



GOVERNMENT OF ANDHRA PRADESH
**STATE BOARD OF TECHNICAL EDUCATION AND
TRAINING**
Andhra Pradesh :: AMARAVATI



Globally Competitive
CURRICULUM (C-20)
For Polytechnic Diploma Courses
in Andhra Pradesh

3½ YEAR (SW)
DIPLOMA IN
CERAMIC TECHNOLOGY





CURRICULUM -2020

(C-20)

3½ YEAR (SW)

DIPLOMA IN CERAMIC TECHNOLOGY

**STATE BOARD OF TECHNICAL EDUCATION AND TRAINING
Andhra Pradesh :: AMARAVATI**

CURRICULUM – 2020

CURRICULUM – 2020
(C-20)

FOR DIPLOMA COURSE IN CERAMIC TECHNOLOGY

PREAMBLE

The proposed programme intends to develop a skilled technician to support the industries both nationally or globally. It also helps to kindle the spirit of entrepreneurship with necessary skills and theoretical inputs aligning with the National policy of 'Make in India'. The programme also provides for accomplishing higher education goals for those who wish to enrich their theoretical concepts further.

The State Board of Technical Education and Training, (SBTET) AP, has been offering Diploma programmes to meet the above said aspirations of the stake holders: industries, students, academia, parents and the society at large. As such, it has been the practice of SBTET, A.P., to keep the curriculum abreast with the advances in technology through systematic and scientific analysis of current curriculum and bring out an updated revised version at regular intervals. Accordingly the SBTET, AP under the aegis of the Department of Technical Education, Andhra Pradesh in its 57th Board Meeting held on 05-02-2019 (vide item no: 18) resolved to update the Polytechnic Curriculum C-16 with the guidance of National Institute of Technical Teachers Training & Research (NITTTR), Extension Centre, Vijayawada (ECV), to be implemented with effect from the academic year '20-21.

Analysis of Curriculum C-16 (SWOT analysis) started in the month of June-2019. Feedback was collected from all stake holders: Students, Lecturers, Senior Lecturers, Head of Sections and Principals for all programmes for this purpose. A series of workshops with subject experts followed in the subsequent weeks and the draft curricula were prepared for every programme. Finally, an interactive session with representatives from industries, academia and subject experts was held on 04.01.2020 for thorough perusal and critique of draft curricula; and the suggestions received thus received from Industrialists and academia have been recorded , validated by another set of experienced subject teachers from the Department of Technical education for incorporation into the Curriculum C-20.

The design of new Curricula for the different diploma programmes has thus been finalised with the active participation of the members of the faculty teaching in the Polytechnics of Andhra Pradesh, and duly reviewed by Expert Committee constituted of academicians and representatives from industries. Thus, the primary objective of the curriculum change is to produce employable technicians in the country by correlating the growing needs of the industries with relevant academic input.

The outcome based approach as given by NBA guidelines has been followed throughout the design of this curriculum is designed to meet the requirements of NBA Accreditation, too.

The revised New Curriculum i.e., Curriculum–2020 (C-20) is approved by BoG of SBTET for its implementation with effect from 2020-21.

Highlights of Curriculum C-20:

1. Duration of course for regular Diploma and for sandwich Diploma is and 3½ years.
2. The Curriculum is prepared in Semester Pattern.
3. One year Industrial training has been introduced in 3½ years Sandwich Diploma course. One year training divided into two industrial spells. Each spell contain 6months period.
4. The policy decisions taken at the State and Central level with regard to environmental science are implemented by including relevant topics in Chemistry. This is also in accordance with the SupremeCourtguidelinesissuedinSriMehta'scase.
5. Keeping in view the increased need of communication skills which is playing a major role in the success of Diploma Level students in the Industries, emphasis is given for learning and acquiring listening, speaking, reading and writing skills in English. Further as emphasized in the meetings, Communication Skills lab and Life Skills lab are continuing for all thebranches.
6. CAD specific to the branch has been given emphasis in the curriculum. Preparing drawings using CAD software has been given moreimportance.
7. Upon reviewing the existing C-16 curriculum, it is found that the theory content is found to have more weightage than the Practical content. In C-20 curriculum, more emphasis is given to the practical content in Laboratories and Workshops, thus strengthening the practical skills.
8. With increased emphasis for the student to acquire Practical skills, the course content in all the subjects is thoroughly reviewed and structured as outcome based than the conventional procedurebased.
9. Curricula of Laboratory have been thoroughly revised based on the suggestions received from the industry and faculty, for better utilization of the equipment available in the Polytechnics. The experiments /exercises that are chosen for the practical sessions are identified to confirm to the field requirements ofindustry.
10. An exclusive section for assessing Higher order Thinking skills (HOTS) has been introduced in summativeevaluation.

Acknowledgements:

It is pertinent to acknowledge the support of the following in the making of Curriculum C-20.

A series of workshops in three phases were conducted by NITTTR, AP Extension Centre, Vijayawada involving faculty from Polytechnics, Premier Engineering Colleges & Industries to analyze the Previous C-16 Curriculum and to design C-20 Curriculum under the guidance of Dr C. R. Nagendra Rao, Professor & Head, NITTTR-ECV. The efforts & support extended by NITTTR to bring out final Curriculum C-20 by incorporating needs, aspiration & expectations of all stake holders is highly appreciated and gratefully acknowledged.

The Members of the working group are grateful to Sri Dr. Pola Bhaskara I.A.S., Commissioner of Technical Education & Chairman of SBTET, AP and Sri M.M. Nayak, I.A.S., former Special Commissioner of Technical Education & Chairman of SBTET, AP. and Smt. G. Jaya Lakshmi, I.A.S., Principal Secretary, Department of Skill Development and Training and Sri. G. AnanthaRamu, I.A.S., former Principal Secretary, Department of Skill Development and Training for their guidance and valuable inputs during process of revising, modifying and updating the Curriculum C-20.

The Members acknowledge with thanks the guidance & inspiration provided by by Sri. K.Vijaya Bhaskar, Secretary, SBTET, Andhra Pradesh and Sri. V.S. Dutt, former Secretary, SBTET, Andhra Pradesh and other officials of Directorate of Technical Education and the State Board of Technical Education, Andhra Pradesh, experts from industry, academia from the universities and higher learning institutions and all teaching fraternity from the Polytechnics who are directly or indirectly involved in preparation of the curricula.

II. RULES AND REGULATIONS FOR CURRICULUM (C-20) FOR 3 ½ YEAR (SW)

DIPLOMA COURSE IN CERAMIC TECHNOLOGY

1.ADMISSION PROCEDURES:

1.1 DURATION OF THE COURSE:

(A). The Diploma course is 3 ½ years Sandwich format.

(B). The duration of the programme is of three and half years (seven semesters), in the standard format for Ceramic technology and Textile Technology. The maximum duration permissible for Ceramic Technology and Textile technology Diploma program is SEVEN semesters.

1.2. PROCEDURE FOR ADMISSION INTO 3 ½ YEAR DIPLOMA COURSES:

Selection of candidates is governed by the Rules and regulations laid down in this regard from time to time.

i) Candidates who wish to seek admission in any of the Diploma courses will have to appear for Common Entrance Test for admissions into Polytechnics (POLYCET) conducted by the State Board of Technical Education and Training, Andhra Pradesh.

Only the candidates satisfying the following requirements will be eligible to appear for the Common Entrance Test for admissions into Polytechnics (POLYCET).

a) The candidates seeking admission should have appeared for X class examination, conducted by the Board of Secondary Examination, Andhra Pradesh or equivalent examination thereto, at the time of making application to the Common Entrance Test for Polytechnics for admissions into Polytechnics (POLYCET). In case of candidates who apply pending results of their qualifying examinations, their selection shall be subject to production of proof of their passing the qualifying examination in one attempt or compartmentally at the time of interview for admission.

b) Admissions are made based on the merit obtained in the Common Entrance Test (POLYCET) and the reservation rules stipulated by the Government of Andhra Pradesh from time to time.

1.3. MEDIUM OF INSTRUCTION:

The medium of instruction and examination shall be ENGLISH.

1.4. PERMANENT IDENTIFICATION NUMBER (PIN):

A cumulative / academic record is to be maintained with the Marks secured in sessional work and end examination of each semester for determining the eligibility for promotion etc., a Permanent

Identification Number (PIN) will be allotted to each candidate so as to facilitate this work and avoid errors in tabulation of results.

1.5. PROCEDURE FOR ADMISSION INTO SANDWICH DIPLOMA COURSES UNDER MULTIPOINT ENTRY AND CREDIT SYSTEM:

Admission into D.Cer.Tech.andD.T.Tech, courses are made as follows under MPEC system:

INTRODUCTION:

The Department of Technical Education has introduced MPEC system coupled with autonomy at the following institutions: -

Government Institute of Ceramic Technology-Gudur and

Government Institute of Textile Technology - Guntur

Vide Commissioner's letter No. H 1 / 23493 / 97 dated 25.7.97, citing G.O.Ms.No.214/ Edn. (TE-1) Dept., dated 05.10.1996.

MPEC Stands for: M-MULTI, P-POINT, E-ENTRY and C-CREDIT System.

Under this MPEC system, a student should be able to enter the institution, at any stage of the Diploma Programme, depending up on the vacancy position and entry qualification at that point of time, in addition to the students admitted through POLYCET in Ist semester.

Once the students are admitted, they can present their higher qualifications, if any, like Intermediate, Diploma, Degree etc. these students are exempted from subjects like English, Mathematics, Physics and Chemistry etc. depending on their entry qualification i.e. 10+2, Diploma or 10+2+3 course subject to the internal assessment done by institute. These students are allowed to take some other courses (subjects), to fulfil the requirement of minimum number of credits, which credits are allotted per semester. Apart from these credits, all students are allowed to take extra credits by registering for more courses (subjects). This way a student can complete the diploma programme well within the standard 3 ½ year duration. This can also be called Multi Point Entry/Exit and Credit System.

CREDITS:

Every course is allotted certain number of credits. The calculation of credits is as follows:

One Theory Period / Week / Semester is equal to 1 Credit.

Two Practical Periods / Week / Semester are equal to 1 Credit.

Three Drawing Periods / Week / Semester are equal to 2 Credits.

Example: If a subject, say Mathematics is allotted Five PERIODS/ WEEK in a semester, that subject is equal to Five (5) credits.

COURSE:

Under this system all subjects are termed as ***courses***. A course here means a subject.

CLASSIFICATION OF COURSES:

All the courses of the Diploma programme are classified in to four categories, namely:

- (i). Foundation Courses,
- (ii). Core Courses,
- (iii). Applied Courses and
- (iv). Diversified/ Advanced Courses.

Everyone must select a minimum number of courses under each head for getting the eligibility for awarding the Diploma. No student is allowed to take a course without studying the pre requisite course. (**Example:** - A student cannot register for Glass Engineering -II without studying the Glass Engineering -I Course).

(I). FOUNDATION COURSES:

Foundation courses are those, which are to be taken by the students who have passed the 10th class. Approximately 20% of the total credit requirement of the Diploma program is to be allotted for these fundamental courses.

(II). CORE COURSES:

These courses are bridge courses between the pure science courses and applied courses. Approximately 30% of the total credit requirement of the Diploma program is to be allotted for these core courses.

(III) APPLIED COURSES:

These are the professional level terminal courses through which the desired knowledge and skills are to be developed in the students to perform his/her job in the chosen field of engineering and technology and hence a maximum of 40% weightage has been given for these applied courses. Registration for Applied courses will be permitted only after satisfying the pre requisite core courses.

(IV). DIVERSIFIED / ADVANCED COURSES:

It is envisaged that the training provided through all the foundation, core and applied courses would provide broad base for performing the job function in the selected discipline. But the purpose of including the diversified courses is to provide an opportunity for some more knowledge in detail in specific areas in related discipline and 10% weightage has been allotted for these courses.

COURSECODES:

All the courses (subjects) are given a **FOUR-DIGIT** code. The **FIRST DIGIT** will indicate the **SEMESTER**, (In which the subject is taught), the **SECOND DIGIT** will indicate the **CLASSIFICATION OF COURSE** and the **LAST TWO DIGITS** will indicate the **SERIAL NUMBER** in their respective courses. The four categories of courses are given a series number, as follows:

<u>COURSE VARIETY</u>	<u>SERIES</u>
Foundation Courses	1
Core Courses	2
Applied Courses	3
Diversified Courses	4

The programme name/code will be appended before the four - digit code if necessary

EXPLANATION:

Cer-4311, the course offered in Ceramic Technology programme is as fourth (4) semester course, of Applied in nature (3), with serial Eleven (11), in Applied courses i.e. Cement Technology.

1.6. PROGRAMME OFFERD:

The programme offered are of sandwich pattern. The details are as follows: -

<i>PROGRAMME NAME</i>	<i>NAME OF THE INSTITUTION</i>
1. Diploma in Ceramic Technology	Govt. Institute of Ceramic Technology, Gudur.
2. Diploma in Textile Technology	Govt. Institute of Textile Technology, Guntur.

1.7. COURSES OFFERED:

See the detailed lists of courses (subjects) offered under various categories, in each Diploma Programme.

1.8. NUMBER OF WORKING DAYS PER SEMESTER:

- a). The Academic year for all the Courses usually shall be as given by Commissioner of T.E and it is same as that of polytechnics
- b). The Working days in a week shall be from Monday to Saturday
- c). There shall be 7 periods of 50 minutes duration on all working days.
- d). The minimum number of working days for each semester shall be 90 days excluding examination days. If this prescribed minimum is not achieved due to any reason, special arrangements shall be made to conduct classes to cover the syllabus.

1.9. REQUIRED CREDITS:

A student has to secure the following minimum credits to get eligibility for the award of Diploma in Ceramic Technology programme.

1. Diploma in Ceramic Technology - - - 221.5 Credits out of 245 credits offered.

1.10. CREDITS GAINED THROUGH EXEMPTIONS IF CANDIDATES ALREADY STUDIED THESE SUBJECTS:

An Intermediate candidate who has passed **Two-year Intermediate** course with Maths, Physics and Chemistry as his/her optional subjects and degree, diploma holders gain credit (through exemption) all courses for which the student is eligible if course syllabus is equivalent to diploma course syllabus.

In case of vocational Intermediate, relevant credits will be given extra to regular intermediate candidates. (Ex: Engineering Drawing)

In case of Employees working in a Ceramic Industry not less than supervisor position with Degree qualification of minimum on year are eligible for exemption of the following:

Industrial Training V semester	25
<u>Industrial Training VI semester</u>	<u>25</u>
<u>Total</u>	<u>50</u>

Special Note:

A candidate can gain credit on all counts, for which the student is eligible.

Example:

A B.Sc. (MPC) candidate working in an industry can gain credits based on +2, degree and industrial experience are $32 + 7 + 50 = 89$ credits.

This will help the students as shown below.

An Intermediate student can acquire the required number of credits, well within 2 ½ years.

A degree, diploma holder can do the same in two and half years.

A degree holder etc. with industrial experience can achieve the same in less than two years.

Important:

Credits gained through exemptions will not be taken in to consideration for the calculation of CMA and award of class.

1.11. ELIGIBILITY OF ATTENDANCE TO APPEAR FOR THE END EXAMINATION

- a). A candidate shall be permitted to appear for the end examination, if he or she has attended a minimum of 75% of working days during the Semester.
- b). Shortage of attendance in aggregate upto 10% (65% & above and below 75%) in each semester may be condoned on medical grounds, which is left to the discretion of the Principal on payment of stipulated fee towards condoning shortage of attendance before commencement of examinations.
- c). Candidates having less than 65% attendance must be detained.
- d). Students whose shortage of attendance is not condoned in any semester, they are not eligible to take their end examination of that semester/class. They may seek re-admission for that semester when offered next.

1.12. READMISSION

Readmission shall be granted to eligible candidates by the respective Principal.

- (a) within 15 days after commencement of class work in any semester
- (b) Otherwise such cases shall not be considered for readmission for that semester / year and are advised to seek readmission in the next subsequent eligible academic year.
- (c) The percentage of attendance of the readmitted candidates shall be calculated from the first day of beginning of the regular class work for that Semester, as officially announced by SBTET/Principal but not from the day on which he/she has actually reported to the class work, after readmission is granted.

(d) Permission for Second time readmission to same class should be given by RJD, S.V Region

2. EXAMINATION REGISTRATION:

At the time of reporting to the semester the student need to register for the courses (Subjects) they are undertaking to study by applying in the prescribed Proforma. No separate application is needed for the end examination for the Regular candidates. Backlog candidates should register for the examination within two weeks of declaration of notification. Fee once paid, will not be returned or adjusted against for future examinations. The fee paid will be forfeited, if the candidate fails to appear for the examination/ detained. The registration fee will be increased from time to time for each batch of admitted candidates.

EXPLANATION:

Once a student reports to the institution, every student is assigned to a guide. In consultation with the guide, the student chooses his/her courses (subjects) after claiming exemptions if any. Once the courses are finalized, the student registers for the selected courses by paying the registration fee which is prescribed by institute (@ **Rs. 25/- per credit**). Any student can change his option once, within seven days, by paying an amount of Rs 100.00 as withdrawal fee. This change is allowed only once in a semester. Every Student shall register for the number of credits prescribed for each semester applicable to that particular programme. However, student can register more number of credits at his/her desire within the violation of rules.

1.The fee paid for course with drawn can be adjusted if any alternate course is taken, but it will not be refunded under any circumstances.

2. The withdrawal should not violate the norms of Credit system.

2.1. EXAMINATION FEE STRUCTURE:

For the regular candidates the examination fee is the registration fee collected at the time of registration itself.

Back log/ Supplementary Students need to pay examination fee along with the submission of application form for the examination. The examination fee for Backlog/ supplementary candidates is Rs550/- amount prescribed by Institute, irrespective of number of subjects applied. Backlog/ Supplementary candidates should register for the examination within 15 days of declaration of notification.

EXPLANATION:

Every student must apply, in the prescribed application form at the time of registration/applying for supplementary examination itself.

The application form will be made available at the institution, for a cost of Rs.10.00 per copy and Rs.25 for Mark list.

Examination fee once paid is not refundable under any circumstances.

3. SCHEME OF EXAMINATION:

3.1 (a) I, II, III, IV and VII semesters

(i) THEORY Subject carries 80% marks with end examination of 3 hours duration, 20% marks for internal evaluation. (Sessional marks). However, there are no minimum marks prescribed for sessional/ intervals.

(ii) PRACTICAL EXAMINATION: There shall be 40% Marks for regular practical work done, i.e. Sessional marks for each practical subject with an end examination of 3 hours duration carrying 60% marks. However, there are no minimum marks prescribed for Sessional.

(b) V, VI semesters (Industrial Training)

The training assessment shall be done and marks will be awarded in the following manner.

Industrial assessment	:	240 marks (in two spells of 120 marks each)
Maintenance of log book/Diary	:	30 marks
Project report	:	20 marks
Seminar / viva-voce	:	10 marks

TOTAL	:	300 marks

The assessment at the institute level (Seminar/ Viva-voce) shall be done by three members, viz., Internal Faculty member, External Examiner and H.O.D. and will be averaged.

3.2. INTERNAL ASSESSMENT SCHEME

- a) **Theory Courses:** Internal assessment shall be conducted for awarding Sessional marks on the dates specified. **Two unit tests shall be conducted for all semesters.**

Internal Assessment shall be of 90 minutes duration and for a maximum of 40 marks for each test

The average of marks of all the test, reduced to 20 shall be taken as final Sessional in any case.

b) Practical Courses:

(i) Drawing Courses:

The award of Sessional marks for internal Assessment shall be as given in the following table

Distribution of Marks for the Internal Assessment Marks	
Semesters (Total:40 Marks)	
Max:20 Marks	Max:20 Marks
From the Average of TWO Unit Tests.	From the Average of Assessment of Regular Class work Exercises.

- **For the semester drawing examinations, Two Unit tests shall be conducted as per the Board End Examination Question Paper Pattern.**
- **All Drawing exercises are to be filed in serial order and secured for further scrutiny by a competent authority**

(ii) Laboratory Courses:

Student's performance in Laboratories / Workshop shall be assessed during the semester of study for 40 marks in each practical Course.

Evaluation for Laboratory Courses, other than Drawing courses:

- i. Instruction (teaching) in laboratory courses (except for the course on Drawing) here after shall be task/competency based as delineated in the Laboratory sheets, prepared by SBTET, AP & NITTTR- ECV and posted in SBTET website.
- ii. Internal assessment for Laboratory shall be done on the basis of task/s performed by the student as delineated in the laboratory sheets, prepared by SBTET, AP & NITTTR- ECV and posted in AP, SBTET website.

- iii. Question paper for End semester Evaluation shall also be task/s based and shall be prepared and distributed by SBTET as done in case of theory courses be prepared as per SBTET rules in vogue.
- c) Internal assessment in Labs / workshops / Survey field work etc., during the course of study shall be done and sessional marks shall be awarded by the concerned Teacher.
- d) For practical examinations, except in drawing, there shall be two examiners. External examiner shall be appointed by the Principal in consultation with respective Head of Section preferably choosing a qualified person from in the order of preference.

i) Nearby Industry

ii) Govt / Semi Govt organization like R & B, PWD, PR, Railways, BSNL, APSRTC, APSEB etc.,

iii) Govt / University Engg College.

iv) HoDs from Govt. Polytechnic

Internal examiner shall be the person concerned with internal assessment as in (c) above. The end examination shall be held along with all theory papers in respect of drawing.

- e) Question Paper for Practicals: Question paper should cover (the experiments / exercise prescribed to test various) skills like handling, manipulating, testing, trouble shooting, repair, assembling and dismantling etc., from more than one experiment / exercise
- f) Records pertaining to internal assessment marks of both theory and practical Courses are to be maintained for official inspection.
- g) **In case of Diploma programs *having* Industrial Training, Internal Assessment and Summative Evaluation**, shall be done as illustrated in the following table:

Assessment no	Upon completion of	By	Based on	Max Marks
1	12 weeks	1.The faculty concerned (Guide) and 2. Training in charge (Mentor) of the industry	Learning outcomes as given in the scheme of assessment ,for Industrial Training	120
2	22 weeks			120
3.Final summative Evaluation	24 week	1.The faculty member	1.Demonstration of any one of the skills listed in learning	30

		concerned, 2.HoD concerned and 3.An external examiner	outcomes	
			2.Training Report	20
			3.Viva Voce	10
TOTAL				300

h) Each staff member including Head of Section shall be assigned a batch of students 10 to 15 for making assessment during industrial training.

3.3 MINIMUM PASS MARKS

(a) THEORY EXAMINATION:

For passing a theory subject, a candidate has to secure a minimum of 35% i.e 28 for 80 in end examination and a combined minimum of 35% of both Sessional and end examination marks put together.

(b) PRACTICAL EXAMINATION:

For passing Practical subjects including Drawing Subject , a candidate has to secure, a minimum of 50% i.e30 for 60 in the end examination and a combined minimum of 50% of both sessional and practical examination marks put together.

(c) INDUSTRIAL TRAINING:

The pass marks for industrial training in each semester 50% i.e 150 for 300marks (i.e 50% i.e 120/240 in industrial assessment and 50% i.e30/60 in Institute assessment).

3.4. PROVISION FOR IMPROVEMENT:

1. Improvement is allowed only after he/she has completed all the subjects from First semester to Final semester of the course.
2. Improvement is allowed in any 4 (FOUR) subjects of the diploma.
3. The student can avail the improvement chance only once, that to within the succeeding two examinations after the completion of the diploma.
4. No improvement is allowed in practical/lab subjects or projects work or Industrial training assessment. However, improvement is allowed in drawing subjects.
5. If improvement is not achieved, the marks obtained in previous examinations holds good.
6. Improvement is not allowed in respect to the candidate who are punished under malpractices in any examinations.
7. Examination fee for improvement shall be paid as per the notification issued by Institute from time to time.

8. All the candidates who wish to appear for improvement of performance shall deposit the original marks Memo's of all the years/semesters and also original diploma certificate to the board/ Institute. if there is a improvement in performance of the current examination, the revised memorandum of marks and original diploma certificate will be issued or else the originals will be returned.

4. RULES OF PROMOTION FROM 1st, 2nd, 3rd, 4th, 5th, 6th and 7th SEMESTERS / APPEAR EXAMINATIONS:

1. A candidate shall be permitted to appear for 1st semester examination provided he / she puts in 75% attendance, which can be condoned on Medical grounds for students having 65% and above as detailed in point 1.11b and also register for 1st semester courses.
2. A Candidate who is eligible for appearing 1st semester examinations, will be promoted to 2nd semester whether he attends or not for 1st semester examinations.
Candidates are permitted to attend 2nd semester classes if they registers for 2nd semester courses.

A candidate shall be permitted to appear for 2nd semester examination provided he / she puts in 75% attendance, which can be condoned on Medical grounds for students having 65% and above as detailed in point 1.11b.

3. A Candidate who is eligible for appearing 2nd semester examinations, will be promoted to 3rd semester whether he attends or not for 1st and 2nd semester examinations.
Candidates are permitted to attend 3rd semester classes if they registers for 3rd semester courses.

A candidate shall be permitted to appear 3rd semester examination if he/she puts in 75% attendance, which can be condoned on Medical grounds for students having 65% above as detailed in point 1.11b.

4. A Candidate who is eligible for appearing 3rd semester examinations, will be promoted to 4th semester whether he attends or not for 3rd semester examinations if he registered for 4th semester courses.

A candidate is permitted to appear for the 4th semester exam if he/she

- i) puts in 75% attendance, which can be condoned on Medical grounds for students having 65% and above as detailed in point 1.11b.
 - ii) Should not have failed in more than **EIGHT subjects of 1st and 2nd semester put together.**
5. A candidate shall be promoted to 5th semester provided he / she puts the required percentage of attendance in the 4th semester and pays the Registration/examination fee. Candidates, who are not eligible to write 4th semester examinations, has to pay the promotion fee as prescribed by State Board of Technical Education and Training/ Institute from time to time before commencement of 5th semester.

For attending training they shall pay prescribed registration fee for both 5th and 6th semesters.

Students who are eligible to appear for 4th semester who puts up 90% attendance in Industrial training are only eligible for presenting the final seminar for successful completion of Industrial training in both 5th and 6th semesters.

6. Promotion from 5th to 6th semester is automatic (i.e., from 1st spell of Industrial Training to 2nd spell).
7. A candidate shall be promoted to 7th semester if he/ she has successfully completed Vand VI semesters.

Candidates are permitted to attend 7th semester classes if they registers for 7th semester courses.

A candidate is eligible to appear for 7th semester examination if he/she

- i) Puts in 75% attendance which can be condoned on Medical grounds for students having 65% and above as detailed in point 1.11b.
- ii) Should get eligibility to appear for 4th semester examinations.

OTHER DETIALS:

- (a). In case a candidate does not successfully complete the industrial training, he/she will have to repeat the training at his/her own cost till he completes successfully.
- (b). The 1st spell of industrial training shall commence after the completion of the 4th semester examinations.
- (c). The 2nd spell of industrial training shall commence within one week after the completion of 1st spell of Industrial training.

5. STUDENTS PERFORMANCE EVALUATION:

5.1 ISSUE OF DIPLOMA:

At the end of completion of the program by the student, the entire scholastic record duly counter signed by the Chairman of the academic committee as well as the Controller of the examinations must be submitted to the S.B.T.E.T., A P for the issue of 3-1/2 Year Diploma . A sum of Rs 600 /- or the amount prescribed by SBTET, A.P., will be collected from each candidate who is registering for VII semester apart from the registration fee and the same shall be remitted to SBTET account for the issue of 3-1/2 Year Diploma Certificate.

5.2 AWARD OF DIPLOMA

A student will be declared to have passed the diploma programme if the student earns the required number of credits for respective programme.

For declaration of class/grade for passed candidates the CMA (Cumulative Marks average) will be calculated as follows.

$$\Sigma (\text{Total Marks obtained X Credits of the course})$$

$$\text{CMA} = \frac{\text{-----}}{\Sigma \text{ Credits of the courses}}$$

CMA is \geq 75% and has passed the <i>Core, Applied and Diversified</i> Courses in First attempt and passed foundation courses in 3 ½ years and four subsequent examinations (i.e. after final semester regular examination, from the year of first admission).	FIRST CLASS WITH DISTINCTION
CMA is \geq 60% and have passed the <i>Core, Applied and Diversified</i> courses and passed foundation courses in 3 ½ years and four subsequent examinations (i.e. after final semester regular examination, from the year of first admission).	FIRST CLASS
For all other qualified candidates.	SECOND CLASS

NOTE: -1. The marks obtained in ***CORE, APPLIED and DIVERSIFIED*** courses only are

taken in to consideration for the class award calculation.

2. Second Class shall be awarded to all the students, who fail to complete the Diploma in 5 ½ years.

5.3 STRUCTURE OF END EXAMINATION QUESTION PAPER:

The question paper for theory examination is patterned in such a manner that the Weightage of periods/marks allotted for each of the topics for a particular subject be considered. Examination is for 3hour's duration.

- a) Each theory paper consists of PART 'A' and PART 'B' and PART 'C'. PART 'A' contains 10 short answer questions. All questions are to be answered and each question carries 3 marks.

Max. Marks: $10 \times 3 = 30$.

PART B contains 5 essay type questions with internal choice in each question, 5 questions are to be answered each question carries 8 marks.

Max.Marks: $5 \times 8 = 40$.

PART C contains 1 essay type question for 10 marks, which is to be answered compulsorily,

Total Maximum Marks: PART A + PART B + PART C put together 80.

- b) Engineering Drawing Subject (1107 & 2114) consist of PART 'A' and PART 'B'. PART 'A' contains four (4) questions.

All questions in PART 'A' are to be answered and each carries 5 marks. Max. Marks: $4 \times 5 = 20$.

PART 'B' contains six (6) questions. Out of which four (4) questions are to be answered and each question carries 10 Marks.

Max. Marks $4 \times 10 = 40$.

Total Maximum Marks: PART A +PART B put together 60.

- c) Practical Examinations

For Workshop practice and Laboratory Examinations,

Each student has to pick up a question paper distributed by Lottery System.

Max. Marks for an experiment / exercise : 50%

Max. Marks for VIVA-VOCE : 10%

Total : 60% (of total marks for the subject)

In case of practical examinations with 50 marks, the marks will be worked out basing on the above ratio.

In case of any change in the pattern of question paper, the same shall be informed sufficiently in advance to the candidates.

5.4. MARK SHEET:

At the end of every semester, a marks sheet shall be issued to the student. The fee for marks sheet is Rs. 25.00.

5.5. MAXIMUM PERIOD FOR COMPLETION OF DIPLOMA COURSES:

Maximum period for completion of the Course is Twice (i.e 7 years) the Duration of the course is considered from the date of first admission (includes period of detention and discontinuation of studies by student etc...). Failing, which they will have to forfeit the claim for appearing examination for award of diploma. (They will not be permitted to appear for examinations after that date). These rules applies for all diploma courses.

5.6. ELIGIBILITY FOR AWARD OF DIPLOMA

A candidate is eligible for award of Diploma Certificate if he / she fulfils the following academic regulations.

- i. He / She pursued the course of study for not more than 7 academic years.
- ii. He / she has completed all the subjects and gained 221.5 credits

Students who fail to fulfill all the academic requirements for the award of the Diploma within 7 academic years from the year of admission shall forfeit their seat in the course & their seat shall stand cancelled.

5.7. RECOUNTING:

1. The verification and totaling will be done by HOD of the Institute and will be intimated to the candidate by post only on request of student by paying prescribed fee within 10days of declaration of results.

2. The following documents should be invariably be enclosed with the application, failing which the application will not be considered.

- i). Marks secured as per tabulated marks sheet certified by the principal.
- ii). Self addressed stamped envelope of 11x5 inch size.
- iii). Demand daft towards payment of fees, as stated by SBTET/Institute, Andhra Pradesh.

(Applicable to all the theory subjects only including Engg Drawing subject)

The application received after the prescribed date will not be accepted and any correspondence in this regard will not be entertained

5.8. MALPRACTICE CASES:

If any candidate resorts to any malpractice during examinations, he/she shall be booked and the punishment will be awarded for those who are involved in malpractice cases as per rules and regulations framed by SBTET from time to time.

5.9. DISCREPANCIES/PLEAS:

Any discrepancy/pleas regarding results etc., shall be represented to *the chairman of the examination committee* within six months from the date of issue of results. Thereafter, no such cases will be entertained in any manner.

6. ISSUE OF CERTIFICATES AND VETO

6.1. ISSUE OF DUPLICATE DIPLOMA

If a candidate loses his/her original Diploma Certificate and request for a duplicate, he/she should produce written evidence. He / she may obtain a duplicate from the Secretary, State Board of Technical Education and Training, Andhra Pradesh on payment of prescribed fee and on production of an affidavit signed before a First Class Magistrate (Judicial) and *non-traceable certificate* from the Department of Police. The candidate seeking Duplicate Diploma should send his application through Principal of the concerned institute. In case of damage of original Diploma Certificate, he / she may obtain a duplicate certificate by surrendering the original damaged certificate on payment of prescribed fee to the State Board of Technical Education and Training.

Payment of fee for Duplicate Diploma can be made through ONLINE through the website 'apsbtet.net/online_services'

In case the candidate cannot collect the original Diploma within 1 year from the date of issue of the certificate, the candidate has to pay the penalty prescribed by the SBTET/ Institute from time to time.

6.2. ISSUE OF MIGRATION CERTIFICATE AND TRANSCRIPTS:

The Board on payment of prescribed fee will be issued these certificates for the candidates who intend to go for Higher Studies.

Payment of fee for Migration Certificate and Transcripts can be made through ONLINE through the website 'apsbtet.net/online_services'

6.3GENERAL

In case of any ambiguity in the interpretation of the above rules, the decision of the Chairman of the examination committee is final.

-oOo-

ANNEXURE OF COURSES OFFERED

FOUNDATION COURSES

Course Code	Course Name	Theory	Practical	Drawing	Credits
CER-1101	English -I	03	--	--	03
CER-1102	Engineering Mathematics-I	05	--	--	05
CER-1103	Engineering Physics-I	04	--	--	04
CER-1104	Engineering Chemistry-I& environmental studies	04	--	--	04
CER-1105	Physics Laboratory -I	--	1 ½	--	0.75
CER-1106	Chemistry Laboratory-I	--	1 ½	---	0.75
CER-1107	Engineering Drawing-I	--	--	06	04
CER-2108	English -II	03	--	--	03
CER-2109	Engineering Mathematics-II	05	--	--	05
CER-2110	Engineering Physics-II	04	--	--	04
CER-2111	Engineering Chemistry-II & Environmental Studies	04	--	--	04
CER-2112	Physics Laboratory -II	--	1 ½	--	0.75
CER-2113	Chemistry Laboratory-II	--	1 ½	--	0.75
CER-2114	Engineering Drawing-II	--	--	07	4.5
CER-3115	Engineering Mathematics-III	04	--	--	04
CER-4116	Engineering Mathematics-IV	03	--	--	03
	TOTAL	39	06	13	50.5

CORE COURSES

Course Code	Course Name	Theory	Practical	Credits
CER-1201	Elements of Ceramic Technology – I	04	--	04
CER-1202	Ceramic Raw Materials	05	--	05
CER-1203	Computer Fundamental Laboratory-I	--	04	02
CER-2204	Elements of Ceramic Technology – II	05	--	05
CER-2205	General Engineering	06	--	06
CER-2206	Computer Fundamental Laboratory-II	--	05	2.5
CER-3207	Fuels & Furnace Technology	04	--	04
CER-3208	Ceramic Tests & Quality Control	05	--	05
CER-3209	Communication Skills	--	03	1.5
CER-4210	Ceramic Calculations	05	--	05
CER-4211	Life Skills	--	03	1.5
CER-7212	Industrial Management and Entrepreneurship & Smart Technology	05	--	05
CER-7213	C Language	05	--	05
CER-7214	Ceramic Science	05	--	05
CER-7215	C Language Lab	--	06	03
CER-7216	Computer Applications practice in Ceramic Industry	---	05	2.5
CER-0217	Furnace Engineering	06	--	06
CER-0218	Entrepreneurship in Ceramic industry	06	--	06
CER-0219	Equipment Drawing	--	03	1.5
	TOTAL	61	29	75.5

APPLIED COURSES

Course Code	Course Name	Theory	Practical	Credits
CER-1301	Fundamental Properties of Ceramics Lab	--	04	02
CER-3302	Glass Engineering – I	05	--	05
CER-3303	Whiteware& Heavy Clay Ware-I	05	--	05
CER-3304	Refractories-I	04	--	04
CER-3305	Glass Engineering – I Lab	--	04	02
CER-3306	Whiteware& Heavy Clay Ware-I Lab	--	04	02
CER-3307	Refractories Lab	--	04	02
CER-4308	Glass Engineering – II	04	--	04
CER-4309	Whiteware& Heavy Clay Ware-II	05	--	05
CER-4310	Refractories-II	04	--	04
CER-4311	Cement Technology	04		04
CER-4312	Cement Technology Lab	--	04	02
CER-4313	Glass Engineering – II Lab	--	05	2.5
CER-4314	Whiteware& Heavy Clay Ware-II Lab	--	05	2.5
CER-5315	Industrial Training-I (Spell-I)	--	6 months Trg	25
CER-6316	Industrial Training-II (Spell-II)	--	6 months Trg	25
	TOTAL	31	30+ 12 months Trg	96

DIVERSIFIED COURSES

Course Code	Course Name	Theory	Practical	Credits
CER-7401	Advanced Ceramics	05	--	05
CER-7402	Special Glasses and Enamels	05	--	05
CER-7403	Glaze Technology Lab	--	03	1 ½
CER-7404	Enamels Lab	--	03	1 ½
CER- 0404	Safety in Ceramic Industry	05	--	05
CER-0405	Nuclear & Space Ceramics	05		05
	TOTAL	20	06	23

SUMMARY OF COURSE WEIGHTAGES

Course Category	Credits		Total Credits	Percentage
	Theory	Practical		
Foundation Courses	39	12.5	51.5	20.94
Core Courses	61	14.5	75.5	30.69
Applied Courses	31	65	96	39.02
Diversified Courses	20	3	23	9.35
Total	150	95	246	100.00

DIPLOMA IN CERAMIC TECHNOLOGY

3 ½ YEAR SANDWICH COURSE

SCHEME AT A GLANCE

SEMESTER	PERIOD/WEEK			TOTAL MARKS		
	Theory	Practical	Total	Theory	Practical	Total
FIRST	25	17	42	600	400	1000
SECOND	27	15	42	600	300	900
THIRD	27	15	42	600	400	1000
FOURTH	25	17	42	600	400	1000
FIFTH	INDUSTRIAL TRIANING-SIXMONTHS					300
SIXTH	INDUSTRIAL TRIANING-SIX MONTHS					300
SEVENTH	25	17	42	500	400	900
	GRAND TOTAL					5400

TOTAL NUMBER OF CREDITS TO BE ACQUIRED FOR A DIPLOMA.

SEMESTER - WISE - CREDITS

I. SEMESTER	34.5
II. SEMESTER	35.5
III. SEMESTER	34.5
IV. SEMESTER	33.5
V. SEMESTER	25.0
VI. SEMESTER	25.0
VII. SEMESTER	33.5
TOTAL	221.5

As and when the student acquires the required number of credits i.e.221.5 credits, the student is eligible for the award of diploma. Those students who has completed Intermediate MPC or B.Sc (MPC) need not study for the period of 3 ½ years, but is allowed to study at a rapid rate to acquire the required 221.5 credits, by opting for extra credits in each semester under MPEC system.

Extra Courses offered in lieu of Regular Courses Beyond the Standard Format.

Course Code	Course Name	Number of periods		Credits
		Theory	Practical	
CER-0217	Furnace Engineering	06	--	06
CER-0218	Entrepreneurship in Ceramic Industry	06	--	06
CER-0219	Equipment Drawing		03	1.5
CER-0404	Safety in Ceramic Industry	05	--	05
CER-0405	Nuclear & Space Ceramics	05	--	05

Depending on the demand, some more courses also may be added, in future.

C-20 CURRICULUM

VISION

To impart technical knowledge in various fields of Ceramic technology to the students and improve opportunities in employment and higher learning

MISSION

M1	To impart quality technical education that will produce globally competitive technologists.
M2	To inculcate entrepreneurial skill and leadership quality amongst potential students.
M3	Modernization of Laboratories as per the Curriculum specified by the SBTET AP and conducting industrial training for better understanding of critical concepts
M4	Provide opportunities for developing multidisciplinary skills, communication skills, professional attitude and ethics.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1	Apply fundamental knowledge of mathematics, Basic sciences to solve day to day challenges in the field of Ceramic Technology
PEO2	To enhance entrepreneurial, communication and other soft skills, which will enable them to work globally as leaders, team members and contribute to nation building for the betterment of the society.
PEO3	Applications of the principles, concepts and techniques in ceramic technology area to solve contemporary issues and gain hands on experience.
PEO4	To make them strongly committed to the highest levels of professional ethics and focus on ensuring quality, adherence to public policy and law, safety, reliability and environmental sustainability in all their professional activities

PROGRAMME OUTCOMES (POs)

PO1	Basic and Discipline Specific Knowledge: To apply knowledge of mathematics, science and engineering fundamentals and engineering specialization to Engineering Problems.
PO2	Problem Analysis: Identify and analyse well-defined engineering problems using codified standard methods mechanical engineering problems for meaningful solutions
PO3	Design/Development of Solutions: Design solutions for well defined technical problems and assist with the design of systems components or processes to meet specific needs.
PO4	Engineering tools, Experimentation and Testing: Apply modern engineering tools and appropriate techniques to conduct standard tests and measurements.
PO5	Engineering Practices for Society, Sustainability and Environment: Apply appropriate technology in context of society, sustainability, environment and ethical practices.
PO6	Project Management: Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well defined engineering activities.
PO7	Life-long Learning: Ability to analyse individual needs and engaging updating in the context of technological changes.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1	An ability to understand the basic concepts of and to apply them to various areas of Ceramic Technology like manufacturing of tiles, glass, refractories, glass fiber, sanitaryware, managerial skills and the use of SMART Technologies
PSO2	Ability to supervise production process, solving the problems, New product development, cost estimation, quality improvement techniques
PSO3	Wisdom of social and environmental awareness along with ethical responsibility to have a successful career and to sustain passion and zeal in the field of Ceramic Technology for real-world applications in the field of ceramics using optimal resources as an Entrepreneur.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING
ANDHRA PRADESH
DIPLOMA IN CERAMIC TECHNOLOGY
3 ½ YEAR SANDWICH COURSE (UNDER MPEC SYSTEM)
FIRST SEMESTER

Subject	Name of the Subject	Instruction Periods/Week		Total Periods / Semester	Duration (hrs)	Scheme of Examinations			
		Theory	Practicals			Sessional Marks	End Exam Marks	Total Marks	Credits
THEORY SUBJECTS									
CER-1101	English -I	3	-	45	3	20	80	100	3
CER-1102	Engineering Mathematics – I	5	-	75	3	20	80	100	5
CER-1103	Engineering Physics-I	4	-	60	3	20	80	100	4
CER-1104	Engineering Chemistry & Environmental Studies -I	4	-	60	3	20	80	100	4
CER-1201	Elements of Ceramic Technology -I	4	-	60	3	20	80	100	4
CER-1202	Ceramic Raw Materials	5		75	3	20	80	100	5
PRACTICAL SUBJECTS									
CER-1105	Physics Laboratory-I	-	1 ½	22 ½	3	20	30	50	0.75
CER-1106	Chemistry Laboratory-I	-	1 ½	22 ½	3	20	30	50	0.75
CER-1107	Engineering Drawing-I	-	06	90	3	40	60	100	4
CER-1203	Computer Fundamentals Lab practice- I	-	04	60	3	40	60	100	2
CER-1301	Fundamental Properties of Ceramics Lab	-	04	60	3	40	60	100	2
	Total	25	17	630	-	280	720	1000	34.5

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING
ANDHRA PRADESH
DIPLOMA IN CERAMIC TECHNOLOGY
3 ½ YEAR SANDWICH COURSE (UNDER MPEC SYSTEM)**

SECOND SEMESTER

Subject	Name of the Subject	Instruction Periods/Week		Total Periods/Semester	Scheme Of Examinations				
		Theory	Practical		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks	Credits
THEORY SUBJECTS									
CER-2108	English -II	03	-	45	3	20	80	100	3
CER-2109	Engineering Mathematics – II	05	-	75	3	20	80	100	5
CER-2110	Engineering Physics -II	04	-	60	3	20	80	100	4
CER-2111	Engineering Chemistry & Environmental Studies -II	04	-	60	3	20	80	100	4
CER-2204	Elements of Ceramic Technology -II	05	-	75	3	20	80	100	5
CER-2205	General Engineering	06	-	90	3	20	80	100	6
PRACTICAL SUBJECTS									
CER-2112	Physics Laboratory-II	-	1 ½	22 ½	1 ½	20	30	50	0.75
CER-2113	Chemistry Laboratory-II	-	1 ½	22 ½	1 ½	20	30	50	0.75
CER-2114	Engineering Drawing-II	-	07	105	3	40	60	100	4.5
CER-2206	Computer Fundamental Lab practice- II	-	05	75	3	40	60	100	2.5
	Total	27	15	630	-	240	660	900	35.5

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING
ANDHRA PRADESH
DIPLOMA IN CERAMIC TECHNOLOGY
3 ½ YEAR SANDWICH COURSE
(MPEC SYSTEM)**

THIRD SEMESTER

Subject Code	Name of the Subject	Instruction Periods/Week		Total Periods/ Semester	Scheme of Examination				
		Theory	Practical		Duration (Hrs)	Sessional Marks	End Exam Marks	Total Marks	Credits
THEORY SUBJECTS									
CER-3115	Engineering Mathematics – III	4	--	60	3	20	80	100	4
CER-3207	Fuels and Furnace Technology	4	--	60	3	20	80	100	4
CER-3208	Ceramic Tests & Quality Control	5	--	75	3	20	80	100	5
CER-3302	Glass Engineering - I	5	--	75	3	20	80	100	5
CER-3303	White ware & Heavy Clay Ware-I	5	--	75	3	20	80	100	5
CER-3304	Refractories-I	4	--	60	3	20	80	100	4
PRACTICAL SUBJECTS									
CER-3209	Communication Skills	--	3	45	3	40	60	100	1.5
CER-3305	Glass Engineering-I Lab	--	4	60	3	40	60	100	2
CER-3306	White ware & Heavy Clay Ware-I Lab	--	4	60	3	40	60	100	2
CER-3307	Refractories Lab	--	4	60	3	40	60	100	2
TOTAL		27	15	630	-	280	720	1000	34.5

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING
ANDHRA PRADESH
DIPLOMA IN CERAMIC TECHNOLOGY
3 ½ YEAR SANDWICH COURSE
(MPEC SYSTEM)**

FOURTH SEMESTER

Subject Code	Name of the Subject	Instruction Periods/Week		Total Periods/ Semester	Scheme of Examination				
		Theory	Practical		Duration	Sessional	End Exam	Total	Credits
				(Hrs)	Marks	Marks	Marks		
THEORY SUBJECTS									
CER-4116	Engineering Mathematics-IV	3	--	45	3	20	80	100	3
CER-4210	Ceramic Calculations	5	--	75	3	20	80	100	5
CER-4308	Glass Engineering - II	4	--	60	3	20	80	100	4
CER-4309	White Ware & Heavy Ware-II	5	--	75	3	20	80	100	5
CER-4310	Refractories-II	4	--	60	3	20	80	100	4
CER-4311	Cement Technology	4	--	60	3	20	80	100	4
PRACTICAL SUBJECTS									
CER-4211	Life Skills lab practice	--	3	45	3	40	60	100	1.5
CER-4312	Cement Technology Lab	--	4	60	3	40	60	100	2
CER-4313	Glass Engineering – II Lab	--	5	75	3	40	60	100	2.5
CER-4314	White Ware & Heavy Clay Ware-II Lab	--	5	75	3	40	60	100	2.5
	TOTAL	25	17	630	-	280	720	1000	33.5

STATE BOARD OF TECHNICAL EDUCATION & TRAINING

ANDHRA PRADESH

DIPLOMA IN CERAMIC TECHNOLOGY

3 ½ YEAR SANDWICH COURSE

(MPEC SYSTEM)

FIFTH SEMESTER

SUBJECT CODE: 5315

SUBJECT NAME: INDUSTRIAL TRAINING

Marks Awarded by the Industry	Viva-Voce /Seminar Marks	Demonstration of any one of skill listed in learning outcomes	Training Report	Total Marks	No. of Credits
240	10	30	20	300	25

STATE BOARD OF TECHNICAL EDUCATION & TRAINING

ANDHRA PRADESH

DIPLOMA IN CERAMIC TECHNOLOGY

3 ½ YEAR SANDWICH COURSE

(MPEC SYSTEM)

SIXTH SEMESTER

SUBJECT CODE: 6316

SUBJECT NAME: INDUSTRIAL TRAINING

Marks Awarded by the Industry	Viva-Voce	Demonstration of any one of skill listed in learning outcomes	Training Report	Total Marks	No. of Credits
240	10	30	20	300	25

STATE BOARD OF TECHNICAL EDUCATION & TRAINING

ANDHRA PRADESH

DIPLOMA IN CERAMIC TECHNOLOGY

3 ½ YEAR SANDWICH COURSE

(MPEC SYSTEM)

SEVENTH SEMESTER

Subject Code	Name of the Subject	Instruction Periods/Week		Total Periods/ Semester	Scheme of Examination				
		Theory	Practicals		Duration (Hrs)	Sessional Marks	End Exam Marks	Total Marks	Credits
THEORY SUBJECTS									
CER-7212	Industrial Management & Smart Technology	5	--	75	3	20	80	100	5
CER-7213	C Language	5	--	75	3	20	80	100	5
CER-7214	Ceramic Science	5	--	75	3	20	80	100	5
CER-7401	Advanced Ceramics	5	--	75	3	20	80	100	5
CER-7402	Special Glasses & Enamels	5	--	75	3	20	80	100	5
PRACTICAL SUBJECTS									
CER-7215	C Language Lab	--	6	90	3	40	60	100	3
CER-7216	Computer Applications practice in Ceramic Industry	--	5	75	3	40	60	100	2.5
CER-7403	Glaze Technology Lab	--	3	45	3	40	60	100	1.5
CER-7404	Enamels Lab	--	3	45	3	40	60	100	1.5
	TOTAL	25	17	630	-	260	640	900	33.5

Note:1. Subject CER-7212 is same as M-501 of Diploma in Mechanical Engineering.

TOTAL NUMBER OF CREDITS TO BE ACQUIRED FOR A DIPLOMA.

SEMESTER - WISE - CREDITS

I. SEMESTER	34.5
II. SEMESTER	35.5
III. SEMESTER	34.5
IV. SEMESTER	33.5
V. SEMESTER	25.0
VI. SEMESTER	25.0
VII. SEMESTER	33.5
TOTAL	221.5

As and when the student acquires the required number of credits i.e.221.5 credits, the student is eligible for the award of diploma. Those students who has completed Intermediate MPC or B.Sc (MPC) need not study for the period of 3 ½ years, but is allowed to study at a rapid rate to acquire the required 221.5 credits, by opting for extra credits in each semester under MPEC system.

Extra Courses offered in lieu of Regular Courses Beyond the Standard Format.

Course Code	Course Name	Number of periods		Credits
		Theory	Practical	
CER-0217	Furnace Engineering	06	--	06
CER-0218	Entrepreneurship in Ceramic Industry	06	--	06
CER-0219	Equipment Drawing		03	1.5
CER-405	Safety in Ceramic Industry	05	--	05
CER-406	Nuclear & Space Ceramics	05	--	05

Depending on the demand, some more courses also may be added, in future.

DIPLOMA IN
CERAMIC TECHNOLOGY
3 ½ YEAR SANDWICH
UNDER MPEC

FIRST SEMESTER

CURRICULUM – 2020

(C-20)

**STATE BOARD OF
TECHNICAL EDUCATION & TRAINING
ANDHRA PRADESH**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING
ANDHRA PRADESH
DIPLOMA IN CERAMIC TECHNOLOGY
3 ½ YEAR SANDWICH COURSE (UNDER MPEC SYSTEM)
FIRST SEMESTER**

Subject	Name of the Subject	Instruction Periods/Week		Total Periods / Semester	Duration (hrs)	Scheme of Examinations			
		Theory	Practicals			Sessional Marks	End Exam Marks	Total Marks	Credits
THEORY SUBJECTS									
CER-1101	English -I	3	-	45	3	20	80	100	3
CER-1102	Engineering Mathematics – I	5	-	75	3	20	80	100	5
CER-1103	Engineering Physics-I	4	-	60	3	20	80	100	4
CER-1104	Engineering Chemistry & Environmental Studies -I	4	-	60	3	20	80	100	4
CER-1201	Elements of Ceramic Technology -I	4	-	60	3	20	80	100	4
CER-1202	Ceramic Raw Materials	5		75	3	20	80	100	5
PRACTICAL SUBJECTS									
CER-1105	Physics Laboratory-I	-	1 ½	22 ½	3	20	30	50	0.75
CER-1106	Chemistry Laboratory-I	-	1 ½	22 ½	3	20	30	50	0.75
CER-1107	Engineering Drawing-I	-	06	90	3	40	60	100	4
CER-1203	Computer Fundamentals Lab practice- I	-	04	60	3	40	60	100	2
CER-1301	Fundamental Properties of Ceramics Lab	-	04	60	3	40	60	100	2
	Total	25	17	630	-	280	720	1000	34.5

ENGLISH – I

Course Code	Course Title	No. of Credits	No. of Periods/week	Total No. of periods	Marks for FA	Marks for SA
CER-1101	English - I	3	3	45	20	80

S. No.	Unit Title	No of Periods	COs Mapped
1	English for Employability	9	CO1, CO2, CO3, CO4
2	Living in Harmony	9	CO1, CO2, CO3, CO4
3	Connect with Care	9	CO1, CO2, CO3, CO4
4	Humour for Happiness	9	CO1, CO2, CO3, CO4
5	Never Ever Give Up!	9	CO1, CO2, CO3, CO4
Total Periods		45	

Course Objectives	To improve the skills of English Language use by enriching vocabulary and learning accurate structures for effective communication.
	To comprehend themes for value based living in professional and personal settings.

CO No.	Course Outcomes
CO1	Applies perceptions of themes related to societal responsibility of adolescents towards their surroundings.
CO2	Demonstrates knowledge of form and function of 'grammar items' and uses them in both academic and everyday situations.
CO3	Demonstrates effective English communication skills with competence in listening, speaking, reading and writing in academic, professional and everyday contexts.
CO4	Displays positivity and values of harmonious living in personal and professional spheres as reflected through communication.

CO-PO Matrix

Course Code CER-1101	Course Title: English-I Number of Course Outcomes: 3			No. of Periods: 45	
POs	Mapped with CO No.	CO Periods Addressing PO in Column 1		Level of Mapping (1,2,3)	Remarks
		Number	Percentage		
PO1		Not directly Applicable for English course, however activities that use content from science and technology relevant to the Programme taken up by the student shall be exploited for communication in the Course.			
PO2					
PO3					
PO4					
PO5	CO1,CO2, CO3,CO4	9	20		>50%: Level 3
PO6	CO1,CO2, CO3,CO4	27	60		21-50%: Level 2
PO7	CO1,CO2, CO3,CO4	9	20		Up to 20%: Level 1

Level 3 – Strongly Mapped
 Level 2- Moderately Mapped
 Level 1- Slightly Mapped

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1					✓	✓	✓
CO 2					✓	✓	✓
CO3					✓	✓	✓
CO 4					✓	✓	✓

NOTE: CO-PO groups shall be fulfilled through activities that use content from science and technology relevant to the Programme taken up by the student shall be exploited for communication in the Course.

PO5: Appropriate quiz programme may be conducted at intervals and duration as decided by concerned teacher.

PO6: Seminars on applications of mathematics in various engineering disciplines are to be planned and conducted.

PO7: Such activities are to be planned that students visit library to refer standard books on Mathematics and latest updates in reputed national and international journals, attending seminars, learning mathematical software tools.

Blue Print of Question Paper:

S. No.	Name of the Unit	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	English for Employability	9	11	3	8	0		1	1			CO 1, CO 2, CO3, CO4
2	Living in Harmony	9	11	3	8	0		1	2			CO 1, CO 2, CO3, CO4
3	Connect with Care	9	14	6	8	0		2	1			CO 1, CO 2, CO3, CO4
4	Humour for Happiness	9	22	6	16	0		2	2			CO1, CO2, CO3, CO4
5	Never Ever Give Up!	9	22	6	16	0		2	2			CO 1, CO 2, CO3, CO4
TOTAL		45	80	24	56	0	0	8	8			

PART-A: 10 Questions 3 marks each=30Marks

PART-B: 5 Questions 8 marks each=40Marks **Internal choice**

Part-C: 1 Question 10marks =10Marks
(Higher Order Question)

NOTE: * indicates questions can be given from any of the corresponding lessons in the blue print.

Question Paper Pattern for Unit Tests

Part A: 16 marks: 4 questions with 1 mark each (FIB, True/false, one word/phrase, etc.)
4 questions with 3 marks each (short answer/ descriptive/ applicative questions) Part B: 24 marks: 3 questions 8 marks each with internal choice

Learning Outcomes

1. English for Employability

Explain the need for improving communication in English for employability
Use adjectives and articles effectively while speaking and in writing
Write simple sentences

2. Living in Harmony

Develop positive self-esteem for harmonious relationships
Use affixation to form new words
Use prepositions and use a few phrasal verbs contextually

3. Connect with Care

Use social media with discretion
Speak about abilities and possibilities
Make requests and express obligations
Use modal verbs and main verbs in appropriate form
Write short dialogues for everyday situations

4. Humour for Happiness

Explain the importance of humour for a healthy living
Improve vocabulary related to the theme
Display reading and speaking skills
Frame sentences with proper Subject – Verb agreement
Explain the features of a good paragraph and learn how to gather ideas as a preliminary step for writing a good paragraph.

5. Never Ever Give Up!

Practice to deal with failures in life.
Use the present tense form for various every day communicative functions such as speaking and writing about routines, professions, scientific descriptions and sports commentary.
Write paragraphs with coherence and other necessary skills.

Textbook: INTERACT (A Textbook for I Year English) - Published by SBTET, AP

Reference Books:

- Martin Hewings : Advanced Grammar in Use, Cambridge University Press
Murphy, Raymond : English Grammar in Use, Cambridge University Press
Sidney Greenbaum : Oxford English Grammar, Oxford University Press
Wren and Martin (Revised by N.D.V. Prasad Rao) : English Grammar and Composition, Blackie ELT Books, S. Chand and Co.
Sarah Freeman : Strengthen Your Writing, Macmillan

Unit Test Syllabus

Year/Semester	Unit Test	Syllabus
		English for Employability Living in Harmony

First Semester	Unit Test-I	
	Unit Test-II	Connect with Care Humour for Happiness Never Ever Give Up

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur
C-20, Model paper
I Semester – Unit I

Subject Name: ENGLISH-I	Course Code: CER-1101
Time: 90 min Max. Marks: 40	

Instructions: Answer all the questions. Each question carries Four marks. 4 x 4 = 16 M

PART – A

1. Fill in the blanks with suitable article.
 - a. He is _____ honest man.
 - b. I want to buy _____ bike.
 - c. They come to college _____ foot.
 - d. She is _____ intelligent.

2.
 - a. Write the antonym of 'Pretty'.
 - b. Write the Synonym of 'ban'
 - c. Give Prefixes to 'conscious.'
 - d. Give suffixes to 'faith'

3. Rewrite the sentences as directed.
 - a. Suresh is clever boy in the class (Change into Superlative degree)
 - b. Iswarya is more beautiful than sujatha. (Change into positive degree)
 - c. Nayani is not so great as Sujani (Change into Superlative)
 - d. You ask your Mom to give you another chocolate (change into request)

4. Fill in the blanks with suitable prepositions.
 - a. The dog ran _____ the road.
 - b. The river flows _____ the bridge.
 - c. My present live _____ the USA.
 - d. Who is the person _____ this picture?

PART – B

Instructions: Answer all the questions and each question carries EIGHT marks. 3 x 8=24

5. How can you improve the skills of English language for Employability.
6. Write a paragraph in about 100 words on What you do daily.
7. Write a paragraph in about 100 words on First day your college life.

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur
C-20, Model paper
I Semester – Unit II

Subject Name: **ENGLISH-I**

Course Code: CER-1101

Time: 90 min Max. Marks: 40

Instructions: Answer all the questions. Each question carries Four marks.

4 x 4 = 16 M

PART – A

1. Rewrite as directed.
 - a. You are studying in a hostel. The tap in your bathroom is leaking. Request the plumber to repair it.
 - b. Request your classmate to lend you the physics lab record.
 - c. You are going by car. Your neighbor is waiting for an auto to go to his office. How do you offer him.
 - d. Request the librarian to help you find the Thesaurus.
2. Fill in the blanks with appropriate words of obligations.
 - a. He _____ avoid working too hard.
 - b. You _____ wear a helmet when you are riding a bike.
 - c. Students _____ pass in all exams.
 - d. You _____ get first class.
3. Fill in the blanks with appropriate form of verbs given in brackets.
 - a. I _____ (go) to Hyderabad yesterday.
 - b. She _____ (learn) music for two years.
 - c. They _____ (writing) since 9'0 clock.
 - d. He _____ (work) daily.
4. Frame "Yes-No" questions for the following statement.
 - a. She writes well.
 - b. The soldiers fought the battle courageously.
 - c. Ravi is going to market.
 - d. They are coming to college now.

PART – B

Instructions: Answer all the questions and each question carries EIGHT marks.

3 x 8=24

5. Make an analysis and write a paragraph in around 100 words about your strengths and weakness in learning and using English and also the measures to improve it.
6. Frame Five 'Wh' questions using 'Who, Why, Where, What, When _____ etc... for the following.

Radha has two siblings. She is the eldest of the three children in the house. Her two younger brothers are studying in high school. Their father bought them a new carom board last week. They needed a fourth player to make two teams. So the youngest one went to his friend's house and brought him to their house.

7. Write a paragraph about your daily routines.

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic TEchnology (Autonomous)
Gudur
C-20,Model paper
I Semester

Subject Name: : **ENGLISH-I**

Course CodeCER-1101

Time: : 3 hoursMax. Marks: 80

Instructions: Answer all the questions. Each question carries Three marks. 10 x 3 = 30

1. Fill in the blanks with suitable articles.

- a. _____ Ramayana is _____ holy book of _____ Hindus.
- b. _____ Himalayas are _____ highest mountains in _____.

2. Write a paragraph comparing the Guntur and the Hyderabad city using at least five adjectives with different degrees. (You can use hits: as _____ as, bigger, not so _____ as, many, more, less)

3. Fill in the blanks choosing the appropriate prepositions from the list given
(at, of, on, behind, by)

Raju is one of the most sincere students in the class. He comes to college _____ foot, Because his house is just _____ the compound wall. He enters the class room _____ 9 am sharp. He listens to his teachers attentively.

4. Give prefix for the word: **hood, less, city.**

Write Suffix for the word: **bio, man, aqua**

5. Fill in the blanks with appropriate words of **obligation.**

- a. We _____ attend the flag hoisting.
- b. Students _____ Pass in al Exams.
- c. Every member _____ pay the annual subscription.

6. Write answer

- a. Request the teacher to repeat the previous exercise.
- b. Request the counter clerk to cancel your railway ticket.

7. Fill in the blanks with proper form of verb given in bracket.

When I _____ (wake up) this morning my father _____ (leave) already, even my mother had finished her cooking. After I _____ (eat) my breakfast I _____ (go) to college.

8. Fill in the blank with proper model auxillary verb based on the clue in the bracket.
- Ravi _____ speak in English (Ability)
 - You _____ play Cricket.
 - They _____ come to college.
9. Frame Three “Wh” questions using ‘Who, why, where, what, when..... etc. ‘for the following.’
Radha has two siblings. She is the eldest of the three children in the house. Her two younger brothers are studying in high school. Their father bought them a new carom board last week. They needed a fourth player to make two teams. So the youngest one want to his friends house and brought him to their house.
10. Frame “Yes-No” questions for the following statements.
- The Principal has declared holidays.
 - The soldiers fought the battle courageously.
 - Chief Minister is planning a new capital for the state.

PART – B

Instructions: Answer the following questions. Each question carries EIGHT marks. 5 x 8 = 40

11. Write a dialogue of at least five turns between Bank Manager and Borrower about Educational Loan.
OR

Construct a dialogue of at least five turns between an American and you about places

12. Fill in the blanks with suitable Prepositions.

- The students looked very happy _____
- She is afraid _____ dogs.
- He is listening _____ the radio.
- They have known he _____ childhood.
- They climbed _____ the lorry.
- The house is _____ two trees.
- He has been playing _____ morning.
- He was born _____ 26th, Feb.

OR

Read the following paragraph and make necessary corrections.

Myself is Harish. My age is 17 years old. Every day I am getting up in the morning at 6.00 AM. I am eaten breakfast at 7.30 AM. I goes to polytechnic by walk. Umesh is my cousin brother. Umesh and me play cricket on the evening. We both drinks coffee at 6.30 PM. He taught Physics every day at 7.00 PM. I see television for an hour in the night.

13. Write a paragraph in about 100 words on your strengths and weaknesses in learning and using English and also how to improve it.

OR

Write a paragraph about on how to improve communication skills in English for Employability.

14. Write a paragraph in about 100 words on your school days.

OR

Write a paragraph about your daily routines.

15. Write a paragraph in about 100 words on how to overcome low esteem and negativity.

OR

Write a paragraph in about 100 words on Cricket commentary.

PART – C

1 X 10 = 10 Marks.

16. Read the following paragraph and answer the question below.

Gandhiji was surely one of the most remarkable men in the world. But he was also a human being with a combination of faults and virtues. Gandhiji had the courage to admit his faults. But despite his faults, he was a great and noble person. He considers himself to be an ordinary human being and therefore believed that anybody could be like him. He never asked anybody to do anything which he himself could not do. This is what gives a special value to his life. He practiced what he preached. He was devoted to truth and constantly tried to perfect his character. He never compromised on what he believed to be true and right for him both the ends and the means to achieve a goal had to be just.

- i) What kind of human being is Gandhiji?
- ii) What courage did Gandhiji possess?
- iii) How does he consider himself?
- iv) What gives special value to his life?
- v) Give the Synonyms for the following words.
 - a. Preach
 - b. Compromise

ENGINEERING MATHEMATICS – I

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks of FA	Marks of SA
CER-1102	Engineering Mathematics – I	05	75	20	80

S.No.	Unit Title	No. of periods	COs mapped
1	Algebra	30	CO1, CO2
2	Trigonometry	45	CO3, CO4
TOTAL		75	

Course Objectives	<ul style="list-style-type: none"> (i) To apply the principles of Algebra, Trigonometry. (ii) To comprehend and apply the concepts of Trigonometry.
--------------------------	---

Course Outcomes	CO1	Use function concepts and resolve rational fractions into partial fractions.
	CO2	Find the product of Matrices, value of determinations, inverse of matrix and solve simultaneous linear equations.
	CO3	Solve problems on compound, multiple & sub multiple angles.
	CO4	Apply transformations, inverse trigonometric functions for solving Engineering problems. Represent complex numbers in various forms.

Learning Outcomes

UNIT – I

C.O. 1 Use function concepts and resolve rational fractions into partial fractions.

L.O. 1.1 Define Set, ordered pairs and Cartesian product - examples.

1.2 Explain Relations and functions – examples

1.3 Classify types of functions (one-one, onto and bijective).

1.4 Find Domain & Range of functions – simple examples.

1.5 Define inverse functions - examples.

1.6 Define rational, proper and improper fractions of polynomials.

1.7 Explain the procedure of resolving rational fractions of the type mentioned below into partial fractions

$$i) \frac{f(x)}{(x+a)(x+b)(x+c)} \quad ii) \frac{f(x)}{(x+a)^2(x+b)(x+c)}$$

$$iii) \frac{f(x)}{(x^2+a)(x+b)} \quad iv) \frac{f(x)}{(x+a)(x^2+b)^2}$$

C.O. 2 Find the product of Matrices, value of determinations, inverse of matrix and solve simultaneous linear equations.

L.O. 2.1 Define a matrix and order of a matrix

2.2 State various types of matrices with examples (emphasis on 3rd order square matrices).

2.3 Compute sum, scalar multiplication and product of matrices.

2.4 Illustrate the properties of these operations such as associative, distributive, commutative properties with examples and counter examples.

2.5 Define the transpose of a matrix and write its properties;

2.6 Define symmetric and skew-symmetric matrices;

2.7 Resolve a square matrix into a sum of a symmetric and skew-symmetric matrices-Examples in all cases.

2.8 Define minor, co-factor of an element of a 3x3 square matrix with examples.

2.9 Expand the determinant of a 3 x 3 matrix using Laplace expansion formula.

- 2.10 Distinguish singular and non-singular matrices.
- 2.11 Apply the properties of determinants to solve problems.
- 2.12 Solve system of 3 linear equations in 3 unknowns using Cramer's rule.
- 2.13 Define multiplicative inverse of a matrix and list properties of adjoint and inverse.
- 2.14 Compute adjoint and multiplicative inverse of a square matrix.
- 2.15 Solve system of 3 linear equations in 3 unknowns by matrix inversion method

UNIT - II

C.O. 3 Solve problems on compound, multiple & sub multiple angles.

L.O. 3.1 Define trigonometric ratios of any angle.

3.2 List the values of trigonometric ratios at specified values.

3.3 Draw graphs of trigonometric functions

3.4 Explain periodicity of trigonometric functions.

3.5 Define compound angles and state the formulae of $\sin(A\pm B)$, $\cos(A\pm B)$, $\tan(A\pm B)$ and $\cot(A\pm B)$

3.6 Give simple examples on compound angles to derive the values of $\sin 15^\circ$, $\cos 15^\circ$, $\sin 75^\circ$, $\cos 75^\circ$, $\tan 15^\circ$, $\tan 75^\circ$ etc.

3.7 Derive identities like $\sin(A+B) \sin(A-B) = \sin^2 A - \sin^2 B$ etc.,

3.8 Solve simple problems on compound angles.

3.9 Derive the formulae of multiple angles $2A$, $3A$ etc and sub multiple angles $A/2$ in terms of angle A of trigonometric functions.

3.10 Derive useful allied formulas like $\sin A = (1 - \cos 2A)/2$ etc.,

3.11 Solve simple problems using the above formulae

C.O. 4 Apply transformations, inverse trigonometric functions for solving Engineering problems. Represent complex numbers in various forms

L.O. 4.1 Derive the formulae on transforming sum or difference of two trigonometric ratios in to a product and vice versa- examples on these formulae.

4.2 Solve problems by applying these formulae to sum or difference or product of three or more terms.

4.3 Explain the concept of the inverse of a trigonometric function by selecting an appropriate domain and range.

4.4 Define inverses of six trigonometric functions along with their domains and ranges.

4.5 Derive relations between inverse trigonometric functions so that given $A = \sin^{-1}x$, express angle A in terms of other inverse trigonometric functions with examples.

4.6 State various properties of inverse trigonometric functions and identities like $\sin^{-1}x + \cos^{-1}x = \frac{\pi}{2}$ etc.

4.7 Apply formulae like $\tan^{-1}x + \tan^{-1}y = \tan^{-1}\left(\frac{x+y}{1-xy}\right)$, where $x \geq 0, y \geq 0, xy < 1$ etc.,

to solve simple problems

4.8 Explain what is meant by solutions of trigonometric equations and find the general solutions of $\sin x = k$, $\cos x = k$ and $\tan x = k$ with appropriate examples.

4.9 Solve models of the type $a \sin^2 x + b \sin x + c = 0$, $a \cos x + b \sin x = c$ etc., and problems using simple transformations.

4.10 State sine rule, cosine rule, tangent rule and projection rule.

4.11 Explain the formulae for $\sin A/2$, $\cos A/2$, $\tan A/2$ and $\cot A/2$ in terms of semi-perimeter and sides a, b, c and solve problems.

4.12 List various formulae for the area of a triangle.

4.13 Solve problems using the above formulae.

4.14 Define Sinh x, cosh x and tanh x and list the hyperbolic identities.

4.15 Represent inverse hyperbolic functions in terms of logarithms.

4.16 Define complex number, its modulus, conjugate and list their properties.

4.17 Define the operations on complex numbers with examples.

4.18 Define amplitude of a complex number

4.19 Represent the complex number in various forms like modulus-amplitude (polar) form, Exponential (Euler) form with examples.

CO/PO - Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1						2		
CO2	3	2	2	1						3		
CO3	3	3	3	2						3		
CO4	3	3	3	2						3		

1. Slight (Low)
2. Moderate (Medium)
3. Substantial (High)

Sl No	Chapter/ Unit Title	No of Periods	Weightage Allotted	Marks Wise distribution of weightage	Question Wise distribution of weightage	COs mapped
-------	---------------------	---------------	--------------------	--------------------------------------	---	------------

Note:

PSO1: An ability to understand the concepts of basic mathematical concepts and to apply them in various areas like computer programming, civil constructions, fluid dynamics, electrical and electronic systems and all concerned engineering disciplines.

PSO2: An ability to solve the Engineering problems using latest software tool, along with analytical skills to arrive at faster and appropriate solutions.

PSO3: Wisdom of social and environmental awareness along with ethical responsibility to have a successful career as an engineer and to sustain passion and zeal for real world technological applications.

PO5: Appropriate quiz programme may be conducted at intervals and duration as decided by concerned teacher.

PO6: Seminars on applications of mathematics in various engineering disciplines are to be planned and conducted.

PO7: Such activities are to be planned that students visit library to refer standard books on Mathematics and latest updates in reputed national and international journals, attending seminars, learning mathematical software tools.

COURSE CONTENT

Unit-I Algebra

1. Relations and Functions :

Define Set, Ordered pairs, Cartesian product, Relations, functions and inverse functions. Describe types of functions (one-one, onto and bijective). Find Domain & Range of functions – examples.

2. Partial Fractions :

Rational, proper and improper fractions of polynomials. Resolve rational fractions into their partial fractions covering the types mentioned below .

$$\begin{array}{ll}
 \text{i) } \frac{f(x)}{(x+a)(x+b)(x+c)} & \text{ii) } \frac{f(x)}{(x+a)^2(x+b)(x+c)} \\
 \text{iii) } \frac{f(x)}{(x^2+a)(x+b)} & \text{iv) } \frac{f(x)}{(x+a)(x^2+b)^2}
 \end{array}$$

Matrices:

3. Definition of matrix, types of matrices-examples, algebra of matrices-equality of two matrices, sum, scalar multiplication and product of matrices. Transpose of a matrix-Symmetric, skew symmetric matrices-Minor, cofactor of an element-Determinant of a square matrix-Laplace's expansion, properties of determinants. Singular and non singular matrices-Adjoint and multiplicative inverse of a square matrix- examples-System of linear equations in 3 variables-Solutions by Cramers's rule and Matrix inversion method-examples.

Unit-II Trigonometry :

4. Trigonometric ratios: definition of trigonometric ratios of any angle, values of trigonometric ratios at specified values, draw graphs of trigonometric functions, periodicity of trigonometric functions.

5. Compound angles: Formulas of $\sin(A \pm B)$, $\cos(A \pm B)$, $\tan(A \pm B)$, $\cot(A \pm B)$, and related identities with problems.

6. Multiple and sub multiple angles: Formula for trigonometric ratios of multiple angles $2A, 3A$ and submultiple angle $A/2$ with problems.

		Theory	Practice		R	U	Ap	An	R	U	Ap	An	
	Unit - I : Algebra												
1	Relations and Functions	4	1	3	0	3	0	0	0	1	0	0	CO1
2	Partial Fractions	3	2	3	0	3	0	0	0	1	0	0	CO1
3	Matrices and Determinants	10	10	11	3	0	8	0	1	0	1	0	CO2
	Unit - II : Trigonometry												
4	Trigonometric Ratios	3	2	0	0	0	0	0	0	0	0	0	CO3
5	Compound Angles	3	2	8	8	0	0	0	1	0	0	0	CO3
6	Multiple and Submultiple angles	3	3	11	8	3	0	0	1	1	0	0	CO3
7	Transformations	3	3	8	3	0	0	5	1	0	0	1/2	CO4
8	Inverse Trigonometric Functions	3	2	11	3	0	8	0	1	0	1	0	CO4
9	Trigonometric Equations	3	2	6	3	3	0	0	1	1	0	0	CO4
10	Properties of triangles	3	2	13	0	8	0	5	0	1	0	1/2	CO4
11	Hyperbolic Functions	3	0	0	0	0	0	0	0	0	0	0	CO4
12	Complex Numbers	3	2	6	3	0	0	0	1	0	1	0	CO4
	Total	44	31	80	31	20	19	10	7	5	3	1	

7. Transformations of products into sums or differences and vice versa simple problems

8. Inverse trigonometric functions : definition, domains and ranges-basic properties- problems.

9. Trigonometric equations: concept of a solution, principal value and general solution of trigonometric equations : $\sin x = k$, $\cos x = k$, $\tan x = k$. Solutions of simple quadratic equations, equations involving usage of transformations- problems.

10. Properties of triangles: relation between sides and angles of a triangle- sine rule, cosine rule, tangent rule and projection rule-area of a triangle- problems.

11. Hyperbolic functions: Definitions of hyperbolic functions, identities of hyperbolic functions, inverse hyperbolic functions and expression of inverse hyperbolic functions in terms of logarithms.

12. Complex Numbers : Definition of a complex number, Modulus and conjugate of a complex number, Arithmetic operations on complex numbers, Modulus- Amplitude (polar) form , Exponential form(Euler) form of a complex number- Problems.

Reference Books :

1. Textbook prescribed by SBTET, AP, Vijayawada
2. A text book of matrices by Shanti Narayan,
3. Plane Trigonometry, by S.L Loney
4. Co-ordinate Geometry, by S.L Loney
5. Thomas Calculus, Pearson Addison-Wesley publishers
6. Calculus – I, by Shanti Narayan and Manicavachgam Pillai, S.V Publications

Unit Test Syllabus

R: Remember Type : 31 Marks

U: understand Type : 20 Marks

App: Application Type : 16 Marks

**ANA:
Type :**

**Analyse
13 Marks**

Year/Semester	Unit Test	Syllabus
First Semester	Unit Test-I	Relations and Functions Partial Fractions Matrices and Determinants Trigonometric Ratios Compound Angles
	Unit Test-II	Multiple and Submultiple angles Transformations Inverse Trigonometric Functions Properties of triangles Hyperbolic Functions Complex Numbers

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur
C-20, Model paper
I Semester – Unit I

Subject Name: Engineering Mathematics – I

Course Code: CER-1102

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. a) If $f(x) = x^2$ and domain is $\{-1,0,1\}$ then find the range.
b) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ then find $2A$.
c) Find the value of $\cos 120^\circ$.
d) Find the value of $\sin 75^\circ$.
2. If $f: R \rightarrow R$ and $f(x) = 3x - 5$ then show that $f(x)$ is one to one .
3. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}, B = \begin{bmatrix} -1 & 2 \\ 1 & 0 \end{bmatrix}$ then find $2A + 2B$.
4. Show that $\sin(A + B) \cdot \sin(A - B) = \sin^2 A - \sin^2 B$.
5. If $\tan \theta = \frac{5}{4}$ then find $\cos \theta, \sin \theta, \sec \theta$.

PART- B

Marks: 3 x 8= 24

Answer all questions. Each question carries eight marks.

6. Resolve $\frac{2x}{(x-1)(x-3)}$ into partial fractions. (or)

Resolve $\frac{x+4}{x^2-3x+2}$ into partial fractions.

7. Solve that $\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = abc\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c} + 1\right)$. (or)

Find the adjoint of $\begin{pmatrix} 1 & 2 & 1 \\ 3 & 2 & 3 \\ 1 & 1 & 2 \end{pmatrix}$.

8. If $A + B = 45^\circ$ then show that $(1 + \tan A)(1 + \tan B) = 2$. (or)

If $\tan A = \frac{5}{6}$ and $\tan B = \frac{1}{11}$ then show that $A + B = \frac{\pi}{4}$.

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur
C-20, Model paper
I Semester – Unit II

Subject Name: Engineering Mathematics – I

Course Code: CER-1102

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. a) $\sin C - \sin D = 2 \sin \frac{C-D}{2} \cos \frac{C+D}{2}$ state true or false.
b) If $z = 2 + 3i$ then find $|z|$.
c) Find $\sinh x$.
d) Find $\sin \theta = \frac{1}{2}$.
2. Find $\sin 2A$ in terms of $\tan A$.
3. Find $\sin 34 + \cos 64 - \cos 4$.
4. Find the area of the triangle if $a = 2, b = 3, c = 5$.
5. Find the inverse of $\frac{1}{1+i}$

PART - B

Marks: 3 x 8 = 24

Answer all questions. Each question carries eight marks.

6. In any $\Delta^{le} ABC$, prove that $\cot A + \cot B + \cot C = \frac{a^2+b^2+c^2}{4\Delta}$. (or)

If $\cot \frac{A}{2} : \cot \frac{B}{2} : \cot \frac{C}{2} = 3 : 5 : 7$ then show that $a : b : c = 6 : 5 : 4$.

7. If $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \frac{\pi}{2}$ then show that $x^2 + y^2 + z^2 + 2xyz = 1$. (or)

Solve $2 \sin^2 \theta - \sin \theta - 1 = 0$.

8. If $\frac{\sin(A+B)}{\sin(A-B)} = \frac{a+b}{a-b}$ then show that $B \tan A = A \tan B$. (or)

Expand $\cos 5\theta$ in terms of $\cos \theta$.

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur
C-20, Model paper
I Semester

Subject Name: Engineering Mathematics – I	Course Code: CER-1102
Time: 3 Hours	Max. Marks: 80

PART - A **10 x 3 = 30**

Answer all questions. Each question carries three marks.

1. Show that $f(x) = 2x - 1$ is bijective.
2. Resolve $\frac{x}{(x-1)(x-2)}$ into partial fractions.
3. If $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}, B = \begin{pmatrix} -1 & 0 \\ 0 & 2 \end{pmatrix}$ then find $2A + 3B$.
4. Simplify $\sqrt{2 + \sqrt{2 + \sqrt{2 \cos 2\theta}}}$.
5. Prove that $\sin 78 + \cos 132 = \frac{\sqrt{5}-1}{4}$.
6. Solve $\sin^{-1} x + \sin^{-1} 2x = \frac{\pi}{3}$.
7. Solve $\sin \theta + \cos \theta = \frac{1}{\sqrt{2}}$.
8. Solve $\sqrt{3} \sin \theta = \cos \theta$.
9. Find the inverse of $1 + i$.
10. Write $\frac{1}{1+i}$ in $a + ib$ form.

PART- B**Marks: 5 x 8= 40**

Answer all questions. Each question carries eight marks.

11. A) Solve $3x + y + 2z = 3, 2x - 3y - 3 = -3, x + 2y + z = 4$ by method of matrices.

(or)

B) Write the matrix $\begin{bmatrix} 1 & -1 & 2 \\ 2 & 1 & 3 \\ 4 & 2 & 3 \end{bmatrix}$ as a sum of symmetric and skew symmetric matrices.12. A) Prove that $\sin^2 52\frac{1}{2} - \sin^2 22\frac{1}{2} = \frac{\sqrt{3}+1}{4\sqrt{2}}$. (or)B) If $A + B + C = 180^\circ$, then prove that $\tan A + \tan B + \tan C = \tan A \tan B \tan C$.13. A) Prove that $(\cos \alpha + \cos \beta)^2 + (\sin \alpha + \sin \beta)^2 = 4 \cos^2 \left(\frac{\alpha - \beta}{2}\right)$. (or)B) Expand $\cos 5\theta$ in terms of $\cos \theta$.14. A) In any $\Delta^{le} ABC$ show that $bc \cos^2 \frac{A}{2} + ac \cos^2 \frac{B}{2} + ab \cos^2 \frac{C}{2} = S^2$. (or)B) In any $\Delta^{le} ABC$ show that $\sum a \sin(B - C) = 0$.15. A) If $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \frac{\pi}{2}$ then prove that $x^2 + y^2 + z^2 + 2xyz = 1$. (or)B) Prove that $\tan^{-1} \frac{1}{3} + \tan^{-1} \frac{1}{5} + \tan^{-1} \frac{1}{7} + \tan^{-1} \frac{1}{8} = \frac{\pi}{4}$.**PART- C****Marks: 1 x 10= 10**

Answer the following question. Question carries ten marks.

16. A) If $\sin x + \sin y = a, \cos x + \cos y = b$ then find $\tan \frac{x+y}{2}$.B) In any $\Delta^{le} ABC$ prove that $a \cos A + b \cos B + c \cos C = \frac{2\Delta}{R}$.

ENGINEERING PHYSICS– I

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks of FA	Marks of SA
CER-1103	Engineering Physics – I	04	60	20	80

S.No	Name of the Experiment	No. of Periods	COs Mapped
1.	Units and Dimensions	08	CO1
2.	Elements of Vectors	12	CO2
3.	Dynamics	12	CO3
4.	Friction	08	CO4
5.	Work, Power and Energy	12	CO5
6	Properties of matter	08	CO5
	Total	60	

Course Objectives and Course Outcomes

Course Objectives	<ol style="list-style-type: none"> To familiarize with the concepts of Physics involved in the process of various Engineering, Industrial and Daily life Applications. To understand and apply the basic principles of physics in the field of engineering and technology to familiarize certain natural phenomenon occurring in the day to day life To reinforce theoretical concepts by conducting relevant experiments/exercises 		
	CO1	CER-1103.1	Explain S.I units and dimensions of different physical quantities
	CO2	CER-	Explain basic operations among vector quantities

Course Outcomes		1103.2	
	CO3	CER-1103.3	Explain the motion of objects moving in one dimension and two dimensions.
	CO4	CER-1103.4	Explain , the causes of motion and hindrance to the motion of the objects especially with respect to friction.
	CO5	CER-1103.5	Explain the mechanical energy of bodies like PE, KE and conservation law of energy.
	CO5	CER-1103.5	Explain certain properties of solids, liquids like elastic properties, viscosity and surface tension

COS, POS, PSOS MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3					1		1	1	1
CO2	3		2					1	1	
CO3	3		2					1		
CO4	3	2			2				2	2
CO5	3			2			2	1	1	

3: High, 2: Moderate, 1: Low

Note:
The

gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:

- i) Seminars ii) Tutorials iii) Guest lectures iv) Assignments v) Quiz competitions vi) Industrial visits
vii) Tech Fest viii) Mini project ix) Group discussion x) Virtual classes xi) Library visit fore-books

.Learning Outcomes

1.0 Concept of Units and dimensions

- 1.1 Explain the concept of Units, Physical quantity, Fundamental physical quantities and Derived physical quantities
- 1.2 Define unit, fundamental units and derived units, State SI units with symbols
- 1.3 State Multiples and submultiples in SI system, State Rules of writing S.I. units, State advantages of SI units
- 1.4 Define Dimensions, Write Dimensional formulae of physical quantities
- 1.5 List dimensional constants and dimensionless quantities
- 1.6 State the principle of homogeneity of dimensions
- 1.7 State the applications and limitations of dimensional analysis
- 1.8 Errors in measurement, Absolute error, relative error, percentage error, significant figures

1.9 Solve problems

2.0 Concept of Elements of Vectors

- 2.1 Explain the concept of scalars, Vectors and give examples
- 2.2 Represent vectors graphically, Classify the Vectors, Resolve the vectors
- 2.3 Determine the resultant of a vector by component method, represent a vector in Space using unit vectors (i, j, k)
- 2.4 State and explain triangle law, parallelogram law, and polygon law of addition of Vectors
- 2.5 Define Dot product of two vectors with examples (Work done, Power), mention the Properties of dot product
- 2.6 Define cross product of two vectors with examples (Torque, Linear velocity) Mention the properties of Cross product.
- 2.7 Solve the related numerical problems

3.0 Concept of Dynamics

- 3.1 Write the equations of motion in a straight line. Explain the acceleration due to Gravity.
- 3.2 Explain vertical motion of a body and derive expressions for
 - a) Maximum Height,
 - b) Time of ascent,
 - c) time of descent, and
 - d) time of flight
- 3.3 Derive height of a tower when a body projected vertically upwards from the top of a tower.
- 3.4 Explain projectile motion with examples
- 3.5 Explain horizontal projection and derive an expression for the path of a projectile in horizontal projection
- 3.6 Explain oblique projection and derive an expression for it. Derive formulae for
 - a) Maximum Height
 - b) time of ascent
 - c) time of descent and
 - d) time of flight
 - e) Horizontal Range,
 - f) Maximum range
- 3.7 Define force, momentum, angular displacement, angular velocity, angular acceleration, angular momentum, moment of inertia, torque
- 3.8 Solve the related numerical problems.

4.0 Concept of Friction

- 4.1 Define friction and classify the types of friction.
- 4.2 Explain the concept of normal reaction.
- 4.3 State the laws of friction.
- 4.4 Define coefficients of friction, Angle of friction and angle of repose.
- 4.5 Derive expressions for acceleration of a body on a rough inclined plane. (Upwards and downwards)
- 4.6 List the advantages and disadvantages of friction.
- 4.7 Mention the methods of minimizing friction.
- 4.8 Explain why it is easy to pull a lawn roller than to push it.
- 4.9 Solve the related numerical problems.

5.0 Concepts of Work, Power, and Energy

- 5.1 Define the terms Work, Power and Energy. State SI units and dimensional Formulae.

- 5.2 Define potential energy and give examples, derive an expression for potential energy.
- 5.3 Define Kinetic energy and give examples, derive an expression for kinetic energy.
- 5.4 State and derive Work-Energy theorem.
- 5.5 Derive the relation between Kinetic energy and momentum.
- 5.6 State the law of conservation of energy and verify it in the case of a freely falling body.
- 5.7 Solve the related numerical problems.

6.0 Concepts of properties of matter

- 6.1 Explain the terms elasticity, stress, strain and types of stress and strain.
- 6.2 State and explain Hooke's law.
- 6.3 Definitions of Modulus of elasticity, Young's modulus (Y), Bulk modulus (K), Rigidity modulus (n), Poisson's ratio (μ),
- 6.4 Define surface tension and give examples.
- 6.5 Explain Surface tension with reference to molecular theory.
- 6.6 Define angle of contact and capillarity and write formula for Surface Tension.
- 6.7 Explain the concept of viscosity, give examples, write Newton's formula.
- 6.8 Define co-efficient of viscosity and write its units and dimensional formula and state Poiseuille's equation for Co-efficient of viscosity.
- 6.9 Explain the effect of temperature on viscosity of liquids and gases.
- 6.10 Solve the related numerical problems.

COURSE CONTENT

1. Units and Dimensions:

Introduction, Physical quantity, Fundamental and Derived quantities, Fundamental and Derived units, SI units, Multiples and Sub multiples, Rules for writing S.I. units, Advantages of SI units. Dimensions and Dimensional formulae, Dimensional constants and Dimensionless quantities, Principle of homogeneity, Advantages and limitations of dimensional analysis, Errors in measurement, Absolute error, relative error, percentage error, significant figures, Problems.

2. Elements of Vectors:

Scalars and Vectors, Types of vectors (Proper Vector, Null Vector, Unit Vector, Equal, Negative Vector, Like Vectors, Co-Initial Vectors, Co-planar Vectors and Position Vector). Addition of vectors, Representation of vectors, Resolution of vectors, Parallelogram, Triangle and Polygon laws of vectors, Subtraction of vectors, Dot and Cross products of vectors-Problems.

3. Dynamics

Introduction-Concept of acceleration due to gravity-Equations of motion for a freely falling body and for a body thrown up vertically- Projectiles- Horizontal and Oblique projections- Expressions for maximum height, time of flight, range-Define force, momentum, angular displacement, angular velocity, angular acceleration, angular momentum, moment of inertia, torque-problems.

4. Friction:

Introduction to friction- Causes- Types of friction- Laws of friction- Angle of repose-Angle of friction- rough inclined plane- Advantages and disadvantages of friction-Methods of reducing friction-Problems.

5. Work, Power and Energy:

Work, Power and Energy- Definitions and explanation- potential energy- kinetic energy- Derivations of Potential and Kinetic energies-K.E and Momentum relation - Work-Energy theorem- Law of Conservation of energy- Problems.

6. Properties of matter

Definition of Elasticity -Definition of stress and strain -the units and dimensional formulae for stress and strain - The Hooke's law-Definitions of Modulus of elasticity,

Young's modulus (Y), Bulk modulus (K), Rigidity modulus (n), Poisson's ratio (μ), relation between Y, K, n and μ (equations only, no derivation)

Definition of surface tension - Explanation of Surface tension with reference to molecular theory - Definition of angle of contact - Definition of capillarity - The formula for surface tension based on capillarity - Explanation of concept of Viscosity - Examples for surface tension and Viscosity - Newton's formula for viscous force - Definition of co-efficient of viscosity - The effect of temperature on viscosity of liquids and gases - Poiseuille's equation for Co-efficient of viscosity - Related numerical problems.

REFERENCE BOOKS

- | | |
|---|------------------------------------|
| 1. Intermediate physics Volume-I & 2 | Telugu Academy (English version) |
| 2. Unified physics Volume 1,2,3 and 4 | Dr.S.L.Guptha and Sanjeev Guptha |
| 3. Text book of physics Volume I | Resnick & Holiday |
| 4. Text book of applied physics | Dhanpath Roy |
| 5. Fibre optics | D.A Hill |
| 6. NCERT Text Books ----- XI & XII Standard | |

Blue Print and question Paper

S. No	Unit Title/Chapter	No of Periods	Weightage of marks	Marks wise distribution of Weightage				Question wise distribution of Weightage				Mapped with CO
				R	U	Ap	An	R	U	Ap	An	
1	Units and Dimensions	08	09	3	03	3	0	1	1	1	0	CO1
2	Elements of Vectors	12	14	3	08	3	10	1	1	1	1	CO2
3	Dynamics	12	21	0	11	0	0	0	2	0	0	CO3
4	Friction	08	11	0	3	8	0	0	1	1	0	CO4
5	Work, Power and Energy	12	14	3	11	0	0	1	2	0	0	CO5
6	Properties of matter	08	11	8	3	0	0	1	1	0	0	CO5
Total		60	80	17	39	14	10	4	8	3	1	

Unit Test Syllabus

Year/ Semester	Unit Test	Syllabus
First semester	Unit Test-I	1. Units and Dimensions 2. Elements of Vectors 3. Dynamics
	Unit Test-II	4. Friction 5. Work, power and energy 6. Properties of matter

State Board of Technical Education and Training Andhra Pradesh::Vijayawada

Govt. Institute of Ceramic Technology (Autonomous)

Gudur, SPSR Nellore-524101

C-20, Model paper

I Semester – Unit -I

Subject Name: Engineering Physics-I

Course Code: CER-1103

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Fill in the blanks

a) The dimensional formula of force is....

b) Dimensional analysis is not applicable if an equation contain exponential function...(True/ False)

c). Which is following is not fundamental physical quantities.....

A). Length B). Mass C). Volume

d). S.I units can covers all branches of science and engineering...(Yes/No)

2. State triangular law vectors?

3. If a force $F=i+j+3k$ produces a displacement $S=2i-j+4k$. find work done?

4. Write the equations of motion for a freely falling body?

5. Derive the expression for maximum height of a body projected vertically upwards?

PART- B

Marks: 3 x 8= 24

Answer all questions. Each question carries eight marks.

6. A). State the principle of homogeneity and check the correctness of equation $v=u+at$?

(OR)

B). Convert energy unit erg into joule?

7. A). Write each four properties of vector product and scalar product?

(Or)

B). State and prove parallelogram law of vectors?

8. A). Derive the expressions for time of light and range for projectile?

(Or)

B). Show the path of projectile is parabola in case of an oblique projection?

State Board of Technical Education and Training

Andhra Pradesh::Vijayawada

Govt. Institute of Ceramic Technology (Autonomous)

Gudur, SPSR Nellore-524101

C-20,Model paper

I Semester – Unit -II

Subject Name: Engineering Physics-I

Course Code: CER-1103

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Write any four methods of reducing of friction?
2. State any three laws of friction?
3. Define work, Power and Energy?
4. Explain the Hook's law?
5. Derive the relationship between kinetic energy and momentum?

PART- B

Marks: 3 x 8= 24

Answer all questions. Each question carries eight marks.

6. A). It is easier to pull a lawn roller than to push it. Explain?

(OR)

B). Derive the expression for acceleration of body moving upon a rough inclined plane?

7. A). State and prove work- energy theorem?

(Or)

B). State and verify the law of conservation of energy in the case of a freely falling body?

8. A). what is effect of temperature on viscosity of liquids and gases?

(Or)

B). Explain phenomenon of surface tension with reference to the molecular theory?

SCHEME: C – 20

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY

GUDUR – 524101: SRI POTTI SREERAMULU NELLORE DISTRICT, A.P

Autonomous Institute Vide G.O.Ms.No. 214/ Edn, (TE – I Dept.) 05-10-1996

ISemester Examination (MPEC) for 3 ½ Year Diploma in Ceramic Technology

COURSE CODE: CER-1103

COURSE NAME: ENGINEERING PHYSICS-I

TIME: 3 HOUR

Max.Marks:80

PART—A

3×10=30

Instructions: (1) Answer all questions.

(2) Each question carries threemarks.

(3) Answers should be brief and straight to the point and shall not exceed five simple sentences.

1. Write the dimensional formula of the following physical quantities
a) (Velocity) (b) Force (c) Angular momentum
2. Write any three properties of scalar product.
3. Define fundamental unit, dimension and dimensional formula.
4. Define projectile. Give two examples.
5. It is easier to pull a lawn roller than to push it. Explain.
6. Define potential energy and kinetic energy.
7. List the base and supplementary units of S.I system with their symbol.
8. Explain and state polygon law of vectors.
9. Define work, power and energy.
10. Define viscosity and give two examples.

PART—B

8 × 5 = 40

Instructions: (1) Each question carries eight marks.

(2) Answers should be comprehensive and the criterion for valuation is the content But not the length of the answer.

11. A) Derive an expression for magnitude and direction of the resultant of two vectors using Parallelogram law of vectors.

OR

B) write properties of vector product and scalar product.

12. A) Show that path of a projectile is parabola in case of oblique projection and derive expression for maximum height.

OR

B) Derive an expression for time of flight and maximum height for vertically thrown up body.

13. A) Derive expression for acceleration of a body sliding downwards on a rough inclined plane.

OR

B) write advantages and disadvantages of friction

14. A) Verify the law of conservation of energy in case of a freely falling body

OR

B) State and prove work-energy theorem.

- 15.) A). Write the effect of temperature on viscosity of liquids and gases..

OR

B). Explain the surface tension with molecular theory.

PART C

1 × 10 = 10

- 16) so that time of ascent and time of descent are equal for vertically projected body.

ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES – I

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks of FA	Marks of SA
CER-1104	Engineering Chemistry & Environmental Studies – I	04	60	20	80

S. No	Unit Title	No. Of periods	Cos mapped
1	Fundamentals of chemistry	18	28
2	Solutions	10	14
3	Acids and bases	10	14
4	Principles of metallurgy	10	8
5	Electro chemistry	12	16
	Total	60	80

COURSE OBJECTIVES AND COURSE OUTCOMES

Course Objectives		<ol style="list-style-type: none">1. To understand the concepts of chemistry involved in the process of various Engineering Industrial Applications.2. To know the various natural and man-made environmental issues And concerns with an interdisciplinary approach that include physical, chemical, biological and socio cultural aspects of environment.3. After studying this course, the student will be able to understand and appreciate the role of chemistry in our daily life.
	CO1	Explain Bohr's atomic model and the different types of chemical bonding in certain molecules and concept of oxidation, reduction.
	CO2	Understand mole concept, molarity and normality and solve the problems.
	CO3	Explain the theories of acids and bases, concept of pH, buffer solutions, buffer action and preservatives.
	CO4	Understand and explain the different metallurgical processes, alloys and applications of alloys.
	CO5	Explain electrolysis and applications of electrolysis; Solve the problems on Faraday's laws of electrolysis. Understand and Explain Galvanic cell, emf of cell -electro chemical series- Applications of Galvanic cells, batteries and fuel cells.

Course Outcomes		
-----------------	--	--

COS, POS, PSOS MAPPING

High, 2:
Moderate,
1: Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3					1		1	1	1
CO2	3		2					1	1	
CO3	3		2					1		
CO4	3	2			2				2	2
CO5	3			2			2	1	1	

Blue Print of a Question Paper

S.No	Major topic	No of Periods	Weight age of marks	Marks wise distribution of Weightage				Question wise distribution of Weightage				Mapping with CO
				R	U	AP	AN	R	U	AP	AN	
1	Fundamentals of Chemistry	18	28	14	11	3	0	3	2	1	0	CO1
2	Solutions	10	14	3	0	11	0	1	0	2	0	CO2
3	Acids and bases	10	14	3	8	3	0	1	1	1	0	CO3
4	Principles of Metallurgy	10	8	0	8	0	0	0	1	0	0	CO4
5	Electrochemistry	12	16	3	3	0	10	1	1	0	1	CO5
	Total	60	80	23	30	17	10	6	5	4	1	

Upon completion of the course the student shall be able to learn

out ENGINEERING CHEMISTRY AND ENVIRONMENTAL STUDIES

1. Atomic structure

1.1 Explain the charge, mass of fundamental particles of an atom (electron, proton and neutron) and the concept of atomic number and mass number.

1.2 State the Postulates of Bohr's atomic theory and its limitations.

1.3 Explain the significance of four Quantum numbers.

1.4 Explain 1. Aufbau principle, 2 Pauli's exclusion principle 3 Hund's rule.

1.5 Define Orbital of an atom and draw the shapes of s, p and d-Orbitals.

1.6 Write the electronic configuration of elements up to atomic number 30

- 1.7 Explain the significance of chemical bonding
- 1.8 Explain the Postulates of Electronic theory of valency
- 1.9 Define and explain Ionic and Covalent bonds with examples of NaCl, MgO, *H₂, *O₂ and *N₂. (* Lewis dot method)
- 1.10 List out the Properties of Ionic compounds and covalent compounds and distinguish between their properties.
- 1.11 Structures of ionic solids-define a) Unit cell b) co-ordination number and the structures of NaCl and CsCl unit cells.

2. Solutions

- 2.1 Define the terms 1. Solution, 2. Solute and 3. Solvent
- 2.2 Classify solutions based on physical state and solubility
- 2.3 Define mole and problems on mole concept.
- 2.4 Define the terms 1. Atomic weight, 2. Molecular weight and 3. Equivalent weight and calculate Molecular weight and Equivalent weight of the given acids. (HCl, H₂SO₄, H₃PO₄) Bases (NaOH, Ca(OH)₂, Al(OH)₃) and Salts (NaCl, Na₂CO₃, CaCO₃)
- 2.5 Define molarity and normality and numerical problems on molarity and normality
 - a) Calculate the Molarity or Normality if weight of solute and volume of solution are given
 - b) Calculate the weight of solute if Molarity or normality with volume of solution
 - c) Problems on dilution to convert high concentrated solutions to low concentrated Solutions

3. Acids and bases

- 3.1 Explain Arrhenius theory of Acids and Bases and give the limitations of Arrhenius theory of Acids and Bases.
- 3.2 Explain Bronsted-Lowry theory of acids and bases and give the limitations of Bronsted-Lowry theory of acids and bases.
- 3.3 Explain Lewis theory of acids and bases and give the limitations of Lewis theory of acids and bases.

3.4 Explain the Ionic product of water

- 3.5 Define pH and explain P^H scale and solve the Numerical problems on pH (Strong Acids and Bases)
- 3.6 Define and explain buffer solution and give the examples of buffer solutions.
- 3.7 State the application of buffer solutions

4. Principles of Metallurgy

- 4.1 List out the Characteristics of Metals and non-metals
- 4.2 Distinguish between Metals and Non-metals
- 4.3 Define the terms 1. Mineral, 2. Ore, 3. Gangue, 4. Flux, 5. Slag
- 4.4 Describe the methods of concentration of Ore; 1. Handpicking, 2. Levigation and 3. Froth Floatation
- 4.5 Describe the methods involved in extraction of crude metal- Roasting, Calcination and Smelting.
- 4.6 Explain the purification of Copper by Electrolytic Refining
- 4.7 Define an Alloy and Write the composition and uses of the following alloys. 1. Brass 2. German silver 3. Nichrome.

5. Electrochemistry

- 5.1 Define the terms 1. Conductor 2. Semiconductor 3. Insulator, 4. Electrolyte 5. Non-electrolyte. Give two examples each.
- 5.2 Distinguish between metallic conduction and Electrolytic conduction
- 5.3 Explain electrolysis by taking example fused NaCl
- 5.4 Explain Faraday's laws of electrolysis
- 5.5 Define 1. Chemical equivalent (E) 2. Electrochemical equivalent (e) and their relation.
- 5.6 Solve the Numerical problems on Faraday's laws of electrolysis and applications of electrolysis (Electro plating)
- 5.7 Define Galvanic cell and explain the construction and working of Galvanic cell.
- 5.8 Distinguish between electrolytic cell and galvanic cell
- 5.9 Explain the electrode potentials and standard electrode potentials
- 5.10 Explain the electrochemical series and its significance
- 5.11 Explain the emf of a cell and solve the numerical problems on emf of the cell based on standard electrode potentials.

COURSE CONTENT

ENGINEERING CHEMISTRY AND ENVIRONMENTAL STUDIES

1. Fundamentals of Chemistry

Atomic Structure: Introduction - Fundamental particles – Bohr's theory – Quantum numbers

–Aufbau principle - Hund's rule - Pauli's exclusion Principle- Orbitals, shapes of s, p and d orbitals - Electronic configurations of elements

Chemical Bonding: Introduction – types of chemical bonds – Ionic and covalent bond with examples – Properties of Ionic and Covalent compounds- structures of ionic crystals (NaCl and CsCl).

2. Solutions

Introduction of concentration methods – mole concept, molarity and normality – Numerical problems on mole, molarity and normality.

3. Acids and Bases

Introduction – Theories of acids and bases and limitations – Arrhenius theory- Bronsted – Lowry theory – Lewis acid base theory – Ionic product of water- pH related numerical problems – Buffer solutions, action of buffer and its applications.

4. Principles of Metallurgy

Characteristics of Metals and non-metals – Distinguish between Metals and Non-metals, Define the terms i) Metallurgy ii) ore iii) Gangue iv) flux v) Slag - Concentration of Ore – Hand picking, Levigation, Froth floatation – Methods of Extraction of crude Metal – Roasting, Calcination, Smelting – Alloys – Composition and uses of brass, German silver and nichrome.

5. Electrochemistry

Conductors, semiconductors, insulators, electrolytes and non-electrolytes – electrolysis – Faraday's laws of electrolysis-application of electrolysis (electroplating) - numerical problems on Faraday's laws – Galvanic cell – standard electrode potential – electrochemical series – emf and numerical problems on emf of a cell.

REFERENCE BOOKS

- | | | |
|----|----------------|----------------------------------|
| 1. | Telugu Academy | Intermediate chemistry Vol 1 & 2 |
| 2. | Jain & Jain | Engineering Chemistry |
| 3. | O.P. Agarwal, | Hi- Tech. Engineering Chemistry |
| 4. | Sharma | Engineering Chemistry |

5. A.K. De EngineeringChemistry

Table specifying the scope of syllabus to be covered for unit test 1 and unit test 2

Unit Test	Learning outcomes to be covered
Unit Test - 1	From 1.1 to 3.7
Unit Test - 2	From 4.1 to 5.11

Model question paper for Unit Test with Cos mapped

UNIT TEST –I

Model Question Paper (C-20)

ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES - I (CER-1104)

TIME:90minutes

Total Marks:40

PART-A

16Marks

Instructions: (1) Answer all questions.

(2) First question carries 4 marks and each of rest carries 3marks.

(3) Answers for Q.No. 2 to 5 should be brief and straight to the point and shall not exceed five simple sentences.

- Number of neutrons in ${}_{11}^{23}\text{Na}$ is -----
 - The molarity and normality of HCl is the same (True or False)
 - What is the p^{H} range of base?
 - Graphite is a good conductor of electricity (Yes or No)
- Distinguish between orbit and orbital.
- Define Covalent bond. Explain the formation of covalent bond in Oxygen and Nitrogen molecules.
- Define mole. Calculate the number of moles present in 50 gm of CaCO_3 and 9.8 gm of H_2SO_4 .
- Define P^{H} . Calculate the P^{H} of 0.001M HCl and 0.01M NaOH solution.

PART–B

3x8M =24M

Answer either (A) or (B) from Each question carries 8 marks.

- Explain Postulations of Bhor's atomic theory. Give its limitations.

(OR)

 - Explain the significance of Quantum numbers.
- Express molarity normality with mathematical equation. Calculate the molarity and normality of 10gm of NaOH present in 500 ml solution.

(OR)

 - Classify solutions based the physical state of solute and solvent and give an example each.
- What is buffer solution? Classify with examples and give it's applications.

(OR)

 - Explain Bronsted-Lowry theory of acids and bases. Give its limitations.

UNIT TEST –II

Model Question Paper (C-20)

ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES - I (CER-1104)

TIME:90minutes

Total Marks:40

PART-A

4 X 5 = 20M

Instructions: (1) Answer all questions.

(2) Each question carries 4 marks.

1. List out the characteristics of Metals
2. Define Alloy and write composition for Brass.
3. Define the terms Conductor and Semi Conductor.
4. List any three differences between metallic conduction and electrolytic conduction.

PART-B

3x8M =24M

Answer either (A) or (B) from Each question carries 8 marks.

5. A) Explain the purification of Copper by Electrolytic Refining.
(OR)
B) Explain the methods involved in extraction of crude metal roasting, Calination and smelting.
6. A) Explain electrolysis by taking example fused NaCl.
(OR)
B) explain electrochemical series and its significance.
7. A) Explain froth floatation and electrolytic refining of copper with s k e t c h
(OR)
B) Explain the construction and working ofgalvaniccell.

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY

GUDUR – 524101: SRI POTTI SREERAMULU NELLORE DISTRICT, A.P

Autonomous Institute Vide G.O.Ms.No. 214/ Edn, (TE – I Dept.) 05-10-1996

ISemester Examination (MPEC) for 3 ½ Year Diploma in Ceramic Technology

COURSE CODE: **CER -1104**

COURSE NAME: **ENGINEERING CHEMISTRY &
ENVIRONMENTAL STUDIES - I**

TIME: 3 HOUR

Max.Marks:80

PART – A

3 x 10 = 30 Marks

Note : 1. Answer all questions and each question carry **THREE** marks.

2. Answer should be brief and straight to the point and shall not

exceed **FIVE** simple sentences.

1. Define atomic number and mass number with an example each.
2. State and explain Aufbau's principle .
3. Define orbital . Draw the Shapes of S and P orbitals .
4. Write the electronic Configuration of a) Magnesium b) Chromium c) Sulphur.
5. Define Solute ,Solvent and Solution .
6. Define Mole. Calculate the number of moles in 90 gm of Water.
7. Define P^H. Calculate the P^H of 0.001M NaOH Solution.
8. Lewis acid. Give any two examples
9. Distinguish between electrolytic cell and Galvanic cell.
10. Define Strong and Weak electrolytes. Give an example each.

PART – B

5 X 8 = 40 Marks

Note : 1. Answer **all** questions and each question carry **Eight** marks.

2.The answer should be comprehensive and the criteria for valuation

is the content but not the length of the answer.

11. A).What are Quantum numbers. Explain their Significance.
(Or)
B).Define Covalent bond. Explain the bond formation in H₂ and O₂ molecules by Lewis dot method.
12. A). What are the important Postulates of Bohr's atomic theory and write any two limitations of Bohr's atomic theory.

(Or)

B) Define Ionic bond. Explain the formation in NaCl by Lewis dot method.

13. A). Define molarity. Give their expression and units. Find the molarity of solution contains 10.6 gm of Na_2CO_3 in 500 ml solution.

(Or)

B). Define normality. Give their expression and units. Calculate the volume of water to be added to 200 ml of 0.1 M NaOH solution.

14. A). Explain Bronsted-Lowry theory of acids and bases and write its limitations

(Or)

B). What is Buffer solution. State the applications of Buffer solutions

15. A) Distinguish between Metal and Non Metals.

(Or)

B) Explain froth flotation process with a neat sketch.

PART – C

1X 10 = 10

Instructions: Part C consists of **One** question which carries **Ten** marks.

16. State the Faraday's first and second laws. Calculate the weight of copper deposited at cathode when 10 amp of current is passed through copper sulphate solution for 1 hour (atomic weight of copper = 63.5).

\-oOo-

ELEMENTS OF CERAMIC TECHNOLOGY-I

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks of FA	Marks of SA
CER-1201	ELEMENTS OF CERAMIC TECHNOLOGY-I	04	60	20	80

S.No	Unit Title	No. of Periods	COs Mapped
1	Introduction	10	CO1
2	Types Of Clay Ware / Pottery Ware	12	CO1
3	Preparation Of Clay Bodies	12	CO1,CO2
4	Fabrication Methods In Clay Industry	12	CO1,CO2,CO3
5	Finishing And Drying Of Clay Ware	05	CO2,CO3,CO4
6	Glazing And Decoration	04	CO4,CO5
7	Firing Of Ceramic Ware	05	CO4,CO5,CO6
	Total	60	

Course Objectives and Course Outcomes

Course Objectives	Upon completion of the course the student shall be able to: Acquire the basic knowledge about ceramics, its sub- branches and process of preparing a pottery articles		
Course contents		Upon completion of the course the student shall be able to:	
	CO1	CER-1201.1	Comprehend the term ceramics and various fields of ceramics
	CO2	CER-1201.2	List the different types of pottery ware
	CO3	CER-1201.3	Prepare a pottery bodies by using different compositions
	CO4	CER-1201.4	Learn different shaping methods of preparing pottery articles
CO5	CER-1201.5 CER-1201.6	Get knowledge on finishing, Drying, glazing and firing of pottery ware	

PO-CO Mapping

Course Code: 1201		Course Title: Elements of Ceramic Technology-I			No of Periods: 60	
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks	
		No	%			
PO1	CO1, CO2	15	25	2	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately Addressed 5 to 25% Level 1 Low addressed <5% Not addressed	
PO 2	CO2,CO3,CO4,CO5	37	61.67	3		
PO 3						
PO 4						
PO 5						
PO 6						
PO 7	CO4, CO5	08	13.33	1		

3: High, 2: Moderate,1: Low

Blue Print of a Question Paper

S. No	Chapter Name	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Introduction	10	06	03	03			1	1			CO2,CO3,CO4,CO5
2	Types Of Clay Ware / Pottery Ware	12	14	3	11			1	2			CO3,CO4
3	Preparation Of Clay Bodies	12	22	11	3	8		2	1	1		CO4,CO5
4	Fabrication Methods In Clay Industry	12	21	3		8	10	1		1	1	CO4,CO5
5	Finishing And Drying Of Clay Ware	05	03		03				1			CO4
6	Glazing And Decoration	04	03		3				1			CO4
7	Firing Of Ceramic Ware	05	11	3	8			1	1			CO4,CO5
TOTAL		60	80	23	31	16	10	6	7	2	1	

R-Remember; U-Understanding; Ap-Application ; An- Analysing

Learning Outcomes

Upon on completion of the course the student shall be able to:

1.0 INTRODUCTION

- 1.1 Know the Origin of Ceramics.
- 1.2 Define Ceramics.
- 1.3 Discuss the Stages in the Development of Ceramics.
- 1.4 Understand the applications of the Ceramics.
- 1.5 List the Sub-branches in Ceramics.
- 1.6 Define the term Refractories, Glass, Enamel and Cement with examples.
- 1.7 List the Pottery Ware and mention examples.
- 1.8 Know the importance of Silicate Technology in Ceramics.

2.0 TYPES OF POTTERY WARE

- 2.1 Define the term Pottery.
- 2.2 List the types of Pottery
- 2.3 List the types of porous bodies and its properties.
- 2.4 List the products of Heavy Clay Ware
- 2.5 Define Terracotta, Majolica Ware, Earthen Ware.
- 2.6 Define Non-porous/Dense bodies.
- 2.7 List the types of Non-porous/ Dense bodies and its properties.
- 2.8 Define Stoneware, Porcelain, Bone China.
- 2.9 Define the term White Ware.
- 2.10 List the Types of product comes under White Ware, Vitreous and Semi Vitreous bodies

3.0 PREPARATION OF POTTERY BODIES

- 3.1 Benification process of Plastic Materials (Clays) and Non-plastic Materials.
- 3.2 Understand the term Ageing and souring, slaking and weathering
- 3.3 What is Calcination and the use of calcination.
- 3.4 List the Stages in the body preparation.
- 3.5 Describe the crushing and grinding of Raw materials.
- 3.6 Explain the Importance of weighing of the batch and mixing of Raw materials.
- 3.7 Know Blunging, Agitation and Agitator, Screening (or) Lawn and Magnetic separation
- 3.8 Explain the Spray drying process, Filter pressing process and Pugging & De-airing.

4.0 FORMING METHODS IN CLAY INDUSTRY

- 4.1 List the types of Fabrication methods.
- 4.2 Know briefly the Slip casting processes like Solid Casting, Hollow Casting, Pressure Casting, Battery Casting, etc.
- 4.3 List the Plastic Forming.
- 4.4 Describe the Soft mud processes like Hand moldings, Throwing, Jiggering and jollying, ram press, etc.
- 4.5 Describe the stiff mud process like extrusion, wire cut process etc.
- 4.6 What is Turning process.
- 4.7 Explain the Dry Pressing.

5.0 FINISHING & DRYING OF CERAMIC WARE

- 5.1 What is the Necessity of Finishing.
- 5.2 Describe Trimming process, Spinging process, Fettling process and Towing process.
- 5.3 Comprehend the Necessity of drying.
- 5.4 List the drying defects in Clay Ware.
- 5.5 List the Types of dryers used in Ceramic industry.

6.0 GLAZING AND DECORATION

- 6.1 Define the term Glaze.
- 6.2 Classify the glazes according to Composition and Temperature

- 6.3 List the Application methods of glaze.
- 6.4 Write the need of decoration of Ceramic Ware.
- 6.5 List the Ceramic coloring oxides.
- 6.6 Name the different Ceramic Stains.
- 6.7 Name the application methods of decoration.
- 6.8 Understand the under- glaze and on-glaze decoration process
- 6.9 List the defects in glazed ware.

7.0 FIRING OF CERAMIC WARE

- 7.1 Name the types of Kilns used for firing of ceramic ware
- 7.2 Write the necessity Bisque Firing process.
- 7.3 Know about Glost Firing process.
- 7.4 Explain the action of Heat on clay bodies or Physical & Chemical changes in the ceramic ware.

COURSE CONTENTS:

1. **INTRODUCTION:** Origin of Ceramics, Definition of Ceramics, Stages in Development of Ceramics, Importance of Ceramics, Sub-branches in Ceramics, Pottery-Glass-Refractories-Cement-Enamels, Silicate Technology related to Ceramics.

2. **TYPES OF POTTERY WARE:** Definition of Pottery, Types of Pottery, Porous and Non-porous Bodies, Heavy clay ware products, Terracotta, Majolica ware, Earthen ware, Non-porous bodies-Stone ware, Porcelain, Bone china, White ware products, Vitreous and Semi-Vitreous bodies.

3. **PREPARATION OF CLAY BODIES:** Treatment of Plastic Materials, Ageing and souring, slaking and weathering, Treatment of Non-plastic materials. Calcination, Stages in body preparation, crushing and grinding of raw materials, weighing and mixing of raw materials, Blunging, screening, Magnetic separation, spray drying process, Filter pressing process, pugging and de-airing.

4. **FORMING METHODS IN CLAY INDUSTRY:** Types of Fabrication methods. Types of Slip Casting methods- Solid casting, Hollow casting, Battery casting and pressure casting, . Types of Plastic Forming methods, Soft mud process- Hand molding, Throwing, Jigger and jolleying, ram press, Stiff mud process like extrusion, wire cut process, Turning Process, Dry Pressing Process.

5. **FINISHING AND DRYING OF CERAMIC WARE:** Types of Finishing methods like Trimming, sponging, fettling and towing, Need of Drying, Types of Dryers, Drying defects

6. **GLAZING AND DECORATION:** Definition of glaze, Types of glazes. Preparation of glazes. Methods of application of glaze. Need of decoration. Application methods of decoration. Ceramic colors. Ceramic stains.

7. **FIRING OF CERAMIC WARE:** Types of Kilns, Bisque Firing. Glost Firing. Action of Heat on clay ware during firing/ physical and chemical changes during firing .

NOTE: - The faculty, teaching the subject are requested to keep it in view that these topics are taught in detail as an individual papers in the future semesters, hence stress is to be given on the basis.

REFERENCE BOOKS:

1. Sudhir Sen, Ceramic White Wares, Oxford & IBH publishing Ltd., New Delhi, 1992.
2. S. Kumar, Hand Book of Ceramics, Volume I and II. Kumar and Associates, Kolkata, 1994 and 1995
3. F.H. Norton, Elements of Ceramics, 2nd edition, Addison Wesley, London, 1994.
4. S. Kumar, Source of Ceramics, Dipankar Kumar, Kolkata, 2002
5. Saikat Maitra and Asis K Bandyopadhyay, Gate Way to Ceramics, SMD Udyog, 9/4A/1Q South Sinthee Road, Kolkata-5, 2003.

6. Felix Singer and Sonja S Singer Industrial Ceramics, Oxford & IBH Publishing Co., New Delhi, 1991.
7. Budnikov, P.P, The Technology of Ceramics and Refractories, Cambridge MIT, 1964.
8. R.CHARAN, Hand Book of Glass Technology,
9. FAY V. TOOLEY, Handbook of Glass Manufacture Volume I & II, Ogden Publishing Company, New York, 1960.
10. SAMUEL R SCHOLES, Modern Glass Practice, Industrial Publications, Inc., Chicago, 1952.

Unit Test Syllabus

Year/ Semester	Unit Test	Syllabus
First semester	Unit Test-I	<ol style="list-style-type: none">1. Introduction2. Types of clay ware3. Preparation of clay bodies
	Unit Test-II	<ol style="list-style-type: none">4. Fabrication methods in clay industry5. Finishing and Drying6. Glazing and Decoration7. Firing of ceramic ware

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur, SPSR Nellore-524101
C-20, Model paper
I Semester – Unit I

Subject Name: ECT-I

Course Code: CER-1201

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Fill in the blanks
 - a. Chemical formula of Clay is
 - b. Ball clay is a plastic material (True/ False)
 - c. Earthen ware is a Porous body (True/ False)
 - d. is used to make granules from slip
2. Define Ceramics?
3. List the products comes under Heavy clay ware ?
4. Define Porcelain?
5. What is Tempering?

PART- B

Marks: 3 x 8= 24

Answer all questions. Each question carries eight marks.

6. A). Write classification of Ceramics? Explain in detail?
(or)
B) Describe Heavy clay ware?
7. A) Write short notes on (a) Earthen ware (b) Stone ware
(or)
B) Explain working of spray drier?
8. A) Describe Ball mill?
(or)
B) Explain working of Filter press?

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur, SPSR Nellore-524101
C-20,Model paper
I Semester – Unit II

Subject Name: ECT-I
Time: 90 min

Course Code: CER-1201
Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Fill in blanks
 - a. Fettling is a Finishing technique (True/ false)
 - b. A glassy coating on ceramic ware is called
 - c. The suspension of particles in fluid medium is called.....
 - d. Extrusion is a soft mud process (True/ False)
2. Define Glaze? Write classification of glazes?
3. Write classification of Kilns?
4. What is under glaze decoration?
5. List drying defects?

PART- B

Marks: 3 x 8= 24

Answer all questions. Each question carries eight marks.

6. A).Write the types of Slip casting? Describe any two of them?

(Or)

B).How to make cups by Jigger and Jolleying process?

7. A).Describe Extrusion process?

(Or)

B).Write chemical changes that occur during firing of ceramic ware ?

8. A).Explain in detail about Finishing of ceramic ware ?

(Or)

B).Describe Dry pressing ?

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY

GUDUR-524101:SRI POTTI SREERAMULU NELLORE DISTRICT, A.P

Autonomous Institution Vide G.O.Ms.No. 214/Edn, (TE-I Dept.) 05-10-1996

I-Semester Examination (MPEC) for 3½ Year Diploma in Ceramic Technology

C-20

COURSE CODE: CER-1201

COURSE NAME: **ECT-I**

TIME: 3 Hours

Max Marks: 80

PART – A

10 X 3 = 30

Instructions: *Part A consists of 10 questions. Answer all questions and each question carries three marks.*

1. Define the term Ceramic?
2. Define Glass? Give examples?
3. Write the properties of Porous bodies?
4. List the products comes under vitreous and non- vitreous bodies?
5. Write the stages in the body preparation?
6. Describe Blunger?
7. Write the types of plastic forming methods?
8. What is fettling?
9. Classify the glazes according to the composition and temperature?
10. List types of kilns used for firing?

PART – B

5 X 8 = 40

Instructions: *Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.*

11. (A) Define Non- porous bodies? Write types of Non- porous bodies? Explain any one of them?

(OR)

(B) List the products comes under Heavy clay ware? Describe Earthen ware?

12. (A) Write the construction, working of a Jaw crusher?

(OR)

(B) Describe about Spray Dryer?

13. (A) Explain in detail about Filter press?

(OR)

(B) Write short notes on (a) Magnetic separator (b) Tempering

14. (A) Describe different slip casting process?

(OR)

(B) Explain in detail about Dry pressing process?

15. (A) What is Bisque and glost firing? List the kilns used for firing of ceramic articles?

(OR)

(B) Write the Physical and chemical changes that takes place during firing?

PART – C

1X 10 = 10

Instructions: *Part C consists of 1 question which carries 10 marks.*

16. Suggest the fabrication process which is used for making of ceramic tubes and rods? Describe the manufacturing process in detail?

-oOo-

CERAMIC RAW MATERIALS

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks of FA	Marks of SA
CER-1202	Ceramic Raw Materials	05	75	20	80

S.No	Unite Title	Periods	Cos Mapped
1	Geology	10	CO1
2	Mineralogy	10	CO2
3	Clays	05	CO3
4	Silica Minerals	10	CO4
5	Alumina Minerals	05	CO5
6	Feldspar Minerals	05	
7	Carbonate Minerals	05	
8	Magnesia Minerals	05	
9	Fluorine Minerals	05	
10	Titanium Minerals	05	
11	Rare Earth Minerals	05	
12	Industry Usage in vast manner	05	
	Total	75	

Course Objective and Course Outcomes

Courses Objectives	Upon Completion of the Courses the student be able to know the basic knowledge of Earth Minerals and source of the ceramic minerals		
Courses Contents	Upon Completion of the Courses the student be able to		
	CO1	CER-1202.1	study the formation of Earth, Rocks, Minerals
	CO2	CER-1202.2	Developing the skills during Interference of Ceramic Mineral characteristics
	CO3	CER-1202.3	Analyse importance of ceramic minerals
	CO4	CER-1202.4	Get comprehensive knowledge on Usage of Industrial minerals
	CO5	CER-1202.5 to 12	Get concept of clays ,Important properties of different Natural Mineral group and it's Roll in Ceramic Industry.

PO-CO Mapping

Course Code :CER-1202		Course Title : Ceramic Raw Materials		No.Of.Periods : 75	
Pg.No	Mapped with Co No	Co Periods addressing Po In Co/1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1,CO2,CO3	25	32.5	2	>40% Level 3 High addressed 25% to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <% Not addressed
PO2	CO4	05	9.0	1	
PO3					
PO4					
PO5	CO1-CO4,5	45	58.5	3	
PO6					
PO7					

Blue Print For Question Paper

S.No	Chapter Name	Period Allocated	Weighted Allocated	Marks Wise Distribution of weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	AP	AN	R	U	AP	AN	
1	Geology	10	11	03		08		01		01		CO5-CO10, CO12
2	Mineralogy	10	03	03				01				
3	Clays	05	03	03				01				CO1-CO3
4	Silica Minerals	10	08			08				01		CO4
5	Alumina Minerals	05	03	03				01				CO5
6	Feldspar Minerals	05	18			08	10			01	01	CO5
7	Carbonate Minerals	05	03		03				01			CO5
8	Magnesia Minerals	05	03	03				01				CO5
9	Fluorine Minerals	05	03		03				01			CO5
10	Titanium Minerals	05	03		03				01			CO5
11	Rare Earth Minerals	05	11	03		08		01		01		CO5
12	Industry used in vast manner	05	11	03	08			01	01			CO5
	Total	75	80	21	17	32	10	07	04	04	01	

R-Remember , U- Understanding , Ap – Application, An- Analysing

Learning Outcomes

Upon on Completion of the course the student shall be able to

1.0 GEOLOGY

- 1.1 Definition of geology, petrology, lava, magma.
- 1.2 Formation of rocks, characteristics of rocks
- 1.3 Classification of rocks and sub-classification of rocks.
- 1.4 Distinguish between lava and magma,
- 1.5 Distinguish primary or secondary rocks.
- 1.6 Formation of secondary and metamorphic rocks.

2.0 MINERALOGY

- 2.1 Reference the terms of mineralogy, mineral, ore.
- 2.2 List the ore, minerals used in ceramic industry.
- 2.3 Distinguish the ore and mineral
- 2.4 Understand chemical composition, physical properties of minerals.
- 2.5 Understand the optical properties of minerals
- 2.6 Explain Moh's Scale Hardness of minerals.

3.0 CLAYS

- 3.1 Details study of natural mineral groups kaolin, montmorillonite group, and illite group
- 3.2 Describe the origin of clay, classification of clays.
- 3.3 List the impurities and its effects of clays.
- 3.4 List the physical properties of clays
- 3.5 Explain properties and uses of kaoline, pyrophyllite
- 3.6 List the clays and used in ceramic industry

4.0 SILICA MINERALS

- 4.1 Classify the silica minerals
- 4.2 Source, physical, chemical, properties and uses of
 - (i) Quartz
 - (ii) Quartzite
 - (iii) Flint
 - (iv) Diatomite
 - (v) Quartz sand
 - (vi) Glass sand
- 4.3 Explain allotropy of quartz

5.0 ALUMINA MINERALS

- 5.1 Classify the alumina minerals
- 5.2 Source, physical, chemical, properties and uses of
 - a. Corundum
 - b. Hydrated Alumina minerals.
 - (i). Bauxite, (ii). Gibbsite, (iii) Diaspore, (iv). Boehmite etc.
 - c. Alumino - Silicate minerals.
 - (i). Sillimanite, (ii) Kyanite, (iii) Andalusite etc.,
 - d. Hydrated Alumino Silicates.
 - e. Alkali Alumino silicates: (i). Feldspar, (ii). Talc, (iii). Beryl etc.

6.0 FELDSPAR GROUP MINERALS

- 6.1 Classify the feldspar minerals and their formula's
- 6.2 Source, properties and uses of different types of feldspar
- 6.3 Source, properties and uses of Nephelinesyenite, china stone and Cornish stone.

7.0 CARBONATE MINERALS

- 7.1 list the carbonate minerals

- 7.2 Source, properties and uses of lime stone, dolomite, magnesite and calcite.
- 7.3 Understanding the properties and uses of wollastone
- 8.0 MAGNESIUM SILICATE MINERALS
 - 8.1 list the magnesium silicate minerals
 - 8.2 Source, properties and uses of steatite, talc, cordierite and forsterite.
 - 8.3 Source, properties and uses of olivine, fayalite
- 9.0 FLUORINE MINERALS
 - 9.1 list the fluorine mineral
 - 9.2 Source, properties and uses of fluorspar and cryolite
- 10.0 TITANIUM MINERALS
 - 10.1 list the titanium minerals
 - 10.2 Source, properties and uses of Rutile, Brookite, Anatase etc
 - 10.3 Source, properties and uses of beryl.
- 11.0 RARE EARTH MINERALS
 - 11.1 list of the rare earth minerals
 - 11.2 Source, properties and uses of
 - (b) Zircon
 - (c) Zirconia
 - (d) Beach sand
 - (e) Uranium oxide
 - (f) Thoria
 - (g) Beryllia..etc.,
- 12.0 INDUSTRIAL USAGE IN VAST MANNER
 - 12.1 List the types of gypsum
 - 12.2 Source, properties and uses of gypsum
 - 12.3 The effect of heat on gypsum
 - 12.4 Source, properties and uses of plaster of paris
 - 12.5 Source, properties and uses of i). Pyroxene ii). Barites iii). Graphite iv). chromite
 - 12.6 Source, properties and uses of i). Red lead ii). White

COURSE CONTENTS:

1. GEOLOGY: Definition of geology, petrology, lava, magma-Formation of rocks, characteristics of rocks-Classification of rocks and sub-classification of rocks-Formation of secondary and metamorphic rocks.
2. MINERALOGY: the terms of mineralogy, mineral, ore- chemical composition, physical properties and uses of minerals-optical properties of minerals-List the ceramic minerals-Moh's Scale Hardness of minerals.
3. CLAYS : natural mineral groups kaolin, montmorillonite group, and illite group- origin of clay, classification of clays- impurities and its effects of clays- physical properties of clays- kaoline, pyrophyllite physical properties.
4. SILICA MINERALS: Classification of silica minerals-Source, physical, chemical, properties and uses of different silica minerals- allotropy of quartz.
5. ALUMINA MINERALS: Classification of alumina minerals-Source, physical, chemical, properties and uses of different types alumina minerals.
6. FELDSPAR GROUP MINERALS: Introduction and classification feldspar minerals -Source, properties and uses of different types of feldspar-Nephelinesyenite, china stone and Cornish stone.
7. CARBONATE MINERALS: list the carbonate minerals-Source, properties and uses of lime stone, dolomite, magnesite and calcite-properties and uses of wollastone
8. MAGNESIUM SILICATE MINERALS: list the magnesium silicate-Source, properties and uses of steatite, talc, cordierite and forsterite-olivine, fayalite

9. FLUORINE MINERALS: list the fluorine mineral-Source, properties and uses of fluorspar and cryolite
10. TITANIUM MINERALS: list the titanium minerals-Source, properties and uses of Rutile, Brookite, Anatase-beryl.
11. RARE EARTH MINERALS: list of the rare earth minerals-Source, properties and uses of Zirconia, Beachsand, Uranium oxide, Thoria, Beryllia..etc.,
12. INDUSTRIAL USAGE IN VAST MINERALS-List the types of gypsum-Source, properties and uses, effect of heat gypsum-Source, properties and uses of plaster of paris-Source, properties and uses of Pyroxene, Barites, Graphite, chromite, Red lead, White.

BOOKS RECOMMENDED:

1. C D Gribble, Rutley's Elements of Mineralogy, 27th Edition, Satish Kumar Jain for CBS Publishers, New Delhi, 1991.
2. Krishnan M.S, Introduction to Geology of India, The Madras Law Journal, 1943.
3. Kumar.S. , Handbook of Ceramics. Volume I , Kumar and Associate, Kolkata, 1994,
4. Worrall, W.E. Clays and Ceramic Raw Materials, Pergaman press, New York, 1992.
5. W.Ryan, Properties of Ceramic Raw Materials, Pergaman press, New York, 1978.
6. A.V. Milovsker and O V Kononov, Mineralogy, Mir Publishers, Mascow, 1985.
7. DANA, E.S. Text book of Mineralogy, 1946
8. Norton FH, Fine Ceramics, MecGraw Hill, New York, 1992.

Unit Test Syllabus

Year/ Semester	Unit Test	Syllabus
First semester	Unit Test-I	1. Geology 2. Minerology 3. Clays 4. Silica minerals
	Unit Test-II	5. Alumina Minerals 6. Feldspar Minerals 7. Carbonate Minerals 8. Magnesia Minerals 9. Fluorine Minerals 10. Titanium Minerals 11. Rare Earth Minerals 12. Industry Usage in vast manner

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur, SPSR Nellore-524101
C-20, Model paper
I Semester – Unit I

Subject Name: Ceramic Raw Materials	Course Code: CER-1202
Time: 90 min	Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

9. Fill in the blanks
 - I. The term geology
 - II. The term ore is.....
 - III. Lava is an.....
 - IV. Rock is a
10. Name the types of rocks?
11. Differentiate the magma and lava?
12. Define the term ore? List the types of ores?
13. Write physical properties of calcium fluorite mineral?

PART- B

Marks: 3 x 8= 24

Answer all questions. Each question carries eight marks.

14. A). Explain the formation of intrusive rock and extrusive rock?

(Or)

B). List the types of minerals used in ceramic industry?

15. A). Write the impurities and its effect in clays?

(Or)

B). Write the montmorillonite group minerals?

16. A). Describe in detail about kaolinization?

(Or)

B). Explain sedimentary rock formation?

State Board of Technical Education and Training
Andhra Pradesh:: Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur, SPSR Nellore-524101
C-20, Model paper
I Semester – Unit II

Subject Name: Ceramic Raw Materials

Course Code: CER-1202

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carry three marks each.

9. Fill in blanks

I. Colour of quartz....

II. Lustre of zirconia....

III. Chromite is

IV. Formula of forsterite....

10. Write physical properties of Quartz?

11. Classification feldspar group minerals?

12. Write the properties and uses of nepheline?

13. List the types of titanium minerals?

PART- B

Marks: 3 x 8= 24

Answer all questions. Each question carries eight marks.

14. A).List the types of gypsum? Write physical properties and uses of gypsum?

(Or)

B).List the types of plaster of paris? Write physical properties and uses of plaster of paris?

15. A).Write the properties and uses of red lead?

(Or)

B).Writeproperties of barities?

16. A).Describe in detail about wollastonite?

(Or)

B).Explainabout Cornish stone?

SCHEME: C – 20

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY

GUDUR – 524101: SRI POTTI SREERAMULU NELLORE DISTRICT, A.P

Autonomous Institute Vide G.O.Ms.No. 214/ Edn, (TE – I Dept.) 05-10-1996

ISemester Examination (MPEC) for 3 ½ Year Diploma in Ceramic Technology

COURSE CODE: **CER-1202** COURSE NAME: **CERAMIC RAW MATERIALS**

TIME: 3 HOUR

Max.Marks:80

PART – A

3 x 10 = 30 Marks

Note : 1. Answer all questions and each question carry **THREE** marks.

2. Answer should be brief and straight to the point and shall not

exceed **FIVE** simple sentences.

1. List the major rock forming minerals for ceramic?
2. What is optical mineralogy?
3. Differentiate Ore and a Mineral?
4. What is Koalinization?
5. Write the formula of Clay and Bauxite?
6. List the fluorine Minerals?
7. List the physical properties of Clay?
8. Write the effect of heat on gypsum?
9. Write the uses of Graphite?
10. What is Magnetite?

PART – B

5 X 8 = 40 Marks

Note : 1. Answer **all** questions and each question carry **Eight** marks.

2. The answer should be comprehensive and the criteria for valuation

is the content but not the length of the answer.

11 A) Explain the occurrence, properties and uses of Rutile?

(Or)

B). Explain how Feldspar, clay and Quartz are widely used in ceramics ?

12 Write a short notes on

1). Plaster of paris 2). Lime stone 3) Dolomite

13 A). Explain primary, secondary and Fusible Clays with example?

(Or)

B). How pressure and Temperature Influence the formation of Metamorphic Rock ? Write about types of Metamorphism?

14 A). Discuss the Physical properties and uses of Quartz and glass sand?

B).What is Synthetic materials? Discuss the physical and chemical properties of any one of them?

15 A). Write classification of clays, and write the properties and uses of China clay ?

B). Write about Moles Scale Hardness? Write about NephelineSyenite

PART – C

1X 10 = 10

Note 1 *Part C consists of **One** question which carries Ten marks.*

17. Compare Feldspar group Minerals? Write the sources, properties and uses of NephelineSyenite?

-oOo-

PHYSICS LAB-I

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks of FA	Marks of SA
CER-1105	Engineering Physics Lab-I	$1\frac{1}{2}$	$22\frac{1}{2}$	20	30

TIME SCHEDULE

S.No	Name of the Experiment	No. of Periods	COs Mapped
1	Hands on practice on Vernier Calipers	03	CO1
2	Hands on practice on Screw gauge	03	CO2
3	Verification of Parallelogram law of forces and Triangle law of forces	03	CO3
4	Simple pendulum	03	CO4
5.	Velocity of sound in air – (Resonance method)	03	CO5
	DEMONSTRATION EXPERIMENT		
6	Surface tension of liquid using travelling microscope	03	CO5
	Revision	03	
	Test	$1\frac{1}{2}$	
	Total	$22\frac{1}{2}$	

Objectives:

Upon completion of the course the student shall be able to

- 1.0 Practice with Vernier calipers to determine the volumes and areas of a cylinder and sphere and their comparison etc.
- 2.0 Practice with Screw gauge to determine thickness of a glass plate, cross sectional area of a wire and volumes of sphere and also their comparison etc
- 3.0 Verify the parallelogram law and Triangle law
- 4.0 Determine the value of acceleration due to gravity using Simple Pendulum
- 5.0 Determine the velocity of sound in air at room temperature and its value at zero degree centigrade.
- 6.0 Determine the surface tension of a liquid using travelling Microscope (Demo)

Competencies and Key competencies to be achieved by the student

Name of the Experiment (No. of periods)	Competencies	Key competencies
1. Hands on practice on Vernier Calipers(03)	<ul style="list-style-type: none"> <input type="checkbox"/> Find the Least count <input type="checkbox"/> Fix the specimen in posit <input type="checkbox"/> Read the scales <input type="checkbox"/> Calculate the physical quantities of given object 	<ul style="list-style-type: none"> • Read the scales • Calculate the requisite physical quantities of given objects
2. Hands on practice on Screw gauge(03)	<ul style="list-style-type: none"> <input type="checkbox"/> Find the Least count <input type="checkbox"/> Fix the specimen in posit <input type="checkbox"/> Read the scales <input type="checkbox"/> Calculate thickness of glass plate and cross section of wire and other quantities 	<ul style="list-style-type: none"> <input type="checkbox"/> Read the scales <input type="checkbox"/> Calculate thickness of given glass plate <input type="checkbox"/> Calculate cross section of wire and other quantities
3. Verification of Parallelogram law of forces and Triangle law of forces(03)	<ul style="list-style-type: none"> • Fix suitable weights • Note the positions of threads on drawingsheet • Find the angle at equilibrium point • Construct parallelogram • Compare the measured diagonal • Construct triangle • Find the length of sides • Compare the ratios 	<ul style="list-style-type: none"> • Find the angle at equilibrium point • Constructing parallelogram • Construct triangle • Compare the ratios of force and length
4. Simple pendulum(03)	<ul style="list-style-type: none"> • Fix the simple pendulum to the stand • Adjust the length of pendulum • Find the time for number of oscillations • Find the time period • Calculate the acceleration due to gravity • Draw l-T and l-T² graph 	<ul style="list-style-type: none"> • Find the time for number of oscillations • Find the time period • Calculate the acceleration due to gravity • Draw l-T and l-T² graph

5. Velocity of sound in air –Resonance method (03)	<ul style="list-style-type: none"> • Arrange the resonance apparatus • Adjust the reservoir level for booming sound • Find the first and second resonant lengths • Calculate velocity of sound 	<ul style="list-style-type: none"> • Adjust the reservoir level • Find the first and second resonant lengths • Calculate velocity of sound at room temperature • Calculate velocity of sound at 0°C
6. Surface tension of liquid using traveling microscope(03)	<ul style="list-style-type: none"> • Find the least count of vernier on microscope • Focus the microscope to the lower meniscus & bent pin • Read the scale • Calculate height of liquid rise • Calculate the surface tension of water 	<ul style="list-style-type: none"> • Read the scale • Calculate height of liquid rise • Calculate the surface tension of water

Scheme of Valuation for end Lab Practical Examination :

- | | |
|--|--------------------|
| A. Writing Aim, Apparatus, Formula, Graph, Precautions carries | 10 (Ten) Marks |
| B. For Drawing the table, taking Readings, Calculation work, Drawing the graph, finding result carries | 15 (Fifteen) Marks |
| C. Viva Voice 05 (Five) Marks | |

Total 30 (Thirty) Marks

Course Objectives and Course Outcomes

Course contents		Upon completion of the course the student shall be able to:	
	CO1	CER-1105.1	Experiments with Vernier calipers
	CO2	CER-1105.2	Experiments with Screw gauge
	CO3	CER-1105.3	Experiments with Parallelogram law and Triangle law
	CO4	CER-1105.4	Experiments with Simple pendulum
	CO5	CER-1105.5 CER-1105.6	Experiments with Resonance apparatus (Velocity of sound in air), Refractive index of solid by travelling microscope

PO-CO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3			1	1	1	1
CO2	3	2	2		1		
CO3	3		2			1	2
CO4	3	2			2		
CO5	3		1	2		1	2

3: High, 2: Moderate, 1: Low

CHEMISTRY LAB-I

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks of FA	Marks of SA
CER-1106	Chemistry Lab-I	1 $\frac{1}{2}$	22 $\frac{1}{2}$	20	30

S.No	Name of the Experiment	No.of Periods	Mapped withCOs
1.	a) Recognition of chemical substances and solutions used in the laboratory by senses. b) Familiarization of methods for Volumetric analysis	03 1/2	CO1
2.	Preparation of Std Na ₂ CO ₃ and making solutions of different dilution	03	CO1
3.	Estimation of HCl solution using Std. Na ₂ CO ₃ solution	03	CO2
4.	Estimation of NaOH using Std. HCl solution	03	CO2
5.	Estimation of H ₂ SO ₄ using Std. NaOH solution	03	CO2
	DEMONSTRATION EXPERIMENT		
6.	Determination of pH using pH meter	03 1/2	CO5
7.	Determination of conductivity of water and adjusting ionic strength	03 1/2	CO5
	Total:	22 1/2	

Course objective

- 1.0 Practice volumetric measurements (using pipettes, measuring jars, volumetric flask, burettes) and gravimetric measurements (using different types of balances), making dilutions, etc. To identify the chemical compounds and solutions by senses.
- 2.0 Practice making standard solutions with pre weighed salts and to make solutions of desired dilutions using appropriate techniques.
- 3.0 Conduct titrations adopting standard procedures and using Std. Na₂CO₃ solution for estimation of HCl
- 4.0 Conduct titrations adopting standard procedures and using Std. HCl solution for estimation of NaOH
- 5.0 Conduct titrations adopting standard procedures and using Std. NaOH solution for estimation of H₂SO₄
- 6.0 Conduct the test on given samples of water / solutions (like soft drinks, sewage, etc.) to determine their pH using standard pH meter
- 7.0 Conduct the test on given samples of water / solutions
 - a) To determine conductivity
 - b) To adjust the ionic strength of the sample to the desired value

Competencies and Key competencies to be achieved by the student

Name of the Experiment (No of Periods)	Competencies	Key competencies
Familiarization of methods for Volumetric analysis. Recognition of chemical substances And solutions (03)	-	--
Preparation of StdNa ₂ CO ₃ and making solutions of different dilution(03)	<ul style="list-style-type: none"> ▪ Weighing the salt to the accuracy of .01mg ▪ Measuring the water with volumetric flask, measuring jar, volumetric pipette and graduatedpipette ▪ Making appropriatedilutions 	<ul style="list-style-type: none"> ▪ Weighing the salt to the accuracy of .01mg ▪ Measuring the water with volumetric flask, measuring jar, volumetric pipette and graduatedpipette ▪ Making appropriatedilutions
Estimation of HCl solution using Std. Na ₂ CO ₃ solution (03)	<ul style="list-style-type: none"> ▪ Cleaning the glassware and rinsing withappropriate 	<ul style="list-style-type: none"> ▪ Making standardsolutions ▪ Measuring accuratelythe
<p>Estimation of NaOH using Std.HCl solution (03)</p> <p>Estimation of H₂SO₄ using Std.NaOH solution (03)</p>	<p>solutions</p> <ul style="list-style-type: none"> ▪ Making standardsolutions ▪ Measuring accurately the standard solutions andtitrants ▪ Filling the burette withtitrant ▪ Fixing the burette to thestand ▪ Effectively Controlling the flow of thetitrant ▪ Identifying the endpoint ▪ Making accurateobservations ▪ Calculating theresults 	<p>standard solutions and titrants</p> <ul style="list-style-type: none"> ▪ Effectively Controlling the flow of thetitrant ▪ Identifying the endpoint ▪ Making accurateobservations
<p>Determination of pH using pH meter (03)</p> <p>Determination of conductivity of water and adjusting ionic strength to required level (03)</p>	<ul style="list-style-type: none"> ▪ Familiarize withinstrument ▪ Choose appropriate‘Mode’ /‘Unit’ ▪ Prepare standard solutions / buffers,etc. ▪ Standardize the instrument with appropriate standard solutions ▪ Plot the standardcurve ▪ Make measurements accurately ▪ Follow Safetyprecautions 	<ul style="list-style-type: none"> ▪ Prepare standard solutions / buffers,etc. ▪ Standardize the instrument with appropriate standard solutions ▪ Plot the standardcurve ▪ Make measurements accurately

SCHEME OF VALUATION

A) Writing Chemicals, apparatus ,principleandprocedure	5M
B) Demonstratedcompetencies	20M
Making standard solutions	
Measuring accurately the standard solutions and titrants Effectively	
controlling the flow of the titrant	
Identifying the end point	
Making accurate observations	
C) Viva-voce	5M

Total	30M

Course Objectives and Course Outcomes

Course contents		Upon completion of the course the student shall be able to:	
	CO1	CER-1106.1	Operate and practice volumetric apparatus and preparation of standard solution
	CO2	CER-1106.2	Evaluate and judge the neutralization point in acid base titration
	CO3	CER-1106.3	Judge operate and demonstrate and perform precise operations with instrument for investigation of water pollution parameters

PO CO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3		1				1		
CO2	2	3		2	2			1		
CO3	2	3		2	2			1		
CO4	2	3		2	2			1		
CO5	2	3		2	2			1		

ENGINEERING DRAWING-I

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks of FA	Marks of SA
CER-1107	ENGINEERING DRAWING-I	06	90	40	60

TIME SCHEDULE

S.No	Major Topics	No. of Drawin g plates	Periods	Weightage of Marks	Short Answer Question s (5 M)	Essay Type Question s (10 M)
1	Importance of Engineering Drawing	--	01	-	-	-
2	Engineering Drawing Instruments	01	02	-	-	-
3	Free hand lettering & Numbering	01	06	05	1	-
4	Dimensioning Practice	01	06	05	1	-
5	Geometrical constructions	03	21	25	1	2
6	Projections of Points, Lines, Planes & Auxiliary Planes	03	21	15	1	1
7	Projections of Solids	01	12	10		1
8	Orthographic Projections	01	21	20	-	2
Total		14	90	80	04	06

Course Objectives and Course Outcomes

Course Objectives		Upon completion of the course the student shall able to understand the basic graphic skills and use them in preparation of engineering drawings, their reading and interpretation	
Course Outcomes	CO1	CER-1107.1 CER-1107.2 CER-1107.3	Describe the use of engineering drawing instruments. Practice the conventions to be followed in engineering drawing as per BISand Practice on Free hand lettering &Numbering.
	CO2	CER-1107.4	Practice on Dimensioning Practice.
	CO3	CER-1107.5	Draw i) basic geometrical constructions ii) engineering curves
	CO4	CER-1107.6 CER-1107.7	Draw the projections of i) Points ii) Lines iii) Regular Planes iv) Regular Solids V) Sections of Regular Solids
	CO5	CER-1107.8	Draw the orthographic projections of drawings.

PO-CO Mapping

Course Code : CER-1107	Course Title: ENGINEERING DRAWING Number of Course Outcomes: 05	No. of Periods: 90			
POs	Mapped with CO No.	CO Periods addressing PO in Column 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1, CO2, CO3, CO4, CO5,	38	42	3	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately Addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO2	CO1, CO2, CO3, CO4, CO5	25	28	2	
PO3	CO1, CO2, CO3, CO4, CO5	20	22	1	
PO4					
PO5					
PO6					
PO7	CO1, CO2, CO3, CO4, CO5	07	08	1	

3: High, 2: Moderate, 1: Low

Note:

The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:

- (i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quiz (vii) Industry Visits (viii) Tech Fest (ix) Mini Projects (x) Library Visits.

LEARNING OUTCOMES

Upon completion of the course the student shall be able to

1.0 Understand the basic concepts of Engineering Drawing

- 1.1) State the importance of drawing as an engineering communication medium
- 1.2) State the necessity of B.I.S. Code of practice for Engineering Drawing.
- 1.3) Explain the linkages between Engineering drawing and other subjects of Mechanical Engineering

2.0) Use of Engineering Drawing Instruments

- 2.1) Select the correct instruments to draw the different lines /curves
- 2.2) Use correct grade of pencil to draw different types of lines and for different purposes
- 2.3) Select and use appropriate scales for a given application.
- 2.4) Identify different drawing sheet sizes as per I.S. and Standard Lay-outs.
- 2.5) Prepare Title block as per B.I.S. Specifications.
- 2.6) Identify the steps to be taken to keep the drawing clean and tidy.

Drawing Plate 1 : Use of Engineering Drawing Instruments

3.0) Write Free Hand Lettering and Numbers

- 3.1) Write titles using vertical lettering and numerals of 7mm, 10mm and 14mm height
 - 3.2) Write titles using sloping lettering and numerals of 7mm, 10mm and 14mm height
 - 3.3) Select suitable sizes of lettering for different layouts and applications
- Drawing plate 2: Exercises on Free hand lettering and numbering

4.0 Understand Dimensioning Practice

- 4.1 Acquaint with the conventions, notations, rules and methods of dimensioning in engineering drawing as per the B.I.S.
- 4.2 Dimension a given drawing using standard notations and desired system of dimensioning.

Drawing Plate 3: Exercises on Dimensioning Practice

5.0) Apply Principles of Geometric Constructions

- 5.1) Practice the basic geometric constructions like i) dividing a line into equal parts
ii) exterior and interior tangents to the given two circles iii) tangent arcs to two given lines and arcs
- 5.2) Draw any regular polygon using general method when i) side length is given
ii) inscribing circle radius is given iii) describing circle radius is given
- 5.3) Draw the conics using general and special methods,

Draw the engineering curves like i) involute ii) cycloid iii) helix

Drawing Plate -4: Having problems up to construction of polygon

Drawing Plate -5: Having problems of construction of conics

Drawing Plate -6: Having problems of construction of involute, cycloid and helix

6.0) Projections of points, lines, planes & auxiliary planes

- 6.1 Explain the basic principles of the orthographic projections
- 6.2 Visualise and draw the projection of a point with respect to reference planes (HP & VP)
- 6.3 Visualise and draw the projections of straight lines with respect to two reference planes (up to lines parallel to one plane and inclined to other plane).
- 6.4 Visualise and draw the projections of planes (up to planes perpendicular to one plane and inclined to other plane).
- 6.5 Draw the auxiliary views of a given engineering component

Drawing Plate -7: problems on projection of points and Lines

Drawing Plate -8: problems on projection of planes

Drawing Plate -9: problems on auxiliary plane

7.0)Draw the Projections of Solids

7.1) Visualise and draw the projections of regular solids like Prisms, Pyramids, Cylinder, Cone (up to axis of solids parallel to one plane and inclined to other plane)

Drawing plate No.10: Problems on projection of solids

8.0) Apply principles of orthographic projection

8.1) Draw the orthographic views of an object from its pictorial drawing.

8.2) Draw the minimum number of views needed to represent a given object

fully. Drawing Plate 12 : Problems on **orthographic projections**

Competencies and Key competencies to be achieved by the student

S.No	Major topic	Key Competency
1.	Importance of Engineering Drawing	<ul style="list-style-type: none">• Explain the linkages between Engineering drawing and other subjects of study in Diploma course.
2.	Engineering Drawing Instruments	<ul style="list-style-type: none">• Select the correct instruments to draw various entities in different orientation
3.	Free hand lettering & Numbering	<ul style="list-style-type: none">• Write titles using sloping and vertical lettering and numerals as per B.I.S (Bureau of Indian standards)
4.	Dimensioning Practice	<ul style="list-style-type: none">• Dimension a given drawing using standard notations and desired system of dimensioning
5.	Geometrical construction	<ul style="list-style-type: none">• Construct ellipse, parabola, rectangular hyperbola, involute, cycloid and helix from the given data.
6.	Projection of points, Lines, Planes & Solids	<ul style="list-style-type: none">• Draw the projections of points, straight lines, planes & solids with respect to reference planes (HP & VP)
7.	Auxiliary views	<ul style="list-style-type: none">• Draw the auxiliary views of a given Engineering component• Differentiate between Auxiliary view and apparent view
8	Orthographic Projection	<ul style="list-style-type: none">• Draw the minimum number of views needed to represent a given object fully.

COURSE CONTENTS:

NOTE

S:

1. B.I.S Specification should invariably be followed in all the topics.
2. A-3 Size Drawing Sheets are to be used for all Drawing Practice Exercises.

1.0 The importance of Engineering Drawing

Explanation of the scope and objectives of the subject of Engineering Drawing Its importance as a graphic communication -Need for preparing drawing as per standards – SP-46 –1988 – Mention B.I.S - Role of drawing in -engineering education – Link between Engineering drawing and other subjects of study.

2.0 Engineering drawing Instruments

Classifications: Basic Tools, tools for drawing straight lines, tools for curved lines, tools for measuring distances and special tools like mini drafter & drafting machine – Mentioning of names under each classification and their brief description -Scales: Recommended scales reduced & enlarged -Lines: Types of lines, selection of line thickness - Selection of Pencils - Sheet Sizes: A0, A1, A2, A3, A4, A5, Layout of drawing sheets in respect of A0, A1, A3 sizes, Sizes of the Title block and its contents - Care and maintenance of Drawing Sheet,

3.0 Free hand lettering & numbering

Importance of lettering – Types of lettering -Guide Lines for Lettering
Practicing of letters & numbers of given sizes (7mm, 10mm and 14mm)
Advantages of single stroke or simple style of lettering - Use of lettering stencils

4.0 Dimensioning practice

Purpose of engineering Drawing, Need of B.I.S code in dimensioning -Shape description of an Engineering object -Definition of Dimensioning size description -Location of features, surface finish, fully dimensioned Drawing -Notations or tools of dimensioning, dimension line extension line, leader line, arrows, symbols, number and notes, rules to be observed in the use of above tools -Placing dimensions: Aligned system and unidirectional system (SP-46-1988)-Arrangement of dimensions Chain, parallel, combined progressive, and dimensioning by co-ordinate methods-The rules for dimensioning standard, features “Circles (holes) arcs, angles, tapers, chamfers, and dimension of narrow spaces.

5.0 Geometric Construction

Division of a line: to divide a straight line into given number of equal parts

Construction of tangent lines: to draw interior and exterior tangents to two circles of given radii and centre distance

Construction of tangent arcs:

- i) To draw tangent arc of given radius to touch two lines inclined at given angle (acute, right and obtuse angles).
- ii) Tangent arc of given radius touching a circle or an arc and a given line.
- iii) Tangent arcs of radius R, touching two given circles internally and externally.

Construction of polygon: construction of any regular polygon by general method for given side length, inscribing circle radius and describing/superscribing circle radius

Conics: Explanation of Ellipse, Parabola, Hyperbola, as sections of a double cone and a loci of a moving point, Eccentricity of above curves – Their Engg. Applications viz., Projectiles, reflectors, Cooling Towers, P-V Diagram of a Hyperbolic process - Construction of any conic section of given eccentricity by general method - Construction of ellipse by concentric circles method, Oblong Method and Arcs of circles method - Construction of parabola by rectangle method and Tangent method - Construction of rectangular hyperbola

General Curves: Involute, Cycloid and Helix, explanations as locus of a moving point, their engineering application, viz., Gear tooth profile, screw threads, springs etc. – their construction

6.0 Projection of points, lines and planes & auxiliary views

Classification of projections, Observer, Object, Projectors, Projection, Reference Planes, Reference Line, Various angles of projections – Differences between first angle and third angle projections

Projections of points in different quadrants Projections of straight line -

- (a) Parallel to both the planes.
- (b) Perpendicular to one of the planes.
- (c) Inclined to one plane and parallel to other planes

Projections of regular planes

- (a) Plane parallel to one of the reference planes
- (b) Plane perpendicular to HP and inclined to VP and vice versa.

Auxiliary views

Need for drawing auxiliary views - Explanation of the basic principles of drawing an auxiliary views explanation of reference plane and auxiliary plane - Partial auxiliary view.

7.0 Projections of regular solids

- (a) Axis perpendicular to one of the planes
- (b) Axis parallel to VP and inclined to HP and vice versa.

8.0 Orthographic Projections

Meaning of orthographic projection - Using a viewing box and a model – Number of views obtained on the six faces of the box, - Legible sketches of only 3 views for describing object - Concept of front view, top view, and side view sketching these views for a number of engg objects - Explanation of first angle projection. – Positioning of three views in First angle projection - Projection of points as a means of locating the corners of the surfaces of an object – Use of miter line in drawing a third view when other two views are given - Method of representing hidden lines - Selection of minimum number of views to describe an object fully.

REFERENCE BOOKS

- Engineering Graphics by P I Varghese – (McGraw-hill)
- Engineering Drawing by Basant Agarwal & C.M Agarwal - (McGraw-hill)
- Engineering Drawing by N.D.Bhatt.
- T.S.M. & S.S.M on “ Technical Drawing” prepared by T.T.T.I., Madras.
- SP-46-1998 – Bureau of Indian Standards.

**BOARD DIPLOMA EXAMINATION,
FORMATIVE ASSESSMENT- 1
ENGINEERING DRAWING-I**

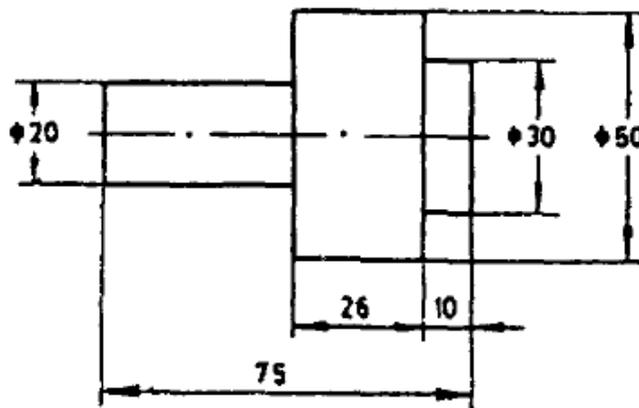
Time : 90 Minutes

Total Marks: 40

PART –A**04x 04=16**

Instructions: (1) Answer all questions. Each question carries Four marks.

01. Write the following in single stroke capital vertical lettering of size 10mm
ORTHOGRAPHIC PROJECTIONS
02. Redraw the following figure and arrange the dimensions by Aligned method as per SP 46-2003.



03. Draw External common tangents to two unequal circles of radii 30mm and 20mm. The distance between the circles is 80 mm.
04. Construct a Hexagon of side 30 mm.

PART –B**3X 8= 24**

01. Answer any Three of the following questions 02. Each question carries Eight marks.
- 05 Draw the involute of a circle of diameter 30 mm and also draw a tangent to the curve at a distance of 60 mm from the centre of the circle.
06. Draw an ellipse by Concentric circles method whose major and minor axes are 80 mm and 60 mm respectively.
07. Construct a Cycloidal curve through a point on the circumference of a circle of radius 25 mm. Draw a tangent and normal to it.
08. Draw a helix of pitch 60 mm on a cylinder of diameter of 50 mm.

09. Construct a rectangular hyperbola through a point which is a distance of 30 mm and 20 mm from the two asymptotes.

SCHEME: C – 20

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY

GUDUR – 524101: SRI POTTI SREERAMULU NELLORE DISTRICT, A.P

Autonomous Institute Vide G.O.Ms.No. 214/ Edn, (TE – I Dept.) 05-10-1996

I Semester Examination (MPEC) for 3 ½ Year Diploma in Ceramic Technology

COURSE CODE: **CER-1107**

COURSE NAME: ENGINEERING DRAWING-I

TIME: 3 HOUR

Max.Marks:60

Instructions: (1) Answer all questions.

(4) Each question carries FIVE marks.

(5) Answers should be brief and straight to the point and shall not exceed five simple sentences.

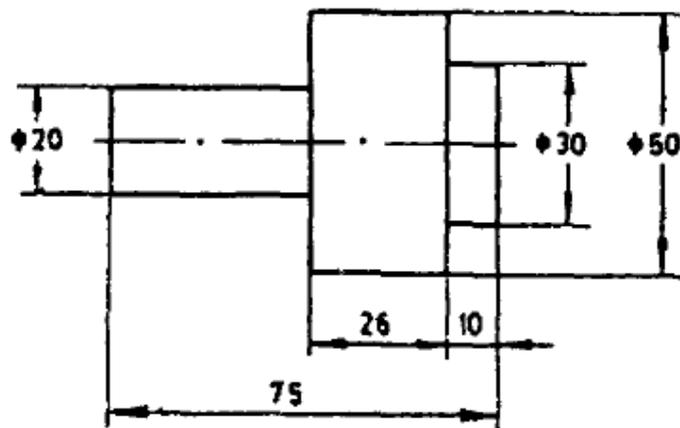
PART –A

04x 05=20

04. Write the following in single stroke capital vertical lettering of size 10mm

ORTHOGRAPHIC PROJECTIONS

05. Redraw the following figure and arrange the dimensions by Aligned method as per SP 46-2003.



06. Draw internal common tangents to two unequal circles of radii 26mm and 20mm. The distance between the circles is 75mm.

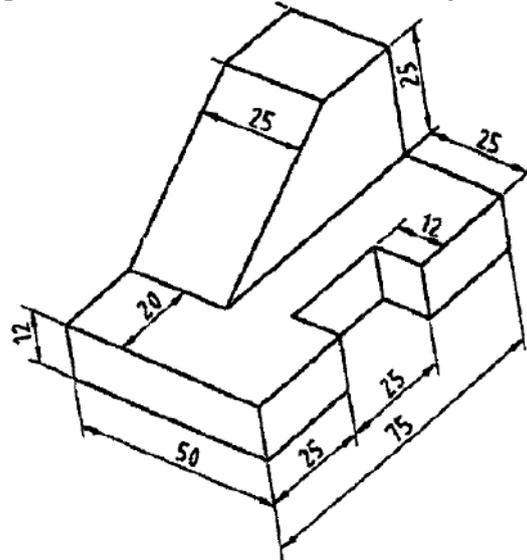
07. Draw the projections of a point 'A' which is 40 mm above the H.P. and 25 mm in front of V.P.

PART –B

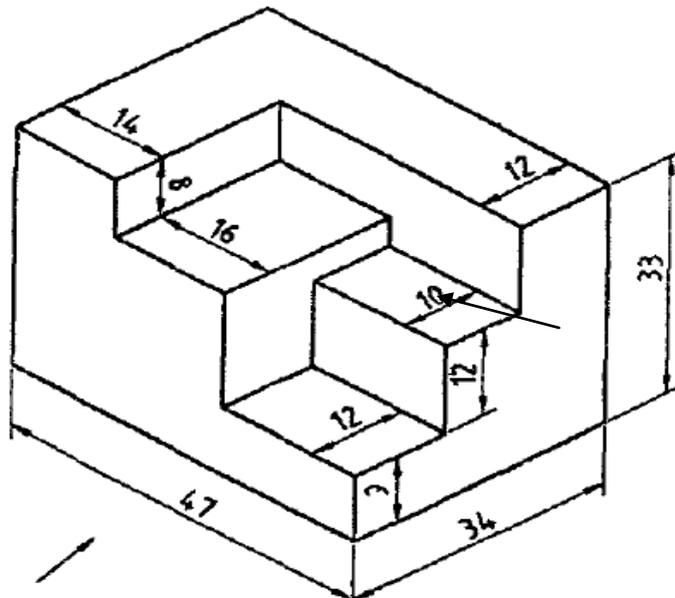
04X 10= 40

01. Answer any FOUR of the following questions
02. Each question carries TEN marks.

08. Draw the involute of a circle of diameter 30 mm and also draw a tangent to the curve at a distance of 60 mm from the centre of the circle.
10. Draw an ellipse by Concentric circles method whose major and minor axes are 80 mm and 60 mm respectively.
11. A straight line AB 70 mm. long has one of its ends 25 mm. behind V.P. and 20 mm. below H.P. The line is inclined at 30° to H.P. and 50° to V.P. Draw its projections.
12. A hexagonal prism, with side of base 25 mm and axis 60 mm long, is resting on one of its rectangular faces on H.P. . Draw the projections of the prism , when its axis is inclined at 45° to V.P.
13. Draw the front view, top view and left side view of the object shown in the fig.



14. Draw the three orthographic views from the given Isometric view as per first angle projection.



COMPUTER FUNDAMENTALS LAB-I

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
CER-1203	Computer Fundamentals Lab-I	4	60	40	60

Time schedule:

Course Objectives		i) To know Hardware Basics ii) To familiarize operating systems iii) To use MS Office effectively to enable to students use these skills in future courses	
Course Outcomes	CO1	CER-1203.1	Identify hardware and software components
	CO2	CER-1203.2	Prepare documents with given specifications using word processing software
	CO3	CER-1203.3 CER-1203.4	Use Spread sheet software to make calculation and to draw various graphs / charts.

S.No.	Chapter/Unit Title	No.of Periods	CO's Mapped
1.	Computer hardware Basics	10	CO1
2.	Windows Operating System	10	CO1
3.	MS Word	30	CO2
4.	MS Excel	10	CO3
Total periods		60	

PO-CO Mapping

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
C-1203.1	3	3	3	3	3	3	3	3	2	3
C-1203.2	3	3	3	3	3	3	3	3	2	3
C-1203.3	3	3	3	3	3	3	3	3	2	3
Average	3	2	3							

3=Strongly mapped, 2=moderately mapped, 1=slightly Mapped

Learning Outcomes

I. Computer Hardware Basics

1. a).To Familiarize with Computer system and hardware connections
b).To Start and Shut down Computer correctly
c).To check the software details of the computer
2. To check the hardware present in your computer

II. Windows's operating system

1. To Explore Windows Desktop
2. Working with Files and Folders
3. Windows Accessories: Calculator – Notepad – WordPad –MS Paint

III. Practice with MS-WORD

1. To familiarize with Ribbon layout of MSWord
Home – Insert- Page layout – References – Review- View.
2. To practice Word Processing Basics
3. To practice Formatting techniques
4. To insert a table of required number of rows and columns
5. To insert Objects, Clipart and Hyperlinks
6. To use Mail Merge feature of MSWord
7. To use Equations and symbols features

IV. Practice with MS-EXCEL

1. To familiarize with MS-EXCEL layout
2. To access and enter data in the cells
3. To edit a spread sheet- Copy, Cut, Paste, and selecting Cells
4. To use built in functions and Formatting Data
5. To create Excel Functions, Filling Cells
6. To enter a Formula for automatic calculations

Key competencies:

Expt No	Name of Experiment	Competencies	Key competencies
1 (a).	To familiarize with Computer system and hardware connections	<p>a. Identify the parts of a Computer system: i). CPU ii). Mother Board iii) Monitor iv) CD/DVD Drive v) Power Switch vi) Start Button vii) Reset Button</p> <p>b. Identify and connect various peripherals</p> <p>c. Identify and connect the cables used with computer system</p> <p>d. Identify various ports on CPU and connect Keyboard & Mouse</p>	Connect cables to external hardware and operate the computer

1 (b).	To Start and Shut down Computer correctly	<ul style="list-style-type: none"> a. Log in using the password b. Start and shut down the computer c. Use Mouse and KeyBoard 	<ul style="list-style-type: none"> a. Login and logout as per the standard procedure b. Operate mouse &KeyBoard
1 (c).	To Explore Windows Desktop	<ul style="list-style-type: none"> a. Familiarize with Start Menu, Taskbar, Icons and Shortcuts b. Access application programs using Start menu, Task manager c. Use Help support 	<ul style="list-style-type: none"> a. Access application programs using Start menu b. Use taskbar and Task manager
2.	To check the software details of the computer	<ul style="list-style-type: none"> a. Find the details of Operating System being used b. Find the details of Service Pack installed 	<ul style="list-style-type: none"> a. Access the properties of computer and find the details
3.	To check the hardware present in your computer	<ul style="list-style-type: none"> a. Find the CPU name and clock speed b. Find the details of RAM and Hard disk present c. Access Device manager using Control Panel and check the status of devices like mouse and keyboard d. Use My Computer to check the details of Hard drives and partitions e. Use the Taskbar 	<ul style="list-style-type: none"> a. Access device manager and find the details b. Type /Navigate the correct path and Select icon related to the details required
4.	Working with Files and Folders	<ul style="list-style-type: none"> a. Create folders and organizing files in different folders b. Use copy / paste move commands to organize files and folders c. Arrange icons – name wise, size, type, Modified d. Search a file or folder and find its path e. Create shortcut to files and folders (in other folders) on Desktop f. Familiarize with the use of My Documents g. Familiarize with the use of Recycle Bin 	<ul style="list-style-type: none"> a. Create files and folders Rename , arrange and search for the required folder/file b. Restore deleted files from Recycle bin
5.	To use Windows Accessories: Calculator – Notepad – WordPad – MS Paint	<ul style="list-style-type: none"> a. Familiarize with the use of Calculator b. Access Calculator using Run command c. Create Text Files using Notepad and WordPad and observe the difference in file size d. Use MS paint and create .jpeg, .bmp files using MS Paint 	<ul style="list-style-type: none"> a. Use windows accessories and select correct text editor based on the situation. b. Use MS pain to create /Edit pictures and save in the required format.
6.	To familiarize with Ribbon layout of MS word. – Home – Insert- page layout- References-Review-View	<ul style="list-style-type: none"> a. Create/Open a document b. Use Save and Save as features c. Work on two Worddocuments simultaneously d. Choose correct Paper size and Printing options 	<ul style="list-style-type: none"> a. Create a Document and name appropriately and save b. Set paper size and print options
7.	To practice Word Processing Basics	<ul style="list-style-type: none"> a. Typing text b. Keyboard usage 	<ul style="list-style-type: none"> a. Use key board and mouse to enter/edit text in the document.

		<ul style="list-style-type: none"> c. Use mouse (Left click / Right click /Scroll) d. Use Keyboard shortcuts e. Use Find and Replace features in MS-word f. Use Undo and Redo Features g. Use spell check to correct Spellings and Grammar 	<ul style="list-style-type: none"> b. Use shortcuts c. Use spell check/ Grammar features for auto corrections.
8.	To practice Formatting techniques	<ul style="list-style-type: none"> a. Formatting Text b. Formatting Paragraphs c. Setting Tabs d. Formatting Pages e. The Styles of Word f. Insert bullets and numbers g. Themes and Templates h. Insert page numbers, header and footer 	<ul style="list-style-type: none"> a. Format Text and paragraphs and use various text styles. b. Use bullets and numbers to create lists c. Use Templates/Themes d. Insert page numbers date, headers and footers
9.	To insert a table of required number of rows and columns	<ul style="list-style-type: none"> a. Edit the table by adding the fields – Deleting rows and columns –inserting sub table – marking borders. Merging and splitting of cells in a Table 	<ul style="list-style-type: none"> a. Insert table in the word document an edit b. Use sort option for arranging data.
10.	To Insert objects, clipart and Hyperlinks	<ul style="list-style-type: none"> a. Create a 2-page document. &Insert hyperlinks and t Bookmarks. b. Create an organization chart c. Practice examples like preparing an Examination schedule notice with a hyperlink to Exam schedule table. 	<ul style="list-style-type: none"> a. Insert hyperlinks &Bookmarks b. Create organization charts/flowcharts
11.	To Use Mail merge feature of MS Word	<ul style="list-style-type: none"> a. Use mail merge to prepare individually addressed letters b. Use mail merge to print envelopes. 	Use Mail merge feature
12.	To use Equations and symbols features.	<ul style="list-style-type: none"> a. Explore various symbols available in MSWord b. Insert a symbol in the text c. Insert mathematical equations in the document 	Enter Mathematical symbols and Equations in the word document
13.	To Practice with MS-EXCEL	<ul style="list-style-type: none"> a. Open /create an MS Excel spread sheet and familiarize with MS Excel 2007 layout like MS office Button- b. Use Quick Access Toolbar- Title Bar- Ribbon-Worksheets- Formula Bar-Status Bar 	<ul style="list-style-type: none"> a. Familiarize with excel layout and use b. Use various features available in toolbar
14.	To access and Enter data in the cells	<ul style="list-style-type: none"> a. Move Around a Worksheets- Quick access -Select Cells b. Enter Data-Edit a Cell-Wrap Text-Delete a Cell Entry-Save a File-Close Excel 	<ul style="list-style-type: none"> a. Access and select the required cells by various addressing methods b. Enter data and edit.
15.	To edit spread sheet Copy, Cut, Paste, and selecting cells	<ul style="list-style-type: none"> a. Insert and Delete Columns and Rows-Create Borders-Merge and Center b. Add Background Color-Change 	Format the excel sheet

		<p>the Font, Font Size, and Font Color</p> <p>c. Format text with Bold, Italicize, and Underline-Work with Long Text-Change a Column's Width</p>	
16.	To use built in functions and Formatting Data	<p>a. Perform Mathematical Calculations verify-AutoSum</p> <p>b. Perform Automatic Calculations-Align Cell Entries</p>	Use built in functions in Excel
17.	To enter a Formula for automatic calculations	<p>a. Enter formula</p> <p>b. Use Cell References in Formulae</p> <p>c. Use Automatic updating function of Excel Formulae</p> <p>d. Use Mathematical Operators in Formulae</p> <p>e. Use Excel Error Message and Help</p>	Enter formula for automatic calculations
18.	To Create Excel Functions, Filling Cells	<p>a. Use Reference Operators</p> <p>b. Work with sum, Sum if, Count and Count If Functions</p> <p>c. Fill Cells Automatically</p>	<p>a. Create Excel sheets involving cross references and equations</p> <p>b. Use the advanced functions for conditional calculations</p>

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY

GUDUR – 524101: SRI POTTI SREERAMULU NELLORE DISTRICT, A.P

Autonomous Institute Vide G.O.Ms.No. 214/ Edn, (TE – I Dept.) 05-10-1996

I Semester Examination (MPEC) for 3 ½ Year Diploma in Ceramic Technology

COURSE CODE: **CER-1203**

COURSE NAME : **COMPUTER FUNDAMENTAL LAB-I**

TIME: 3 HOUR

Max.Marks:60

1. Identify the internal hardware components of a PC and assemble them.
2. Identify the external components or peripherals of a PC and connect them.
3. Write the procedure to create the files and folders
4. Write the procedure to access Calculator, Paint and Notepad application
5. Write the procedure to perform the following in MSWord
 - (a) Change the Font Size
 - (b) Change the Font Style
 - (c) Change the Text Size
6. Write the procedure to perform the following in MSWord
 - (a) Change the Font Color.
 - (b) Use Various Text Alignment Options.
 - (c) Format text in Bold, Italic and Underline.
7. Create the hierarchy of your family in MSWord.
8. Write the procedure to perform the following in MSWord:
 - (a) Insert a Table
 - (b) Add a Row
 - (c) Add a column
 - (d) Delete a Row
 - (e) Delete a column
9. Write the procedure to use Equation and Symbol.
10. Write the procedure to perform the following in MSExcel
 - (a) To Modify Column Width
 - (b) To Modify Row Height
 - (c) Format text in Bold, Italic, and Underline.

FUNDAMENTAL PROPERTIES OF CERAMICS LAB

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks of FA	Marks of SA
CER-1202	FUNDAMENTAL PROPERTIES OF CERAMICS LAB	04	60	40	60

LIST OF EXPERIMENTS:

S.No	Unite Title	No. of Periods	Cos Mapped
1	Identification of Raw materials	06	CO1,CO2,CO3
2	Preparation of clay models	06	CO1,CO2,CO3,CO4
3	Determination of the Particle size analysis	06	CO1,CO2,CO3,CO4
4	Determination of the moisture content	06	CO1,CO2,CO3,CO4,CO5
5	Determination of Slaking of clays	06	CO1,CO2,CO3,CO4,CO5
6	Determination of Water of Plasticity of clays	06	CO5,CO6,CO7,CO8
7	Determination of the Linear Drying Shrinkage	06	CO5,CO6,CO7,CO8
8	Determination of the Volume Shrinkage	06	CO5,CO6,CO7,CO8,CO9
9	Determination of Density and Specific gravity	06	CO5,CO6,CO7,CO8,CO9
10	Preparation of Cement Brick	06	CO6,CO7,CO8,CO9,CO10
	Total	60	

Course Objectives and Course Outcomes

Course Objectives		Upon completion of the course the student shall be able to: (i) To Identify the minerals used in Ceramic Industry. (ii) To Understand the properties Required to the Raw materials. (iii) To Improve the better Fabrication Skills.	
Course Outcomes		Upon completion of the course the student shall be able to:	
	CO1	CER-1301.1 CER-1301.2 CER-1301.10	To Identify the minerals and to Improve the better fabrication skills.
	CO2	CER-1301.3 CER-1301.4 CER-1301.5	To Analyze the properties of the raw materials
	CO3	CER-1301.4 CER-1301.5 CER-1301.6	Determines the characteristics and understand behavior of the minerals.
	CO4	CER-1301.9	Determines the compactness to achive the Superior properties of the finished product.
	CO5	CER-1301.7 CER-1301.8 CER-1301.10	Determines the Dimensional changes occur while drying and firing.

PO-CO Mapping

Course Code: M-309		Course Title: Fuels Laboratory			No of Periods: 45
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%ge		
PO1	CO1,CO2,CO4,CO%	28	47	3	>40% Level 3 Highly addressed
PO2	CO4,CO5	12	20	1	
PO3	CO1,CO5	12	20	1	25% to 40% Level 2 Moderately addressed
PO4					
PO5					5 to 25% Level 1 Low addressed
PO6					

PO7	CO5	8	13	1	<5%	Not addressed
-----	-----	---	----	---	-----	---------------

Learning Outcomes

Up on Completion of the course the student shall be able to:

List of Experiments

1.0. Identification of Ceramic Raw materials.

1.1 Identification of Raw materials used in Ceramic Industries based on Physical Properties.

2.0. Preparation of clay models and Geometrical shapes.

- 1 Take the Fine powder of clay which is passed through 240 mesh.
2. Convert it into plastic form with the addition of adding suitable amount of water.
3. The plastic form of clay has to be convert into suitable geometrical shape.

3.0. Determination of the Particle size analysis by Ro-Tap sieve shaker (Ceramic powder and glass sand)

- 1 Take the raw material
- 2 Accurately Weigh 100gm on Analytical Balance.
- 3 The weighed material is Shifted upon the top sieve of the Ro-Tap Sieve shaker.
- 4 Switch on the Ro-Tap Sieve shaker Machine.
- 5 The coarser material retained on the top sieve and the fine material Reaches the Bottom one
- 5 Stop the Rotation of the Machine and Weigh the Material left upon the Each Sieve.
- 7 Calculate the Cumulative percentage of Grit retained on the each sieve.

4.0. Determination of the moisture content of Plastic and non-Plastic materials.

- 1 Take the 100gm of sample material.
- 2 Kept this sample inside of the lab Drier.
- 3 Rise the Drier temperature up to 100°C and maintain 1Hr.
- 4 switch off the drier and cool the Drier Temperature.
- 5 Take the dried Weight of Sample material.
- 5 Calculated the percentage Moisture content by using Formula.

5.0. Determination of Slaking time of clays.

- 1 Take the Powder form of clay which is passed through 240 mesh.
- 2 Convert this clay into Plastic form with the addition of suitable amount of water.
- 3 1inx1inx1in cube is made with plastic form of clay by using standard mould.
- 4 The plastic form of cube is dried at constant temperature of 110°C at the lab drier.
5. This specimen of the cube is ready for testing.
- 5 This specimen is immersed in the water containing enamel basin.
- 7 While immersion of the Specimen in the water the Stop watch is kept 'ON'.
- 3 After Completion of the Complete slaking of the clay "OFF" the stop watch and Note the time taken for slaking.

5.9 Repeat this Procedure with 6 different specimens and take the average value of time taken for slaking of Specimen.

6.0. Determination of Water of Plasticity of clays.

- 1 Take 500gm of fine powder of the clay which was passed through 240 mesh.
- 2 Convert it into plastic form with the addition of suitable amount of water.
- 3 The plastic form of clay is Gently filled in the standard Brick mould.
- 4 Before filling the plastic form clay inside of the standard mould it should be well Lubricated.
- 5 The wet shape of brick is gently released from the Standard mould.
- 5 Take the weight of wet brick "W₁" gm.

- 7 Then the wet brick is Allowed for drying at the temperature of 100°C in the lab drier.
- 3 Take the weight of dry Brick represent 'W₂' gm.
- 9 The loss in weight of brick i.e wet weight to dry weight (W₁-W₂) given the water of plasticity which was represent in the Percentage

7.0. Determination of the Linear Shrinkage of clay.

- 7.1. Select the Plastic or non Plastic Clay Which has to measure Linear Shrinkage.
- 7.2. Make it into specimen by using suitable mould.
- 7.3. Dry and fire at suitable temperatures.
- 7.4. Find out drying and firing shrinkage.

8.0. Determination of the Volume Shrinkage.

1. Ceramic ware Consist pore volume
2. The ware consist different types of volume
3. The volume will be Hidden or Open
- 4 .Calculate include open and Closed volume of give ware

9.0. Determination of Density and Specific gravity of ceramic powders.

- 1 Take the fine powder of sample.
- 2 Specific gravity bottle is used for determination of density and specific gravity of sample.
- 3 Take the weight of Empty specific gravity bottle which represent 'W₁' gm.
- 4 Take the weight of SpGr Bottle + sample, which represent 'W₂' gm.
- 5 Take the weight of SpGr Bottle + Water, which represent 'W₃' gm.
- 5 Take the weight of SpGr Bottle + sample + water , which is represent 'W₄' gm.
- 7 Calculate the density and specific gravity by using Formula.

10.0. Preparation of Cement Brick

- 10.1 Prepare the standard brick by using Ordinary Portland cement.
- 10.2. Find out the properties of the Cement Brick.

SECOND SEMESTER

CURRICULUM – 2020

(C-20)

**STATE BOARD OF
TECHNICAL EDUCATION & TRAINING
ANDHRA PRADESH**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING
ANDHRA PRADESH
DIPLOMA IN CERAMIC TECHNOLOGY
3 ½ YEAR SANDWICH COURSE (UNDER MPEC SYSTEM)**

SECOND SEMESTER

Subject	Name of the Subject	Instruction Periods/Week		Total Periods/ Semester	Scheme Of Examinations				
		Theory	Practical		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks	Credits
THEORY SUBJECTS									
CER-2108	English -II	03	-	45	3	20	80	100	3
CER-2109	Engineering Mathematics – II	05	-	75	3	20	80	100	5
CER-2110	Engineering Physics -II	04	-	60	3	20	80	100	4
CER-2111	Engineering Chemistry & Environmental Studies -II	04	-	60	3	20	80	100	4
CER-2204	Elements of Ceramic Technology -II	05	-	75	3	20	80	100	5
CER-2205	General Engineering	06	-	90	3	20	80	100	6
PRACTICAL SUBJECTS									
CER-2112	Physics Laboratory-II	-	1 ½	22 ½	1 ½	20	30	50	0.75
CER-2113	Chemistry Laboratory-II	-	1 ½	22 ½	1 ½	20	30	50	0.75
CER-2114	Engineering Drawing-II	-	07	105	3	40	60	100	4.5
CER-2206	Computer Fundamental Lab practice- II	-	05	75	3	40	60	100	2.5
	Total	27	15	630	-	240	660	900	35.5

ENGLISH – II

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks of FA	Marks of SA
CER-2108	ENGLSIH - II	03	45	20	80

S. No.	Unit Title	No of Periods	COs Mapped
1	Preserve or Perish	7	CO1, CO2, CO3, CO4
2	The Rainbow of Diversity	7	CO1, CO2, CO3, CO4
3	New Challenges- Newer Ideas	7	CO1, CO2, CO3, CO4
4	The End Point First!	8	CO1, CO2, CO3, CO4
5	The Equal Halves	8	CO1, CO2, CO3, CO4
6	Dealing with Disaster	8	CO1, CO2, CO3, CO4
Total Periods		45	

Course Objectives	To improve the skills of English Language use by enriching vocabulary and learning accurate structures for effective communication.
	To comprehend themes for value based living in professional and personal settings.

CO No.	Course Outcomes
CO1	Applies perceptions of themes related to societal responsibility of adolescents towards their surroundings.
CO2	Demonstrates knowledge of form and function of 'grammar items' and use them in both academic and everyday situations.
CO3	Demonstrates effective English communication skills with competence in listening, speaking, reading and writing in academic, professional and everyday contexts.

CO4	Displays positivity and values of harmonious living in personal and professional spheres as reflected through communication.
-----	--

CO-PO Matrix

Course Code TT-2101	Course Title: English Number of Course Outcomes: 4			No. of Periods: 90	
POs	Mapped with CO No.	CO Periods Addressing PO in Column 1		Level of Mapping (1,2,3)	Remarks
		Number	Percentage		
PO1		Not directly Applicable for English course, however activities that use content from science and technology relevant to the Programme taken up by the student shall be exploited for communication in the Course.			
PO2					
PO3					
PO4					
PO5	CO1,CO2,CO3,CO4	10	22		>50%: Level 3
PO6	CO1,CO2,CO3,CO4	26	58		21-50%: Level 2
PO7	CO1,CO2,CO3,CO4	9	20		Up to 20%: Level 1

Level 3 – Strongly Mapped
 Level 2- Moderately Mapped
 Level 1- Slightly Mapped

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1					✓	✓	✓
CO 2					✓	✓	✓
CO3					✓	✓	✓
CO 4					✓	✓	✓

NOTE: CO-PO groups shall be fulfilled through activities that use content from science and technology relevant to the Programme taken up by the student shall be exploited for communication in the Course.

PO5: Appropriate quiz programme may be conducted at intervals and duration as decided by concerned teacher.

PO6: Seminars on applications of mathematics in various engineering disciplines are to be planned and conducted.

PO7: Such activities are to be planned that students visit library to refer standard books on Mathematics and latest updates in reputed national and international journals, attending seminars, learning mathematical software tools.

Blue Print of Question Paper:

S. No.	Name of the Unit	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Preserve or Perish	7	14	6	8			2	1			CO1, CO2, CO3, CO4
2	The Rainbow of Diversity	7	14	6	8			2	1			CO1, CO2, CO3, CO4
3	New Challenges - Newer Ideas	7	14	6	8			2	1			CO1, CO2, CO3, CO4
4	The End Point First!	8	14	6	8			2	1			CO1, CO2, CO3, CO4
5	The Equal Halves	8	14	6	8			2	1			CO1, CO2, CO3, CO4
6	Dealing with Disasters	8	10				10				1	CO1, CO2, CO3, CO4
TOTAL		45	80	30	40		10	10	5		1	

PART-A: 10 Questions 3 marks each=30Marks All Questions are compulsory: 60 minutes

PART-B: 5 Questions 8 marks each=40Marks

Internal choice

: 90minutes

Part-C: 1 Question 10marks =10Marks (Higher Order Question)

No choice, one compulsory question : 30minutes

NOTE: * indicates questions can be given from any of the corresponding lessons in the blue print.
Question Paper Pattern for Unit Tests

Part A: 16 marks: 4 questions with 1 mark each (FIB, True/false, one word/phrase, etc.)
4 questions with 3 marks each (short answer/ descriptive/ applicative questions)
Part B: 24 marks: 3 questions 8 marks each with internal choice

Learning Outcomes

1. Preserve or Perish

Describe the ecological challenges that we face today and act to save the environment.
Narrate / Report past events.
Develop vocabulary related to environment.
Write e-mails.

2. The Rainbow of Diversity

Illustrate and value other cultures for a happy living in multi-cultural workspace
use different types of sentences
Ask for or give directions, information, instructions
Use language to express emotions in various situations
Write letters in various real life situations

3. New Challenges – Newer Ideas

Explain the functional difference between Active Voice and Passive Voice
Use Passive Voice to speak and write in various contexts
List the major parts and salient features of an essay
Explain latest innovations and get motivated

4. The End Point First!

Illustrate the importance of setting a goal in life
Report about what others have said both in speaking and writing
Write an essay following the structure in a cohesive and comprehensive manner
Apply the words related to Goal Setting in conversations and in life

5. The Equal Halves

Value the other genders and develop a gender-balanced view towards life
Identify the use of different conjunctions in synthesising sentences
Write various types of sentences to compare and contrast the ideas
Apply the knowledge of sentence synthesis in revising and rewriting short essays
Develop discourses in speech and writing

6. Dealing with Disasters

Speak and write about different kinds of disasters and the concept of disaster management
Generate vocabulary relevant to disaster management and use it in sentences
Analyze an error in a sentence and correct it
write different kinds of reports

Textbook: INTERACT (A Textbook for I Year English) - Published by SBTET, AP

Reference Books:

- | | |
|--|--|
| Martin Hewings | : Advanced Grammar in Use, Cambridge University Press |
| Murphy, Raymond | : English Grammar in Use, Cambridge University Press |
| Sidney Greenbaum | : Oxford English Grammar, Oxford University Press |
| Wren and Martin (Revised by N.D.V. Prasad Rao) | : English Grammar and Composition, Blackie ELT Books, S. Chand and Co. |
| Sarah Freeman | : Strengthen Your Writing, Macmillan |

Unit Test Syllabus

Year/Semester	Unit Test	Syllabus
Second Semester	Unit Test-I	Preserve or Perish The Rainbow of Diversity New Challenges - Newer Ideas
	Unit Test-II	The End Point First The Equal Halves Dealing with Disasters

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur
C-20, Model paper
II Semester – Unit I

Subject Name: ENGLISH-II

Course Code: CER-2101

Time: 90 min Max. Marks: 40

Instructions: Answer all the questions. Each question carries Four marks.

4 x 4 = 16 M

- Change the voice of the following
 - Pragathi can type the letter.
 - Pavan has not sent me a text message.
 - Cell phones banned in Educational Institutions.
 - I sent a text message to my brother.
- Match the words in column A with their corresponding meaning in column B.

COLUMN A

- Audience
- Vital
- Confirmation
- Rapport
- Rely

COLUMN B

- Very important
- Proof
- depend
- Listeners
- link

3. You are in Class room and your friend who has come for the first time to your college is at the entrance. Give directions as he or she asks for to go to Office.
4. Describe any past event in past tense.

PART – B

Instructions: Answer all the questions and each question carries EIGHT marks. 3 x 8=24

5. Write a report in 100 words on the bad roads in your Village.
6. Read the following passage given below and answer the questions that follow.

Professor Amartya Sen is a noted economist philosopher. He was the first Asian economist to get the coveted Nobel Prize in 1998 for Economic Science which was instituted by the Bank of Sweden in the memory of Alfred Nobel. The prize was in recognition of Sen's contribution to study of famines.

Sen was born in Shantiniketan in 1933. He was named 'Amartya' the one who deserves immortality by Ravindranath Tagore. The poet had told Amartya parents. "I can see the boy will grow into an outstanding person.'

As a school boy Amartya had dreamt of different professions: first Shanskrit Scholar like his grandfather there a physicist, later a Mathematician. However when he joined Calcutta's Presidency college, he studies Economics. As a boy often he had witnessed the horros or Bengal Fanube if 1943. More than five million people had died. He had seen people dying in front of his house. It made him think about the cause of famine. 'When I took on the famine work in a formal way thirty years later, I was still haunted by the memories of period, he said.

Question:

- a. Who is Amartya Sen?
 - b. Who instituted the Nobel Prize?
 - c. What was his grandfather?
 - d. Who named Amartya Send?
7. Write a letter to the Editor of a newspaper about the inconvenience caused due to loud speaker in your area.

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur
C-20, Model paper
II Semester – Unit II

Subject Name: **ENGLISH-II**

Course Code: CER-2108

Time: 90 min Max. Marks: 40

Instructions: Answer all the questions. Each question carries Four marks. 4 x 4 = 16 M

1. Change the speech of the following.
 - a. He says, "They are repairing the bridge."
 - b. I said to Rani, I have posted the letter just now."
 - c. She said, "How lucky I am."
 - d. Please post letter.
2. Rewrite as directed.
 - a. Though he was weak, he took the test (Change into a simple sentence)
 - b. You must work hard to achieve success (Change into a complex sentence)
 - c. If you run fast, you will catch the bus (change into a compound sentence)
 - d. I have posted the letter. (change into a simple present tense)
3. What is your goal and how do you achieve it.
4. Write a paragraph about on how do you motive yourself when you went to other state.

PART – B

Instructions: Answer all the questions and each question carries EIGHT marks. 3 x 8=24

5. Read the passage give below and answer the questions that follow.

Grandfather bought Toto from a tonga-driver for the sum of five rupees. Grandfather decided to would add the little follow to his prints 200. Toto was a pretty money. His bright eye sparkled with mischief beneath deep-set eyebrows and his teeth, which were pearly white, were very often displayed in a simple that frightened the life of elderly Anglo-Indian ladies. But his hands looked dried up. Yet his fingers were quick and wicked and his tail, while adding to good look also samed as third hand.

Questions:

- a. Where did grandfather buy Toto?
- b. What is Toto?
- c. How much did grandfather pay for Toto?
- d. What did grandfather decide to do Toto?
- e. Read the passage and make notes:

6. Sports are an integral part of education. The aim of education in physical, mental and moral development of a student. A sound body certainly has a sound mind. If the body is weak, then the mind cannot be strong.

Games teach us discipline and sportsmanship they provide a good training for playing the game of life. A true player is unmindful of joys and sorrows. They help in the formation of character. And presence of mind. They teach team spirit and cooperation.

Games at times breed jealousy, anger and party feeling. Studies are neglected and health is lost. There should be a balance between studies and games.

7. Write a report in 100 words on Industrial Visit.

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur
C-20, Model paper
II Semester

Subject Name: **ENGLISH-II**

Course Code: CER-2108

Time: 3 hours Max. Marks: 80

Instructions: Answer all the questions. Each question carries Three marks. 10 x 3 = 30

1. Match the words in column A with their corresponding meaning in column B.

COLUMN A

f. Audience

g. Vital

h. Confirmation

i. Rapport

j. Rely

COLUMN B

i. Very important

ii. Proof

iii. depend

iv. Listeners

v. link

2. Change the voice of the following.

a. Sravani has been offered a job.

b. The Chief Guest will be received by the Final students.

c. Rama Killed Ravana.

3. Locate Six errors from the following passage and correct them.

I like to eating rotis. They are prepared without oil. They made with various kinds of food grains. They gives us the required nutritions and energy. I eat rotis and slice raw vegetables daily. I remain health because of rotis. Rotis are ate widely eaten in many parts of India.

4. Write about on your short term and long term goals.

5. Rewrite as directed

a. I have been writing a note (change into simple past tense)

b. On seeing the tiger, he climbed a tree (split into two simple sentences)

c. He is poor. He is honest (combined the two sentences using 'but')

6. Write a paragraph about on the role of Robots in the modern work.
7. Fill in the blanks with appropriate forms of verbs given in brackets.
 - a. Balu _____ (sing) for over fifty years in the films.
 - b. The Principal (Enter) the class before students came.
8. Write any past incidents in your life?
9. Write, How you ask for directions.

You are in Hyderabad. You have to attend an interview of Hi-Tech City. Ask a stranger where it is and how to get there.

10. What are the dangers of **e-waste**?

PART – B

Instructions: Answer the following questions. Each question carries EIGHT marks. 5 x 8 = 40

11. Write a report in 100 words on an Industrial Visit Using the hints below.

Visited NSL Texiles Pvt. Ltd ----- on 08-06-2020 ----- Interested with the MD and other Employees ----- raw material ----- the latest machinery ----- spent time in packaging section ----- gathered a lot of useful information.

OR

Imagine that you participated in the science fair held at Vijayawada, A.P. on 12th August, 2020. Write a report on the event.

12. Write a letter to your father about your preparation for your and examinations.

OR

Write a letter to the principal of your Institution requesting him to provide a cycle stand in the campus.

13. Change the voice of the following.
 - a. The bank issued the Credit Card to siva
 - b. He will paint the house tomorrow.
 - c. I have sent my brother a message
 - d. They are giving me some tips.
 - e. Who wrote this poem.
 - f. Keep silent in the class.

- g. Does she eat sweets?
- h. She tells lessons.

OR

Rewrite the following jumbled words in sentences to construct sentences in passive forms.

- a. He a box is given
 - b. Brought a big loaf of Shatosh bread was to
 - c. We were a joke told the teacher by
 - d. I have sent a text message not been.
 - e. We sent a letter the dog before yesterday were
 - f. I given the book by was my last Sunday friend
 - g. Him has written a letter by been her to
 - h. Stories us told many Our grand mother.
14. What is your goal? How do you achieve it?

OR

Write an essay in about 120 words on importance of gender equality.

15. Correct the following sentences.

- a. My mother love me very much.
- b. Bhaskar wants to quickly paint the picture.
- c. I am not knowing why they have not come
- d. I will get up early day usually.
- e. Unless you don't pay the fee, you cannot write the exam.
- f. Our examination begin in Monday morning.
- g. Please kindly help me.
- h. My computer don't work well sometimes.

OR

Findout at least Eight errors in the following paragraph and correct them.

News papers are a source of information on various issue from different parts of the world. Each reader, however, have his own corner of interest for example youngsters may be interested in news related to sports, films, employment and even politics. Businessmen show a strong interest by business news, share market and studies closely classified or advertisements. Newspapers also providing a change to voice opinions of people in the letters column. All said and done, we can conclude that newspapers have become so much a part of everyday life that the day begins for many without reading the news papers. News papers are a boon to the students who strive to improve English language skills. They own buy or find them in the college library and read at least for half the hour daily.

PART – C

1 X 10 = 10 Marks.

16. Read the following paragraph and make notes first then its summary.

Homeopathy, as a method of therapy, appeared more than 200 years ago. This therapy is aimed to reconstruct the life power of the organism by means of activating the process of body self regulation, leading to the recovery. A Homeopath selects a corresponding homeopathic remedy to each patient according to his health condition. Generally saying, its main advantages is that it helps the organism cope with the diseases by itself. Ordinary medicine suppresses or agitate certain processes in the body while homeopathy simple regulate these process treats the person, not the disease itself. It is a kind of 'disease treatment' by very small amount of drugs that it given to a healthy person, would produce symptoms like these of the disease itself.

ENGINEERING MATHEMATICS – II

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks of FA	Marks of SA
CER-2109	Engineering Mathematics – II	05	75	20	80

S.No	Unit Title	No of Periods	Cos Mapped
1	Coordinate Geometry	22	CO1
2	Differential Calculus	33	CO2,CO3
3	Applications of the Differentiation	20	CO4
TOTAL		75	

Learning outcomes

UNIT - I

Coordinate Geometry

C.O.1 Solve problems on Straight lines, circles, parabola, ellipse & hyperbola.

L.O. 1.1 Write the different forms of a straight line – point slope form, two point form, intercept form, normal form and general form

1.2 Solve simple problems on the above forms

1.3 Find distance of a point from a line, acute angle between two lines, intersection of two non parallel lines and distance between two parallel lines.

1.4 Define locus of a point – circle and its equation.

1.5 Find the equation of a circle given (i) center and radius, (ii) two ends of a diameter (iii) Centre and a point on the circumference (iv) three non collinear points.

1.6 Write the general equation of a circle and find the centre and radius.

1.3. Define a conic section.

1.8 Explain the terms focus, directrix, eccentricity, axes and latus rectum of a conic with illustrations.

1.9 Find the equation of a conic when focus, directrix and eccentricity are given

1.10 Describe the properties of Parabola, Ellipse and Hyperbola in standard form.

UNIT - II

Differential Calculus

C.O. 2 Find the limits of different functions.

L.O. 2.1 Explain the concept of limit and meaning of $\lim_{x \rightarrow a} f(x) = l$ and state the properties of limits .

2.2 Mention the Standard limits $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a}$, $\lim_{x \rightarrow 0} \frac{\sin x}{x}$, $\lim_{x \rightarrow 0} \frac{\tan x}{x}$, $\lim_{x \rightarrow 0} \frac{a^x - 1}{x}$, $\lim_{x \rightarrow 0} \frac{e^x - 1}{x}$, $\lim_{x \rightarrow 0} (1+x)^{\frac{1}{x}}$,

$\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x$ (All without proof).

2.3 Solve the problems using the above standard limits

2.4 Evaluate the limits of the type $\lim_{x \rightarrow l} \frac{ax^2 + bx + c}{\alpha x^2 + \beta x + \gamma}$ and $\lim_{x \rightarrow \infty} \frac{f(x)}{g(x)}$

2.5 Explain the concept of continuity of a function at a point and on an interval with some examples whether a given function is continuous or not.

C.O. 3 Find the derivatives of various functions.

L.O.3.1 State the concept of derivative of a function $y = f(x)$ – definition, first principle as

$\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ and also provide standard notations to denote the derivative of a function.

3.2 State the significance of derivative in scientific and engineering applications.

3.3 Find the derivatives of elementary functions like x^n , a^x , e^x , $\log x$, $\sin x$, $\cos x$, $\tan x$, $\sec x$, $\operatorname{cosec} x$ and $\cot x$ using the first principles.

3.4 Find the derivatives of simple functions from the first principle .

3.5 State the rules of differentiation of sum, difference, scalar multiplication, product and quotient of functions with illustrative and simple examples.

3.6 Explain the method of differentiation of a function of a function (Chain rule) with illustrative examples , such as

i) $\sqrt{t^2 + \frac{2}{t}}$ ii) $x^2 \sin 2x$ (iii) $\frac{x}{\sqrt{x^2 + 1}}$ (iv) $\log(\sin(\cos x))$.

3.7 Find the derivatives of Inverse Trigonometric functions and examples using the Trigonometric transformations.

3.8 Explain the method of differentiation of a function with respect to another function and also differentiation of parametric functions with examples.

3.9 Find the derivatives of hyperbolic functions.

3.10 Explain the procedures for finding the derivatives of implicit function with examples.

3.11 Explain the need of taking logarithms for differentiating some functions with examples like $[f(x)]^{g(x)}$.

3.12 Explain the concept of finding the higher order derivatives of second and third order with examples.

3.13 Explain the concept of functions of several variables, partial derivatives and difference between the ordinary and partial derivatives with simple examples.

3.14 Explain the definition of Homogenous function of degree n

3.15 Explain Euler's theorem for homogeneous functions with applications to simple problems.

UNIT - III

Applications of the Differentiation

C.O. 4 Apply differentiation to solve the problems on tangents & normal to the curves, rate of measuring and extreme values of function.

L.O.4.1 State the geometrical meaning of the derivative as the slope of the tangent to the curve $y=f(x)$ at any point on the curve.

4.2 Explain the concept of derivative to find the slope of tangent and to find the equation of tangent and normal to the curve $y=f(x)$ at any point on it.

4.3 Find the lengths of tangent, normal, sub-tangent and sub normal at any point on the curve $y=f(x)$.

4.4 Explain the derivative as a rate of change in distance-time relations to find the velocity and acceleration of a moving particle with examples.

4.5 Explain the derivative as a rate measurer in the problems where the quantities like volumes, areas vary with respect to time- illustrative examples.

4.6 Define the concept of increasing and decreasing functions.

4.7 Explain the conditions to find points where the given function is increasing or decreasing with illustrative examples.

4.8 Explain the procedure to find the extreme values (maxima or minima) of a function of single variable- simple problems yielding maxima and minima.

4.9 Solve problems on maxima and minima in applications like finding areas, volumes etc.

CO/PO - Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1						3		
CO2	3	3	2	1						3		
CO3	3	3	2	1						3		
CO4	3	3	3	2						3		

4. Slight (Low)
5. Moderate (Medium)
6. Substantial (High)

Note:

PSO1: An ability to understand the concepts of basic mathematical concepts and to apply them in various areas like computer programming, civil constructions, fluid dynamics, electrical and electronic systems and all concerned engineering disciplines.

PSO2: An ability to solve the Engineering problems using latest software tool, along with analytical skills to arrive at faster and appropriate solutions.

PSO3: Wisdom of social and environmental awareness along with ethical responsibility to have a successful career as an engineer and to sustain passion and zeal for real world technological applications.

PO5: Appropriate quiz programme may be conducted at intervals and duration as decided by concerned teacher.

PO6: Seminars on applications of mathematics in various engineering disciplines are to be planned and conducted.

PO7: Such activities are to be planned that students visit library to refer standard books on Mathematics and latest updates in reputed national and international journals, attending seminars, learning mathematical software tools.

COURSE CONTENT

UNIT-I Coordinate geometry

1. Straight lines: various forms of straight lines, angle between lines, perpendicular distance from a point, distance between parallel lines-examples.
2. Circle: locus of a point, Circle, definition-Circle equation given
 - (i) center and radius,
 - (ii) two ends of a diameter
 - (i) centre and a point on the circumference (iv) three non collinear points - general equation of a circle – finding center, radius.
3. Definition of a conic section, equation of a conic when focus directrix and eccentricity are given. properties of parabola, ellipse and hyperbola in standard forms.

UNIT-II Differential Calculus

1.. Concept of Limit- Definition- Properties of Limits and Standard Limits -Simple Problems-Continuity of a function at a point- Simple Examples only.

2. Concept of derivative- definition(first principle)- different notations-derivatives of elementary functions- problems. Derivatives of sum, product, quotient, scalar multiplication of functions - problems. Chain rule, derivatives of inverse trigonometric functions, derivative of a function with respect to another function, derivative of parametric functions, derivative of hyperbolic, implicit functions, logarithmic differentiation – problems in each case. Higher order derivatives - examples – functions of several variables - partial differentiation, Euler’s theorem-simple problems.

UNIT-III Applications of Derivatives:

1 Geometrical meaning of the derivative, equations of Tangent and normal to a curve at any point. Lengths of tangent, normal, subtangent and subnormal to the curve at any point - problems.

2 Physical applications of the derivative – velocity, acceleration, derivative as a rate measure –Problems.

3 Applications of the derivative to find the extreme values – Increasing and decreasing functions, finding the maxima and minima of simple functions - problems leading to applications of maxima and minima.

Reference Books :

1. Textbook prescribed by SBTET, AP, Vijayawada
2. A text book of matrices by Shanti Narayan,
3. Plane Triogonometry, by S.L Loney
4. Co-ordinate Geometry, by S.L Loney
1. Thomas Calculus, Pearson Addison-Wesley publishers
2. Calculus – I, by Shanti Narayan and Manicavachgam Pillai, S.V Publications

Unit Test Syllabus

Year/Semester	Unit Test	Syllabus
SECOND SEMESTER	Unit Test-I	Straight Lines Circle Conic Sections Limits and Continuity and some topics of differentiation
	Unit Test- II	Differentiation Geometrical Applications Physical Applications Maxima and Minima

Sl No	Chapter/ Unit Title	No of Periods		Weightage Allotted	Marks Wise distribution of weightage				Question Wise distribution of weightage				COs mapped
		Theory	Practice		R	U	Ap	An	R	U	Ap	An	
	Unit III : Co-ordinate Geometry												
1	Straight Lines	3	2	6	6	0	0	0	2	0	0	0	CO1
2	Circle	3	2	6	3	3	0	0	1	1	0	0	CO1

														Co1
3	Conic Sections	8	4	6	3	3	0	0	1	1	0	0		
	Unit – IV : Differential Calculus													
1	Limits and Continuity	3	2	6	3	3	0	0	2	0	0	0		CO2
2	Differentiation	18	10	22	22		0	0	4	0	0	0		CO3
	Unit - V : Applications of Differentiation													
1	Geometrical Applications	5	2	13	0	0	8	5	0	0	1	1/2		CO4
2	Physical Applications	3	2	8	0	0	8	0	0	0	0	0		CO4
2	Maxima and Minima	5	3	13	0	0	8	5	0	0	0	1/2		CO4
Total		48	27	80	37	9	24	10	10	2	1	1		

Short Type

Essay Type

Marks Questions Questions

R:	Remember Type	: 37 Marks	7	2
U:	Understand Type	: 9 Marks	3	0
Ap:	Application Type	: 24 Marks	0	3
An:	Analyse Type	: 10 Marks	0	1

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Guntur-5.
C-20, Model paper
II Semester - I Unit

PART - A 16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

9. a) The equation of straight line is $y = mx$ (State true or false).
b) The equation of circle is $(x - h)^2 + (y - k)^2 = r^2$ (State true or false).
c) Find the formula of $\text{Lt}_{x \rightarrow 0} \frac{x^n - a^n}{x - a}$.
d) Find $\frac{dy}{dx}$ if $y = \sin^{-1} x$.
10. Find the centre and radius of circle $x^2 + y^2 + 2x - 3y - 4 = 0$.
11. Find the eccentricity of rectangular hyperbola.
12. Find $\frac{dy}{dx}$ if $y = 3^x$.

PART - B Marks: 3 x 8 = 24

Answer all questions. Each question carries eight marks.

13. Find the equation of parabola if focus is $(-1, 1)$ and directrix is $x - y + 1 = 0$. (or)
Find centre, vertices, e, length of axes, length of latus rectum and focii, equation of directrices, equation of latus rectum of $\frac{x^2}{4} + \frac{y^2}{9} = 1$.

14. Evaluate $\text{Lt}_{x \rightarrow 4} \frac{3 - \sqrt{5+x}}{x-4}$. (or)

Evaluate $\text{Lt}_{\theta \rightarrow 0} \frac{1 - \cos \theta}{\theta^2}$.

15. Find the derivative of $\sin x$ using first principle. (or)

Find $\frac{dy}{dx}$ if $y = \frac{x^3 + \sin^{-1} x + \cos x}{x}$.

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Textile Technology (Autonomous)
Guntur-5.
C-20, Model paper
II Semester – Unit II

Subject Name: Engineering Mathematics – II

Course Code: TT-2102

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

9. a) State true or false if $\frac{dy}{dx}$ is 1 if $y = \sin^{-1} x + \cos^{-1} x$.

b) Write tangent equation at (x_1, y_1) .

c) Write velocity formula.

d) What is the slope of parallel lines.

10. Find $\frac{dy}{dx}$ if $y = \sin x + \cos^{-1} x + \log x$.

11. Find $\frac{\partial y}{\partial x}$ if $u = x^2 + y^2$.

12. Find $\frac{dy}{dx}$ if $x = at^2, y = 2at$.

PART- B

Marks: 3 x 8 = 24

Answer all questions. Each question carries eight marks.

13. Find $\frac{dy}{dx}$ if $y = \sin^3 x \cdot \cos^3 x$ w.r.to x . (or)

Find $\frac{dy}{dx}$ if $y = \sqrt{x + \sqrt{x + \sqrt{x \cdots \infty \text{ terms}}}}$.

14. Find tangent equation and normal equation to the curve $y^2 = 4x$ at $(1, -1)$. (or)

Find $\frac{dy}{dx}$ if $ax^2 + 2hxy + by^2 = 1$.

15. If the length of a simple pendulum 'l' is decreased by 2% then find the percentage

error in time period 'T', $T = 2\pi \sqrt{\frac{l}{g}}$, g is constant. (or)

Find the maximum and minimum value of $x^3 - 6x^2 + 9x + 1$.

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Textile Technology (Autonomous)
Guntur-5.
C-20, Model paper
II Semester

Subject Name: Engineering Mathematics – II Course Code: TT-2102

Time: 3 Hours Max. Marks: 80

PART - A 10 x 3 = 30M

Answer all questions. Each question carries three marks.

17. Find the straight line passing through (1,2) and parallel to $2x + 3y + 5 = 0$.

18. Find the equation of straight line with x – intercept is $\frac{3}{5}$ and y – intercept is $\frac{4}{5}$.

19. Find the equation of circle with centre(3,4) and $r = 5$.

20. Find the centre and radius of circle $x^2 + y^2 + 2x + 4y - 2 = 0$.

21. Find the equation of parabola with focus as (2,0).

22. Find the eccentricity of $2x^2 + 3y^2 = 1$.

23. Evaluate $\text{Lt}_{x \rightarrow 2} \frac{x^3 - 8}{x - 2}$.

24. Evaluate $\text{Lt}_{\theta \rightarrow 0} \frac{\sin 7\theta}{\tan 2\theta}$.

25. Differentiate $e^x + \log x$ w.r.to x .

26. Differentiate $\sin^{-1} x + \cos^{-1} x$ w.r.to x .

PART- B

Marks: 5 x 8 = 40

Answer all questions. Each question carries eight marks.

27. A) Differentiate $\sin x$ using first principle. (or)
B) Differentiate $\tan x$ using first principle.
28. A) If $y = \tan^{-1} x$ then prove that $(1 + x^2)y_1 + 2xy_2 = 0$. (or)
B) Find $\frac{dy}{dx}$ if $y = \tan^{-1} \left(\frac{\cos x}{1 + \sin x} \right)$.
29. A) Find the equations of tangent and normal to the curve $y = x^2 - 3x + 5$ at (2,3). (or)
B) Find the lengths of tangent, normal, subtangent and subnormal to the curve $y = x^2 + 2x - 4$.
30. A) The motion of a particle is governed by $S = t^3 - 9t^2 + 24t - 18$. Find the velocity of the particle when the acceleration is zero. (or)
B) A circular metal plate is expanded by heat so that its radius increases at the rate of 0.02 cm/sec . At what rate its area is increasing when the radius is 20 cm .
31. A) The sum of ten numbers is 24. Find them if their product is maximum. (or)
B) Find the maximum and minimum values of $x^3 - 6x^2 + 9x + 1$.

PART- C

Marks: 1 x 10 = 10

Answer the following question. Question carries ten marks.

32. A) If the rate of increase of $x^3 - 5x^2 + 5x + 8$ is twice the rate of inverse of x .
Find the value of x .
B) If the length of a simple pendulum is decreased by 2%. Find the % error in the time period ' T ' when $T = 2\pi \sqrt{\frac{l}{g}}$. g is constant.

ENGINEERINGPHYSICS-II

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks of FA	Marks of SA
CER-2110	ENGINEERING PHYSICS -II	4	60	20	80

TIME SCHEDULE

S.No	Name of the Experiment	No. of Periods	COs Mapped
1.	Simple Harmonic Motion	12	CO1
2.	Heat & Thermodynamics	14	CO2
3.	Sound	12	CO3
4.	Electricity & Magnetism	14	CO4
5.	Modern Physics	08	CO5
	Total	60	

Course Objectives and Course Outcomes

Course Objectives	<ol style="list-style-type: none"> 1. To familiarize with the concepts of Physics involved in the process of various Engineering, Industrial and Daily life Applications. 2. To understand and apply the basic principles of physics in the field of engineering and technology to familiarize certain natural phenomenon occurring in the day to day life. 3. To reinforce theoretical concepts by conducting relevant experiments/exercises 		
Course Outcomes	CO1	CER-2110.1	Explain the properties of S.H.M
	CO2	CER-2110.2	Explain gas law's, Ideal gas equation, Isothermal and adiabatic processes, specific heats, to study the laws' of thermodynamics
	CO3	CER-2110.3	Causes, consequences and methods to minimize noise pollution, explain beats, Doppler effect, reverberation, echoes
	CO4	CER-2110.4	Explain Ohm's law, to study Kirchoff's laws. To study the principle of wheatstone's bridge and it's application to meter bridge. To study the magnetic forces and understand magnetic field. To compute magnetic field strength on axial and equatorial lines of bar magnet.
	CO5	CER-2110.5	To familiarize with modern topics like photoelectric effect, optical fibres, super conductivity and Nano Technology

COS, POS, PSOS MAPPING

POs mapping strength

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3					1		1	1	1
CO2	3		2					1	1	
CO3	3		2					1		
CO4	3	2			2				2	2
CO5	3			2			2	1	1	

3: High, 2: Moderate, 1: Low

Note:

The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:

- i) Seminars ii) Tutorials iii) Guest lectures iv) Assignments v) Quiz competitions vi) Industrial visits
vii) Tech Fest viii) Mini project ix) Group discussion x) Virtual classes xi) Library visit fore-books

Learning Outcomes

1.0 Concepts of Simple harmonic motion

- 1.1 Define Simple harmonic motion, Give examples, state the conditions.
- 1.2 Explanation of uniform circular motion of a particle is a combination of two Perpendicular S.H.M.s.
- 1.3 Derive expressions for displacement, velocity, acceleration, Frequency, Time period of a particle executing SHM.
- 1.4 Define phase of SHM.
- 1.5 Define Ideal simple pendulum and derive expression for time period of simple pendulum.
- 1.6 State the laws of motion of simple pendulum.
- 1.7 Solve the related numerical problems.

2.0 Concept of heat and thermodynamics

- 2.1 Explain the concept of expansion of gases
- 2.2 State and explain Boyle's and Charles laws.
- 2.3 Define absolute zero temperature, absolute scale of temperature
- 2.4 Define ideal gas and distinguish from real gas
- 2.5 Derive Ideal gas equation. Define specific gas constant and universal gas constant, write S.I unit and dimensional formula. Calculate the value of R.
- 2.6 Explain why universal gas constant is same for all gases
- 2.7 State and explain isothermal process and adiabatic process
- 2.8 State first and second laws of thermodynamics and state applications
- 2.9 Define specific heats and molar specific heats of a gas, Derive $C_p - C_v = R$
- 2.10 Solve the relevant numerical problems.

3.0 Concept of Sound

- 3.1 Concept of the sound, Wave motion. (Longitudinal and transverse wave)
- 3.2 Distinguish between musical sound and noise.
- 3.3 Explain noise pollution and state SI unit for intensity level of sound.
- 3.4 Explain causes, effects and methods of minimizing of noise pollution.
- 3.5 Explain the phenomenon of beats state the applications.
- 3.6 Define Doppler Effect, list the applications.
- 3.7 Define reverberation and reverberation time and write Sabine's formula.
- 3.8 Define and explain echoes state its applications.
- 3.9 State conditions of good auditorium.
- 3.10 Solve the related numerical problems.

4.0 Concepts of Electricity and Magnetism

- 4.1 Explain Ohm's law in electricity and write the formula.
- 4.2 Define specific resistance, conductance and state their units.
- 4.3 Explain Kirchhoff's laws.
- 4.4 Describe Wheatstone's bridge with legible sketch.
- 4.5 Describe Meter Bridge for the determination of resistivity with a circuit diagram.
- 4.6 Explain the concept of magnetism. State the Coulomb's inverse square law of Magnetism.
- 4.7 Define magnetic field and magnetic lines of force and write the properties of magnetic lines of force.
- 4.8 Derive an expression for the moment of couple on a bar magnet placed in a uniform magnetic field.
- 4.9 Derive equations for Magnetic induction field strength at a point on the axial line and on the equatorial line of a bar magnet.
- 4.10 Solve the related numerical problems

5.0 Concepts of modern physics

- 5.1 State and explain Photo-electric effect and Write Einstein's photoelectric Equation.
- 5.2 State laws of photo electric effect.
- 5.3 Explain the Working of photo electric cell, write its applications.
- 5.4 Recapitulation of refraction of light and its laws, critical angle, total Internal Reflection.
- 5.5 Explain the principle and working of Optical fiber, mention different types of Optical fiber, state the applications.
- 5.6 Define super conductor and super conductivity and mention examples.
- 5.7 State the properties of super conducting materials and list the applications.
- 5.8 Nanotechnology definition, nano materials, applications.

COURSE CONTENT

1. Simple Harmonic Motion:

Introduction- Conditions of SHM- Definition- Examples- Expressions for displacement, velocity, acceleration, Time period, frequency and phase in SHM- Time period of a simple pendulum- Laws of simple pendulum-seconds pendulum-Problems.

2. Heat and Thermodynamics:

Expansion of Gases, Boyle's law, absolute scale of temperature- Charles laws- Ideal gas equation- Universal gas constant- Differences between gas constant(r) and universal gas constant(R), Isothermal and adiabatic processes, Laws of thermodynamics, Specific heats - molar specific heats of a gas -Different modes of transmission of heat ,laws of thermal conductivity, Coefficient of thermal conductivity-Problems.

3. Sound:

Sound- Nature of sound- Types of wave motion -musical sound and noise- Noise pollution – Causes & effects- Methods of reducing noise pollution- Beats- Doppler effect- Echo- Reverberation-Reverberation time-Sabine 's formula-Conditions of good auditorium- Problems.

4. Electricity & Magnetism:

Ohm's law and explanation, Specific resistance, Kirchoff's laws, Wheatstone's bridge, Meter bridge, Coulomb's inverse square law, magnetic field, magnetic lines of force, magnetic induction field strength- magnetic induction field strength at a point on the axial line - magnetic induction field strength at a point on the equatorial line–problems.

5. Modern Physics;

Photoelectric effect –Einstein's photoelectric equation-laws of photoelectric effect- photoelectric cell–Applications of photo electric effect- Total internal reflection- fiber optics- -principle and working of an optical fiber-types of optical fibers - Applications of optical fibers- superconductivity–applications-Nanotechnology definition, nano materials, applications.

REFERENCE BOOKS

- | | |
|-------------------------------------|--------------------------------------|
| 1. Telugu Academy (English version) | Intermediate physics Volume-I & 2 |
| 2. Dr. S.L. Gupta and Sanjeev Gupta | Unified physics Volume 1, 2, 3 and 4 |
| 3. Resnick & Holiday | Textbook of physics Volume I |
| 4. Dhanpath Roy | Textbook of applied physics |
| 5. D.A Hill | Fiber optics |
| 6. XI & XII Standard | NCERT Text Books |

S. No	Unit Title/Chapter	No of Periods	Weightage of marks	Marks wise distribution of Weightage				Question wise distribution of Weightage				Mapped with CO
				R	U	Ap	An	R	U	Ap	An	
1	Simple harmonic motion	12	14	3	11	0	0	1	2	0	0	CO1
2	Heat and Thermodynamics	14	24	8	3	3	10	1	1	1	1	CO2
3	Sound	12	14	3	11	0	0	1	1	0	0	CO3
4	Electricity and Magnetism	14	22	3	11	8	0	1	2	1	0	CO4
5	Modern physics	08	06	0	3	3	0	0	1	1	0	CO5
Total		60	80	17	39	14	10	4	8	3	1	

Unit Test Syllabus

Year/ Semester	Unit Test	Syllabus
Second semester	Unit Test-I	1. Simple Harmonic Motion 2. Heat & Thermodynamics 3. Sound
	Unit Test-II	4. Electricity and magnetism 5. Modern Physics

State Board of Technical Education and Training

Andhra Pradesh::Vijayawada

Govt. Institute of Ceramic Technology (Autonomous)

Gudur, SPSR Nellore-524101

C-20, Model paper

II Semester – Unit -I

Subject Name: Engineering Physics-II

Course Code: CER-2110

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. i). Sabine's formula $T = \dots\dots\dots$

ii). Echo will be occur when sound....

iii). The time taken by the oscillating particle in its complete oscillation is called

iv). In $Y = 6\sin\left(\frac{\pi}{2}t + \frac{\pi}{4}\right)$ amplitude is.....

2. State first and second law's of thermodynamics?

3. Define S.H.M and give two examples?

4. Distinguish between isothermal and adiabatic process?

5. Distinguish between musical sound and noise?

PART- B

Marks: 3 x 8= 24

Answer all questions. Each question carries eight marks.

6. (A) Derive the expressions for velocity and acceleration of a particle executing S.H.M?
(Or)
(B). Derive an expression for time period of a simple pendulum?.
7. (A). Prove that $C_p - C_v = R$
(Or)
(B). Derive an ideal gas equation?
8. (A). (a). Explain any four causes of noise pollution?
(b). Explain any four effects of noise pollutions?
(Or)
(B). State any 8 conditions of good auditorium?

**State Board of Technical Education and Training
Andhra Pradesh::Vijayawada**

Govt. Institute of Ceramic Technology (Autonomous)

Gudur, SPSR Nellore-524101

C-20, Model paper

II Semester – Unit -II

Subject Name: Engineering Physics-II

Course Code: CER-2110

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. i). Photo electric cell converts light energy in to _____ energy
ii). What is photo electric effect
iii). SI unit of Specific resistance is.....
iv). Inside a bar magnet magnetic line of force will travel from North Pole to South pole [True / False]
2. Define critical angle & total internal reflection
3. State coulombs inverse square law of magnetism
4. The values of resistances P, Q, R are 50Ω , 10Ω , 15Ω respectively in the balanced condition of Wheatstone bridge, find the unknown resistance
5. What is nanotechnology and write any two uses.

PART- B

Marks: 3 x 8 = 24

Answer all questions. Each question carries eight marks.

6. (A) Derive the balancing condition of Wheatstone bridge with neat circuit Diagram.
(Or)
(B). Derive an expression for the magnetic induction field strength at a point on the equatorial line of a bar magnet.
7. (A). Describe an experiment to determine the specific resistance of a wire using meter bridge.

(Or)

(B). Derive an expression for the magnetic induction field strength at a point on the equatorial line of a bar magnet.

8. (A). i. Define photoelectric effect

ii. Write the Einstein photoelectric equation & name the terms involve in the equation.

iii. Write any three applications of photoelectric effect.

(Or)

(B). Explain principle and working of optical fibers. Write any three applications

SCHEME: C – 20

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY

GUDUR – 524101: SRI POTTI SREERAMULU NELLORE DISTRICT, A.P

Autonomous Institute Vide G.O.Ms.No. 214/ Edn, (TE – I Dept.) 05-10-1996

II Semester Examination (MPEC) for 3 ½ Year Diploma in Ceramic Technology

PART—A

3×10=30

Instructions: (1) Answer all questions.

(6) Each question carries three marks.

(7) Answers should be brief and straight to the point and shall not exceed five simple sentences.

1. Define S.H.M and give two examples.
2. For a body in simple harmonic motion velocity at mean position is 4m/s, if the time period is 3.14 s, find its amplitude.
3. State Boyle's law in gases express its equation in terms of density.
4. State first and second laws of thermodynamics.
5. Write any three conditions of good auditorium
6. Write Sabine's formula for reverberation time.
7. Define ohmic and non-ohmic conductors.
8. Write the law's of photo electric effect.
9. State Coulomb's inverse square law of magnetism.
10. Write any three applications of super conductor.

PART—B

8 × 5 = 40

Instructions: (1) Each question carries eight marks.

(3) Answers should be comprehensive and the criterion for valuation is the content But not the length of the answer.

11. A) Derive an expression for velocity and acceleration of a particle performing simple harmonic motion.

OR

- B) Derive an expression for time period of a simple pendulum

12. A) Distinguish between isothermal and adiabatic processes.

OR

- B) Define ideal gas and derive ideal gas equation.

13. A) Two tuning forks A and B produce 4 beats per second. On loading B with wax 6 beats are produced. If the quantity of wax is reduced the number of beats drops to 4. If the frequency of A is 326 Hz, find the frequency of B.

OR

- B) write effects of noise pollution.

14. A) Derive an expression for balancing condition of Wheatstone's bridge with a neat circuit diagram.

OR

B) State and explain Kirchhoff's laws.

15) A). Derive an expression for the strength of magnetic induction field at a point on the axial line of bar magnet.

OR

B). Derive an expression for momentum of couple on a bar magnet placed in uniform magnetic field.

PART C

1 x 10 = 10

16) Derive relationship between molar specific heat of a gas at constant pressure C_p and molar specific heat of a gas at constant volume C_v and hence show that C_p is greater than C_v .

ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES-II

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks of FA	Marks of SA
CER-2111	ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES-II	4	60	20	80

TIME SCHEDULE

S. No	Major Topic	No. Of periods	Weightage of Marks	Short Type			Essay Type			Remarks
				R	U	A	R	U	A	
1	Corrosion	8	8	0	0	0	0	8	0	
2	Water Technology	12	14	3	3	0	0	0	8	
3	Polymers	12	24	3	3	0	0	0	18	
4	Fuels	6	9	6	3	0	0	0	0	
5	Chemistry in daily life	6	3	0	0	3	0	0	0	
6	Environmental studies	16	22	3	3	0	0	8	8	
	Total	60	80	15	12	3	0	16	34	

COURSE OBJECTIVES AND COURSE OUTCOMES

Course Objectives	<ol style="list-style-type: none"> To understand the concepts of chemistry involved in the process of various Engineering Industrial Applications. To know the various natural and man-made environmental issues And concerns with an interdisciplinary approach that include physical, chemical, biological and socio cultural aspects of environment. After studying this course, the student will be able to understand and appreciate the role of chemistry in our daily life. 	
	CO1	Understand and explain corrosion and preventive methods of corrosion
	CO2	Distinguish the temporary and permanent hardness; apply the different methods of softening of hard water, including desalination.
	CO3	List out the different methods of preparation and industrial uses of plastics, rubber and vulcanized rubber
	CO4	Classify the fuels and explain basic terms of fuel. Composition and industrial uses of gaseous fuels
	CO5	Understand the basic information about the chemical products that we come across in our daily life.
	CO6	Explain the causes, effects and controlling methods of air and water pollutions. Compare the renewable and non renewable energy sources, to take measures to protect the biodiversity and also the environment.

COS, POS, PSOS MAPPING

POs mapping strength

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3					1		1	1	1
CO2	3		2					1	1	
CO3	3		2					1		
CO4	3	2			2				2	2
CO5	3			2			2	1	1	

3: High, 2: Moderate, 1: Low

S.No	Major topic	No of Periods	Weight age of marks	Marks wise distribution of Weightage				Question wise distribution of Weightage				Mapped with CO
				R	U	AP	AN	R	U	AP	AN	
1	Corrosion	8	8	0	0	8	0	0	0	1	0	CO1
2	Water Technology	12	14	3	3	8	0	1	1	1	0	CO2
3	Polymers	12	24	3	3	18	0	1	1	2	0	CO3
4	Fuels	6	9	6	3	0	0	2	1	0	0	CO4
5	Chemistry in daily life	6	3	0	0	3	0	0	0	1	0	CO5
6	Environmental Studies	16	22	3	11	8	0	1	2	1	0	
	Total	60	80	15	20	45	0	5	5	6	0	

Blue print and Question Paper

S.No	Major topic	No of Periods	Weight age of marks	Short type (3marks)			Essay type (10 marks)			remarks
				R	U	A	R	U	A	
1	Corrosion	8	10	0	0	0	0	8	0	
2	Water Technology	14	13	3	3	0	0	0	8	
3	Polymers	24	13	3	3	0	0	0	18	
4	Fuels	9	3	6	3	0	0	0	0	
5	Chemistry in daily life	3	3	0	0	3	0	0	0	
6	Environmental Studies	22	13	3	3	0	0	8	8	
	Total	80	80	15	12	3	0	16	34	

Upon completion of the course the student shall be able to learn

LEARNING OUTCOMES

1.0 Corrosion

1.1 Define the term corrosion

1.2 state the Factors influencing the rate of corrosion

1.3 Describe the formation of a) composition cell b) stress cell c) concentration cell during corrosion.

1.4 Define rusting of iron and explain the mechanism of rusting of iron.

1.5 Explain the methods of prevention of

- 1.6 corrosion a) Protective coatings (anodic and cathodic coatings)
b) Cathodic protection (Sacrificial anode process and Impressed-voltage process)

2.0 Water Treatment

- 2.1 Define soft water and hard water with respect to soap action.
- 2.2 Define and classify the hardness of water.
- 2.3 List out the salts that causing hardness of water (with Formulae)
- 2.4 State the disadvantages of using hard water in industries.
- 2.5 Define Degree of hardness and units of hardness (mg/L) or (ppm).
- 2.6 Explain the methods of softening of hard water: a) Ion-exchange process, b) Permutit process or zeolite process
- 2.7 State the essential qualities of drinking water.
- 2.8 Chemistry involved in treatment of water (Coagulation, Chlorination, defluoridation)
- 2.9 Explain Osmosis and Reverse Osmosis with examples.
- 2.10 State the applications of Reverse Osmosis.

3.0 Polymers

- 3.1 Explain the concept of polymerisation
- 3.2 Describe the methods of polymerization a) addition polymerization of ethylene b) condensation polymerization of Bakelite (Only flowchart)
- 3.3 Define thermoplastics and thermosetting plastics with examples.
- 3.4 Distinguish between thermo plastics and thermosetting plastics
- 3.5 List the Characteristics of plastics and state the disadvantages of using plastics.
- 3.6 State the advantages of plastics over traditional materials.
- 3.7 Explain the methods of preparation and uses of the following plastics:
 1. PVC, 2. Teflon, 3. Polystyrene 4. Nylon 6,6
- 3.8 Explain processing of Natural rubber and write the structural formula of Natural rubber.
- 3.9 List the Characteristics of raw rubber
- 3.10 Define and explain Vulcanization and List out the Characteristics of Vulcanized rubber.
- 3.11 Define the term Elastomer and describe the preparation and uses of the following synthetic rubbers a) Buna-s and b) Neoprene rubber.

4.0 Fuels

- 4.1 Define the term fuel
- 4.2 Classify the fuels based on physical state and based on occurrence.
- 4.3 List the characteristics of good fuel.
- 4.4 State the composition and uses of gaseous fuels.
 - a) water gas b) producer gas, c) natural gas, d) Coal gas, e) Biogas.

5.0 Chemistry in daily life

- 5.1 Give the basic chemical composition, applications, health aspects and pollution impacts of
a) soaps, and detergents b) vinegar c) insect repellents d) activated charcoal e) Soft drinks

6.0 ENVIRONMENTAL STUDIES

- 6.1 Define the term environment and explain the scope and importance of environmental studies
- 6.2 Define the segments of environment 1). Lithosphere, 2). Hydrosphere, 3). Atmosphere, 4). Biosphere,
- 6.3 Define the following terms 1) Pollutant, 2) Pollution, 3) Contaminant, 4) receptor, 5) sink, 6) particulates, 7) dissolved oxygen (DO), 8) Threshold limit value (TLV), 9) BOD, 10) COD 11) ecosystem 12) Producers 13) Consumers 14) Decomposers with examples
- 6.4 State the renewable and non-renewable energy sources with examples.
- 6.5 Explain biodiversity and threats to biodiversity

- 6.6 Define air pollution and classify the air pollutants-based on origin and physical state of matter.
- 6.7 Explain the causes, effects of air pollution on human beings, plants and animals and control methods of airpollution.
- 6.8 State the uses of forestresources.
- 6.9 Explain causes and effects of deforestation
- 6.10 Explain the causes and effects of the following
1.) Greenhouse effect, 2) Ozone layer depletion and 3) Acid rain

Define Water pollution, explain the causes, effects and control methods of Waterpollution.

COURSE CONTENT

ENGINEERING CHEMISTRY AND ENVIRONMENTAL STUDIES

- 1 Corrosion
Introduction - factors influencing corrosion - composition, stress and concentration cells– rusting of iron and its mechanism – prevention of corrosion by coating methods, cathodic protection methods.
- 2 Watertechnology
Introduction–soft and hard water–causes of hardness–types of hardness –disadvantages of hard water – degree of hardness (ppm and mg/lit) – softening methods – permutit process – ion exchange process– qualities of drinking water – Chemistry involved in treatment of water (Coagulation, Chlorination, defluoridation) - Osmosis, Reverse Osmosis
–Applications of Reverse osmosis.
- 3 Polymers
Introduction – polymerization – types of polymerization – addition, condensation with examples – plastics – types of plastics – advantages of plastics over traditional materials- Disadvantages of using plastics – Preparation and uses of the following plastics i).PVC ii) Teflon iii) Polystyrene iv) .Nylonn 6,6 –Processing of natural rubber - Vulcanization – Elastomers- Preparation and applications of Buna-s, Neoprene rubbers.
- 4 Fuels
Definition and classification of fuels–characteristics of good fuel-composition and uses of gaseous fuels.
- 5 Chemistry in daily life
Basic composition, applications, health aspects and pollution impacts of soaps and detergents, vinegar, insect repellents, soft drinks, activated charcoal.
- 6 ENVIRONMENTALSTUDIES
Introduction– environment –scope and importance of environmental studies – important terms related to environment– renewable and non-renewable energy sources–Concept of ecosystem – Biotic components –Forest resources – Deforestation -Biodiversity and its threats-Air pollution – causes-effects–Global environmental issues – control measures – Water pollution – causes – effects – control measures.

REFERENCEBOOKS

- | | | |
|---|---------------|--------------------------------|
| 1 | TeluguAcademy | Intermediate chemistry Vol1&2 |
| 2 | Jain&Jain | EngineeringChemistry |
| 3 | O.P.Agarwal, | Hi- Tech. EngineeringChemistry |
| 4 | Sharma | EngineeringChemistry |
| 5 | A.K. De | EngineeringChemistry |

Table specifying the scope of syllabus to be covered for unit test 1 and unit test 2

Unit Test	Learning outcomes to be covered
Unit Test - 1	From 1.1 to 2.10
Unit Test - 2	From 3.1 to 6.10

Model question paper for Unit Test with Cos mapped

UNIT TEST – I
Model Question Paper (C-20)

ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES - II (CER-2111)
TIME:90minutes TotalMarks:40Marks

PART-A

4x4 =16M

Instructions: (1) Answer all questions. Each question carries 4 marks.

1. Define the term corrosion.
2. Define rusting of iron.
3. Define soft water and hard water.
4. State essential qualities of drinking water.

PART-B

3x8M =24M

Answer either (A) or (B) from each questions from Part-B.

Each question carries 8 marks.

- 5.A) Define corrosion? Write the factors that influences the rate of corrosion.

(Or)

- B) Explain to prevent corrosion of a metal by inorganic coating.

- 6.A) Explain the sacrificial anode method in the prevention of corrosion.

(Or)

- B) What is a rusting of iron? Explain with chemical equation.

7. A) Explain Froth floatation process.

(OR)

- B) Explain Electrolytic refining processing of copper.

UNIT TEST – II
Model Question Paper (C-20)

ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES - II (CER-2111)
TIME:90minutes TotalMarks:40Marks

PART-A 16Marks

Instructions: (1) Answer all questions. Each question carries 4 marks.

1. Write characteristics of a good fuel.
2. Explain the three causes of air pollution.
3. Write a note on Acid rain.
4. Write the preparation and uses of polyvinyl chloride.

PART-B

3x8M =24M

Answer either (A) or (B) from each questions from Part-B.
Each question carries 8 marks.

5. A) Write the methods of controlling Air pollution.

(or)

B) State the effects of deforestation.

- 6.A) Define Osmosis and reversis osmosis with suitable examples.

(or)

B) write essential qualities of drinking water.

7. A) Explain Froth floatation process.

(OR)

- B) Explain Electrolytic refining processing of copper.

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY

GUDUR – 524101: SRI POTTI SREERAMULU NELLORE DISTRICT, A.P

Autonomous Institute Vide G.O.Ms.No. 214/ Edn, (TE – I Dept.) 05-10-1996

ISemester Examination (MPEC) for 3 ½ Year Diploma in Ceramic Technology

COURSE CODE: **CER -2111**

COURSE NAME: Engineering chemistry and Environmental Studies - II

TIME: 3 HOUR

Max.Marks:80

PART – A

3 x 10 = 30 Marks

Note : 1. Answer all questions and each question carry **THREE** marks.

2. Answer should be brief and straight to the point and shall not

exceed **FIVE** simple sentences.

1. What are the Salts responsible for hardness of water
2. Define degree of hardness. Mention its units..
3. Write any three advantages of plastics over traditional materials.
4. Write the Preparation and any two uses of PVC.
5. Write any three characteristics of good fuel .
6. State the composition and any two uses of Producer gas.
7. What are Secondary fuels. Give any two examples.
8. Mention the basic chemical composition and applications of Vinegar.
9. Define the terms a)Producers b) Consumers c)Decomposers.
10. Write a short note on acid rain.

PART – B

5 X 8 = 40 Marks

Note : 1. Answer **all** questions and each question carry **Eight** marks.

2.The answer should be comprehensive and the criteria for valuation

is the content but not the length of the answer.

11. A).What is Cathodic Protection. Explain the Impressed voltage method with an example.
(Or)
B) What is rusting of iron .Give its Mechanism.
12. A). Explain removal of hardness by Ion-exchange method.
(Or)
B) Define reverse Osmosis. Write any Six essential qualities of drinking water.
13. A).Explain addition polymerisation and condensation polymerisation with example each
(Or)
B).Distinguish between Thermo plastics and Thermo setting plastics.
14. A). Define Water pollution. What are the causes of water pollution.
(Or)
B) What is Biodiversity. Mention major threats to biodiversity.
15. A)Define air pollution .What are primary and secondary pollutants .Give two examples.
(Or)
B)State the renewable and non-renewable energy sources with example.

PART – C

1X 10 = 10

Instructions: *Part C consists of **One** question which carries **Ten** marks.*

16. Define Vulcanization . Explain with chemical equation. Write any four properties of Vulcanized rubber.

-oOo-

ELEMENTS OF CERAMIC TECHNOLOGY-II

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks of FA	Marks of SA
CER-2204	ELEMENTS OF CERAMIC TECHNOLOGY-II	05	75	20	80

S.No	Unit Title	No. of Periods	Cos Mapped
1	Refractories	18	CO1
2	Glass	20	CO2
3	Special Glasses	10	CO2,CO3
4	Enamels	10	CO3,CO4
5	Cement	10	CO5
6	Basic Concepts of Nano-Ceramics	07	CO5
	TOTAL	75	

Course Objectives and Course Outcomes

Course Objectives		Upon completion of the course the student shall be able to: Acquire the basic knowledge about Glass, Refractories, Enamels and cement	
Course contents		Upon completion of the course the student shall be able to:	
	CO1	CER-2204.1	Learn the types and manufacturing of refractories
	CO2	CER-2204.2	Comprehend the preparation of glass and its types
	CO3	CER-2204.3	Classify special glasses
	CO4	CER-2204.4	Get knowledge on enamels
	CO5	CER-2204.5, 6	Study the manufacturing of cements, its types and basic concepts of Nano-ceramics

PO-CO Mapping

Course Code: 2204		Course Title: Elements of Ceramic Technology-II			No of Periods: 75
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1, CO2, CO4, CO5	25	33.33	2	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately Addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO 2	CO1, CO2, CO4, CO5	40	53.33	3	
PO 3					
PO 4					
PO 5					
PO 6					
PO 7	CO3, CO5	10	13.33	1	

3: High, 2: Moderate, 1: Low

Blue Print of a Question Paper

S. No	Chapter Name	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Refractories	18	14	3	11			1	2			CO1
2	Glass	20	24	3	3	8	10	1	1	1	1	CO2,CO3
3	Special Glasses	10	11	3	-	8		1	-	1		CO2,CO3
4	Enamels	10	14	6	8			2	1			CO2, CO4
5	Cement	10	14	3	11			1	2			CO5
6	Basic Concepts of Nano-Ceramics	07	03		3				1			CO6
TOTAL		75	80	18	36	16	10	6	7	2	1	

R-Remember; U-Understanding; Ap-Application ; An- Analysing

OBJECTIVES:

On completion of the course the student should be able to know the following:

1.0 REFRACTORIES:

- 1.1 Define the term Refractory
- 1.2 Name the Natural and Synthetic Refractory materials.
- 1.3 Classify the Refractories.
- 1.4 Write the uses of refractory materials.
- 1.5 Understand the importance of Refractories in metal and Non-metal industries.
- 1.6 List the varieties of refractory products like bricks, wool, cements, etc.
- 1.7 Know the Treatment of raw materials used in the Refractories.
- 1.8 Draw the Flow diagram for the manufacture of Fireclay, Dolomite, Magnesite, chrome Magnesite and Silica Refractories.
- 1.9 Describe the Weighing, mixing, shaping and Drying of Refractories.
- 1.10 Name the Kilns for Firing of Refractories.

1.11 List the properties and tests conducted on Refractories.

2.0 GLASS:

2.1 Define the term glass

2.2 Write the difference between glass and crystal.

2.3 Classify glass based on composition

2.4 Know the classification of glass making raw materials and function of each raw material in glass making

2.5 Draw the schematic diagram of glass making oxides.

2.6 Define the term cullet, its types and importance.

2.7 Explain the Glass batch preparation and Importance of weighing and mixing of batch materials.

2.8 Draw the Block diagram of Glass melting furnace and phases involved in melting of glass

2.9 Name the furnaces used for melting glass batch.

2.10 Name the fabrication techniques for glass products like pressing, blowing, drawing etc...

2.11 Know the Importance of annealing of glass.

3.0 SPECIAL GLASSES

3.1 Introduction to Special glasses

3.2 Describe the composition and uses of fiberglass, Pyrex glass, flint glass, crown glass, amber glass, optical glass

3.3 Explain the preparation of Safety glass

3.4 Know the difference between glass and glass-ceramics

3.5 Write the composition and uses of glass ceramics

4.0 ENAMELS:

4.1 Define the term Enamels.

4.2 Write the classification of enamel compositions

4.3 List the types of metals used in enamel industry.

4.4 Describe the Preparation of metal surface for enameling.

4.5 Draw the Flow diagram of frit making process.

4.6 List the frit making smelters and melters.

4.7 Know the Preparation of enamel slip.

4.8 Draw the Flow diagram of Manufacture of Enamel ware

- 4.9 List the methods of enamel slip application techniques for enameling and furnaces used in Firing of Enamel ware
- 4.10 Name the defects in enamel

5.0 CEMENT:

- 5.1 Define the term Cement.
- 5.2 Write the classification of the cements by composition
- 5.3 List the Properties of different types of cements
- 5.4 What is natural cement and setting time of cement.
- 5.5 Write the function of gypsum in the making of cement.
- 5.6 Classify the raw materials used in the Cement making.
- 5.7 List the types of kilns used in cement manufacture
- 5.8 Draw the flow diagram of Manufacturing process of Wet and Dry methods.
- 5.9 Define the term Clinker
- 5.10. Write the uses of cements

6.0 BASIC CONCEPTS OF NANO-CERAMICS

- 6.1 Comprehend the Introduction of Nano-ceramics
- 6.2 List the preparation methods of Nano-ceramics
- 6.3 Know the properties, Applications of Nano-ceramics

COURSE CONTENTS:

1. REFRACTORIES: Introduction to Refractories-Classification-Examples for Refractories- Refractories in Metal and Non- metal industries, Variety of refractories-Treatment of Raw materials- Manufacturing process- Drying - Firing - Properties of Refractories -Test of Refractories.

2. GLASS: Introduction- Classification - Varieties of Glass Products- (Bottle glass- sheet glass- fiberglass etc.) Raw materials used in Glass- Cullet- Glass Batch and Chemical composition- Glass batch mixing & Weighing- Glass melting - Shaping Techniques of – Annealing.

3. SPECIAL GLASSES: Introduction- composition, definition, uses of fiber glass, optical glass, pyrex glass, safety glass, crown glass, flint glass, glass ceramics etc...

4. ENAMELS: Introduction- Types of Enamels [Cast Iron, Sheet iron, and Steel]. Formation of metal shapes-Preparation of the metal surface for enameling- Enamel Compositions- Frit making & Frit making smelters- Milling & Mill additions-Methods of application of enamel slip- Firing.

5. CEMENT: Introduction- Raw materials, Types of cements, function of gypsum-clinker Flow diagram of manufacturing process, Properties and uses.

6. BASIC CONCEPTS OF NANO-CERAMICS: Introduction to Nanoceramics, Preparation, properties and applications of Nanoceramics.

REFERENCE BOOKS:

1. R.CHARAN, Hand Book of Glass Technology,
2. FAY V. TOOLEY, Handbook of Glass Manufacture Volume I & II, Ogden Publishing Company, New York, 1960.
3. SAMUEL R SCHOLLES, Modern Glass Practice, Industrial Publications, Inc., Chicago, 1952.
4. ANDREWS I. ANDREWS, Enamels –The preparation, Application and Properties of Vitreous Enamels, The Garrard Press, Publishers, Champaign, Illionois, 1949.
5. A RASHID CHESTI, Refractories, Prentice Hall of InidaPvt Ltd, New Delhi, 1986
6. D N NANDI, Hand Book on Refractories, Tata McGraw-Hill Publishing Co. New Delhi, 1991.
7. Dr.M. L. MISRA, Refractories, Clear Type Press, Allahabad, 1975.
8. H N BANERJEA, Technology of Portland cement and Blended Cement.

Unit Test Syllabus

Year/Semester	Unit Test	Syllabus
SECOND SEMESTER	Unit Test-I	1.Refractories 2.Glass
	Unit Test- II	3.Special Glasses 4.Enamels 5.Cement 6.Introduction to Nanomaterials

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur, SPSR Nellore Dist
C-20, Model paper
II Semester - I Unit

Subject Name: Elements of Ceramic Technology-II	Course Code: CER-2204
Time: 90 min Max. Marks: 40	

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Fill in the Blanks

- a) Fired fire clay is called _____
- b) Silica is Refractory (Acidic/Basic/Neutral)
- c) Sand is a important raw material for glass making (True or False)
- d) Pot furnace is a Continuous type of glass melting furnace (True or False)

2. Differentiate Glass is crystal?

3. Define Refractory?

4. List the test conducted on refractories?

5. Define cullet? Write its classification?

PART- B

Marks: 3 x 8= 24

Answer all questions. Each question carries eight marks.

- 6. (A) Draw a flow sheet for manufacturing of fireclay?
(OR)
(B) Write the uses of refractories in metal and Non-metal Industries?
- 7. (A) Draw a flow sheet for manufacturing of Glass?
(OR)
(B) Explain the Classification of Glass?
- 8. (A) Describe the process involved in glass melting process?
(OR)
(B) write short notes on (a) Pressing (b) Rolling

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur, SPSR Nellore Dist
C-20, Model paper
II Semester - II Unit

Subject Name: Elements of Ceramic Technology-II

Course Code: CER-2204

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Fill in the Blanks

- a) Which of the following glass is used in Laboratories
 - i. Crown Glass
 - ii. Borosilicate Glass
 - iii. Float Glass
 - iv. Lead Glass
- b) Glass coating on metal surface is called _____
- c) _____ phase helps in quick setting of cement
- d) Rotary kiln is used for cement making (True or False)

2. List the furnace used for frit making?

3. Write the function of Gypsum in cement mixing?

4. Write the uses for Enamels?

5. Write application of Nano-materials?

PART- B

Marks: 3 x 8= 24

Answer all questions. Each question carries eight marks.

6. (A) Draw a flow sheet for manufacturing of Enamels?

(OR)

(B) Describe the preparation of Metal surface for Enameling?

7. (A) Define Cement? Describe the Properties and uses of Cement?

(OR)

(B) Draw a flow sheet for manufacturing of Cement?

8. (A) Write short notes on

- i. Glass - Ceramics
- ii. Pyrex - Glass

(OR)

(B) How to prepare enamel slip? Write the application methods of enamel slip?

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY

GUDUR-524101:SRI POTTI SREERAMULU NELLORE DISTRICT, A.P

Autonomous Institution Vide G.O.Ms.No. 214/Edn, (TE-I Dept.) 05-10-1996

II-Semester Examination (MPEC) for 3½ Year Diploma in Ceramic Technology

COURSE CODE: CER-2204

COURSE NAME: ECT-II

TIME: 3 Hours

Max Marks: 80

C-20

PART – A

10 X 3 = 30

Instructions: *Part A consists of 10 questions. Answer all questions and each question carries three marks.*

1. Classify Refractories? Give examples?
2. List any three tests conducted on Refractories?
3. Differentiate Glass and Crystal?
4. What is Annealing? Write the necessity of Annealing?
5. Write composition and use of Pyrex glass?
6. Define the term Enamel?
7. List the furnaces used for firing of Enamel ware?
8. What is Natural cement?
9. Write the function of Gypsum in cement?
10. Write the Applications of Nano-ceramics?

PART – B

5 X 8 = 40

Instructions: *Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.*

11. (A) Draw a flow sheet for manufacturing of Fire clay Refractories

(OR)

(B) List the Natural and synthetic refractory materials? Write the applications of Refractories in Metal and Non-Metal industries?

12. (A) Define Glass? Write about different types of glasses?

(OR)

(B) List shaping process used for manufacturing of Glass? Explain any two of them?

13. (A) Differentiate Glass and Glass- Ceramic? Write composition and uses of Fiber glass?

(OR)

(B) How to prepare Safety glass? Write its advantages?

14. (A) Draw a flow sheet for manufacturing of Enamel ware?

(OR)

(B) How to prepare metal surface for Enamelling?

15. (A) Classify Cement? List the types of kilns used for cement making? Write properties and uses of cement?

(OR)

(B) Draw a flow sheet for manufacturing of Cement by Dry process?

PART – C

1X 10 = 10

Instructions: *Part C consists of 1 question which carries 10 marks.*

16. Recommend the glass which has to be used for Tube lights? Write its composition and properties? Draw a flow sheet for manufacturing?

-oOo-

GENERAL ENGINEERING

Course code	Course title	No. of periods/ week	Total no. of periods	Marks for FA	Marks for SA
CER-2205	GENERAL ENGINEERING	6	90	20	80

S. No.	Unit Title	No. of Periods	CO'S Mapped
ELECTRICAL ENGINEERING			
1	Basic Principles Of Electricity	10	C01
2	D.C.Machines	12	
3	A.C.Fundamentals&A.C.Circuits	07	C02
4	A.C.Machines	13	
5	Storage Batteries And Safety Procedures	05	C03
MECHANICAL ENGINEERING			
6	Basic Workshop Tools	10	C04
7	Mechanical Working Of Metals	07	
8	Simple Stresses And Strains	10	C05
9	Fundamentals Of Thermodynamics	06	C06
10	Internal Combustion Engines	10	
Total		90	

Course Objectives		i) Understand basic principles of Electricity, D.C Machines, A.C Circuits and Machines and storage batteries and safety procedure. ii) Understand the basic workshop tools, Mechanical working of metals, Simple stresses, strains, Thermodynamics and working of I.C engines.	
Course contents		Upon completion of the course the student shall be able to:	
	C01	CER-2205-1 CER-2205-2	Explain the basic concepts of basic Principles Of electricity. Describe the D.C.Generator and D.C.Motor.

	C02	CER-2205-3 CER-2205-4	Explain the basic concepts of A.C. Fundamentals & A.C. Circuits. Describe the Alternator , transformer, 1 ϕ and 3 ϕ induction motor
	C03	CER-2205-5	Explain Storage Batteries And Safety Procedures.
	C04	CER-2205-6 CER-2205-7	Describe the classification of basic workshop tools. Describe lathe machine and drilling machine. Describe the hot working and cold working processes
	C05	CER-2205-8	Explain the concept of stress and strain and various constituent relations
	C06	CER-2205-9 CER-2205-10	Explain the fundamentals of Thermodynamics. Explain the Working of I C Engine Systems

Blue Print:

S. No	Chapter Name	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Basic Principles Of Electricity	10	17	3	6	8		1	2	1		CO1
2	D.C. Machines	12										
3	A.C. Fundamentals & A.C. Circuits	07	14	3	3	8		1	1	1		CO2,
4	A.C. Machines	13										
5	Storage Batteries And Safety Procedures	05	08	3	3	8		1	1	1		CO3
6	Basic Workshop Tools	10	14									
7	Mechanical Working Of Metals	07		3			10	1			1	CO4
8	Simple Stresses And Strains	10	13									
9	Fundamentals Of Thermodynamics	06	14	3	3	8		1	1	1		CO5
10	Internal Combustion Engines	10										
TOTAL		90	80	15	15	40	10	05	5	05	01	

R-Remember; U-Understanding; Ap-Application ; An- Analysing

PO-CO Mapping

Course Code : CER-2205	Course Title: GENERAL ENGINEERING Number of Course Outcomes: 06				No. of Periods: 90
POs	Mapped with CO No.	CO Periods addressing PO in Column 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1, CO2, CO3, CO4, CO5, CO6	38	42	3	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately Addressed 5to25% Level 1 Low addressed <5% Not addressed
PO2	CO1, CO2, CO3, CO4, CO5, CO6	25	28	2	
PO3	CO1, CO2, CO3, CO4, CO5, CO6	20	22	1	
PO4					
PO5					
PO6					
PO7	CO1, CO2, CO3, CO4, CO5, CO6	07	08	1	

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CER-2205-1	3	2	2				1	2	3	1
CER-2205-2	3	2	2				1	2	3	1
CER-2205-3	3	2	2				1	2	3	1
CER-2205-4	3	2	2				1	2	3	1
CER-2205-5	3	2	2				1	2	3	1
CER-2205-6	3	2	2				1	2	3	1

Average										
3-Strongly Mapped	2- Moderately Mapped			1- Slightly Mapped						

Note:

The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quizzes (vii) Industrial Visits (viii) Tech Fests (ix) Mini Projects (x) Library Visits

Learning Objectives:

1.0 Basic Principles Of Electricity

- 1.1. Definition and units of electric potential, potential difference, voltage, electromotive force and electric current.
- 1.2. State the Ohm's law
- 1.3. Difference between series and parallel circuits.
- 1.4. Definition and units of electric power and electrical energy.
- 1.5. Definitions of magnetic flux, magnetic field strength, permeability and reluctance.
- 1.6. State Faraday's laws of electromagnetic induction.
- 1.7. State Lenz's law.
- 1.8. Definition of dynamically induced e.m.f. and statically induced e.m.f.
- 1.9. Definition of self inductance and Mutual inductance.
- 1.10. Definition of electric field, electric flux, electric field intensity and capacitance.

2.0 D.C. Machines

- 2.1. State constructional features of D.C.Machines.
- 2.2. Discuss working principle of D.C.Generator.
- 2.3. State formula for E.M.F equation of D.C.Generator (derivation is not required).
- 2.4. State types of D.C.Generator.
- 2.5. Draw the sketches of different types of D.C.Generator.
- 2.6. Working principle of D.C.Motor.
- 2.7. State types of D.C.Motors.
- 2.8. Draw the schematic diagram of the above D.C.Motors.
- 2.9 State the applications of D.C.Motors.
- 2.10.State necessity of starter for D.C.Motor.

3.0 A.C. Fundamentals & A.C. Circuits

- 3.1. Define Alternating current, cycle, amplitude, periodic Time and frequency.
- 3.2. Define phase and phase difference.
- 3.3. Define average value, RMS value form factor and peak factor

4.0 A.C. Machines

- 4.1. Discuss working Principle of Alternator.
- 4.2. e.m.f. Equation of an alternator (derivation not required)
- 4.3. Describe the working principle of transformer.
- 4.4. Write the e.m.f. Equation pf transformer (derivation not required).
- 4.5. Describe the working principle of 3 ϕ induction motor.
- 4.6. State different types of 3 ϕ induction motors and their applications.
- 4.7. Describe working principle of 1 ϕ induction motor.
- 4.8. State the different types of 1 ϕ induction motors and their applications.

5.0 Storage Batteries And Safety Procedures

- 5.1. State different types of cells.
- 5.2. State the active materials of Lead acid cell.
- 5.3. Write difference between lead acid cell and Nickel Iron cell.
- 5.4. Write the usage of storage batteries.
- 5.5. State the effect of electrical shock and burns.
- 5.6. State the precautions to be taken against electrical shock.
- 5.7. Discuss the procedures to be adopted in case of electric shock.

6.0 Basic Workshop Tools

- 6.1 State the Classification of various workshop tools.
- 6.2 Sketch the various marking and measuring tools in workshop as such steel rule, calipers, divider, Vernier calipers, sine bar, filler gauge. Wire gauge, plate gauge, Tri square, Marking knife, scriber, pick punch.
- 6.3 Describe with neat sketches the various cutting tools used in workshop such as saw, snips, chisels, drills, wheels brace, jackplane, File etc.
- 6.4 Describe with neat sketches the various striking tools used in work shop such as Warrington hammer, claw hammer, sledge hammer, mallet etc.
- 6.5 Describe with neat sketches the various holding tools used in work shop such as bench vice, pipe vice, hand vice etc.
- 6.6 Describe with neat sketches the various miscellaneous tools used in workshop such as pincer, screwdriver, spanners, pliers.
- 6.7 Describe with neat sketches the various machine tools like lathe, drilling machine used in workshop.

7.0 Mechanical Working Of Metals

- 7.1 Define hot working.
 - 7.2 List the advantages and disadvantages of hot working.
 - 7.3 Illustrate the working principle of various hot working processes like rolling, extrusion, forging, piercing, reeling, spinning, drawing etc.
 - 7.4 Define Cold working.
 - 7.5 List the advantages and disadvantages of cold working.
 - 7.6 Illustrate the working principle of various cold working processes like rolling, drawing, extrusion, embossing, joining, bending etc.
 - 7.7 Comparison of hot working with cold working.

8.0 Simple Stresses and Strains

- 8.1 Define the stress.
- 8.2 Define the Strain.
- 8.3 State the Poisson's ratio.
- 8.4 State the different types of stresses and strains.
- 8.5 Discuss about elastic limit.
- 8.6 State Hook's law.
- 8.7 Define Modulus of elasticity.
- 8.8 State and explain Thermal stresses.
- 8.9 Compute stress and strain relating bodies of uniform section, changes in lateral and volumetric dimensions of bodies of uniform section under the action of normal forces and thermal stress as in bodies of uniform section.

9.0 Fundamentals Of Thermodynamics

- 9.1. Define the term of Heat.
- 9.2. Discuss about Temperature.
- 9.3. Discuss about Specific heat.
- 9.4. State the laws of thermodynamics.
- 9.5. State and explain law of perfect gases.

- 9.6. Define internal energy.
- 9.7. State law of internal energy.
- 9.8. State law of conservation of energy.

10.0 Internal Combustion Engines

- 10.1 Define Heat engine.
- 10.2 Classify of heat engines with examples.
- 10.3 Discuss internal combustion engine terminology.
- 10.4 Explain with a line diagram of the working of a Four-stroke petrol engine with a neat line diagram.
- 10.5 Explain with a line diagram of the working of a Four-stroke diesel engine.
- 10.6 Explain with line diagram the working of Two-stroke petrol engine.
- 10.7 Explain with line diagram the working of Two-stroke diesel engine.
- 10.8 Compare two-stroke engine with four-stroke engine.
- 10.9 Compare diesel engine with petrol engine.
- 10.10 Draw the Line diagram of fuel supply system in petrol engine.
- 10.11 Draw the Line diagram of fuel injection system for C.I engines.
- 10.12 Understand the necessity of cooling for I.C engine.
- 10.13 Describe the methods of cooling like air-cooling system and water-cooling system.

HYPONATED COURSE CONTENT

1. BASIC PRINCIPLES OF ELECTRICITY: Define and state units of electric potential, potential difference, voltage, electromotive force and electric current. Ohm's law .Series and parallel circuits. Definitions of electric power and electrical energy, magnetic flux, magnetic field strength, permeability and reluctance. Faraday's laws of electromagnetic induction. Lenz's law. Dynamically induced e.m.f. and statically induced e.m.f. Self inductance and Mutual inductance. Define electric field, electric flux, electric field intensity and capacitance.

2. D.C. MACHINES: D.C.Machines. D.C.Generator. Formula for E.M.F equation of D.C. Generator Types of D.C.Generator. Working principle of D.C.Motor, Types of D.C.Motors, uses all D.C.Motors. Starter of a D.C.Motor.

3. A.C.FUNDAMENTALS & A.C.CIRCUITS: Define Alternating current, cycle, amplitude, periodic time, frequency, Phase and phase difference, Define average value, RMS value, form factor and peak factor,

4. A.C.MACHINES: Working Principle of Alternator. E.M.F. Equation of an alternator and .Working principle of transformer. E.M.F. Equation of transformer, working principle of 3 ϕ induction motor and single phase induction motor and its types and uses.

5. STORAGE BATTERIES AND SAFETY PROCEDURES: Types of Cells, active materials of Lead acid cell, Nickel Iron cell, uses of storage batteries. Electrical shock and burns and its effects. Precautions for electrical shock.

6. BASIC WORK SHOP TOOLS: Classification, hand tools, marking, and measuring tools, striking tools, holding tools, miscellaneous tools and uses.

7. MECHANICAL WORKING OF METALS: Hot working process, cold working process, advantages and disadvantages of both and comparison.

8. SIMPLE STRESSES AND STRAINS: Stress, Strain, Various types of stresses and strains. Hook's law, Module of elasticity, lateral strain, Poisson's ratio, calculation of stress, strain and dimensional changes in bodies, thermal stresses.

9. FUNDAMENTALS OF THERMODYNAMICS: Heat, temperature, specific heat, loss of thermodynamics, loss of perfect gases, internal energy, law of conservation of energy.

10. INTERNAL COMBUSTION ENGINES: Definition, examples, classification, I.C. engine parts, engine terminology, four stroke (petrol and diesel) engines, Two stroke (petrol and diesel) engines, Four stroke vs. two stroke, petrol vs. Diesel engines, fuel supply system in a petrol

engines, fuel injections system for diesel engines, cooling system of I.C. engine, necessity of cooling and methods of cooling.

REFERENCES

1. BL Theroja and AKTheroja, Electrical Technology Volume I and II
2. Theraja, B.L., Fundamentals of Electrical Engineering”, NirajPrakashma 1966.
3. RS Khurmi, Strength of Materials,
4. RS Khurmi, A text book on Mechanical technology,
5. BL Theroja and AKTheroja, Electrical Technology Volume I and II
6. HajraChoudhery, Elements of Workshop Technology.
7. B.S. Raghuvamsi, Workshop Technology.

Note : 1. This subject is to be taught by Electrical and Mechanical faculty 2. Paper setting and paper evaluation is also to be done by Electrical and Mechanical faculty.

Govt Institute of Ceramic Technology –Gudur
DIPLOMA IN CERAMIC TECHNOLOGY - UNIT TEST
CER-2205:: GENERAL ENGINEERING (C20)

Time : 90 Minutes

Total Marks: **40**

PART – A

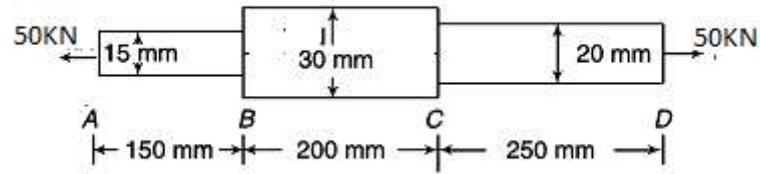
Instructions: 1st Question having 4 one mark questions, and remaining 4 Questions carry 3 marks each

1. (a) Use of claw hammer
(b) list out the methods of hot working
(c) State Hooke's Law
(d) Define heat and temperature
2. List out the work Holding devices, Marking and Measuring tools ,Cutting tools and Striking tools.
3. Write two advantages and two disadvantages of hot working.
4. A bar of 25 mm diameter is tested in tension. It is observed that when a load of 60 kN is applied, the extension measured over a gauge length of 200 mm is 0.12 mm . Find the values of stress and strain.
5. Write two differences between S.I and C.I engines.

PART – B

Instructions: Part B consists of 3Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.

1. a). Draw a line diagram of Lathe machine and Radial drilling machine and label the parts also.
(OR)
b). Draw a neat sketches of Vernier Caliper and Sine bar and label the parts.
- 7.a) A steel circular bar has three segments as shown in the fig. Determine the total elongation of the bar. Take $E = 210 \text{ GPa}$.



(OR)

b) A specimen of rectangular section 40 x 50 mm is 800 mm long. It is elongated by 0.4 mm under an axial pull of 40 kN. Determine
 a). Stress induced b). Longitudinal strain c). Young Modulus of Elasticity
 d). Lateral strain. Take Poisson's ratio = 0.3

8.a) Explain the working principle of 4 stroke Petrol engine with a line diagram for each stroke. Draw P-V diagram.

(OR)

b) State First and Second law of thermodynamics. Explain the working principle of 2 stroke Diesel engine.

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY

GUDUR-524101:SRI POTTI SREERAMULU NELLORE DISTRICT, A.P
Autonomous Institution Vide G.O.Ms.No. 214/Edn, (TE-I Dept.) 05-10-1996

C-20

II-Semester Examination (MPEC) for 3½ Year Diploma in Ceramic Technology

COURSE CODE: CER-2205

COURSE NAME: **GENERAL ENGINEERING**

TIME: 3 Hours

Max Marks: 80

PART-A

3 X 10=30

Instructions: (i) Answer **all** questions.
(ii) Each question carries **three** marks.
(iii) Answer should be brief and straight to the point and shall not exceed five simple sentences.

1. State the Ohm's law.
2. Write the applications of D.C. Motors.
3. Define RMS value and form factor
4. Write the working Principle of Alternator.
5. State Lenz's law.
6. Mention the examples of striking tools, holding tools and measuring tools.
7. List out the Hot working methods.
8. State Hooke's law.
9. Explain First law of Thermodynamics.
10. List out the various components of an I.C. Engines.

PART-B

8 X 5=40

Instructions: (i) Answer **all five** questions.
(ii) Each question carries **eight** marks.
(iii) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. a). Describe working principle of D.C. Motor.
(OR)
b). State Faraday's laws of electromagnetic induction. Define self-inductance and mutual inductance
12. a). Describe the working principle of 3 ϕ induction motor.
(OR)
b). Describe working principle of 1 ϕ induction motor.
13. a). Write difference between lead acid cell and Nickel Iron cell. Write the usage of storage batteries.
(OR)
b). State the precautions to be taken against electrical shock.
14. a). Draw a neat sketch of Lathe machine, Label the parts and explain.
(OR)
b). Explain any three cold working methods.

15. a). Explain First law and Second law of Thermodynamics.

(OR)

b). Describe the working of four stroke petrol engine with a neat sketch.

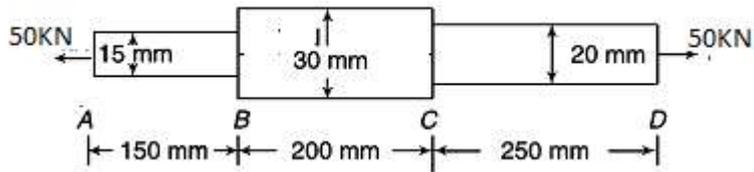
PART-C

1 X 10=10

Instruction:

i) Answer the following question which carries TEN marks.

16. A steel circular bar has three segments as shown in the fig. Determine the total elongation of the bar. Take $E = 210 \text{ GPa}$.



PHYSICS LAB-II

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks of FA	Marks of SA
CER-2112	ENGINEERING PHYSICS LAB-II	$1\frac{1}{2}$	$22\frac{1}{2}$	20	30

TIME SCHEDULE

S.No	Name of the Experiment	No. of Periods	COs Mapped
1.	Focal length and Focal power of convex lens (Separate & Combination) (Single)	03	CO1
2.	Refractive index of solid using traveling microscope	03	CO2
3.	Boyle's law verification	03	CO3
4.	Meter bridge	03	CO4
5.	Mapping of magnet lines of force and locate null points	03	CO5
	DEMONSTRATION EXPERIMENT		
6.	Coefficient of viscosity by capillary method	03	CO5
	Revision	06	
	Test	$1\frac{1}{2}$	
	Total	$22\frac{1}{2}$	

Objectives:

Upon completion of the course the student shall be able to

- 1.0 Calculate the Focal length and focal power of convex lenses using distant object method, U-V method, U-V graph and $1/u - 1/v$ graph methods and their comparison.
- 2.0 Determine the refractive index of a solid using travelling microscope.
- 3.0 Verify Boyle's law employing a Quill tube.
- 4.0 Determine the specific resistance of material of a wire using Meter Bridge.
- 5.0 Drawing magnetic lines of force under N-S and N-N methods and locate null points.
- 6.0 Determine the viscosity of a liquid using capillary method
(Demo)

Competencies and Key competencies to be achieved by the student

Name of the Experiment (No. of periods)	Competencies	Key competencies
1. Focal length and Focal power of convex lens (Separate & Combination) (03)	<ul style="list-style-type: none">• Fix the object distance• Find the Image distance• Calculate the focal length and power of convex lens and combination of convex lenses• Draw u-v and $1/u - 1/v$ graphs	<ul style="list-style-type: none">• Calculate the focal length and power of convex lens• Draw u-v and $1/u - 1/v$ graphs
2. Refractive index of solid using traveling microscope (03)	<ul style="list-style-type: none">• Find the least count of vernier on microscope• Place the graph paper below microscope• Read the scale• Calculate the refractive index of glass slab	<ul style="list-style-type: none">• Read the scale• Calculate the refractive index of glass slab
3. Boyle's law verification (03)	<ul style="list-style-type: none">• Note the atmospheric pressure• Fix the quill tube to retort stand• Find the length of air column• Find the pressure of enclosed air• Find and compare the	<ul style="list-style-type: none">• Find the length of air column• Find the pressure of enclosed air• Find the value $P \times l$

	calculated value $P \times l$	
4. Meter bridge(03)	<ul style="list-style-type: none"> • Make the circuit connections • Find the balancing length • Calculate unknown resistance • Find the radius of wire • Calculate the specific resistance 	<ul style="list-style-type: none"> • Find the balancing length • Calculate unknown resistance • Calculate the specific resistance
5. Mapping of magnet lines of force(03)	<ul style="list-style-type: none"> • Draw magnetic meridian • Placed the bar magnet in NN and NS directions • Draw magnetic lines of force • Locate the neutral points along equatorial and axial lines 	<ul style="list-style-type: none"> • Draw magnetic lines of force • Locate the neutral points along equatorial and axial lines
6. Coefficient of viscosity by capillary method(03)	<ul style="list-style-type: none"> • Find the least count of vernier • Fix the capillary tube to aspiratory bottle • Find the mass of collected water • Find the pressure head • Calculate rate of volume of liquid collected • Find the radius of capillary tube • Calculate the viscosity of water using capillary method 	<ul style="list-style-type: none"> • Find the pressure head • Calculate rate of volume of liquid collected • Find the radius of capillary tube • Calculate the viscosity of water

Scheme of Valuation for end Lab Practical Examination :

D. Writing Aim, Apparatus, Formula, Graph, Precautions carries 10 (Ten) Marks

E. For Drawing the table, taking Readings, Calculation work, Drawing the graph, finding result carries 15 (Fifteen) Marks

F. Viva Voice 05 (Five) Marks

Total 30 (Thirty) Marks

Course Objectives and Course Outcomes

Course contents		Upon completion of the course the student shall be able to:	
	CO1	CER-2112.1	Experiments with Convex lens
	CO2	CER-2112.2	Experiments with Refractive index of solid by travelling Microscope
	CO3	CER-2112.3	Experiments with quill tube (Boyles law verification),

	CO4	CER-2112.4	Experiments with Meter bridge
	CO5	CER-2112.5 CER-2112.6	Experiments with Mapping of magnetic lines of force, Experiment with viscosity(Demo)

PO-CO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3			1	1	1	1
CO2	3	2	2		1		
CO3	3		2			1	2
CO4	3	2			2		
CO5	3		1	2		1	2

3: High, 2: Moderate, 1: Low

CHEMISTRY LABORATORY-II

S.No	Name of the Experiment	No.of Periods	Mapped withCOs
1.	Estimation of Mohr's Salt using Std.KMnO ₄	03	CO3
2.	Determination of acidity of water sample	03	CO2
3.	Determination of alkalinity of water sample	03	CO2
4.	Determination of total hardness of water using Std. EDTA solution	03	CO4
5.	Estimation of Chlorides present in water sample	03	CO4
6.	Estimation of Dissolved Oxygen(D.O)in water sample	03	CO5
7.	Determination of turbidity of water	03	CO5
8.	Estimation of total solids present in water sample	02 1/2	CO5
Total:		22 1/2	

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks of FA	Marks of SA
CER-2113	CHEMISTRY LABORATORY - II	1 $\frac{1}{2}$	22 $\frac{1}{2}$	20	30

Objectives:

Upon completion of the course the student shall be able to

- 6.0 Conduct titrations adopting standard procedures and using Std.KMnO₄solution for estimation of Mohr'sSalt
- 7.0 Conduct titrations adopting standard procedures to determine the acidity of given samples of water (One ground water and one surface / tap water, and rain water ifavailable)
- 8.0 Conduct titrations adopting standard procedures to determine the alkalinity of given samples of water (One ground water and one surface / tapwater)
- 9.0 Conduct titrations adopting standard procedures to determine the total hardness of given samples of water (One ground water and one surface / tap water) using Std. EDTA

solution

- 10.0 Conduct titrations adopting standard procedures to determine the chlorides present in the given samples of water and wastewater (One ground water and one surface / tapwater)
- 11.0 Conduct the test using titrometric / electrometric method to determine Dissolved Oxygen (D.O) in given water samples (One sample from closed container and one from open container / tapwater)
- 14.0 Conduct the test on given samples of solutions (coloured and non coloured) to determine their turbidity in NTU
- 15.0 To determine the total solids present in given samples of water (One ground water and one surface / tapwater)

Competencies and Key competencies to be achieved by the student

Name of the Experiment (No of Periods)	Competencies	Key competencies
Estimation of HCl solution using Std. Na ₂ CO ₃ solution (03)	<ul style="list-style-type: none"> ▪ Cleaning the glassware and rinsing with appropriate 	<ul style="list-style-type: none"> ▪ Making standard solutions ▪ Measuring accurately the
Estimation of NaOH using Std. HCl solution (03)	<p>solutions</p> <ul style="list-style-type: none"> ▪ Making standard solutions 	<p>standard solutions and titrants</p> <ul style="list-style-type: none"> ▪ Effectively Controlling the flow of the titrant
Estimation of H ₂ SO ₄ using Std. NaOH solution (03)	<ul style="list-style-type: none"> ▪ Measuring accurately the standard solutions and titrants 	<ul style="list-style-type: none"> ▪ Identifying the endpoint
Estimation of Mohr's Salt using Std. KMnO ₄ (03)	<ul style="list-style-type: none"> ▪ Filling the burette with titrant ▪ Fixing the burette to the stand 	<p>Making accurate observations</p>
Determination of acidity of water sample (03)	<ul style="list-style-type: none"> ▪ Effectively Controlling the flow of the titrant 	
Determination of alkalinity of water sample (03)	<ul style="list-style-type: none"> ▪ Identifying the endpoint ▪ Making accurate observations 	
Determination of total hardness of water using Std. EDTA solution (03)	<p>Calculating the results</p>	
Estimation of Chlorides present in water sample (03)		
Estimation of Dissolved Oxygen (D.O) in water sample (By titration method) (03)		
Determination of pH using pH meter (03)	<ul style="list-style-type: none"> ▪ Familiarize with instrument ▪ Choose appropriate 'Mode' / 'Unit' 	<ul style="list-style-type: none"> ▪ Prepare standard solutions / buffers, etc.
Determination of conductivity of water and adjusting ionic strength to required level (03)	<ul style="list-style-type: none"> ▪ Prepare standard solutions / buffers, etc. ▪ Standardize the instrument with 	<ul style="list-style-type: none"> ▪ Standardize the instrument with appropriate standard solutions ▪ Plot the standard curve

Determination of turbidity of water (03)	<p>appropriate standard solutions</p> <ul style="list-style-type: none"> ▪ Plot the standard curve ▪ Make measurements accurately <p>Follow Safety precautions</p>	Make measurements accurately
Estimation of total solids present in water sample (03)	<ul style="list-style-type: none"> ▪ Measuring the accurate volume and weight of sample ▪ Filtering and air drying without losing any filtrate ▪ Accurately weighing the filter paper, crucible and filtrate <p>Drying the crucible in an oven</p>	<ul style="list-style-type: none"> ▪ Measuring the accurate volume and weight of sample ▪ Filtering and air drying without losing any filtrate <p>Accurately weighing the filter paper, crucible and filtrate</p>

SCHEME OF VALUATION

A) Writing Chemicals, apparatus, principle and procedure	5M
B) Demonstrated competencies	20M
Making standard solutions	
Measuring accurately the standard solutions and	
titrants Effectively controlling the flow of the titrant	
Identifying the end point	
Making accurate observations	
Viva-voce	5M

Course Objectives and Course Outcomes

Course contents		Upon completion of the course the student shall be able to:	
	CO1	CER-2113.1	Evaluate the end point of reduction and oxidation reaction
	CO2	CER-2113.2	Judge the stable end point of complex formation, stable precipitation
	CO3	CER-2113.3	Judge operate and demonstrate and perform precise operations with instrument for investigation of water pollution parameters

COs-POs mapping strength

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3		1				1		
CO2	2	3		2	2			1		
CO3	2	3		2	2			1		
CO4	2	3		2	2			1		
CO5	2	3		2	2			1		

3=strongly mapped,2= moderately mapped, 1= slightly mapped

ENGINEERING DRAWING-II

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks of FA	Marks of SA
CER-2114	ENGINEERING DRAWING -II	07	105	40	60

TIME SCHEDULE

S.No	Major Topics	No. of Drawing plates	Periods	Weightage of Marks	Short Answer Questions (5 M)	Essay Type Questions (10 M)
1	Sections of Solids	01	20	15	1	1
2	Isometric Views	02	30	25	1	2
3	Development of surfaces	01	20	15	-	1
4	Auxiliary views	01	10	10	1	1/2
5.	Ceramic Drawing	05	25	15	1	1 1/2
Total		10	105	80	04	06

Course Objectives and Course Outcomes

Course Objectives	Upon completion of the course the student shall able to understand the basic graphic skills and use them in preparation of engineering drawings, their reading and interpretation		
Course Outcomes	CO1	CER-2114.1	Draw sectional views and true sections of regular solids by applying the principles of hatching.
	CO2	CER-2114.2	Prepare Isometric drawings from the given orthographic views.
	CO3	CER-2114.3	Draw the development of simple engineering objects and their truncations (cubes, prisms, cylinders,

		cones,pyramid)
CO4	CER-2114.4	Draw the auxiliary views of a given engineering component
CO5	CER-2114.5	Draw the different diagrams of important ceramic machines.

PO-CO Mapping

Course Code :- CER-2114	Course Title: ENGINEERING DRAWING-II			No. of Periods: 105	
	Number of Course : Outcomes: 05				
POs	Mapped with CO No.	CO Periods addressing PO in Column 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1, CO2, CO3, CO4, CO5,	45	42	3	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately Addressed 5to25% Level 1 Low addressed <5% Not addressed
PO2	CO1, CO2, CO3, CO4, CO5,	27	26	2	
PO3	CO1, CO2, CO3, CO4, CO5,	27	26	2	
PO4					
PO5					
PO6					
PO7	CO1, CO2, CO3, CO4, CO5,	06	06	1	

3: High, 2: Moderate, 1: Low

Note:

The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quiz (vii) Industry Visits (viii) Tech Fest (ix) Mini Projects (x) Library Visits.

LEARNING OUTCOMES

Upon completion of the course the student shall able to

1.0) Appreciate the need of Sectional Views

Identify the need to draw sectional views.

Differentiate between true shape and apparent shape of section

Draw sectional views and true sections of regular solids by applying the principles of hatching.
Drawing Plate–11: Problems on section of solids

2.0) Prepare pictorial drawings

identify the need of pictorial drawings.
Differentiate between isometric scale and true scale.

Prepare Isometric views from the given orthographic drawings. Drawing plate

13: Exercise on Isometric drawings only

3.0) Interpret Development of surfaces of different solids.

State the need for preparing development drawing.
Draw the development of simple engineering objects and their truncations (cubes, prisms, cylinders, cones, pyramid)
Prepare development of surface of engineering components like i) funnel
ii) 90° elbow iii) Tray

Drawing plate No. 14: Problems on Development of surfaces

4.0) Understand the need of auxiliary views

State the need of Auxiliary views for a given engineering drawing
Draw the auxiliary views of a given engineering component
Differentiate between auxiliary view and apparent view

5.0) Ceramic Drawings

- a) Draw the plan and elevation of all types of Bricks and Blocks
- b) Draw the plan and elevation of Continuous Glass tank furnace.
- c) Draw the plan and elevation of Day Tank Furnace
- d) Draw the plan and elevation of Enamel Modern Muffle furnace.
- e) Draw the plan and elevation of Rotary smelter for frit making.
- f) Draw the plan and elevation of Round Down draft kiln.
- g) Draw the plan and elevation of Rectangular Down draft kiln.
- h) Draw the plan and elevation of Muffle Tunnel kiln.
- i) Draw the plan and elevation of Rotary kiln.
- j) Draw the diagram of Spray drier for preparation of granules
- k) Draw the diagram of Gas burner and Oil burner
- l) Draw the plan and elevation of Roller Hearth Kiln for Tiles firing
- m) Draw the diagram of Ball mill

COURSE CONTENTS:

NOTES:

3. B.I.S Specification should invariably be followed in all the topics.

4. A-3 Size Drawing Sheets are to be used for all Drawing Practice Exercises.

1) Sectional views

Need for drawing sectional views – what is a sectional view - Location of cutting plane – Purpose of cutting plane line – Selection of cutting plane to give maximum information (vertical and offset planes) - Hatching – Section of regular solids inclined to one plane and parallel to other plane

Drawing Plate 11: Consisting of six exercises on sections of solids

2) Auxiliary views

Need for drawing auxiliary views - Explanation of the basic principles of drawing auxiliary views, explanation of reference plane and auxiliary plane - Partial auxiliary view.

Drawing plate 10: Consisting of four exercises on auxiliary views

3)Pictorial Drawings

Brief description of different types of pictorial drawing viz., Isometric, oblique, and perspective and their use - Isometric drawings: Iso axis, angle between them, meaning of visual distortion in dimensions - Need for an isometric scale, difference between Isometric scale, and ordinary scale- difference between Isometric view and Isometric projection - Isometric and Non-isometric lines -Isometric drawing of common features like rectangles, circular shapes, non-isometric lines - Use of box and offset methods

Drawing plate 13: Consisting of 12 exercises on Isometric views of engineering objects

4)Development of Surfaces

Need for preparing development of surface with reference to sheet metal work -Concept of true length of a line with reference to its orthographic projection when the line is (i) parallel to the plane of projection (ii) inclined to one principal plane and parallel to the other -Development of simple solids like cubes, prisms, cylinders, cones, pyramids -Types of development: Parallel line and radial line development -Procedure of drawing development - drawings of trays, funnels, 90⁰ elbow pipes and rectangular ducts.

Drawing plate 14: Consisting of 5 exercises on development problems

5.0 Ceramic Drawings

Draw the plan and elevation of all types of Bricks and Blocs - Draw the plan and elevation of Continuous Glass tank furnace - Draw the plan and elevation of Enamel Modern Muffle furnace - Draw the plan and elevation of Rotary smelter - Draw the plan and elevation of Round Down draft kiln - Draw the plan and elevation of Rectangular Down draft kiln - Draw the plan and elevation of Muffle Tunnel kiln - Draw the plan and elevation of Rotary kiln - Draw the plan and elevation of Shaft kiln.

REFERENCE BOOKS

Engineering Graphics by P I Varghese – (McGraw-hill)

Engineering Drawing by Basant Agarwal & C.M Agarwal - (McGraw-hill) Engineering Drawing by N.D.Bhatt.

T.S.M. & S.S.M on “ Technical Drawing” prepared by T.T.T.I., Madras.

SP-46-1998 – Bureau of Indian Standards.

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY

II Semester Diploma in Ceramic Technology

CER-2114 ENGINEERING DRAWING-II TIME: 1 ½ HOUR Max.Marks:60

PART –A

4x 4=16

Instructions: (1) Answer all questions. (2). Each question carries FIVE marks.

1. Draw the conventional representation of the following materials.

- a). Concrete b). Liquids c). Glass d). Metals

2. Develop the lateral surfaces of a hexagonal prism of base side is 30 mm and height 60mm.

3. Front view and Side view of a component is given in **Fig. 1**. Redraw those as per

scale 1:1 and Draw the auxiliary view of the sloping surface of the object.

4. Draw the Isometric drawing of an object whose Orthographic projections are given in **Fig. 2**

PART –B

3X 8= 24

1. Answer any **THREE** of the following questions 2. Each question carries **EIGHT** marks.

5. Third angle projections are given in **Fig. 3**. Draw the Isometric projection from the two views of the object.

6. Draw the Isometric view of the model of steps, two views of which are shown in **Fig. 4**.

7. Draw the sectional front view and top view, side view for the object shown in **Fig. 5**.

8. Draw the auxiliary view of the sloping surface of the object shown in **Fig. 6**.

9. Draw the development of a Funnel shown in **Fig. 7**

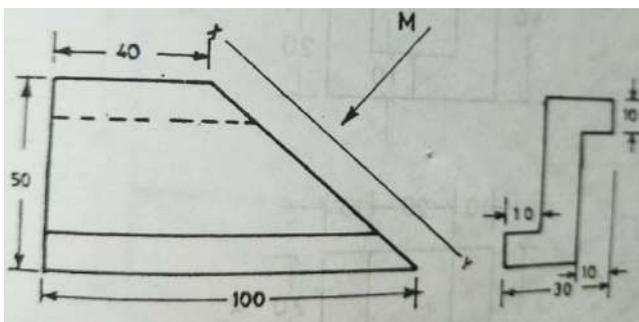


Fig. 1

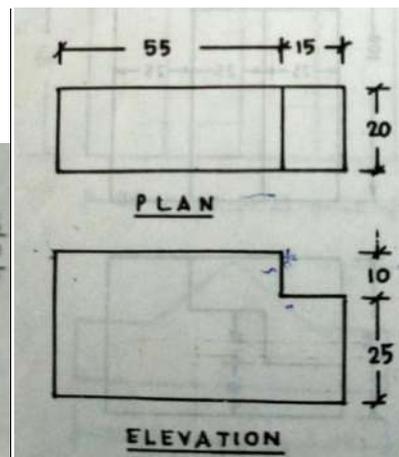


Fig. 2

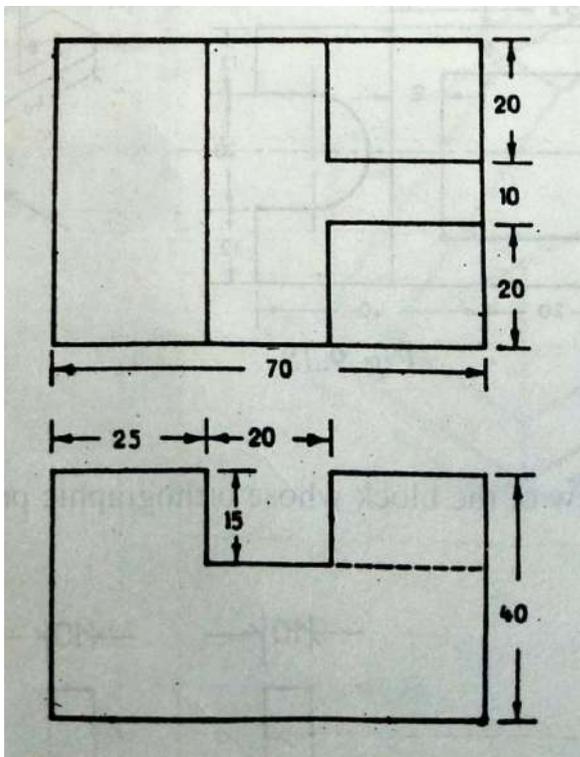


Fig.3

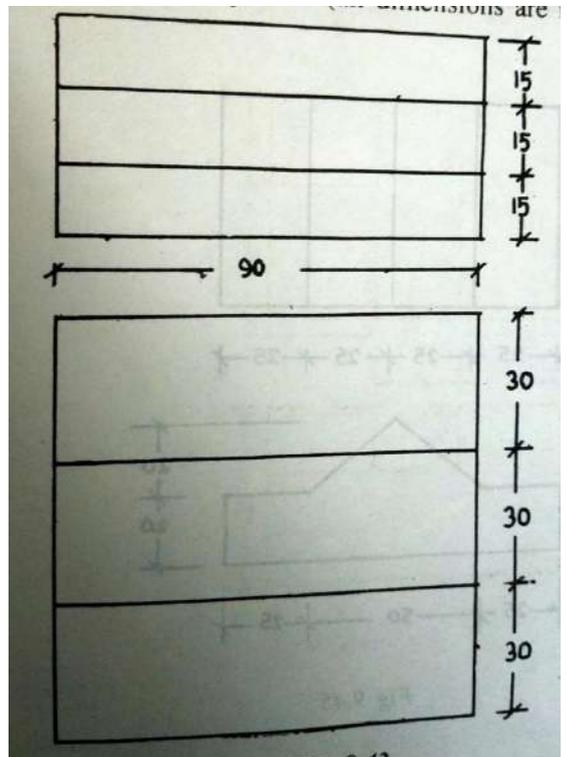


Fig.4

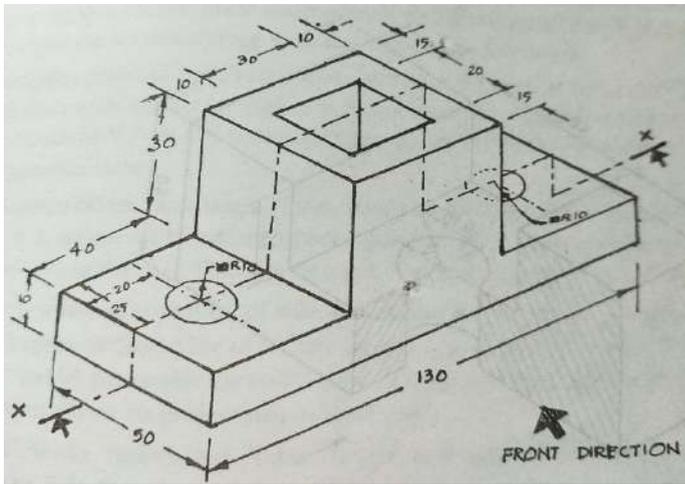


Fig. 5

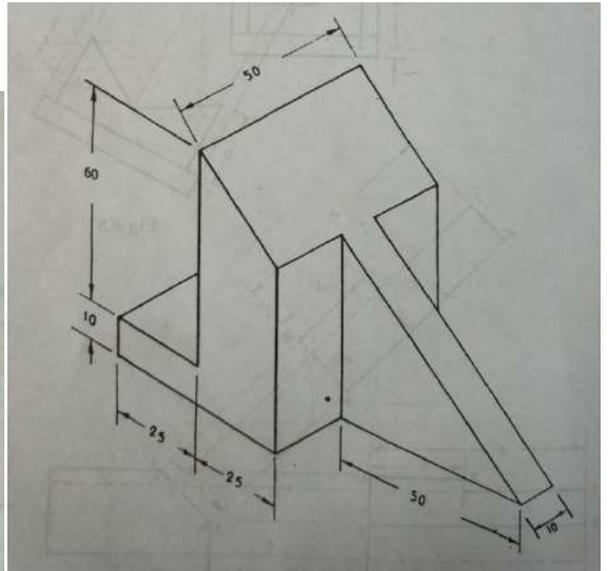


Fig.6

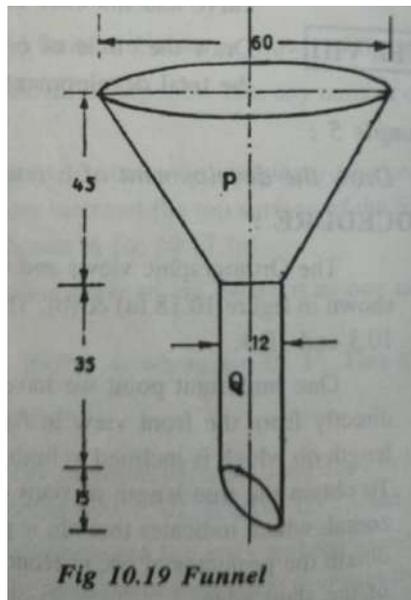


Fig 10.19 Funnel

Fig. 7

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY

GUDUR – 524101: SRI POTTI SREERAMULU NELLORE DISTRICT, A.P

Autonomous Institute Vide G.O.Ms.No. 214/ Edn, (TE – I Dept.) 05-10-1996

I Semester Examination (MPEC) for 3 ½ Year Diploma in Ceramic Technology

COURSE CODE: **CER-2114**

COURSE NAME: ENGINEERING DRAWING-II

TIME: 3 HOUR

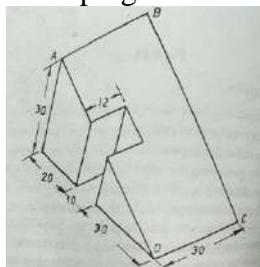
Max.Marks:60

- Instructions:
- (1) Answer all questions.
 - (2) Each question carries FIVE marks.
 - (3) Answers should be brief and straight to the point and shall not exceed five simple sentences.

PART –A

04x 05=20

01. Draw the conventional representation of the following materials.
 - a). Concrete
 - b). Liquids
02. Develop the lateral surfaces of a hexagonal prism of base side is 30 mm and height 60mm.
03. Front view and top view of a component is given in figure. Redraw those as per scale 1:1 and Draw the auxiliary view of the sloping surface of the object.



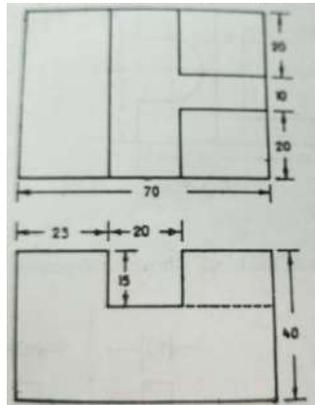
04. Draw the neat sketches of the following bricks used in the refractory's.
 - a). Bevel brick
 - b). Dome brick

PART –B

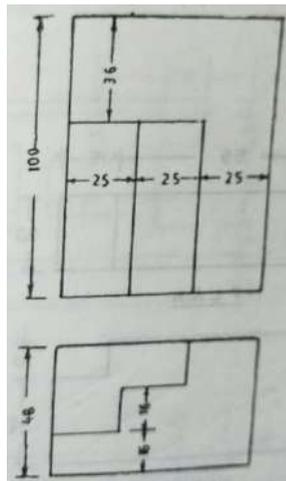
04X 10= 40

01. Answer any FOUR of the following questions
02. Each question carries TEN marks.

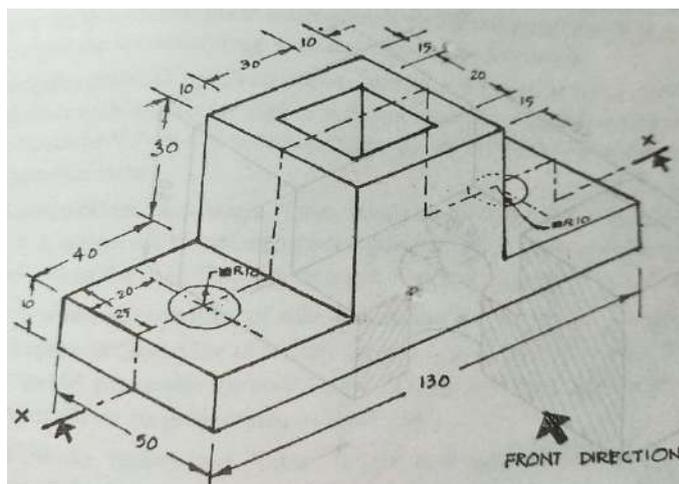
05. Third angle projections are given in figure. Draw the isometric projection from the two views of the object.



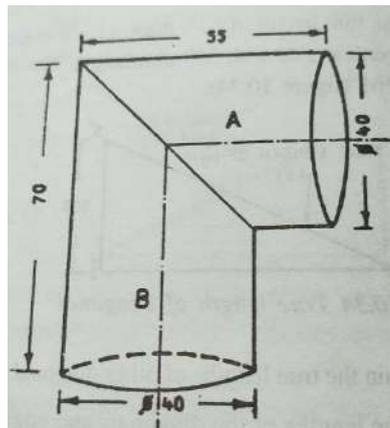
06. Draw the isometric view of the model of steps, two views of which are shown in figure.



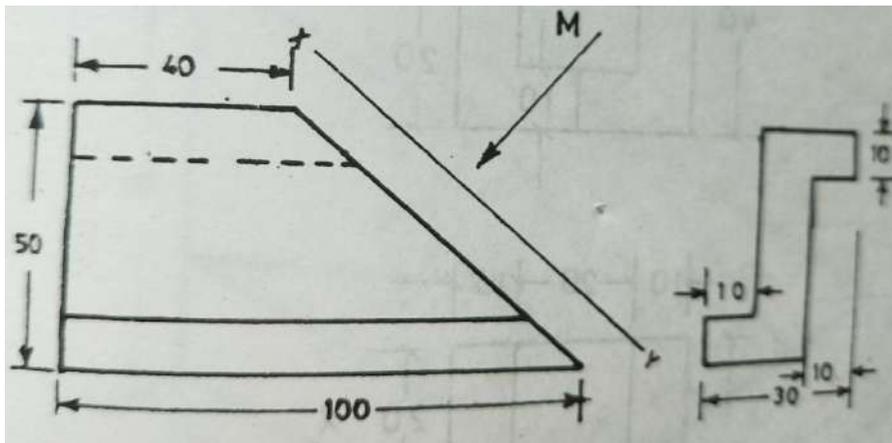
07. Draw the sectional front view and top view for the object shown in below.



08. Draw the development of an elbow in two pieces at 90° shown in figure.



09. a) Draw the auxiliary view of the sloping surface of the object.



b). Draw the diagram of Ball mill.

10. Draw the plan and elevation of round down draft kiln.

COMPUTER FUNDAMENTAL LAB-II

Course code	Course Title	No. of Periods/ Weeks	Total No. of periods	Marks for FA	Marks for SA
CER-2206	Computer Fundamental Lab-II	5	75	40	60

Time schedule:

S.No.	Chapter/Unit Title	No.of Periods	CO's Mapped
4.	MS Excel	20	CO1
5.	MS PowerPoint	25	CO2
6	Adobe Photoshop	30	CO3
Total periods		75	

Course Objectives	i) To use MS Office effectively to enable to students use these skills in future courses ii) To use Adobe Photoshop in image editing.		
CO1	CER-2206.1	Use Spread sheet software to make calculation and to draw various graphs / charts.	
CO2	CER-2206.2	Use Power point software to develop effective presentation for a given theme or topic.	
CO3	CER-2206.3	Edit digital or scanned images using Photoshop	

CO-PO/PSOMATRIX

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
C-2206.1	3	3	3	3	3	3	3	3	2	3
C-2206.2	3	3	3	3	3	3	3	3	2	3
C-2206.3	3	3	3	3	3	3	3	3	2	3
Average	3	2	3							

3=Strongly mapped, 2=moderately mapped, 1=slightly Mapped Learning Outcomes:

I. Practice with MS-Excel

1. To sort and filter data in table.
2. To present data using Excel Graphs and Charts.
3. To develop lab reports of respective discipline.
4. To format a Worksheet in Excel, Page Setup and Print

II. Practice with MS-POWERPOINT

1. To familiarize with Ribbon layout features of PowerPoint2007.
2. To create a simple PowerPoint Presentation
3. To set up a Master Slide in PowerPoint

4. To insert Text and Objects
5. To insert FlowCharts
6. To insert Table
7. To insert Charts/Graphs
8. To insert video and audio
9. To practice Animating text and objects
10. To Review presentation

III. Practice with Adobe Photoshop

1. To familiarize with standard toolbox
2. To edit a photograph.
3. To insert Borders around photograph.
4. To change Background of a Photograph.
5. To change colors of Photograph.
6. To prepare a cover page for the book in your subject area.
7. To adjust the brightness and contrast of the picture so that it gives an elegant look.
8. To type a word and apply the shadows emboss effects.

Key competencies:

Expt No	Name of Experiment	Competencies	Key competencies
1.	To sort and filter data in table	a. Sort data in multiple columns b. Sort data in a row c. Sort data using Custom order d. Filter data in worksheet	a. Refine the data in a worksheet and keep it organized b. Narrow a worksheet by selecting specific choice
2.	To Practice Excel Graphs and Charts	a. Produce an Excel Pie Chart b. Produce c. Excel Column Chart	a. Use data in Excel sheet to Create technical charts and graphs Produce Excel Line Graph b. Produce a Pictograph in Excel
3	To develop lab reports of respective discipline	Create Lab reports using MS Word and Excel	a. Insert Practical subject name in Header and page numbers in Footer
4	To format a Worksheet in Excel, page setup and print	a. Shade alternate rows of data b. Add currency and percentage symbols c. Change height of a row and width of a column d. Change data alignment e. Insert Headers and Footers f. Set Print Options and Print	a. Format Excel sheet b. Insert headers & footers and print
5	To familiarize with Ribbon layout & features of PowerPoint 2007.	Use various options in PowerPoint a. Home b. Insert c. Design	Access required options in the tool bar

		<ul style="list-style-type: none"> d. Animation e. Slideshow f. View g. Review 	
6	To create a simple PowerPoint Presentation	<ul style="list-style-type: none"> a. Insert a New Slide into PowerPoint b. Change the Title of a PowerPoint Slide c. PowerPoint Bullets d. Add an Image to a PowerPoint Slide e. Add a Textbox to a PowerPoint slide 	<ul style="list-style-type: none"> a. Create simple PowerPoint presentation with photographs/ClipArt and textboxes b. Use bullets option
7	To Set up a Master Slide in PowerPoint and add notes	<ul style="list-style-type: none"> a. Create a PowerPoint Design Template b. Modify themes c. Switch between Slide master view and Normal view d. Format a Design Template Master Slide e. Add a Title Slide to a Design Template f. The Slide Show Footer in PowerPoint g. Add Notes to a PowerPoint Presentation 	<ul style="list-style-type: none"> a. Setup Master slide and format b. Add notes
8	To Insert Text and Objects	<ul style="list-style-type: none"> a. Insert Text and objects b. Set Indents and line spacing c. Insert pictures/clipart d. Format pictures e. Insert shapes and wordart f. Use 3d features g. Arrange objects 	<ul style="list-style-type: none"> Insert Text and Objects Use 3d features
9	To insert a Flow Chart / Organizational Charts	<ul style="list-style-type: none"> a. Create a Flow Chart in PowerPoint b. Group and Ungroup Shapes c. Use smart art 	<ul style="list-style-type: none"> Create organizational charts and flow charts using smart art
10	To insert a Table	<ul style="list-style-type: none"> a. PowerPoint Tables b. Format the Table Data c. Change Table Background d. Format Series Legend 	<ul style="list-style-type: none"> Insert tables and format
11	To insert a Charts/Graphs	<ul style="list-style-type: none"> a. Create 3D Bar Graphs in PowerPoint b. Work with the PowerPoint Datasheet c. Format a PowerPoint Chart Axis d. Format the Bars of a Chart e. Create PowerPoint Pie Charts f. Use Pie Chart Segments g. Create 2D Bar Charts in PowerPoint h. Format the 2D Chart e. Format a Chart Background 	<ul style="list-style-type: none"> Create charts and Bar graphs, Pie Charts and format.

12	To Insert audio & video, Hyperlinks in a slide Add narration to the slide	<ul style="list-style-type: none"> a. Insert sounds in the slide and hide the audio symbol b. Adjust the volume in the settings c. Insert video file in the format supported by PowerPoint in a slide d. Use automatic and on click options e. Add narration to the slide f. Insert Hyperlinks 	<ul style="list-style-type: none"> a. Insert Sounds and Video in appropriate format. b. Add narration to the slide c. Use hyperlinks to switch to different slides and files
13	To Practice Animation effects	<ul style="list-style-type: none"> a. Apply transitions to slides b. To explore and practice special animation effects like Entrance, Emphasis, Motion Paths & Exit 	Add animation effects
14	Reviewing presentation	<ul style="list-style-type: none"> a. Checking spelling and grammar b. Previewing presentation c. Set up slideshow d. Set up resolution e. Exercise with Rehearse Timings feature in PowerPoint f. Use PowerPoint Pen Tool during slideshow g. Saving h. Printing presentation <ul style="list-style-type: none"> (a) Slides (b) Hand-out 	<ul style="list-style-type: none"> a. Use Spell check and Grammar feature b. Setup slideshow c. Add timing to the slides d. Setup automatic slide show
15	To familiarize with standard toolbox	<ul style="list-style-type: none"> a. Open Adobe Photoshop b. Use various tools such as <ul style="list-style-type: none"> i. The Layer Tool ii. The Color & Swatches Tool iii. Custom Fonts & The Text Tool iv. Brush Tool v. The Select Tool vi. The Move Tool vii. The Zoom Tool viii. The Eraser ix. The Crop Tool x. The Fill Tool 	Open a photograph and save it in Photoshop
16	To edit a photograph	<ul style="list-style-type: none"> a. Use the Crop tool b. Trim edges c. Change the shape and size of a photo d. Remove the part of photograph including graphics and text 	a. Able to edit image by using corresponding tools.
17	To insert Borders around photograph	<ul style="list-style-type: none"> a. Start with a single background layer b. Bring the background forward c. Enlarge the canvas 	Able to create a border or frame around an image to add visual interest to

		<ul style="list-style-type: none"> d. Create a border color e. Send the border color to the back f. Experiment with different colors 	a photo
18	To change Background of a Photograph	<ul style="list-style-type: none"> a. open the foreground and background image b. Use different selection tools to paint over the image c. Copy background image and paste it on the foreground. d. Resize and/or drag the background image to reposition. e. In the Layers panel, drag the background layer below the foreground image layer. 	Able to swap background elements using the Select and Mask tool and layers.
19	To change colors of Photograph	<ul style="list-style-type: none"> a. Change colors using: <ul style="list-style-type: none"> i) Color Replacement tool ii) Hue/Saturation adjustment layer tool 	Able to control color saturation
20	To prepare a cover page for the book in subject area	<ul style="list-style-type: none"> a. open a file with height 500 and width 400 for the cover page. b. apply two different colors to work area by dividing it into two parts using Rectangle tool. c. Copy any picture and place it on work area →resize it using free transform tool. d. Type text and apply color and style e. Apply effects using blended options 	Able to prepare cover page for the book
21	To adjust the brightness and contrast of picture to give an elegant look	<ul style="list-style-type: none"> a. open a file. b. Go to image →adjustments→ Brightness/Contrast. c. Adjust the brightness and contrast. d. Save the image. 	Able to control brightness/contrast.
22	To type a word and apply the shadow emboss effects	<ul style="list-style-type: none"> a. open a file b. Select the text tool and type text. c. Select the typed text go to Layer →layer style →blended option →drop shadow, inner shadow, beveland emboss→ contour→ satin→ gradient overlay d. Save the image. 	Able to apply shadow emboss effects

III SEMESTER

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING
ANDHRA PRADESH
DIPLOMA IN CERAMIC TECHNOLOGY
3 ½ YEAR SANDWICH COURSE
(MPEC SYSTEM)**

THIRD SEMESTER

Subject Code	Name of the Subject	Instruction Periods/Week		Total Periods/ Semester	Scheme of Examination				
		Theory	Practical		Duration (Hrs)	Sessional Marks	End Exam Marks	Total Marks	Credits
		THEORY SUBJECTS							
CER-3115	Engineering Mathematics – III	4	--	60	3	20	80	100	4
CER-3207	Fuels and Furnace Technology	4	--	60	3	20	80	100	4
CER-3208	Ceramic Tests & Quality Control	5	--	75	3	20	80	100	5
CER-3302	Glass Engineering - I	5	--	75	3	20	80	100	5
CER-3303	White ware & Heavy Clay Ware-I	5	--	75	3	20	80	100	5
CER-3304	Refractories-I	4	--	60	3	20	80	100	4
PRACTICAL SUBJECTS									
CER-3209	Communication Skills	--	3	45	3	40	60	100	1.5
CER-3305	Glass Engineering-I Lab	--	4	60	3	40	60	100	2
CER-3306	White ware & Heavy Clay Ware-I Lab	--	4	60	3	40	60	100	2
CER-3307	Refractories Lab	--	4	60	3	40	60	100	2
	TOTAL	27	15	630	-	280	720	1000	34.5

ENGINEERING MATHEMATICS-III

Course Code	Course Title	No. of Periods/week	Total No. of periods	Marks for FA	Marks for SA
C-301	Engineering Mathematics-II	4	60	20	80

S.No.	Unit Title	No. of periods	COs mapped
1	Indefinite Integration	22	CO1
2	Definite Integration and its applications	24	CO2
3	Differential Equations of first order	14	CO3
Total Periods		60	

Course Objectives	<ul style="list-style-type: none"> (ii) To understand the concepts of indefinite integrals and definite integrals with applications to engineering problems. (iii) To understand the formation of differential equations and learn various methods of solving them.
--------------------------	---

Course Outcomes	CO1	Integrate various functions using different methods.
	CO2	Evaluate definite integrals with applications.
	CO3	Obtain differential equations and solve differential equations of first order and first degree.

ENGINEERING MATHEMATICS – II

Learning Outcomes

Unit-I

C.O. 1 Integrate various functions using different methods.

L.O.1.1. Explain the concept of Indefinite integral as an anti-derivative.

1.2. State the indefinite integral of standard functions and properties of Integrals $\int (u + v) dx$ and $\int ku dx$ where k is constant and u, v are functions of x .

1.3. Solve integration problems involving standard functions using the above rules.

1.4. Evaluate integrals involving simple functions of the following type by the method of substitution.

i) $\int f(ax + b) dx$ where $f(x)dx$ is in standard form.

ii) $\int [f(x)]^n f'(x) dx$

iii) $\int f'(x)/[f(x)] dx$

iv) $\int f\{g(x)\} g'(x) dx$

1.5. Find the integrals of $\tan x$, $\cot x$, $\sec x$ and $\operatorname{cosec} x$ using the above.

1.6. Evaluate the integrals of the form $\int \sin^m x \cos^n x dx$ where m and n are suitable positive integers.

1.7. Evaluate integrals of suitable powers of $\tan x$ and $\sec x$.

1.8. Evaluate the Standard integrals of the functions of the type

i) $\frac{1}{a^2 + x^2}, \frac{1}{a^2 - x^2}, \frac{1}{x^2 - a^2}$

ii) $\frac{1}{\sqrt{a^2 + x^2}}, \frac{1}{\sqrt{a^2 - x^2}}, \frac{1}{\sqrt{x^2 - a^2}}$

iii) $\sqrt{x^2 - a^2}, \sqrt{x^2 + a^2}, \sqrt{a^2 - x^2}$

1.9. Evaluate the integrals of the type

$$\int \frac{1}{a + b \sin \theta} d\theta, \int \frac{1}{a + b \cos \theta} d\theta \text{ and } \int \frac{1}{a \cos \theta + b \sin \theta + c} d\theta.$$

1.10. Evaluate integrals using decomposition method.

1.11. Solve problems using integration by parts.

1.12 Use Bernoulli's rule for evaluating the integrals of the form $\int u.v dx$.

1.13. Evaluate the integrals of the form $\int e^x [f(x) + f'(x)] dx$.

Unit-II

C.O.2 Evaluate definite integrals with applications.

L.O.2.1. State the fundamental theorem of integral calculus

2.2. Explain the concept of definite integral.

2.3. Solve problems on definite integrals over an interval using the above concept.

2.4. State various properties of definite integrals.

2.5. Evaluate simple problems on definite integrals using the above properties.

Syllabus for Unit test-I completed

2.6. Explain definite integral as a limit of sum by considering an area.

2.7. Find the areas under plane curves and area enclosed between two curves using integration.

2.8. Obtain the mean value and root mean square value of the functions in any given interval.

2.9. Obtain the volumes of solids of revolution.

2.10. Solve some problems using Trapezoidal rule, Simpson's 1/3 rule for approximation of integrals.

Unit -III

C.O. 3 Form differential equations and solve differential equations of first order and first degree.

L.O. 3.1 Define a Differential equation, its order and degree

3.2 Find order and degree of a given differential equation.

3.3 Form a differential equation by eliminating arbitrary constants.

3.4 Solve the first order and first degree differential equations by variables separable method.

3.5 Solve Homogeneous differential equation of first order and first degree.

3.6 Solve exact differential equation of first order and first degree.

3.7 Solve linear differential equation of the form $dy/dx + Py = Q$, where P and Q are functions of x or constants.

3.8 Solve Bernoulli's differential equation reducible to linear form.

3.9 Solve simple problems arising in engineering applications.

Syllabus for Unit test-II completed

Engineering Mathematics – III

CO/PO – Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	2				3	1	2
CO2	3	3	3	3				3	3	3
CO3	3	3	3	3				3	3	3
Avg	3	2.6	2.6	2.6				3	2.3	2.6

3 = Strongly mapped (High), **2** = Moderately mapped (Medium), **1** = Slightly mapped (Low)

PO5: Appropriate quiz programme may be conducted at intervals and duration as decided by concerned teacher.

PO6: Seminars on applications of mathematics in various engineering disciplines are to be planned and conducted.

PO7: Such activities are to be planned that students visit library to refer standard books on Mathematics and latest updates in reputed national and international journals, attending seminars, learning mathematical software tools.

PSO1: An ability to understand the concepts of basic mathematical techniques and to apply them in various areas like computer programming, civil constructions, fluid dynamics, electrical and electronic systems and all concerned engineering disciplines.

PSO2: An ability to solve the Engineering problems using latest software tools, along with analytical skills to arrive at faster and appropriate solutions.

PSO3: Wisdom of social and environmental awareness along with ethical responsibility to have a successful career as an engineer and to sustain passion and zeal for real world technological applications.

PO- CO – Mapping strength

PO no	Mapped with CO no	CO periods addressing PO in column I		Level (1,2 or 3)	Remarks
		Number	%		
1	CO1, CO2, CO3	60	100%	3	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately addressed
2	CO1, CO2, CO3	60	100%	3	
3	CO1, CO2, CO3	60	100%	3	
4	CO2, CO3	38	63.3%	3	
5					
6					
7					
PSO 1	CO1, CO2, CO3	60	100%	3	5% to 25% Level 1 Low addressed <5% Not addressed
PSO 2	CO1, CO2, CO3	40	66.6%	3	
PSO 3	CO1, CO2, CO3	48	75%	3	

ENGINEERING MATHEMATICS – III

COURSE CONTENTS

Unit-I

Indefinite Integration.

1. Integration regarded as anti-derivative – Indefinite integrals of standard functions. Properties of indefinite integrals. Integration by substitution or change of variable. Integrals of $\tan x$, $\cot x$, $\sec x$, $\operatorname{cosec} x$. Integrals of the form $\int \sin^m x \cdot \cos^n x dx$, where at least one of m and n is odd positive integers. Integrals of suitable powers of $\tan x$, $\sec x$ and $\operatorname{cosec} x \cdot \cot x$ by substitution.

Evaluation of integrals which are reducible to the following forms:

$$i) \frac{1}{a^2 + x^2}, \frac{1}{a^2 - x^2}, \frac{1}{x^2 - a^2}$$

$$ii) \frac{1}{\sqrt{a^2 + x^2}}, \frac{1}{\sqrt{a^2 - x^2}}, \frac{1}{\sqrt{x^2 - a^2}}$$

$$iii) \sqrt{x^2 - a^2}, \sqrt{x^2 + a^2}, \sqrt{a^2 - x^2}$$

Integration by decomposition of the integrand into simple rational, algebraic functions.

Integration by parts, Bernoulli's rule and integrals of the form $\int e^x [f(x) + f'(x)] dx$.

Unit-II

Definite Integral and its applications:

2. Definite integral-fundamental theorem of integral calculus, properties of definite integrals, evaluation of simple definite integrals. Definite integral as the limit of a sum. Area under plane curves – Area enclosed between two curves. Mean and RMS values of a function on a given interval Volumes of solids of revolution. Trapezoidal rule, Simpson's 1/3 rule to evaluate an approximate value of a definite integral.

Unit -III

Differential Equations:

3. Definition of a differential equation-order and degree of a differential equation- formation of differential equations-solutions of differential equations of first order and first degree using methods, variables separable, homogeneous, exact, linear differential equation, Bernoulli's equation.

Textbook:

Engineering Mathematics-II, a textbook for third semester diploma courses, prepared & prescribed by SBTET, AP.

Reference Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
2. Schaum's Outlines Differential Equations, Richard Bronson & Gabriel B. Costa
3. M.Vygodsky, Mathematical Handbook: Higher Mathematics, Mir Publishers, Moscow.

BLUE PRINT

S. No	Chapter/Unit title	No of Periods	Weight age allotted	Marks wise distribution of weight age				Question wise distribution of weight age				COs mapped
				R	U	Ap	An	R	U	Ap	An	
1	Unit – I: Indefinite Integration	22	28	11	11	06	0	2	2	2	0	CO1
2	Unit – II: Definite Integration and its applications	24	33	11	03	11	08	2	1	2	1	CO2
3	Unit – III: Differential Equations of first order	14	19	03	03	03	10	1	1	1	1	CO3
Total		60	80	25	17	20	18	5	4	5	2	

R: Remembering Type : 25 Marks

U: understanding Type : 17 Marks

Ap: Application Type : 20 Marks

An: Analysing Type : 18 Marks

Engineering Mathematics – III

Unit Test Syllabus

Unit Test	Syllabus
Unit Test-I	From L.O 1.1 to L.O 2.5
Unit Test-II	From L.O 2.6 to L.O 3.9

UNIT TEST MODEL PAPERS

Unit Test I

State Board of Technical Education and Training, A. P

Subject name: **Engineering Mathematics-III**

Sub Code: **CER-3115**

Time : 90 minutes

Max.marks:40

Part-A

16Marks

Instructions: (1) Answer **all** questions.

(2) First question carries **four** marks and the remaining questions carry **three** marks each.

1. Answer the following.

Evaluate $\int x^8 dx$ (CO1)

Evaluate $\int \frac{1}{\sqrt{4-x^2}} dx$. (CO1)

$\int e^x (f(x) + f'(x)) dx = e^x f(x) + c$ is true/false (CO1)

a. Evaluate $\int_0^{\frac{\pi}{2}} \cos x dx$ (CO2)

2. Evaluate $\int \left(3 \cos ec^2 x - 2 \tan x \sec x + \frac{1}{x} \right) dx$. (CO1)

3. Evaluate $\int \frac{\sin(\log x)}{x} dx$. (CO1)

4. Evaluate $\int e^x \sin 2x dx$. (CO1)

5. Evaluate $\int_0^{\frac{\pi}{2}} \sin^2 x dx$ (CO2)

- Instructions:** (1) Answer **all** questions.
(2) Each question carries **eight** marks
(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. A) Evaluate $\int \frac{1}{5+4\cos x} dx$. (CO1)
or

B) Evaluate $\int \sin^4 x \cos^3 x dx$. (CO1)

7. A) Evaluate $\int \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right) dx$. (CO1)
or

B) Evaluate $\int x^4 e^{2x} dx$. (CO1)

8. A) Evaluate $\int_0^{\frac{\pi}{2}} \cos 4x \cos x dx$ (CO2)
or

B) Evaluate $\int_0^{\frac{\pi}{2}} \frac{\sin^{10} x}{\sin^{10} x + \cos^{10} x} dx$ (CO2)

Unit Test II

State Board of Technical Education and Training, A. P

Subject name: **Engineering Mathematics-III**

Sub Code: **CER-3115**

Time : 90 minutes

Max.marks:40

Part-A

16Marks

Instructions: (1) Answer **all** questions.

(2) First question carries **four** marks and the remaining questions carry **three** marks each.

1. Answer the following.

a. Volume of the curve $y = f(x)$ over the interval $[a, b]$ when rotated about X-axis is _____ (CO2)

b. Mean value of $f(x)$ over the interval $[a, b]$ is _____ (CO2)

c. Order of differential equation $\frac{d^2y}{dx^2} + p^2y = 0$ is _____ (CO3)

d. Integrating factor of $\frac{dy}{dx} + Py = Q$ is _____ (CO3)

2. Find the mean value of $x^2 + 2x + 1$ over the interval $[1, 2]$ (CO2)

3. Find the area enclosed by curve $x^2 = 4y$ between the lines $x = 2$ and $x = 4$ (CO2)

4. Form the differential equation by eliminating the arbitrary constants from $y = A \cos 2x + B \sin 2x$. (CO3)

5. Solve $\frac{dy}{dx} = \sqrt{\frac{1-y^2}{1-x^2}}$. (CO3)

Part-B

3×8=24

Instructions: (1) Answer **all** questions.

(2) Each question carries **eight** marks

(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. A) Find the area bounded between the curve $y = x^2 - 5x$ and the line $y = 4 - 2x$ (CO2)

Or

B) Find the R.M.S value of $\sqrt{\log x}$ between the lines $x = e$ to $x = e^2$ (CO2)

7. A) Find the volume of the solid obtained by revolving the ellipse $\frac{x^2}{16} + \frac{y^2}{25} = 1$ about x axis

(CO2)

or

B) Calculate the approximate value of $\int_0^6 \frac{1}{1+x} dx$ by taking $n = 6$ using Trapezoidal

rule

(CO3)

8. A) Solve $(y^2 - 2xy)dx + (2xy + x^2)dy = 0$. (CO3)

or

B) Solve $x \frac{dy}{dx} + \frac{y}{x} = x^3 y^6$. (CO3)

END EXAM MODEL PAPERS

STATE BOARD OF TECHNICAL EDUCATION, A.P

ENGINEERING MATHEMATICS CER-3115

TIME : 3 HOURS

MODEL PAPER- I

MAX.MARKS : 80M

PART-A

Answer All questions. Each question carries THREE marks. 10x3=30M

1. Evaluate $\int \left(2 \sin x - 3e^x + \frac{4}{1+x^2} \right) dx$. **CO1**

2. Evaluate $\int e^x \sin e^x dx$. **CO1**

3. Evaluate $\int \sin 3x \cos 2x dx$. **CO1**

4. Evaluate $\int xe^x dx$. **CO1**

5. Evaluate $\int_0^1 \frac{1}{1+x^2} dx$. **CO2**

6. Find the mean value of $y = x^2$ from $x = 0$ to $x = 1$ **CO2**

7. Find the area of the region bounded by the curve $y = \sin x$ from $x = 0$ to $x = \pi$

CO2

8. Find the order and degree of the differential equation $\left(\frac{d^3 y}{dx^3} \right)^2 - 3 \left(\frac{dy}{dx} \right)^2 - x^2 = 1$

CO3

9. Solve $\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$ **CO3**

10. Solve $(x^2 + y)dx + (y^2 + x)dy = 0$. **CO3**

PART-B

Answer All questions. Each question carries EIGHT marks. 5x8=40M

11. A) Evaluate $\int \frac{3x+1}{(x-1)(x+3)} dx$. **CO1**

Or

B) Evaluate $\int \frac{1}{5+4\cos x} dx$. **CO1**

12. A) Evaluate $\int x \sin 3x \cos x dx$. **CO1**

Or

B) Evaluate $\int x^3 \cos x dx$. **CO1**

13. A) Evaluate $\int_0^1 \frac{x^3}{1+x^8} dx$. **CO2**

Or

B) Evaluate $\int_0^{\frac{\pi}{2}} \frac{1}{1+\tan^3 x} dx$. **CO2**

14. A) Find the area of the region bounded by the curves $y^2 = 4x$ and $x^2 = 4y$. **CO2**

Or

B) Find the R.M.S values of $\sqrt{27-4x^2}$ from $x=0$ to $x=3$ **CO2**

15. A) Find the volume of the solid generated by revolution of the ellipse $\frac{x^2}{16} + \frac{y^2}{25} = 1$ about

X-axis **CO2**

Or

B) Calculate the approximate value of $\int_1^{11} x^3 dx$ by using Simpson's 1/3rd rule by dividing the range into 10 equal parts. **CO2**

PART-C

Answer the following question. Question carries TEN marks. 1x10=10M

16. Solve $2 \sin x \frac{dy}{dx} - y \cos x = xy^3 e^x$. **CO3**

STATE BOARD OF TECHNICAL EDUCATION, A.P

ENGINEERING MATHEMATICS CER-3115

TIME : 3 HOURS

MODEL PAPER-II

MAX.MARKS : 80M

PART-A

Answer All questions. Each question carries THREE marks. 10x3=30M

1. Evaluate $\int \left(3e^x - 2\cos x + \frac{3}{x} \right) dx$. CO 1

2. Evaluate $\int \cos^2 2x dx$. CO 1

3. Evaluate $\int \frac{\tan^{-1} x}{1+x^2} dx$. CO 1

4. Evaluate $\int x \cos x dx$. CO1

5. Evaluate $\int_0^2 \frac{1}{\sqrt{4-x^2}} dx$. CO2

6. Find the mean value of $i = a \sin t$ over the complete wave. CO2

7. Find the volume generated by revolving the circle $x^2 + y^2 = 9$ from $x = 0$ to $x = 2$ about x-axis CO2

8. Obtain the differential equation by eliminating the arbitrary constants A and B

from the curve $y = Ae^x + Be^{-x}$ CO3

9. Solve $\frac{dy}{dx} = e^{2x+y}$ CO3

10. Solve $\frac{dy}{dx} + \frac{y}{x} = x$ CO3

PART-B

Answer All questions. Each question carries EIGHT marks. 5x8=40M

11. A) Evaluate $\int \frac{1}{2x^2 + 3x + 5} dx$. CO1

Or

B) Evaluate $\int \sin^3 x \cos^5 x dx$. CO1

12. A) Evaluate $\int e^x \left(\frac{2 + \sin 2x}{1 + \cos 2x} \right) dx$. CO1

Or

B) Evaluate $\int e^{2x} x^4 dx$. **CO1**

13. A) Evaluate $\int_0^1 \frac{\sec^2 x}{(1 + \tan x)^2} dx$. **CO2**

Or

B) Evaluate $\int_0^{\frac{\pi}{2}} \log(1 + \tan \theta) d\theta$. **CO2**

14. A) Find the area bounded between the curves $y = x^2$ and the line $y = 3x + 4$. **CO3**

Or

B) Find the R.M.S value of $\sqrt{\log x}$ between the lines $x = e$ to $x = e^2$ **CO2**

15. A) Find the volume of right circular cone using integration. **CO2**

Or

B) Find the approximate value of π from $\int_0^1 \frac{1}{1+x^2} dx$ using Trapezoidal rule by dividing

$[0,1]$ into 5 equal sub-intervals. **CO2**

PART-C

Answer the following question. Question carries TEN marks. $1 \times 10 = 10M$

16. Solve $xy^2 dy - (x^3 + y^3) dx = 0$ **CO3**

FUELS AND FURNACE TECHNOLOGY

SUBJECT TITLE : **FUELS AND FURNACE TECHNOLOGY**
SUBJECT CODE : **CER-3207**
PERIODS/WEEK : **04**
PERIODS/SEMESTER : **60**

Time Schedule

S. No	Major Topics	Periods	Weightage of Marks	Short Answer questions (3M)	Essay type Questions (8M)	Essay Type Questions (10M)
1	CONVENTION FUEL	10	14	02	01	
2	RENEWABLE ENERGY SOURCES	04	06	02		
3	TESTING OF FUELS	05	14	02	01	
4	COMBUSTION OF FUELS	06	11	01	01	
5	KILINS IN CERAMIC INDUSTRY	15	21	01	01	01
6	FURNACE IN GLASS INDUSTRY	16	11	01	01	
7	BURNERS	04	03	01		
	Total	60	80	10	05	01

Course Objective and Course Outcome

Courses Objectives	Understand the ceramic industry used kiln and furnace along with fuels and their uses and testing methods		
Courses Contents	Upon Completion of the Courses the student be able to		
	CO1	CER-3207.1	Identify the fuels which are used ceramic industry
	CO2	CER-3207.2	Learn renewable energy sources and their production
	CO3	CER-3207.3	Find the tests conducting on fuel
	CO4	CER-3207.4	Analyse the fuel combusting properties
	CO5	CER-3207.5 CER-3207.6 CER-3207.7	Analyse Kilns, Furnaces and burners used in Ceramic industry

PO-CO- Mapping

Course Code :CER-3207		Course Title : FUELS AND FURNACE TECHNOLOGY		No.Of.Periods 60	
Pg.No	Mapped with	Co Periods addressing Po In Co/1	Level (1,2,3)	Remarks	

	Co No	No	%		
Po1	CO1,CO2	04	24	2	>40% Level 3 High addressed 25% to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <% Not addressed
Po2	CO5	35	20	3	
PO3					
PO4	CO3,CO4	11	56	2	
PO5					
PO6					
PO7					

Blue Print of a Question Paper

S · N o	Chapter Name	Period Allocate d	Weighte d Allocate d	Marks Wise Distribution of weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	AP	AN	R	U	AP	AN	
1	CONVENTION FUEL	10	14	03	03	08		01	01	01		CO1
2	RENEWABLE ENERGY SOURCES	04	06	03	03			01	01			CO2
3	TESTING OF FUELS	05	14	03	03	08		01	01	01		CO2,CO 1
4	COMBUSTION OF FUELS	06	11		03		08		01		01	CO4,CO 1
5	KILINS IN CERAMIC INDUSTRY	15	21		03	08	10		01	01	01	CO5
6	FURNACE IN GLASS INDUSTRY	16	11	03	08			01	01			CO5
7	BURNERS	04	03	03				01				
	Total	60	80	15	23	24	18	05	06	03	02	

R-Remember, U- Understanding ,Ap – Application, An- Analysing

Learning Outcomes

OBJECTIVES: On completion of the course the student should be able to know the following

1.0 CONVENTION OF FUELS

1.1 Definition of Fuel, Classification of fuels

- 1.2 Describe the coal formation, mineral matter, classification, storage , washing of coal and properties and uses of coal
- 1.3 Describe the carbonization of coal and wood
- 1.4 The term liquid fuel, classify the liquid fuel
- 1.5 Describe the refining, storage, handling and by products of liquid fuels
- 1.6 Classification of gaseous fuel, production of producer gas, water gas, natural gas, Gobar gas
- 1.7 Analysis of merits and de-merits of solid, liquid, and gaseous fuels
- 1.8 Proximate and ultimate analysis of coal

2.0 RENEWABLE ENERGY SOURCES

- 2.1 Introduction and definition of NCE and RES
- 2.2 List the fuels under NCE and RES
- 2.3 Explain the following A). Bio gas energy
B). Solar thermal energy
C). Solar photovoltaic energy
D). Wind energy
E). Ocean energy
F). Bio mass energy
- 2.4 Present development of hydrogen energy and preparation of hydrogen fuel

3.0 TESTING OF FUELS

- 3.1 List the tests of fuel
- 3.2 Understanding of calorific value, distinguish the gross and net calorific value of fuels
- 3.3 Determination calorific values of fuel with the help of bomb calorimeter
- 3.4 Determination of calorific value of gaseous fuel with help of Junker's gas calorimeter
- 3.5 Describe the viscosity of liquid fuels
- 3.6 Understand the context of flash point, fire point, pour point and freezing point of fuels
- 3.7 Explain the testing of flash point, fire point, pour point and freezing point and cloud point

4.0 COMBUSTION OF FUELS

- 4.1 Introduction and definition of combustion
- 4.2 Calculate the quantity of air required for combustion based on volume base and mass base analysis
- 4.3 The products of combustion and mass of carbon in flue gases
- 4.4 Analysis of flue gas by Orsat's apparatus
- 4.5 Name the heat transfer method in kiln or furnace
- 4.6 Describe in heat conduction, convection and radiation in kiln/furnace
- 4.7 Heat losses in kiln/furnace and explain heat recovery in kiln/furnace
- 4.8 Explain working and principle of regenerator and recuperator

5.0 KILNS IN CERAMIC INDUSTRIES

- 5.1 Introduction, definition and classification of kilns
- 5.2 Understand the materials used in kilns

5.3 Understand the design, operation and construction the following kilns

- (a) Scove kiln
- (b) Clamp Kiln
- (c) Bottle Neck or Updraft Kiln
- (d) Down Draft Kiln
- (e) Ring chamber kiln
- (f) Tunnel Kiln
- (g) Roller Hearth Kiln
- (h) Rotary Kiln
- (i) Shaft Kiln
- (j) Top Hat Kiln
- (k) Zig-Zag Kiln

6.0 FURNACES IN GLASS INDUSTRY

6.1 Introduction , definition and classification of furnace's in glass industry

6.2 Materials used in furnace foundation and construction

6.3 Understand the design ,operation and construction of the following furnaces

A)Crucible

B) Pot Furnace

C)Pot arch

D) Day tank furnace

E) Electrical glass melting furnace

6.4 List the types of continuous furnace for container glass

6.5 Understand the working, principle, heat loss in continuous tank furnace for fiber, container and sheet glass.

6.6 Understand the Design and Construction of Enamel Industry Furnace

A) Unit smelter

B)Hearth or box type muffle furnace

C) Rotary smelter

D) Different generation of muffle kilns

7.0 BURNERS

7.1 Define the term Burner.

7.2 Know the term Atomization.

7.3 Classify the Burners.

7.4 List the Types of Low pressure Burners with neat sketch for Gaseous fuels.

7.5 List the Types of High pressure Burners with neat sketch for Liquid fuels.

7.6 Know the Advantages and disadvantages of different types of Burners.

COURSE CONTENTS:

1. **CONVENTIONAL FUELS:** Definition -Classification of fuels- coal formation, mineral matter, storage , washing of coal and properties and uses of coal-carbonization of coal and wood-liquid fuel, classification-refining, storage, handling and distillation products of liquid fuels-Classification of gaseous fuel-production of producer gas-water gas-natural gas-Gobar gas-merits and de-merits of solid, liquid, and gaseous fuels-Proximate and ultimate analysis of coal.
2. **RENEWABLE ENERGY SOURCES:** Introduction and definition of NCE and RES-list the fuels under NCE and RES-Explain - Bio gas energy-solar thermal energy-solar photovoltaic energy-wind energy-Ocean energy-Bio mass energy-hydrogen energy and preparation of hydrogen fuel
3. **TESTING OF FUELS:** list the tests of fuel-calorific value, distinguish the gross and net calorific value of fuels-determination with the help of bomb calorimeter-calorific value of gaseous fuel with help of junker's gas calorimeter-viscosity of liquid fuels-flash point, fire point, pour point and freezing point of fuels.
4. **COMBUSTION OF FUELS:** combustion-calculate the quantity of air- based on volume base and mass base analysis-carbon in flue gases-analysis of flue gas-heat transfer method in kiln or furnace-heat losses in kiln/furnace and explain heat recovery in kiln/furnace-regenerator and recuperator.
5. **KILN IN CERAMIC INDUSTRY:** Introduction, definition and classification of kilns- materials used in kilns- Design, Operation and Construction of- Scovekiln- Clamp Kiln-Bottle Neck or Updraft Kiln-Down Draft Kiln-Ring chamber kiln-Tunnel Kiln-Roller Hearth Kiln-Rotary Kiln-Shaft Kiln-Top Hat Kiln-ZigZag Kiln.
6. **FURNACES IN GLASS INDUSTRY:** Introduction , definition and classification of furnace's in glass industry-Materials used in furnace foundation and construction-Design, Operation and Construction of Crucible-Pot Furnace-Pot arch-Day tank furnace-Electrical glass melting furnace-List the types-working, principle, heat loss in continuous tank furnace for fiber, container and sheet glass-Design and Construction of Enamel Industry Furnace-Unit smelter-Hearth or box type muffle furnace-Rotary smelter-Different generation of muffle kilns
7. **BURNERS:** Define the term Burner-Atomization-Classify the Burners-List the Types of Low pressure for Gaseous fuels-List the Types of High pressure Burners for Liquid fuels-Advantages and disadvantages of different types of Burners.

REFERENCE BOOKS:

1. Chas R Darling, Pyrometry, E & F.N Spon Ltd., London, 1920.
2. JSS Brane and JG King, Fules, 5th Edition, Edward Arnold Publishers Ltd., 1956.
3. O P Guptha Elements of Fuels, Furnaces and Refractories, Kanna Publishers, Delhi, 1991.
4. Donald P. eckman, Industrial Instrumentation, John Wiley & Sons New York, 1991.
5. Shaha, A.K., Combustion Engineering and Fuel Technology, Oxford & IBH Publishing Co., New Delhi, 1974.
6. Wilfrid Francis and Marin C. Peter, Fuels and Fuel Technology Pergamon Press, 1980.

7. Samir Sarkar, Fuels and Combustion, 2 nd Edition, orient Longman, Bombay, 1990.
8. M. Srinivasulu A Text book of Thermal Engineering-I, VGS Book linkings, Vijayawada
9. Donald P. Eckman, Industrial Instrumentation, Willey- Eastern Limited, Hyderabad

Unit Test Syllabus

Year/ Semester	Unit Test	Syllabus
Third semester	Unit Test-I	1. Conventional Fuels 2. Renewable Energy Source 3. Testing of fuels 4. Combustion of Fuels
	Unit Test-II	5. Kilns in Ceramics 6. Furnaces in Glass 7. Burners

State Board of Technical Education and Training
 Andhra Pradesh::Vijayawada
 Govt. Institute of Ceramic Technology (Autonomous)
 Gudur, SPSR Nellore-524101
C-20, Model paper
 III Semester – Unit I

Subject Name: Fuels and Furnace Technology	Course Code: CER-3207
Time: 90 min	Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Fill in the blanks
 - I. Coal is a....fuel
 - II. Example for liquid fuel is....
 - III. Gobar gas is produced from....
 - IV. Calorific value of natural gas.....
2. Define the NCES & RES?
3. Explain ocean thermal energy?
4. Classification of liquid fuels?
5. Write the merit and demerits of solid fuels?

PART- B

Marks: 3 x 8=

24

Answer all questions. Each question carries eight marks.

6. A). Describe the refining, storage of liquid fuels?

(OR)

B). Explain making of water gas?

7. A). Describe the carbonization of coal?

(Or)

B). Describe in detail wind energy?

8. A). Explain working principle of regenerator?

(Or)

B). Describe in detail testing of flash point of fuel?

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur, SPSR Nellore-524101
C-20, Model paper
III Semester – Unit II

Subject Name: Fuels and Furnace Technology	Course Code: CER-3207
Time: 90 min	Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Fill in the blanks

I. Down draft kiln is periodical(True/False)

II. Crucible is used for....

III. Combustion is exothermic chemical reaction(True/False)

IV. Conversion of liquid particle into fine particle is called.....

2. What is furnace? Classification of furnaces?

3. Explain atomization of burner?

4. List the types burners?

5. What is port in furnace?

PART- B

Marks: 3 x 8=

24

Answer all questions. Each question carries eight marks.

6. A). Describe design, operation and construction scove kiln?

(OR)

B). Describe design, operation and construction down draft kiln?

7. A). Write working principle of glass tank furnace?

(Or)

B). Describe in detail working, operation and construction of pot furnace?

8. A). Explain in detail operation and working of rotary smelter?

(Or)

B). Write the merits and de-merits of different types of burners?

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY
GUDUR – 524101: SRI POTTI SREERAMULU NELLORE DISTRICT, A.P
Autonomous Institute Vide G.O.Ms.No. 214/ Edn, (TE – I Dept.) 05-10-1996
VISemester Examination (MPEC) for 3 ½ Year Diploma in Ceramic Technology
COURSE CODE: **CER -3207** COURSE NAME: **FUELS AND FURNACES**

TECHNOLOGY

TIME: 3 HOUR

Max.Marks:80

PART – A

3 x 10 = 30 Marks

Note : 1. Answer all questions and each question carry **THREE** marks.
2. Answer should be brief and straight to the point and shall not exceed **FIVE** simple sentences.

1. Define the term fuel?
2. Write the classification of petroleum?
3. List the properties affecting coal utilization?
4. List the fuels used under NCES?
5. Define fire point of fuel?
6. Differentiate updraft and downdraft kiln?
7. Draw a neat diagram of rotary kiln?
8. What is the role of heat exchangers in glass tank furnace?
9. List the advantages of liquid burners?
10. List the advantages of LPG over gaseous fuels?

PART – B

5 X 8 = 40 Marks

Note : 1. Answer **all** questions and each question carry **Eight** marks.
2. The answer should be comprehensive and the criteria for valuation is the content but not the length of the answer.

11. A). Explain the importance of proximate analysis of coal?
(Or)

B). Explain the following I). Solar Photovoltaic Energy II). Biogas Energy?

12. A). Write the classification of furnaces? Explain the design contraction and operations
Of muffle furnaces?

(or)

B). explain the Design, Operation and Construction of shaft kiln?

13. A). Explain about pot furnace with neat diagram?

(Or)

B). Explain the Design, Operation and Construction of down draft kiln?

14. A). Write the classification of fuels with the help of flow sheet and explain them?

(Or)

B). Describe The Refining, Storage and handling of liquid fuels?

15. A) what is meant by calorific values? Explain the heat transfer method in kilns?

(Or)

B). explain the design construction and operation of tunnel kiln?

PART – C

1X 10 = 10

Note 1 *Part C consists of **one** question which carries **Ten** marks.*

16. Why kilns are used? Suggest the different kilns used in ceramic industry? Describe Bottle neck kiln?

-oOo-

CERAMIC TESTS AND QUALITY CONTROL

SUBJECT TITLE : **CERAMIC TESTS AND QUALITY CONTROL**
SUBJECT CODE : **CER-3208**
PERIODS/WEEK : **05**
PERIODS/SEMESTER : **75**

TIME SCHEDULE

S.No	Major Topics	Periods	Weightage of Marks	Short Answer questions (3M)	Essay type Questions (8M)	Essay Type Questions (10M)
1	Testing of Ceramic Raw Materials	12	24	02	01	01
2	Testing of Physical Properties	12	14	02	01	
3	Characteristics of fired ware	12	11	01	01	
4	Characteristics of Glazes	05	06	02		
5	Compatibility of Body & Glaze	12	14	02	01	
6	Characteristics of Refractories	17	08		01	
7	Quality control	05	03	01		
	Total	75	80	10	05	01

COURSE OBJECTIVES AND COURSE OUTCOMES

Courses Objectives	Upon Completion of the Courses the student be able to know the Different Test's in Ceramic Industries.		
Courses Contents	Upon Completion of the Courses the student be able to		
	CO1	CER-3208.1	Get experimental set up to the applications of different techniques over the Ceramic Raw material
	CO2	CER-3208.2	Estimate Particle size of Clay Bodies
	CO3	CER-3208.3	Find the Characteristics of fired Body of ceramic Industries
	CO4	CER-3208.4	Acquire knowledge Quality, quality control and assurance over the Ceramic Product
	CO5	CER-3208.5 CER-3208.6 CER-3208.7	Analyze the refractory Product and find Consecutive Properties and quality standards

PO-CO mapping

Course Code :CER-3208		Course Title :Ceramic Tests and Quality Control		No. of. Periods : 75	
Pg. No	Mapped with Co No	Co Periods addressing Po In Co/1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1	12	16	2	>40% Level 3 High addressed 25% to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <% Not addressed
PO2	CO5	05	08	1	
PO3	CO2-CO3	58	75	3	
PO4					
PO5					
PO6					
PO7					

Blue Print of the Question Paper

S.No	Chapter Name	Period Allocated	Weighted Allocated	Marks Wise Distribution of weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	AP	AN	R	U	AP	AN	
1	Testing of Ceramic Raw Materials	12	24	03	03	08	10	01	01	01	01	CO1
2	Testing of Physical Properties	12	14	03	03	08		01	01	01		CO2
3	Characteristics of fired ware	12	11	03			08	01			01	CO3
4	Characteristics of Glazes	05	06	03	03			01	01			CO4
5	Compatibility of Body & Glaze	12	14	03	03		08	01	01		01	CO2 CO6
6	Characteristics of Refractories	17	08				08				01	CO5
7	Quality control	05	03	03				01				CO1,CO5
8	TOTAL	75	80	18	12	16	34	06	04	02	04	

R-Remember , U- Understanding , Ap – Application, An- Analysing

Learning Outcomes

OBJECTIVES: On completion of the course the student should be able to know the following:

1.0 TESTING OF CERAMIC RAW MATERIALS.

1.1 The Sampling of raw material by Coning and Quartering.

1.2 Estimation of Moisture In Raw Material In Different Manners(infra red moisture balance and speedy moisture tester)

1.3 Estimation of Particle Size In Different Types Of Standard Sieves ASTM, BSS and ISS

1.4 Describe the stokes law

1.5 Describe the estimation of particle size by sedimentation method, Andreasen Pipette method and Hydrometer method.

2.0 TESTING OF PHYSICAL PROPERTIES OF CLAYS AND BODIES.

2.1 Estimation of surface area by Permeametry and Gas adsorption.

2.2 Determination plasticity of clay and clay bodies by Pefferkorn Test method, “AtterbergNumber”test method and BCR compression plastometer.

2.3 Understand the term contraction of clay and body, determination of linear contraction method dry and fired ware.

2.4 Determination of volume dry and fired shrinkage

2.5 Estimation of viscosity of slip by viscometer and torsion viscometer, specific gravity by hydrometer.

3.0 CHARACTERISTICS OF FIRED WARE

3.1 Estimation of apparent volume, true volume, apparent solid volume

3.2 Types of pores present in the fired ware

3.3 Investigation of bulk density, true density, water absorption, apparent porosity, true porosity, specific gravity

4.0 CHARACTERIZATION OF GLAZES

4.1 Introduction of glazes

4.2 Explain Harman’s method of coherence, receptivity, pick-up weight of glaze.

4.3 Investigation of glaze viscosity at low temperature (500-800⁰C) and high temperature (800-1300⁰C)

4.4 Estimation of solubility of lead frits and glazes and measurement of lead solubility

5.0 COMPATIBILITY OF BODY & GLAZE

5.1 Understanding of deflection of bar, ring test, flat plate test.

5.2 Investigation of thermal expansion, differential thermal expansion, reversible thermal expansion.

5.3 Fabrication of specimen for glaze test.

5.4 Assessment of body/glaze compatibility by using of malkin's instrument and auto-clave crazing test.

5.5 Estimation of hardness of body and glaze by moh's scale

5.6 Describe the thermal shock, abrasion resistance tests

5.7 Determination of glaze thickness by thickness guage

6.0 CHARACTERIZATION OF REFRACTORY PRODUCTS

6.1 Investigation of bulk density, porosity, specific gravity and permeability.

6.2 Describe in detail the test procedure of PCE, RUL, CCS, MOR and Hot-MOR,PLCR.

6.3 Describe the spalling resistance, thermal conductivity, slag resistance by (a) Pill test (b) Impingement method (c) Immersion method (d) Fusion method

7.0 QUALITY CONTROL

7.1 The terms of quality, necessarily of quality,.

7.2 Understanding of different things like zero defect concept, ISO and BIS

7.3 Understanding the concept of total quality management.

7.4 Understanding the term of SIX SIGMA Black belt, SASO

COURSE CONTENT:

1.0 TESTING OF CERAMIC RAW MATERIALS: The Sampling of raw material by Coning and Quartering- Moisture In Raw Material In Different Manners-Particle Size In Different Types Of Standard Sieves ASTM, BSS and ISS -stokes law for estimation of particle size and sedimentation method using Andresen-Pipette Method and Hydrometer Method.

2.0 TESTING OF PHYSICAL PROPERTIES OF CLAYS AND BODIES: surface area by Permeametry and Gas adsorption- plasticity of clay and clay bodies by Pefferkorn Test method, "AtterbergNumber"test method and BCR compression plastometer-contraction

of clay and body, estimation of linear method and volume method of dry and fired ware- viscosity of slip by viscometer and torsion viscometer, specific gravity by hydrometer- solid content in clay slip by pint weight.

3.0 CHARACTERISTICS OF FIRED WARE: Bulk density, water absorption, true density, specific gravity-definition and classification volume-apparent volume, true volume, true porosity-volume and

4.0 CHARACTERIZATION OF GLAZES: Introduction of glazes-Harman's method of coherence, receptivity, pick-up weight of glaze-glaze viscosity at low temperature (500-800⁰C) and high temperature (800-1300⁰C)-solubility of lead and lead frit.

5.0 COMPATIBILITY OF BODY & GLAZE: Deflection of bar, ring test, flat plate test-thermal expansion, differential thermal expansion, reversible thermal expansion-specimen for glaze test-Assessment of body/glaze compatibility by using of malkin's instrument and auto-clave crazing test- hardness of body and glaze by moh's scale-thermal shock, abrasion resistance-glaze thickness.

6.0 CHARACTERIZATION OF REFRACTORY PRODUCTS: Bulk density, porosity, specific gravity and permeability- PCE, RUL, CCS, MOR and Hot-MOR, PLCR test's-spalling resistance, slag resistance by different methods.

7.0 QUALITY CONTROL: Terms of quality, necessarily of quality-zero defect concept, ISO and BIS-total quality management-term of SIX SIGMA, SASO

REFERENCE BOOKS:

1. Ceramic Tests and Calculations, A .I Andrews,
2. W. Ryan and C Radford, White wares Production, Testing and Quality Control, The Institute of ceramics by Pergaman press, Oxford, 1987.
3. A Rashid Chesti, Refractories, Prentice-Hall of India pvt ltd., 1986,
4. F H Norton, Refractories, Prentice Hall of India pvt. Ltd, New Delhi, 1986,
5. Flix Singer and Sonja Singer, Industrial ceramics, Oxford and IBH Publishing ltd, New Delhi, 1992
6. H.Lal Total Quality Management- a practical approach – wiley edition, 1990
7. Juran J M and Gryna, F M – Quality control Handbook – McGraw Hill 1988.

8. R, Charan, Hand Book of Glass Technology,

9. Calculations in ceramics, Grriffiths& Redford, Made & Printed by Livesey ltd, St.Hon's Hill, Shrewsbury, England, 1965

10. A Handbook for Production of Vitreous China sanitary wares by Dr.K.N.Maiti

Unit Test Syllabus

Year/ Semester	Unit Test	Syllabus
Third semester	Unit Test-I	1. Testing of Ceramic Raw Materials 2. Determination of Physical Properties of Clays & Bodies 3. Physical properties after firing of clay ware
	Unit Test-II	4. Testing of Glazes 5. Testing of Body/Glaze Fit 6. Testing of Refractories 7. Quality Control

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur, SPSR Nellore-524101
C-20, Model paper
III Semester – Unit I

Subject Name: Ceramic tests & Quality Control	Course Code: CER-3208
Time: 90 min	Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Sampling of raw material by coning and quartering?
2. How to determine the apparent porosity?
3. Determination water absorption by water boiling technique?
4. Determine the percentage drying linear shrinkage of the clay?
5. How to calculate solid content of slip?

PART- B

Marks: 3 x 8=

Answer all questions. Each question carries eight marks.

6. A). Describe the determination moisture content by infrared moisture balance?

(OR)

- B). Determination particle size by Andersen pipette method?

7. A). Determination of plasticity of clay by preffrkorn test?

(Or)

- B). Determine the measurement of viscosity of slip by viscometer torsion viscometer?

8. A). Determine the plasticity by atterburg number?

(Or)

- B). Write the bulk density and specific gravity of a porous body?

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur, SPSR Nellore-524101
C-20,Model paper
III Semester – Unit II

Subject Name: Ceramic tests & Quality Control	Course Code: CER-3208
Time: 90 min	Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. How to test glaze?
2. How to determine deflection of glaze bar?
3. What is zero defects?
4. Write the pill test in refractory
5. How to determine the spalling resistance?

PART- B

Marks: 3 x 8=

24

Answer all questions. Each question carries eight marks.

6. A). How to determine the cold crushing strength?

(OR)

B). Determination autoclave crazing test and glaze fit measurements?

7. A). Differentiate between ISO and IS quality standards?

(Or)

B). Determine the thermal expansion of body and glaze?

8. A). Describe the test the measurement of lead solubility?

(Or)

B). Write the hardness of glaze and body by moh's scale?

SCHEME: C – 20

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY
GUDUR – 524101: SRI POTTI SREERAMULU NELLORE DISTRICT, A.P
Autonomous Institute Vide G.O.Ms.No. 214/ Edn, (TE – I Dept.) 05-10-1996
III Semester Examination (MPEC) for 3 ½ Year Diploma in Ceramic Technology
COURSE CODE: **CER – 3208** COURSE NAME: **CERAMIC TESTS AND**
QUALITY CONTROL
TIME: 3 HOUR
Max.Marks:80

PART – A

3 x 10 = 30 Marks

Note : 1. Answer all questions and each question carry **THREE** marks.
2. Answer should be brief and straight to the point and shall not exceed **FIVE** simple sentences.

2. What are the uses of Viscometer?
3. What is Prefferkon Test?
4. Discuss about the deflection of Glaze Bar?
5. Explain about Flat Plate Test?
6. Discuss about the measurement of Lead Solubility?
7. Define the term of Quality Control?
8. Explain about Spalling Resistance?
9. What are the uses of Torsion Viscometer?
10. Name the apparatus used for Thermal Expansion?

11. What is specific gravity and how to measure it?

PART – B

5 X 8 = 40 Marks

Note : 1. Answer **all** questions and each question carry **Eight** marks.

2.The answer should be comprehensive and the criteria for valuation is the content but not the length of the answer.

12. A).How do you measure the moisture by ‘Speedy Moisture Tester’?

(Or)

B).How do you find particle size by sedimentation method using stokes’ law?

13. A).Explain the thermal expansion of body and glaze test procedure by dilatometer?

(Or)

B).How do you measure the thickness of glaze applied on test piece by thickness gauge?

14. Determine the slag resistance of refractory material by

A) Fusion method B) impingement method

14. A).Harman’s method for glaze slip control by making receptivity and pick-up?

(Or)

B).What is Cold Crushing Strength Test? How refractoriness is determined by using P.C.E test?

15. A).How to help the present quality controls like ISO certificates in ceramic industries explain?

(Or)

B).Explain Anderson pipette test (fixed position) for particle size analysis?

PART – C

1X 10 = 10

Note 1 *Part C consists of **One**question which carries **Ten** marks.*

16. Compare particle size determination by Sieve analysis and sedimentation method?
Write limitation of both methods?

-oOo-

GLASS ENGINEERING-I

SUBJECT TITLE : **GLASS ENGINEERING-I**
SUBJECT CODE : **CER-3302**
PERIODS/ WEEK : **5**
PERIODS/ SEMESTER : **75**

TIME SCHEDULE

S. No	Major Topics	Periods	Weightage of marks	No. of Short Answer Questions (3M)	No. of Essay Questions (8M)	No. of Essay type Questions (10M)
1	Introduction to Glass	03	03	01	--	
2	Glass batch preparation	20	22	02	02	
3	Glass Melting Process	20	24	02	01	01
4	Fabrication Process of Glass	12	14	02	01	
5	Annealing And Tempering.	10	06	02	--	
6	Testing And Quality Control.	10	11	01	01	
TOTAL		75	80	10	05	01

Course Objectives and Course Outcomes

Course Objectives	Upon completion of the course the student shall be able to: Get knowledge on manufacturing process of glass and Testing, quality control of glass		
Course contents		Upon completion of the course the student shall be able to:	
	CO1	CER-3302.1	Learn properties and uses of glass
	CO2	CER-3302.2	Comprehend on Raw materials for glass making and calculation of a glass batch from chemical composition
	CO3	CER-3302.3	Get knowledge on reactions involved in the converting the glass batch into molten glass
	CO4	CER-	Study Handmade process, relation between fabrication and

		3302.4	viscosity
	CO5	CER-3302.5	Analyse purpose and process of annealing, tempering of glass, defects and tests conducted on glass

PO-CO Mapping

Course Code: 3302		Course Title: GLASS ENGINEERING-I			No of Periods: 60	
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks	
		No	%			
PO1	CO1,CO2,CO3	20	26.67	2	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately Addressed 5 to 25% Level 1 Low addressed <5% Not addressed	
PO 2	CO2,CO3,CO4,CO5	35	46.67	3		
PO 3						
PO 4	CO5	10	13.33	1		
PO 5						
PO 6						
PO 7	CO2,CO3,CO4	10	13.33	1		

3: High, 2: Moderate,1: Low

Blue Print of a Question Paper

S. No	Chapter Name	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Introduction to Glass	03	03		03				01			CO1, CO2
2	Glass batch preparation	20	22	03	3	8	08	1	1	1	1	CO3, CO5
3	Glass Melting Process	20	24	03	3	8	10	1	1	1	1	CO2, CO5
4	Fabrication Process of Glass	12	14	03	11			1	2			CO1, CO2
5	Annealing And Tempering.	10	06		06				2			CO6
6	Testing And Quality Control.	10	11	03	8			1	2			CO2, CO3, CO4, CO5
TOTAL		75	80	12	34	16	18	4	9	2	2	

R-Remember; U-Understanding; Ap-Application ; An- Analysing

Learning Outcomes

Upon on completion of the course the student shall be able to:

1.0 INTRODUCTION TO GLASS

- 1.1 Define the term Glass.
- 1.2 Differentiate between Glass and crystal
- 1.3 List the properties and common uses of glasses.
- 1.4 Classification of commercial glasses.

2.0 PREPARATION OF GLASS BATCH

- 2.1 State Zacharaiasen's rules.
- 2.2 Name the network formers, network modifiers and intermittent oxides used for making of glass.
- 2.3 List of glass making Raw materials.
- 2.4 State the glass composition of different glasses.
- 2.5 Name the major, minor ingredients in glass melting..
- 2.6 Specification of glass sand for making Glass.
- 2.7 Know the Functions of sand, boric oxide, lead, soda ash, salt cake and sodium nitrate, Lime stone, Dolomite, Feldspar and Nepheline synte in glass making
- 2.8 Compare soda ash to salt cake in Glass making process.
- 2.9 Write the Effect of impurities in raw materials used in the Glass Batch.
- 2.10 List the melting Accelerators.
- 2.11 Know the Function of Oxidizing agents.Reducingagents.Decolorizing agents
- 2.12 Classify the cullet and effect of cullet during melting

3.0 GLASS MELTING PROCESS.

- 3.1 Know the Process of charging like Hand charging and Mechanical charging
- 3.2 Explain the four phases involved in glass making processes.
- 3.3 Explain the mechanism of melting of glass
- 3.4 Write the Effect of temperature, particle size on the glass melting.
- 3.5 Write the Conditions governing on Devitrification,Paddle's limit of Devitrification, Silica and stabilizing oxides on Devitrification
- 3.6 Know the period of danger in melting and working, Volatilization and effect of pre sintering of glass
- 3.7 Write the Source of gas bubbles and identification of gases.
- 3.9 Know the Solubility gases in glass and Growth and raise of bubbles.
- 3.10 Know the Chemistry of refining action and list refining agents
- 3.11 Describe the rate of refining in relation to minor ingredients.
- 3.12 Explain Homogenizing of glass.
- 3.13 Write the Source of Inhomogeneity.

- 3.14 Understand the rate of Homogenization in relation to kinetics and Convection currents.
- 3.15 Explain about Heat conditioning phase

4.0 FABRICATION PROCESS OF GLASS.

- 4.1 State the Principles of glass working.
- 4.2 Know the Preparation of glass.
- 4.3 Write the function of rings and boots.
- 4.4 Describe the Blow –pipe, gathering rod, marvering, puffing.
- 4.5 Explain the jug making by off- hand working of glassware.
- 4.6 Explain the bottle making by hand method.
- 4.7 Define the term viscosity and state viscosity of glass at various stages of fabrication.
- 4.8 Explain the relation between viscosity - working of glass, Composition- viscosity, fining- viscosity, viscosity- temperature.
- 4.9 Explain the necessity of durability of glass.
- 4.10 Know the weathering and chemical attack.
- 4.11 Explain the methods for improving of durability of glass.
- 4.12 Relate the composition and durability of glass.

5.0 ANNEALING AND TEMPERING

- 5.1 Define the term Annealing.
- 5.2 Know the Sources of strain in glass.
- 5.3 Name the types of strain in glass
- 5.4 Explain the annealing process and release of stress and strain.
- 5.5 Describe the Annealing schedule for slabs, plates & Containers.
- 5.6 Write the composition of glass and it's annealing temperature.
- 5.7 Know the permissible strain in glass.
- 5.8 Define the tempering.
- 5.9 Explain the process of tempering of glassware.

6.0 TESTING AND QUALITY CONTROL

- 6.1 Name the defects in glass ware.
- 6.2 Write the Causes and remedies of stones, cords, blisters & seeds, bad color and bad workmanship in glassware.
- 6.3 Name the Tests conducted for Q.C of bottles.
- 6.4 Explain the Importance of weight and capacity of bottles.
- 6.5 How to measure Impact strength of bottles and sheet glass and alkalinity of glass product.
- 6.6 Explain the Bursting pressure resistance of containers.
- 6.7 How to conduct Thermal shock resistance of containers.
- 6.8 List the Physical properties and Mechanical properties of glass.
- 6.9 Know the Chemical, Optical and Electrical properties of glass.

COURSE CONTENT:

1. INTRODUCTION TO GLASS: Introduction –Difference between glass and crystal-properties and Common uses of glass- commercial glasses.

2. PREPARATION OF GLASS BATCH: Zachariasen's rules of glass formation- Network formers- Network modifiers-Intermittent oxides- glass making raw materials- Functions of glass making raw materials like sand, boric oxide, lead, soda ash, salt cake, sodium nitrate, lime stone, Dolomite, Feldspar Nephlinesynite- Minor ingredients like oxidizing agents, reducing agents, decolorizing agents, coloring agents, refining agents- Effect of impurities in glass making- melting accelerators-Types of cullet- effect of cullet during melting

3.GLASS MELTING PROCESS: Charging of glass batch into furnace, hand charging and mechanical charging – Phases involved in melting of glass- mechanism of Melting, effect of temperature and particle size on melting of glass- effect of presintering on melting- Devitrification- paddles limit of devitrification, silica and stabilizing oxides on devitrification

Refining: Sources of gas bubbles – fused batch interfaces and reboil Identification of gases- Solubility of gases in glass- Growth and rise of bubbles- Refining agents chemistry of the factors of minor ingredients.

Homogenization – Source of homogeneity- rate of homogenization in relation to diffusion kinetics- Convictional currents and rise of bubbles

Heat conditioning of glass

4. FABRICATION PROCESS OF GLASS: Principles of glass working- rings, boots- Blow pipe, gathering rod- gathering of glass- marvering- puffing- making of jug by off hand working- bottle making by hand making process

Viscosity: Viscosity of glass at various stages of fabrication, working characteristics- Viscosity temperature relationship for common glasses.

Durability: The necessity for high durability of the glass- nature of the weathering and chemical attack- improving the durability of glasses-composition and durability.

5. ANNEALING AND TEMPERING: Release of stress- Sources of stress and strain-types of strains-Annealing process- Annealing schedule for Slabs-continuous plate and containers- tempering-detection and measurement of strain – strength of glass

6. TESTING AND CONTROL: Defects in glass: Seeds and Blisters- Cords- Straie- strain and stones- causes and remedies.

Fabrication defects: Various Fabrication defects of container ware- their causes and remedies.

Testing of container glass: weight and capacity- Impact strength- Bursting Pressure and Thermal shock resistance-Alkalinity of glass – Testing of Flat glass.- Physical, mechanical, chemical and electrical properties of glass.

REFERENCE BOOKS:

- 1.R. Charan, Hand Book of Glass Technology,
2. Tooley F V, Hand book of Glass Manufacture Volume I & II, Ogden Publishing Company, New York 36. New York.1960.
3. Chappeman and Hall, Schott Guide to Glass, 2nd Edition, Chapeman and Hall, London, 1996
4. Samuel R Scholes, Moderns Glass Practice, Industrial publications, Inc., Chicago, 1952.
5. Rudolf Gunther, Glass Melting Tank Furnaces, Society of Glass Technology, Sheffield, 1958.
6. Paul A, Chemistry of Glasses, 2nd edition, Chapman and Hall, New York, 1990.
7. George W. McLellan and E B Shand, Glass Engineering Hand Book, McGraw – Hill book company, New York, 1984.
8. Charles H. Grene, Modern Glass Practice, Cahuers books, Boston, 1975.
9. Alexis G. Pinkas, Meting Furnace Operation in the Glass Industry, Magazines for industry inc., New York, 1980.

- 10.Raw materials in the Glass Industry. Part 1&2 (Minor and Major ingredients) Alexis G.Pincus, David H. Davies, and Books for Industry and the glass industry magazine, 1981.
- 11.Batching in the Glass Industry, Alexis G.Pincus, David H. Davies, and Books for Industry and the glass industry magazine, 1981.
- 12.Donald P. Eckman, Industrial Instrumentation, Willey- Eastern Limited, Hyderabad

Unit Test Syllabus

Year/Semester	Unit Test	Syllabus
THIRD SEMESTER	Unit Test-I	1.Introduction to Glass 2.Glass batch preparation 3.Glass Melting process
	Unit Test- II	4. Fabrication process of Glass 5.Annealing and Tempering 6. Testing and Quality control

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur, SPSR Nellore Dist
C-20,Model paper
III Semester - I Unit

Subject Name: Glass Engineering-I
3302

Course Code: CER-

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Fill in the Blanks

- a) Glass is Ductile (True or False)
- b) Example of Network Formers is _____
- c) Soda ash is a melting accelerator(True or False)
- d) _____ gives Green colors in Glass

- 2. Write the difference between Glass & Crystal?
- 3. What is refining? Give examples of Refining agents?
- 4. Define cullet? Write its importance in Glass Making?
- 5. State Zachaiasen's Rules?

PART- B

Marks: 3 x 8=

24

Answer all questions. Each question carries eight marks.

- 6. (A) Draw the flow Sheet for Manufacturing of Glass?
(OR)
(B) write Properties and uses of Glass?
- 7. (A) Describe the classification of Glass making oxides?
(OR)
(B) Write the function of Boric acid, soda ash, Lime stone, Lead in glass Making?
- 8. (A) State the phases involved in glass melting process? Explain any two Phases?
(OR)
(B) write short notes on
 - i. Devitrification?
 - ii. Sources of in Homogeneity?

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur, SPSR Nellore Dist
C-20, Model paper
III Semester - II Unit

Subject Name: Glass Engineering-I
3302

Course Code: CER-

PART - A**16 Marks**

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Fill in the Blanks

- Annealed glass are stronger than tempered glass (True or False)
- Uncontrolled Crystallization of Glass is Called _____
- The viscosity of glass melting point is _____
- Removed of stress and strain Process in glass is called _____

2. Describe Blow Pipe?

3. Define Tempering?

4. Name the tests conducted for Qc of bottles?

5. How to improve durability of Glass?

PART- B**Marks: 3 x 8=****24**

Answer all questions. Each question carries eight marks.

- (A) Explain the Bottle making by hand made process?
(OR)
(B) Describe the jug making by hand made process?
- (A) Describe the annealing Schedule of Glass bottle?
(OR)
(B) Explain thermal tempering and Chemical tempering?
- (A) How to measure impact strength of Glass bottles?
(OR)
(B) State the relation between composition, Refining temperature to Viscosity?

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY

GUDUR-524101: SRI POTTI SREERAMULU NELLORE DISTRICT, A.P

Autonomous Institution Vide G.O.Ms.No. 214/Edn, (TE-I Dept.) 05-10-1996

III-Semester Examination (MPEC) for 3½ Year Diploma in Ceramic Technology

COURSE CODE: CER-3302

COURSE NAME: GLASS

ENGINEERING-I

TIME: 3 Hours

Max Marks:

80

C-20

PART – A

10 X 3 = 30

Instructions: *Part A consists of 10 questions. Answer all questions and each question carries three marks.*

1. Write properties and uses of Glass?
2. State Zacharaiasen's rules?
3. Write the function of Oxidizing and reducing agents? Give examples?
4. List the funaces used for melting of glass?
5. What is Refining?
6. Write the relation between Viscosity and temperature?
7. What is Marvering?
8. Define Tempering?
9. What is upper and lower annealing temperature?
10. List the physical properties of glass?

PART – B

5 X 8 = 40

Instructions: *Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.*

11. (A) Classify glass making raw materials according to their use?

(OR)

(B) Write the functions of Soda ash, lime stone and Lead in Glass?

12. (A) Explain Network formers, Network modifiers and Intermediate oxides?

(OR)

(B) Write short notes on (i) Cullet (ii) Decolourisers

13. (A) List the phases involved in Melting of glass? Explain about Melting and Homogenizing phase?

(OR)

(B) Explain the working of Cross-fired glass melting furnace?

14. (A) How to make glass bottle by Hand made process?

(OR)

(B) Define Durability? Explain the methods for improving of durability of glass?
Write the relation between composition and durability of glass?

15. (A) List the defects in Glass? Give causes and remedies of any three defects?

(OR)

(B) How to measure Impact strength and Bursting pressure test of container glass?

PART – C

1X 10 = 10

Instructions: *Part C consists of 1 question which carries 10 marks.*

16. What would happen if the glass is full of bubbles and seeds in Forehearth? What are the ways to remove bubbles and seeds? Give reasons for formation of bubbles and seeds?

-oOo-

WHITE WARE & HEAVY CLAY WARE-I

SUBJECT TITLE : **WHITE WARE & HEAVY CLAY WARE – I**
SUBJECT CODE : **CER-3303**
PERIODS/ WEEK : **05**
PERIODS/ SEMESTER : **75**

TIME SCHEDULE

S.No	Major Topics	Periods	Weightage of Marks	Short Answer questions (3M)	Essay type Questions (8M)	Essay Type Questions (10M)
1.	Introduction	03	03	01	-	-
2.	Machinery for crushing and Grinding	20	29	01	02	01
3.	Body preparation	14	14	02	01	-
4.	Fabrication Methods	14	14	02	01	-
5.	Drying of clay product	06	11	01	01	-
6.	Glazing	04	03	01	-	-
7.	Setting of clay Products	06	03	01	-	-
8.	Firing of Clay ware	08	03	01	-	-
	Total	75	80	10	05	01

Course Objective and Course Outcome

Courses Objectives	Upon Completion of the Courses the student be able to understand the (i) Various machinery used in pottery ware Manufacturing (ii) Body Preparation. (iii) Drying & Firing process.		
Courses Contents	Upon Completion of the Courses the student be able to		
	CO1	CER-3303.1 CER-3303.2	Acquire knowledge on Working of various machines used for making white ware and heavy clay ware.
	CO2	CER-3303.3 CER-3303.4	Get Knowledge on Processing of raw materials and Fabrication Methods & finishing Techniques.
	CO3	CER-3303.5	Comprehend Factors effecting on the Drying.
	CO4	CER-3303.6	List application Methods of Glassy coating.
	CO5	CER-3303.7 CER-3303.8	Study the Setting of Ware in the Kiln and Different Kilns used for Firing

PO-CO Mapping

Course Code :CER-3303		Course Title :White ware & Heavy Clay ware - I		No. of. Periods: 75	
Pg. No	Mapped with Co No	Co Periods addressing Po In Co/1		Level (1,2,3)	Remarks
		No	%		
Po1	CO1,CO3,CO4,CO5	20	27	2	>40% Level 3 High addressed
Po2	CO3,CO5	44	59	3	

PO3	CO1,CO3,CO4	11	15	1	25% to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <% Not addressed
PO4					
PO5					
PO6					
PO7					

Blue Print of the question Paper

S.No	Chapter Name	Period Allocated	Weighted Allocated	Marks Wise Distribution of weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	AP	AN	R	U	AP	AN	
1	Introduction	03	03	-	03	-	-	-	01	-	-	CO2,CO3, CO4,CO5
2	Machinery for crushing and Grinding	20	29	03	08	08	10	01	01	01	01	CO3,CO4, CO5
3	Body preparation	14	14	03	03	08	-	01	01	01	-	CO2,CO3, CO4,CO5
4	Fabrication Methods	14	14	-	03	03	08	-	01	01	01	CO2,CO3, CO4
5	Drying of clay product	06	11	03	80	-	-	01	01	-	-	CO3,CO4, CO5
6	Galzing	04	03	03	-	-	-	01	-	-	-	CO2,CO3, CO4,CO5
7	Setting of clay Products	06	03	-	-	03	-	-	-	01	-	CO3,CO4, CO5
8	Firing of Clay ware	08	03	-	-	03	-	-	-	01	-	CO3,CO4, CO5
	Total	75	80	12	25	25	18	04	05	05	02	

R-Remember u-understand Ap - Application An- Analyzing

OBJECTIVES: On completion of the subject the student should be able to understand and solve the problems to related topics:-

OBJECTIVES: On completion of the course, the student should be able to know the following:

1. 0 INTRODUCTION

1.1 Understand the term Whiteware and Heavy clay ware

1.2 List the products that come under White ware and Heavy clay Ware

1.3 List the machinery required for Manufacturing of White ware and Heavy clay ware

2.0 MACHINERY FOR CRUSHING AND GRINDING:

2.1 The Importance of machinery and equipment used in pottery industry.

2.2 Define the Crushing.

2.3 Classify the Crushers.

2.4 Describe the Principle, Construction and working of the Jaw crusher, Gyratory Crusher, Pan mill / Edge Runner, disintegrator, Roller Crusher, Impact Crusher.

2.5 Define grinding.

2.6 Describe the Principle, Construction and working of the Ball mill, Hardinge conical Ball Mill, Tubemill, Centrifugal / Raymond mill, Vibro Energy mill, Jet mill / Fluid Energy mill

2.7 Describe the Principle, Construction and working of the Dust collector/air separator

3.0 BODY PREPARATION

3.1 Know the Body preparation.

3.2 Classify the Mixers.

3.3 Describe the working of Blunger, Agitator, Pug mill, V- type Mixer.

3.4 Making of casting slip.

3.5 Making of plastic body by advanced methods involving intensive mixer.

i). Dry preparation,

ii). Based on spray drying,

iii). Computerized body preparation etc,

3.6 Describe the working of magnetic separator.

3.7 Describe the working of vibrating sieves.

3.8 Describe the working of Filter Press.

3.9 Describe the working of diaphragm Pump.

3.10 Preparation of granules by dry and Wet Method.

4.0 FABRICATION METHODS

4.1 Classify the fabrication methods used in clay industry.

4.2 Describe the rheological properties of casting slip.

4.3 Explain the factors affecting the castability of slip

4.4 Discuss the Different Slip casting techniques.

4.5 Explain rate of casting control.

4.6 Discuss Traditional methods of slip casting.

4.7 Discuss Ethyl silicate casting process

4.8 List the casting defects

4.9 Discuss the Traditional plastic forming methods like hand molding and molding, plastic pressing, throwing, jiggering and jollying, extrusion, Turning, throwing, plastic pressing.

4.13 Function Extruder.

a. Augur Extruder.

b. Piston Extruder.

c. Vacuum Extruder.

4.14 Describe in detail Toggle press, screw press, Hydraulic Press, hot pressing and Isostatic Pressing.

4.15 Discuss the advanced methods of shaping in the plastic state like forming by roller machines, ram pressing impact forming, injection molding.

5.0 DRYING OF CLAY PRODUCTS

5.1 Classify the driers.

5.2 Explain in detail intermittent dryers lofts, hot floors, compartment or chamber type, humidity drier.

5.3 Describe the tunnel drier, mangle drier, rotary drier, drum drier.

5.4 Describe the Mechanism of drying.

5.5 Factors affecting on drying.

5.6 Discuss the critical moisture content.

5.7 Explain drying of Plastic & Non-Plastic Ceramic bodies.

5.9 List the drying defects, its causes and Remedies.

6.0 GLAZING

6.1 Define the Glaze

6.2 List the glazing machines.

6.3 Describe the working of Automatic glazing machine.

6.4 List the Glaze Application Techniques.

7.0 SETTING OF CLAY PRODUCTS:

7.1 List the kiln furniture and supports.

7.2 Name the Construction material for Kiln furniture.

- 7.3 Setting of common brick in the kiln
- 7.4 Setting of unglazed bricks in the kiln.
- 7.5 Setting of glazed brick in the Kilns.
- 7.6 Setting of sewer pipes in the Kilns
- 7.7 Setting of bricks in the Scove Kilns
- 7.8 Setting of bricks on tunnel cars.
- 7.9 Setting of white ware in saggers for biscuit firing.
- 7.10 Setting of glaze ware in saggers and without saggers.

8.0 FIRING OF CLAY WARE

- 8.1 classify of the kilns.
- 8.2 Differentiate the bisque firing and Glaze Firing.
- 8.3 Theoretical justification for fast firing.
- 8.4 Reasons for fast firing
- 8.5 Effect of heat on ceramic bodies.
- 8.6 Compare Sintering and vitrification of the body.
- 8.7 Physical changes in ceramic body after firing.

COURSE CONTENT:

1. INTRODUCTION

The term White ware and Heavy clay ware -flow diagram of manufacturing White ware - Name the products comes under White ware and Heavy clay Ware -the machinery required for White ware and Heavy clay ware

2.0 MACHINERY FOR CRUSHING AND GRINDING:

Importance of machinery and equipment used in ceramic/pottery industry-Crushing operation.-Classification of Primary and Secondary crushers.-working of Jaw crusher.-working of Gyratory Crusher-Roller mills-Pan Mill/Edge runner-Disintegrator -impact crusher /Hammer mill-grinding operation-.Ball mill-Hardinge conical ball mill-Tube mill-Centrifugal/Raymond mill -Jet mill/Fluid energy mill -Vibro energy mill-Dust collector/air separator

3.0 BODY PREPARATION

Body preparation & Select the pottery body composition-.Weighing& Mixing- Mixers.

Blunger.-agitator-pug mill-.V-type mixer.-Muller mixers-preparation of casting slip.-plastic body

- .magnetic separator.-vibrating sieves.-Filter Press.-diaphragm Pump.-granules.

4.0 FABRICATION METHODS

fabrication methods.-rheological properties of casting slip.-factors affecting the castability of slip -Slip casting technique -Mechanism of slip formation.-rate of casting control.-traditional methods of slip casting.-advanced methods of shaping in the liquid state like bench casting and battery casting.-Ethyl silicate casting process -casting defects-Traditional plastic forming methods like hand molding and molding, plastic pressing, throwing, jiggering and jollying, extrusion -Hand moulding, throwing, plastic pressing-details of all Extruders.-manual and automatic Jiggering & Jollying machines.-Mechanical Presses like Toggle press, screw press -

Hydraulic Presses, and Isostatic Pressing.-Die - materials & design.-advanced methods of shaping in the plastic state like forming by roller machines, ram pressing impact forming, injection molding -hot pressing and Isostatic pressing.-turning process.-dry pressing.-particle size distribution in slip

5.0 DRYING OF CLAY PRODUCTS

driers.-Mechanism of drying.-factors affecting on drying.-critical moisture content.-drying of Plastic & Non-Plastic Ceramic bodies.-Shrinkage of the body during drying.-drying defects, its causes and remedies.

6.0 GLAZING

Glaze- glazing machines.-Automatic glazing machine.-Design and Printing machines

7.0 SETTING OF CLAY PRODUCTS:

kiln furniture and supports.-Kiln furniture.-common brick in the kiln-unflashed bricks in the kiln.-glazed brick in the Kilns.-sewer pipes in the Kilns-bricks in the Scove Kilns

bricks on tunnel cars.-white ware in saggars for biscuit firing.-glaze ware in saggars and without saggars.

8.0 FIRING OF CLAY WARE

classification of the kilns. - bisque firing-glost firing-fast firing-Theoretical justification for fast firing.-practical aspects which make fast firing possible.-Reasons for fast firing-Effect of heat on ceramic bodies.-Thermal decomposition materials in the ceramic body.-Sintering and vitrification of the body.-the physical changes in ceramic body after firing.-Kilns used for firing of Ceramic ware

REFERENCE BOOKS:

1. SudhirSen, Ceramic White Ware, Oxford and IBH Publishing Limited, New Delhi, 1992.
2. Singer F and Singer S. S., Industrial Ceramics. Oxford and IBH Publishing Limited, New Delhi, 1963
3. S.Kumar Hand book of Ceramics Volume I to IV, Kumar and Associates, Kolkata, 1994 to 1997.
4. Rosenthal, Pottery and Ceramics, Ernst, Britain for Penguin books ltd, 1949.
5. Paulrado. An Introduction to the Technology of Pottery, 2 edn., The institute of ceramics, by Pergaman press, New York, 1988.
6. H.N.Bose, Modern Pottery Manufacture, Ceramic Publishing House, Bhagalpur, 1987.
7. J T Johns and M F Berard, Ceramics-industrial processing and Testing, The Iowa University press, AMES, Iowa, 1972
9. Allen Dinsdate, Pottery Science; Materials, processes, and products, Ellis Horwood Ltd., New York, 1986.
10. Ryan W and Redford C, White wares production testing and quality control, Pergamon Press New York, 1987.
11. Richard Zakin, Ceramics, A and C Block, 1990.

12. FH Norton, Fine Ceramics – Technology and applications, Robert E. Krieger Publishing co., New York, 1978,

13. A Handbook for Production of Vitreous China sanitary wares by Dr.K.N.Maiti.

Unit Test Syllabus

Year/ Semester	Unit Test	Syllabus
Third semester	Unit Test-I	1. Introduction 2. Machinery for crushing & Grinding 3. Body preparation 4. Fabrication Methods
	Unit Test-II	5. Drying of Clay Products 6. Glazing on Clay Products Body/Glaze Fit 7. Setting of Clay Products 8. Firing of Clay Products

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur, SPSR Nellore-524101
C-20, Model paper
III Semester – Unit I

Subject Name: White Ware & Heavy Clay Ware-I	Course Code: CER-3303
Time: 90 min	Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Fill in the blanks

- Jaw crusher is primary crusher (True/False)
- Ball mill used for drying(True/False)
- Spray drier used in the tile industry for the making of

- d. In slip casting the moulds are made with.....
2. What is crushing and grinding?
 3. Draw the flow sheet for making of earthen ware body preparation?
 4. Classify the mixers?
 5. Classify the fabrication methods used in clay industry?

PART- B

Marks: 3 x 8=

24

Answer all questions. Each question carries eight marks.

6. A). Describe the working of jaw crusher?

(OR)

- B). Describe working of gyratory crusher?

7. A). Explain working of blunger?

(Or)

- B). Write about the working of filter press?

8. A). Explain slip casting?

(Or)

- B). Explain rate of casting?

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur, SPSR Nellore-524101
C-20, Model paper
III Semester – Unit II

Subject Name: White Ware & Heavy Clay Ware-I	Course Code: CER-3303
Time: 90 min	Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Fill in the blanks
A. Deflocculant reduces the

- B. Glassy coating on the clay ware is....
 - C. Drying is carried out at the temperature of
 - D. Potash feldspar is a flux(True/False)
2. What is critical moisture content?
 3. List the drying defects?
 4. What is glaze?
 5. List the glazing machines?

PART- B

Marks: 3 x 8=

24

Answer all questions. Each question carries eight marks.

6. A). Explain in detail working principle of humidity drier?

(OR)

- B). Explain the factors effecting upon drying?

7. A). Describe the working of screen printing machine?

(Or)

- B). Write about the spraying of glaze?

8. A). Write the Physical and chemical changes in ceramic body after firing?

(Or)

- B). Explain the fast firing technology in ceramic industry?

SCHEME: C – 20

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY
GUDUR – 524101: SRI POTTI SREERAMULU NELLORE DISTRICT, A.P
Autonomous Institute Vide G.O.Ms.No. 214/ Edn, (TE – I Dept.) 05-10-1996
IIISemester Examination (MPEC) for 3 ½ Year Diploma in Ceramic Technology

COURSE CODE: **CER – 3303** COURSE NAME: **WHITE WARE
& HEAVY CLAY WARE - I**

TIME: 3 HOUR

Max.Marks:80

PART – A

3 x 10 = 30 Marks

Note : 1. Answer all questions and each question carry **THREE** marks.

2. Answer should be brief and straight to the point and shall not exceed **FIVE** simple sentences.

1. What is White ware and Heavy clay ware?
2. Classify Crushers with a Example?
3. What is computerized Body preparation?
4. What is Jiggering and Jolleying?
5. What is Ethyl silicate Casting?
6. List the Dryers used in ceramic Industry?
7. What is Spraying?
8. List the kiln furniture and Supports?
9. What is Glost firing?
10. Write the reasons for fast firing?

PART – B

5 X 8 = 40 Marks

Note : 1. Answer **all** questions and each question carry **Eight** marks.

2. The answer should be comprehensive and the criteria for valuation is the content but not the length of the answer.

11. A). Describe in detail principle, construction and working of the ball mill?
(Or)

B). Write short notes on

- 1) Dust collector
- 2) magnetic Separator

12. A). Describe in detail Principle, construction and working of the spray drier?
(Or)

B). write about

- 1) jaw crusher
- 2) Vibro Energy mill

13. A). Classify the mixers. Describe in detail working of blunger?
(Or)

B). Describe in detail working of filter press?

14. A). Explain the factors affecting upon the rate of casting?
(Or)

B). Write about

- 1) Hand molding
- 2) Extrusion

15. A). Describe in detail factors affecting upon the drying?

(Or)

B). Write short notes on

1) humidity dryer

2) Critical Moisture Content

PART – C

1X 10 = 10

Instructions: *Part C consists of One question which carries Ten marks.*

17. Recommend a mill for grinding of Quartz? Describe principle, working and construction of that mill?

-oOo-

REFRACTORIES-I

SUBJECT TITLE : REFRACTORIES - I

SUBJECT CODE : CER-3304

PERIODS/WEEK : 04

PERIODS/SEMESTER : 60

TIME SCHEDULE

S. No	Major Topics	Periods	Weightage of Marks	Short Answer questions (3M)	Essay type Questions (8M)	Essay Type Questions (10M)
1	Introduction to Refractories	03	03	01		
2	Alumino-Silicate Refractory	05	08		01	
3	Alumina Refractory	05	11	01	01	
4	Silica Refractory	08	11	01	01	
5	Dolomite Refractory	05	03	01		
6	Magnesite Refractory	05	13	01		01
7	Chromite Refractory	05	03	01		
8	Chrome-Mag, Mag-chrome Refractory	05	11	01	01	
9	Carbon Refractory	06	03	01		
10	Insulation Refractories	08	11	01	01	
11	Refractory Cements and Mortars	05	03	01		
	Total	60	80	10	05	01

Course Objective and Outcome

Courses Objectives	Upon Completion of the Courses the student be able to Understand the making of Different Refractory		
Courses Contents	Upon Completion of the Courses the student be able to		
	CO1	CER- 3304- 1	Demonstration of Raw materials and Processing of Alumina, Silica, Dolomite, Magnesite, chromate and Mag-chrome Refractories
	CO2	CER- 3304- 2	Comprehensive materials of Carbon, Insulation and Refractory Cement and Mortars.
	CO3	CER- 3304- 3	The statement of Raw material usage and Different types of Beneficiation and shaping methods for Refractories
	CO4	CER- 3304- 4	Knowledge to Different materials and Processing and Drying and firing of Refractory ware.
	CO5	CER- 3304- 5	The Study of end Product Behavior and Characteristic of Different Refractories Brick

PO-CO Mapping

Course Code :CER-3304		Course Title :REFRACTORIES		No. of. Periods: 75	
Pg.No	Mapped with Co No	Co Periods addressing Po In Co/1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1	10	13	1	>40% Level 3 High addressed 25% to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <% Not addressed
PO2	CO2	10	13	2	
PO3					
PO4					
PO5	CO2-CO8	50	65	3	
PO6					
PO7	CO10	05	09	1	
PO8					
PO9					
PO10					

Blue Print of Question Paper

S.No	Chapter Name	Period Avocated	Weighted Avocated	Marks Wise Distribution of weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	AP	AN	R	U	AP	AN	
1	Introduction to Refractories	03	03	03				01				
2	Alumino-Silicate Refractory	10	08			08		01		01		CO1
3	Alumina Refractory	05	11	03		08		01		01		CO1 CO2
4	Silica Refractory	10	11	03		08		01		01		CO3
5	Dolomite Refractory	05	03		03				01			CO4
6	Magnesite Refractory	05	13	03			10	04			01	CO5
7	Chromite Refractory	05	03	03				01				CO6
8	Chron-Mag Mag-chrom Refractory	10	11		03	08			01	01		CO5C, CO6,C O7

9	Carbon Refractory	10	03		03				01			CO8
10	Insulation Refractories	10	11	03		08		01		01		CO9
11	Refractory Cement and Mortars	05	03		03				01			CO1-CO9
	Total	75	80	17	12	40	10	06	04	05	01	

R-Remember , U- Understanding , Ap – Application, An- Analysing

Learning Outcomes

OBJECTIVES: On completion of the course the student should be able to know the following

1.0 INTRODUCTION TO REFRACTORIES

- 1.1 Definition and Classification of Refractories based on Chemical Nature
- 1.2 Selection of Refractories
- 1.3 List the Properties and uses of Refractories.

2.0 ALUMILNO-SILICATE REFRACTORIES:

- 2.1 Name the raw materials for alumina-silicate refractories
- 2.2 List the alumina-silicate refractories
- 2.3 Characteristics of grog
- 2.4 Making, drying, firing of alumina-silicate refractories
- 2.5 Application, uses and properties of alumino-silicate refractories

3.0 ALUMINA REFRACTORIES

- 3.1 Name the raw material for alumina refractories.
- 3.2 Shaping, drying, and firing of alumina/High alumina refractories.
- 3.3 Properties, uses and application of alumina refractories.

4.0 SILICA REFRACTORIES

- 4.1 Name the raw materials, bonding agents and mineralizers of silica refractories
- 4.2 Mixing, shaping, drying, firing, and cooling of silica refractories.
- 4.3 Types of silica alloyed refractories
- 4.4 Firing schedule curves, list of kilns, properties uses and application of refractories.

5.0 DOLOMITE REFRACTORIES

- 5.1 Name the raw materials for dolomite refractories
- 5.2 Calcination, soaking, bonding agents and manufacturing of dolomite refractories.
- 5.3 Properties and application of dolomite refractories

6.0 MAGNESITE REFRACTORIES

- 6.1 Name the raw materials for magnesite refractories
- 6.2 Understanding the process of dead burnt and calcinations of magnesite
- 6.3 List the bonding agents or additives of magnesite refractories
- 6.4 Manufacturing, properties and application of magnesite refractories

7.0 CHROMITE REFRCATORIES

- 7.1 Name the raw materials for chromite refractories
- 7.2 List the bonding agents
- 7.3 Manufacturing, properties and uses of chromite refractories.
- 8.0 CHROME-MAGNESITE AND MAGNESITE- CHROMITE REFRACTORIES
 - 8.1 List the raw materials materials and bondings used for Chrome-Mag and Mag-Chrome refractories
 - 8.2 Shaping, drying, firing, characteristics of Chrome-Mag and Mag-Chrome refractories
 - 8.3 Describe in detail notes on metal-case mag-chrome refractories.
 - 8.4 Understanding of bursting problem in chrome-mag refractories
- 9.0 CARBON REFRACTORIES
 - 9.1 Name the raw materials for carbon refractories
 - 9.2 Manufacturing, drying, firing of carbon refractories
 - 9.3 Understand the properties and uses of carbon refractories
 - 9.4 Ceramic-graphite based products making
 - 9.5 Name the raw materials, manufacturing, properties and uses of plumbago refractories
- 10.0 INSULATOR BRICKS
 - 10.1 Definition of cellularity and creating methods in bricks
 - 10.2 Raw materials, making, properties and uses, application of bricks.
- 11.0 REFRACTORY CEMENTS AND MORTARS
 - 11.1 Name the raw materials of cements and mortars
 - 11.2 List the refractory cements by chemical nature
 - 11.3 Types of refractory cements
 - 11.4 Understanding the term of Molithics, Reaming Masses and Gunning Mixtures
 - 11.5 Explain Air Setting & Heat setting of cements
 - 11.6 Properties and uses, application of cements, castable, ramming and gunning mixtures.

COURSE CONTENT:

- 1.0 INTRODUCTION TO REFRACTORIES : Definition and Classification of Refractories - Chemical Nature - Selection of Refractories - Properties and uses of Refractories.
- 2.0 ALUMINO-SILICATE REFRACTORIES: List raw materials for alumina-silicate refractories-Definition, preparation and properties of grog-Making, drying, firing of alumina-silicate refractories-Application, uses and properties of alumino-silicate refractories
- 3.0 ALUMINA REFRACTORIES: Name the raw material for alumina refractories-Shaping, drying, and firing-Properties, uses and application of alumina refractories.
- 4.0 SILICA REFRACTORIES: Name the raw materials, bonding agents and mineralizers of silica refractories-Mixing, shaping, drying, firing, cooling of silica refractories-Types of

silica alloyed refractories-Firing schedule curves, list of kilns, properties uses and application of refractories.

- 5.0 DOLOMITE REFRACTORIES: Name the raw materials for dolomite refractories- Calcination, soaking, manufacturing of Properties and application -List the bonding agents
- 6.0 MAGNESITE REFRACTORIES: Name the raw materials for magnesite refractories-the process of dead burnt and calcinations of magnesite-List the bonding agents- Manufacturing, properties and application of magnesite refractories
- 7.0 CHROMITE REFRACTORIES: Name the raw materials for chromite refractories-List the bonding agents-Manufacturing, properties and uses of chromite refractories.
- 8.0 CHROME-MAGNESITE AND MAGNESITE- CHROMITE REFRACTORIES: List the raw materials and bondings used for Chrome-Mag and Mag-Chrome refractories- Shaping, drying, firing, characteristics of Chrome-Mag and Mag-Chrome refractories- metal-case mag-chrome refractories-bursting problem in chrome-mag refractories.
- 9.0 CARBON REFRACTORIES: Name the raw materials for carbon refractories- Manufacturing, drying, firing-the properties and uses-Ceramic-graphite based products making-Name the raw materials, manufacturing, properties and uses of plumbago refractories
- 10.0 INSULATOR BRICKS: Definition of cellularity and creating methods in bricks- Raw materials, making, properties and uses, application of bricks.
- 11.0 REFRACTORY CEMENTS AND MORTARS: Name the raw materials of cements and mortars-list the types of refractory cements-molothics, reaming masses and gunning mixtures-Air Setting & Heat Setting of cements-properties and uses, application of cements, castable, ramming and gunning mixtures.

REFERENCE BOOKS:

1. F H Norton, Refractories, Prentice Hall of India pvt.Ltd, New Delhi, 19862.
2. J.H. Chester's Steel plant Refractories, Sheffield, The united steel companies ltd, 1957.
3. A.RashidChesti Refractories, Prentice Hall of India pvt ltd., New Delhi, 1986.
4. M.L.Misra Refractories, Clear Type Press, Allahabad, 1975,
5. Nandi, D.N. Handbook of Refractories, Tata McGraw-Hill Publishing Co., New Delhi, 1991.
6. O P Gupta Element of Fuels, Furnace and Refractories, Kanna publishers, Delhi, 1991.
7. Singer F and Singer S S., Industrial Ceramics, Oxford & IBH Publishing Co., 1963.

8. Subrata Banerjee, Monolithic refractories, T V Prasad Indian Refractory makers association, Kolkata, 1972.
10. Griffin, Modern Furnace Technology, Charles Griffin and company ltd., London, 1961.
11. Rudolf Gunther, Glass Melting Tank Furnace, Society of Glass Technology, Sheffield, 1958
12. SuhirSen, Ceramic White Wares, Oxford & IBH Publishing Co., 1992.
13. V Krivandin, B L Markov, Metallurgical Furnaces, Mir Publishers, Moscow, 1980.

Year/ Semester	Unit Test	Syllabus
Third semester	Unit Test-I	1. Introduction to refractories 2. Alumino-Silicate Refractories 3. Alumina Refractories 4. Silica Refractories
	Unit Test-II	5. Dolomite Refractories 6. Magnesite Refractories 7. Chromite Refractories 8. Chrome-Magnesite Refractories & Magnesite-Chromite Refractories 9. Carbon Refractories 10. Insulation Refractories 11. Refractory Cements & Mortars

State Board of Technical Education and Training
 Andhra Pradesh::Vijayawada
 Govt. Institute of Ceramic Technology (Autonomous)
 Gudur, SPSR Nellore-524101
C-20, Model paper
 III Semester – Unit I

Subject Name: Refractories-I	Course Code: CER-3304
Time: 90 min	Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Define refractory? List the properties of refractories?
2. Classify the refractories?
3. Write the fabrication techniques of refractories?
4. What is mineralizer?
5. List the kiln used for refractories?

PART- B

Marks: 3 x 8=

Answer all questions. Each question carries eight marks.

6. A). what is grog? Write the preparation and properties of grog?

(OR)

B). Draw the flow sheet for alumino-silicate refractories?

7. A). Describe in detail raw materials, bonding agents and manufacturing of silica refractories?

(Or)

B). Write about the drying and setting of silica bricks?

8. A). Explain the manufacturing dolomite bricks?

(Or)

B). Write properties and applications of dolomite bricks?

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur, SPSR Nellore-524101
C-20,Model paper
III Semester – Unit II

Subject Name: Refractories-I

Course Code: CER-3304

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. What is dead burnt and calcined magnesite?
2. Write the applications of chrome-magnesite refractories?
3. What is bursting problem in chrome-magnesite refractories?
4. What the importance of insulation refractories?
5. What is Cellularity?

PART- B

Marks: 3 x 8=

Answer all questions. Each question carries eight marks.

6. A). Write manufacturing process of chromite refractories?

(OR)

B). Describe the chrome-magnesite refractories?

7. A). Describe in detail preparation of chromite and magnesite for chrome-mag bricks?

(Or)

B). Explain in detail making of metal-case bricks?

8. A). Explain the refractory cements & mortars?

(Or)

B). Describe in detail firing of carbon refractories?

SCHEME: C – 20

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY

GUDUR – 524101: SRI POTTI SREERAMULU NELLORE DISTRICT, A.P

Autonomous Institute Vide G.O.Ms.No. 214/ Edn, (TE – I Dept.) 05-10-1996

III Semester Examination (MPEC) for 3 ½ Year Diploma in Ceramic Technology

COURSE CODE: **CER - 3304**

COURSE NAME: **REFRACTORIES-I**

TIME: 3 HOUR

Max.Marks:80

PART – A

3 x 10 = 30 Marks

Note : 1. Answer all questions and each question carry **THREE** marks.

2. Answer should be brief and straight to the point and shall not exceed **FIVE** simple sentences.

17. Discuss the properties of Magnesite Refractories?

18. Why fire clay is good refractory material?

19. Write the different bonding agents used in Dolomite Refractories?

20. Write about Graphitized Clay?

21. Explain about Tempering?

22. Mention some raw-materials name for Silica Brick?
23. Give the composition of chrome ore for the manufacturing of Chrome Refractories?
24. Distinguish between Magnesite-Chromite and Chrome-Magnesite Refractories?
25. List out the various steps involved in the manufacturing of Refractories?
26. Name the refractory cements and it's advantages?

PART – B

5 X 8 = 40 Marks

Note : 1. Answer **all** questions and each question carry **Eight** marks.

2.The answer should be comprehensive and the criteria for valuation is the content but not the length of the answer.

27. A).Explain the reactions in oxidation stage of Fire Clay Refractories?
(Or)
- B).Give the properties uses of High Alumina Refractories?
28. Write a short notes on
 - 1). Dead Burnt Magnesite
 - 2). Di-Calcium silicate
29. A).Write the making of graphite crucible and explain properties, applications?
(Or)
- B).Illustrate the manufacturing of High Alumina Refractories?
30. A).Explain in detail manufacturing process of Dolomite Brick along with neat sketch?
- B).explain steps to manufacturing of Carbon refractories
31. Explain the following
 - 1). Bursting problem in Chrome-Magnesite Refractories
 - 2). Types of bonds used for Chrome –Magnesite Refractories

PART – C

1X 10 = 10

Note 1 *Part C consists of Onequestion which carries Ten marks.*

16. Why dead burnt magnesite is used for making refractories? Suggest bond/additives used in magnesite refractories? Describe firing schedule of Magnesite refractories?

-oOo-

COMMUNICATION SKILLS

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks for FA	Marks for SA
CER-3209	Communication Skills	3	45	40	60

S. No.	Chapter/Unit Title	No of Periods	COs Mapped
1	Listening Skills	6	CO1
2	Introducing Oneself	3	CO1, CO2, CO3
3	Short Presentation (JAM)	6	CO1, CO2, CO3
4	Group Discussion	6	CO1, CO2, CO3
5	Preparing Resume with Cover Letter	3	CO3
6	Interview Skills	9	CO1, CO2, CO3
7	Presentation Skills	9	CO1, CO2
8	Work place Etiquette	3	CO1, CO2
Total Periods		45	

Course Objectives	To comprehend the features of communication needed for professional success and display the use of these competently
	To present ideas, opinions in group discussions and presentations on topics of general and technical interest
	To prepare for job selection processes

CO No.	Course Outcomes
CO1	Interacts in academic and social situations by comprehending what is listened to when others speak.
CO2	Demonstrates effective English communication skills while presenting ideas, opinions in group discussions and presentations on topics of general and technical interest.
CO3	Exhibits workplace etiquette relevant in classroom situations for easy adaptation in professional setting in the future.

CO-PO Matrix

Course Code C-408	Course Title: English Number of Course Outcomes: 3			No. of Periods: 45	
POs	Mapped with CO No.	CO Periods Addressing PO in Column 1		Level of Mapping (1,2,3)	Remarks
		Number	Percentage %		
PO1		Not directly applicable for Communication Skills Course however interactive activities that use content from science and technology relevant to the Programme taken up by the student shall be exploited for communication in the Course.			
PO2					
PO3					
PO4					
PO5	CO1, CO2, CO3	11	25%		>60%: Level 3
PO6	CO1, CO2, CO3	27	60%		16 -59%: Level 2
PO7	CO1, CO2, CO3	7	15%		Up to 15%: Level 1

Level 3 – Strongly Mapped

Level 2- Moderately Mapped

Level 1- Slightly Mapped

Mapping Course Outcomes with Program Outcomes:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1					✓	✓	✓
CO 2					✓	✓	✓
CO3					✓	✓	✓

Blue Print for evaluation based on Course Outcomes for SA:

Note: Every Question based on CO has to be given marks for the following parameters of communication in the rubric.

- Fluency and Coherence
- Lexical Resource (Vocabulary)
- Grammatical Range and Accuracy

***Rubric Descriptors 'Good/ Competent / Fair /Poor' for Communication**

LEVEL OF COMPETENCE	Fluency and Coherence	Lexical Resource (Vocabulary)	Grammatical Range and Accuracy
<p style="text-align: center;">GOOD (9-10*)</p>	<p>Speaks at length without noticeable effort or loss of coherence. May demonstrate language-related hesitation at times, or some repetition and/or self-correction.</p>	<p>Uses vocabulary resources flexibly during discussion. Uses paraphrase effectively.</p>	<p>Uses a range of complex structures with some flexibility.</p>
	<p>Uses a range of connectives and discourse markers with some flexibility. Articulates and adapts to near naturalization.</p>	<p>Uses some less common vocabulary and shows some awareness of style and collocation</p>	<p>Mostly produces error-free sentences.</p>

COMPETENT (6-8)	Is willing to speak at length, though may lose coherence at times due to occasional repetition, self-correction or hesitation.	Has enough vocabulary to discuss topics and make meaning clear in spite of inappropriacies.	Uses a mix of simple and complex structures, but with limited flexibility.
	Uses a range of connectives and discourse markers but not always appropriately.	Generally paraphrases successfully	May make mistakes with complex structures though these rarely cause comprehension problems.
FAIR (3-5)	Tries to maintain a flow of speech but t uses repetition, self correction and/or slow speech to keep going.	Manages to talk about familiar and unfamiliar topics but uses vocabulary with limited flexibility.	Produces only basic sentence forms, however, errors persist.
	Produces simple speech fluently, but more complex communication causes fluency problems.	Attempts to use paraphrase but with mixed success.	Uses a limited range of more complex structures, but these usually contain errors and may cause some comprehension problems
POOR (0 *-2)	Speaks with long pauses. Pauses lengthy before most words. Merely imitates	Uses simple vocabulary to convey personal information	Attempts basic sentence forms but with limited success, or relies on apparently memorized utterances
	Has limited ability to link simple sentences	Has insufficient vocabulary for less familiar topics	Makes numerous errors except in memorized expressions
	Gives only simple responses and is frequently unable to convey basic message	Only produces isolated words or memorized utterances	Struggles to produce basic sentence forms

s*10 marks to be awarded only if competence level shows flawless expertise in English.

***0 marks to be awarded when student shows incoherence and gives irrelevant responses.**

Blue Print for evaluation based on Course Outcomes for SA of each student:

Note: Marks are awarded for each student as per the Rubric descriptors.

S. No.	Questions based on Course Outcomes	Periods Allocated for practical work	Marks Wise Distribution of Weightage	Marks allotment for each Student in the Rubric*				Mapping of COs
				Poor 0-2	Fair 3-5	Competent 6-8	Good 9-10	
1	Describe the given object in a minute	6	10					CO 2
2	Exchange ideas/ views in a group discussion on _____ issue (academic, technical or social)	6	10					CO1, CO 2
3	Present your ideas /opinions on the given issue/Chapter(individual to an audience)	9	10					CO1, CO2, CO 3
4	Role play an imaginary workplace situation	6	10					CO1, CO2, CO 3
5	Individual interaction with the Examiner duly submitting Resume (Facing the Interview) – Introducing oneself and answering questions	12	10					CO1, CO2, CO 3
6	*Listen to and comprehend any audio	6	10					CO1, CO2, CO 3

	communication/ content							
TOTAL		45	60					

***Listen to and comprehend the given audio content:** Giving the Students time to read the questions (Fill in the Blanks, Select from Alternatives, True or False, Table fill, etc.) in chunks before listening to audio inputs also played in chunks.

Blue Print for evaluation based on Course Outcomes for Formative Assessment:

Note: Every Question based on CO has to be given marks for the following parameters in the rubric.

- Fluency and Coherence
- Lexical Resource
- Grammatical Range and Accuracy

S. No.	Questions based on Course Outcomes	Periods Allocated for practical work	Marks Wise Distribution of Weightage	Marks allotment for each Student in the Rubric*				Mapping of COs
				Poor 0-2	Fair 3-5	Competent 6-8	Good 9-10	
Formative Assessment - 1								
1	Describe the given object in a minute	3	10					CO 2
2	Exchange ideas/ views in a group discussion on _____ issue (academic, technical or social)	6	10					CO1, CO 2

3	Present your ideas /opinions on the given issue/Chapter(individual to an audience)	6	10					CO1, CO2, CO 3
4	*Listen to and comprehend any audio communication/ content	3	10					CO1, CO2, CO 3
Total		18	40					
Formative Assessment -2								
1	Present your ideas /opinions on the given issue/Chapter(individual to an audience)	3	10					
2	Role play an imaginary workplace situation	6	10					CO1, CO2, CO 3
3	Individual interaction with the Examiner duly submitting Resume (Facing the Interview) – Introducing oneself and answering questions	15	10					CO1, CO2, CO 3
4	*Listen to and comprehend any audio communication/ content	3	10					CO1, CO2, CO 3
TOTAL		27	40					

Learning Outcomes

1. Listening Skills:

- 1.1 Listen to audio content (dialogues, interactions, speeches, short presentations) and answer questions based on them
- 1.2 Infer meanings of words / phrases / sentences / after listening to audio content as mentioned above

2. Introducing Oneself:

- 2.1 Prepare a grid different aspects for presentation about a person / oneself
- 2.2 Present a 1 or 2 minute introduction of oneself for an audience

3. Short Presentation:

- 3.1 Define an object
- 3.2 Describe an object, phenomenon, event, people
- 3.3 Speak on a Chapter randomly chosen

4. Group Discussion:

- 4.1 Practice Group Discussion. Techniques
- 4.2 Participate in group discussions

5. Resume Writing and Cover Letter:

- 5.1 Prepare resumes of different sorts – one's own and others.
- 5.2 Write an effective cover letter that goes with a resume

6. Interview Skills:

- 6.1 Prepare a good Curriculum Vitae
- 6.2 Exhibit acceptable (Greeting, Thanking, Answering questions with confidence)

7. Presentation Skills:

- 7.1 Prepare Posters, Charts, PPT's on issue of general and technical interest
- 7.2 Present one's ideas before an audience with confidence using audio visual aids and answer questions that are raised.

8. Workplace Etiquette:

- 8.1 Show positive attitude & adaptability / appropriate body language to suit the work place
- 8.2 Display basic of etiquette like politeness, good manners.

GLASS ENGINEERING -I LAB

SUBJECT TILTLE	:	GLASS ENGINEERING-I LAB
SUBJECTCODE	:	CER-3305
PERIODS/ WEEK	:	04
PERIODS/ SEMESTER	:	60

TIME SCHEDULE

S. No.	Major Components	Periods
1.	Determination of Particle size of a given Sand by Rotap sieve shaker.	3
2.	Leaching of Glass Sand by Alkali solutions.	3
3.	Leaching of Glass Sand by Acid solution like Hydrochloric Acid and Sulphuric Acid	3
4.	Preparation of Sodium Silicate by using Electrical crucible furnace	4
5.	Preparation of Soda Lime Silica Glass, Transparent/flint glass and Crystal Glass, Colored glasses, Opal and Opal colored glass	4
6	Determination of Strain by Strain viewer/Polariscope	4
7	Determination of Surface alkalinity/durability of given Glass Bottle by Autoclave Tests.	4
8	Determination of alkalinity of given Glass Powder by Autoclave Test	4
9	Determination of the DENSITY of a given GLASS by Boiling method and Steel walker yard balance	4
10	Determination of the DENSITY of a given GLASS ware by Density Comparator	4
11	Determination of impact strength of Container and Float glass	4
12	Determination of the DENSITY of a given GLASS Powder by Pycnometer/ specific gravity bottle method	4
13	Determination of the seeds present in a given sample by SEEDOSCOPE Method.	4
14	Determination of Thermal Shock Resistance Test for containers	4
15	Determination of Refractive Index of given glass by Abbe refractometer.	4
16	Determination the thermal expansion	3

	TOTAL PERIODS	60
--	---------------	----

Course Objectives and Course Outcomes

Course Objectives	Upon completion of the course the student shall be able to: (iv) To familiarise with the knowledge testing of different raw materials used and manufacturing of glass (v) To get hands on experience on quality control tests conducted for glass bottles and sheets		
Course Outcomes		Upon completion of the course the student shall be able to:	
	CO1	CER-3305.1 to CER-3305.5	Demonstrate the skills of planning and organizing the experimental setup to determine the particle size, % alkali and acid impurities and melting of different glasses
	CO2	CER-3305.5 to CER-3305.16	Demonstrate the skill of planning and organizing the experimental setup to conduct tests on glass bottles and sheet glass
	CO3	CER-3305.1, CER-3305.4, CER-3305.6,7,8,10,11,13,15,16	Perform precise operations with Rotap sieve shaker, electrical crucible furnace, polariscope, seedoscope, Autoclave, impact tester, density comparator, Abbe refractometer, Dilatometer
	CO4	CER-3305.1, 2,3, 7,8,9,10,11,12,13,15,16	Analyse the experimental results to draw inferences, to make recommendations
	CO5	CER-3305.1 to 16	Practice ethics and etiquette while working in a group and display professionalism while communicating as a member and a leader in a group.

PO-CO Mapping

Course Code: CER-3305		Course Title: GLASS ENGINEERING-I LAB			No of Periods: 60
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%ge		
PO1	CO1,CO2,CO4	15	25	2	>40% Level 3 Highly addressed
PO2					25% to 40% Level 2 Moderately addressed
PO3					
PO4	CO1,CO2,CO3	27	45	3	5 to 25% Level 1 Low addressed
PO5	CO5	8	13.3	1	
PO6	CO5	10	16.67	1	<5% Not addressed
PO7					

Learning Outcomes

Up on Completion of the course the student shall be able to:

1. Determination of Particle size of a given Sand by Rotap sieve shaker.
 - 1.1 Weigh 200gms of sand
 - 1.2 Sieve through set of sieves by using Rotap sieve shaker
 - 1.3 Weigh the retained sand on each sieve
 - 1.4 Calculate percentage and cumulative percentage
2. Leaching of Glass Sand by Alkali solutions.
 - 2.1 Prepare different concentration of sodium carbonate solution
 - 2.2 Weigh 25gm of sand

- 2.3 Sand is soaked in sodium carbonate solution for an hour
- 2.4 After one hour sand is washed thoroughly, dried and weighed
- 2.5 Calculate loss in weight
3. Leaching of Glass Sand by Acid solution like Hydrochloric Acid and Sulphuric Acid
 - 3.1 Prepare different concentration of acid solution
 - 3.2 Weigh 25gm of sand
 - 3.3 Sand is soaked in acid solution for an hour
 - 3.4 After one hour sand is washed thoroughly, dried and weighed
 - 3.5 Calculate loss in weight
4. Preparation of Sodium Silicate by using Electrical crucible furnace
 - 4.1 Weigh sand and soadash according to the composition
 - 4.2 Mix the materials
 - 4.3 Fill in crucible
 - 4.4 Melt in Electrical crucible furnace
5. Preparation of Soda Lime Silica Glass,Transparent/flint glass and Crystal Glass, Colored glasses, Opal and Opal colored glass.
 - 5.1 Weigh the raw materials according to the composition
 - 5.2 Mix the materials
 - 5.3 Fill in crucibles
 - 5.4 Melt in furnace
 - 5.5 Fabricate the articles
 - 5.6 Do annealing
6. Determiation of Strain by Strain viewer/Polariscope.
 - 6.1 The glass to be examined is placed in polariscope
 - 6.2 Well annealed appear transparent
 - 6.3 Unannealed glasses appear dark colors
7. Determiation of Surface alkalinity/durability of given Glass Bottle by Autoclave Tests.
 - 7.1 Take $3/4^{\text{th}}$ of distilled water in 3 or 4 bottles
 - 7.2 Place bottles in Autoclave
 - 7.3 Raise the pressure to $1\text{kg}/\text{cm}^2$ and maintain for half an hour
 - 7.4 Cool the bottles and take out 100ml of this water in conical flask
 - 7.5 Take 100ml of ordinary water in another conical flask

- 7.6 Add Methyl orange indicator, color changes to yellow
- 7.7 Titrate two solutions against N/50 H₂SO₄ till color changes to orange
- 7.8 Calculate the alkalinity
8. Determination of alkalinity of given Glass Powder by Autoclave Test.
 - 8.1 Crush the glass bottles and pass through BSS No.36 Mesh
 - 8.2 Take 10gm of glass powder in conical flask, add 100ml distilled water
 - 8.3 Take one more conical flask, add 100ml of distilled water
 - 8.4 Place in Autoclave
 - 8.5 Raise the pressure to 1kg/cm² and maintain for half an hour
 - 8.6 Transfer the solution into another conical flask and titrate against 0.02N HCl
 - 8.7 Calculate the value
9. Determination of impact strength of Container and Float glass.
 - 9.1
10. Determination of the DENSITY of a given GLASS by Boiling method and Steel walker yard balance.
 - 10.1 Weigh the glass sample
 - 10.2 Boil in water for half an hour
 - 10.3 Measure soaked weight and immersed weight
 - 10.4 Calculate by using formula
11. Determination of the DENSITY of a given GLASS ware by Density Comparator.
 - 11.1 Take glass bottle and cut into small two pieces
 - 11.2 First and second Naselar tube having standard glass piece
 - 11.3 Place cut glass piece in third tube and start
 - 11.4 Raise the temperature and standard glass piece is falls at a particular temperature
 - 11.5 After sometime sample glass piece falls, note the temperature
 - 11.6 Calculate density by using formula
12. Determination of the DENSITY of a given GLASS Powder by Pycnometer/ specific gravity bottle method
 - 12.1 Weigh empty specific gravity bottle(W1)
 - 12.2 Fill 1/5th of specific gravity bottle with glass powder and weigh (W2)
 - 12.3 Fill water and weigh(W3)
 - 12.4 Completely fill with bottle and weigh(W4)
 - 12.5 Calculate the density

13. Determination of the seeds present in a given sample by SEEDOSCOPE Method.
 - 13.1 Cut the glass into square shape
 - 13.2 Place the sample in Seedoscope
 - 13.3 Observe the number of seeds present
 - 13.4 Calculate using formula
14. Determination of Thermal Shock Resistance Test for containers.
 - 14.1 Take glass bottles and immerse in hot water for 5 minutes
 - 14.2 After 5 minutes immerse in cold water
 - 14.3 Observe the cracks
 - 14.4 If there are no cracks repeat the process
15. Determination of Refractive Index of given glass by Abbe refractometer.
16. Determination the thermal expansion
 - 1) By using Dilatometer (IS: 5623-1970, ASTM: C-337-57)
 - 2) Under controlled heating rate

WHITEWARE & HEAVY CLAY WARE-I LAB

SUBJECT : WHITE WARE & HEAVY CLAYWARE-I LAB

SUBJECT CODE : CER 3306

PERIODS/ WEEK : 04

PERIODS/ SEMESTER : 60

TIME SCHEDULE

S. No.	Major Components	Periods
1.	Grit Content	05
2.	Atter-Burg Number	05
3.	Single Piece Plaster mould	05
4.	Multiple piece plaster mould	05
5.	Body of Slip	05
6.	Rheological Properties of Slip	05
7.	Hallow & Solid casting	05
8.	Floor Tiles	05
9.	Glazed Roofing Tile	05
10.	Common Bricks	05
11.	Firing	05
12.	Finished Product Properties	05

Course Objectives and Course Outcomes

Course Objectives	Upon completion of the course the student shall be able to: (vi) To know the Quality of Raw material. (vii) To Improve the better Fabrication skills. (viii) To Analyse the Quality of the Finished product.		
Course Outcomes		Upon completion of the course the student shall be able to:	
	CO1	CER-3306.1 CER-3306.2 CER-3306.6 CER-3306.12	Experiment to determine Fineness, Plasticity of the clays, Properties of the slip used for Fabrication and Finished product Properties.
	CO2	CER-3306.5	Demonstrate the skill and manufacturing of the body slip for the Fabrication of different Ware.
	CO3	CER-3306.3 CER-3306.4 CER-3306.7 CER-3306.8 CER-3306.9 CER-3306.10	Practices different techniques to Fabricate the ware.
	CO4	CER-3309.1	Inventing and Decision making to get the required Properties for getting Finished product.
	CO5	CER-3309.12 CER-3309.1 CER-3309.2 CER-3309.6	Analyze the experimental results to make better product.

PO-CO Mapping

Course Code: M-309		Course Title: Fuels Laboratory			No of Periods: 45
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%ge		
PO1	CO1,CO2,CO3,CO4,CO5	15	25	2	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO2	CO3,CO4,CO5	10	17	1	
PO3					
PO4	CO1,CO5	25	42	3	
PO5	CO2,CO3	05	08	1	
PO6					
PO7	CO5	05	08	1	

Learning Outcomes

Up on Completion of the course the student shall be able to:

LIST OF EXPERIMENTS:

1.0 Determination of grit content of given sample by Wet method

- 1.1. Take the 100gm of sample and passed through the 240 mesh.
- 1.2. The Retained material is dried in the drier along with the mesh.
- 1.3. Weigh the material retained in the 240 mesh and Calculate the Percentage of the Grit

2.0. Determination of Atterburg Number of the Given Clay Sample :

- 2.1 Take the sample as fine Powder and convert it into Rolling state, plastic state and fluid state with the addition of water.
- 2.2 Then find out the Atter burg number by using formula.

3.0. Preparation of Mono piece Plaster of Paris Moulds.

- 3.1 Prepare a suitable model /Take the model supplied.
- 3.2 Then construct the supports beside of the model with suitable material with specified method.
- 3.3 Lubricate the model and supports.
- 3.4 Pour the plaster slip inside of the supported walls
- 3.5 After setting gently remove the model then do the necessary finishing.

4.0 Preparation of Multiple piece Plaster of Paris Moulds

- 4.1 Take the right model for making mold.
- 4.2 Half of the model is inserted in to the clay bat.
- 4.3 Then construct the supports beside of the model at the right distances.
- 4.4 Plaster Slip is poured inside of the support and make the half of the portion.
- 4.5 Make the notches upon the half mold.
- 4.6After constructing the support walls upon the prepared half portion mold the plaster slip has to be drained.
- 4.7After Proper finishing remove the mold then take the model.

5.0 Prepare a suitable body slip by using Ball mill

- 5.1 Select the suitable body composition for making slip.
- 5.2 Charge the raw materials into the ball mill.
- 5.3 After getting suitable properties unload it.

6.0 Find out the Rheological properties of various body slips

- 6.1 Take the sample of slip.

- 6.2 Stir properly by using lab stirrer.
- 6.3 Check the density by using Density bottle.
- 6.4 Check the viscosity by using viscometer.
- 6.5 Check the residue by using specified mesh.

7.0 Cast the articles with the different body slips by the method of solid casting.

- 7.1 Take the suitable plaster mold for casting.
- 7.2 Select the type of casting to be needed.
- 7.3 Then cast the articles by using different body slips.

8.0 Cast the articles with the different body slips by the method of hollow casting.

- 8.1 After selection and suitable Lubrication of the mold, the slip is poured into the mold.
- 8.2 Different techniques are employed for casting.
- 8.3 Drain the excess slip.

9.0 Preparation of Plastic body with Earthen ware, Porcelain and Stone ware for pressing.

- 9.1 Prepare the plastic body with the Earthen ware, Porcelain and Stone ware
- 9.2 Pressing was carried out in the molds by different techniques

10.0 Prepare a tile with Earthen ware

- 10.1 Choose the Earthenware composition which was suitable for different fabrication Techniques.
- 10.2 Fabricate the tile by using different techniques.

11.0 Prepare a glazed roofing tile with Terracotta and common clay bodies.

- 11.1 Select the body composition of Terracotta for making roofing tile.
- 11.2 The raw materials are converted into plastic form by suitable processing.
- 11.3 Fabricate the tile in the Tile Pressing machine.

12. 0 Preparation of common bricks with different sizes by Hand /Semi- automatic method.

- 12.1 Fabricate the brick in the suitable mold.
- 12.2 Then dry and fired in the suitable kiln.

13.0 Preparation of Flower pots by Turning process using Potters wheel

- 13.1 Fabricate the flower pot by Turning process using Potters wheel.

13.2 Then dry and fired in the suitable kiln.

14.0 Firing of above products at Suitable temperatures.

14.1 The dried articles are loaded into the different kilns for firing.

14.2 The articles are fired at different temperatures to get required properties

15.0 Routine tests for fired ceramic samples.

15.1 Take the specimen which was used to determine the specific property i.e., Density, porosity, Specific Gravity, etc.

REFRACTORIES LAB

Subject : **Refractories LAB**
Subject Code : **CER-3307**
PERIODS/ WEEK : **04**
Periods Per Sem : **60**

TIME SHEDULE

s.No	Major Components	periods
1.	Prepare a different shape of fire clay bricks with given refractory mixture	05
2.	Prepare a fire clay bricks with the given composition	06
3.	Prepare a cellular /Insulation brick with vermiculite	05
4.	Prepare a cellular /Insulation brick with rice husk	05
5.	Prepare a cellular /Insulation brick with mica powder	05
6.	Preparation of 2” cubes with $\frac{3}{4}$ ” x $\frac{3}{4}$ ”x $\frac{3}{4}$ ” opening at the Top center for Slag Attack Test	05
7.	Prepare a sager	10
8.	Prepare a crucible	06
9.	Determination of Porosity, Apparent Density, Specific Gravity of the given Refractory bricks	05
10.	Compare the specific gravity with lump and powder state	04
11.	Finding C.C.S. of Refractory bricks	04
	Total	60

COURSE OBJETIVES AND COURSE OUTCOMES

Courses Objectives	Upon Completion of the Courses the student be able to know the cement quality by understanding analytical methods
Courses Contents	Upon Completion of the Courses the student be able to

	CO1	CER-3307-1 CER-3307-3 CER-3307-4 CER-3307-5 CER-3307-6 CER-3307-7 CER-3307-8	Skill for preparation of fire clay bricks, insulation, 2inch cube, sagars and crucibles
	CO2	CER-3307-1 CER-3307-2 CER-3307-7 CER-3307-9 CER-3307-10	Perform the experiment with the brick mould, wooden cylindrical drum, specific gravity bottle and pycnometer bottle devices
	CO3	CER-3307-9 CER-3307-11	Analysis of experiments results of determination of porosity, apparent density, specific gravity, compressive strength
	CO4	CER-3307-11	Analyses the experimental results to drawn inferences to make recommendations

CO-PO

Course Code :CER-3307		Course Title : REFRACTORIS LAB		No.Of.Periods:60	
Pg.No	Mapped with Co No	Co Periods addressing Po In Co/1		Level (1,2,3)	Remarks
		No	%		
PO1	CO10	4	7	1	>40% Level 3 High addressed 25% to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <% Not addressed
PO2	CO6,CO8,CO11	14	24	3	
PO3	CO3,CO4,CO5	15	25	2	
PO4	CO1,CO2,CO7,CO8,	27	44	2	
PO5					
PO6					
PO7					

List of Experiments:

1. Prepare a different shape of fire clay bricks with given refractory mixture
 - 1.1 Raw materials are mix with required amount of water
 - 1.2 Mix it well and soak for plasticity get it
 - 1.3 Soaking mixture form the shape
 - 1.4 Dried the ware
 - 1.5 Check dimensional accuracy

2. Prepare a fire clay bricks with the given composition.
 - 2.1 Selected based on type of body condition and working condition and type of application area
 - 2.2 Beneficiation techniques followed
 - 2.3 Finally study dimensions other related
3. Prepare a cellular /Insulation brick with vermiculite.
 - 3.1 Cellularity creating method by using different raw materials
 - 3.2 Selected materials mixing and forming shape
 - 3.3 Dried and understand characters of outcome product
4. Prepare a cellular /Insulation brick with rice husk.
 - 4.1 Cellularity creating method by using different raw materials
 - 4.2 Selected materials mixing and forming shape
 - 4.3 Dried and understand characters of outcome product
5. Prepare a cellular /Insulation brick with mica powder.
 - 5.1 Cellularity creating method by using different raw materials
 - 5.2 Selected materials mixing and forming shape
 - 5.3 Dried and understand characters of outcome product
6. Preparation of 2” cubes with $\frac{3}{4}$ ” x $\frac{3}{4}$ ”x $\frac{3}{4}$ ” opening at the Top center for Slag Attack Test.
 - 6.1 Raw materials mix as per standard procedure
 - 6.2 Aging and shaping with tolerable dimensions
7. Prepare a sager.
 - 7.1 With suitable composition mixture is prepared
 - 7.2 By using wooden drum shape is formed
 - 7.3 Handle with care should needed
 - 7.4 Hence utmost followed producer has begin
 - 7.5 End product obtain by drying and firing techniques
8. Prepare a crucible.
 - 8.1 Mixture molding is done
 - 8.2 Molding should manage cavity size and depth of cavity
 - 8.3 Body should either it is suitable frit or glass melt
9. Determination of Porosity, Apparent Density, Specific Gravity of the given Refractory bricks.
 - 9.1 Fired product received and followed the test one by one

- 9.2 Result are analyze with standard one
- 10. Compare the specific gravity with lump and powder state.
 - 10.1 Refractory material show their density
 - 10.2 Under different condition material density calculate.
- 11. Finding C.C.S. of Refractory bricks.
 - 11.1 Compressive strength show ability bearing of load the material
 - 11.2 First calculate the area
 - 11.3 Hydraulic machine apply load
 - 11.4 Load and area substitute in the formula
 - 11.5 The results are understand in different units like C.G.S./M.K.S/S.I

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING
ANDHRA PRADESH
DIPLOMA IN CERAMIC TECHNOLOGY
3 ½ YEAR SANDWICH COURSE
(MPEC SYSTEM)**

FOURTH SEMESTER

Subject Code	Name of the Subject	Instruction Periods/Week		Total Periods/ Semester	Scheme of Examination				
		Theory	Practical		Duration	Sessional	End Exam	Total	Credits
				(Hrs)	Marks	Marks	Marks		
THEORY SUBJECTS									
CER-4116	Engineering Mathematics-IV	3	--	45	3	20	80	100	3
CER-4210	Ceramic Calculations	5	--	75	3	20	80	100	5
CER-4308	Glass Engineering - II	4	--	60	3	20	80	100	4
CER-4309	White Ware & Heavy Ware-II	5	--	75	3	20	80	100	5
CER-4310	Refractories-II	4	--	60	3	20	80	100	4
CER-4311	Cement Technology	4	--	60	3	20	80	100	4
PRACTICAL SUBJECTS									
CER-4211	Life Skills lab practice	--	3	45	3	40	60	100	1.5
CER-4312	Cement Technology Lab	--	4	60	3	40	60	100	2
CER-4313	Glass Engineering – II Lab	--	5	75	3	40	60	100	2.5
CER-4314	White Ware & Heavy Clay Ware-II Lab	--	5	75	3	40	60	100	2.5
	TOTAL	25	17	630	-	280	720	1000	33.5

ENGINEERING MATHEMATICS-III

Course Code	Course Title	No. of Periods/week	Total No. of periods	Marks for FA	Marks for SA
M-401	Engineering Mathematics-III	3	45	20	80

S.No.	Unit Title	No. of periods	COs mapped
1	Higher order Linear Differential equations with constant coefficients	15	CO1
2	Laplace Transforms	18	CO2
3	Fourier Series	12	CO3
Total Periods		45	

Course Objectives	<ul style="list-style-type: none"> (i) To learn the principles of solving differential equations of second and higher order. (ii) To comprehend the concept of Laplace transformations and inverse Laplace transformations. (iii) To understand the concept of Fourier Series expansion of functions.
--------------------------	--

Course Outcomes	CO1	Solve homogeneous and non-homogeneous differential equations of second and higher order.
	CO2	Find Laplace and inverse Laplace transforms of various functions.
	CO3	Expand given functions as Fourier series and half- range Fourier Sine and Cosine series.

ENGINEERING MATHEMATICS – IV

Learning Outcomes

Unit-I

Differential Equations of higher order

C.O. 1 Solve homogeneous and non-homogeneous differential equation of second and higher order.

L.O 1.1 Solve Differential equations of the type $(aD^2 + bD + c)y = 0$ where a, b, c are real numbers and provide examples.

1.2 Solve higher order homogeneous differential equations with constant coefficients and provide examples.

1.3 Define complementary function, particular Integral and general solution of a non-homogeneous differential equation.

1.4 Describe the methods of solving $f(D)y = X$ where $f(D)$ is a polynomial of n^{th} order and X is a function of the forms $k, e^{ax}, \sin ax, \cos ax, x, x^n$ and their linear combinations where n is a positive integer, with examples.

Unit-II

Laplace Transforms

C.O. 2 Find Laplace and inverse Laplace transforms of various functions.

L.O. 2.1 Define Laplace Transform and explain the sufficient conditions of existence of Laplace Transform

2.2. Obtain Laplace transforms of standard functions and solve simple problems.

2.3 Write the properties of Laplace Transform – Linearity property, First shifting theorem (without proof) and Change of Scale property and solve simple problems.

2.4. Write the Laplace Transform of unit step function and second shifting theorem (without proof) and solve simple problems.

2.5. Write formulae for Laplace transform of functions with multiplication by t^n and division by t, Laplace transform of derivatives, evaluation of some definite integrals using Laplace Transforms and solve simple problems.

Syllabus for Unit test-I completed

2.6 Define inverse Laplace Transform, obtain inverse Laplace Transforms of standard functions and solve simple problems.

2.7 Write linearity property, first and second shifting theorems (without proof), change of scale property of inverse Laplace transform and solve simple problems.

2.8 Write inverse Laplace transforms of derivatives and integrals and solve simple problems.

2.9 Write inverse Laplace transforms of functions with multiplication by s and division by s and solve simple problems.

2.10 Write inverse Laplace transforms of functions using partial fractions and solve some simple problems.

2.10 Define convolution of two functions, state convolution theorem (without proof) and solve simple problems.

Unit-III

Fourier series

C.O. 3 Expand given functions as Fourier series and half- range Fourier Sine and Cosine series

L.O. 3.1 Define the orthogonality of functions in an interval.

3.2 Define Fourier series of a function in the intervals $(c, c + 2\pi)$ and $(c, c + 2l)$ and write the Euler's formulae for determining the Fourier coefficients.

3.3 Write sufficient conditions for the existence of Fourier series expansion of a function.

3.4 Find Fourier series of simple functions in the range $(0, 2\pi)$ and $(-\pi, \pi)$

3.5 Write Fourier series for even and odd functions in the interval $(-\pi, \pi)$ and $(-l, l)$ expand simple functions.

3.6 Write Fourier series expansion of a function over the interval $(0, 2l)$ and $(-l, l)$ and expand simple functions.

3.7 Write half-range Fourier sine and cosine series of a function over the interval $(0, \pi)$ and $(0, l)$ and expand simple functions.

Syllabus for Unit test-II completed

Engineering Mathematics – IV

CO/PO - Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	1				2	3	2
CO2	3	3	3	3				3	3	3
CO3	3	3	3	3				3	3	3
Avg	3	2.66	2.33	2.33				2.66	3	2.66

3 = Strongly mapped (High), 2 = Moderately mapped (Medium), 1 = Slightly mapped (Low)

Note:

PO5: Appropriate quiz programme may be conducted at intervals and duration as decided by concerned teacher.

PO6: Seminars on applications of mathematics in various engineering disciplines are to be planned and conducted.

PO7: Such activities are to be planned that students visit library to refer standard books on Mathematics and latest updates in reputed national and international journals, attending seminars, learning mathematical software tools.

PSO1: An ability to understand the concepts of basic mathematical concepts and to apply them in various areas like computer programming, civil constructions, fluid dynamics, electrical and electronic systems and all concerned engineering disciplines.

PSO2: An ability to solve the Engineering problems using latest software tool, along with analytical skills to arrive at faster and appropriate solutions.

PSO3: Wisdom of social and environmental awareness along with ethical responsibility to have a successful career as an engineer and to sustain passion and zeal for real world technological applications.

Engineering Mathematics – IV

PO- CO – Mapping strength

PO no	Mapped with CO no	CO periods addressing PO in column I		Level (1,2 or 3)	Remarks
		No	%		
1	CO1, CO2, CO3	45	100%	3	>40% Level 3 Highly addressed
2	CO1, CO2, CO3	37	82.2%	3	
3	CO1, CO2, CO3	32	71.1%	3	
4	CO1, CO2, CO3	32	71.1%	3	
5					25% to 40% Level 2 Moderately addressed
6					
7					
PSO 1	CO1, CO2, CO3	37	82.2%	3	5% to 25% Level 1 Low addressed
PSO 2	CO1, CO2, CO3	45	100%	3	
PSO 3	CO1, CO2, CO3	36	80%	3	
					<5% Not addressed

ENGINEERING MATHEMATICS – IV

(Common Course)

Course Content

Unit I: Differential Equations of higher order

1. Solve Homogenous linear differential equations with constant coefficients of order two and higher with emphasis on second order.
2. Solve Non-homogenous linear differential equations with constant coefficients of the form $f(D)y = X$ where X is in the form $k(\text{constant})$, e^{ax} , $\sin ax$, $\cos ax$, x^n , where n is a positive integer, finding complimentary function, particular integral and general solution.

Unit II: Laplace Transforms

3. Definition, sufficient conditions for existence of LT, LT of elementary functions, linearity property, state first shifting theorem, change of scale property, multiplication by t^n , division by t , LT of derivatives and integrals, LT of unit step function, state second shifting theorem, inverse Laplace transforms- state shifting theorems and change of scale property, multiplication by s^n and division by s , derivatives, integrals, examples of inverse LT using partial fractions, state convolution theorem with simple examples.

Unit III: Fourier series

4. Orthogonality of trigonometric functions, Representation of a function in Fourier series over the interval $(c, c + 2\pi)$ and $(c, c + 2l)$, Euler's formulae, sufficient conditions for existence of Fourier series expansion of a function, Fourier series expansion of basic functions limited to $k(\text{constant})$, x , x^2 , $\sin ax$, $\cos ax$, e^{ax} and their combinations over the intervals $(0, 2\pi)$, $(-\pi, \pi)$, $(0, 2l)$, $(-l, l)$, Fourier series for even and odd functions over $(-\pi, \pi)$ and $(-l, l)$, Fourier half-range sine and cosine series over $(0, \pi)$ and $(0, l)$

Textbook:

Engineering Mathematics-I, a textbook for first year diploma courses, prepared & prescribed by SBTET, AP.

Reference Books:

1. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers
2. M.R. Spiegel, Schaum's Outline of Laplace Transforms, Schaums' Series

3. M.Vygodsky, Mathematical Handbook: Higher Mathematics, Mir Publishers, Moscow.

Blue print

S. No	Chapter/ Unit title	No of Periods	Weightage allotted	Marks wise distribution of weightage				Question wise distribution of weightage				COs mapped
				R	U	Ap	An	R	U	Ap	An	
1	Unit – I Higher order Linear Differential equations with constant coefficients	15	28	11	11	3	3	2	2	1	1	CO1
2	Unit - II Laplace Transforms	18	33	11	11	11	0	2	2	2	0	CO2
3	Unit - III Fourier Series	12	19	3	3	3	10	1	1	1	1	CO3
Total		45	80	25	25	17	13	5	5	4	2	

R: Remembering Type : 25 Marks

U: understanding Type : 25 Marks

Ap: Application Type : 17 Marks

An: Analysing Type : 13 Marks

C-20

Engineering Mathematics – IV

Unit Test Syllabus

Unit Test	Learning Outcomes to be Covered
Unit Test-I	From LO 1.1 to 2.5
Unit Test-II	From LO 2.6 to 3.7

Unit Test I

State Board of Technical Education and Training, A. P

First Year

Course name: **Engineering Mathematics-IV**

Sub Code: **CER-4116**

Time : 90 minutes

Max.marks:40

Part-A

16Marks

Instructions: (1) Answer all questions.

(2) First question carries four marks and the remaining questions carry three marks each

1. Answer the following:

a. Write the auxiliary equation for given differential equation $(D^2 + 4)y = 0$ (CO1)

b. For given differential equation $f(D)y = 0$, if roots of auxiliary equation are 1,-1, then $y =$ _____ (CO1)

c. $L\{e^{3t}\} =$ _____ (CO2)

d. $L\{f(t)\} = \bar{f}(s)$ then $L\{e^{at} f(t)\} = \bar{f}(s+a)$: State TRUE/FALSE (CO2)

2. Solve $(D^2 - 2D + 1)y = 0$. (CO1)

3. Find the particular integral of $(D^2 + D + 4)y = e^x$ (CO1)

4. Evaluate $L\{(t-1)^2\}$ (CO2)

5. Evaluate $L\{t^2 + 2\cos t + 3\sin t\}$ (CO2)

Part-B

3×8=24

Instructions: (1) Answer **all** questions.

(2) Each question carries **eight** marks

(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. A) Solve $(D^4 - 5D^2 + 4)y = 0$. (CO1)

or

B) Solve $(D^2 + D - 6)y = 1 + e^{-3x}$. (CO1)

7. A) Solve $(D^2 + 3D + 2)y = x^2 + \sin x$. (CO1)

or

B) Solve $(D^2 - D)y = 2e^x + 3\cos x$. (CO1)

8. A) Evaluate $L\{e^{3t} \cos^2 t\}$ (CO2)

or

B) Evaluate $L\{e^t (t+1)^2\}$ (CO2)

Unit Test II

State Board of Technical Education and Training, A. P

Part-A**16Marks****Instructions:** (1) Answer **all** questions.(2) First question carries **four** marks and the remaining questions carry **three** marks each

1. Answer the following:

a. $L\{f(t)\} = \bar{f}(s)$ then $L\{tf(t)\} = -\frac{d}{ds}(\bar{f}(s))$: State TRUE/FALSE (CO2)

b. $L^{-1}\left\{\frac{1}{s-3}\right\} = ?$ (CO2)

c. $L^{-1}\left\{\frac{1}{s^2+a^2}\right\} = ?$ (CO2)

d. Write the Fourier series for the function $f(x)$ in the interval $c < x < c + 2\pi$. (CO3)2. Evaluate $L\{te^t\}$. (CO2)3. Evaluate $\int_0^{\infty} e^{-3t} \sin 4t dt$. (CO2)4. Evaluate $L^{-1}\left\{\frac{3}{s+4} + \frac{2}{s^2+16} - \frac{s}{s^2-4}\right\}$. (CO2)5. Evaluate Fourier coefficient a_0 for $f(x)$ in the interval $(-\pi, \pi)$. (CO3)**Part-B****3×8=24****Instructions:** (1) Answer **all** questions.

(2) Each question carries eight marks

(3) Answer should be comprehensive and the criterion for valuation

is the content but not the length of the answer.

6. A) Evaluate $L\{te^{-t} \cos t\}$. (CO2)

or

B) Evaluate $L \left\{ \frac{\cos at - \cos bt}{t} \right\}$. (CO2)

7. A) Evaluate $L^{-1} \left\{ \frac{s}{(s+1)(s^2+1)} \right\}$. (CO2)

or

B) Evaluate $L^{-1} \left\{ \frac{s}{(s-1)^4} \right\}$. (CO2)

8. A) Obtain the Fourier series for the function $f(x) = e^x$ in the interval $(0, 2\pi)$. (CO3)

or

B) Obtain the half range Fourier cosine series of $f(x) = x^2$ in $(0,1)$. (CO3)

-o0o-

END EXAM MODEL PAPER

STATE BOARD OF TECHNICAL EDUCATION, A.P

ENGINEERING MATHEMATICS –CER-4116

TIME : 3 HOURS

MODEL PAPER- I

MAX.MARKS : 80M

PART-A

Answer All questions. Each question carries THREE marks.

10x3=30M

1. Solve $(D^2 - 3D + 2)y = 0$. **CO 1**
2. Solve $(D^2 + D + 1)y = 0$. **CO 1**
3. Find the particular integral of differential equation $(D^2 + 4)y = \sin 2x$. **CO 1**
4. Find the particular integral of differential equation $(D^2 + 3D + 2)y = e^{3x}$. **CO 1**
5. Find $L\{2e^{3t} + \sin 3t + \cosh t\}$. **CO2**
6. Find $L\{e^t \cos 4t\}$. **CO2**
7. Find $L^{-1}\left\{\frac{1}{s^2} + \frac{4}{s^2 + 4} + \frac{3s}{s^2 - 9}\right\}$. **CO2**
8. Find the value of a_0 in the Fourier expansion of $f(x) = e^x$ in the interval $(0, 2\pi)$. **CO3**
9. Find the Fourier coefficients of $f(x)$ in the interval $(-\pi, \pi)$. **CO3**
10. Find the value of a_1 in the half range cosine series of $f(x) = k$ in the interval $(0, \pi)$. **CO3**

PART-B

Answer All questions. Each question carries EIGHT marks. 5x8=40M

11. A) Solve $(D^3 - 6D^2 + 11D - 6)y = 0$. **CO 1**

Or

B) Solve $(D^2 - 9)y = e^{3x} + e^{-3x}$. **CO 1**

12. A) Solve $(D^2 - 4D + 4)y = \sin 3x$. **CO1**

Or

B) Solve $(D^2 + 2D + 2)y = x^2 + x + 1$. **CO1**

13. A) Evaluate $L\{te^t \cos t\}$. **CO2**

Or

B) Evaluate $L\{t^2 \cos 2t\}$. **CO2**

14. A) Evaluate $L\left\{\frac{\sin 5t \sin t}{t}\right\}$. **CO2**

Or

B) Evaluate $\int_0^{\infty} \frac{\sin t}{t} dt$. **CO2**

15. A) Find $L^{-1}\left\{\frac{1}{s(s+1)(s+2)}\right\}$. **CO2**

Or

B) Using convolution theorem find $L^{-1}\left\{\frac{s}{(s^2+1)(s^2+4)}\right\}$. **CO2**

PART-C

Answer the following question. Question carries TEN marks. $1 \times 10 = 10M$

16. Find the Fourier expansion of $f(x) = x + x^2$ in the interval $(-\pi, \pi)$ and hence deduce that

$$\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots = \frac{\pi^2}{12}.$$

CO3

STATE BOARD OF TECHNICAL EDUCATION, A.P

ENGINEERING MATHEMATICS – CER-4116

TIME : 3 HOURS

MODEL PAPER- 2

MAX.MARKS : 80M

PART-A

Answer All questions. Each question carries THREE marks. 10x3=30M

1. Solve $(D^2 + 4D + 4)y = 0$. CO 1

2. Solve $(D^2 + 9)y = 0$. CO 1

3. Find the particular integral of differential equation $(D^2 - 4D + 3)y = e^{4x}$. CO 1

4. Find the particular integral of differential equation $(D^2 - 4D - 5)y = \cos 2x$. CO 1

5. Find $L\{2 - e^{-2t} + \sinh 6t\}$. CO2

6. Find $L\{e^{-2t}t^2\}$. CO2

7. Find $L^{-1}\left\{\frac{1}{s^2} + \frac{4}{s^2 + 4} + \frac{3s}{s^2 - 9}\right\}$. CO2

8. Find the value of a_0 in the Fourier expansion of $f(x) = x + x^2$

in the interval $(-1,1)$.

CO3

9. Write Euler's formula of Fourier expansion of $f(x)$ in the interval $(c, c + 2\pi)$. CO3

10. Find the value of a_1 in the half range cosine series of $f(x) = \pi$ in the interval

$(0, \pi)$.

CO3

PART-B

Answer All questions. Each question carries EIGHT marks. 5x8=40M

11. A) Solve $(D^3 + 1)y = 0$. CO 1

Or

B) Solve $(D^2 + D - 6)y = e^{3x} + e^{-3x}$. CO 1

12. A) Solve $(D^2 - 3D + 2)y = \cos 3x$. CO1

Or

B) Solve $(D^2 + 2D + 1)y = 2x + x^2$. **CO1**

13.A) Evaluate $L\{e^{3t} \cos^2 t\}$. **CO2**

Or

B) Evaluate $L\{t^2 \cos 2t\}$. **CO2**

14.A) Evaluate $L\left\{\frac{e^{-at} - e^{-bt}}{t}\right\}$. **CO2**

Or

B) Using Laplace transforms evaluate $\int_0^{\infty} \cos 3t dt$. **CO2**

15.A) Find $L^{-1}\left\{\log\left(\frac{s^2 + 1}{(s-1)^2}\right)\right\}$. **CO2**

Or

B) Using convolution theorem find $L^{-1}\left\{\frac{1}{(s^2 + 1)(s+1)}\right\}$. **CO2**

PART-C

Answer the following question. Question carries TEN marks. 1x10=10M

16. Find the Fourier expansion of $f(x) = (\pi - x)^2$ in the interval $0 < x < 2\pi$ and hence deduce

that $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \dots = \frac{\pi^2}{6}$.

CO3

CERAMIC CALCULATIONS

SUBJECT TITLE : CERAMIC CALCULATIONS.

SUBJECT CODE : CER- 4210

PERIODS/ WEEK : 05

PERIODS / SEMESTER : 75

TIME SCHEDULE

S.No	Major Topics	Periods	Weightage of Marks	Short Answer questions (3M)	Essay type Questions (8M)	Essay Type Questions (10M)
1	Dimensional Changes	06	14	02	01	
2	Density and specific Gravity	06	03	01	-	

3	Porous Solids	08	03	01	-	
4	Suspension	08	11	01	01	
5	Triaxial Diagram	02	03	01	-	
6	Body Calculations	08	03	01	-	
7	Introduction to Glaze Calculations	19	21	01	01	01
8	Fritted Glazes	10	08	-	01	
9	Miscellaneous Glaze Calculations	04	03	01	-	
10	Ultimate and proximate Analysis	06	03	01	-	
11	Introduction to Glass calculation	08	08	-	01	
	Total	75	80	10	05	01

Course Objective and Course Outcome

Courses Objectives	Upon Completion of the Courses the student be able to understand (i) Perform Premix operation with Dimensional while making ceramic product and along with different .The fired properties should observed		
Courses Contents	Upon Completion of the Courses the student be able to		
	CO1	CER-4210-1 CER-4210-2 CER-4210-3	Solve the problems related to Dimensional changes while making Ceramic product and firing Properties.
	CO2	CER-4210-4 CER-4210-5	Find properties of Slip and composition in triaxial diagram
	CO3	CER-4210-6 CER-4210-7 CER-4210-8	Calculatethe conversion of body composition, chemical composition and calculate formula of body.
	CO4	CER-4210-9	Practice problems related to Substitution in the Body and glaze Composition.
	CO5	CER-4210-10 CER-4210-11	Solve problems related to Body Composition. And glass batch composition.

PO-CO Mapping

Course Code : CER-4210		Course Title :Ceramic Calculation		No. of. Periods:75	
Pg. No	Mapped with Co No	Co Periods addressing Po In Co/1		Level (1,2,3)	Remarks
		No	%		
Po1	CO1.CO2,CO3,C04,CO5	20	27	2	>40% Level 3 High addressed 25% to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <% Not addressed
Po2	CO1,CO2,CO4	42	56	3	
PO3	CO1,CO2,CO4,CO5	13	17	1	
PO4					
PO5					
PO6					
PO7					

Blue Print of the question Paper

S.No	Chapter Name	Period Allocated	Weighted Allocated	Marks Wise Distribution of weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	AP	AN	R	U	AP	AN	
1	Dimensional Changes	06	14	03	03	08	-	01	01	01	-	CO3,CO6
2	Density and specific Gravity	06	03	-	-	-	03	-	-	-	01	CO1
3	Porous Solids	08	03	-	03	-	-	-	01	-	-	CO1,CO2
4	Suspension	08	11	-	03	-	08	-	01	-	01	CO6
5	Triaxial Diagram	02	03	-	03	-	-	-	01	-	-	CO2
6	Body Calculations	08	03	-	-	03	-	-	-	01	-	CO5,CO1
7	Introduction to Glaze Calculations	19	21	03	-	08	10	01	-	01	01	CO3
8	Fritted Glazes	10	08	-	-	08	-	-	-	01	-	CO3,CO2
9	Miscellaneous Glaze Calculations	04	03	03	-	-	-	01	-	-	-	CO6,CO1
10	Ultimate and proximate Analysis	06	03	03	-	-	-	01	--	-	-	CO3,CO4
11	Introduction to Glass calculation	08	08	-	-	-	08	-	-	-	01	CO2,CO3
	TOTAL	75	80	12	12	27	29	04	04	04	04	

R-Remember u-understand Ap- Application An- Analyzing

OBJECTIVES: *On completion of the subject the student should be able to understand and solve the problems to related topics:-*

1.0 DIMENSIONAL CHANGES

- 1.1 Calculate the Drying Shrinkage and firing shrinkage of ceramic bodies and the Loss on Ignition
- 1.2 Calculate the Relationship between percentage Moisture content (Dry Basis) and Volume Shrinkage.

2.0 DENSITY AND SPECIFIC GRAVITY

- 2.1 Define Density and specific gravity.
- 2.2 Comparison of Densities of different raw materials.
- 2.3 Calculate the Specific Gravity/Relative Density of different Raw materials.
- 2.4 Describe in detail of Archimedes Principle and related problems.

3.0 POROUS SOLIDS:

- 3.1 Define the term Porosity.
- 3.2 Effect of Porosity on the Function of Ceramic Materials.
- 3.3 Calculate the
 - A) Apparent Density and True density of porous solids.
 - B) Apparent Porosity and True Porosity of porous solids.
 - C) Water Absorption of porous bodies.
 - D) Sealed Pores.

4.0 SUSPENSIONS:

- 4.1 Find out the Density of slip.
- 4.2 Solve the calculations relating mixtures of solid particles and water.
- 4.3 Dilution Formula and Solve the Dilution Problems.

4.4 Brongniart's formula and Solve the related Problems.

4.5 "Standard" Slopeck calculation.

5.0 TRIAXIAL DIAGRAM:

5.1 Draw the Triaxial diagram.

5.2 Explain Plotting of Triaxial diagram.

5.3 Point the different Proportions of materials or ceramic products.

6.0 BODY CALCULATIONS:

6.1 . Dry and wet measurements of materials for body mixing.

6.2 . Effect of Specific Gravity of body slip and Density of body slip.

6.3 Substitution to the Wet Recipe.

7.0 INTRODUCTION TO GLAZE CALCULATIONS:

7.1 Calculate the Molecular weight of oxides, Raw materials and Minerals used in Ceramics and Formula

7.2 Mention uses of the percentage Composition and Formula.

7.3 Calculate the

A) Percentage composition from the given formula.

B) The recipe from the given Glaze Formula.

C) The Glaze formula from the given glaze recipe.

D) The recipe from the given percentage composition of glaze.

F) The percentage composition from the given Glaze recipe.

8.0 FRITTED GLAZES:

8.1 Define the term Frit.

8.2 Describe the Reasons for Fritting.

8.3 Know the Frit Rules.

8.4 Calculate the

A) Fritting Factors

B) The Recipe from the given Formula.

C) Calculate the Formula for a Fritted glaze from the given recipe.

D) Calculate the Percentage composition of the Mill Batch from the given Recipe.

9.0 MISCELLANEOUS GLAZE CALCULATIONS:

9.1 Know the Substitutions.

9.2 Calculate the glaze formula when the components of the glaze are quoted in term of Percentage composition.

10.0 ULTIMATE AND PROXIMATE ANALYSIS:

10.1 Definitions of Ultimate and Proximate and Rational Analysis.

10.2 Calculate the Rational Analysis of clay by the method of Feldspar Convention.

10.3 Calculate the Rational Analysis of clay by the method of Mica Convention.

10.4 Substitution of clays in Body Recipes.

11.0 INTRODUCTION TO GLASS CALCULATIONS

11.1 Calculate the

A) Batch composition from the given molecular formula.

B) Molecular formula from the given Batch compositions.

C) Molecular formula from the given chemical composition.

D) Chemical composition from the given Molecular formula.

C) Batch composition from the given chemical composition.

D) Chemical composition from the given batch composition.

11.2 Calculate the problems related to introducing cullet in batch composition.

COURSE CONTENT:

1.0 DIMENSIONAL CHANGES: Shrinkage (Wet to Dry)- Shrinkage (Dry to Fired)- Volume shrinkage- Moisture contents- LOI and related Problems.

2.0 DENSITY AND SP.GRAVITY: Archimedes Principle- Calculations applicable to ideal solids and Liquids and related problems.

3.0 POROUS SOLIDS: Effect of Porosity on the function of Ceramic materials- Pore structure

Density- Apparent and True density- Apparent Solid Density-Porosity- Apparent Porosity- Water Absorption- True Porosity and related Problems.

4.0 SUSPENSIONS: Density of slips- calculations relating mixtures of solid particles and water- dilution problems- Brongniart's formula- "Standard" Slopeck and related problems.

5.0 TRIAXIAL DIAGRAM: Plotting Triaxial diagram and the point the different proportions of materials/ceramic products.

6.0 BODY CALCULATIONS: Dry and wet measurements of materials for body mixing- Wet inches- effect of sp.gr.- density of the body slips- dimensions of the mixing ark- adjustments to the wet recipe and related Problems.

7.0 INTRODUCTION TO GLAZE CALCULATIONS: Molecular weights- formula and uses

of chemical equations- oxides- Percentage composition and formula- Calculation of a recipe

from simple glaze formula- given the recipe of a glaze calculate the formula and related

problems.

8.0 FRITTED GLAZES: Given the formulacalculate a Recipe- fritting factor- given the recipe

calculate a formula- and given the recipe calculate the percentage composition of the Mill batch

and related problems.

9.0 MISCELLANEOUS GLAZE CALCULATION: Substitution Problems- to calculate a glaze formula when the percentage composition is given and related problems.

10.0 ULTIMATE AND PROXIMATE ANALYSIS: Ultimate and Proximate analysis of clays-

ultimate analysis and percentage composition-Calculation of rational analysis of clays by

feldspar- Mica conventions- substitution of clays in body recipes and related problems.

11.0 INTRODUCTION TO GLASS CALCULATIONS: Determination of molecular formula of glass from chemical composition of the glass-and from the batch composition- Determination of batch from molecular formula of glass- Determination of batch produces a glass from the given chemical composition.

REFERENCE BOOKS:

1. A I Andrews, Ceramic Tests and Calculations, John Wiley and Sons, Inc., New York, 1928
2. R Griffith, Calculations in ceramics, Livesey Ltd., St. John's Hill, Shrewsbury, England, 1965
3. R Charan, Hand book of Glass Technology.

Unit Test Syllabus

Year/ Semester	Unit Test	Syllabus
Fourth semester	Unit Test-I	1. Dimensional changes 2. Density & Specific Gravity 3. Porous Solids 4. Suspensions 5. Triaxial Diagram
	Unit Test-II	6. Body Calculations 7. Introduction to Glaze Calculations 8. Fritted Glazes 9. Miscellaneous Glaze Calculation 10. Ultimate & Proximate Analysis 11. Introduction to Glass Calculations

State Board of Technical Education and Training

Andhra Pradesh::Vijayawada

Govt. Institute of Ceramic Technology (Autonomous)

Gudur, SPSR Nellore-524101

C-20, Model paper

IV Semester – Unit -I

Subject Name: Ceramic Calculation

Course Code: CER-4210

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Fill in the blanks

- I. Drying of clay ware physical held water is removed.....(True/False)
- II. % volume shrinkage =.....x % linear shrinkage
- III. Formula of Talc is
- IV. At critical Moisture content shrinkage is completed.....(True/False)

2. A sample of china clay 12.61gm dried at 110⁰C to a constant weight of 10.84 gm. What it's moisture content?
3. If 200cc of slip weighs 298gm. Find out the density of slip?
4. A sample of Quartz density 2.62gm/cc. find out the specific gravity of the Quartz?
5. 300cc of slip weighs 460gm. The solid component is flint (Sp.Gr2.50) calculate the dry content in the slip?

PART- B

Marks: 3 x 8=

24

Answer all questions. Each question carries eight marks.

6. A). Test piece of bone china body has a marked length of 5.0cm in the plastic stage, after drying the distance between the mark is 4.80cm and after firing 4.35cm. Calculate the % drying shrinkage, % firing shrinkage and % total shrinkage?
(OR)
B). The require diameter of the finished product 9 inches. If the firing contraction is 4.62% and drying contraction 3.15% calculate (a). The diameter after drying
(b). the original mould diameter
(c). the % total contraction.
7. A). 5.0gm of plastic clay after drying at 110⁰C weighs 4.216gm. When fired at 1100⁰C the weight become 3.927gm. Calculate (A). % Moisture content (B). % LOI.
(Or)
B). In the laboratory the suspension using 20gm of dry clay (Sp.Gr 2.62) and 30cc of water. What is density of slip(gm/cc), Specific Gravity of slip and pint weight.
8. A). Porous test piece having the dry weight 14.62gm, Soaked weight 16.25gm and immersion weight 8.37gm. Calculate % apparent porosity and % water absorption?
(Or)
B). Test piece weighs 84.1gm at air and 47.3gm in immersed in water with the % apparent porosity is 23.6%. Calculated the bulk density?

State Board of Technical Education and Training

Andhra Pradesh::Vijayawada

Govt. Institute of Ceramic Technology (Autonomous)

Gudur, SPSR Nellore-524101

C-20,Model paper

IV Semester – Unit -II

Subject Name: Ceramic Calculation

Course Code: CER-4210

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

formula



(Or)

B). Calculate the weight of glass produced from the following batch composition

Sand-100 parts

Soda ash-30 parts

Lime stone -12 parts

Borax-28 parts

Scheme:C-20

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY

GUDUR – 524101: SRI POTTI SREERAMULU NELLORE DISTRICT, A.P

Autonomous Institute Vide G.O.Ms.No. 214/ Edn, (TE – I Dept.) 05-10-1996

III Semester Examination (MPEC) for 3 ½ Year Diploma in Ceramic Technology

COURSE CODE: CER -4210 COURSE NAME: CERAMIC CALCULATION

TIME: 3 HOUR

Max.Marks: 80

PART – A

3 x 10 = 30 Marks

Note : 1. Answer all questions and each question carry THREE marks.

2. Answer should be brief and straight to the point and shall not

exceed FIVE simple sentences.

1. The diameter of a plate in the mould during plate shaping is 9.8 inch. If the drying shrinkage is 6.4 % .what will be the plate diameter after drying?
2. A sample of dried ball clay weight 1.2869gm. After ignition its weight is 1.1682gm. What is the percentage Loss on ignition?
3. A Piece of glass weighs 14.26gm and has a volume of 5.8cc. what is it's Specific Gravity?
4. Differentiate between porosity and water absorption?
5. 200cc of slip weighs 298gm. What is its pint weight?
6. Calculate the percentage dry recipe of the following mix?
500gall of fire clay slip at 24oz/pt.
300gall of flint slip at 30 oz/pt
7. Find out the molecular weight of the Following formula? A)
3Mgo4SiO₂H₂O B) Na₂CO₃
8. Find out the fritting factors of the following Materials?
A)Na₂O2B₂O₃10H₂O B) CaCO₃
9. What is Triaxial Diagram?
10. Define Ultimate and Proximate analysis?

PART – B

5 X 8 = 40 Marks

Note : 1. Answer all questions and each question carry Eight marks.

2.The answer should be comprehensive and the criteria for valuation

is the content but not the length of the answer.

11. A).The die size of the brick is 9.4in x3.8in x2.4in. If the total volume shrinkage is 21.5%. what is
1) The volume 2) The Approximate Length of the Fired Brick

(Or)

B).5.0gm of plastic clay after Drying at 110⁰ C, The weight 4.216gm.When Fired at 1100⁰C. Then weight becomes 3.927gm. Calculate

- 1) The Percentage moisture content 2) The percentage loss-On-Ignition.

12. A) In the laboratory a suspension is made using 20gm of dry clay (Specific Gravity= 2.62) and 30cc of water. What is it's Density (gm /cc), Specific gravity?

- B) Equal weights of water and Powder material of the Specific gravity 2.50 are made into a Slip. What will be its Pint Weight?

13. A).The Analysis of the Glaze is given as follows

PbO-53.24%

CaO-5.72%

Al₂O₃ -5.21%

SiO₂-35.81%

Calculate the molecular formula?

(Or)

B). Calculate the percentage composition of the following compounds, in terms of oxides

- 1) Hydrated Borax - $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$
- 2) Lead bi silicate - $\text{PbO} \cdot 2\text{SiO}_2$
- 3) Feldspar - $\text{K}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2$
- 4) Dolomite - $\text{CaCO}_3 \cdot \text{MgCO}_3$

14. A). Calculate the Molecular formula of the following glass batch

- Sand - 1000
- Soda Ash - 400
- Lime Stone - 100

(Or)

B). Determine the percentage Oxide composition of glass with the given formula



15. A) How many tons of Red Lead are required in the production of 10 tons of Lead bi silicate frit ($\text{PbO} \cdot 2\text{SiO}_2$)?

(Or)

B). A Frit has the following recipe

- Borax - 40
- Flint - 14
- Feldspar - 40
- Whiting - 20
- China Clay - 6

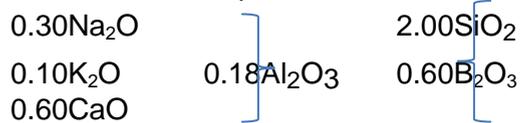
10 tons of this frit are produced each week. How many tons of each raw material must be stocked for 1 year production (50 weeks)?

PART – C

1X 10 = 10

Instructions: Part C consists of One question which carries Ten marks.

16. Calculate the recipe for the frit of the formula



Using Borax, whiting, Feldspar, China Clay and Flint.

-oOo-

GLASS ENGINEERING - II

SUBJECT TITLE : **GLASS ENGINEERING - II**

SUBJECT CODE : **CER - 4308**

PERIODS/ WEEK : **04**

PERIODS / SEMESTER : **60**

TIME SCHEDULE

S. No	Major Topics	Periods	Weight age of marks	No. of Short Answer Questions (3M)	No. of Essay type Questions (8M)	No. of Essay type Questions (10 M)
1	Layout Of Modern Glass Plant	05	8	--	01	
2	Glass Batch House	13	17	03	01	
3	Glass Melting Furnace	12	11	01	01	
4	Glass Fabrication Process	20	38	04	02	01
5	Special Process	10	6	02	--	
TOTAL		60	80	10	08	01

Course Objectives and Course Outcomes

Course Objectives		Upon completion of the course the student shall be able to: Get thorough knowledge on Machinery, equipment used in glass batch house, furnaces used for glass melting, fabrication of glass and the treatments to the final glass	
Course contents		Upon completion of the course the student shall be able to:	
	CO1	CER-4308.1	Draw the layout of modern glass plant
	CO2	CER-4308.2	Acquire knowledge machinery and equipment used in glass batch house
	CO3	CER-4308.3	Classify different furnaces used in glass melting
	CO4	CER-4308.4	Learn the fabrication process of different glass articles
	CO5	CER-4308.5	Find the different value adding processes done on glass

PO-CO Mapping

Course Code: 4308		Course Title: GLASS ENGINEERING-II			No of Periods: 75
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1,CO2,CO3	20	33.33	2	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately Addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO 2	CO2,CO3,CO4,CO5	32	53.33	3	
PO 3					
PO 4					
PO 5					
PO 6					
PO 7	CO4,CO5	8	13.33	1	

3: High, 2: Moderate,1: Low

Blue Print of a Question Paper

S. No	Chapter Name	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Layout Of Modern Glass Plant	05	8		8				1			CO1, CO2,
2	Glass Batch House	13	17	3	3	8	3	1	1	1	1	CO1, CO3
3	Glass Melting Furnace	12	11	3			8	1			1	CO1, CO2, CO4
4	Glass Fabrication Process	20	38	3	17	8	10	1	4	1	1	CO2, CO5
5	Special Process	10	6		3	3			1	1		CO4
TOTAL		60	80	9	31	19	21	3	7	3	3	

R-Remember; U-Understanding; Ap-Application ; An- Analysing

Learning Outcomes

Upon on completion of the course the student shall be able to:

1.0 LAYOUT OF MODERN GLASS PLANT.

- 1.1 Draw a layout and flow diagram of modern Glass plants.
- 1.2 Know the Site selection for modern glass plant.
- 1.3 Know the Infrastructure facilitates.

2.0 GLASS BATCH HOUSE.

- 2.1 Define the term Batch House.
- 2.2 Explain the Shipment and unloading of Raw materials.
- 2.3 Write the Storage and conveying of Raw materials
- 2.4 Explain the Handling, Storage, Crushing and washing of cullet.
- 2.5 Describe the Weighing equipment, Mixers and mixing methods of batch materials.
- 2.6 Know the Handling of batch materials.
- 2.7 Write about Briquetting & Pelletization of glass batch.
- 2.8 List the Batch House equipment and machinery.
- 2.9 Know the Charging of glass batch materials to the furnace

3.0 GLASS MELTING FURNACES:

- 3.1 List the types of Continuous furnaces used for container and sheet glass
- 3.2 Draw a Sketch / diagram of container and sheet glass tank furnace.
- 3.3 Know the working of End fired and cross fired regenerative type tank furnace used in the container glass manufacturing
- 3.4 Know the Thermal efficiency of continuous tank furnace and construction.
- 3.5 Know the Melting area and depth in relation to pull of glass and type of glass.
- 3.6 List the Heat Exchangers
- 3.7 Describe Regenerators and recuperates
- 3.8 Know the operation of Fuel reversing valves
- 3.9 Explain about Electric glass melting furnace

4.0 GLASS FABRICATION PROCESS:

- 4.1 List the types of fabrication process and types moulds used in the glass industry.
- 4.2 Know about the wooden moulds, carbon moulds, cast iron moulds and paste moulds
- 4.3 Define the term flashing and explain different types of flashing of glass.
- 4.4 How to make glass rods, tubes and Flat glass by hand process.

- 4.5 Know the Blow mould, Parison and neckring moulds.
- 4.6 Explain the Semi-automatic process for making containers, chimneys and Jars.
- 4.7 Describe the Operation of blow and blow ,press and blow machine and Drawing process.
- 4.8 Write the Construction of forehearth and Distribution of temperature in forehearth of the furnace.
- 4.9 Explain the Operation of different types of feeders, Gob and Gob sizes and shapes, Dimensions of spout and orifice in relation to size of gob.
- 4.10 Know the Maintenance of glass level related to pull.
- 4.11 Explain in detail operation, control, Principle and efficiency of the following Automatic machines.
 - a. I.S. machine.
 - b. Lynch machine.
 - c. Owens machine.
 - d. 'O'Nills machine for wide & narrow neck bottles.
- 4.12 Write in detail the process, operation and control of the following machines for drawing of sheet.
 - a. Colburn's process
 - b. Pittsberg process
 - c. Fourcault Process.
- 4.13 Describe about the Float glass manufacturing.

5.0 SPECIAL PROCESS.

- 5.1 What is Tempering of glasses.
- 5.2 Know the Chemical process of surface crystallization.
- 5.3 How to produce laminated glass.
- 5.4 List the different types of surface coatings of glass surface and its advantages.
- 5.5 List the application methods of surface coatings like silver coating on glass.
- 5.6 Explain about Cutting, Engraving, Etching, Enameling, Staining, Sand blasting, and Frosting of glass.

- 5.7 Write about polishing, grinding and selection of media for this operation.
- 5.8 Know the Metallization of glass.
- 5.9 Explain the Methods of Glass blowing operation.
- 5.10 List the types of glass used for scientific glass, and its compositions and applications.

COURSE CONTENT:

1. **LAYOUT OF MODERN GLASS PLANT:** Glass manufacture flow diagram- Layout-site selection-infrastructure facilities.

2. **BATCH HOUSE:** Handling of Raw materials- Batch House equipment and machinery- shipping-unload-storage-conveying-weighing equipment- Batch mixing - Working Principles of mixtures- Handling, storage, crushing and washing of cullet -Briquetting and Pelletizing-charging of glass batch into furnace

3. **GLASS MELTING FURNACES:** Types of continuous tank furnaces- Principle- working-construction End port and cross fired regenerative type tank furnace- thermal efficiency- Heat exchangers- Regenerators- recuperates- operation of fuel reversing valves- operation of Electric glass melting furnace

4. **FABRICATION PROCESS:** Types of Fabrication methods of glass ware- types of moluds- wooden mould, carbon mould, cast iron mould and paste mold-Handmade Process- - flashing methods- making of glass rods, tubes and flat glass by hand process-semi automatic process of making containers, chimneys and jars- classification of moulds- feeders and Fore hearth-Gob size and Shape etc.- Spout and Orifice.- blow and blow process- press and blow process-

Machines for Blow ware: Principles of operation and Control of I.S- Lynch-'O'Nills and Ownes machine.

Press machines: General description and operation of automatic Press machine.

Drawing of sheet glass: Handmade- Foucault- Pittsberg-Colburn and float process

5. **SPECIAL PROCESS:** Strengthening: Tempering- Chemical process and surface crystallization- Lamination.

Surface coatings: Different methods of surface coatings con glassware and its uses.

Decoration: Engobing- cutting- Engraving- Etching- Enamel Printing-Sand Blasting etc.

Other operations:Polishing- grinding- Types of grinding media-Metallization of glass.

SCIENTIFIC GLASS: Types of glasses and its composition.

REFERENCE BOOKS:

- 1.R. Charan, Hand Book of Glass Technology,
2. Tooley F V, Hand book of Glass Manufacture Volume I & II, Ogden Publishing Company, New York 36. New York.1960.
3. Chappeman and Hall, Schott Guide to Glass, Chappeman and Hall, London, 1996.
4. Samuel R Scholes, Moderns Glass Practice, industrial publication, Inc., Chicago, 1952.
5. Rudolf Gunther, Glass Melting Tank Furnaces, Society of Glass Technology, Sheffield, 1958.
6. Paul A, Chemistry of Glasses, 2nd edition, Chapman and Hall, New York, 1990.
7. George W. McLellan and E B Shand, Glass Engineering Hand Book, McGraw – Hill book company, New York, 1984.
8. Charles H. Grene, Modern Glass Practice, Cahuers books, Boston, 1975.
9. Alexis G. Pinkas, Meting Furnace Operation in the Glass Industry, Magazines for industry inc., New York, 1980.
- 10.Raw materials in the Glass Industry. Part 1&2 (Minor and Major ingredients) Alexis G.Pincus, David H. Davies, and Books for Industry and the glass industry magazine, 1981.
- 11.Batching in the Glass Industry, Alexis G.Pincus, David H. Davies, and Books for Industry and the glass industry magazine, 1981

Unit Test Syllabus

Year/Semester	Unit Test	Syllabus
	Unit Test-I	1.Layout of Modren glass plant 2.Glass batch house

THIRD SEMESTER		3.Glass melting furnace
	Unit Test- II	4. Glass fabrication process 5.Special process

State Board of Technical Education and Training

Andhra Pradesh::Vijayawada

Govt. Institute of Ceramic Technology (Autonomous)

Gudur, SPSR Nellore Dist

C-20,Model paper

IV Semester - I Unit

Subject Name: Glass Engineering-II
4308

Course Code: CER-

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Fill in the Blanks

- Rejected glass ware is Called _____
- Briquetting of Glass batch reduces fuel Consumption during melting (True or False)
- _____ is used to convey the material in vertical direction
- Electric glass melting Furnace has high thermal efficiency?

2. Sate the infrastructural Facilities required for modern glass plant?

3. What is the importance of mixing? Describe mixers?

4. List any six Batch house Equipments?

5. Define thermal Efficiency? What are the factors that effects the thermalefficiency

PART- B Marks: 3 x 8= 24

Answer allquestions.Each question carries eight marks.

6. (A) Explain in detail about conveyors used in glass Batch house?

(OR)

(B) Draw a layout of modern glass plant? What factors to be considered for Six Selection?

7. (A) Describe the changes used for charging of glass batch?

(OR)

(B) Explain about regeneration and Recuperation?

8. (A) Explain the working of End port continues tank furnaces?

(OR)

(B) Describe about Electric melting furnace?

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur, SPSR Nellore Dist
C-20, Model paper
IV Semester - II Unit

Subject Name: Glass Engineering-II
4308

Course Code: CER-

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Fill in the Blanks

- a) Container Glass are made by Pressing Process (True or False)
- b) _____ is a one of the drawing Process.
- c) Lynch machine is a automatic bottle making process (True or False)
- d) _____ is used as inter layer Laminated Glass

2. Define Flashing? Write types of Flashing Process?

3. What is Fore hearth?

4. State the moulds used in blowing Process?

5. How to apply silver coating on Glass?

PART- B Marks: 3 x 8= 24

Answer all questions. Each question carries eight marks.

6. (A) Describe Blow & Blow process 7 Press and Blow process?

(OR)

(B) Explain the Owen's automatic bottle making machine?

7. (A) Describe I.S Machine?

(OR)

(B) How to make bottle by Semi automatic process?

8. (A) how to manufacture Laminated Glass?

(OR)

(B) write short notes on

1. Enameling
2. Sand Blasting

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY

GUDUR-524101:SRI POTTI SREERAMULU NELLORE DISTRICT, A.P

Autonomous Institution Vide G.O.Ms.No. 214/Edn, (TE-I Dept.) 05-10-1996

IV-Semester Examination (MPEC) for 3½ Year Diploma in Ceramic Technology

COURSE CODE: CER-4308 COURSE NAME: **GLASS ENGINEERING-II**

TIME: 3 Hours

Max Marks: 80

C-20

PART – A

10 X3 = 30

Instructions: *Part A consists of **10** questions. Answer **all** questions and each question carries **three** marks.*

1. Define Batch House?
2. List the Conveyors used in Glass Batch house?
3. What are the advantages of Briquetting of glass batch?
4. Write the uses of Regenerator?
5. How to make flat glass by hand?
6. List the moulds used in glass fabrication process?
7. How to make glass tube by Drawing process?
8. Describe Forehearth?
9. How to do silvering on glass?

10. What is laminated glass?

PART – B

5 X 8 = 40

Instructions: *Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.*

11. (A) Draw a layout of modern plant layout? Write flow diagram of modern glass plants?

(OR)

(B) What factors to be considered for selection of site for modern glass plant ?

12. (A) Explain about crushing and washing of cullet?

(OR)

(B) Write short notes on (i) Pneumatic unloading (ii) Weighing of raw materials

13. (A) Define Thermal efficiency? Draw heat balance diagram of glass melting furnace?

(OR)

(B) Explain about Working of End fired regenerative tank furnace?

14. (A) Write working, principal of Owen's Bottle making machine?

(OR)

(B) Explain about sheet glass making by Floating process?

15. (A) What is flashing? Describe different flashing methods?

(OR)

(B) Explain about Blow & Blow process, Press & Blow process?

PART – C

1X 10 = 10

Instructions: *Part C consists of 1 question which carries 10 marks.*

16. Recommend the bottle making machine which is very widely used for automatic process and why? Describe the principal and working of that machine?

WHITEWARE AND HEAVY CLAYWARE - II

SUBJECT TITLE : WHITEWARE & HEAVY CLAYWARE - II

SUBJECT CODE : CER - 4309

PERIODS/WEEK : 05

PERIODS/SEMESTER : 75

TIME SCHEDULE

S.No	Major Topics	Periods	Weightage of Marks	Short Answer questions (3M)	Essay type Questions (8M)	Essay Type Questions (10M)
1.	Layout of Modern Ceramic Plant	04	03	01	-	-
2.	Porcelain and Special Porcelain ware.	25	24	02	01	01
3.	Sanitary ware	08	11	01	01	-
4.	Earthen ware	12	14	02	01	-
5.	Heavy Clay ware	08	06	02	-	-
6.	Floor and Wall Tiles	10	11	01	01	-
7.	Glazes, Colours and Decoration	08	11	01	01	-
	Total	75	80	10	05	01

Course Objective and Course Outcome

Courses Objectives	Upon Completion of the Courses the student be able to understand the (i) Site selection for Modern Ceramic plant. (ii) Manufacturing process of Earthen ware, Stone ware, Porcelain and Heavy clay ware (iii) Decoration techniques upon the Pottery ware		
Courses Contents	Upon Completion of the Courses the student be able to		
	CO1	CER-4309.1 CER-4309.2	Draw Modern Ceramic plant Layout , learn Manufacturing and uses of Sanitary Ware.
	CO2	CER-4309.3	Get the knowledge on Manufacturing of Earthen Ware.

	CO3	CER-4309.4 CER-4309.5	Study the Fabrication of Earthen Ware and Heavy Clay Ware.
	CO4	CER-4309.6	Explain the Manufacturing of different types of Tiles.
	CO5	CER-4309.7	Find Techniques used for Protection & decoration of the pottery Ware

PO-CO Mapping

Course Code :CER-4309		Course Title :White ware & Heavy Clay ware – II		No. of. Periods:75	
Pg. No	Mapped with Co No	Co Periods addressing Po In Co/1		Level (1,2,3)	Remarks
		No	%		
Po1	CO1,CO2,CO3,CO4,CO5	27	36	2	>40% Level 3 High addressed 25% to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <% Not addressed
Po2	CO1,CO3,CO5	32	43	3	
PO3					
PO4					
PO5					
PO6					
PO7	CO3,CO4,CO5	16	21	1	

Blue Print of the question Paper

S.No	Chapter Name	Period Allocated	Weighted Allocated	Marks Wise Distribution of weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	AP	AN	R	U	AP	AN	
1	Layout of Modern Ceramic Plant	04	03	-	03	-	-	-	01	-	-	
2	Porcelain and Special Porcelain ware.	25	24	03	03	08	10	01	01	01	01	
3	Sanitary ware	08	11	03	-	08	-	01	-	01	-	
4	Earthen ware	12	14	-	03	03	08	-	01	01	01	
5	Heavy Clay ware	08	06	03	03	-	-	01	01	-	-	
6	Floor and Wall Tiles	10	11	03	-	08	-	01	-	01	-	
7	Glazes, Colours and Decoration	08	11	-	03	-	08	-	01	-	01	
	TOTAL	75	80	12	15	27	26	04	05	04	03	

R-Remember u-understand Ap - Application An- Analyzing

OBJECTIVES: On completion of the course, the student should be able to know the following:

1.0 LAYOUT OF MODERN CERAMIC PLANT:

- 1.1 Draw the Flow diagram of manufacture of clay product by pressing and casting.
- 1.2 Factors effecting on Site selection and location of ceramic plant.
- 1.3 Draw the Modern ceramic Factory layout.

2.0 PORCELAIN AND SPECIAL PORCELAIN WARES.

- 2.1 Define the term porcelain.
- 2.2 Classify the porcelain
- 2.3 Discuss Triaxial bodies.
- 2.4 List the Types of hard porcelain and soft porcelain
- 2.5 List the Raw materials and body compositions of hard porcelain & Soft porcelain
- 2.6 Explain the types of soft porcelain such as Fritted porcelain, Bone china, semi vitreous porcelain.
- 2.7 List the Types of porcelain glazes.

- 2.8 Setting of porcelain Dry Ware in the Kiln.
- 2.9 Glost firing of porcelain.
- 2.10 List the products of porcelain and its uses
- 2.11 Describe in detail Body composition, manufacturing, properties and uses of
 - a) Chemical porcelain
 - b) Dental porcelain
 - c) Electrical porcelain
- 2.12 List the types of LT & HT electrical insulators
- 2.13 List Properties required for Technical porcelain.
- 2.14 Explain in detail about the types of technical porcelain products and uses.
- 2.15 Explain about the following SPECIAL PORCELAIN bodies:
 - i. Zircon bodies.
 - ii. Titanium ceramics.
 - iii. High Alumina ceramics.
 - iv. Corundumceramics.
 - v. Mulliteporcelain.
 - vi. Wallostonite bodies.
 - vii. Dental Proclain bodies.
 - vii. Lithiaporcelain bodies.
 - viii. Beryllia bodies.
 - ix. Cordierite bodies.

3.0 SANITARY WARE:

- 3.1 List of products under sanitary ware.
- 3.2 List the Types of bodies used for the preparation of sanitary ware.
- 3.3 List the Raw materials for making of different bodies.

- 3.4 Describe Body preparation, Shaping techniques, Finishing techniques and Drying process.
- 3.5 List the Types of glazes suitable for sanitary ware.
- 3.6 Know the Setting and glost firing.
- 3.7 Know the Properties and uses of sanitary ware.
- 3.8 List the defects in Sanitary ware and its Remedies.

4.0 EARTHEN WARE:

- 4.1 Discuss the Majolica and Terracotta bodies
- 4.2 Define the term Faience.
- 4.3 Describe the Delft ware/Blue pottery.
- 4.4 Define the term Earthenware.
- 4.5 State the classification of Earthenware.
- 4.6 Write the Raw materials and body compositions for Earthen Ware.
- 4.7 Body preparation and shaping methods Earthen Ware.
- 4.8 Describe the Finishing techniques.
- 4.9 Process of the Drying of green ware.
- 4.10 Process of the Setting of ware in the Kiln.
- 4.11 Describe the bisque firing.
- 4.12 List and explain the methods of glaze applications and Techniques
- 4.13 Explain the glost firing of Earthen Ware.
- 4.14 Preparation of colored earthenware bodies.
- 4.15 Preparation flat ware/tiles.
- 4.16 Properties of earthenware product.
- 4.17 List the product of earthenware and uses.

5.0 HEAVY CLAY WARE:

5.1 List in detail about Flow sheet, raw materials, body composition, shaping, drying, firing, properties and uses of the following Heavy Clay Ware products.

- A) Common bricks.
- B) Face bricks and paving bricks.
- C) Hollow tiles and conduits.
- D) Drain tiles and Roofing tiles.
- E) Flowerpots.
- F) Sewer pipes and wall copings.
- G) Vitrified tiles and Floor tiles.
- H) Stone ware pipes and salt glazing.
- I) Electrical stoneware.
- J) Stoneware vases.

6.0 FLOOR AND WALLTILES:

- 6.1 Define the term Floor and Wall Tiles.
- 6.2 Describe the raw material for Floor Tiles.
- 6.3 Describe the Body Preparation for the Tiles.
- 6.4 Explain the process of pressing of Tiles.
- 6.6 Explain the drying, Engobing, glaze application and firing of tiles.
- 6.7 Describe about polishing of tiles
- 6.8 Describe detail manufacturing of Glazed Vitrified, Vitrified, Nano coated and double charge tiles.
- 6.7 Know the Quality control for tiles.

7.0 GLAZES, COLOURS AND DECORATION:

I) GLAZES:

- 7.1 Classify the Glaze.

- 7.2 Describe the details about lead and lead less glazes.
- 7.3 Describe the details about Fritted glazes.
- 7.4 Describe the details about Felspathic glazes.
- 7.5 Describe the about calcareous glazes.
- 7.6 Describe the details about matty and crystalline glazes.
- 7.7 Describe the details about semiconducting glazes.
- 7.8 Describe the details about opaque glazes.
- 7.9 Describe the details about Aventurine glazes.
- 7.10 List glaze defects, causes and remedies.

II) COLORS:

- 7.11 List the coloring agents
- 7.12 List the various ceramic colors used in the Ceramic industry.
- 7.13 Discuss the compositions of different ceramic colors.
- 7.14 Describe the preparation of stains and precaution to be taken to obtain desired colours.
- 7.15 Preparation of Luster.

III) DECORATION:

- 7.16 Describe the details about
 - A) metallic luster decoration.
 - B) liquid gold decoration.
 - C) the Decalcomania
- 7.17 Explain the methods of decoration on ceramic ware like printing, spraying, free hand painting, silk screen printing, dusting, stamping, computerized decoration ect,
- 7.18 Discuss the Engobing and advantages on glaze and under glaze decoration.

COURSE CONTENT:

- 1. LAYOUT OF MODERN CERAMIC PLANT:** Flow diagram- site selection- Location- layout of Factory.
- 2. EARTHEN WARE:** Definition- classification- Raw materials- Body compositions- Body preparation- shaping methods- Finishing drying-setting- Bisquiting- Glazes and its application- Glost firing- colored earthenware- Flat ware-properties- and types of the product and uses of earthenware.
- 3. PORCELAIN SPECIAL PORCELAIN WARE:** Definition- classification- triaxial bodies- raw materials for porcelain- shaping methods-drying- pre firing- glaze application- glost firing- uses- Technical porcelain-raw materials- body composition- shaping- drying- glazing-glost firing- Special porcelain bodies.
- 4. SANITARY WARE:** List of Sanitary ware-Flow sheet- raw materials- Body compositions-shaping methods- drying- finishing- glazes-setting- glost firing- properties and uses of sanitary ware products.
- 5. HEAVY CLAY WARE:** List of Heavy clay ware- Flow sheet-Raw materials Body compositions-shaping- drying- setting- firing- properties and applications of Heavy clay products i.e. Face bricks- paving bricks- Hollow Tiles- conduits- Drain tiles- Roofing tiles-Flowerpots-sewer pipes-stoneware pipes- Tiles of vitrified- Floor tiles- electrical stoneware and vases.
- 6.0 FLOOR AND WALL TILES:** Define the term Floor and Wall tiles- raw material for Floor tiles- raw materials for the wall tiles- preparation of body for the Tiles- process of pressing of tiles-drying- Engobing- glaze application and firing of tiles-Quality control for tiles.
- 7.0.GLAZES, COLOURS AND DECORATION:** **Glazes:** Classification- preparation- glazes compositions of lead- lead less-Felspathic- calcareous glazes- matty-crystalline- semiconductor- opaque glazes- Glaze defects- and remedies.**Colors:** Types of colors preparation- stain preparation and its compositions. **Decoration:** Metallic luster- liquid gold- decals and other decorations and its process of application on ceramic bodies.

REFERENCE BOOKS:

1. Sudhir Sen, Ceramic White Ware, Oxford and IBH Publishing Limited, New Delhi, 1992.
2. Singer F and Singer S. S., Industrial Ceramics. Oxford and IBH Publishing Limited, New Delhi, 1963
3. S.Kumar Hand book of Ceramics Volume I to IV, Kumar & Associate, Kolkata, 1994 to 1997.
4. H.N.Bose, Modern Pottery Manufacture, Southern Bose, Bhagalpur, 1987,
5. P. Vincenzini, Fundamentals of Ceramic Engineering,
6. Allen Dinsdate, Pottery Science; Materials, processes, and products, Ellis Horwood Ltd. New York, 1986.
7. Ryan W and Redford C, White wares production testing and quality control, Pergamon Press New York, 1987.

8. FH Norton, Fine Ceramics – Technology and applications, Robert E. Krieger Publishing co., New York, 1978

9. A Hand book of production of Vitreous china sanitary ware by Dr. K.N Maithi

Unit Test Syllabus

Year/ Semester	Unit Test	Syllabus
Fourth semester	Unit Test-I	1. Layout of Modern Ceramic Plant 2. Porcelain and Special Porcelain Ware 3. Sanitary Ware
	Unit Test-II	4. Earthen Ware 5. Heavy Clay ware Product 6. Floor and Wall Tiles 7. Glazes, Colours and Decoration

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada

Govt. Institute of Ceramic Technology (Autonomous)

Gudur, SPSR Nellore-524101

C-20, Model paper

IV Semester – Unit -I

Subject Name: White Ware & Heavy Clay Ware-II

Course Code: CER-4309

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Fill in the blanks
 - I. porcelain ware having porosity(True/False)
 - II. For fast firing roller hearth kiln is used(True/False)
 - III. Cordierite formula is
 - IV. Common bricks are made in theforming technique
2. Write Tri-axial bodies?
3. Explain special porcelain bodies?
4. List of sanitary ware products?
5. List the types of LT & HT Electrical insulators?

PART- B

Marks: 3 x 8=

24

Answer all questions. Each question carries eight marks.

6. A). Draw the flow diagram of manufacturing of clay product by pressing and casting?

(OR)

- B). Explain the types of soft porcelain and semi vitreous bodies?

7. A). Write glaze application and explain glost firing?

(Or)

- B). Explain in detail the shaping methods of insulators?

8. A). Explain raw material and body composition of hard porcelain?

(Or)

- B). Draw the modern ceramic plant layout?

State Board of Technical Education and Training

Andhra Pradesh::Vijayawada

Govt. Institute of Ceramic Technology (Autonomous)

Gudur, SPSR Nellore-524101

C-20,Model paper

IV Semester – Unit -II

Subject Name: White Ware & Heavy Clay Ware-II

Course Code: CER-4309

PART - A**16 Marks**

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Fill in the blanks
 - A. Engobe is thecoat in between body and glaze of the tile
 - B. Fully vitrified tile having porosity(True/False)
 - C. Opaque glaze having lack of transparency(True/False)
 - D. Pre-firing of dried articles are called asfiring
2. Define the term faience?
3. Define the term of Mojolica and Terracotta bodies?
4. List and explain glazing methods?
5. Define the term of Floor and Wall Tiles?

PART- B**Marks: 3 x 8=****24**

Answer all questions. Each question carries eight marks.

6. A). State the classification of the glazes?

(OR)

B). Explain Aventurine glazes?

7. A). Explain preparation and processing of earthenware products?

(Or)

B). Detail note on Sewer pipes and wall copings?

8. A).Write composition of different ceramic colours?

(Or)

B). Explain the methods of preparation on ceramic ware?

SCHEME: C – 20

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY

GUDUR – 524101: SRI POTTI SREERAMULU NELLORE DISTRICT, A.P

Autonomous Institute Vide G.O.Ms.No. 214/ Edn, (TE – I Dept.) 05-10-1996

III Semester Examination (MPEC) for 3 ½ Year Diploma in Ceramic Technology

COURSE CODE: **CER -4309**

COURSE NAME: WHITE WARE HEAVY & CLAY WARE - II

TIME: 3 HOUR

Max. Marks: 80

PART – A

3 x 10 = 30 Marks

Note : 1. Answer all questions and each question carry **THREE** marks.

2. Answer should be brief and straight to the point and shall not

exceed **FIVE** simple sentences.

1. Draw the Flow chart for Body Preparation?
2. Classify the Porcelain with example?
3. List the product of porcelain and its applications?
4. What is Scumming?
5. Draw the flow sheet for the making of Delft Ware?
6. What is faience?
7. List the Heavy Clay Ware products?
8. Draw the flow sheet for the making of flower pots?
9. What is Engobe?
10. Classify the Glazes?

PART – B

5 X 8 = 40 Marks

Note : 1. Answer **all** questions and each question carry **Eight** marks.

2. The answer should be comprehensive and the criteria for valuation

is the content but not the length of the answer.

11. A).Describe in detail Raw materials, Body preparation, Fabrication, drying and Firing of Bone china?
(Or)
B).Write about
1) Cordierite 2) Dental Porcelain
12. A). Describe in detail Drying of Sanitary ware?
(Or)
B). List the Defects in Sanitary ware and suggest it's remedies ?
13. A).Describe in detail Body preparation and Fabrication techniques of the Earthen ware?
(Or)
B).write short notes on
1) Bisque firing 2) Battery Casting
14. A). Describe in detail Body Preparation of the Floor Tile?
(Or)
B). Write about
1) Double charged Tiles 2) Roller Hearth Kiln
15. A) Write about
1). Lead and Leadless glaze 2) frit
(Or)
B) List the glaze defects. Write it's causes and remedies?

PART – C

1X 10 = 10

Instructions: *Part C consists of **One** question which carries **Ten** marks.*

16. Describe and details about (i) Chemical porcelain (ii) HT insulators
-oOo-

REFRACTORIES - II
REFRACTORIES - II

SUBJECT TITLE : REFRACTORIES - II

SUBJECT CODE : CER-4310

PERIODS/WEEK : 04

PERIODS/SEMESTER : 60

Time Schedule

S.No	Major Topics	Periods	Weightage of Marks	Short Answer questions (3M)	Essay type Questions (8M)	Essay Type Questions (10M)
1	Special Refractories	10	24	02	01	01
2	Electrocast Refractories	10	11	01	01	
3	Refractories in Atomic Energy	10	14	02	01	
4	Refractories in Space Technology	04	06	02		
5	Refractories in Metal and non – Metal industries	10	11	01	01	
6	Abrasives	08	03	01		
7	Pyrometer	08	11	01	01	
	Total	60	80	10	05	01

Course Objective and Course Outcome

Courses Objectives	Upon Completion of the Courses the student be able to understand the Advance application of Ceramic Methods		
Courses Contents	Upon Completion of the Courses the student be able to		
	CO1	CER- 4310.1	Learn the concept of different application of Refractories
	CO2	CER- 4310.2	Study the Elevated Temperature Working Operations
	CO3	CER- 4310.3 CER-4310.4	Find the refractories in Atomic energy and space technology
	CO4	CER- 4310.5	Study refractory materials used in Ferrous and non-ferrous industries
	CO5	CER- 4310.5 CER-4310.6 CER-4310.7	Get the knowledge on Abrasives and Pyrometers

PO-CO- Mapping

Course Code :CER-4310		Course Title :REFRACTORIES-II		No. of. Periods:60	
Pg.No	Mapped with Co No	Co Periods addressing Po In Co/1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1	08	14	1	>40% Level 3 High addressed 25% to 40% Level 2
PO2	CO3	12	16	2	

PO3	CO2	15	16	3	Moderately addressed 5 to 25% Level 1 Low addressed <% Not addressed
PO4	CO5	08	10	2	
PO5	CO4	22	30	3	
PO6					
PO7	CO5	10	14	3	
PO8					
PO9					
PO10					

Blue Print of a Question Paper

S.No	Chapter Name	Period Allocated	Weighted Allocated	Marks Wise Distribution of weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	AP	AN	R	U	AP	AN	
1	Special Refractories	10	24	03	03	08	10	01	01	01		CO1
2	Electrocast Refractories	10	11	03	03	08			01	01		CO2
3	Refractories in Atomic Energy	10	14	03	03	08		01	01	01		CO1-C03
4	Refractories in Space Technology	08	06	03	03			01	01			CO1-CO4
5	Refractories in Metal and non – Metal industries	10	11	03		08		01		01		CO1-CO5
6	Abrasives	08	03	03				01				CO3
7	Pyrometer	04	11	03	03	08			01	01		CO3
	Total	60	80	21	15	40	10	05	05	05	01	

R-Remember , U- Understanding , Ap – Application, An- Analysing

Learning Outcomes

OBJECTIVES: On completion of the course the student should be able to know the following

1.0 SPECIAL REFRACTORIES

- 1.1 Importance, classification, properties of special refractories
- 1.2 Describe manufacturing process, properties and Applications of Silicon carbide refractories, SIALON, Zircon, Zirconia, Thoria, Beryllia, Corderite, Mullite, Alumina-Carbon, Silicon nitride, Boron Carbide, Boron Nitride

2.0 ELECTROCAST REFRACTORIES

- 2.1 Detail explanation of electro-cast refractories

- (a) Fusion cast alumina-silicate
- (b) Corhart standard blocks
- (c) Corhart ZAC blocks
- (d) Monofrax Refractories

3.0 REFRACTORIES IN ATOMIC ENERGY

- 3.1 Explain function of nuclear reactor and types of breeders.
- 3.2 Describe fuel, chain reactor control, moderator and reflector and coolants
- 3.3 List the structural material, ceramic fuel and dense UO_2 , ZrO_2 ceramic fuel.
- 3.4 Understanding cermets, dense graphite, control rod materials

4.0 REFRACTORIES IN SPACE TECHNOLOGY

- 4.1 Function of ceramic materials in space technology
- 4.2 Function of ceramic materials in missiles
- 4.3 Function of ceramic materials in rocket nozzles
- 4.4 Function of ceramic materials in aerospace
- 4.5 Function of ceramic materials in radar aids and telecommunications.

5.0 REFRACTORIES IN FERROUS AND NON-FERROUS INDUSTRIES

- 5.1 Name the different types of refractories used for different parts of Ferrous Industries like Blast furnace, Open-hearth furnace, L.D. Process, Nozzles, Stoppers, and Sleeves, Bessemer converter,.
- 5.2 Name the different types of refractories used for different parts of Non-ferrous industries like copper, zinc, lead and titanium industries.
- 5.3 Name the different types of refractories used for different parts of Non-metal industries like Glass industry, cement Industry, pottery and refractory industry, coke ovens, boilers and chemical industries.

6.0 ABRASIVES

- 6.1 Definition and classification of Abrasives
- 6.2 List the Natural and Synthetic Abrasives materials
- 6.3 Bonds used in Abrasive Product
- 6.4 Manufacturing of Abrasives
- 6.5 Application of Abrasives
- 6.6 Characteristic of Abrasives

7.0 PYROMETERS

- 7.1 Introduction and Classify the pyrometers
- 7.2 Understand the temperature Scales.
- 7.3 introduction and types of Pyroscopes and Explain Fusible Pyroscope
- 7.4 Introduction to Millivoltmeter, Potentiometer, thermal well, thermopiles, lead wires of thermo couples
- 7.5 State principles of wheat stone bridge
- 7.6 Describe Mercury in Glass Thermometer, Bi Metallic Thermometer, pressure Spring thermometer
- 7.7 Construction and working Principle of Optical pyrometer, Ferry Optical Pyrometer, Resistance pyrometer, thermoelectric pyrometer.
- 7.8 The term Radiation pyrometers and Explain Black Body Radiation.

COURSE CONTENT:

- 1.0 SPECIAL REFRACTORIES: Importance, classification, details of special refractories- Silicon carbide refractories, SIALON, Zircon, Zirconia, Thoria, Beryllia, Corderite, Mullite, Alumina-Carbon, Silicon nitride, Boron Carbide, Boron Nitride
- 2.0 ELECTROCAST REFRACTORIES: electro-cast refractories-Fusion cast alumina-silicate-Corhart standard blocks-Corhart ZAC blocks-Monofrax Refractories
- 3.0 REFRACTORIES IN ATOMIC ENERGY: function of nuclear reactor-fuel, chain reactor control, moderator and reflector and coolants-List the structural material, ceramic fuel and dense UO_2 , ZrO_2 ceramic fuel-cermets, dense graphite, control rod materials
- 4.0 REFRACTORIES IN SPACE TECHNOLOGY: Ceramic materials used in space satellites-missiles-rocket nozzles-aerospace-radar aids and telecommunications.
- 5.0 REFRACTORIES IN FERROUS AND NON-FERROUS INDUSTRIES: Types of refractories used for different parts of Ferrous Industries like Blast furnace, Open-hearth furnace, L.D. Process, Nozzles, Stoppers, and Sleeves, Bessemer converter-Non-ferrous industries like copper, zinc, lead and titanium industries-Non-metal industries like Glass industry, cement Industry, pottery and refractory industry, coke ovens, boilers and chemical industries.
- 6.0 ABRASIVES: Definition and classification of Abrasive-Natural and Synthetic Abrasives materials-Bonds –Shaping – Processes – Applications – Characteristic of Abrasives
- 7.0 PYROMETERS: Introduction and Classify the pyrometers - Temperature Scales - Types of Pyroscopes and Fusible Pyroscope - Millivoltmeter, Potentiometer, thermal well, thermopiles, lead wires of thermo couples- wheat stone bridge -Mercury in Glass Thermometer - Bi Metallic Thermometer- pressure Spring thermometer - Optical pyrometer- Ferry Optical Pyrometer - Radiation pyrometers and Black Body Radiation.

REFERENCE BOOKS:

1. F.H.Norton, Refractories, McGraw Hill Book Company, Inc., 1949.
2. J.H. Chester's Steel plant Refractories, Sheffield, the united steel companies ltd, 1957.
3. A.RashidChesti, Refractories, Prentics- Hall of India pvt ltd., New Delhi, 1986,
4. M.L.Misra Refractories, Clear Type Press, Allahabad, 1975.
5. Robert E Fisher Advances in Refractories Technology Vol.-IV, The American Ceramic Society, Inc., Ohio, 1988.
6. Coope, B.M. and Dickson, E.M, Raw Materials for the Refractories Industry, An Industrial Minerals consumer Survey, 1981.
7. Akira Nishikawa, Technology of Monolithic Refractories.,Plibrico, Japan Co. Ltd., Tokyo, 1984.

8. Shaw, K, Refractories and their uses, App. Science publishers, UK, 1972.

Unit Test Syllabus

Year/ Semester	Unit Test	Syllabus
	Unit Test-I	1. Special Refractories 2. Electro-cast

Fourth semester		Refractories 3. Refractories in atomic energy 4. Refractories Space technology
	Unit Test-II	5. Refractories in metal and Non-metal 6. Abrasives 7. Pyrometers

State Board of Technical Education and Training

Andhra Pradesh::Vijayawada

Govt. Institute of Ceramic Technology (Autonomous)

Gudur, SPSR Nellore-524101

C-20,Model paper

IV Semester – Unit -I

Subject Name: Refractories-II

Course Code: CER-4310

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Fill in the blanks
 - a. Open hearth furnace used for.....
 - b. In nuclear reactor ZrO_2 used as a fuel(True/False)
 - c. Unshaped refractories are.....
 - d. Hot face brick used in kiln(True/False).
2. Explain thoria refractories?
3. Write the properties and uses of super refractories?
4. Write the importance of special refractories?
5. Explain in detail about SiAlON?

PART- B

Marks: 3 x 8=

24

Answer all questions. Each question carries eight marks.

6. A). Explain the manufacturing of Zirconia?

(OR)

B). Write about fusion cast Alumino-Silicate refractories?

7. A). Writ the manufacturing monofrax refractories?

(Or)

B). Write function of ceramic materials in missiles?

8. A). List of materials used in space technology?

(Or)

B). Explain fused and electro-cast refractories?

**State Board of Technical Education and Training
Andhra Pradesh::Vijayawada**

Govt. Institute of Ceramic Technology (Autonomous)

Gudur, SPSR Nellore-524101

C-20,Model paper

IV Semester – Unit -II

Subject Name: Refractories-II

Course Code: CER-4310

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Fill in blanks
 - A. High alumina used as abrasive material(True/False)
 - B. Thermocouple is a one of pyrometer(True/False)
 - C. Zinc melting temperature.....
 - D. Thermopile is.....
2. Classification of pyrometers?
3. Explain Bi-metallic thermometer?
4. Name the types of high performance refractories?
5. What is temperature scale?

PART- B

Marks: 3 x 8=

24

Answer all questions. Each question carries eight marks.

6. A). Explain blast furnace?

(OR)

B). Explain the working principle and construction of radiation pyrometers?

7. A). State the characteristics of abrasives?

(Or)

B). Explain the usage of abrasives?

8. A). what do you understand about black body radiation?

(Or)

B). Write about the refractories used in boiler industry?

SCHEME: C – 20

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY

GUDUR – 524101: SRI POTTI SREERAMULU NELLORE DISTRICT, A.P

Autonomous Institute Vide G.O.Ms.No. 214/ Edn, (TE – I Dept.) 05-10-1996

IVSemester Examination (MPEC) for 3 ½ Year Diploma in Ceramic Technology

COURSE CODE:**CER -4310**

COURSE NAME:**REFRACTORIES-II**

TIME: 3 HOUR

Max.Marks:80

PART – A

3 x 10 = 30 Marks

Note : 1. Answer all questions and each question carry **THREE** marks.

2. Answer should be brief and straight to the point and shall not

exceed**FIVE**simple sentences.

1. Write the importance of pyrometers?
2. What is SIALON?
3. Define Super Refractories?
4. Where the Kilns furniture used?
5. Write a note on uses of muffles?
6. List any three requirements of refractories used in coke oven?
7. Write about refractories used in nozzles?
8. Write a note on control rod elements?
9. Describe ceramic materials used in rocket nozzles?
10. Write the refractories commonly used in Zinc Industry?

PART – B

5 X 8 = 40 Marks

Note : 1. Answer **all** questions and each question carry **Eight** marks.

2.The answer should be comprehensive and the criteria for valuation

is the content but not the length of the answer.

11. A).Explain in detail silicon carbide refractories ?
(Or)
B)Elaborate on metal-caste refractories, their properties and uses?
12. A) Write the raw materials used for preparation of zirconia refractories and the importance?
(Or)
B).Write the Importance of saggars and rollers?
13. A).Discuss the usage of refractories in copper industry?
B).Write in detail about usage of ceramic in space and missiles?
14. A). Explain the essential requirement of Thermoelectric Thermomete?
B). Write principle, construction of wheat stone Bridge?
15. A) Write the principle of black body?

B) Name the Abrasives and explain their Application and uses?

PART – C

1X 10 = 10

Note : 1 *Part C consists of **One**question which carries **Ten** marks.*

16. Why the special refractories are used? Describe the manufacturing of Silicon carbide refractories?

-oOo-

CEMENT TECHNOLOGY

SUBJECT TITLE : CEMENT TECHNOLOGY
SUBJECT CODE : CER-4311
PERIODS/WEEK : 04
PERIODS/SEMESTER : 60

Time Schedule

S.No	Major Topics	Periods	Weightage of Marks	Short Answer questions (3M)	Essay type Questions (8M)	Essay Type Questions (10M)
1	Introduction and Raw Materials for Cement	05	14	02	01	
2	Unit Operation	10	21	01	01	01
3	Manufacturing of Cement	10	14	02	01	
4	Chemistry of Portland Cement	10	11	01	01	
5	Blended Cement	10	11	01	01	
6	Dental Cement	05	03	01		
7	Concrete Technology	05	03	01		
8	Testing of Cement	05	03	01		
	Total	60	80	10	05	01

Course Objective and Course Outcome

Courses Objectives	Upon Completion of the Courses the student be able to understand the different application of Cement and making methods		
Courses Contents	Upon Completion of the Courses the student be able to		
	CO1	CER-4311.1 CER-4311.2	Identify the Raw materials used for Cement and unit operations
	CO2	CER-4311.3	Evolve steps involved in manufacturing of cement
	CO3	CER-4311.4 CER-4311.5	Analyse the chemistry of Portland cement and blended cement
	CO4	CER-4311.6 CER-4311.7	Learn concrete technology, dental cements
	CO5	CER-4311.8	Identify the tests to be conducted on cements

PO-CO- Mapping

Course Code :CER-4311		Course Title :Cement Technology		No.Of.Periods:60	
Pg.No	Mapped with Co No	Co Periods addressing Po In Co/1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1	08	13	1	>40% Level 3 High addressed 25% to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <% Not addressed
PO2	CO3	12	20	1	
PO3	CO2	15	24	1	
PO4	CO8	08	13	1	
PO5	CO4	18	30	2	
PO6					
PO7					
PO8					

Blue Print of a Question Paper

S.No	Chapter Name	Period Allocated	Weighted Allocated	Marks Wise Distribution of weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	AP	AN	R	U	AP	AN	
1	Introduction & Raw Materials for Cement	05	14	03	03	08		01	01	01		CO1
2	Unit Operation	10	21		03	08	10		01	01	01	CO1,CO2
3	Manufacturing of Cement	10	14	03	03	08		01	01	01		CO1-C03
4	Chemistry of Portland Cement	10	11	03		08		01		01		CO3,CO4
5	Blended Cement	10	11		03	08			01	01		CO1
6	Dental Cement	05	03	03				01				CO3
7	Concrete Technology	05	03	03				01				CO3
8	Testing of Cement	05	03	03				01				CO4
	Total	60	80	18	12	50	10	06	04	05	01	

R-Remember , U- Understanding , Ap – Application, An- Analysing

Learning Outcomes

OBJECTIVES: On completion of the course the student should be able to know the following

1. INTRODUCTION & RAW MATERIALS FOR CEMENT
 - 1.1. Definition of Cement and types of cement
 - 1.2. Applications of Cement
 - 1.3. Importance of Modern cement plant layout and site selection of cement plant
 - 1.4. Explain types of materials used for cement
 - 1.5. Classification of lime based materials
 - 1.6. Impurities of raw materials and its effect in raw mix
 - 1.7. Understand the calculation of raw mix
 - 1.8. The effect of fluxes in cement
 - 1.9. Importance of fuel and gypsum in cement
2. UNIT OPERATION
 - 2.1. Raw material unit operation
 - 2.2. Storage of raw materials
 - 2.3. pulverisation of coal
 - 2.4. Weighing & mixing of raw materials
3. MANUFACTURING OF CEMENT
 - 3.1. Manufacturing of Portland cement by different processing method.
 - 3.2. Flow chart for wet and dry process for making of OPC
 - 3.3. Detail explanation of thermo-chemical and physical properties of cement.
 - 3.4. Preparation of clinker and grinding of clinker
 - 3.5. Types of kilns used in cement plants and detail notes.
 - 3.6. Factors consider for increasing of heat efficiency of cement
 - 3.7. List the instruments for correct operation of kiln
4. CHEMISTRY OF PORTLAND CEMENT
 - 4.1. Chemical constituents of cements
 - 4.2. Chemical composition of clinker
 - 4.3. Understand the constituents for setting and hardening of cement.
 - 4.4. Chemical reaction of individual oxides.
5. BLENDED CEMENTS AND ALLOYED
 - 5.1. Classification of cements
 - 5.2. Describe in detail manufacturing, properties and applications of
 - (1) Portland blast furnace slag cement
 - (2) Portland pozzalona cement
 - (3) Super sulphate cement
 - (4) Rapid hardening cement
 - (5) Masonry cement
 - (6) White cement
 - (7) Hydrophobic cement
 - (8) Expansion cement
 - (9) Oil well cement
 - (10) High Alumina cement
 - (11) Acid resistance cement

- 5.3. Properties and uses of blended cements
- 5.4. List the special cements and it's compositions
- 5.5. Different grades of cements
- 6. CONCRETE TECHNOLOGY
 - 6.1. Understand the term concrete and classify the concretes
 - 6.2. Flexible or bendable concrete
 - 6.3. Ready mix concrete
 - 6.4. Glass-fibre concrete
 - 6.5. Self compacting concrete
 - 6.6. High performance concrete
- 7. DENTAL CEMENTS
 - 7.1. Glass ionomer cement
 - 7.2. Zinc phosphate cement
 - 7.3. Fibre cement.
 - 7.4. Resin cement
 - 7.5. Resin modified glass-ionometer
 - 7.6. Zinc polycarbonate
- 8. QUALITY TESTING OF CEMENT
 - 8.1. Investigate quality of cements by
 - A. Fineness,
 - B. Normal Consistency
 - C. Initial and Final Setting
 - D. Cold Crushing Strength,
 - E. Tensile Strength
 - F. Soundness of cement
 - G. Autoclave test
 - H. Specific gravity of cement

COURSE CONTENT:

- 1.0 RAW MATERIALS FOR CEMENT: Types of cement- plant layout-Types of materials used for cement-Classification of lime based materials-Impurities of raw materials and it's effect in raw mix-calculation of raw mix-effect of fluxes in cement- fuel and gypsum in cement
- 2.0 UNIT OPERATION : Raw material unit operation-Storage of raw materials-Grinding of coal-Weighing & mixing of raw materials
- 3.0 MANUFACTURING OF CEMENT: Manufacturing of Portland cement by different processing method-Flow chart for wet and dry process-Mechanism-Thermo-chemical and physical properties of cement-Preparation of clinker and grinding of clinker-Types of kilns used in cement plants and detail notes-Heat efficiency of cement-List the instruments for correct operation of kiln
- 4.0 CHEMISTRY OF PORTLAND CEMENT: Chemical -Chemical composition of clinker-setting and hardening of cement-Chemical reaction of individual oxides.
- 5.0 BLENDED CEMENTS: Classification of cements-blended cements-Properties and uses of blended cements-List the special cements and it's compositions-Different grades of cements

- 6.0 DENTAL CEMENT : Flexible or bendable concrete-Ready mix concrete
- 7.0 CONCERT TECHNOLOGY: Glass ionomer cement-Zinc phosphate cement-Fibre cement.
- 8.0 TESTING OF CEMENT: Investigate quality of cements by Fineness-Normal Consistency, Initial and Final Setting-Cold Crushing Strength-Tensile Strength-Soundness of cement-Autoclave test-Specific gravity of cement.

REFERENCE BOOKS:

1. H.N. Banerjee, Technology of Portland cement & Blended cements, Wheeler Publishing, Allahabad, 1992
2. Duda, Cement Data book, vol. 1 to 3, Berling, Bauverlag, 1988
3. K Peray, The Rotary Cement kiln, 2nd edition, Chemical publishing co., Inc., London, 1986.
4. Robert S. Boynton, Chemistry and Technology of limestone, John Wiley and sons, Inc., New York, 1980
5. Edwin C. Eckel C.E., Cements, Limes and Plasters, John Wiley and sons, Inc., New York, 1922
6. S.Kumar, Source Book of Ceramics Vol.1 and 2, Dipankar Kumar, kolkata,2003.
7. Textbook of Cement and Concrete- Lee
8. A.M Neville,' Properties of Concrete', Longman,1986

Unit Test Syllabus

Year/ Semester	Unit Test	Syllabus
	Unit Test-I	<ol style="list-style-type: none"> 1. Raw materials for cement 2. Unit operation 3. Manufacturing of cement

Fourth semester		4. Chemistry of Portland cement
	Unit Test-II	5. Blended cements 6. Dental cements 7. Concrete Technology 8. Testing of cement

**State Board of Technical Education and Training
Andhra Pradesh::Vijayawada**

Govt. Institute of Ceramic Technology (Autonomous)

Gudur, SPSR Nellore-524101

C-20, Model paper

IV Semester – Unit -I

Subject Name: Cement Technology	Course Code: CER-4311
Time: 90 min	Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Define the term cement?
2. Write preparation of clinker?
3. Write the uses and application of Portland cement?
4. Explain grinding of coal?
5. What is the function of retarder?

PART- B

Marks: 3 x 8=

24

Answer all questions. Each question carries eight marks.

6. A). Draw the modern cement plant layout?

(OR)

Explain the differences between setting and hardening?

7. Write the manufacturing of cement in dry method?

(Or)

What are impurities present in cement and its effect in it?

8. Describe the girding of raw materials for making Portland cement?

(Or)

Write the types of lime stone and explain any five it's?

**State Board of Technical Education and Training
Andhra Pradesh::Vijayawada**

Govt. Institute of Ceramic Technology (Autonomous)

Gudur, SPSR Nellore-524101

C-20,Model paper

IV Semester – Unit -II

Subject Name: Cement Technology	Course Code: CER-4311
Time: 90 min	Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Define term concrete and type's concrete's?
2. Write physical and chemical properties cement?
3. Name the types of cements?
4. Explain rapid hardening cement?
5. How to determine fineness of cement?

PART- B

Marks: 3 x 8=

24

Answer all questions. Each question carries eight marks.

6. Study the mechanism of burning of cement?

(OR)

Explain the Portland blast furnace slag cement?

7. A). Explain glass-fibre concrete?

(Or)

B). Describe in detail manufacturing of resin cement?

8. A). How to determine the soundness of cement and explain autoclave method?

(Or)

B). What is need of normal consistency cement? Explain the normal consistency test?

SCHEME: C – 20

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY

GUDUR – 524101: SRI POTTI SREERAMULU NELLORE DISTRICT, A.P

Autonomous Institute Vide G.O.Ms.No. 214/ Edn, (TE – I Dept.) 05-10-1996

IVSemester Examination (MPEC) for 3 ½ Year Diploma in Ceramic Technology

COURSE CODE:**CER - 4311**

COURSE NAME:**CEMENT TECHNOLOGY**

TIME: 3 HOUR

Max.Marks:80

PART – A

3 x 10 = 30 Marks

Note : 1. Answer all questions and each question carry **THREE** marks.

2. Answer should be brief and straight to the point and shall not

exceed**FIVE**simple sentences.

1. What is the refractory used in burning zone of cement?
2. Write the difference between white cement and normal cement?
3. List any three physical requirement of cement ?
4. Write the two major Impurities in lime stone and it'sEffect?
5. Write the Advantages and disadvantages os using Wet feed that dry feed in cement kilns?
6. What is meant by Clinker ?
7. What is Initial Stting of cement?
8. List the Dental cements and Explain Resin cement?
9. Define the term of Concert and Mention Varies of concert?
10. List the Mechanical Instruments for Size Reduction of Cementing Materials?

PART – B

5 X 8 = 40 Marks

Note : 1. Answer **all** questions and each question carry **Eight** marks.

2.The answer should be comprehensive and the criteria for valuation

is the content but not the length of the answer.

11. A).Explain the formation, composition and classification of Lime stone?
(Or)
B).Explain the measurement of soundness and fineness of cement?
- 12 A).Explain the composition, properties of low heat portland cement and high alumina cement?
(Or)
B).Name the different types of cement. Give the Chemical Composition and properties any two of them?
- 13 A).What are the tests that are application of I) Clinker II) Gypsum?
B).Explain Wet Method for making of Cement with a neat sketch?
- 14 A).Write different types of Cements grades? Write composition of Clinker?
B). Write a short notes on A) Flexible or bendable concrete B) High Performance Concert?
- 15 A) Write a short notes on I) Zinc polycarbonate II) Fiber Cement?
(Or)
B) Write the Classification of cement and Explain Properties of Blended cements?

PART – C

1X 10 = 10

Note 1 *Part C consists of one question which carries **Ten** marks.*

16. Why the machines are used for raw material processing? Give reasoning to the pulverization of coal and processing of unit operation?

Life Skills Lab Practice

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks for FA	Marks for SA
CER-4211	Life Skills Lab Practice	3	45	40	60

S. No.	Unit Title	No of Periods	COs Mapped
1	Attitude	4	CO1
2	Adaptability	4	CO1, CO2
3	Goal Setting	4	CO1, CO2, CO3
4	Motivation	4	CO1, CO2, CO3
5	Time Management	4	CO2
6	Critical thinking	4	CO3
7	Creativity	4	CO3
8	Problem Solving	5	CO3
9	Team Work	4	CO4
10	Leadership	4	CO4
11	Stress Management	4	CO4
Total Periods		45	

Course Objectives	To understand the importance of Life skills for acceptable, sustainable and ethical behaviour in academic, professional and social settings
--------------------------	---

CO No.	Course Outcomes
CO1	Demonstrates positive attitude and be able to adapt to people and events
CO2	Fixes personal and professional goals and manages time to meet targets
CO3	Exhibits critical and lateral thinking skills for problem solving.
CO4	Shows aptitude for working in teams in a stress free manner and sometimes/ very often/ mostly display leadership traits.
	To exhibit language competence appropriate to acceptable social and professional behaviour.
	To demonstrate time management, stress management, team skills, problem solving ability to manage oneself in academic, professional and social settings.

CO-PO Matrix

Course Code C-508	Course Title: English Number of Course Outcomes: 4			No. of Periods: 45	
POs	Mapped with CO No.	CO Periods Addressing PO in Column 1		Level of Mapping (1,2,3)	Remarks
		Number	Percentage %		
PO1		Not directly applicable for Life Skills Course. However activities that use content and situations from academic, professional and social settings relevant to the Programme shall be exploited for triggering thought and interaction in the Course.			
PO2					
PO3					
PO4					
PO5	CO1, CO2, CO3, CO 4	11	25%		>60%: Level 3
PO6	CO1, CO2, CO3, CO4	27	45%		16 -59%: Level 2
PO7	CO1, CO2, CO3, CO4	7	30%		Up to 15%: Level 1

Level 3 – Strongly Mapped

Level 2- Moderately Mapped

Level 1- Slightly Mapped

Mapping Course Outcomes with Program Outcomes:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1					✓	✓	✓
CO 2					✓	✓	✓
CO3					✓	✓	✓
CO4					✓	✓	✓

Blue Print for evaluation based on Course Outcomes for SA:

Note: Every Activity based Question that focuses on COs and responses as exhibited through communication has to be given marks for the following parameters

- Clarity of Thinking as Exhibited through Content
- Features of Etiquette

***Rubric Descriptors ‘Outstanding/ Very Good/ Good/ Satisfactory/ Poor’ levels of Competence**

Level of Competence	Parameters of Assessment	
	Clarity of thinking as exhibited through content	Features of etiquette
Outstanding 10	<p>Thinking is extremely logical and suggested course of action is feasible</p> <p>Shows creativity and uniqueness</p> <p>Exhibits expert use of expression (organizational devices and discourse markers) that denote clarity in thought.</p>	<p>Exhibits courtesy to all most appropriatelywith confidence</p>
Very Good 8/9	<p>Thinking is clear and logical</p> <p>Suggested course of action is feasible</p>	<p>Exhibits courtesy to all to a considerable level.</p>

	Shows traces of creativity Exhibits good expression (organizational devices and discourse markers) that denote clarity in thought.	
Good 6/7	Thinking is clear and logical most of the time. Lacks creativity or out of the box thinking as expressed through content.	Exhibits courtesy / politeness to an acceptable level.
Satisfactory 4/5	Thinking is logical; However expressing content is disjointed and disorganized.	Has courtesy but often fumbles with language.
Poor 3 or less than 3	Thoughts as expressed through content are incoherent. Language skills are very limited.	Fails to show courtesy to others.

Blue Print for evaluation based on Course Outcomes for SA of each student:

Note: Marks are awarded for each student as per the Rubric descriptors.

S No.	Questions based on Course Outcomes	Periods Allocated for practical work	Max Marks	Poor >3	Satisfactory 4 /5	Good 6/7	Very Good 8/9	Outstanding 10
1	Short presentation on GOALS with Timeline and Action Plan	12	10					
2	State what you will do in the given situation (Assesses adaptability and critical thinking skills, leadership, team skills)	12	10					
3	In how many different and creative way can you use _____ (Object) other than its primary use	8	10					
4	What solutions can you think of for _____ problem.	13	10					
	Total	45	60					

Note: The marks that are awarded for the student for 40 to be increased proportionally for 60.

Learning Outcomes

1. Attitude Matters :

- 1.1 Understand the importance of positive attitude and the consequences of negative attitude.
- 1.2 Demonstrate positive attitude in dealing with work-related issues and in personal life.

2. Adaptability....makes life easy :

- 2.1 Understand the significance of adaptability.
- 2.2 Show adaptability whenever needed, both at place of work and on personal front.
- 3. Goal Setting ... life without a Goal is a rudderless boat!**
 - 3.2 Understand the SMART features of goal-setting.
 - 3.3 State one's short-term and long-term goals and spell out plans to achieve them.

- 4. Motivation ... triggers success!**
 - 4.2 Comprehend the need for motivation in order to achieve success in life.
 - 4.3 State how one is motivated in life.
 - 4.4 Show the impact of motivation on one's life
- 5. Time Management... the need of the Hour!**
 - 5.2 Understand the value of time management and prioritizing in life
 - 5.3 Demonstrate the effect of time management on one's professional work.
- 6. Critical Thinking ... logic is the key!**
 - 6.1 Distinguish between facts and assumptions
 - 6.2 Use logical thinking in dealing with professional matters
- 7. Creativity ... the essential you!**
 - 7.2 Understand the importance of thinking out of the box in dealing with critical issues
 - 7.3 Solve problems using creativity / imagination
- 8. Problem Solving ... there is always a way out!**
 - 8.2 Understand the need for and importance of problem solving.
 - 8.3 Use logic or creativity to solve a problem at workplace or home.
- 9. Team Work... together we are better!**
 - 9.1 Understand the need for team skills / team building
 - 9.2 Demonstrate one's skills as a team player
- 10. Leadership... the meaning of a leading!**
 - 10.1 Understand the need for team skills / team building
 - 10.2 Demonstrate one's skills as a team player
- 11. Stress Management... live life to the full!**
 - 11.1 Understand what causes stress and how to cope with stress at workplace.
 - 11.2 Demonstrate how stress can be overcome in a healthy way.

CEMENT TECHNOLOGY LAB

Subject Title : CEMENT TECHNOLOGY LAB
Subject Code : CER-4312
Periods / Week : 04
Periods / Semester : 60

TIME SCHEDULE

S.No	Major Components	Periods
1.	Determination of Fineness of Cement by dry sieving	04
2.	Determination the normal consistency of the cement paste	04
3.	Determination of initial setting time and final setting time of given mix	10
4.	Determination of setting time of given plaster of paris	04
5.	Determination of soundness of cement by Autoclave test method	12
6.	Determination of soundness of cement by Le- chatleir apparatus	04
7.	Determination of compressive strength of cement	04

8.	Determination of specific gravity of cement	04
9.	Determination of compressive strength of fly ash brick	06
10.	Non-destructive test of cement by rebound hammer	02
11.	Determination of compressive strength of cement concrete brick	06
	Total	60

COURSE OBJECTIVES AND COURSE OUTCOMES

Courses Objectives	Upon Completion of the Courses the student be able to know the cement quality by understanding analytical methods		
Courses Contents	Upon Completion of the Courses the student be able to		
	CO1	CER-4312 -1 CER-4312 -2 CER-4312 -3 CER-4312 -4 CER-4312 -5	Demonstrated that skills of planning and organizing the experimental set up to determine the finess of cement, normal consistence of cement paste, setting times of given mix, setting time of plaster of paries and soundness of cement
	CO2	CER-4312 -7 CER-4312 -8 CER-4312 -9 CER-4312 -11	Demonstrated the skills of planning and organizing experimental set up to determine to specific gravity of cement, compressive strength of cement, fly ash bricks and concrete
	CO3	CER-4312 -2 CER-4312 -3 CER-4312 -5 CER-4312 -6	Perform premix operations with thevicat operators, auto clave, le-chatleir, cement mixture devices
	CO4	CER-4312 -10	Analyses the experimental results to drawn inferences to make recommendations
	CO5	CER-4312 -11	Practice ethics and etiquette while working in group and display profension while communicating as a member and a leader in a group

Course Code :CER-4312		Course Title :CEMENT TECHNOLOGY LAB		No.Of.Periods:60	
Pg.No	Mapped with Co No	Co Periods addressing Po In Co/1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1,CO6	08	16	2	>40% Level 3 High addressed 25% to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <% Not addressed
PO2	CO2,CO3,CO4,CO7,CO9,CO11	36	58	3	
PO3	CO8,CO5	16	26	2	
PO4	CO2,CO3,CO4,CO7,CO9,CO11	36	58	3	
PO5					
PO6					
PO7					
PO8					

PO9					
PO10					

1. Determination of Fineness of Cement by dry sieving
 - 1.1 take the cement from bag
 - 1.2 pass 15min in ASTM 325 Sieve
 - 1.3 Value less than 10%
2. Determination the normal consistency of the cement paste.
 - 2.1 water is added to cement
 - 2.2 cement paste is filled in vicatmould
 - 2.3 needle is drop
 - 2.4 reading between 5 to 7mm
3. Determination of initial setting time and final setting time of given mix
 - 3.1 water is added to cement
 - 3.2 cement paste is filled in vicatmould
 - 3.3 needle is drop
 - 3.4 initial setting time is 5to7mm
 - 3.5 final setting time regret to impression
4. Determination of setting time of given plaster of paris
 - 4.1 take plaster of paries
 - 4.2 add water to plaster
 - 4.3 paste poured in mould
 - 4.4 calculate setting time
5. Determination of soundness of cement by Autoclave test method
 - 5.1 as per normal consistency of cement add water
 - 5.2 cement paste filled in Le-chartleir
 - 5.3 instrument kept in auto clamp machine and run cycles
 - 5.4 after it boil and measure expansion of cement
6. Determination of soundness of cement by Le- chatleir apparatus
 - 6.1 as per normal consistency of cement add water
 - 6.2 cement paste filled in Le-chartleir
 - 6.3 instrument kept in water for 24 hours
 - 6.4 after it boil and measure expansion of cement
7. Determination of compressive strength of cement
 - 7.1 specimen prepared by conventional method

- 7.2 specimen area readings are noted
- 7.3 the specimen placed in hydraulic machine
- 7.4 apply load constantly at elevated specimen failure to load
8. Determination of specific gravity of cement
 - 8.1 take specific gravity bottle
 - 8.2 sample is filled and note values w_1, w_2, w_3, w_4
 - 8.3 based formula sample specific gravity
9. Determination of compressive strength of fly ash brick
 - 9.1 specimen prepared by conventional method with addition of fly ash
 - 9.2 specimen area readings are noted
 - 9.3 the specimen placed in hydraulic machine
 - 9.4 apply load constantly at elevated specimen failure to load
10. Non-destructive test of cement by rebound hammer.
 - 10.1 rebound hammer button impact on specimen
 - 10.2 reading as per standard formula
 - 10.3 display on dial gauge
11. Determination of compressive strength of cement concrete brick
 - 11.1 Specimen prepared by conventional method with addition of concrete mixture.
 - 11.2 specimen area readings are noted
 - 11.3 the specimen placed in hydraulic machine
 - 11.4 apply load constantly at elevated specimen failure to load

GLASS ENGINEERING - II LAB

SUBJECT TITLE : GLASS ENGINEERING – II LAB

SUBJECT CODE : *CER - 4313*

PERIODS/ WEEK : 05

PERIODS / SEMESTER : 75

TIME SCHEDULE

S. No.	Major Components	Periods
1.	Produce a design on given glass sheet by etching by Hydrofluoric acid	5
2.	Etching on Glass by Crystal acid	5
3.	Decoration on glass by White acid etching	5
4.	Decoration on glass by Painting	3
5	Prepare a Mirror by Silvering process	3
6.	Produce a design / name on given glass Mirror by Sand blasting process	3
7.	Preparation of Ethylene Di Amine Tetra Acetic Acid solution (EDTA) of 0.01M	4
8.	Preparation of Reagents	4
9.	Preparation of Indicators	4
10.	Determination of percentage of SiO ₂ , CaO, MgO, Fe ₂ O ₃ and Al ₂ O ₃ from the given glass/ Feldspar by Volumetric method	10
11.	Determination of percentage of CaO, MgO, Fe ₂ O ₃ , Al ₂ O ₃ and SiO ₂ from the given Dolomite/ calcite by volumetric method	6
12.	Determination of percentage of Na ₂ O, K ₂ O from the given glass/ Feldspar by Flame spectrophotometer	8
13.	Estimation of SiO ₂ in Quartz by Hydrofluorization	5
14.	Determination of SiO ₂ , Al ₂ O ₃ , Fe ₂ O ₃ , TiO ₂ and MgO in Alumino-silicate minerals	10
	TOTAL PERIODS	75

Course Objectives and Course Outcomes

Course Objectives		Upon completion of the course the student shall be able to: (i) To learn the different decoration methods used on glass for value addition (ii) To get knowledge on chemical analysis of glass, dolomite, limestone and aluminosilicate minerals	
Course Outcomes		Upon completion of the course the student shall be able to:	
	CO1	CER-4313.1 to CER-4313.6	Demonstrate the skills of planning and organizing the experimental setup to do different decorations on glass for value addition
	CO2	CER-4313.7 to CER-4313.14	Demonstrate the skill of planning and organizing the experimental setup to determine chemical composition of different materials used in glass
	CO3	CER-4313.1,2,3,6,7,8,9,12	Perform precise operations with Stencil cutter, Compressor, chemical analytical balance, Flame photometer
	CO4	CER-4313.10,11,12,13,14	Analyse the experimental results to draw inferences, to make recommendations
	CO5	CER-4313.1 to 14	Practice ethics and etiquette while working in a group and display professionalism while communicating as a member and a leader in a group.

PO-CO Mapping

Course Code: CER-4313		Course Title: GLASS ENGINEERING-II LAB		No of Periods: 75
PO No	Mapped with CO no	CO Periods addressing PO in Col 1	Level (1,2,3)	Remarks

		No	%ge		
PO1	CO1,CO2,CO4	20	26.67	2	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO2					
PO3					
PO4	CO1,CO2,CO3	35	46.67	3	
PO5	CO5	10	13.33	1	
PO6	CO5	10	13.33	1	
PO7					

Learning Outcomes

Up on Completion of the course the student shall be able to:

1. Produce a design on given glass sheet by etching by Hydrofluoric acid.
 - 1.1 Clean glass sheet and apply wax
 - 1.2 Trace the design on trace paper
 - 1.3 Draw the design by using trace paper with the help of carbon paper
 - 1.4 Remove wax on the design
 - 1.5 Pour HF and wait for ½ hour
 - 1.6 Remove HF and wax
2. Etching on glass by Crystal acid
 - 2.1 Cut the design on stencil paper
 - 2.2 Stick the stencil paper on the backside of mirror glass
 - 2.3 Remove the designed part of stencil paper and remove silver coating
 - 2.4 Immerse the glass in crystal acid for 45min
 - 2.5 Remove and clean the glass
3. Decoration of glass by White acid etching
 - 3.1 Cut the design on stencil paper
 - 3.2 Stick the stencil paper on the mirror glass
 - 3.3 Remove the designed part of stencil paper

- 2.8 Pour the white acid and keep it for half an hour
- 2.9 Remove and clean the glass
4. Decoration on glass by painting
 - 4.1 Take transparent glass
 - 4.2 Place designed paper under the glass
 - 4.3 Draw the outline of design on glass by liner
 - 4.4 Fill the different colours
5. Prepare a Mirror by silvering process.
 - 5.1 Weigh 1 gm of silver nitrate and 1 gm of sodium hydroxide in separate glass beakers add enough water
 - 5.2 Mix two solutions together
 - 5.3 Add ammonia and 4gm of sugar
 - 5.4 Pour the solution on glass
 - 5.5 Gently heat solution
 - 5.6 A coating of silver formed on glass
6. Produce a design/name on given Mirror by sand blasting process.
 - 6.1 Take mirror glass and stick the design on glass
 - 6.2 Take the sand which is passed through 20 mesh and retained on 40mesh
 - 6.3 Fill the sand in spray gun of compressor
 - 6.4 Blast the sand on glass
7. Preparation of Ethylene Di Amine Tetra Acetic Acid Di solution Salt (EDTA) 0.01 M.
 - 7.1 Calculate the amount of EDTA powder to be taken
 - 7.2 Weigh the EDTA powder
 - 7.3 Transfer to volumetric flask
 - 7.4 Add water and mix well
8. Preparation of Reagents such as:
 - i). Triethanolamine 500 ml of 50%,
 - ii). Potassium Hydroxide 500 ml of 50 %,
 - iii). Ammonium Acetate 500 ml of 10%,
 - iv). Hydroxyl Ammonium chloride 500 ml of 10 %,
 - v). Ammonium Buffer solution 500 ml of 50 %.
 - 8.1 Weigh the chemicals
 - 8.2 Transfer to volumetric flask
 - 8.3 Add water and mix well
9. Preparation of Indicators:
 - i). Patron and Readers reagent (P&R),
 - ii). Erichrome Black-T/ Solo Chrome Black-T,
 - iii). Propanol 2 / Isopropyl Alcohol,
 - iv). Salicylic Acid,

v). Copper PAN.

9.1 Weigh the components

9.2 Measure the liquids

9.3 Mix well and store in indicator bottles

10. Determination of the Percentage of SiO_2 , CaO , MgO , Fe_2O_3 and Al_2O_3 from the given Glass/Feldspar by Volumetric method.

10.1 crush the glass pieces by using Agate pestle and Mortar and pass through BSS 300mesh

10.2 Weigh approximately 1gm of sample and add fusion mixture

10.3 Melt the sample at 1000°C

10.4 Extract the melted glass into 500ml beaker

10.5 Add HCl and Water

10.6 Boil the above solution till to get dry powder

10.7 Add water, HCl and filter the solution

10.8 Residue on filter paper is used for determination of SiO_2

10.9 Solution passes through filter paper is used for determination of CaO , MgO , Fe_2O_3 and Al_2O_3

11. Determination of the Percentage of CaO , MgO , Fe_2O_3 , Al_2O_3 and SiO_2 , from the give Dolomite/Calcite by Volumetric method.

11.1 Weight approximately 1 gm of sample

11.2 Add distilled water and HCl to sample in beaker

11.3 Keep the beaker in Bunsen burner until convert to dry powder

11.4 Add distilled water and 2 to 3 ml of HCl and heat

11.5 Filter the solution

11.6 Residue on filter paper is used for determination of SiO_2

11.7 Solution passes through filter paper is used for determination of CaO , MgO

12. Determination of Percentage of Na_2O , K_2O from the given Glass/Feldspar by Flamephotometer

12.1

13. Estimation of SiO_2 in Quartz by Hydrofluorization.

13.1 crush the quartz by using Agate pestle and Mortar and pass through BSS 300mesh

13.2 Weigh approximately 1 gm of quartz

13.3 Add HF to sample and heat

13.4 Take the final weight

13.5 Calculate % SiO_2 by using the formula

14. Determination of SiO_2 , Al_2O_3 , Fe_2O_3 , TiO_2 & MgO in Aluminosilicates minerals.

14.1 crush the material by using Agate pestle and Mortar and pass through BSS 300mesh

14.2 Weigh approximately 1gm of sample and add fusion mixture

14.3 Melt the sample at 1000°C

14.4 Extract the melted glass into 500ml beaker

14.5 Add HCl and Water

14.6 Boil the above solution till to get dry powder

14.7 Add water, HCl and filter the solution

14.8 Residue on filter paper is used for determination of SiO_2

14.9 Solution passes through filter paper is used for determination of CaO , MgO , Fe_2O_3 and Al_2O_3

WHITEWARE & HEAVY CLAY WARE-II LAB

SUBJECT : WHITE WARE & HEAVY CLAYWARE-I LAB

SUBJECT CODE : CER - 4314

PERIODS/ WEEK : 04

PERIODS/ SEMESTER : 60

TIME SCHEDULE

S. No.	Major Components	Periods
1.	Body Slip preparation	05
2.	Floor and Wall Tiles, Moisture Content	05

3.	Pressing	05
4.	Engobe	05
5.	Casting	05
6.	Roofing Tiles	05
7.	Lead Glazes	05
8.	Lead less Glazes	05
9.	Fritted Glazes	05
10.	Glaze Application	05
11.	Crazing Resistance	05
12.	Thermal Shock resistance	05
13	Abrasion Resistance	05
14.	Modulus of Rupture	05

Course Objectives and Course Outcomes

Course Objectives		Upon completion of the course the student shall be able to: (ix) Processing of raw materials . (x) Improve the Better Manufacturing Skills. (xi) Analyse the Properties of the Finished product.	
Course Outcomes		Upon completion of the course the student shall be able to:	
	CO1	CER-4314.1, CER-4314.2, CER-4314.3, CER-4314.4, CER-4314.5	Experiment understand the process of making suitable body and required form.
	CO2	CER-4314.2, CER-4314.3 CER-4314.5 CER-4314.6	Demonstrate the skill and manufacturing Process.

	CO3	CER-4314.7, CER-4314.8, CER-4314.9,	Analyze the different Composition to make the better Product with High Quality with Lower Price.
	CO4	CER-4314.10, CER-4314.1, CER-4314.7, CER-4314.8	Practise different techniques to achieve the better results.
	CO5	CER-4314.11, CER- 4314.12,CER- 4314.13, CER- 4314.14.	Analyze the experimental results,To make a better product.

PO-CO Mapping

Course Code: M-309		Course Title: Fuels Laboratory			No of Periods: 45
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%ge		
PO1	CO1,CO2,CO3,CO4,	35	47	3	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <5% Not addressed
PO2	CO3,CO4	20	27	2	
PO3					
PO4					
PO5					
PO6					
PO7	CO4,CO5	15	20	1	

Learning Outcomes

Up on Completion of the course the student shall be able to:

List of Experiments

1.0 Preparation of Earthen ware / Stone ware slips and making of articles by slip casting.

- 1.1. Prepare the slip with Earthenware/Stoneware body.
- 1.2. Pore the slip into the suitable plaster mould.
- 1.3. Sufficient formation of thickness draw the excess slip.
- 1.4. Gently remove the fabricate of shape from the mold by sufficient drying.

2.0 Prepare the body for making tiles and estimate Moisture content

- 2.1. Select the body for making tiles.
- 2.2. Process the body in suitable process.
- 2.3. Fabricate the tile by different techniques.

3.0 By using granules prepare Floor/ Wall tiles by pressing.

- 3.1. Take the granules.
- 3.2. Fabricate the tile in suitable press.

4.0 Prepare and apply the engobe and glaze on dried ceramic tile by spraying and fired at suitable temperature.

- 4.1. Take the dried tile.
- 4.2. Then apply the engobe and Glaze upon it by spraying process.
- 4.3. Fire the tile in suitable kiln at suitable temperature.

5.0 Cast the Earthen ware articles and apply glaze and fired at suitable temperature.

- 5.1. The Earthenware slip is used to cast in the suitable plaster mold.
- 5.2. After removal of the shape from the mold, the blaze is applied upon the article by suitable application technique.
- 5.3. The glazed articles are fired in the suitable kiln at suitable temperature

6.0 Making of roofing tiles with terracotta/ earthen ware body and apply low temperature glaze.

- 6.1. Take the raw materials as per the terracotta/earthenware body composition.
- 6.2. After body preparation the material is convert into suitable shape by pressing.
- 6.3. Perform the drying.

6.4. Apply the low temperature glaze upon the roofing tile in suitable application technique

7.0 Preparation of Lead Glaze.

7.1. Set the lead glaze composition depending upon the maturing temperature.

7.2. Perform the weighing, mixing & grinding

7.3. Perform the weighing, mixing & grinding.

7.4. Convert it into suitable form for application on the ware

8.0 Preparation of Lead Less Glazes.

8.1. Select the lead less glaze composition.

8.2. Convert into suitable form for application.

9.0 Preparation of Fritted Glaze.

9.1. Select the fritted glaze composition.

9.2. Convert it into suitable form for application

10.0 Application of the above Glazes on the Articles by:

i). Dipping Method,

ii). Pouring Method,

iii). Spraying Method. And fired at suitable temperature

10.1. Take the dried articles which have been for glaze application.

10.2. Then do the necessary finishing.

10.3. Apply the glaze upon the articles by necessary glaze application technique i.e., dipping, pouring, spraying etc.,

11.0 Determination the Craze Resistance of the Glazed ware by Autoclave Method.

11.1. Take the test specimens and put into the auto-clave machine.

11.2. Apply the specified pressure i.e., 50 lb/m² for a period of 1 hour.

11.3. Then check the failure by observing crack formation upon it.

11.4. Calculate the mean value.

12.0 Determination the Thermal shock Resistance of the Ceramic Articles.

12.1. Take the specimen.

12.2. Put the specimen in water at room temperature.

12.3. Then transferred into the hot water at the temperature of 100°C

12.4. Then Transfer into the water at room temperature.

12.5. Note the specimen how many cycles withstand without crack formation.

13.0 Determination the Abrasion Resistance of the Floor and Wall Tiles.

13.1. Take the Specimen and take the weight accurately.

13.2 .Cut the specimen into 7.06cmX 7.06cm

13.3. Press the tile in face wise under specific load on a grinding path.

13.4 .Apply the Abrasive powder on the rotating disc.

13.5. The tile is subjected to number of rotations.

13.6. The wear of tile is measured in the thickness gauge

14.0 Determination the Modulus of Rupture to the green, dry and fired Tile.

14.1. Take the green/dry/fired tile.

14.2. Put into the MOR testing machine

14.3. Apply the load upon the tile.

14.4. Note the breaking load.

14.5. Calculate the corresponding MOR.

V SEMESTER

DIPLOMA IN CERAMIC TECHNOLOGY

3½ YEAR SANDWICH COUSE

(MPEC SYSTEM)

V SEMESTER

Course Title : **Industrial Training**

Course Code : **CER- 5315**

Duration : **6 months**

Time schedule

S.NO	Code	TOPICS	Duration
1	CER-5315	<ul style="list-style-type: none">• Practical training in Industry• Training Report Preparation Report Preparation: Title Page, Certificate, Acknowledgements, Abstract, Contents(introduction of Industry, Plant Layout, Organization Chart, List of Major Equipments, List of Processes: Skills Acquired; Conclusions; References	Six Months

Course Objectives and Course Outcomes

Upon completion of the course the student shall be able to		
Course Objectives	1.Expose to real time working environment	
	2. Enhance knowledge and skill already learnt in the institution.	
COURSE OUT COMES	CO1	Apply theory to practical work situations
	CO2	Cultivate sense of responsibility and good work habits
	CO3	Exhibit the strength, teamwork spirit and self-confidence
	CO4	Write report in technical projects
3. Acquire the required skills of manufacturing processes, supervising in the engineering fields.		
4. Install the good qualities of integrity, responsibility and self confidence.		

PO-CO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2				2		1	3		2
CO2						3		3		2
CO3						3		3		2
CO4						3		3		2

3: High, 2: Moderate, 1: Low

Learning Outcomes

The student shall be able to display the following skill sets

- 1) Technical Skills (Manufacturing/Service/Drafting/Maintenance etc)
- 2) Reading drawings and analysing Specifications
- 3) Recognize and Practice safety Measures
- 4) Handling Tools/Instruments/Materials/Machines
- 5) Assess and Control of quality parameters
- 6) Planning, Organizing and recording Skills

Scheme of evaluation

Sl. No.	Course	Duration	Scheme of evaluation		
			Assessment	Nature	Max. Marks
1	Industrial Training	6 months	1.First Assessment at Industry (After 12 Weeks)	Assessment of Learning outcomes by both the faculty and training Mentor of the industry	120
			2.Second Assessment at	Assessment of Learning	120

			<i>the Industry (After 22 weeks)</i>	<i>outcomes by both the faculty and training Mentor of the industry</i>	
			<i>Final Summative assessment at institution level</i>	<i>Training Report</i>	20
				<i>Demonstration of any one of the skills listed in learning outcomes</i>	30
				<i>Viva Voce</i>	10
TOTAL MARKS					300

Weightage of marks for Assessment of Skill sets during first and second assessment.

During assessment the performance of the students shall be assessed in those skills in which the student has been trained and be awarded the marks as per the weightage assigned as above. In case the student has undergone training in a few skill sets then the total marks obtained shall be raised to 120 marks for the given assessment i.e. either assessment 1 or 2. However the performance of the student shall be assessed at the most skill sets listed above but not less than three skill sets.

Illustration

If the student has undergone training in only 4 skill sets (namely serial number 1, 3, 4, 5 of above skill sets) and marks awarded during assessment is 50 out of 80 marks, then the marks of 50 shall be enhanced to 120 proportionately as $(50/80)*120=75$.

GUIDELINES FOR INDUSTRIAL TRAINING

1. Duration of the training: 6 months.
2. Eligibility: The As per SBTET norms
3. Training Area: Students may be trained in the fields of Tiles, Glass, Sanitary ware and refractories etc.
4. The candidate shall put a minimum of 90% attendance during Industrial Training.
5. If the student fails to secure 90% attendance during industrial training, the student shall reappear for 6 months industrial training.
6. Formative assessment at industry level shall be carried out by the Mentor from of the industry, where the student is undergoing training and the faculty in charge (Guide) from the concerned section in the institution.
7. The Industrial training shall carry 300 marks and pass marks is 50% in assessments at industry (first and second assessment) and final summative assessment at institution level put together i.e. 150 marks out of 300 marks.
8. If the student fails to secure 50% marks in final summative assessment at institution level, the student should reappear for final summative assessment in the subsequent board examination.
9. Final Summative assessment at institution level is done by a committee including 1)Head of the section (Concerned branch/discipline), External examiner and Faculty members who assessed the students during Industrial Training as members.

Guidelines and responsibilities of the faculty members who are assessing the students performance during industrial training:

- Shall guide the students in all aspects regarding training.
- Shall create awareness regarding safety measures to be followed in the industry during the training period, and shall check it scrupulously.
- Shall check the logbook of the students during the time of their visit for the assessment.
- Shall monitor progress at regular intervals and make appropriate suggestions for improvement.
- Shall visit the industry and make first and second assessments as per stipulated schedules.
- Shall assess the skill sets acquired by the students during their assessment.
- Shall award the marks for each skill set as per the marks allotted for that skill set during 1st and 2nd assessments
- Shall voluntarily supplement students learning through appropriate materials like photographs, articles, videos etc.
- Shall act as co-examiner along with other examiners in the final assessment at institution.
- Shall act as liaison between the student and mentor.
- Shall maintain a diary indicating his observation with respect to the progress of students learning in all three domains (Cognitive, Psychomotor and Affective).

Guidelines to the training mentor in the industry:

- Shall train the students in all the skill sets as far as possible.
- Shall assess and award the marks in both the assessments along with the faculty member .
- Shall check and approve the log books of the students.
- Shall approve the attendance of each student at the end of the training period.
- Shall report to the guide about student's progress, personality development or any misbehavior as the case may be.

DEPARTMENT OF TECHNICAL EDUCATION

NAME OF THE INSTITUTION

INDUSTRIAL TRAINING ASSESSMENT

PIN:

NAME OF THE STUDENT:

<i>Skill Set Sl.No</i>	<i>SKILL SET</i>	<i>Max Marks Allotted For each parameter</i>	<i>Marks obtained</i>
<i>1</i>	<i>Charectarization of Raw materials</i>	<i>20</i>	
<i>2</i>	<i>Knowledge of manufacturing process</i>	<i>25</i>	
<i>3</i>	<i>Quality Assessment and control</i>	<i>20</i>	
<i>4</i>	<i>Defect Analysis</i>	<i>15</i>	
<i>5</i>	<i>Practicing safety measure</i>	<i>15</i>	
<i>6</i>	<i>Soft skills and Reporting skills</i>	<i>25</i>	
	<i>Total</i>	<i>120</i>	

(Marks in words:)

Signature of the Training In-charge (Mentor)
(Guide)

Name:

Designation:

Signature of the visiting staff

Name:

Designation:

VI SEMESTER

VI SEMESTER

INDUSTRIAL TRAINING

Course Title : **Industrial Training**

Course Code : **CER- 6316**

Duration : **6 months**

Time schedule

S.NO	Code	TOPICS	Duration
1	CER-6316	<ul style="list-style-type: none">• Practical training in Industry• Training Report Preparation Report Preparation: Title Page, Certificate, Acknowledgements, Abstract, Contents(introduction of Industry, Plant Layout, Organization Chart, List of Major Equipments, List of Processes: Skills Acquired; Conclusions; References	Six Months

Course Objectives and Course Outcomes

Upon completion of the course the student shall be able to		
Course Objectives		1.Expose to real time working environment 2. Enhance knowledge and skill already learnt in the institution. 3. Acquire the required skills of manufacturing processes, supervising in the engineering fields. 4. Install the good qualities of integrity, responsibility and self confidence.
	COURSE OUT COMES	
	CO1	Apply theory to practical work situations
	CO2	Cultivate sense of responsibility and good work habits
	CO3	Exhibit the strength, teamwork spirit and self-confidence
	CO4	Write report in technical projects

PO-CO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2				2		1	3		2
CO2						3		3		2
CO3						3		3		2
CO4						3		3		2

3: High, 2: Moderate, 1: Low

Learning Outcomes

The student shall be able to display the following skill sets

- 7) Technical Skills (Manufacturing/Service/Drafting/Maintenance etc)
- 8) Reading drawings and analysing Specifications
- 9) Recognize and Practice safety Measures
- 10) Handling Tools/Instruments/Materials/Machines
- 11) Assess and Control of quality parameters
- 12) Planning, Organizing and recording Skills

Scheme of evaluation

Sl. No.	Course	Duration	Scheme of evaluation		
			Assessment	Nature	Max. Marks
1	Industrial	6 months	1.First Assessment at	Assessment of Learning	120

	Training		Industry (After 12 Weeks)	outcomes by both the faculty and training Mentor of the industry	
			2.Second Assessment at the Industry (After 22 weeks)	Assessment of Learning outcomes by both the faculty and training Mentor of the industry	120
			Final Summative assessment at institution level	Training Report	20
				Demonstration of any one of the skills listed in learning outcomes	30
				Viva Voce	10
TOTAL MARKS					300

Weightage of marks for Assessment of Skill sets during first and second assessment.

During assessment the performance of the students shall be assessed in those skills in which the student has been trained and be awarded the marks as per the weightage assigned as above. In case the student has undergone training in a few skill sets then the total marks obtained shall be raised to 120 marks for the given assessment i.e. either assessment 1 or 2. However the performance of the student shall be assessed at the most skill sets listed above but not less than three skill sets.

Illustration

If the student has undergone training in only 4 skill sets (namely serial number 1, 3, 4, 5 of above skill sets) and marks awarded during assessment is 50 out of 80 marks, then the marks of 50 shall be enhanced to 120 proportionately as $(50/80)*120=75$.

GUIDELINES FOR INDUSTRIAL TRAINING

1. Duration of the training: 6 months.
2. Eligibility: The As per SBTET norms
3. Training Area: Students may be trained in the fields of Tiles, Glass, Sanitary ware and refractories etc.
4. The candidate shall put a minimum of 90% attendance during Industrial Training.
5. If the student fails to secure 90% attendance during industrial training, the student shall reappear for 6 months industrial training.
6. Formative assessment at industry level shall be carried out by the Mentor from of the industry, where the student is undergoing training and the faculty in charge (Guide) from the concerned section in the institution.
7. The Industrial training shall carry 300 marks and pass marks is 50% in assessments at industry (first and second assessment) and final summative assessment at institution level put together i.e. 150 marks out of 300 marks.
8. If the student fails to secure 50% marks in final summative assessment at institution level, the student should reappear for final summative assessment in the subsequent board examination.
9. Final Summative assessment at institution level is done by a committee including 1)Head of the section (Concerned branch/discipline), External examiner and Faculty members who assessed the students during Industrial Training as members.

Guidelines and responsibilities of the faculty members who are assessing the students performance during industrial training:

- Shall guide the students in all aspects regarding training.
- Shall create awareness regarding safety measures to be followed in the industry during the training period, and shall check it scrupulously.
- Shall check the logbook of the students during the time of their visit for the assessment.
- Shall monitor progress at regular intervals and make appropriate suggestions for improvement.

- Shall visit the industry and make first and second assessments as per stipulated schedules.
- Shall assess the skill sets acquired by the students during their assessment.
- Shall award the marks for each skill set as per the marks allotted for that skill set during 1st and 2nd assessments
- Shall voluntarily supplement students learning through appropriate materials like photographs, articles, videos etc.
- Shall act as co-examiner along with other examiners in the final assessment at institution.
- Shall act as liaison between the student and mentor.
- Shall maintain a diary indicating his observation with respect to the progress of students learning in all three domains (Cognitive, Psychomotor and Affective).

Guidelines to the training mentor in the industry:

- Shall train the students in all the skill sets as far as possible.
- Shall assess and award the marks in both the assessments along with the faculty member .
- Shall check and approve the log books of the students.
- Shall approve the attendance of each student at the end of the training period.
- Shall report to the guide about student's progress, personality development or any misbehavior as the case may be.

DEPARTMENT OF TECHNICAL EDUCATION

NAME OF THE INSTITUTION

INDUSTRIAL TRAINING ASSESSMENT

PIN:

NAME OF THE STUDENT:

<i>Skill Set Sl.No</i>	<i>SKILL SET</i>	<i>Max Marks Allotted For each parameter</i>	<i>Marks obtained</i>
1	<i>Charectarization of Raw materials</i>	20	
2	<i>Knowledge of manufacturing process</i>	25	
3	<i>Quality Assessment and control</i>	20	
4	<i>Defect Analysis</i>	15	
5	<i>Practicing safety measure</i>	15	
6	<i>Soft skills and Reporting skills</i>	25	
	<i>Total</i>	120	

(Marks in words:)

Signature of the Training In-charge (Mentor)
(Guide)

Name:

Designation:

Signature of the visiting staff

Name:

Designation:

VII SEMESTER

STATE BOARD OF TECHNICAL EDUCATION & TRAINING

ANDHRA PRADESH

DIPLOMA IN CERAMIC TECHNOLOGY

3 ½ YEAR SANDWICH COURSE

(MPEC SYSTEM)

SEVENTH SEMESTER

Subject Code	Name of the Subject	Instruction Periods/Week		Total Periods/ Semester	Scheme of Examination				
		Theory	Practicals		Duration (Hrs)	Sessional Marks	End Exam Marks	Total Marks	Credits
THEORY SUBJECTS									
CER-7212	Industrial Management & Smart Technology	5	--	75	3	20	80	100	5
CER-7213	C Language	5	--	75	3	20	80	100	5
CER-7214	Ceramic Science	5	--	75	3	20	80	100	5
CER-7401	Advanced Ceramics	5	--	75	3	20	80	100	5
CER-7402	Special Glasses & Enamels	5	--	75	3	20	80	100	5
PRACTICAL SUBJECTS									
CER-7215	C Language Lab	--	6	90	3	40	60	100	3
CER-7216	Computer Applications practice in Ceramic Industry	--	5	75	3	40	60	100	2.5
CER-7403	Glaze Technology Lab	--	3	45	3	40	60	100	1.5
CER-7404	Enamels Lab	--	3	45	3	40	60	100	1.5
	TOTAL	25	17	630	-	260	640	900	33.5

Note:1. Subject CER-7212 is same as M-501 of Diploma in Mechanical Engineering.

INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP

Course Title	Course Code	Periods/Week	Periods per Semester
Industrial Management and Entrepreneurship	CER-7212	05	75

TIME SCHEDULE

Sl. No.	Chapter/Unit Title	Periods	Weightage of Marks	Short Answer Questions (3M)	Essay Type Questions (8M)	Higher Order Question (10M)
1.	Basics of Industrial Management.	06	03	01		
2	Organisation structure & Organisational behaviour	15	11	01	01	01
3	Production Management	10	11	01	01	
	Materials Management	10	14	02	01	
	Maintenance Management & Industrial Safety	10	11	01	01	
4	Entrepreneurship Development	12	11	01	01	
5	New Trends in Management	12	09	03		
Total		75	70+10	10	05	01

Note: 10 Marks higher order question may be given from the Chapter -2 or Chapter - 3

Course Objectives and Course Outcomes

COURSE OBJECTIVES	Upon completion of the course the student shall be able to (i) Familiarise the concepts of management, ownership styles and organisation structures. (ii) Exposure to organisational behavioural concepts, basics of project and operational management and materials management in industries. (iii) Understand the modern trends of management in industries.		
COURSE OUTCOMES	CO1	CER-7212.1	Understand the principles of management as applied to industry
	CO2	CER-7212.2	Explain types of ownerships, the organisation structure of different business organisations and the behaviour of an individual in an organisation, motivational and leadership models
	CO3	CER-7212.3	Explain the different aspects of production management, Materials Management and Maintenance activities in industries.

	CO4	CER-7212.4	Describe the role of entrepreneur in economic development
	CO5	CER-7212.5	Explain the latest trends and technologies which are essential for the overall progress of Entrepreneur.

CO-PO MAPPING

POs	Mapped with CO No	No of Cos: 05			No. Of periods: 75
		CO Periods Addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1	6	8	1	>40% Level 3 (Highly Addressed) 25% to 40% Level 2 (Moderately Addressed) 5% to 25% Level 1 (Low Addressed) <5% Not Addressed
PO2	CO3	30	40	3	
PO3					
PO4					
PO5	CO4	12	16	1	
PO6	CO2	15	20	1	
PO7	CO5	12	16	1	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	1							1		
CO2		1								2
CO3	3								2	2
CO4						3		1	2	
CO5							2	1	2	

3: High, 2: Moderate,1: Low

Note:

The gaps in CO and PO mapping will be achieved by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest Lectures (v) Group Discussions (vi) Quiz (vii) Industry Visits (viii) Tech Fest (ix) Mini Projects (x) Library Visits.

Blue Print of the Question Paper

S. No	Chapter/Unit Title	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage			
				R	U	Ap	An	R	U	Ap	An
1	Basics of Industrial Management	06	03	03				01			
2	Organisation Structure &	15	21	03		08	10	01		01	01

	Organisational Behaviour										
3	Production Management	10	11	03		08		01		01	
	Materials Management	10	14	06		08		02		01	
	Maintenance Management & Industrial Safety	10	11	03		08		01		01	
4	Entrepreneurship Development	12	11	03		08		01		01	
5	New Trends in Management	12	09	09				03			
Total		75	80	30		40	10	10		05	01

R-Remembering; U-Understanding; Ap-Appling; An- Analysing

Note: 10 Marks higher order question may be given from the Chapter- 2 or Chapter -3 (Here it is taken from Chapter – 2)

Learning Outcomes

Understand the principles of management as applied to industry.

1.0 Basics of Industrial Management

- 1.1 Define industry, commerce (Trade) and business.
- 1.2 Know the need for management.
- 1.3 Understand functions of Management.
- 1.4 List the principles of scientific management by F.W.Taylor
- 1.5 List the principles of management by Henry Foyal.
- 1.6 Differentiate management, administration and organisation
- 1.7 Differentiate lower, middle and Top level management
- 1.8 Explain the importance of managerial skills (Technical, Human, Conceptual)

2.0 Organisation Structure & Organisational Behaviour

- 2.1 Know types of ownerships, the organisation structure of an industry and the behaviour of an individual in an organisation.
- 2.2 Understand the philosophy and need of organisation structure of an industry.
- 2.3 Understand the line, staff and line &staff organisations
- 2.4 Outline the communication process
- 2.5 State
 - a. Motivation theories.
 - b. Explain Maslow's Hierarchy of needs.
- 2.6 Explain
 - a. Different leadership models
 - b. Trait theory of leadership
 - c. Behavioural theory of Leadership
 - d. The process of decision making.
- 2.7 Assessing Human resource requirements
- 2.8 Understand
 - a. the process of recruitment, selection, training and development

b. types of business ownerships

3.(a)Production Management

- 3.1 Understand the different aspects of production management.
- 3.2 Identify the factors of Plant Location
- 3.3 Know the objectives of plant Layout
- 3.4 Understand the principles of plant Layouts
- 3.5 Explain the types of plant Layouts
- 3.6 Relate the production department with other departments.
- 3.7 Explain
 - (a)Function of Production, planning and control.
 - (b) Break Even Analysis
- 3.8 Draw PERT/CPM networks.

3(b) Materials Management

- 3.9. Understand the role of materials management industries.
- 3.10. Explain the importance of materials management in Industry.
- 3.11. Know the functions of Materials Management
- 3.12. Explain ABC analysis.
- 3.13. Define
 - (a) Safety stock. (b) Reorder level
- 3.14. Derive an expression for economic ordering quantity.
- 3.15. Know the functions of Stores Management, types of store layouts, stores records
- 3.16. Describe the Bin card, Cardex method
- 3.17. Explain
 - (a) General purchasing procedures
 - (b) Tendering, E-tendering and E-procurement procedures
 - (c) Purchase records.

3(c) Maintenance Management & Industrial Safety

- 3.18. Comprehend the Importance of Maintenance Management & Safety procedures
- 3.19. Explain the importance of maintenance management in Industry.
- 3.20. Know the
 - (a)Objectives of maintenance management
 - (b)Activities of maintenance management
 - (c)Importance of Preventive maintenance
 - (d) Need for scheduled maintenance
- 3.21. Differentiate scheduled and preventive maintenance
- 3.22. Know the principles of 5 s for good house keeping
- 3.23.Explain
 - (a) The importance of safety at Work place.
 - (b) The important provisions related to safety.
 - (c) Hazard and accident.

- (d) Different hazards in the industry.
 - (e) The causes of accidents, prevention
- 3.24. Explain the direct and indirect cost of accidents.

4. Entrepreneurship Development.

- 4.1. Understand the role of entrepreneur in economic development and in improving the quality of life.
- 4.2. Define the word entrepreneur.
- 4.3. Explain
 - (a) The requirements of an entrepreneur.
 - (b) The role of entrepreneurs in promoting Small Scale Industries.
- 4.4. Describe
 - (a) The details of self-employment schemes.
 - (b) Characteristic of successful entrepreneurs
- 4.5. Explain the method of site selection.
- 4.6. List out
 - (a) the financial assistance programmes for entrepreneurial development
 - (b) the organisations that help an entrepreneur
- 4.7. Know the use of EDP Programmes
- 4.8. Understand
 - (a) the concept of make in India, Zero defect and zero effect
 - (b) the importance for start-ups
 - (c) the conduct of demand surveys
 - (d) the conduct of a market survey
 - (e) Evaluation of Economic and Technical factors.
- 4.9. Prepare feasibility report study

5. New Trends in Management

- 5.1. Understand the new concepts adopted in modern management
- 5.2. Know the differences between data and information
- 5.3. Understand the information as a resource
- 5.4. Explain
 - (a) the use of Information technology in the organizational functions
 - (b) the applications of RFID
 - (c) the concept of quality.
 - (d) the quality systems and elements of quality systems.
 - (e) the principles of quality Assurance.
 - (f) the basic concepts of TQM
- 5.5. Know the Pillars of TQM
- 5.6. List the
 - (a) ISO standards.
 - (b) Beneficiaries of ISO 9000.
- 5.7. Explain
 - (a) ISO standards and ISO 9000 series of quality systems.
 - (b) the concepts of ISO 14000

Smart Technologies

- 5.8. Get an overview of IoT
- 5.9. Define the term IoT
- 5.10. Know how IoT work
- 5.11. List the key features of IoT
- 5.12. List the components of IoT : hardware, software, technology and protocols
- 5.13. List the advantages and disadvantages of IoT
- 5.14. List the applications of IOT

Course Content

1.0 Basics of Industrial Management

Introduction: Industry, Commerce and Trade; Definition of management; Functions of management; Principles of scientific management: – F.W.Taylor, Principles of Management: Henry Fayol; Administration organisation and management; Nature of management; levels of management; managerial skills;

2.0 Organisation Structure & Organisational Behaviour

Organizing - Process of Organizing; Line, Staff and line & staff Organizations, Communication, Motivational Theories; Leadership Models; Decision making, Human resources development; Forms of Business ownerships: Types – Sole proprietorship, Partnership, Joint Stock Companies, Cooperative types of Organizations, Corporations, Boards

3. (a) Production Management

Definition and importance; Plant location and layout; Types of production -job, batch and mass; production Planning and Control: relation of production department with other departments, routing, scheduling, dispatching and follow up; Break even analysis; Application of CPM and PERT techniques; simple numerical problems;

3.(b) Materials Management

Materials in industry, Basic inventory control model, ABC Analysis, Safety stock, re-order level, Economic ordering quantity, Stores Management: Stores layout, stores equipment, Stores records, purchasing procedures, e-tendering, e-procurement; purchase records, Bin card, Cardex system.

3.(c) Maintenance Management & Industrial Safety

Objectives and importance of plant maintenance, Different types of maintenance, Nature of maintenance problems, Range of maintenance activities, Schedules of preventive maintenance,

Advantages of preventive maintenance, 5 S principles; Importance of Safety at work places; Causes of accidents-cost of accidents-prevention- industrial hazards

4. Entrepreneurship Development

Definition of Entrepreneur; Role of Entrepreneur; Concept of Make In India, ZERO defect, Zero Effect, Concept of Start-up Company, Entrepreneurial Development: Role of SSI, MSME, DICs, Entrepreneurial development schemes; Institutional support, financial assistance programmes; Self-employment schemes, Market survey and Demand survey; Preparation of Feasibility study reports

5.0 New Trends in Management

Introduction to Management Information System (MIS); RFID application in materials management; Total Quality Management (TQM)- Concept of quality discussed by B. Crosby W. Edward, Deming, Joseph M. Juran, Kooru Ishikawa, Genichi Taguchi, Shigco Shingo. Quality systems – Definitions of the terms used in quality systems like, quality policy, quality management, quality systems, Stages of development of ISO9000 series , ISO-14000,

Smart Technologies : Over view of IoT - Define IoT, how IoT work, key features of IoT, components of IoT : hardware, software, technology and protocols, advantages and disadvantages of IoT –Applications of IoT-Smart Manufacturing.

REFERENCE BOOKS

1. Industrial Engineering and Management -by O.P Khanna
2. Production Management- by Buffa.
3. Engineering Economics and Management Science - by Banga & Sharma.
4. Personnel Management by Flippo.
5. Production and Operations Management –S.N. Chary
6. Converging_ Technologies for Smart Environments and Integrated Ecosystems IERC Book Open Access 2013 pages-54-76

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY, GUDUR
VII SEMESTER EXAMINATION
INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP

Time : 3 Hours

Total Marks: 80

PART – A

Answer all questions

10 X3=30

1. With line diagram, show the managerial skills needed at various levels of management
2. Differentiate job description and job specification
3. List out types of production and explain any one of them
4. List out different stores records
5. What is meant by inventory control
6. List out the advantages of preventive maintenance
7. List out the organizations that help an Entrepreneur
8. List out ISO 9000 series
9. Define Quality as stated by Ishikava and by P.B.Crosby
10. List out the components of IoT

PART B

Answer all questions

5 X 8=40

11. A) Explain the process of communication
OR
B) Explain Maslows needs of hierarchy motivation theory
12. A) Explain the factors to be considered while selecting a plant location
OR
B) For the following data of a project, Draw the network, Find out critical path and project duration .

Activity.	1--2	1--6	2--3	2-4	3--5	4--5	6--7	5--8	7-8
Optimistic time days	2	2	5	1	5	2	3	2	7
Most likely time days	5	5	11	4	11	5	9	2	13
Pessimistic time days	14	8	29	7	17	14	27	8	31

13. A) Explain purchasing procedure
OR
B) (i) Derive expression for Economic order quantity
(ii) Explain ABC analysis with graphical illustration
- 14 A) Explain the Direct and Indirect cost of accidents
OR
B) Explain the various Industrial hazards
- 15 A) Describe the details of the self-employment schemes
OR
B) Explain the Entrepreneurial Development schemes

PART C**Answer all questions****1 X 10=10**

16. Explain line and staff organization structure with line diagram and explain how it is useful for large industries.

**Table specifying the scope of syllabus to be covered for Unit Test-I & Unit Test-II
CER-7212 :: Industrial Management and Entrepreneurship**

Unit Test	Learning Outcomes to be covered
Unit Test – I	From 1.1 to 3.17 (including problems)
Unit Test – II	From 3.18 to 5.14

Unit Test - 1

Q.No	Question from the Chapter	Bloom's category	Marks allocated	CO addressed
Part - A (16 marks)				
1	Basics of Industrial Management, Organisation structure & Organisational behaviour, Production Management, Materials Management.	R,U	4	CO1 CO2, CO3,
2	Basics of Industrial Management	U	3	CO1
3	Organisation structure & Organisational behaviour	U	3	CO2
4	Production Management	U	3	CO3
5	Materials Management	U	3	CO3
Part - B (24 marks)				
6	Organisation structure & Organisational behaviour	Ap	8	CO2
7	Production Management	Ap	8	CO3
8	Materials Management	Ap	8	CO3

R-Remembering; U-Understanding; Ap-Appling; An- Analysing

Unit Test - 2

Q.No	Question from the Chapter	Bloom's category	Marks allocated	CO addressed
Part - A (16 marks)				
1	Maintenance management & Industrial Safety, Entrepreneurship Development, New Trends in Management	R,U	4	CO3 CO4, CO5
2	Maintenance management & Industrial Safety	U	3	CO3
3	Entrepreneurship Development	U	3	CO4
4	New Trends in Management	U	3	CO5
5	Smart technologies	U	3	CO5
Part - B (24 marks)				
6	Maintenance management & Industrial Safety	Ap	8	CO3
7	Entrepreneurship Development	Ap	8	CO4
8	New Trends in Management	Ap	8	CO5

R-Remembering; U-Understanding; Ap-Appling; An- Analysing

**BOARD DIPLOMA EXAMINATION,
Unit Test - 1
CER-7212 Industrial Management and Entrepreneurship**

Time : 90 Minutes

Total Marks: **40**

PART – A

Instructions: *1st Question having 4 one-mark questions, and remaining 4 Questions carry 3 marks each*

- 1.(a) The highest skill required for top level management is -----
 (b) Who stated the Needs of hierarchy theory?
 (c) PERT is event oriented approach (Yes/No)
 (d) Choose the correct answer
 Bin card are used in (planning department/stores/marketing department/finance department)
2. List out functions of management
3. Distinguish between Job description and job specification
4. List out phases of PPC
5. State the duties of store keeper

PART – B

Instructions: *Part B consists of 3 Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.*

- 6.(a) Explain Staff organisation with the aid of sketch and state advantages and disadvantages.
 (OR)
 (b) What is meant by communication? Explain the process of communication
- 7.(a) Explain various types of plant layouts
 (OR)
 (b) For the following data of a project, Draw the network. Find out critical path and project duration

Activity.	1--2	1--3	1--4	2--5	3--5	3--6	4--6	5--7	6--7
Days.	5	4	7	6	10	7	8	5	6

- 8(a) Derive expression for EOQ
 (OR)
 (b) Explain about E-tendering system

**BOARD DIPLOMA EXAMINATION,
Unit Test - 2
CER-7212 Industrial Management and Entrepreneurship**

Time : 90 Minutes

Total Marks: **40**

PART – A

Instructions: *1st Question having 4 one-mark questions, and remaining 4 Questions carry 3 marks each*

- 1.(a) Chose the correct answer
 Which type of maintenance implies that repairs are made after the equipment is out of order
 i) Break down maintenance ii) Scheduled maintenance iii) Preventive maintenance
 (b) Write the full form of MSME
 (c) Choose the correct answer
 ISO means Indian organisation for standardisation (Yes/No)
 (d) IoT means -----
2. List out causes for accidents in the industry

3. What are the expectations of entrepreneur
4. What are the pillars of TQM
5. List out components of IoT

PART – B

Instructions: *Part B consists of 3Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.*

6.(a) Explain various industrial hazards .

(OR)

(b) Explain any two types of maintenance generally carried out in industries

7.(a) Explain any four self-employment schemes

(OR)

(b) Explain the Entrepreneurial Development schemes existing in our country

8(a) what are the advantages and disadvantages of ISO 9000series of standards

(OR)

(b) Explain various elements of quality systems

C LANGUAGE

SUBJECT TITLE : **C LANGUAGE**

SUBJECT CODE : **CER-7213**

PERIODS / WEEK : **05**

PERIODS / SEMESTER : **75**

TIME SCHEDULE

S.No.	Major Topics	Periods	Weightage Of Marks	Short Type	Essay Type
1	C Programming Basics	17	26	2	2
2	Decision & Loop Control Statements	17	29	3	2
3	Arrays & Strings	16	26	2	2
4	Functions, Structures, Unions & Pointers	25	29	3	2
	Total	75	110	10	08

OBJECTIVES: *On completion of the course, the student should be able to know the following:*

1.0 Understand C Programming Basics .

- 1.1 Know about the character set.
- 1.2 List various types of data and give examples
- 1.3 Explain different Arithmetic operations.
- 1.4 Define an expression and show how to evaluate.
- 1.5 Mention about assignment statements,
- 1.6 Explain an increment and decrement operators.
- 1.7 Identify compound Assignment Operators.

- 1.8 Explain the Nested assignments.
- 1.9 Explain I/P functions printf and scanf
- 1.10 Know various type conversion techniques and discuss them.
- 1.11 List various relational operators with their precedence.
- 1.12 List various logical operators and explain them with their precedence
- 1.13 Evaluate a logical expression.

2.0 Understand Decision & Loop Control Statements .

- 2.1 State the importance of conditional expression.
- 2.2 List various conditional statements and explain .
- 2.3 Explain Switch statement.
- 2.4 List the different iterative loops while, do for and explain them.
- 2.5 Define nesting and implement it.
- 2.6 Differentiate break and continue statements.
- 2.7 Mention about null statements and comma operator.

3.0 Understand Arrays & Strings .

- 3.1 Define an 1 – D & 2 – D Arrays.
- 3.2 Know how to initialize the above arrays & Access Array elements.
- 3.3 Pass array elements as arguments and arrays as arguments.
- 3.4 Define string.
- 3.5 Understand various string operations.

4.0 Understand functions ,structures, unions and pointers in 'C'

- 4.1 Define a function.
- 4.2 State the use of return statement
- 4.3 Write programs using function call technique.
- 4.4 Discuss the importance of function proto types in programming

- 4.5 Differentiate local and external variables.
- 4.6 Identify automatic and static variables and discuss them in detail
- 4.7 State the application of external declaration.
- 4.8 Define Recursion and Explain with examples.
- 4.9 Define a structure
- 4.10 Describe about structure variable.
- 4.11 Explain about structure initialization.
- 4.12 Access structure members.
- 4.13 Illustrate concept of structure assignment
- 4.14 Explain how to find size of a structure.
- 4.15 Discuss nested structure concept.
- 4.16 Summarize concept of pointer to structure.
- 4.17 Illustrate concept of structures containing pointers.
- 4.18 Define a Union and Illustrate use of a union.
- 4.19 Differentiate address and de referencing operators.
- 4.20 Declare a pointer, assign a pointer, and initialize a pointer.
- 4.21 Discuss pointer arithmetic.
- 4.22 Illustrate with example how pointer can be used to realize the effect of parameter passing by reference.
- 4.23 Illustrate with examples the relationship between arrays and pointers.
- 4.24 Discuss pointer arrays with example.
- 4.25 Describe concept of pointers to functions.

COURSE CONTENTS:

1. C-Programming Basics

Structure of a C programme, Programming rules, Character Set, Delimiters Keywords, Constants, Variables, Data types, Type conversion.

Arithmetic, Logical, Relational operators and precedences – Assignment, Increment, Decrement operators, evaluation of=89 expressions. Console IO formatted and unformatted functions.

2. Decision and Loop control Statements

If, If-else, Nested If else, Break, Continue, Go to and Switch statements

Loops:- For, While, Do-while, Nesting of Loops

3. Arrays and Strings

1 D Array declaration, Initialization, 2 D Array declaration, Initialization, Accessing of Array elements, Character Arrays declaration and Initialization of Strings, Display of strings with format.

4. Functions, Structures, Unions and pointers

Definition, Declaration, Function Prototypes, Return statements, Function types Function calls, Nesting of functions and Recursion Storage classes of variables, Scope and visibility Structure features, Declaration and Initialization, Structure within a structure, Array of structure, Accessing of Structure members, Structures and functions, Unions.

Pointer declaration, Arithmetic operations and pointers, Pointers and Arrays, Array of pointers, Pointers to pointers, Pointer to structures, Pointers and functions.

REFERENCE BOOKS:

1. Programming in ANSI C, TMH, III Edition - Balaguru Swamy. E TMH
2. Programming In C by Samarjit Ghosh-PHI
3. Programming with ANSI and Turbo C by Kamthane, pearson Education
4. Programming In C by Gottfried (Scham Series).
5. Information Technology and Programming in C – by M.V.S.S.N. Prasad – Published by Radiant Publishing House, Hyderabad.

CERAMIC SCIENCE

SUBJECT TITLE : CERAMIC SCIENCE

SUBJECT CODE : CER - 7214

PERIODS / WEEK : 05

PERIODS/ SEMESTER : 75

TIME SCHEDULE

S. No	Major Topics	Periods	Weight age of marks	No. of Short Answer Questions (3M)	No. of Essay type Questions (10M)	No. of Essay type Questions (10 M)
1	Atomic Structure	05	03	1	--	
2	Chemical Bonding	05	03	1	--	
3	Crystal structures	10	11	1	1	
4	Structure of solids	08	11	1	1	
5	Crystal imperfections	10	11	1	1	
6	Diffusion in solids	08	11	1	1	
7	Phase rule and phase diagrams	10	13	1	--	01
8	Phase transformations	07	11	1	1	
9	Colloidal state	05	03	1	0	
10	Thermodynamics	07	03	1	0	

TOTAL	75	80	10	05	01
--------------	-----------	-----------	-----------	-----------	-----------

Course Objectives and Course Outcomes

Course Objectives		Upon completion of the course the student shall be able to: Get a basic knowledge about crystal systems, microstructure and dependence on various properties	
Course contents		Upon completion of the course the student shall be able to:	
	CO1	CER-7214.1, 7214.2	Learn about the atomic structure and chemical bonding
	CO2	CER-7214.3, 7214.4	Evaluate crystal structure and structure of solids
	CO3	CER-7214.5, 7214.6	Compare crystal imperfections and diffusion in solids
	CO4	CER-7214.7,	Analyse the phases and phase transformation

		7214.8	
	CO5	CER-7214.9, 7214.10	Apply concepts of colloidal state and basic concepts of thermodynamics

PO-CO Mapping

Course Code: 7214		Course Title: CERAMIC SCIENCE			No of Periods: 75	
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks	
		No	%			
PO1	CO1,CO2,CO5	25	33.33	2	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately Addressed 5 to 25% Level 1 Low addressed <5% Not addressed	
PO 2	CO2,CO3,CO4,CO5	40	53.33	3		
PO 3	CO4	5	6.67	1		
PO 4						
PO 5						
PO 6						
PO 7	CO2,CO4	05	6.67	1		

3: High, 2: Moderate,1: Low

Blue Print of a Question Paper

S. No	Chapter Name	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Atomic Structure	05	03		03				1			CO1,CO2,CO3
2	Chemical Bonding	05	03		03				1			CO3,CO4
3	Crystal structures	10	11			03	08			1	1	CO3
4	Structure of solids	08	11		03	08			1	1		CO3,CO4
5	Crystal imperfections	10	11	03	08			1	1			CO3
6	Diffusion in solids	08	11		03	08			1	1		CO3,CO5
7	Phase rule and phase diagrams	10	13		03	-	08		-	1	1	CO4
8	Phase transformations	07	11		03		08		1		1	CO4
9	Colloidal state	05	03		03				1			CO5
10	Thermodynamics	07	03			03				1		CO5
TOTAL		75	80	03	29	22	24	1	7	5	3	

R-Remember; U-Understanding; Ap-Application ; An- Analysing

Learning Outcomes

Upon on completion of the course the student shall be able to:

1.0 ATOMIC STRUCTURE

- 1.1 Know the Periodic table
- 1.2 State the Hund's rule
- 1.3 Describe the Ionization Potential, Electron affinity and Electronegativity

2.0 CHEMICAL BONDING

- 2.1 Define the Chemical bond and Bond energy
- 2.2 List the types of Bonds
- 2.3 What is Bond length
- 2.4 Explain primary bonds like Ionic bond, Covalent Bond, Metallic bond
- 2.5 Describe secondary bonds like Hydrogen bond and Vander Walls bond.

3.0 CRYSTAL STRUCTURES

- 3.1 Define Crystallography, Space Lattice and Unit cell
- 3.2 State the Bravais lattices and its Crystal system.
- 3.3 Describe Crystal System, Edges of Crystal system, Packing Factor & Density.
- 3.4 Know the Introduction about the Crystal Direction and Planes / Miller indices
- 3.5 How to determine structure by Bragg Law of X- ray diffraction
- 3.6 Know the Introduction of Structure determination by the Powder Method.

4.0 STRUCTURE OF SOLIDS:

- 4.1 Write crystalline state materials and Non crystalline state materials

- 4.2 Differentiate the crystalline and non crystalline.
- 4.3 Know the factors, which promote the formation of non-crystalline state materials
- 4.4 Draw the Structure of SC, FCC and BCC
- 4.5 Describe the Structures of covalent solids/C (Diamond).
- 4.6 Know the Structure of Metals and Alloys
- 4.7 Know the Structure of Ionic Solids/NaCl
- 4.8 Draw the Structure of Silica and Silicates and Spinal ($Mg Al_2O_4$)
- 4.9 Define Polymer
- 4.10 Explain the Crystallinity of Polymer

5.0 CRYSTAL IMPERFECTIONS:

- 5.1 Define the imperfections
 - 5.2 List the types of crystalline imperfections
 - 5.3 Describe the different kinds of point imperfections like the vacancy, substitutional, interstitial imperfection, Frenkel imperfection and Schottky imperfection
 - 5.4 Know the Geometry of dislocations
 - 5.5 Write the Edge dislocation and screw dislocation
 - 5.6 State the Burger Vector and Burger Circuit
 - 5.7 Know the Grain boundaries and stacking faults

6.0 DIFFUSION IN SOLIDS:

- 6.1 Define Diffusion
- 6.2 State the Fick's laws of diffusion
- 6.3 Write the Kirkendall effect
- 6.4 Explain the Atomic model of diffusion
- 6.5 Describe the Vacancy diffusion, Interstitial diffusion and the Interstitialcy diffusion
- 6.6 State the Ring mechanism

7.0 PHASE RULE AND PHASE DIAGRAMS:

- 7.1 State the Phase Rule or Gibbs Phase rule.
- 7.2 Define the term Phase
- 7.3 Draw Pressure-Temperature Diagram
- 7.4 Describe the One Component System
- 7.5 Know the Polymorphic Transformation
- 7.6 Draw the Binary Phase Diagrams
- 7.7 Discuss Micro structural changes in binary phase
- 7.8 State the Tie line rule and Lever Rule
- 7.9 Draw Binary Diagram of Al_2O_3 and SiO_2 .
- 7.10 Draw Binary diagram of SiO_2 & Na_2O

8.0 PHASE TRANSFORMATIONS:

- 8.1 Define phase transformation
- 8.2 What is Nucleation
- 8.3 State the Nucleation Kinetics
- 8.4 Write the growth process
- 8.5 State the growth kinetics
- 8.6 Know about Precipitation, solidification and crystallization
- 8.7 Define Glass transition.
- 8.8 Describe the Recovery, Recrystallization and Grain growth

9.0 COLLOIDAL STATE:

- 9.1 Define colloids and colloidal states
- 9.2 List the types of colloidal systems and their properties.
- 9.3 Write the Preparative methods of colloids
- 9.4 Differentiate the Lyophobic sols and Lyophilic sols.
- 9.5 Write the terms coagulation, Precipitation, Flocculation and Deflocculation.
- 9.6 Define Hardy and Schultz law with examples.

9.7 State the term "Gold number".

9.8 Write the Preparation and Properties of Gels and Emulsions.

10.0 THERMO DYNAMICS:

10.1 Define the term Thermo Dynamics.

10.2 State the laws of Thermo dynamics.

10.3 Write the Heat of reactions.

10.4 Define Hess's law of constant heat summation.

10.5 Define adiabatic process and Isothermal process.

10.6 Derive the expression $C_p - C_v = R$ for an ideal gas.

10.7 State and explain the Joule Thompson effect.

10.8 Describe the heat of formation, heat of combustion and heat of dilution.

10.11 Define Gibb's Free energy and Helmholtz free energy

COURSE CONTENTS:

1.0 ATOMIC STRUCTURE: Periodic Table- Hund's rule- Ionization Potential- Electron affinity- Electronegativity

2.0 CHEMICAL BONDING: Chemical bonding and Bond energy- Types of Bonds- Bond length- Ionic Bonding – Covalent Bonding- Metallic Bonding – Hydrogen bond- Van der Waals bonds

3.0 CRYSTAL STRUCTURES: Crystallography- Definition of Space Lattice- Definition of the Unit cell- Bravais lattices and its Crystal system-Crystal Faces, Edges of Crystal system, Packing Factor & Density-Introduction of Crystal Direction and Planes /Miller indices--Structure determination by the Bragg Law of X- ray diffraction-Introduction of Structure determination by the Powder Method.

4.0 STRUCTURE OF SOLIDS: Crystalline state materials- Non crystalline state materials-non-crystalline state materials simple structure SC, FCC, BCC-covalent solids/C (Diamond- Metals and Alloys- structure of Ionic Solids/NaCl- structure of Silica and Silicates- structure of Spinel ($MgAl_2O_4$)- Polymer, Crystallinity of Polymers.

- 5.0 CRYSTAL IMPERFECTIONS: To understand Imperfections** Types of crystalline imperfections- Point imperfection/Zero dimensional imperfection-different kinds of point imperfections - vacancy, substitutional and interstitial imperfection-Frenkel imperfection and Schottky imperfection- Line imperfection/Geometry of dislocations-Edge dislocation and screw dislocation-Burger Vector and Burger Circuit, grain boundaries and stacking faults.
- 6.0 DIFFUSION IN SOLIDS:** Definition of Diffusion-Fick's laws of diffusion- Kirkendal effect-Atomic model of diffusion-Vacancy diffusion- interstitial diffusion-Interstitialcy diffusion - Ring mechanism.
- 7.0 PHASE RULE AND PHASE DIAGRAMS:** Phase Rule/Gibbs Phase rule-Phase, Number of Components, and Degrees of Freedom-independent variables- One Component System-Polymorphic Transformation-Pressure-Temperature Diagram-Binary Phase Diagrams- micro structural changes in binary phase-Tie line rule- Lever Rule-Binary Diagram of Al_2O_3 - SiO_2 - binary diagram of SiO_2 - Na_2O .
- 8.0 PHASE TRANSFORMATIONS: Introduction of phase transformation** Nucleation-Nucleation Kinetics-growth process- growth kinetics-precipitation solidification and crystallization- Glass transition- recovery-recrystallization and grain growth
- 9.0 COLLOIDAL STATE:** Types of colloidal systems and their properties-know the preparative methods of colloids-Lyophobic sols and Lyophilic sols-coagulation, Precipitation, Flocculation and Deflocculation-Hardy and Schultz law with examples-"Gold number- Preparation and Properties of Gels and Emulsions.
- 10.0 THERMO DYNAMICS:** Thermodynamics-laws of Thermo dynamics. Heat of reactions- Hess's law of constant heat summation-adiabatic process and Isothermal -process- $C_p-C_v= R$ for an ideal gas-Joule Thompson effect- heat of formation- heat of combustion-heat of dilution- Gibb's Free energy and Helmholtz free energy.

REFERENE BOOKS:

1. V. Raghavan, Material science and engineering, Prentice-Hall of India pvt Ltd., New Delhi, 2000.
2. W.D.Kingary, H.K.Bowen and D R Uhlmann, Introduction to Ceramics, John wiley and son's, 1965.
3. L.H.Vanvlack, Physical ceramics for engineers, Addison Wesley, Massachusetts, 1964.
4. L.H.Vanvlack, Materials Science for engineers, Addison Wesley, Massachusetts, 1985.
5. B.S.Bahl&G.D.Thtuli, Essentials of physical chemistry, 22nd edition, S.Chand and Co. ltd, New Delhi, 1986.

Unit Test Syllabus

Year/ Semester	Unit Test	Syllabus
Seventh semester	Unit Test-I	1. Atomic structure 2. Chemical bonding 3. Crystal structures 4. Structure of solids 5. Crystal imperfection
	Unit Test-II	6. Diffusion in solids 7. Phase rule and phase diagram 8. Phase transformations 9. Colloidal state 10. Thermodynamics

State Board of Technical Education and Training

Andhra Pradesh::Vijayawada

Govt. Institute of Ceramic Technology (Autonomous)

Gudur, SPSR Nellore-524101

C-20, Model paper

VII Semester – Unit -I

Subject Name: Ceramic Science

Course Code: CER-7214

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Explain space lattice and unit cell?
2. Draw the SC, BCC and FCC?
3. Distinguish the crystalline and non-crystalline materials?
4. Draw and explain structure of silica and silicates?
5. Draw the miller indices [111], [101] and [001] planes?

PART- B

Marks: 3 x 8=

24

Answer all questions. Each question carries eight marks.

6. A). Draw the structure of spinel?

(OR)

- B). Describe in detail X-ray diffraction by Bragg's method?
7. A). Explain with neat sketch X-ray diffraction by powder method?

(Or)

- B). Draw and explain the structure of NaCl?
8. A). How to determine the packing density of crystals? Draw the end centre cube?

(Or)

- B). Name the types of bonds and explain four of it? Give examples?

**State Board of Technical Education and Training
Andhra Pradesh::Vijayawada**

Govt. Institute of Ceramic Technology (Autonomous)

Gudur, SPSR Nellore-524101

C-20, Model paper

VII Semester – Unit -II

Subject Name: Ceramic Science

Course Code: CER-7214

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Name crystal imperfections?
2. Explain Fick's first law of diffusion?
3. Define the colloids and write the types of colloids?
4. Explain the gold number?
5. What is glass transition temperature?

PART- B

Marks: 3 x 8=

24

Answer all questions. Each question carries eight marks.

6. A). Prove the equation of $C_p - C_v = R$?

(OR)

- B). State and explain the Joule-Thomson effect?

7. A). Explain with neat sketch Frankel and Schottky imperfection?

(Or)

B). Draw and explain the Burger vector and Burger circuit?

8. A). Draw the binary diagram of Al_2O_3 and SiO_2 ?

(Or)

B). What is phase transformation and write types of phase transformation methods?

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY

GUDUR-524101: SRI POTTI SREERAMULU NELLORE DISTRICT, A.P

Autonomous Institution Vide G.O.Ms.No. 214/Edn, (TE-I Dept.) 05-10-1996

VII-Semester Examination (MPEC) for 3½ Year Diploma in Ceramic Technology

COURSE CODE: CER-7214 COURSE NAME: **CERAMIC SCIENCE**

TIME: 3 Hours

Max Marks: 80

C-20

PART – A

10 X3 = 30

Instructions: *Part A consists of 10 questions. Answer all questions and each question carries three marks.*

1. Define Electronegativity?
2. Which type of chemical bond do ceramics have? Write about Hydrogen Bond?
3. Define Unit cell?
4. Draw BCC structure?
5. List the Point imperfections?
6. What is vacancy diffusion?

7. State Gibb's Phase rule?
8. Define Glass transition?
9. What is Gold number?
10. Write First law of thermodynamics?

PART – B

5 X 8 = 40

Instructions: *Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.*

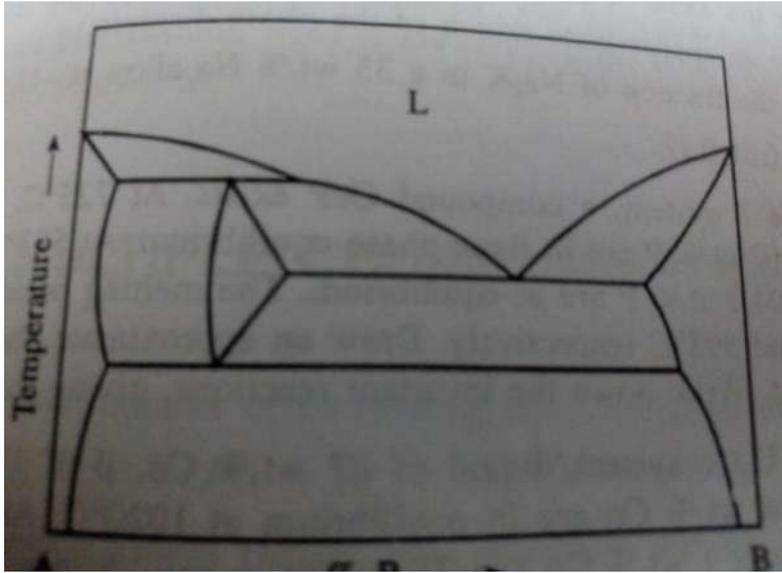
11. (A) How to determine structure by Bragg law of X-ray diffraction?
(or)
(B) Calculate the Packing Factor of FCC?
12. (A) Explain the structure of NaCl?
(or)
(B) Explain the structure of Spinal($MgAl_2O_4$)?
13. (A) Explain Line imperfections?
(or)
(B) Explain about Grain boundaries and stacking faults?
14. (A) Explain about Fick's first law and Second law of diffusion?
(or)
(B) Write short notes on (a) Ring mechanism (b) Interstitial diffusion
15. (A) What is Phase transformation? Explain about Nucleation and Growth?
(or)
(B) Explain about Recovery, Recrystallization and Grain growth?

PART – C

1X 10 = 10

Instructions: *Part C consists of 1 question which carries 10 marks.*

16. In the binary phase diagram given below, mark the various phase fields. Suggest all the invariant reactions that occur, stating their names



ADVANCED CERAMICS

SUBJECT TITLE : **ADVANCED CERAMICS**

SUBJECT CODE : **CER - 7401**

PERIODS/WEEK : **05**

PERIODS/SEMESTER : **75**

TIME SCHEDULE

S. No	Major Topics	No. of Periods	Weight age of marks	No. of Short Answer Questions (3M)	No. of Essay type Questions (8 M)	No. of Essay Type Questions (10M)
1	Introduction To Advanced Ceramics	04	03	01	--	
2	Structural Ceramics	15	11	01	01	
3	Electrical BehaviorOf Ceramic Materials	13	24	02	01	01
4	Dielectric BehaviorOf Ceramic Materials	12	14	02	01	
5	Magnetic And Optical BehaviorOf Ceramics	12	11	01	01	
6	Bioceramics	09	06	02	--	

7	Ceramic Composites	10	11	01	01	
TOTAL		75	80	10	05	01

Course Objectives and Course Outcomes

Course Objectives		Upon completion of the course the student shall be able to: Get knowledge on ceramics that are used for Structural, electrical, magnetic, bio applications	
Course contents		Upon completion of the course the student shall be able to:	
	CO1	CER-7401.1	Comprehend on advanced ceramics
	CO2	CER-7401.2	Classify advanced ceramics, thermal and mechanical properties
	CO3	CER-7401.3 CER-7401.4	Acquire knowledge on electrical and dielectric properties of ceramics
	CO4	CER-7401.5	Learn the concepts the magnetic and optical properties of ceramics
	CO5	CER-7401.6 CER-7401.7	Comprehend on Bioceramics and ceramic composites

PO-CO Mapping

Course Code: 7401		Course Title: ADVANCED CERAMICS			No of Periods: 75
PO No	Mapped with CO no	CO Periods addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1,CO2	25	33.33	2	>40% Level 3 Highly addressed
PO 2	CO2,CO3,CO4,CO5	40	53.33	3	25% to 40% Level 2 Moderately Addressed
PO 3					5 to 25% Level 1 Low addressed
PO 4					

PO 5					<5% Not addressed
PO 6					
PO 7	CO3,CO4,CO5	10	13.33	1	

3: High, 2: Moderate,1: Low

Blue Print of a Question Paper

S. No	Chapter Name	Periods Allocated	Weightage Allocated	Marks Wise Distribution of Weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Introduction To Advanced Ceramics	04	03		03				1			CO2,CO3
2	Structural Ceramics	22	11		03		08		1		1	CO2,CO3,CO4
3	Electrical BehaviorOf Ceramic Materials	13	24	03	03	08	10	1	1	1	1	CO4,CO5
4	Dielectric BehaviorOf Ceramic Materials	12	14		06	08			2	1		CO5,CO6
5	Magnetic And Optical BehaviorOf Ceramics	7	11		03	08			1	1		CO5
6	Bioceramics	7	06		03	03			1	1		CO5
7	Ceramic Composites	10	11		03	08			1	1		CO5
TOTAL		75	80	03	24	35	18	1	8	5	2	

R-Remember; U-Understanding; Ap-Application ; An- Analysing

Learning Outcomes

Upon on completion of the course the student shall be able to:

1.0 INTRODUCTION TO ADVANCED CERAMICS:

- 1.1 Define the term Advanced Ceramics
- 1.2 Difference between Advanced Ceramics and Traditional ceramics
- 1.3 Know the Importance of Technical ceramics
- 1.4 List the properties and uses of Technical Ceramics.

2.0 STRUCTURAL CERAMICS:

- 2.1 List the different types of New Ceramics according to their Function.
- 2.2 Write the advanced powder preparation techniques
- 2.3 Describe the Major Compaction Techniques used for Ceramic Fabrication.
- 2.4 Draw the flow sheet for fabrication by pressing method.
- 2.5 Explain the process of Uniaxial, Isostatic, Hot pressing, Hot Isostatic pressing of ceramic products, Tape casting/Doctor blade, Injection molding.
- 2.6 List the Properties of Structural Ceramics.
- 2.7 Describe Mechanical properties of Structural Ceramics such as Elastic properties/Modulus of elasticity, Brittle Fracture, Fracture Toughness, Toughening Mechanism, Strength of ceramics, Hardness,
- 2.8 Explain the Creep and its measurements and Fatigue of Ceramics.
- 2.9 Write the Thermal properties of New Ceramics such as Thermal stress, Thermal shock, Thermal Conductivity and Thermal expansion.

2.11 OXIDES CERAMICS

- 2.11.1 List of Ceramic/Refractory Oxides having Melting Point above 1500⁰ C.
- 2.11.2 Explain the Alumina Ceramics - its Mineralogical properties and Applications.
- 2.11.3 List the types of Alumina used in Alumina ceramics manufacture.
- 2.11.4 Write the Electrical and Electronics applications of Alumina Ceramics.

- 2.11.5 Explain the Chemical, Mechanical applications of Alumina Ceramics.
- 2.11.6 Know the Properties and application of Zirconia Ceramics including - Stabilized Zirconia.
- 2.11.7 List the Raw material for Automotive Components like ceramic engines etc...
- 2.11.8 Know the production process of Alumina for ceramic engines.
- 2.11.9 Know the Role of Zirconia in automotive industry
- 2.11.10 Know the Advantages of advanced ceramics for car engines.
- 2.11.11 Know the Classification of Advance ceramic material for automobile engines.
- 2.11.13 Know beryllia and Magnesia ceramics

2.12 NON-OXIDES CERAMICS

- 2.12.1 List of important non-oxide ceramics materials.
- 2.12.2 Know the manufacturing, applications and properties of Silicon Carbide.
- 2.12.3 Know the manufacturing, applications and properties of Silicon Nitride.
- 2.12.4 Know the Si C Engine components.
- 2.12.5 Know the Si_3N_4 based ceramics as engine parts.
- 2.12.6 Know the Comparisons of silicon carbide and Silicon Nitride for application in car engine.
- 2.12.7 Know the Potential advance ceramic application in Internal combustion engines.
- 2.12.8 Know the manufacturing, applications and properties of SIALON.
- 2.12.9 Know the manufacturing, applications and properties of Boron Nitride.
- 2.12.10 Know the Cermets and their types and applications.
- 2.12.11 Know the Comparison of the above industrial ceramics in respect of physical and mechanical properties.

3.0 ELECTRICAL BEHAVIOR OF CERAMIC MATERILS

- 3.1 List the Electrical properties of Ceramic materials.
- 3.2 Write the Fundamentals and Definitions of Electricity.

- 3.3 Know the Electronic Conductivity, Ionic Conductivity.
- 3.4 Describe Mechanisms of Ionic Conductivity.
- 3.5 Know the different applications of Ionically conductive Ceramics.
- 3.6 Explain the energy bands in a insulator.
- 3.7 List the Applications of as an Electrical Insulators.
- 3.8 Define the term Semiconductor.
- 3.9 Know the Mechanisms and application of Semiconductor.
- 3.10 Definition of Superconductivity.
- 3.11 Know the Messiner effect of Superconductivity.
- 3.12 Explain the Characteristics and applications of Superdutor.

4.0 DIELECTRIC BEHAVIOUR OF CERAMIC MATERIALS:

- 4.1 List the Dielectric properties of Ceramic Materials.
- 4.2 What isPolarization.
- 4.3 Know the mechanisms of polarization.
- 4.4 Describe the Dielectric Constant, Dielectric Strength, Dielectrics Loss and Capacitance.
- 4.5 Write the History and functions of a Capacitor.
- 4.6 Know the Mechanism of High Dielectric Constant.
- 4.7 List the types of Capacitors.
- 4.8 Definition of Electrocermics.
- 4.9 Definitions of Electrocermics such as Piezoelectric, Pyroelectricity and Ferroelectric.
- 4.10 List the types of Ferroelectric Crystals.
- 4.11 Describe the Applications of Ferro electricity and Piezoelectricity.

5.0 MAGNETIC AND OPTICAL BEHAVIOR OF CERAMICS:

- 5.1 Describe the Magnetic behavior of Materials.

- 5.2 Write the Source of Magnetism
- 5.3 Know the Terminology of magnetic ceramics.
- 5.4 List the Applications of Magnetic Ceramics
- 5.5 Write the classification of Ferrites.
- 5.6 Explain the process of Manufacture of Ferrites and its specific applications.
- 5.7 Know the optical behavior of materials.
- 5.8 Know the Lasers and their application in communication systems.

6.0 BIOCERAMICS:

- 6.1 Define the term Bioceramics.
- 6.2 List the Biomaterials and their fields of applications.
- 6.3 Explain the Ceramic Bones.
- 6.4 Know the Relevance of Bioceramics.
- 6.5 Know the Ceramic devices and Industrials.
- 6.6 Know the ceramic coatings, ceramic composites, Bioglass.
- 6.7 Know the Carbon and its composites

7.0 CERAMIC COMPOSITES:

- 8.1 Define the term Composites.
- 8.2 Classification of Composites.
- 8.3 Know the different Fibers as composite material such as Glass fibers, Carbon fiber
- 8.4 Know the Silicon Carbide Fiber and Alumina Fiber.
- 8.5 Compare the properties and applications of different fibers.
- 8.6 List the Ceramic matrix uses as high temperature composites and properties of Ceramic Matrix materials
- 8.7 Describe the Glass-Ceramics as composite material.
- 8.8 Explain the Carbon-Carbon as composite material.
- 8.9 Know the Nanocomposites.

8.10 Know the Joining of Ceramics, Sealing Glasses and Ceramic Adhesives.

COURSE CONTENT:

1.0 INTRODUCTION: Definition of Technical/Advanced Ceramic Materials- Economic importance of Technical Ceramics/Advanced Ceramics- Important uses and Applications of Technical ceramics- industry of Ceramic Segments with common examples- properties of Technical Ceramics- General characteristics of Ceramics- Future of Advanced ceramics.

2.0 STRUCTURAL CERAMICS:

Types of New Ceramics according to their function- Characteristics of High temperature Ceramics-Properties of Structural Ceramics- Mechanical properties of Structural Ceramics such as Elastic properties/Modulus of elasticity- Brittle Fracture- Fracture Toughness- Toughening Mechanism- Strength of ceramics- Hardness- Creep and its measurements- Fatigue of Ceramics- Thermal properties of New Ceramics such as Thermal stress-Thermal shock- Thermal Conductivity and Thermal expansion- Major Compaction Techniques used for Ceramic Fabrication- idea of flow sheet for fabrication by pressing- Uniaxial- Isostatic-Hot pressing-Hot Isostatic pressing of ceramic products-Tape casting/Doctor blade- Injection molding- High Temperature Ceramics: OXIDES - list of refractory Oxides having Melting Point above 1500°C - Alumina Ceramics - its Mineralogical properties and Applications, Electrical and Electronics applications of Alumina Ceramics- Chemical applications of Alumina Ceramics- Mechanical applications of Alumina ceramics- Properties and application of Zirconia, Alumina, Zirconia as high temperature parts-Magnesia- Beryllia Ceramics- High Temperature Ceramics: NON-OXIDES- list of important non-oxide ceramic materials-manufacturing- applications and properties of Silicon Carbide- manufacturing-applications and properties of Silicon Nitride- manufacturing-applications and properties of SiALON-manufacturing- applications and properties of Boron Nitride-Cermets and their types and applications.

3. ELECTRICAL BEHAVIOR OF CERAMIC MATERIALS: Electrical properties of Ceramic materials- fundamentals and Definitions of Electricity- Electronic Conductivity- Ionic Conductivity- Mechanisms of Ionic Conductivity- different applications of Ionically conductive Ceramics- energy bands in a insulator- materials and applications of as an Electrical Insulators- Define the term Semiconductor- Mechanisms of Semiconductor- applications of Ceramic Semiconductors- definition of Superconductivity- Messiner effect – type I and Type II superconductors- Characteristics of Superconductor- Applications of Superconductors.

4. DI-ELECTRIC BEHAVIOUR OF CERAMIC MATERIALS: Dielectric properties of Ceramic Materials- Polarization- mechanisms of polarization- the Dielectric Constant- Dielectric Strength- Dielectrics Loss- Capacitance- functions of a Capacitor- History of capacitors-Mechanism of High Dielectric Constant- types of Capacitors- definition of Electroceramics- definitions of Electro ceramics such as Piezoelectric- Pyroelectricity and Ferroelectric- Piezoelectricity- Pyroelectricity- Ferroelectricity- types of Ferroelectric Crystals- polycrystalline Ferroelectrics- Applications of Ferroelectricity and Piezoelectricity.

5. MAGNETIC AND OPTICAL BEHAVIOR OF CERAMICS: Magnetic behavior Materials- source of Magnetism- terminology of magnetic ceramics- applications of Magnetic Ceramics- classification of Ferrites, process of Manufacture of Ferrites- Optical behavior of materials- properties such as Absorption and Transparency- Color-Phosphorescence and Index of refraction- Lasers-Electro-Optics/Fiber optics and Integrated Optics.

6. BIOCERAMICS: Bioceramics- Biomaterials and their fields of applications- Ceramic Bones- Relevance of Bioceramics- Ceramic devices and Industrials- ceramic coatings- ceramic composites- Bioglass- carbon and its composites.

7. CERAMIC COMPOSITES: Definition of Composites, Classification Composites- Fibers as composite material such as Glass fibers- Carbon fiber- Silicon Carbide Fiber and Alumina Fiber- comparison of Fiber properties-

Ceramic Matrices uses as high temperature composites- Ceramic Matrix materials-Glass-Ceramics as composite material-Carbon-Carbon as composite material- Nanocomposites- Joining of Ceramics- Sealing Glasses- Ceramic Adhesives- applications of composites.

Understand Nanomaterial and advantages and future prospects etc.

REFERENCE BOOKS:

2. Waye B.E. - Introduction Technical Ceramics Maclaren and sons Limited, London. 1967.
2. Norton F.H. - Fine Ceramics - Technology and Applications Mc Grow Hills, London, New York.1970
3. D W Richardson, Modern Ceramic Engineering, Marcel Dckker Inc., New York, 1992 (Page no. 204 for 3.0 objective and page no.251 for 4.0 objective and page no.286 for 5.0 objective)
4. S.Kumar, Hand Book of Ceramics Vol.IV, Kumar and Associate, Calcutta,1997
5. Advanced Ceramic Technology vol. I By.Dr.SK Banerjee. (for 6.0 and 7.0 objectives).
6. An introduction to High temperate Composite Materials by B.K. Sarkar (for 8.0 objective).
7. Michel W. Barsoum, Fundamentals of Ceramics, McGraw Hill Companies, Inc., New Delhi, 1997.
8. WD Kingery, H K Bowen and D R Uhlmann, Introduction to Ceramics, John Wiley and sons, 1965.

Unit Test Syllabus

Year/Semester	Unit Test	Syllabus
SEVENTH SEMESTER	Unit Test-I	1.Introduction to Advanced Ceramics 2.Structural Ceramics 3.Electrical Behavior of Ceramic materials
	Unit Test- II	4.Dielectric Behavior of ceramic materials 5.Magnetic and Optical behavior 6.Bioceramics 7.Ceramic composites

State Board of Technical Education and Training

Andhra Pradesh::Vijayawada

Govt. Institute of Ceramic Technology (Autonomous)

Gudur, SPSR Nellore Dist

C-20,Model paper

VII Semester - I Unit

Subject Name: Advanced Ceramics

Course Code: CER-

7401

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Fill in the Blanks

- a) _____ one of the Non oxide Ceramics
- b) Sol-gel is used to Synthesis the Non oxide Ceramics Powder (True or False)
- c) The ratio of Stress to Strain till the elastic limit is called _____
- d) Fully stabilized zirconia is a ionically Conductivity Ceramic (True or False)

2. Define advance Ceramic & write its Classification?

3. Define thermal Conductivity, thermal Expansion and thermal shock Resistance?

4. State any six Oxide Ceramics?

5. Define cermets? Write its application?

PART- B

Marks: 3 x 8=

24

Answer all questions. Each question carries eight marks.

6. (A) Describe Synthesis methods of advance ceramic powders?

(OR)

(B) Explain about Hot Isostatic process?

7. (A) Describe the making of the sheets by Doctor Blade method?

(OR)

(B) write the properties and uses of alumina ceramics?

8. (A) How to manufacture Sic?

(OR)

(B) Write the Properties and uses of Si_3N_4 ?

State Board of Technical Education and Training
Andhra Pradesh::Vijayawada
Govt. Institute of Ceramic Technology (Autonomous)
Gudur, SPSR Nellore Dist
C-20, Model paper
VII Semester - II Unit

Subject Name: Advanced Ceramics
7401

Course Code: CER-

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Fill in the Blanks

- a) Super conductors have Zero resistance (True or False)
- b) Which of the following have high dielectric Consistencies
1.Mgo 2.Cao 3. BaTio₃ 4.Sio₂
- c) The temperature at which Ferromagnetic changes into Paramagnetic is called _____
- d) Alumina is a important Bio-Ceramics(True or False)

2. State BCS theory?

3. Write the application of super conductor?

4. Define piezoelectricity and pyroelectricity?

5. Define composite? Write its classification?

PART- B

Marks: 3 x 8= 24

Answer all questions. Each question carries eight marks.

6. (A) what is Semiconductor? Explain about p-type & n-type semi-conductor?

(OR)

(B) Describe about dielectric properties of ceramics?

7. (A) Define Ferrites? Classify Ferrites? Draw a flow sheet for manufacturing of Ferrites?

(OR)

(B) Define Bio-ceramics? Write its applications?

8. (A) Describe manufacturing of Carbon fiber?

(OR)

(B) Explain the mechanism of high dielectric constancy of BaTiO₃?

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY

GUDUR-524101:SRI POTTI SREERAMULU NELLORE DISTRICT, A.P

Autonomous Institution Vide G.O.Ms.No. 214/Edn, (TE-I Dept.) 05-10-1996

VII-Semester Examination (MPEC) for 3½ Year Diploma in Ceramic Technology

COURSE CODE: CER-7401

COURSE NAME: **ADVANCED CERAMICS**

TIME: 3 Hours

Max Marks: 80

C-20

PART – A

10 X3 = 30

Instructions: *Part A consists of 10 questions. Answer **all** questions and each question carries **three** marks.*

1. Define the term Advanced ceramics?
2. Write the classification of Advanced ceramics?
3. State Messiner effect?
4. Write the Applications of Super conductors?

5. Define Dielectric constant?
6. State Piezoelectricity?
7. What is Ferromagnetism?
8. Write the types of Bioceramics?
9. Write the applications of Bioceramics?
10. Define the term Composite?

PART – B

5 X 8 = 40

Instructions: *Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 8 marks and may have sub questions.*

11. (A) How to shape advanced ceramics by Hot isostatic pressing?

(OR)

(B) Explain the thermal properties of ceramics?

12. (A) What is a Semiconductor? Write its types? List the applications of semiconductors?

(OR)

(B) Write Short notes on (a) Electronic conductivity (b) Ionic conductivity

13. (A) Explain in detail about Dielectric properties of ceramics?

(OR)

(B) Describe Mechanism of High Dielectric constant?

14. (A) Explain the process of manufacture of Ferrites?

(OR)

(B) Write the Classification and applications of Magnetic ceramics?

15. (A) Explain the manufacturing of Glass fiber?

(OR)

(B) Write about Carbon- carbon composite material?

PART – C

1X 10 = 10

Instructions: *Part C consists of 1 question which carries 10 marks.*

16. Draw energy band diagram of Insulator, Conductor and semiconductor? Why different materials have different band gaps? How the band gap is related to conductivity?

-oOo-

SPECIAL GLASSES & ENAMELS

SUBJECT TITLE : **SPECIAL GLASSES & ENAMELS**

SUBJECT CODE : **CER-7402**

PERIODS/WEEK : **5**

PERIODS/SEMESTER : **75**

TIME SCHEDULE

S.No	Major Topics	Periods	Weightage of Marks	Short Answer questions (3M)	Essay type Questions (8M)	Essay Type Questions (10M)
1.	Heat Resistance of Glass	10	11	01	01	-
2.	Fiber glass	10	11	01	01	-
3.	Glass ceramics	08	11	01	01	-
4.	Optical Glass	08	03	01	-	-
5.	Introduction of Enamels	02	03	01	-	-
6.	Raw Materials	08	11	01	01	-
7.	Pre-Treatment of metals and non-Metals	10	13	01	-	01
8.	Enamels- Glass composition	08	03	01	-	-
9.	Frit making	08	11	01	01	-

10	Application and Firing	03	03	01	-	-
	Total	75	80	10	05	01

Course Objective and Course Outcome

Courses Objectives	Upon Completion of the Courses the student be able to understand the (i) Manufacturing, Properties and uses of various types of Special Glass.. (ii) Manufacturing of different Enamels		
Courses Contents	Upon Completion of the Courses the student be able to		
	CO1	CER-7402.1 CER-7402.2	Describe the Manufacturing of Heat resistance glass and fiber glass
	CO2	CER-7402.3 CER-7402.4	Acquire knowledge on manufacturing of Glass-ceramics and optical glass
	CO3	CER-7402.5 CER-7402.6	Draw Layout and Site Selection of Modern Enamel plant and comprehend on Raw materials used for making of Enamels.
	CO4	CER-7402.7 CER-7402.8	Learn Pre-treatment of Metal surface for Enamelling and composition of enamel coatings
	CO5	CER-7402.9 CER-7402.10	Evaluate the manufacturing methods of frit, application methods and firing

PO-CO Mapping

Course Code :CER-7402		Course Title : Special glass & Enamels		No. of. Periods: 75	
Pg. No	Mapped with Co No	Co Periods addressing Po In Co/1		Level (1,2,3)	Remarks
		No	%		
Po1	CO1,CO2,CO3,CO4,CO5	26	35	2	>40% Level 3 High addressed 25% to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <% Not addressed
Po2	CO1,CO2,CO4,CO5	40	53	3	
PO3	CO1,CO3,CO5	09	12	1	
PO4					
PO5					
PO6					
PO7					

Blue Print of the question Paper

S.No	Chapter Name	Period Allocated	Weighted Allocated	Marks Wise Distribution of weightage				Question Wise Distribution of Weightage				CO's Mapped
				R	U	AP	AN	R	U	AP	AN	
1	Heat Resistance of Glass	10	11	-	03	-	08	-	01	-	01	CO1,CO2, CO3,CO4
2	Fiber glass	10	11	-	08	03	-	-	01	01	-	CO2,CO4
3	Glass ceramics	08	11	03	-	08	-	01	-	01	-	CO1,CO3
4	Optical Glass	08	03	-	03	-	-	-	01	-	-	CO2,CO4
5	Introduction of Enamels	02	03	03	-	-	-	01	-	-	-	CO4,CO5, CO6
6	Raw Materials	08	11	-	08	03	-	-	01	01	-	CO1,CO3
7	Pre-Treatment of metals and non-Metals	10	13	-	03	10	-	-	01	01	-	CO2,CO5
8	Enamels- Glass composition	08	03	03	-	-	-	01	-	-	-	CO2,CO3, CO5
9	Frit making	08	11	-	-	03	08	-	-	01	01	CO3,CO4
10	Application and Firing	03	03	03	-	-	-	01	-	-	-	CO3,CO5
	Total	75	80	12	25	27	16	04	05	05	02	

R-Remember u-understand Ap - Application An- Analyzing

OBJECTIVES: *On completion of the course, the student should be able to know the following:*

1.0 HEAT RESISTANT GLASSES.

- 1.1 Introduction of Heat resistant Glasses.
- 1.2 Describe in detail composition, Manufacturing, Properties and uses of Boro-silicate Glasses, Pyrex glasses, Jena Glass, Sial glasses, Vycor Glass, 96./ . Silica Glass, Neutral Glass, Water Glass, Gorilla Glass and Bio Glass.
- 1.3 List the glasses for Electrical and electronic industries

2.0 FIBRE GLASS:

- 2.1 Introduction.
- 2.2 Describe in detail Chemical composition of different types fiberglass like S,H,Eand C Glass.
- 2.3 Explain the manufacturing methods of different Fiber Glass.
- 2.4 Describe the preparation of Cerawool and matt products.
- 2.5 Explain various insulating methods of fiberglass.
- 2.6 Applications of Fiberglass-Reinforced plastics.
- 2.7 Explain the properties of Fiberglass.

3.0 GLASS-CERAMICS:

- 3.1 Know the introduction.
- 3.2 Explain the Glass-Ceramic manufacturing process.
- 3.3 Describe the Nucleation and Growth..
- 3.4 Know the systems containg SiO_2 - Al_2O_3 - LiO_2 . .
- 3.5 Know the systems of MgO - Al_2O_3 - SiO_2
- 3.6 Know the functions of the Nucleating agents, like Au, Cu, TiO_2 , ZrO_2 , Cr_2O_3 , P_2O_5 , Y_2O_3 .

4.0 OPTICAL GLASSES:

- 4.1 Know the introduction.
- 4.2 Explain the methods of manufacture of Crown, Flint Photosensitive and ophthalmic glass.
- 4.3 Explain the Composition, manufacturing, Properties and uses of optical glasses
- 4.4 Describe in detail the breaking up and molding the of optical glass.

ENAMELS:

5.0 INTRODUCTION.

- 5.1 Know the position of Enamel industry in India.
- 5.2 Draw the layout of Modern Enamel plant.

6.0 RAW MATERIALS.

- 6.1 Classify the Enamel Compositions.
 - 6.2 List raw materials used in enamels.
 - 6.3 List the fundamental consideration of enamels Sheets.
 - 6.4 List the types of metals used for enameling.
- 6.5 Describe in details Preparation of Metal shapes for enameling.

7.0 PRE TREATMENT OF METAL AND NON-METAL SURFACES.

- 7.1 Describe in detail preparation of Metalsurface for Cast iron enameling.
- 7.2 Explain the blasting processes.
- 7.3 Explain the methods of cleaning of sheet iron for enameling.
- 7.4 Explain the theory of chemical cleaning, theory of pickling, H₂SO₄pickling.,HCl pickling, phosphoric Acid pickling, Ferric sulphate pickling.
- 7.5 Describe the preparation of metal surface for enamelling.
- 7.6 listthe equipment required for Pickling operation
- 7.7 Describe in detail Nickel Dip operation and de-enameling process.

8.0 ENAMEL - GLASS COMPOSITIONS:

- 8.1 Describe in detail various types of coatings applied upon the metal sheet for enameling.
- 8.2 Explain the coloured Enamels for sheet iron.

8.3 Describe in detail Process of making Beading enamels, jewelry enamels, and copper enamels.

8.4 Describe in detail Decoration Techniques.

9.0 FRIT MAKING:

9.1 Describe in detail receiving and storage of batch materials, weighing, mixing and Smelting of Frit Batch.

9.2 Explain the Reactions taking place during smelting.

9.3 Describe the process of quenching and drying.

9.4 Know the types of driers like, stationary, and rotary etc.

9.5 Explain the various types of smelters on detailed (i.e.) Crucible, Hearth, Rotary, Continuous furnace and Electric smelters.

9.6 Describe the milling, mill addition and milling equipment.

9.7 Write the classification of mill additions like suspending agent, opacifiers, colors and electrolytes

.

10.0 APPLICATION AND FIRINGS.

10.1 Describe in detail application of enamel slip upon the metal surface.

10.2 Drying of applied ware.

10.3 Theory of adherence\

10.4 Explain the wet process cast iron enamels and dry process cast iron enamels.

10.5 Effect of furnace atmosphere.

10.6 Behavior of enamel during firing.

10.7 Describe in detail the Box type, Intermittent and Modern muffle, continuous furnaces,

10.8 Describe the Heat transfer and distribution methods of heat transfer and criteria of selection of design and materials for construction.

10.9 List the Defects and analyze the causes and remedies.

COURSE CONTENT:

- 1.0 HEAT RESISTANT GLASSES:** Chemical composition and importance of Borosilicate glass- Pyrex- Jena glass- Sail glass- Vycor Glass- neutral glass- sintered glass- Silica Glass and 96% Silica glass, photosensitive glass. Glass for Electrical and Electronic Industries- Lampshells-electron tubes- T.V.tube- T.V. Shells- Glasses used in microwave oven- Bioglass- Gorilla glass.
- 2.0 FIBRE GLASS:** Glass compositions: A.E.S. and special fiber glass composition- Manufacturing method of fiber glass- mechanical drawing operation- steam or air blowing- flame blowing- surface coating and finishing- preparation of wool and mat products-Variou insulating methods of fiberglass- applications of fiber glass- reinforced plastics and properties of fiberglass.
- 3.0 GLASS CERAMICS:** Introduction- Glass ceramic process- melting and forming- nucleation and nucleating agents- crystallization- commercial application of glass ceramics- systems containing SiO_2 - Al_2O_3 - Li_2O and MgO - Al_2O_3 - SiO_2 .
- 4.0 OPTICAL GLASSES:** Introduction-methods of manufacture of Crown- flint and special compositions- Optical glass- preparation of batch materials- stirring and homogeneity of glasses- studding the breaking up and molding of glasses- annealing-. Ophthalmic glass-Photo chromic glass.

II ENAMELS:

- 5.0 INTRODUCTION:** Position of the Industry of Enamels in India- General Layout of Modern plants.
- 6.0 RAW MATERIALS:** Enamels- classification of raw materials- fundamentals consideration of enamels-types of metals- Cast-iron- sheet iron- enameling Iron- rimmed and killed- special steels-selections- forming and design of sheet iron parts- Aluminium- Alloys- Design of shapes- Aluminized steel- Jewellery metals- High temperature alloys for ceramic coating.
- 7.0 PRE TREATMENT OF METAL AND NON-METAL SURFACES:** Preparation of the surface of Cast Iron-blasting- abrasives- sand- steel grit- Cleaning methods for sheet iron- Theories and processes of Chemical Cleaning- pickling with acids- Equipment for continuous and Automatic cleaning- Sand blasting- Special processes – Neutralizing-Nickel Dip by Galvanic and Reduction methods- De-Enameling-Noble metals preparation-preparation of Aluminium Alloys.
- 8.0 ENAMEL GLASS COMPOSITION:** Classification of composition: sheet Iron - ground coat- one frit and multiple frit ground coats-white cover enamels- fluoride and low Antimony- acid resistant-high opacity-Zirconia-Titania- phosphate- molybdenum and cerium enamels-Colored enamels-beading enamels- Cost Iron - dry and wet process high lead- lead less- Antimony- Titania-Zirconia and colored Enamels- of Aluminium enamels like lead bearing- lead free- phosphate-Barium enamels-High temperature coatings-Jewellery and copper enamels- various methods of decoration-properties of enamels glasses-stress and strain- reflections- gloss- color-opacity etc.
- 9.0 FRIT MAKING:** Receiving and storage of batch materials- Smelting- Quenching and Drying: Types of driers- stationary and rotary- magnetic separation of iron impurities.
- Smelting furnaces- Crucible-Health- rotary and continuous furnace- electric smelting.

Milling and Mill additions- Mill rooms equipment- Milling operation and controls- mill additions- suspending agents-opacifiers-colors-electrolytes.

10.0 APPLICATIONS AND FIRING: Control of slips: Suspending agents- Application Methods and equipment: Dipping-Slushing- spraying- electrostatic spraying- spray booth-Drying- enamel dryers- stenciling and brushing- Firing operations: Firing schedule- gas evolution- adherence-wet process cast iron enamels-dry process cast iron enamels- properties of enamels during firing- Enameling Furnaces: Box type- Intermittent and modern muffle continuous furnaces-electrical muffle furnaces-Heat transfer and distribution methods of heat transfer-Selection of design and materials for construction.Blistering-Chipping-copper heading- crazing-eggshell-fishscale- Healing-Jumpingoff-reboiling-rusting-specking-tearing-warping- wavy surface- peeling-pinholes-casting crack- pop off etc.

REFERECE BOOKS:

1. TooleyFay.V., Hand book of Glass manufacture Vol. I and II, Ogden publishing company, New York.,1960
2. Lewis M H, Glasses and Glass-Ceramics, Chappeman and Hall, London, 1989.
3. Andrew. I, Andrews Enamels, The Garrard Press publisher, Champaign Illinois, U.S.A., 1949.
4. R Charan Hand Book of Glass Technology,
5. Chappeman and Hall, Schott Guide to Gss, 2nd edition, Chappeman and Hall, London, 1996.
6. Samuel R Scholes, Moderns Glass Practice, industrial publications, Inc., Chicago, 1952
7. A Paul, Chemistry of Glasses, 2nd Edition, Chappeman and Hall, New York, 1990.
8. M Cable and J M Pasrker, High Performance Glasses, Blackie, London, 1992
9. E B Shand, Glass Engineering Hand Book,3rd Edition, McGraw Hill book company, New York, 1958.
10. K L Loewenstein, The manufacturing Technology of companies Glass Fibers, Elsevier Scientific publishing co., England, 1973.

Unit Test Syllabus

Year/Semester	Unit Test	Syllabus
SEVENTH SEMESTER	Unit Test-I	1.Heat resistance of glass 2. Fiber glass 3. Glass-Ceramics 4. Optical glass
	Unit Test- II	5.Introduction of enamels 6.Raw materials 7. Pre-treatment of Metals and non-metals 8. Enamel-Glass compositions 9.Frit making 10. Application and Firing

State Board of Technical Education and Training

Andhra Pradesh::Vijayawada

Govt. Institute of Ceramic Technology (Autonomous)

Gudur, SPSR Nellore-524101

C-20, Model paper

VII Semester – Unit -I

Subject Name: Special Glasses & Enamels

Course Code: CER-7402

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Fill in the blanks
 - A. Borosilicate glass used for laboratory ware.....(True/False)
 - B. Colourless clear glass is called as.....
 - C. Optical glass contain glass defects.....(True/False)
 - D. Glass-Ceramics having thestructure.
2. Write importance of sial glass?
3. List the glasses for electrical and electronic industries?
4. Explain flame blowing?
5. Explain the properties of fibre glass?

PART- B

Marks: 3 x 8=

24

Answer all questions. Each question carries eight marks.

6. A). Explain nucleation and crystallization?

(OR)

- B). Write applications of fibre glass-re-inforeced plastics?

7. A). Explain with neat sketch $\text{SiO}_2 - \text{Al}_2\text{O}_3 - \text{LiO}_2$?

(Or)

- B). Describe in detail manufacturing of glass-ceramic process?

8. A). Explain the manufacturing method of optical glass?

(Or)

B). How to prepare wool and matt products?

State Board of Technical Education and Training

Andhra Pradesh::Vijayawada

Govt. Institute of Ceramic Technology (Autonomous)

Gudur, SPSR Nellore-524101

C-20,Model paper

VII Semester – Unit -II

Subject Name: Special Glasses & Enamels

Course Code: CER-7402

Time: 90 min

Max. Marks: 40

PART - A

16 Marks

Answer all questions. First question carries four marks and remaining questions carries three marks each.

1. Fill in the blanks
 - a) Glassy coating upon the metal surface is.....
 - b) Ground coat improves the adhering between metal and cover coat(True/False)
 - c) Pickling removes theupon the metal surface
 - d) Nickel dips are used for making single cover coat enamels(True/False)
2. Name types of metals used for enamelling?
3. What is ground coat and cover coat?
4. What is de-enamelling?
5. What is re-boiling?

PART- B

Marks: 3 x 8=

24

Answer all questions. Each question carries eight marks.

6. A). Explain H_2SO_4 picking operation?

(OR)

B). Suggest the ground coat composition for sheet iron enamels and explain function of each ingredient?

7. A). What is frit? Explain the making frit in rotary smelter?

(Or)

B). What is milling? Describe the milling operation in ball mill?

8. A). Name enamel defects and explain any three of them in detail?

(Or)

B). Name the types of kilns used in enameling industry and explain any two of them?

GOVERNMENT INSTITUTE OF CERAMIC TECHNOLOGY
GUDUR – 524101: SRI POTTI SREERAMULU NELLORE DISTRICT, A.P
Autonomous Institute Vide G.O.Ms.No. 214/ Edn, (TE – I Dept.) 05-10-1996
IIISemester Examination (MPEC) for 3 ½ Year Diploma in Ceramic Technology
COURSE CODE: CER – 7402 COURSE NAME: SPECIAL GLASS & ENAMLES
TIME: 3 HOUR Max.Marks: 80

PART – A 3 x 10 = 30 Marks

Note : 1. Answer all questions and each question carry THREE marks.

2. Answer should be brief and straight to the point and shall not exceed FIVE simple sentences.

17. What is Thirsty Glass?
18. What is Silane Coating?
19. What is meant by Nucleation and Growth?
20. How to perform Annealing of Optical Glass?
21. Draw the Layout of Modern Enamel plant?
22. What is Nickel Dips?
23. Classify the Enamels?
24. Suggest the Composition of jewelry enamels?
25. What is melting and smelting?
26. What is Ground Coat?

PART – B

5 X 8 = 40 Marks

Note : 1. Answer all questions and each question carry Eight marks.

2. The answer should be comprehensive and the criteria for valuation is the content but not the length of the answer.

27. A). What is Vycor Glass. Describe in detail manufacturing of Vycor glass?

(Or)

B). Write about

1) Boro- Silicate Glass

2) Water Glass

28. A) What is Fiber Glass. Describe in detail manufacturing process of Fiber Glass

(Or)

B) Write about

1) Cera Wool

2) E-glass

29. A).What is Glass - Ceramics. Describe in detail Manufacturing process of Glass- Ceramics?

(Or)

B).Write about

1) Crystallization

2) Nucleating Agent

30. A).Describe in detail Preparation of Metal surface for Enamelling?

(Or)

B).Write about

1) De-Enamelling

2) Beading Enamels

31. A) What is frit. Write the reasons for fritting. What is Quenching?

(Or)

B). Describe in detail manufacturing of the frit by using Rotary Smelter?

PART – C

1X 10 = 10

Instructions: Part C consists of One question which carries Ten marks.

16. Suggest the methods to remove rust on metal surface? Describe rust removal process in detail?

-oOo-

C LANGUAGE LAB

SUBJECT TITLE : **C LANGUAGE LAB**

SUBJECT CODE : **CER-7215**

PERIODS / WEEK : **06**

PERIODS / SEMESTER : **90**

COURSE CONTENTS:

1. Exercise to demonstrate C programmed structure, use of printf and scanf Functions
2. Exercise on If, If—else, Nested If else
3. Exercise on Switch and Break Statement
4. Exercise on 1 D Arrays using loops
5. Exercise on functions to demonstrate prototyping parameter passing, function Returning values
6. Exercise on structures
7. Exercise to demonstrate to use of pointers, Pointers as function arguments, functions
Returning pointers, pointers and structures.

COMPUTER APPLICATION PRACTICE IN CERAMIC INDUSTRY

SUBJECT TITLE	:	COMPUTER APPLICATION PRACTICE IN CERAMIC INDUSTRY
SUBJECT CODE	:	CER – 7216
PERIODS/ WEEK	:	4
PERIODS / SEMESTER	:	60

List of Experiments:

1. CAD
 - 1.1 To study the basics of Auto CAD
 - 1.2 To draw 2D ceramic drawing of Block diagram, plant lay out, machine and line
 - 1.3 To draw simple 3D ceramic

Products- i. Porcelain insulator

ii. Refractory products

1.4 To create realistic ceramic products

2. Furnace design by computer
3. Simple programming to calculate physical parameter density, porosity, CCS, MOR
4. Programming to converting chemical analysis to rational analysis and vice versa
5. Programming to calculate a batch
6. Calculate on batch white ware glazed and Refractories
7. Web page designing

7.1 HTML

7.2 Page designing containing images

7.3 Form

7.4 Frame

7.5 Flow chart for preparation of Insulators, Refractories.

GLAZETECHNOLOGY LAB

SUBJECT TITLE : GLAZETECHNOLOGY LAB

SUBJECT CODE : CER - 7404

PERIODS/ WEEK : 03

PERIODS / SEMESTER : 45

S.No	Major Components	Periods
1.	Prepare glaze the following body compositions A). Porcelain Body B). Earthen ware C). Stone ware D). Terracotta	06
2.	Find the rheological properties of prepare glaze	03
3.	Preparation of plaster of pariesmould for casting of articles	06
4.	Preparation of articles for glazing	06
5.	Glaze application over the prepared articles by using technique of brushing/ pouring/ dipping/ splashing/ painting/ printing	04
6.	Fired the glazed articles with suitable temperature	10
7.	Test the fired properties of pottery ware like MOR, W.A, B.D and abrasion, crazing, acid, stain proof resistance.	10
	Total	45

COURSE OBJECTIVES AND COURSE OUTCOMES

Courses Objectives	Upon Completion of the Courses the student be able to know the composition of body, preparation, applications and characteristics of glazes.		
Courses Contents	Upon Completion of the Courses the student be able to		
	C01	CER-7404.1	To understand different types of ceramic wares and its making characteristics
	C02	CER-7404.2	Analysis the rheological properties
	C03	CER-7404.3	Recollecting techniques which learned lower classes and prepared moulds.
	C04	CER-7404.4	Recollecting techniques which learned lower classes and prepared of ceramic articles.
	C05	CER-7404.5	Practice ethics and etiquette while working in art techniques over the ceramic articles
	C06	CER-7404.6	To know the firing process and cautions act on stipule the period
	C07	CER-7404.7	Analysis of end product of glazed ware.

PO-CO-Mapping

Course Code :CER-7404		Course Title : GLAZESTECHNOLOGY LAB		No.Of.Periods:45	
Pg.No	Mapped with Co No	Co Periods addressing Po In Co/1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1	06	14	2	>40% Level 3 High addressed 25% to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <% Not addressed
PO2	CO2	03	06	1	
PO3					
PO4	CO3,CO7	36	80	3	
PO5					
PO6					
PO7					

GLAZES:

1. Prepare glaze the following body compositions
 1. A). Porcelain Body
 2. B). Earthen ware
 3. C). Stone ware
 4. D). Terracotta

- 1.1 The glaze materials selected based their composition
- 1.2 In ceramic organization different types of body making methods are available
- 1.3 Selected composition
- 1.4 Make the glaze by raw material grinding techniques
2. Find the rheological properties of prepare glaze.
 - 2.1 Prepare glaze properties check with rheological
 - 2.2 Properties like density, viscosity, residue in the sense particle diameter
3. Preparation of plaster of pariesmould for casting of articles
 - 3.1 Take plaster of paries powder
 - 3.2 Sprinkled over the water bath
 - 3.3 Blending techniques give slurry
 - 3.4 Slurry poured in define cavity
 - 3.5 Find the shaped specified setting time
4. Preparation of plaster of pariesmould for casting of articles
 - 4.1 Finished plaster of paries cavity
 - 4.2 Raw materials forming into slurry
 - 4.3 Slurry poured over the cavity
 - 4.4 Soaking time has provided for formation layer
 - 4.5 Excess slurry drained and dried
 - 4.6 Finishing techniques apply to obtain fine end product
5. Glaze application over the prepared articles by using technique of brushing/ pouring/ dipping/ splashing/ painting/ printing.
 - 5.1 Prepared glaze coating on dried articles
 - 5.2 With selected technique
 - 5.3 Skill works has learned here Applying glaze
6. Fired the glazed articles with suitable temperature
 - 6.1 Green ware handling should care about article shape
 - 6.2 Article are kept in sager and fired
 - 6.3 Slow firing schedules has selected dependence upon body nature
7. Test the fired properties of pottery ware like MOR, W.A, B.D and abrasion, crazing, acid, stain proof resistance.
 - 7.1 Analyses the object characteristics
 - 7.2 Each test has conduct individual
 - 7.3 Results must compare with standard product
 - 7.4 It give the ideal of product in the market level

ENAMELS LAB

SUBJECT TITLE : ENAMELS LAB

SUBJECT CODE : CER –7405

PERIODS/ WEEK : 03

PERIODS / SEMESTER : 45

S.No	Major Components	Periods
1.	Cutting, Filing, Punching and Finishing of Sheet Metal	10
2.	Annealing and Scaling of Sheet Metal.	05
3.	Chemical treatment of Sheet Iron.	04
4.	Pickling with Sulphuric Acid and Pickling with Hydrochloric Acid.	04
5.	Nickel Dips, Neutralizing and Water rinsing of Pickled Sheet Iron.	04
6.	Prepare enamel slip with suitable composition and find rheological properties	10
7.	Prepare stencil with suitable design	04
8.	Application of enamel slip upon the ware by using the technique of brushing/pouring/dipping/splashing/printing/stickering	04
	Total	45

COURSE OBJECTIVES AND COURSE OUTCOMES

Courses Objectives	Upon Completion of the Courses the student be able to know the enamel making, application and decoration techniques		
Courses Contents	Upon Completion of the Courses the student be able to		
	CO1	CER-7403.1	Demonstrated that skills of planning and organizing the experimental set up to the applications of different techniques over metal surface
	CO2	CER-7403.2	Demonstrated the skills of planning and organizing engineering application
	CO3	CER-7403.3	Perform premix operations with the metal surface
	CO4	CER-7403.4	Analyses the experimental results to drawn inferences metal surface recommendations
	CO5	CER-7403.5	Practice ethics and etiquette while working in group and display metal surface nature
	CO6	CER-7403.6	Practice the slip making and find rheological properties
	CO7	CER-7403.7	Learning skills over creating new design
	CO8	CER-7403.8	Decoration skills development.

PO-CO Mapping

Course Code :CER-4703		Course Title :ENAME LAB		No.Of.Periods:45	
Pg.No	Mapped with Co No	Co Periods addressing Po In Co/1		Level (1,2,3)	Remarks
		No	%		
PO1	CO2	05	12	1	>40% Level 3 High addressed 25% to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed <% Not addressed
PO2	CO6	10	22	2	
PO3					
PO4	CO1, CO3- CO5,CO8	26	58	3	
PO5					
PO6	CO7	4	8	1	
PO7					

ENAMELS:

1. Cutting, Filing, Punching and Finishing of Sheet Metal
 - 1.1 Making metal substrate
 - 1.2 Make different unit operations
 - 1.3 Metal substrate should suitable for smooth
2. Annealing and Scaling of Sheet Metal.
 - 2.1 Metal substrate have face different stained
 - 2.2 Metal object heating taking process result phase stability
 - 2.3 From elevated temperature onwards temperature reach to ambient temperature
3. Chemical treatment of Sheet Iron.
 - 3.1 Metal object have corrosion
 - 3.2 Removing purpose different chemicals used for cleaning
4. Pickling with Sulphuric Acid and Pickling with Hydrochloric Acid.
 - 4.1 Metal object acid treatment has began
 - 4.2 First high concentrated acid clean the metal surface
 - 4.3 Deepens on finishing second stage acid treatment has began
 - 4.4 Later find the surface inspected further steps
5. Nickel Dips, Neutralizing and Water rinsing of Pickled Sheet Iron.
 - 5.1 Metal object get different coatings for neutralizing trace acids molecules
 - 5.2 Techniques help the metal give life in this service area
6. Prepare enamel slip with suitable composition and find rheological properties
 - 6.1 Understanding of different oxides and opacifiers and suspending agent's properties
 - 6.2 Constitute the different materials and formation of glass
 - 6.3 Enameling materials are milling

- 6.4 Testing rheological properties
- 7. Prepare stencil with suitable design
 - 7.1 Stenciling is techniques to form the design
 - 7.2 The design transform over the metal surface
- 8. Application of enamel slip upon the ware by using the technique of brushing/ pouring/ dipping/ splashing/ printing/stickering
 - 8.1 Stenciling design stamping by painting operation gives fine decoration
 - 8.2 It help to metal object retain a beautiful surface.