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

3 YEAR

DIPLOMA IN COMPUTER SCIENCE ENGINEERING (ARTIFICAL INTELLIGENCE)

CURRICULUM -2020

(C-20)

3 YEAR

DIPLOMA IN COMPUTER SCIENCE ENGINEERING (ARTIFICIAL INTELLIGENCE)

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING
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CURRICULUM -2020
(C-20)
FOR DIPLOMA COURSES IN ANDHRA PRADESH CURRICULUM- C 20

PREAMBLE

The State Board of Technical Education and Training, Andhra Pradesh under the aegis of the Department of Technical Education, Andhra Pradesh generally reviews the Curricula once in every five years. However, recognizing the needs of the industries and enhancing the employability skills of Polytechnic students, the 57th Board Meeting of SBTET, AP held on 05-02-2019 vide item no: 18 resolved for Updation of Polytechnic Curriculum with the guidance of National Institute of Technical Teachers Training & Research (NITTTR), Extension Centre, Vijayawada (ECV). Preliminary Evaluation of C-16 Curriculum was started in the month of June-2019 and feedback has been collected from students, Lecturers, Senior Lecturers, Head of Sections and Principals for all branches in C-16 Curriculum. Preliminary workshops were conducted with subject experts and prepared draft curriculum. Workshop has been conducted on C-20 Curriculum revision with Subject experts and Industrialists on 04-01-2020 and the suggestions from Industrialists have also been incorporated in the curriculum. The new Curricula for the different diploma courses have been designed with the active participation of the members of the faculty teaching in the Polytechnics of Andhra Pradesh, besides reviewed by Expert Committee constituted with eminent academicians.

The primary objective of the curriculum change is to produce best technicians in the country by correlating growing needs of the industries with the academic input.

This curriculum is designed to meet the requirements of NBA Accreditation.

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

Present system of C-20Curriculum:

1. Duration of course is either 3 years / 3½ years duration of Regular Academic Instruction.
2. The Curriculum is prepared in Semester Pattern. However, First Year is maintained as Year-wise pattern.
3. 6 Months is introduced for 3 years Diploma Courses and I year Industrial Training is introduced for 3 ½ years Sandwich Diploma courses.
4. Modern subjects relevant to the industry are introduced in all the Diploma courses.
5. CISCO course content has been incorporated into the ECE and CME and CME Allied courses those who are not getting Industrial Training Placement to get certification from CISCO along with Diploma.
6. 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 Supreme Court guidelines issued in Sri Mehta's case.
7. 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 the branches.

8. Modern topics relevant to the needs of the industry and global scenario suitable to be taught at Diploma level are also incorporated in the curriculum.
9. AutoCAD specific to the branch has been given more emphasis in the curriculum. Preparing drawings using CAD software has been given more importance.
10. 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 of Laboratories and Workshops, thus strengthening the practical skills.
11. 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 procedure based.
12. Curricula of Laboratory and Workshops have been thoroughly revised based on the suggestions received from the industry and faculty, for better utilization of the equipment available at the Polytechnics. The experiments /exercises that are chosen for the practical sessions are identified to confirm to the field requirements of industry.
13. 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.
14. The Members of the working group are grateful to Sri P.Bhaskar, I.A.S., Commissioner of Technical Education & Chairman of SBTET, AP. & Sri M.M.NAIK,I.A.S,Special Commissioner of Technical Education.and Sri. G. AnanthaRamu, I.A.S., Principal Secretary, Department of Skill development and Training for their guidance and valuable inputs in revising, modifying and updating the curriculum.
15. The Members acknowledge with thanks the cooperation and guidance provided by Sri. K VIJAYA BHASKAR, 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.

RULES AND REGULATIONS OF C-20 CURRICULUM

1 DURATION AND PATTERN OF THE COURSES

All the Diploma programs run at various institutions are of AICTE approved 3 years or 3½ years duration of academic instruction.

All the Diploma courses are run on year wise pattern in the first year, and the remaining two or two & half years are run in the semester pattern. In respect of few courses like Diploma in Bio-Medical course, the training will be in the seventh semester. Run-through system is adopted for all the Diploma Courses, subject to eligibility conditions.

2 PROCEDURE FOR ADMISSION INTO THE DIPLOMA COURSES:

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

a) 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, Vijayawada.

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

b) The candidates seeking admission should have appeared for S.S.C examination, conducted by the Board of Secondary Education, Andhra Pradesh or equivalent examination thereto, at the time of making application to the Common Entrance Test for admissions into Polytechnics (POLYCET). In case of candidates whose results of their Qualifying Examinations is pending, their selection shall be subject to production of proof of their passing the qualifying examination in one attempt or compartmentally at the time of admission.

c) 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.

d) For admission into the following Diploma Courses for which entry qualification is 10+2, candidates need not appear for POLYCET. A separate notification will be issued for admission into these courses.

i). D.HMCT ii).D. Pharmacy

3 MEDIUM OF INSTRUCTION

The medium of instruction and examination shall be English.

4 PERMANENT IDENTIFICATION NUMBER (PIN)

A cumulative / academic record is to be maintained of the Marks secured in sessional work and end examination of each year for determining the eligibility for promotion etc., A Permanent Identification Number (PIN) will be allotted to each admitted candidate to maintain academic records.

5 NUMBER OF WORKING DAYS PER SEMESTER / YEAR:

a). The Academic year for all the Courses shall be in accordance with the Academic Calendar.

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 / year shall be 90 / 180 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.

6 ELIGIBILITY OF ATTENDANCE TO APPEAR FOR THE END EXAMINATION

a). A candidate shall be permitted to appear for the end examination in all subjects, if he or she has attended a minimum of 75% of working days during the year/Semester.

b). Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester or 1st year may be granted on medical grounds.

c). A stipulated fee shall be payable towards condonation for shortage of attendance.

d). Candidates having less than 65% attendance shall be detained.

e). Students whose shortage of attendance is not condoned in any semester / 1st year and not paid the condonation fee in time are not eligible to take their end examination of that class and their admissions shall stand cancelled. They may seek re-admission for that semester / 1st year when offered next subsequent academic semester/year.

7 READMISSION

Readmission shall be granted to eligible candidates by the respective Principal/ Regional Joint Director.

a) (i) Within 15 days after commencement of class work in any semester (Except Industrial Training).

(ii) For Industrial Training: before commencement of the Industrial training.

b) Within 30 days after commencement of class work in any year (including D. Pharmacy course or first year course in Engineering and Non Engineering Diploma streams).

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.

The percentage of attendance of the readmitted candidates shall be calculated from the first day of beginning of the regular class work for that year / Semester, as officially announced by CTE/SBTET but not from the day on which he/she has actually reported to the class work.

8 SCHEME OF EXAMINATION

a) First Year

THEORY EXAMINATION: Each Subject carries 80% marks with examination of 3 hours duration, along with 20% marks for internal evaluation. (Sessional marks). However, there are no minimum marks prescribed for sessional.

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) III, IV, V, VI and VII Semesters:

THEORY EXAMINATION: Each subject carries usually 80 marks of 3hours duration, along with 20 marks for internal evaluation (sessional marks) respectively.

PRACTICAL EXAMINATION: Each subject carry 60/30 marks of 3hours duration 40/20 sessional marks.

9 **INTERNAL ASSESSMENT SCHEME**

a) Theory Subjects: Theory Subjects carry 20% sessional marks, internal examinations will be conducted for awarding sessional marks on the dates specified. **Three unit tests will be conducted for I year students and two Unit Tests for semesters.** Average of marks obtained in all the prescribed tests will be considered for awarding the sessional marks.

b) Practical Subjects: For Engineering Drawing subjects out of 40 sessional marks, 20 marks is awarded by conducting 3 unit tests for first year drawing and 2 unit tests for semester drawings. Another 20 marks shall be awarded by evaluating drawing sheets from time to time during the academic year/semester.

Student's performance in Laboratories / Workshop shall be assessed during the year/ semester of study for 40% marks in each practical subject. Allotment of marks should be discrete taking into consideration of the students' skills, accuracy, recording and performance of the task assigned to him / her. Each student has to write a record / log book for assessment purpose. In the subject of Drawing, which is also considered as a practical paper, the same rules hold good. Drawing exercises are to be filed in **seriatim.**

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 Lecturer / Senior Lecturer / Workshop superintendent as the case may be.

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 any local Industry/ nearby Government Polytechnic/ Local Government Organization. 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 all the experiments / exercise prescribed to test various skills like handling, manipulating, testing, trouble shooting, repair, assembling and dismantling etc.

f) Records pertaining to internal assessment marks of both theory and practical subjects are to be maintained for official inspection.

g) **In case of Diploma courses *having* Industrial Training**, the training assessment shall be done and the marks are to be awarded in the following manner.

Industrial assessment	240 marks (in two spells of 120 marks each)
Final summative assessment at institution level: 1.Maintenance of log book/Training report 2.Demonstration of any one of the skill listed in learning out comes 3.Viva-voce	 20 marks 30 marks 10 marks
TOTAL	**300 marks**

The final summative assessment at the institution level shall be done by three members, viz., External Examiner, Head of Section and Internal Faculty member, and be averaged.

10 MINIMUM PASS MARKS

THEORY EXAMINATION:

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

PRACTICAL EXAMINATION:

For passing a practical subject, a candidate has to secure a minimum of 50% in end examination and a combined minimum of 50% of both sessional and practical end examination marks put together. In case of D.C.C.P., the pass mark for typewriting and short hand is 45% in the end examination. There are no sessional marks for typewriting and Shorthand subjects of D.C.C.P course.

INDUSTRIAL ASSESSMENT:

Pass marks is 50% in assessment at Industry (I and II assessments put together) and also 50% in final summative assessment at institution level

11. PROVISION FOR IMPROVEMENT

Improvement is allowed only after he / she has completed all the subjects from First Year to Final semester of the Diploma.

a) Improvement is allowed in any 4 (Four) subjects of the Diploma.
b) The student can avail of this improvement chance **ONLY ONCE**, that too within the succeeding two examinations after the completion of Diploma. However, the duration including Improvement examination shall not exceed FIVE years from the year of first admission.
c) No improvement is allowed in Practical / Lab subjects or Project work or Industrial Training assessment. However, improvement in drawing subject(s) is allowed.
d) If improvement is not achieved, the marks obtained in previous Examinations hold good.
e) Improvement is not allowed in respect of the candidates who are punished under Mal-practice in any Examination.
f) Examination fee for improvement shall be paid as per the notification issued by State Board of Technical Education and Training from time to time.
g) All the candidates who wish to appear for improvement of performance shall deposit the original Marks Memos of all the years / Semesters and also original Diploma Certificate to the Board. If there is improvement in performance of the current examination, the revised Memorandum of marks and Original Diploma Certificate will be issued, else the submitted originals will be returned.

12. RULES OF PROMOTION FROM 1ST YEAR TO 3,rd, 4,th 5th ,6th and 7th SEMESTERS:

A) For Diploma Courses of 3 Years duration

i. A candidate shall be permitted to appear for first year examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds upto 10%) i.e. attendance after condonation on Medical grounds should not be less than 65% and pay the examination fee.

ii. A candidate shall be promoted to 3rd semester if he/she puts the required percentage of attendance in the first year and pays the examination fee. A candidate who could not pay the first year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training, AP from time to time before commencement of 3rd semester.

iii. A candidate shall be promoted to 4th semester provided he/she puts the required percentage of attendance in the 3rd semester and pay the examination fee. A candidate, who could not pay the 3rd semester exam fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training AP from time to time before commencement of 4th semester.

A candidate is eligible to appear for the 4th semester examination if he/she

a) Puts the required percentage of attendance in the 4th semester
b) Should not have failed in more than four subjects in 1st year

For IVC & ITI Lateral Entry Students:

a) A candidate is eligible to appear for the 4th semester examination if he/she puts the required percentage of attendance in the 4th semester
b) A candidate is eligible to appear for the 4th semester examination if he/she clears at least two subjects in third semester.

iv) A candidate shall be promoted to 5th semester provided he / she puts the required percentage of attendance in the 4th semester and pays the examination fee. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5th semester.

A candidate is eligible to appear for the 5th semester examination if he/she

a) Puts the required percentage of attendance in the 5th semester
b) Should get eligibility to appear for 4th Semester examination.

The first backlog exam in 5th semester will be conducted only in instant/supplementary diploma examination.

For IVC& ITI Lateral Entry students:

a) Puts the required percentage of attendance in the 5th semester

v) A candidate shall be sent to Industrial training provided he/she puts in the required percentage of attendance in the 4th semester and pay the examination fee/ promotion fee as prescribed by SBTET.

A candidate is eligible to appear for Industrial Training assessment (Seminar/Viva-voce)

a) Puts the required percentage of attendance, i.e., 90% in 6th semester Industrial Training

For IVC & ITI Lateral Entry students:

a) Puts the required percentage of attendance, i.e., 90% in 6th semester Industrial Training.
b) should get eligibility to appear for 5th Semester Examination.

B) For Diploma Courses of 3 ½ Years duration (MET/ CH/ CHPP/ CHPC/ CHOT/ TT):

i. A candidate shall be permitted to appear for 1st year examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds up to 10%) i.e. attendance after condonation on Medical grounds should not be less than 65% and pay the examination fee.

ii. A candidate shall be promoted to 3rd semester if he/she puts the required percentage of attendance in the 1st year and pays the examination fee. A candidate who could not pay the 1st year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 3rd semester.

iii. A candidate shall be promoted to 4th semester provided he/she puts the required percentage of attendance in the 3rd semester and pay the examination fee. A candidate, who could not pay the 3rd semester exam fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 4th semester.

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

a). Puts the required percentage of attendance in the 4th semester
b). Should not have failed in more than Four backlog subjects of 1st year.

For IVC & ITI Lateral Entry students:

a) Puts the required percentage of attendance in the 4th semester

iv. A candidate shall be promoted to 5th semester industrial training provided he / she puts the required percentage of attendance in the 4th semester and pays the examination fee. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5th semester.

v. Promotion from 5th to 6th semester is automatic (i.e., from 1st spell of Industrial Training to 2nd spell) provided he/she puts the required percentage of attendance, which in this

case ie.,90 % of attendance and attends for the VIVA-VOCE examination at the end of training.

vi. A candidate shall be promoted to 7th semester provided he / she puts the required percentage of attendance in the 6th semester and pays the examination fee. A candidate, who could not pay the 6th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 7th semester.

vii. A candidate shall be promoted to 7th semester of the course provided he/she has successfully completed both the spells of Industrial Training.

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

a) Puts the required percentage of attendance in the 7th semester
b) Should get eligibility to appear for 4th semester Examination.

For IVC & ITI Lateral Entry students:

a) Puts the required percentage of attendance in the 7th semester
b) Should not have failed more than four backlog subjects of 3rd Semester

C) For Diploma Courses of 3 ½ Years duration (BM):

The same rules which are applicable for conventional courses also apply for this course. The industrial training in respect of this course is restricted to one semester (6 months) after the 6th semester (3 years) of the course.

i. A candidate shall be permitted to appear for first year examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds upto 10%) i.e. attendance after condonation on Medical grounds should not be less than 65% and pay the examination fee.

ii. A candidate shall be promoted to 3rd semester if he/she puts the required percentage of attendance in the first year and pays the examination fee. A candidate who could not pay the first year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 3rd semester.

iii. A candidate shall be promoted to 4th semester provided he/she puts the required percentage of attendance in the 3rd semester and pay the examination fee. A candidate who could not pay the 3rd semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 4th semester.

A candidate is eligible to appear for the 4th semester examination if he/she

a) Puts the required percentage of attendance in the 4th semester
b) Should not have failed in more than Four backlog subjects of 1st year

For IVC & ITI Lateral Entry Students:

A candidate is eligible to appear for the 4th semester examination if he/she puts the required percentage of attendance in the 4th semester

iv. A candidate shall be promoted to 5th semester provided he / she puts the required percentage of attendance in the 4th semester and pays the examination fee. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5th semester.

A candidate is eligible to appear for the 5th semester exam if he/she

a) Puts the required percentage of attendance in the 5 th semester.
b) Should get eligibility to appear for 4th Semester examination.

For IVC & ITI Lateral Entry students:

a) Puts the required percentage of attendance in the 5th semester.
b) Should not have failed in more than Four backlog subjects of 3rd Semester.

v. A candidate shall be promoted to 6th semester provided he/she puts in the required percentage of attendance in the 5th semester and pays the examination fee.

A candidate who could not pay the 5th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 6th semester.

A candidate is eligible to appear for 6th semester examination

a) Puts the required percentage of attendance in 6th semester and
b) should get eligibility to appear for 4th Semester Examination.

For IVC & ITI Lateral Entry students:

a) Puts the required percentage of attendance in 6th semester.
b) Should get eligibility to appear for 5th Semester Examination.

vi. A candidate shall be promoted to 7th semester provided he/she puts the required percentage of attendance in 6th semester and pay the examination fee. A candidate, who could not pay the 6th semester examination fee, has to pay the promotion fee prescribed by SBTET from time to time before commencement of the 7th semester (Industrial Training).

A candidate is eligible to appear for 7th semester Industrial Training assessment (Seminar/Viva-voce) if he/she

a) Puts the required percentage of attendance, ie., 90% in 7th semester Industrial Training
b) Should get eligibility to appear for 4th Semester Examination.

For IVC & ITI Lateral Entry students:

a) Puts the required percentage of attendance, ie., 90% in 7th semester Industrial Training.
b) Should get eligibility to appear for 5th Semester Examination.

Important Note:

Seminar/Viva-voce should not be conducted for Not-Eligible Candidates, till the candidate gets eligibility. However, the record of internal Assessment for Industrial Training for 260 marks shall be maintained at Institution Level for all candidates and the data is to be uploaded only for eligible candidates. For not eligible candidates the data is to be uploaded as and when the candidate gets eligibility.

OTHER DETAILS

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.

b) The First spell of Industrial training shall commence 10 days after the completion of the last theory examination of 4th Semester.

c) The Second spell of Industrial training shall commence within 10 days after the completion of first spell of Industrial training.

13. STUDENTS PERFORMANCE EVALUATION

Successful candidates shall be awarded the Diploma under the following divisions of pass.

a) First Class with Distinction shall be awarded to the candidates who secure an overall aggregate of 75% marks and above.
b) First Class shall be awarded to candidates who secure overall aggregate of 60% marks and above and below 75% marks.
c) Second Class shall be awarded to candidates who secure a pass with an overall aggregate of below 60%.
    i. The Weightage of marks for various year/Semesters which are taken for computing overall aggregate shall be 25% of I year marks + 100% of 3rd and subsequent Semesters.
    ii. In respect IVC & ITI Lateral Entry candidates who are admitted directly into diploma course at the 3rd semester (i.e., second year) level the aggregate of (100%) marks secured at the 3rd and subsequent semesters of study shall be taken into consideration for determining the overall percentage of marks secured by the candidates for award of class/division.

d) Second Class shall be awarded to all students, who fail to complete the Diploma in the regular 3 years/ 3 ½ years and four subsequent examinations, from the year of first admission.

14. EXAMINATION FEE SCHEDULE:

The examination fee should be as per the notification issued by State Board of Technical Education and Training, AP from time to time.

15. STRUCTURE OF EXAMINATION QUESTION PAPER:

I. Formative assessment (Internal examination)

a)For theory subjects three unit tests for first year and two unit tests for semesters shall be conducted with a duration of one and half an hour for each paper for 40 marks. It consists of part A and Part B. Part A contains five questions and carries 16 marks. Among these five questions first question consists of four objective/ short answer/fill-in the blanks/true or false etc with one mark for each question. The other four questions are short answer questions and carry three marks each. Part B carries 24 marks and consists of three internal choice questions, and each question carries 8 marks each.
The total of 3/2 unit test marks shall be reduced to 20 marks in each subject for assessment.

b) For Drawing subject, three unit tests for first year shall be conducted with a duration of one and half an hour for 40 marks. It consists of part A and Part B. Part A contains four questions and each question carries four marks (4×4 marks=16 marks). Part B carries 24 marks. It consists of five questions, and each question carries 8 marks each, out of five questions student has to answer any three questions (3×8 marks=24 marks).

The total of 3 unit test marks shall be reduced to 20 marks for assessment. Remaining 20 marks are awarded by the subject teacher based on the submission of drawing assignment sheets.

c) For Laboratory /workshop , 40% of total marks for the subject shall be awarded based on continuous assessment of the student in laboratory/workshop classes.

II. Summative assessment (End examination)

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 paper is of 3/6/9 hours duration.

a) Each theory paper consists of Section ‘A’, ‘B’ and ‘C’.

Section ‘A’ contains 10 short answer questions. All questions are to be answered and each carries 3 marks.

Max. Marks: 10 x 3 = 30.

Section B contains 5 essay type questions including Numerical questions with internal choice, each carrying 8 marks.

Max. Marks: 5 x 8 = 40.

Section C contains single essay type higher order question including Numerical questions without choice (without any divisions in the question), The question carrying

Max. Marks: 1 x 10 = 10.
Total Maximum Marks: 80.

b) For Engineering Drawing Subject (107) consist of section 'A' and section 'B'. Section 'A' contains four (4) questions. All questions in section 'A' are to be answered to the scale and each carries 5 marks. Max. Marks: 4 x 5=20. Section 'B' contains six (6) questions. Out of which four (4) questions to be answered and each question carries 10 Marks. Max. Marks 4 x 10 = 40.

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.

Note: Evaluation for Laboratory Courses, other than Drawing courses:

i. Instruction (teaching) in laboratory courses (except for the course on Drawing) hereafter shall be task/competency based as delineated in the Laboratory sheets, prepared by SBTET, AP and posted in its website.
ii. Internal assessment for Laboratory shall be done on basis of task/s performed by the student as delineated in the laboratory sheets, prepared by SBTET, AP and posted in its website.
iii. Question paper for End semester Evaluation shall be prepared as per SBTET rules in vogue.

16. ISSUE OF MEMORONDUM OF MARKS

All candidates who appear for the end examination will be issued memorandum of marks without any payment of fee. However candidates who lose the original memorandum of marks have to pay the prescribed fee to the Secretary, State Board of Technical Education and Training, A.P. for each duplicate memo from time to time.

17. MAXIMUM PERIOD FOR COMPLETION OF DIPLOMA COURSES:

Maximum period for completion of the diploma courses is twice the duration of the course from the date of First admission (includes the period of detention and discontinuation of studies by student etc) failing which they will have to forfeit the claim for qualifying for the award of Diploma (They will not be permitted to appear for examinations after that date).

This rule applies for all Diploma courses of 3 years and 3 ½ years of engineering and non-engineering courses.

18. ELIGIBILITY FOR AWARD OF DIPLOMA

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

i. He / She pursued a course of study for not less than 3 / 3 ½ academic years & not more than 6 / 7 academic years.

ii. He / she have completed all the subjects.
Students who fail to fulfil all the academic requirements for the award of the Diploma within 6 / 7 academic years from the year of admission shall forfeit their seat in the course & their seat shall stand cancelled.

For IVC & ITI Lateral Entry students:

i. He / She pursued a course of study for not less than 2 / 2 ½ academic years & not more than 4 / 5 academic years.

ii. He / she has completed all the subjects.

Students who fail to fulfill all the academic requirements for the award of the Diploma within 4 / 5 academic years from the year of admission shall forfeit their seat in the course & their seat shall stand cancelled.

19. ISSUE OF PHOTO COPY OF VALUED ANSWER SCRIPT, RECOUNTING& REVERIFICATION:

A) FOR ISSUE OF PHOTO COPIES OF VALUED ANSWER SCRIPTS

i. A candidate desirous of applying for Photo copy of valued answer script/ scripts should apply within prescribed date from the date of the declaration of the result.

ii. Photo copies of valued answer scripts will be issued to all theory subjects and Drawing subject(s).

iii. The Photo copy of valued answer script will be dispatched to the concerned candidate's address as mentioned in the application form by post.

iv. No application can be entertained from third parties.

B) FOR RE-COUNTING(RC) and RE-VERIFICATION(RV) OF THE VALUED ANSWER SCRIPT

i. A candidate desirous of applying for Re-verification of valued answer script should apply within prescribed date from the date of the declaration of the result.

ii. Re-verification of valued answer script shall be done for all theory subjects' and Drawing subject(s).

iii. The Re-verification committee constituted by the Secretary, SBTETAP with subject experts shall re-verify the answer scripts.

I. **RE-COUNTING**

The Officer of SBTET will verify the marks posted and recount them in the already valued answer script. The variations if any will be recorded separately, without making any changes on the already valued answer script. The marks awarded in the original answer script are maintained (hidden).

II. RE-VERIFICATION

(i) The Committee has to verify the intactness and genuineness of the answer script(s) placed for Re-verification.

(ii) Initially single member shall carry out the re-verification.

(iii) On re-verification by single member, if the variation is less than 12% of maximum marks, and if there is no change in the STATUS in the result of the candidate, such cases will not be referred to the next level ie., for 2-Tier evaluation.

(iv) On re-verification by a single member, if the variation is more than 12% of maximum marks, it will be referred to 2-Tier evaluation.

(v) If the 2-Tier evaluation confirms variation in marks as more than 12% of maximum marks, the variation is considered as follows:

a) If the candidate has already passed and obtains more than 12% of the maximum marks on Re-verification, then the variation is considered.

b) If the candidate is failed and obtains more than 12% of the maximum marks on Re-verification and secured pass marks on re-verification, then the status of the candidate changes to PASS.

c) If a candidate is failed and obtains more than 12% of the maximum marks on Re-verification and if the marks secured on re-verification are still less than the minimum pass marks, the status of the candidate remain FAIL only.

(vii) After Re-verification of valued answer script the same or change if any therein on Re-verification, will be communicated to the candidate.

(viii) On Re-verification of Valued Answer Script if the candidate's marks are revised, the fee paid by the candidate will be refunded or else the candidate has to forfeit the fee amount.

Note: No request for Photo copies/ Recounting /Re-verification of valued answer script would be entertained from a candidate who is reported to have resorted to Malpractice in that examination.

20. MAL PRACTICE CASES:

If any candidate resorts to Mal Practice during examinations, he / she shall be booked and the Punishment shall be awarded as per SBTETAP rules and regulations in vogue.

21. DISCREPANCIES/ PLEAS:

Any Discrepancy /Pleas regarding results etc., shall be represented to the SBTETAP within one month from the date of issue of results. Thereafter, no such cases shall be entertained in any manner.

22. ISSUE OF DUPLICATE DIPLOMA

If a candidate loses his/her original Diploma Certificate and desires a duplicate to be issued he/she should produce written evidence to this effect. He / she may obtain a duplicate from the Secretary, State Board of Technical Education and Training, A.P., 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. 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, A.P.

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 AP from time to time.

23. ISSUE OF MIGRATION CERTIFICATE AND TRANSCRIPTS:

The Board on payment of prescribed fee will issue these certificates for the candidates who intend to prosecute Higher Studies in India or Abroad.

24. GENERAL

i. The Board may change or amend the academic rules and regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students, for whom it is intended, with effect from the dates notified by the competent authority.

ii. All legal matters pertaining to the State Board of Technical Education and Training, AP are within the jurisdiction of Vijayawada.

iii. In case of any ambiguity in the interpretation of the above rules, the decision of the Secretary, SBTET, A.P is final.

ARTIFICIAL INTELLIGENCE Engineering

VISION

To produce students with comprehensive understanding of the essentials in the area of Artificial Intelligence and make students to become leaders in the industry

MISSION

M1	To provide opportunity to Diploma students who are capable of playing pivotal role in wide aspects of modern Artificial Intelligence Engineering.
M2	To develop test and demonstrate how Artificial Intelligence can be used to tackle the problems in different domains that serves the nation and humanity.
M3	To train the student sensitive to the Environment, safety and economic context.
M4	To produce technically skilled students through intensive training in Artificial Intelligence Engineering tools and application and to prepare the students for professional career and further research.

PROGRAMME EDUCATIONAL OBJECTIVIES(PEOs)	
ARTIFICIAL INTELLIGENCE Engineering programme is ever changing to transform to transform students to competent professionals with qualities, ethics and human values. On completion of the integrated programme, the students should have acquired the following characteristics	
PEO1	To produce best Diploma in ARTIFICIAL INTELLIGENCE Engineeringtechnicians by correlating growing need of the industries in modern topics with the academic input and giving the technical knowledge for further learning.
PEO2	To prepare the students as productive Computer Engineers, possessing supportive and leadership skills in multidisciplinary domains, expertise in Practical orientation, Communication Skills and latest developments.
PEO3	To give the depth of related skills and expertise in a single field, and the ability to collaborate with other disciplines and work at the Supervisory cadre.
PEO4	To promote the students in professionalism, by successful completion of the Diploma in ARTIFICIAL INTELLIGENCE Engineeringby emphasizing Field Practices in industry-oriented activities.
PEO5	To sensitize the students on social and economic commitment and to inculcate a nature to guard the values of community and protect environment.

PROGRAMME SPECIFIC OUTCOME(PSOs)

PSO1	Foundation of Computer System: Ability to understand the principles and working of computer systems and can assess the hardware and software aspects of computer systems.
PSO2	Foundations of Artificial Intelligence: Ability to understand the structure and development methodologies of Artificial Intelligence and Machine Learning.Possess professional skills and knowledge of usage of Python in Artificial Intelligence and Data Analysis. Familiarity and practical competence with a broad range of Python programming language and open source platforms.
PSO3	Foundation of mathematical concepts: Ability to apply mathematical methodologies to solve computation task, model real world problem using appropriate data structure and suitable algorithm, methodologies in developing computer and AI related problem solutions as well as apply them in establishing new firms in small scale with the help of experience gained as part of industrial training.

PROGRAM OUTCOMES (POs)

Students completing Diploma in ARTIFICIAL INTELLIGENCE Engineering are anticipated to have the following abilities	
PO1	Basic and Discipline specific knowledge: Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.
PO2	Problem analysis: Identify and analyse well-defined engineering problems using codified standard methods.
PO3	Design/ development of solutions: Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
PO4	Engineering Tools, Experimentation and Testing: Apply modern engineering tools and appropriate technique 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 engage in updating in the context of technological changes.

MAPPING OF PEOs WITH MISSIONS

PEO	M1	M2	M3	M4
To produce best **Diploma in ARTIFICIAL INTELLIGENCE Engineering** technicians by correlating growing need of the industries in modern topics with the academic input and giving the technical knowledge for further learning.	✓	✓	✓	✓
To prepare the students as productive Computer Engineers, possessing supportive and leadership skills in multidisciplinary domains, expertise in Practical orientation, Communication Skills and latest developments.	✓	✓	✓	✓
To give the depth of related skills and expertise in a single field, and the ability to collaborate with other disciplines and work at the Supervisory cadre.	✓	✓	✓	✓
To promote the students in professionalism, by successful completion of the **Diploma in ARTIFICIAL INTELLIGENCE Engineering** by emphasizing Field Practices in industry-oriented activities.	✓	✓	✓	✓
To sensitize the students on social and economic commitment and to inculcate a nature to guard the values of community and protect environment.	✓	✓	✓	✓

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATION

CURRICULUM-2020

(FIRST YEAR)

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Year	Scheme Of Examinations			
		Theory	Practicals		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
THEORY SUBJECTS								
AI-101	English-I	3	-	90	3	20	80	100
AI-102	Engineering Mathematics - I	5	-	150	3	20	80	100
AI-103	Engineering Physics	4	-	120	3	20	80	100
AI-104	Engineering Chemistry and Environmental studies	4	-	120	3	20	80	100
AI-105	Basics of Computers and AI	3	-	90	3	20	80	100
AI-106	Programming in C	5	-	150	3	20	80	100
PRACTICAL SUBJECTS								
AI-107	Engineering Drawing	-	6	180	3	40	60	100
AI-108	Programming in C Lab	-	6	180	3	40	60	100
AI-109	Physics Lab	-	3	90	1 1/2	20	30	50
	Chemistry Lab			90	1 1/2	20	30	50
AI-110	Computer Fundamentals Lab	-	3	90	3	40	60	100
	Total	**24**	**18**	-	**-**	-	-	**1000**

AI-101,102,103,104,107,109,110 common with all branches

AI-106,108 common with IT,CM branches

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING

SCHEME OF INSTRUCTIONS AND EXAMINATION

CURRICULUM-2020 (III Semester)

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Semester	Scheme Of Examinations			
		Theory	Practicals		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
THEORY SUBJECTS								
AI-301	Mathematics –II	4		60	3	20	80	100
AI-302	Artificial Intelligence	5	-	75	3	20	80	100
AI-303	Java Programming	5	-	75	3	20	80	100
AI-304	Data Structures through C	6	-	90	3	20	80	100
AI-305	Digital Electronics & Computer Organization	6	-	90	3	20	80	100
PRACTICAL SUBJECTS								
AI-306	Artificial Intelligence Lab using Prolog	-	4	60	3	40	60	100
AI-307	Data Structures Through C Lab	-	6	90	3	40	60	100
AI-308	Java Programming Lab	-	3	45	3	40	60	100
AI-309	Digital Electronics Lab	-	3	45	3	40	60	100
	Total	**26**	**16**	-	-	-	-	**900**

AI-301 common with all branches
AI-303 Common with CM-502
AI-304 Common with CM-304
AI-307 Common with CM-307
AI-309 Common with CM-306

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING

SCHEME OF INSTRUCTIONS AND EXAMINATION

CURRICULUM-2020

(IV Semester)

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Semester	Scheme Of Examinations			
		Theory	Practicals		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
THEORY SUBJECTS								
AI-401	Mathematics III	3	-	45	3	20	80	100
AI-402	Python Programming	5	-	75	3	20	80	100
AI-403	Operating Systems	4	-	60	3	20	80	100
AI-404	DBMS	6	-	90	3	20	80	100
AI-405	IntroductionToMachineLearning	5	-	75	3	20	80	100
PRACTICAL SUBJECTS								
AI-406	Python Programming Lab	-	4	60	3	40	60	100
AI-407	Machine Learning Lab	-	6	90	3	40	60	100
AI-408	Communication Skills	-	3	45	3	40	60	100
AI-409	DBMS Lab	-	6	90	3	40	60	100
	Total	23	19	-	-	-	-	900

AI-401 & 408 common with all branches
AI-402 common with CM-505
AI-403 common with CM-303
AI-404 Common with CM-305
AI-406 Common with CM-507

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING

SCHEME OF INSTRUCTIONS AND EXAMINATION

CURRICULUM-2020

(V Semester)

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Semester	Scheme Of Examinations			
		Theory	Pract--icals		Duration (hrs)	Sessio-nal Marks	End Exam Marks	Total Marks
THEORY SUBJECTS								
AI-501	Industrial Management and Entrepreneurship	5	-	75	3	20	80	100
AI-502	Software Engineering	5	-	75	3	20	80	100
AI-503	Computer Networks	5	-	75	3	20	80	100
AI-504	Internet Of Things	5	-	75	3	20	80	100
AI-505	Blockchain Technologies	6	-	90	3	20	80	100
PRACTICAL SUBJECTS								
AI-506	Computer Hardware & Network Maintenance Lab	-	4	60	3	40	60	100
AI-507	Multimedia Lab	_	3	45	3	40	60	100
AI-508	Life Skills	-	3	45	3	40	60	100
AI-509	Project work	-	6	90	3	40	60	100
	Total	**26**	**16**	-	-	-	-	**900**

Note:AI-501 common with IT,CM branches
AI-502 common with CM/IT-503
AI-503 common with CM-405 & IT-302
AI-504 common with CM-504
AI-506 Common with CM-409
AI-508 common with all branches

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING

SCHEME OF INSTRUCTIONS AND EXAMINATION

CURRICULUM-2020

(VI Semester)

AI-601 Industrial Training

Sl. No.	***Subject***	***Duration***	***Scheme of evaluation***		
			Item	***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 the Industry (After 20 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***

The industrial training shall carry **300** marks and pass marks are **50**%. A candidate failing to secure the minimum marks should complete it at his own expenses.

During Industrial training the candidate shall put in a minimum of **90%**attendance.

FIRST YEAR

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATION

CURRICULUM-2020

(FIRST YEAR)

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Year	Scheme Of Examinations			
		Theory	Practicals		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
THEORY SUBJECTS								
AI-101	English-I	3	-	90	3	20	80	100
AI-102	Engineering Mathematics - I	5	-	150	3	20	80	100
AI-103	Engineering Physics	4	-	120	3	20	80	100
AI-104	Engineering Chemistry and Environmental studies	4	-	120	3	20	80	100
AI-105	Basics of Computers and AI	3	-	90	3	20	80	100
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PRACTICAL SUBJECTS								
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AI-108	Programming in C Lab	-	6	180	3	40	60	100
AI-109	Physics Lab	-	3	90	1 1/2	20	30	50
	Chemistry Lab			90	1 1/2	20	30	50
AI-110	Computer Fundamentals Lab	-	3	90	3	40	60	100
	Total	**24**	**18**	-	**-**	-	-	**1000**

AI-101,102,103,104,107,109,110 common with all branches

AI-106,108 common with IT,CM branches

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks for FA	Marks for SA
AI- 101	English	3	90	20	80

S. No.	Unit Title	No of Periods	COs Mapped
1	English for Employability	8	CO1, CO2, CO3, CO4
2	Living in Harmony	8	CO1, CO2, CO3, CO4
3	Connect with Care	8	CO1, CO2, CO3, CO4
4	Humour for Happiness	8	CO1, CO2, CO3, CO4
5	Never Ever Give Up!	8	CO1, CO2, CO3, CO4
6	Preserve or Perish	9	CO1, CO2, CO3, CO4
7	The Rainbow of Diversity	8	CO1, CO2, CO3, CO4
8	New Challenges- Newer Ideas	8	CO1, CO2, CO3, CO4
9	The End Point First!	8	CO1, CO2, CO3, CO4
10	The Equal Halves	8	CO1, CO2, CO3, CO4
11	Dealing with Disaster	9	CO1, CO2, CO3, CO4
Total Periods		**90**	

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 AI-101	**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	20	22		>50%: Level 3 21-50%: Level 2 Up to 20%: Level 1
PO6	CO1, CO2, CO3, CO4	52	58		
PO7	CO1, CO2, CO3, CO4	18	20		

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

AI-101	**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:

<table>
<tr><th rowspan="2">S. No.</th><th rowspan="2">Name of the Unit</th><th rowspan="2">Periods Allocated</th><th rowspan="2">Weightage Allocated</th><th colspan="4">Marks Wise Distribution of Weightage</th><th colspan="4">Question Wise Distribution of Weightage</th><th rowspan="2">CO's Mapped</th></tr>
<tr><th>R</th><th>U</th><th>Ap</th><th>An</th><th>R</th><th>U</th><th>Ap</th><th>An</th></tr>
<tr><td>1</td><td>English for Employability</td><td>8</td><td rowspan="3">17</td><td>3</td><td rowspan="3">8*</td><td></td><td></td><td>1</td><td rowspan="3">1*</td><td rowspan="3">1*</td><td></td><td>CO1, CO2, CO3, CO4</td></tr>
<tr><td>2</td><td>Living in Harmony</td><td>8</td><td>3</td><td></td><td></td><td>1</td><td></td><td></td><td>CO1, CO2, CO3, CO4</td></tr>
<tr><td>3</td><td>Connect with Care</td><td>8</td><td></td><td>3</td><td></td><td></td><td></td><td></td><td>CO1, CO2, CO3, CO4</td></tr>
<tr><td>4</td><td>Humour for Happiness</td><td>8</td><td rowspan="2">14</td><td></td><td>3</td><td rowspan="2">8*</td><td></td><td></td><td>1</td><td rowspan="2">1*</td><td></td><td>CO1, CO2, CO3, CO4</td></tr>
<tr><td>5</td><td>Never Ever Give Up!</td><td>8</td><td></td><td>3</td><td></td><td></td><td>1</td><td></td><td>CO1, CO2, CO3, CO4</td></tr>
<tr><td>6</td><td>Preserve or Perish</td><td>9</td><td rowspan="2">14</td><td></td><td rowspan="2">8*</td><td>3</td><td></td><td></td><td rowspan="2">1*</td><td>1</td><td></td><td>CO1, CO2, CO3, CO4</td></tr>
<tr><td>7</td><td>The Rainbow of Diversity</td><td>8</td><td></td><td>3</td><td rowspan="4">10*</td><td></td><td></td><td>1</td><td></td><td>CO1, CO2, CO3, CO4</td></tr>
<tr><td>8</td><td>New Challenges - Newer Ideas</td><td>8</td><td rowspan="4">35</td><td></td><td rowspan="3">8*</td><td rowspan="3">8*+3+3+3</td><td></td><td rowspan="3">1*</td><td rowspan="3">4</td><td rowspan="4">1*</td><td></td><td>CO1, CO2, CO3, CO4</td></tr>
<tr><td>9</td><td>The End Point First!</td><td>8</td><td></td><td></td><td></td><td>CO1, CO2, CO3, CO4</td></tr>
<tr><td>10</td><td>The Equal Halves</td><td>8</td><td></td><td></td><td></td><td>CO1, CO2, CO3, CO4</td></tr>
<tr><td>11</td><td>Dealing with Disasters</td><td>9</td><td></td><td></td><td></td><td></td><td></td><td></td><td>CO1, CO2, CO3, CO4</td></tr>
<tr><td colspan="2">TOTAL</td><td>90</td><td>80</td><td>6</td><td>30</td><td>34</td><td>10</td><td>2</td><td>5</td><td>8</td><td>1</td><td></td></tr>
</table>

PART-A: 10 Questions 3 marks each =30 Marks	All Questions are compulsory : 60 minutes
PART-B: 5 Questions 8 marks each =40 Marks	Internal choice : 90 minutes
Part-C: 1 Question 10 marks =10 Marks (Higher Order Question)	No choice, one compulsory question : 30 minutes

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

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

2. Living in Harmony

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

3. Connect with Care

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

4. Humour for Happiness

4.1. Explain the importance of humour for a healthy living
4.2. Improve vocabulary related to the theme
4.3. Display reading and speaking skills
4.4. Frame sentences with proper Subject – Verb agreement
4.5. 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!

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

5.3. Write paragraphs with coherence and other necessary skills

6. Preserve or Perish

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

7. The Rainbow of Diversity

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

8. New Challenges – Newer Ideas

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

9. The End Point First!

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

10. The Equal Halves

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

11. Dealing with Disasters

11.1. Speak and write about different kinds of disasters and the concept of disaster management
11.2. Generate vocabulary relevant to disaster management and use it in sentences
11.3. Analyze an error in a sentence and correct it
11.4. 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 ByN.D.V. Prasad Rao)	: English Grammar and Composition, Blackie ELT Books, S. Chand and Co.
Sarah Freeman	: Strengthen Your Writing, Macmillan

STATE BOARD OF TECHNICAL EDUCATION- A.P

Model Question Paper

C20-COMMON-101- ENGLISH

Time: 3hrs

Max.Marks:80

PART-A **10X3=30**

Marks

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

1. a) Fill in the blanks with suitable articles:
   I have seen _____ European at _____local market.
   b) Fill in with proper form of adjective given in the bracket:
   China is the _____country in the world. (populous, more populous, most populous)
   c) i) Choose the synonym from the following for the word : 'filthy'
   dirty / clean / hygienic / tidy
   ii) Choose the antonym from the following for the word: 'exterior'
   external / internal / open / interior

***(Question1 : Remembering- Mapping with CO2 & CO3)**

2. a) i) Give prefix for the word: 'popular'
   ii) Write suffix for the word : 'king'
   b) He was married _____ her _____ January 2015. (Fill in with appropriate preposition)
   c) Match the words in column A with their corresponding meanings in column B:

Column-A	Column-B
i) Dynamic	a) tasty
ii) Gloomy	b) active
	c) sad
	d) proud

***(Question 2 : Remembering- Mapping with (CO2 & CO3)**

3. a) The old man *hunted* for his spectacles. (Give the contextual meaning of the word in italics)
   b) The committee / have submitted / its report / to the President. (identify the part which contains an error)
   c) recently has a scooter purchased Shanthi. (Rearrange the jumbled words to make a meaningful sentence.)

***(Question 3 : Understanding- Mapping with (CO2 & CO3)**

4. a) Use the following primary auxiliary verb in sentence of your own:
‘ does’

b) Fill in the blank with proper modal auxiliary verb based on the clue in the bracket:
Harish _____ speak four languages. (ability)

c) Rakesh wants two hundred rupees from his father. (Write the sentence how he requests his father)

***(Question 4 : Applying - Mapping with CO2 & CO3)**

5. Fill in the blanks with suitable form of the verb given in brackets:
a) He _____ (go) for a walk daily.
b) The bus _____ (arrive) just now.
c) We _____ (live) in Chennai since 2005.

***(Question 5 : Applicative- Mapping with CO2 & CO3)**

6. Change the voice of the following sentences:
a) English is spoken all over the world.
b) They watched a movie yesterday.
c) The Chief Minister will inaugurate the exhibition.

***(Question 6 : Applicative- Mapping with CO2 & CO3)**

7. a) It is a beautiful rainbow. (Change into an exclamatory sentence)
b) C.V. Raman won the Nobel Prize in 1930. (Frame a question using ‘When’)
c) He can swim across the river. (change into ‘Yes / No’ question)

***(Question 7 : Applicative- Mapping with CO2 & CO3)**

8. Change the speech of the following:
a) He said, “I will go to Delhi tomorrow.”
b) Ravi said to Ashok, “ Where are you going?”
c) She told him to mind his own business.

***(Question 8 : Applicative- Mapping with CO2 & CO3)**

9. Rewrite as directed:
a) In spite of being busy he attended the meeting. (Rewrite the sentence using ‘though’)
b) She is poor. She is honest. (combine the two sentences using ‘but’)
c) On seeing the tiger, he climbed a tree. (split into two simple sentences)

***(Question 9 : Applicative- Mapping with CO2 & CO3)**

10. Rewrite the following sentences after making necessary corrections:
a) We have gone to picnic yesterday.
b) Suresh watched T.V when I went to his house.
c) They left Gujarat before the earthquake occurred.

***(Question 10 : Applicative- Mapping with CO2 & CO3)**

PART-B

5X8=40

Instructions: Answer the following questions. Each question carries EIGHT marks.

11. Write a paragraph in about 100 words on what you do daily.

OR

Write a paragraph in about 100 words on the uses and misuses of social media.

***(Question 11 : Understanding - Mapping with CO1, CO3 & CO4)**

12. Construct a dialogue of at least five turns between an American and you about places worth visiting in your city.

OR

Compose a dialogue of at least five turns between two friends, one favouring homemade food and the other, fast food.

***(Question 12 : Applying - Mapping with CO1, CO3 & CO4)**

13. Write a letter to your parents about your preparation for year-end examinations.

OR

Write a letter to the editor of a newspaper about the inconvenience caused due to loud speakers in your area.

***(Question 13 : Understanding - Mapping with CO1, CO3 & CO4)**

14. Write an essay in about 120 words on measures to prevent water pollution.

OR

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

***(Question 14 : Applying - Mapping with CO1, CO3 & CO4)**

15. Read the following passage and answer the questions that follow:

A farmer in ancient China had a neighbour who was a hunter, and who owned ferocious and poorly trained hunting dogs. They jumped over the fence frequently and chased the farmer's lambs. The farmer asked his neighbour to keep his dogs in check, but this fell on deaf ears. One day the dogs again jumped the fence, attacked and severely injured several of the lambs.

The farmer had had enough, and went to town to consult a judge who listened carefully to the story and said: "I could punish the hunter and instruct him to keep his dogs chained or lock them up. But you would lose a friend and gain an enemy. Which would you rather have, friend or foe for a neighbour?" The farmer replied that he preferred a friend. “Alright, I will offer you a solution that keeps your lambs safe, and which will keep your a neighbour a friend." Having heard the judge's solution, the farmer agreed.

Once at home, the farmer immediately put the judge's suggestions to the test. He took three of his best lambs and presented them to his neighbour's three small sons, who were beside themselves with joy and began to play with them. To protect his son's newly acquired playthings, the hunter built a strong kennel for his dogs. Since then, the dogs never again bothered the farmer's lambs. Out of gratitude for the farmer's generosity toward his sons, the hunter often shared the game he had hunted with the farmer. The farmer reciprocated by sending the hunter the cheese he had made. Within a short time the neighbours became good friends.

a) What kind of dogs does the neighbor have?
b) When did the farmer consult the judge?

c) What would be the consequence if the judge punished the neighbor?
d) What was the solution suggested by the judge?
e) What did the neighbour's sons do with the gifts they received?
f) How did the dogs stop bothering the farmer's lambs?
g) What items are exchanged happily between the two neighbours?
h) Pick the word from the passage that would mean: 'a closed shelter for dogs'.

OR

Read the following short poem and answer the questions that follow:

Crisp in the winter's morning,
Softly all through the night,
What is this without warning,
Falling and white?

I have never seen snow,
But I can imagine it quite –
Not how it tastes, but I know,
It falls and is white.

One morning I'll open the door,
To bring in the morning's milk,
And all around there'll be snow –
Fallen and still.

How I'll roll in the stuff!
How I'll tumble and spin!
Until the neighbours cry,
Enough!And send me back in.

Q.1. What is the poem about?
2. How does snow fall?
3. Did you ever touch snow? How did you feel?
4. a) Pick the word from the poem that means 'slip and fall'
b) Write the antonym for the word 'soft'

***(Question 15 : Understanding - Mapping with CO1, CO3 & CO4)**

SECTION – C **1X10=10 Marks**

16. Write a report on the blood donation camp organized by International Red Cross Society in your college. Use the following clues: date, time, place, arrangements, donors, equipment, doctors, response, sponsors, snacks, volunteers, help others, save lives…etc.

***(Question 16 : Applying - Mapping with CO1, CO3 & CO4)**

STATE BOARD OF TECHNICAL EDUCATION –A.P
C20-COMMON-101-ENGLISH
UNIT TEST-1

Time: 90 minutes **Max. Marks: 40**

PART-A **4X4= 16**
marks

Instructions: Answer all the questions. Each question carries FOUR Marks.

1. Rewrite / Fill in the blank as directed. Each question carries ½ Mark.**(CO1,CO2)**

a) Write the antonym of 'cruel' **CO2**

b) Write the synonym of 'love' **CO2**

c) Give prefix to 'adventure'. **CO2**

d) Give suffix to ' liberate' **CO2**

e) It is _____ universal truth. (Fill in with suitable article) **CO1**

f) The boy is fond ____ ice-cream. (Fill in the blank with proper preposition) **CO1**

g) He ____not like sweets. (Fill in the blank with correct primary auxiliary verb.) **CO1**

h) We _____ respect our national flag. (Fill in with a proper modal verb) **CO1**

2. Rewrite the sentences as directed. Each question carries One mark. 4X1=4 Marks **CO1**

a) No other metal is so useful as iron. (Change into superlative degree)

b) Very few students are so clever as Ramesh. (Change into comparative degree)

c) Guess the contextual meaning of the italicized word in the following sentence.

"The CBI officer has *interrogated* the bank employees in connection with the scam."

d) only sings plays Prasanth not also well but cricket. (Rearrange the jumbled words)

3. Fill in the blanks with proper form of the verb given in brackets. 4X1 = 4 marks **CO1**

The IPSGM _____(hold) in our college last month. Nearly all the colleges in our zone _____(participate) in the event. The prizes _____ (distribute) by the district collector.

Next year, Government Polytechnic, Vijayawada _____ (conduct) the games meet.

4. Rewrite the following sentences after making necessary corrections: 4X 1= 4 Marks **CO1**

a) The police has arrested the culprit.

b) Three hundred miles are a long distance.

c) The Principal along with the Heads of Sections have visited the laboratories.

d) Either he or I is to blame.

PART-B

3X8=24 Marks

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

5. Write a dialogue of at least five turns between a shopkeeper and customer about buying a mobile phone. **CO3**

6. Make an analysis and write a paragraph in around 100 words about your strengths and weaknesses in learning and using English and also the measures to improve it. **CO3**

7. Write a paragraph in about 100 words on how to overcome low esteem and negativity. **CO3**

STATE BOARD OF TECHNICAL EDUCATION –A.P
C20-COMMON-101-ENGLISH
UNIT TEST-II

Time: 90 minutes **Max. Marks: 40**

PART-A **4X4= 16 Marks**

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

1. Match the words in column A with their corresponding meanings in column B **CO2**

Column A	**Column B**
a) Deserve	i) continuous
b) hidden	ii) protect
c) Preserve	iii) worthy
d) Incessant	iv) praise
	v) unseen
	vi) affection

2. Rewrite as directed: **CO1**
   a) You ask your Mom to give you another chocolate. (Change into a request)
   b) The baby fell down and got injured. (Change into an exclamatory sentence)
   c) The match was very interesting. (Frame a question using 'how')
   d) Hemanth submitted his project report last week. (Frame Yes-No question)
3. Fill in the blanks with appropriate forms of verbs given in brackets: **CO1**
   a) The Sun _____ (set) in the west.
   b) Balu _____ (sing) for over fifty years in the films.
   c) We _____ (see) a camel on the road yesterday.
   d) They _____(enter) the stadium before the gates were closed.
4. Change the voice of the following: **CO1**
   a) Marconi invented the radio.
   b) Sravanthi has been offered a job.
   c) Pragathi can type the letter.
   d) The Chief Guest will be received by the Final year students.

PART-B **3X8=24 Marks**

Answer all the questions. Each question carries EIGHT marks. CO3

5. Write a letter to your younger brother motivating him to deal with failures and hurdles in life.
6. Write an essay in around120 words on the role of robots in the modern world.
7. Read the following passage and answer the questions that follow:

The greatest enemy of mankind, as people have discovered, is not science, but war. Science merely reflects the social forces by which it is surrounded. It was found that when there is peace, science is constructive when there is war, science is perverted to destructive end. The weapons which science gives us do not necessarily create war. These make war increasingly more terrible. Until now, it has brought us on the doorstep of doom. Our main problem, therefore, is not to curb science, but to substitute law for force, and international government for anarchy in the relations of one nation with another. That is a job in which everybody must participate, including the scientists. Now we are face to face with these urgent questions: Can education and tolerance, understanding and creative

intelligence run fast enough to keep us side by side without our mounting capacity to destroy? That is the question which we shall have to answer, one way or the other, in this generation. Science must help us in the answer, but the main decision lies within ourselves. The hour is late and our work has scarcely begun.

a. What is the chief enemy of man?
b. What does science reflect?
c. When is science perverted?
d. What makes war more terrible?
e. Why do we need international government?
f. What are the four aspects that may stop destruction?
g. Have we really started our work to fight the problem discussed?
h. Pick the word from the passage that would mean: 'replace with other one'

STATE BOARD OF TECHNICAL EDUCATION –A.P
C20-COMMON-101-ENGLISH
UNIT TEST-III

Time: 90 minutes **Max. Marks: 40**

PART-A **4X4 = 16 Marks**

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

1. Give the meaning of the word in italics: **CO1 CO2**
   a) When the girls laughed in the class, the teacher was *furious.*
   b) He was *rusticated* from the school for his misbehaviour.
   c) Vikramaditya was a *benevolent* Indian King.
   d) We should not show any *discrimination* between boys and girls.
2. Change the speech of the following: **CO2**
   a) He said, "I am sorry."
   b) The teacher said to the boys, "Why are you late?"
   c) Sushma said that she had submitted her report recently.
   d) Pratap requested Priya to give him her pen.
3. Rewrite as directed: **CO2**
   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) The fog disappeared when the Sun rose. (Split into two simple sentences)
4. Locate eight errors from the following passage and correct them. **CO3, CO1**

Once upon a time there live a king who was very kind to his people. In his council of ministers, there is a wise man. He had a son called Sumanth who was a educated and highly learned. Once the wise minister fall sick. All the physicists in the country could not heal him. Then Sumanth will go in search of medicine in Himalayas. He bring the special medicinal roots to cure his father's sickness. Sumanth looked before his father carefully and healed him. The king rewarded Sumanth with rich gifts.

PART- B **3X8 = 24 Marks**

Instructions: Answer all the questions and each one carries eight marks. **CO3**

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

Astronauts are people who travel on space ships. They need to have a very clean home. They travel far from Earth. We need clean kitchens everywhere on earth and in space. Astronauts have to solve two problems: how to get food and how to keep their spaceship clean. Here is how they solved the food problem. At first, the astronauts took tubes of food with them into space. They would squeeze a tube and eat semi-liquid food. It did not taste great, but since they did not need to take dishes or silverware with them, they had no dishes to wash. Today's spaceships have a bigger menu. Astronauts can eat from bowls. In fact, they take cereal and other standard foods with them. The foods are packaged in special containers to keep them fresh. They use knives, forks, and spoons. One unusual item on their table is a pair of scissors. They use the scissors to open the food packages. They can eat right from the package. They have a kitchen on the spaceship. Its oven can heat food to 170 degrees. The kitchen has water and sets of meals that come on trays. The astronauts choose their menu before they go into space. They take a lot of food with them. The astronauts keep bread and fresh fruits and vegetables in a special food locker. How do they keep the kitchen clean? They do not have to worry about mice or other rodents. They make sure that there are no rodents before the ship leaves. But sometimes mice travel on the ship. Those mice are part of experiments. They live in cages. How do astronauts keep their trays clean? That is another health problem the astronauts solve. They need to stay healthy in space. To carry a lot of water to wash trays would be a lot of extra weight. They pack wet wipes in plastic bags. They use them to clean trays. So, their kitchen is clean and they stay healthy.

6. Write an essay in about 120 words on the importance of goal setting and your short and long term goals.
7. Write a report about the bush fire that raged in Australia recently by using the following clues: forest, natural disaster, wild fire, dried leaves, no rain fall, wild animals, burnt alive, loss of flora and fauna, fire fighters, uncontrollable, moderate rains, environmental pollution, measures to protect...etc.

Course Code	**Course Title**	**No. of Periods/week**	**Total No. of periods**	**Marks for FA**	**Marks for SA**
AI-102	**Engineering Mathematics-I**	5	150	20	80

S.No.	**Unit Title**	**No. of periods**	**COs mapped**
1	Algebra	31	CO1
2	Trigonometry	44	CO2
3	Co-ordinate Geometry	23	CO3

4	Differential Calculus	33	CO4
5	Applications of Differentiation	19	CO4, CO5
	Total Periods	150	

Course Objectives	(i) To apply the principles of Algebra, Trigonometry and Co-Ordinate Geometry to real-time problems in engineering. (ii) To comprehend and apply the concept of Differential Calculus in engineering applications.

Course Outcomes	CO1	Identify various functions, resolve partial fractions and solve problems on matrices.
	CO2	Solve problems using the concept of trigonometric functions, their inverses and complex numbers.
	CO3	Find the equations and properties of straight lines, circles and conic sections in coordinate system.
	CO4	Evaluate the limits and derivatives of various functions.
	CO5	Evaluate solutions for engineering problems using differentiation.

ENGINEERING MATHEMATICS – I

COMMON TO ALL BRANCHES

Learning Outcomes

UNIT - I

C.O. 1 Identify various functions, resolve partial fractions and solve problems on matrices.

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

1.2 Explain Relations and functions – examples

1.3 Find Domain & Range of functions – simple examples.

1.4 Classify types of functions (into, many-to-one, one-one, onto and bijective).

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) $\dfrac{f(x)}{(ax+b)(cx+d)}$ *ii*) $\dfrac{f(x)}{(ax+b)^2(cx+d)}$

iii) $\dfrac{f(x)}{(x^2+a^2)(bx+c)}$ *iv*) $\dfrac{f(x)}{(x^2+a^2)(x^2+b^2)}$

1.8 Define a matrix and order of a matrix

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

1.10 Compute sum, scalar multiplication and product of matrices. Illustrate the properties of these operations such as associative, distributive, commutative properties with examples and counter examples.

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

1.12 Define symmetric and skew-symmetric matrices with examples Resolve square matrix into a sum of a symmetric and skew- symmetric matrices and provide examples.

1.13 Define determinant of a square matrix, minor, co-factor of an element of a

3x3 square matrix with examples. Expand the determinant of a 3 x 3 matrix

using Laplace expansion formula. State and apply the properties of determinants to solve problems.

1.14 Distinguish singular and non-singular matrices. Define multiplicative inverse of a matrix and list properties of adjoint and inverse. Compute adjoint and multiplicative inverse of a square matrix.

1.15 Solve system of 3 linear equations in 3 unknowns using Cramer's rule and matrix inversion method

UNIT - II

C.O.2 Solve problems using the concept of trigonometric functions, their inverses and complex numbers.

L.O. 2.1 Define trigonometric ratios of any angle.

2.2 List the values of trigonometric ratios at specified values.

2.3 Draw graphs of trigonometric functions

2.4 Explain periodicity of trigonometric functions.

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

2.6 Give simple examples on compound angles to derive the values of $\sin15^0$, $\cos15^0$, $\sin75^0$, $\cos75^0$, $\tan 15^0$, $\tan75^0$ etc.

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

2.8 Solve simple problems on compound angles.

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

2.10 Derive useful allied formulas like $\sin^2 A = (1- \cos2A)/2$ etc.

2.11 Solve simple problems using the above formulae

Syllabus for Unit test-I completed

2.12 Derive the formulae on transforming sum or difference of two trigonometric ratios into a product and vice versa, examples on these formulae.

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

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

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

2.16 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.

2.17 State various properties of inverse trigonometric functions and identities like

$\sin^{-1}x+\cos^{-1} x = \frac{\pi}{2}$ etc.

2.18 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

2.19 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.

2.20 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.

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

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

2.23 List various formulae for the area of a triangle.

2.24 Solve problems using the above formulae.

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

2.26 Represent inverse hyperbolic functions in terms of logarithms.

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

2.28 Define the operations on complex numbers with examples.

2.29 Define amplitude of a complex number

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

2.31 Write DeMoivre's theorem (without proof) and illustrate with simple examples.

UNIT - III

Coordinate Geometry

C.O. 3 Find the equations and properties of straight lines, circles and conic sections in coordinate system.

L.O. 3.1 Write the different forms of a straight line – general form, point-slope form, slope- intercept form, two-point form, intercept form and normal form or perpendicular form.

3.2 Solve simple problems on the above forms

3.3 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.

3.4 Define locus of a point and define a circle.

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

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

3.7. Define a conic section.

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

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

3.10 Describe the properties of Parabola, Ellipse and Hyperbola in standard forms whose axes are along co-ordinate axes and solve simple examples on above.

Syllabus for Unit test-II completed

C.O.4 Evaluate the limits and derivatives of various functions.

L.O. 4.1 Explain the concept of limit and meaning of $\lim_{x\to a} f(x)=l$ and state the properties of limits .

4.2 Evaluate the limits of the type $\lim_{x\to l}\frac{f(x)}{g(x)}$ and $\lim_{x\to\infty}\frac{f(x)}{g(x)}$

4.3 Mention the Standard limits $\lim_{x\to a}\frac{x^n-a^n}{x-a}$, $\lim_{x\to 0}\frac{\sin x}{x}$, $\lim_{x\to 0}\frac{\tan x}{x}$, $\lim_{x\to 0}\frac{a^x-1}{x}$, $\lim_{x\to 0}\frac{e^x-1}{x}$, $\lim_{x\to 0}(1+x)^{\frac{1}{x}}$, $\lim_{x\to\infty}\left(1+\frac{1}{x}\right)^x$ (without proof) and solve the problems using these standard limits.

4.4 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.

4.5 State the concept of derivative of a function y = f(x) – definition, first principle as $\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ and also provide standard notations to denote the derivative of a function.

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

4.7 Find the derivatives of elementary functions like x^n , a^x, e^x, log x, sin x, cos x, tanx,Secx,Cosecx and Cot x using the first principles.

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

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

4.10 Explain the method of differentiation of a function of a function (Chain rule) with illustrative examples.

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

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

4.13 Find the derivatives of hyperbolic functions.

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

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

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

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

4.18 Explain the definition of Homogenous function of degree n

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

C.O. 5 Evaluate solutions for engineering problems using differentiation.

L.O. 5.1 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.

5.2 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.

5.3 Find the lengths of tangent, normal, sub-tangent and sub normal at any point on the curve y=f(x) .

5.4 Explain the derivative as a rate of change in distance-time relations to find the velocity and acceleration of a moving particle with examples.

5.5 Explain the derivative as a rate measurer in the problems where the quantities like volumes, areas vary with respect to time- illustrative examples.

5.6 Define the concept of increasing and decreasing functions.

5.7 Explain the conditions to find points where the given function is increasing or decreasing with illustrative examples.

5.8 Explain the procedure to find the extreme values (maxima or minima) of a function of single variable- simple problems yielding maxima and minima.

5.9 Solve problems on maxima and minima in applications like finding areas, volumes etc.

5.10 Apply the concept of derivatives to find the errors and approximations in simple problems.

Engineering Mathematics – I

CO/PO – Mapping

AI-102	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	1	2				3	2	3
CO2	3	3	3	2				3	3	1
CO3	3	2	2	1				3	2	2
CO4	3	3	2	2				3	2	1
CO5	3	3	3	3				3	3	3
Avg	**3**	**2.6**	**2.5**	**2**				**3**	**2.4**	**2**

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 – I

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,CO4,CO5	150	100%	3	>40% Level 3 Highly addressed 25% to 40% Level 2 Moderately addressed 5% to 25% Level 1 Low addressed <5% Not addressed
2	CO1, CO2, CO3,CO4,CO5	138	92%	3	
3	CO1, CO2, CO3,CO4,CO5	133	88.6%	3	
4	CO1, CO2, CO3,CO4,CO5	120	80%	3	
5					
6					
7					
PSO 1	CO1, CO2, CO3,CO4,CO5	150	100%	3	
PSO 2	CO1, CO2, CO3,CO4,CO5	135	90%	3	
PSO 3	CO1, CO2, CO3,CO4,CO5	125	83.3%	3	

COURSE CONTENT

Unit-I

Algebra

1. Relations and Functions:

Define Set, Ordered pairs, Cartesian product, Relations, functions, domain & range of functions. Describe types of functions (in-to, many-to-one, one-one, onto and bijective) and inverse functions – examples.

2. Partial Fractions:

Define rational, proper and improper fractions of polynomials. Resolve rational fractions in to their partial fractions covering the types mentioned below.

$i)$ $\dfrac{f(x)}{(ax+b)(cx+d)}$ $ii)$ $\dfrac{f(x)}{(ax+b)^2(cx+d)}$

$iii)$ $\dfrac{f(x)}{(x^2+a^2)(bx+c)}$ $iv)$ $\dfrac{f(x)}{(x^2+a^2)(x^2+b^2)}$

3. Matrices:

Definition of a 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±B), cos(A±B), tan(A±B),cot(A±B),and related identities with problems.

6. Multiple and sub multiple angles:

Formulae for trigonometric ratios of multiple angles 2A,3A and submultiple angle A/2 with problems.

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 : sinx =k , cosx= k, tanx =k, where k is a constant. 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- Amplitue (polar) form , Exponential form (Euler form) of a complex number- Problems. DeMoivre's theorem.

UNIT-III

Coordinate geometry

13 Straight lines: various forms of straight lines, angle between lines, perpendicular distance from a point, distance between parallel lines-examples.

14. Circle: locus of a point, Circle, definition-Circle equation given (i) centre and radius, (ii) two ends of a diameter (iii) centre and a point on the circumference (iv) three non collinear points - general equation of a circle – finding centre, radius.

15. 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-IV

Differential Calculus

16. Concept of Limit- Definition- Properties of Limits and Standard Limits -Simple Problems-Continuity of a function at a point- Simple Examples only.

17. 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-V

Applications of Derivatives:

18. 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.

19. Physical applications of the derivative – velocity, acceleration, derivative as a rate measure –Problems.

20. 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.

21. Using the concept of derivative of a function of single variable, find the absolute error, relative and percentage errors and approximate values due to errors in measuring.

Textbook:

Engineering Mathematics-I, a textbook for first year diploma courses, prepared & prescribed by SBTET, AP.

Reference Books:

1. Shanti Narayan, A Textbook of matrices, S.Chand&Co.
2. Robert E. Moyer & Frank Ayers Jr., Schaum's Outline of Trigonometry, 4th Edition, Schaum's Series
3. M.Vygodsky, Mathematical Handbook, Mir Publishers, Moscow.
4. Frank Ayers & Elliott Mendelson, Schaum's Outline of Calculus, Schaum's Series

C-20 Curriculum

Engineering Mathematics – I

Blue print

S. No	Chapter/ Unit title	No of Periods		Weightage Allotted	Marks wise distribution of weightage				Question wise distribution of weightage				COs mapped
	Unit - I : Algebra	**Theory**	**Practice**		**R**	**U**	**Ap**	**An**	**R**	**U**	**Ap**	**An**	
1	Relations and Functions	4	2	3	0	3	0	0	0	1	0	0	**CO 1**
2	Partial Fractions	3	2	3	0	3	0	0	0	1	0	0	**CO 1**
3	Matrices and Determinants	10	10	11	3	0	8	0	1	0	1	0	**CO 1**
	Unit - II : Trigonometry												
4	Trigonometric Ratios	1	1	0	0	0	0	0	0	0	0	0	**CO2**
5	Compound Angles	3	2	3	3	0	0	0	1	0	0	0	**CO2**
6	Multiple and Submultiple angles	4	4	3	0	3	0	0	0	1	0	0	**CO2**
7	Transformations	3	3	8	0	8	0	0	0	1	0	0	**CO2**
8	Inverse Trigonometric Functions	3	2										
9	Trigonometric Equations	3	2	8	0	0	8	0	0	0	1	0	**CO2**
10	Properties of triangles	3	2										
11	Hyperbolic Functions	1	1	0	0	0	0	0	0	0	0	0	**CO2**
12	Complex Numbers	4	2	3	3	0	0	0	1	0	0	0	**CO2**
	Unit III : Co-ordinate Geometry												
13	Straight Lines	4	2	3	3	0	0	0	1	0	0	0	**CO3**
14	Circle	3	2	8	0	8	0	0	0	1	0	0	**CO3**
15	Conic Sections	8	4										
	Unit – IV : Differential Calculus												
16	Limits and Continuity	4	2	3	0	3	0	0	0	1	0	0	**CO4**
17	Differentiation	17	10	14	3	11	0	0	1	2	0	0	**CO4**
	Unit - V : Applications of Differentiation												
18	Geometrical Applications	3	2	10	0	0	0	10	0	0	0	1	**CO5**
19	Physical Applications	2	2										
20	Maxima and Minima	3	4										

21	Errors and Approximations	2	1										
Total		**89**	**61**	**80**	**15**	**39**	**16**	**10**	**5**	**8**	**2**	**1**	

R: Remembering Type : 15 Marks

U: understanding Type : 39 Marks

Ap: Application Type : 16 Marks

An: Analysing Type : 10 Marks

Engineering Mathematics – I

Unit Test Syllabus

Unit Test	Syllabus
Unit Test-I	From L.O. 1.1 to L.O. 2.11
Unit Test-II	From L.O. 2.12 to L.O. 3.10
Unit Test-III	From L.O.4.1 to L.O. 5.10

Unit Test I C –20, AI-102

State Board of Technical Education and Training, A. P

First Year

Subject name: **Engineering Mathematics-I**
Sub Code: **AI-102**

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. If $f(x) = x^2$ and domain $= \{-1, 0, 1\}$, then find range. (CO1)

b. If $A=\begin{bmatrix}1 & 2\\ 3 & 4\end{bmatrix}$, then find 3A. (CO1)

c. Write the value of $Sin120^0$ (CO2)

d. Write the formula for $\tan 2A$ in terms of $\tan A$ (CO2)

2. If $f:R\to R$ is defined by $f(x)=3x-5$, then prove that $f(x)$ is onto. (CO1)

3. If $A=\begin{bmatrix}1 & 3\\ 4 & -9\end{bmatrix}$, $B=\begin{bmatrix}2 & 4\\ -3 & 1\end{bmatrix}$ then find $2A+3B$ (CO1)

4. Prove that $Sin^2 45^0 - Sin^2 15^0 = \frac{\sqrt{3}}{4}$ (CO2)

5. Prove that $\frac{\sin 2A}{1-\cos 2A} = \cot A$ (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) Resolve $\frac{2x}{(x-1)(x-3)}$ into partial fractions.(CO1)

or

B) Resolve $\frac{x+4}{x^2-3x+2}$ into partial fractions.(CO1)

7. A) Using cramer's rule to solve
$x-y+z=2, 2x+3y-4z=-4, 3x+y+z=8$ (CO1)

or

B) Prove that $\begin{vmatrix}bc & b+c & 1\\ ca & c+a & 1\\ ab & a+b & 1\end{vmatrix} = (a-b)(b-c)(c-a)$ (CO1)

8. A) Find the adjoint of Matrix $\begin{bmatrix}1 & 2 & -2\\ -1 & 3 & 5\\ 2 & 7 & -4\end{bmatrix}$ (CO1)

or

B) If $A=\begin{bmatrix} 2 & 3 & 4 \\ 5 & 7 & 9 \\ -2 & 1 & 3 \end{bmatrix}$; $B=\begin{bmatrix} 3 & 1 & -5 \\ 2 & 1 & 4 \\ 0 & 3 & 1 \end{bmatrix}$, find AB and BA and verify if $AB=BA$. (CO1)

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Unit Test II **C –20, AI-102**

State Board of Technical Education and Training, A. P

First Year

Subject name: **Engineering Mathematics-I**
Sub Code: **AI- 102**

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. $\sin C+\sin D=2\cos\left(\frac{C+D}{2}\right)\sin\left(\frac{C-D}{2}\right)$: State TRUE/FALSE (CO2)
   b. If $z=2+3i$, then find $|z|$ (CO2)
   c. $\sinh x=\frac{e^x-e^{-x}}{2}$: State TRUE/FALSE (CO2)
   d. Write the eccentricity of rectangular hyperbola. (CO3)
2. Express $(3-4i)(7+2i)$ in terms of $a+ib$ (CO2)
3. Find the perpendicular distance from $(1,1)$ to the line $2x+3y-1=0$ (CO3)
4. Find the angle between lines $2x-y+3=0$ and $x+y-2=0$ (CO3)
5. Find the centre and radius of the circle $x^2+y^2-2x+4y-4=0$ (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) Prove that $\frac{\sin 2\theta + \sin 4\theta + \sin 6\theta}{\cos 2\theta + \cos 4\theta + \cos 6\theta} = \tan 4\theta$. (CO2)

or

B) Prove that $\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{5} + \tan^{-1}\frac{1}{8} = \frac{\pi}{4}$ (CO2)

7. A) Solve $2\sin^2\theta - \sin\theta - 1 = 0$ (CO2)

or

B) In any ΔABC, If $\angle B = 60^0$ then $\frac{c}{a+b} + \frac{a}{b+c} = 1$ (CO2)

8. A) Find the equation of circle with $(2,3)$ and $(6,9)$ as the end points of diameter and also find centre and radius of circle. (CO3)

or

A) Find the equation of ellipse whose focus is $(1,-1)$, directrix is $x - y + 3 = 0$ and eccentricity is1/2.(CO3)

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Unit Test III **C –20, AI-102**

State Board of Technical Education and Training, A. P

First Year

Subject name: Engineering Mathematics-I
Sub Code: AI-102

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. Find $\lim_{x\to 1}\frac{x^2+1}{x+5}$ (CO4)

b. $\lim_{\theta\to 0}\frac{\sin 2\theta}{\theta}=2$: State TRUE/FALSE (CO4)

c. $\frac{d}{dx}\left(3\tan^{-1}x\right)=?$ (CO4)

d. Formula for percentage error in x is _____ . (CO5)

2. Evaluate $\lim_{x\to 2}\frac{x^5-32}{x^2-4}$ (CO4)

3. Find the derivative of $3\tan x-4\log x+7^x$ w.r.t.x (CO4)

4. Differentiate $x^2\sin x$ w.r.t. x (CO4)

5. Find the derivative of $\frac{2x+3}{3x+4}$ (CO4)

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 derivative of $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ w.r.t. $\tan^{-1}\left(\frac{2x}{1-x^2}\right)$. (CO4)

or

B) Find $\frac{dy}{dx}$ if $y=x^{\cos x}$ (CO4)

7. A) Verify Euler's theorem when $u(x,y)=\frac{x^4+y^4}{x-y}$ (CO4)

or

B) Find the equation of tangent and normal to the curve $3y=x^2-6x+17$ at $(4,3)$ (CO5)

8. A) Circular patch of oil spreads on water and the area is growing at the rate of $8\,sqcm/\min$.

How fast is the radius increasing when radius is $5\,cm$. (CO5)

or

B) Find the maxima and minima values of $f(x)=x^3-6x^2+9x+15.$ (CO5)

END-EXAM MODEL PAPERS

STATE BOARD OF TECHNICAL EDUCATION, A.P

ENGINEERING MATHEMATICS AI- 102

TIME : 3 HOURS **MODEL PAPER- I** **MAX MARKS:80**

PART-A

Answer All questions. Each question carries THREE marks.

10x3=30M

1. If $A=\left\{0,\frac{\pi}{6},\frac{\pi}{4},\frac{\pi}{3},\frac{\pi}{2}\right\}$ and $f:A\to B$ is a function such that $f(x)=\cos x,$ then find the range of f. **CO 1**
2. Resolve the function $\frac{x}{(x-1)(x-2)}$ into partial fractions. **CO 1**
3. If $\mathrm{A}=\begin{bmatrix}3 & 9 & 0\\ 1 & 8 & -2\end{bmatrix}$ and $\mathrm{B}=\begin{bmatrix}4 & 0 & 2\\ 7 & 1 & 4\end{bmatrix}$, find $\mathrm{A}+\mathrm{B}$ and $\mathrm{A}-\mathrm{B}$. **CO1**
4. Show that $\frac{\cos 16^0+\sin 16^0}{\cos 16^0-\sin 16^0}=\tan 61^0.$ **CO2**
5. Prove that $\frac{\sin 2\theta}{1-\cos 2\theta}=\cot\theta.$ **CO2**
6. Find the modulus of the complex number $\left(\frac{1-i}{2+i}\right)$. **CO2**
7. Find the distance between parallel lines $x+2y+3=0$ and $x+2y+8=0$. **CO3**
8. Find $\lim_{x\to 0}\frac{\sin 77x}{\sin 11x}$. **CO4**
9. Differentiate $3\tan x-4\log x-7x^2$ w.r.t. x. **CO4**
10. If $x=at^2, y=2at,$ then find $\frac{dy}{dx}$. **CO4**

PART-B

Answer All questions. Each question carries EIGHT marks.

5x8=40M

11 A) Find the inverse of the matrix $\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$. **CO1**

Or

B) Solve the system of equations $x+y+z=6, x-y+z=2$ and $2x-y+3z=9$ by Cramer's rule. **CO1**

12 A) If $\cos x+\cos y=\frac{3}{5}$ and $\cos x-\cos y=\frac{2}{7}$, then show that **CO2**

$21\tan\left(\frac{x-y}{2}\right)+10\cot\left(\frac{x+y}{2}\right)=0.$

Or

B) If $\tan^{-1}x+\tan^{-1}y+\tan^{-1}z=\pi$ then show that $x+y+z=xyz.$ **CO2**

13 A) Solve $\sqrt{3}\cos\theta-\sin\theta=1.$ **CO2**

Or

B) In any $\Delta ABC,$ Show that $\cot\frac{A}{2}+\cot\frac{B}{2}+\cot\frac{C}{2}=\frac{S^2}{\Delta}.$ **CO2**

14 A) Find the equation of the circle with $(4,2)$ and $(1,5)$ as the two ends of its diameter and also find its centre and radius. **CO 3**

Or

B) Find the centre, vertices, equation of axes, lengths of axes, eccentricity, foci, equations of directrices and length of latus rectum of the ellipse $4x^2+16y^2=1.$ **CO 3**

15 A) Find the derivative of $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ w.r.t. $\tan^{-1}\left(\frac{2x}{1-x^2}\right)$ **CO4**

Or

B) If $u = \tan^{-1}\left(\frac{x^3 - y^3}{x + y}\right)$, then prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \sin 2u.$ **CO4**

PART-C

Answer the following question. Question carries TEN marks.

1x10=10M

16. The sum of two numbers is 24. Find them so that the sum of their squares is minimum.

CO 5

STATE BOARD OF TECHNICAL EDUCATION, A.P

ENGINEERING MATHEMATICS AI- 102

TIME : 3 HOURS **MODEL PAPER- II** **MAX.MARKS : 80M**

PART-A

Answer All questions. Each question carries THREE marks. **10x3=30M**

1. If $f : R \to R$ is a bijective function such that $f(x) = ax + b$, then find $f^{-1}(x)$. **CO 1**
2. Resolve the function $\frac{1}{(x+1)(x-2)}$ into partial fractions. **CO 1**
3. If $A = \begin{bmatrix} 0 & -1 & 3 \\ 1 & 0 & 7 \\ -3 & x & 0 \end{bmatrix}$ is a skew-symmetric matrix, find the value of x. **CO 1**
4. Find the value of $\sin^2 82\frac{1}{2}^0 - \sin^2 22\frac{1}{2}^0$. **CO2**
5. Prove that $\frac{\cos 3A}{2\cos 2A - 1} = \cos A$. **CO2**
6. Find the conjugate of the complex number $(3-2i).(4+7i)$ **CO2**
7. Find the equation of the line passing through the points $(1,2)$ and $(3,-4)$. **CO3**
8. Find $\lim_{x \to 2} \frac{x^5 - 32}{x - 2}$. **CO4**
9. Differentiate $\sqrt{x} - \sec x + \log x$ w.r.t. x. **CO4**
10. If $u(x, y) = x^3 - 3axy + y^3$, then find $\frac{\partial u}{\partial x}$ and $\frac{\partial u}{\partial y}$. **CO4**

PART-B

Answer All questions. Each question carries EIGHT marks. 5x8=40M

11 A) Show that $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} = (a-b)(b-c)(c-a)$. **CO1**

Or

B) Solve the system of equations $x+2y+3z=6, 3x-2y+4z=5$ and $x-y-z=-1$ using matrix inversion method. **CO1**

12 A) Prove that $\frac{\sin 2\theta + \sin 4\theta + \sin 6\theta}{\cos 2\theta + \cos 4\theta + \cos 6\theta} = \tan 4\theta$. **CO2**

Or

B) Prove that $\tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{5} + \tan^{-1}\frac{1}{7} + \tan^{-1}\frac{1}{8} = \frac{\pi}{4}$. **CO2**

13 A) Solve $2\cos^2\theta - 3\cos\theta + 1 = 0$. **CO2**

Or

B) In any ΔABC, Show that $\sum a^3 \cos(B-C) = 3abc$. **CO2**

14 A) Find the equation of the circle passing through the points $(0,0),(6,0)$ and $(0,8)$. **CO3**

Or

B) Find the equation of the rectangular hyperbola whose focus is $(1,2)$ and directrix is $3x+4y-5=0$. **CO3**

15 A) If $\sin y = x\sin(a+y)$, then prove that $\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin a}$. **CO4**

Or

B) If $y = \tan^{-1} x$, then prove that $(1+x^2)y_2 + 2xy_1 = 0$. **CO4**

PART-C

Answer the following question. Question carries TEN marks. 1x10=10M

16 Show that the semi-vertical angle of the cone of maximum volume and of given slant height is $\tan^{-1}\sqrt{2}$.

CO4

Course code	Course Title	No. of Periods per week	Total No. of Periods	Marks for FA	Marks for SA
AI-103	**Engineering Physics**	4	120	20	80

S.No	Unit Title/Chapter	No of Periods	COs Mapped
1	Units and Dimensions	08	CO1
2	Elements of Vectors	12	CO1
3	Dynamics	12	CO2
4	Friction	10	CO2
5	Work, Power and Energy	12	CO3
6	Simple harmonic motion	12	CO3
7	Heat and Thermodynamics	12	CO4
8	Sound	10	CO4
9	Properties of matter	10	CO5
10	Electricity and Magnetism	12	CO5
11	Modern physics	10	CO5
Total		**120**	

- **Course Objectives**

Course Title: Engineering Physics	
Course Objectives	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	Explain S.I units and dimensions of different physical quantities, basic operations among vector quantities.
	CO2	Explain the motion of objects moving in one dimensions and two dimensions, the causes of motion and hindrance to the motion of the objects especially with respect to friction.
	CO3	Explain the mechanical energy of bodies like PE, KE and conservation law of energy, the properties of simple harmonic motion.
	CO4	Explain gas laws, ideal gas equation, Isothermal and adiabatic processes, Specific heats, to study the laws of thermodynamics. Causes, consequences and methods to minimise noise pollution, explain beats, Doppler effect, Reverberation, echoes.
	CO5	Explain certain properties of solids, liquids like elastic properties, viscosity and surface tension. Explain Ohm's law, to study Kirchoff's laws, to study the principle of Wheatstone's bridge and its application to meter bridge. To study the magnetic force and understand magnetic field. To compute magnetic field strength on axial and equatorial lines of a bar magnet. To familiarise with modern topics like photoelectric effect, optical fibres, superconductivity and nanotechnology.

- **Learning Outcome**
- **COs-POs mapping strength (as per given table)**

AI-103	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3					1				
CO2	3		2					2		
CO3	3		2						1	
CO4	3	2			2			2		
CO5	3			2			2			2

3 = strongly mapped 2= moderately mapped 1= slightly mapped

- **Model Blue Print with weightages for Blooms category and questions for chapter and Cos mapped**

S.No	**Unit Title/Chapter**	**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	Units and Dimensions	08	03	3	0	0	0	1	0	0	0	CO1
2	Elements of Vectors	12	11	3	8	0	0	1	1	0	0	CO1
3	Dynamics	12	11	3	8	0	0	1	1	0	*	CO2

4	Friction	10	11	3	0	8	0	1	0	1	0	CO2
5	Work, Power and Energy	12	11	3	8	0	0	1	1	0	0	CO3
6	Simple harmonic motion	12	11	3	8	0	0	1	1	0	*	CO3
7	Heat and Thermodynamics	12	11	0	8	3	0	0	1	1	*	CO4
8	Sound	10	11	0	8	3	0	0	1	1	0	CO4
9	Properties of matter	10	08	0	8	0	0	0	1	0	0	CO5
10	Electricity and Magnetism	12	14	6	0	8	0	2	0	1	0	CO5
11	Modern physics	10	08	0	8	0	0	0	1	0	0	CO5
Total		**120**	**110**	**24**	**64**	**22**	**0**	**8**	**8**	**4**	***10**	

***One question of HOTs for 10 marks from any of the unit title 3 or 6 or 7**

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 Dimension alanalysis

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, 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 products 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 at ower 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 horizontall 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 to f 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 P.E

5.3 Define Kinetic energy and give examples, derive an expression for K.E

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 Simple harmonic motion

6.1 Define Simple harmonic motion, Give examples, State the conditions

6.2 Explanation of uniform circular motion of a particle is a combination of two perpendicular SHMs.

6.3 Derive expressions for displacement, velocity, acceleration, Frequency, Time

period of a particle executing SHM.

6.4 Define phase of SHM

6.5 Define Ideal simple pendulum and derive expression for Time period of simple pendulum

6.6 State the laws of motion of simple pendulum

6.7 Solve the related numerical problems

7.0 Concept of Heat and thermodynamics

7.1 Explain the concept of expansion of gases

7.2 State and explain Boyle's and Charles laws.

7.3 Define absolute zero temperature, absolute scale of temperature

7.4 Define ideal gas and distinguish from real gas

7.5 Derive Ideal gas equation. Define Specific gas constant and Universal gas Constant, write S.I unit and Dimensional Formula. Calculate the value of R.

7.6 Explain why universal gas constant is same for all gases

7.7 State and Explain Isothermal process and adiabatic process

7.8 State first and second laws of thermodynamics and state applications

7.9 Define specific heats & molar specific heats of a gas, Derive C_P-C_V =R

7.10 Solve the relevant numerical problems

8.0 Concept of Sound

8.1 Concept of the sound, Wave motion (longitudinal and transverse wave)

8.2 Distinguish between musical sound and noise

8.3 Explain noise pollution and state SI unit for intensity level of sound

8.4 Explain causes, effects and methods of minimizing of noisepollution

8.5 Explain the phenomenon of beats State the applications

8.6 Define Doppler effect, List the Applications

8.7 Define reverberation and reverberation time and Write Sabine's formula

8.8 Define and Explain echoes state its applications

8.9 State conditions of good auditorium

8.10 Solve the related numerical problems

9.0 Concepts of properties of matter

9.1 Explain the terms Elasticity, stress, strain and types of Stress and Strain

9.2 State and explain Hooke's law

9.3 Definitions of Modulus of elasticity, Young's modulus(Y), Bulk modulus (K), Rigidity modulus (n),Poisson's ratio (σ),

9.4 Define surface tension and give examples

9.5 Explain Surface tension with reference to molecular theory

9.6 Define angle of contact and capillarity and write formula for Surface Tension

9.7 Explain the concept of Viscosity; give examples, Write Newton's formula.

9.8 Define co-efficient of viscosity and write its units and dimensional formula and State Poiseulle's equation for Co-efficient of viscosity

9.9 Explain the effect of temperature on viscosity of liquids and gases

9.10 Solve the related numerical problems

10.Concepts of Electricity and Magnetism

10.1 Explain Ohm's law in electricity and write the formula

10.2 Define specific resistance, conductance and state their units

10.3 Explain Kichoff's laws

10.4 Describe Wheat stone's bridge with legible sketch

10.5 Describe Meter Bridge for the determination of resistivity with a circuit diagram

10.6 Explain the concept of magnetism. State the Coulomb's inverse square law of magnetism

10.7 Define magnetic field and magnetic lines of force and write the properties of magnetic lines of force

10.8 Derive an expression for the moment of couple on a bar magnet placed in a uniform magnetic field

10.9 Derive equations for Magnetic induction field strength at a point on the axial line and on the equatorial line of a bar magnet.

10.1 Solve the related numerical problems

11.0 Concepts of Modern physics

11.1 State and Explain Photo-electric effect and Write Einstein‘s photoelectric equation

11.2 State laws of photo electric effect

11.3 Explain the Working of photo electric cell, write its applications.

11.4 Recapitulatere fraction of light and its laws, criticalangle, TotalInternal Reflection

11.5 Explain the principle and working of Optical Fiber, mention different types of Optical Fibre, state the applications

11.6 Define super conductor and superconductivity and mention examples

11.7 State the properties of super conductingmaterials and list the applications

11.8 Nanotechnology definition, non materials, applications

COURSECONTENT

UNIT I

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 Dimension alanalysis-Errors in measurement, Absolute error, relative error, percentage error, significant figures-Problems.

UNIT II

Elements of Vectors:
Scalars and Vectors–Types of vectors(Proper Vector, NullVector,UnitVector,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

UNIT III

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

UNIT IV

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

UNIT V

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

UNIT VI

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

UNIT VII

Heat and Thermodynamics:

Expansion of Gases-Boyle's law-Absolute scale of temperature- Charles laws- Ideal gas equation- Universal gas constant- Differences between r and 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

UNIT VIII

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

UNIT IX

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 (σ), relation between Y, K, n and σ(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- The related numerical problems

UNIT X

Electricity & Magnetism:

Ohm's law and explanation-Specific resistance-Kirchoff'slaws- Wheat stone'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.

UNIT XI

Modern Physics;

Photoelectric effect –Einstein's photoelectric equation-laws of photoelectric effect-photo electric 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, non materials, applications

REFERENCEBOOKS

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

- **Table specifying the scope of syllabus to be covered for Unit Tests**

Unit Test	**Learning outcomes to be covered**
Unit Test – 1	**From 1.1 to 4.9**
Unit Test – 2	**From 5.1 to 8.10**
Unit Test – 3	**From 9.1 to 11.8**

- **Model question paper for Unit Test with COs mapped**

UNIT TEST –I

Model Question Paper (C-20)

ENGINEERING PHYSICS (103)

TIME: 90 minutes Total Marks:40

PART-A 16 Marks

Instructions: (1) Answer all questions.
(2) First question carries 4 marks and others carry 3 marks each.
(3) Answers for Question Numbers 2 to 5 should be brief and straight to The point and shall not exceed five simple sentences.

1. i) The dimensional formula of force is _____ (CO1)
   ii) which of the following is a scalar (CO1) [ ]

   a) force b) work c) displacement d) velocity
   iii) we can add a scalar to a vector (Yes / No) (CO1)

   iv) Friction is a self-adjusting force. [True / False] (CO2)

2. Define dot product. Give one example. (CO1)

3. A force of 150 N acts on a particle at an angle of 30° to the horizontal. Find the horizontal and vertical components of force (CO1)

4. Define projectile. Give two examples.(CO2)

5. It is easier to pull a lawn roller than to push it. Explain (CO2)

PART—B 3x8=24

Instructions: (1) Answer all questions. Each question carries 8marks.
(2) Answer should be comprehensive and the criteria for evaluation is content but not the length of the answer.

6) (A)Derive an expression for magnitude and direction of resultant of two vectors using parallelogram law of vectors (CO1)

OR

(B) Write any four properties of dot product and any four properties of cross product (CO1)

7) (A) Show that path of a projectile is a parabola in case of oblique Projection. (CO2)

OR

(B) Derive the expression for range and time of flight of a projectile (CO2)

8) (A) State and explain polygon law of vector addition with a neat diagram (CO1)

OR

(B) Derive the equation for acceleration of a body on a rough inclined plane (CO2)

BOARD DIPLOMA EXAMINATION, (C–20)

FIRST YEAR EXAMINATION

Common–103, ENGINEERING PHYSICS

Time : 3 hours] **[Total Marks : 80**

PART—A **3×10=30**

Instructions : (1) Answer all questions.

(2) Each question carries three marks.

(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 (CO1)

   (a) Velocity (b) Force (c) Angular momentum

2. Write any three properties of scalar product.(CO1)

3. Define projectile. Give two examples.(CO2)

4. It is easier to pull a lawn roller than to push it. Explain.(CO2)

5. Define potential energy and kinetic energy. (CO3)

6. 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. (CO3)

7. State first and second laws of thermodynamics. (CO4)

8. Write any three conditions of good auditorium (CO4)

9. Define ohmic and non-ohmic conductors.(CO5)

10. State Coulomb's inverse square law of magnetism.(CO5)

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 twovectors using parallelogram law of vectors. (CO1)

OR

B) Show that path of a projectile is parabola in case of oblique projection and derive expression for maximum height.(CO2)

12. A) Derive expression for acceleration of a body sliding downwards on a rough inclined plane.(CO2)

OR

B) Verify the law of conservation of energy in case of a freely falling body.(CO3)

13. A) Derive an expression for velocity and acceleration of a particle performing simple harmonic motion. (CO3)

OR

B) Define ideal gas and derive ideal gas equation.(CO4)

14. 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.(CO4)

OR

B) Explain surface tension based on molecular theory. Write three examples of surface tension. (CO5)

15. A) Derive an expression for balancing condition of Wheat stone's bridge with a neat circuit diagram.(CO5)

OR

B) Explain principle and working of optical fibers. Write any three applications (CO5).

PART C **1 x 10 = 10**

16) Derive relationship between C_p and C_v and hence show that $C_p$is greater than C_v. (CO4)

C-20

Engineering Chemistry and Environmental Studies

Course code	Course Title	No. of Periods per week	Total No. of Periods	Marks for FA	Marks for SA
AI-104	Engineering Chemistry and Environmental Studies	4	120	20	80

S.No	Unit Title/Chapter	No of Periods	COs Mapped
1	Fundamentals of Chemistry	18	CO1
2	Solutions	10	CO1
3	Acids and bases	10	CO1
4	Principles of Metallurgy	8	CO1
5	Electrochemistry	16	CO2
6	Corrosion	8	CO2
7	Water Treatment	10	CO3
8	Polymers	12	CO4
9	Fuels	6	CO4
10	Chemistry in daily life	6	CO4
11	Environmental Studies	16	CO5
Total		120	

- **Course Objectives**

Course Title: Engineering Chemistry & Environmental Studies	
Course Objectives	1. To familiarize with 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. to reinforce theoretical concepts by conducting relevant experiments/exercises

- **Course outcomes**

Course Outcomes	CO1	Explain Bohr`s atomic model, chemical bonding, mole concept, acids and bases,P^H metallurgical process and alloys
	CO2	Explain electrolysis, Galvanic cell,emf and corrosion
	CO3	Synthesise of Plastics and rubber and industrial applications of fuels
	CO4	Describe the methods of treatment of water and give the information about chemical compounds used in our daily life
	CO5	Explain the causes, effects and control methods of air and water pollution and measures to protect the environment

- **COs-POs mapping strength (as per given table)**

AI-104	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	1	2					3		
CO2	3			2				2	1	
CO3	3		2							
CO4	3				2		2			
CO5	3				3					3

3 = strongly mapped

2= moderately mapped

1= slightly mapped

- **Model Blue Print with weightages for Blooms category and questions for each chapter and COs mapped**

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	Fundamentals of Chemistry	18	19	8	8	3		1	1	1		CO1
2	Solutions	10	11	0	0	8	3			1	1	CO1
3	Acids and bases	10	11	0	8	0	3		1		1	CO1
4	Principles of Metallurgy	8	8	8	0	0		1				CO1

5	Electrochemistry	16	11	8	3	0		1	1		*	CO2
6	Corrosion	8	8	0	8	0			1			CO2
7	Water Treatment	10	11	8	3	0		1	1			CO3
8	Polymers	12	11	3	8	0		1	1		*	CO4
9	Fuels	6	3	3	0	0		1				CO4
10	Chemistry in daily life	6	3	0	0	3				1		CO4
11	Environmental Studies	16	14	3	11	0		1	2			CO5
Total		120	110	12	6	6	6	20	35	5	* 10	

***One question of HOTs for 10 marks from any of the unit title 5 or 8**

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

ENGINEERINGCHEMISTRY AND ENVIRONMENTAL STUDIES

1.0 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 , draw the shapes of s,pandd- Orbitals 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, *H_2,*O_2 and *N_2.(* 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.

2.0 Solutions

2.1 Define the terms 1.Solution, 2.Soluteand 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,H_2SO_4,H_3PO_4)Bases ($NaOH$, $Ca(OH)_2$, $Al(OH)_3$) and Salts ($NaCl$, Na_2CO_3, $CaCO_3$)

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 are given

c) Problems on dilution to convert high concentrated solutions to low concentrated solutions

3.0 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 Lew is 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

4.0 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. Germen silver
3. Nichrome.

5.0 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 used NaCl

5.4 Explain Faraday's laws of electrolysis

5.5 Define 1. Chemical equivalent (E) 2. Electrochemicalequivalent (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 electro chemical series and its significance

5.11 Explain the emf of a cell and solve the numerical problem s the cell based on standard electrode potentials.

6.0 Corrosion

6.1 Define the term corrosion.

6.2 state the Factor sin fluencing the rate of corrosion

6.3 Describe the formation of a) composition cell b)stress cell c)concentration cell during corrosion.

6.4 Define rusting of iron and explain theme chanism of rusting of iron.

6.5 Explain the methods of prevention of corrosion

a)Protective coatings (anodic and cathodic coatings)

b) Cathodicprotection (Sacrificial anode process and Impressed–voltage process)

7. 0 Water Treatment

7.1 Define soft water and hard water with respect to soap action.

7.2 Define and Classify the hardness of water.

7.3 List out the salts that causing hardness of water (with Formulae)

7.4 State the disadvantages of using hard water in industries.

7.5 Define Degree of hardness and units of hardness (mg/L) or(ppm).

7.6 Explain the method so f softening of hard water: a) Ion-exchange process, b)Permuted process or zeolite process

7.7 State the essential qualities of drinking water.

7.8 Chemistry involved in treatment of water (Coagulation, Chlorination, deflouridation)

7.9 Explain Osmosis and Reverse Osmosis with examples.

7.10 State the applications of Reverse Osmosis.

8.0 Polymers

8.1 Explain the concept of polymerization

8.2 Describe the methods of polymerization a) additionpolymerization of ethylene b)condensation polymerization of Bakelite(Only flowchart)

8.3 Define the term plastic and classify the plastics with examples.

8.4 Distinguish between thermo plastics and the rmo setting plastics

8.5 List the Characteristics of plastics and state the disadvantages of using plastics.

8.6 State the advantages of plastics over traditional materials.

8.7 Explain the methods of preparation and uses of the following plastics:

1. PVC, 2.Teflon, 3. Polystyrene 4. Nylon 6,6

8.8 Explain processing of Natural rubber and write the structural formula of Natural rubber.

8.9 List the Characteristics of raw rubber

8.10 Define and explain Vulcanization and List out the Characteristics of Vulcanized rubber.

8.11 Define the term Elastomer and describe the preparation and uses of the following synthetic rubbers a) Buna-s and b)Neoprene rubber.

9.0 Fuels

9.1 Define the term fuel

9.2 Classify the fuels based on physical state and based on occurrence.

9.3 List the characteristics of good fuel.

9.4 State the composition and uses of gaseous fuels.

a)water gas b)producer gas, c)natural gas, d) Coal gas, e)Biogas.

10.0 Chemistry in daily life

10. Give the basic chemical composition, applications, health aspects and pollution impacts of

a) soaps, and detergents

b)vinegar

c) Insect repellent sand

d) activated charcoal

e) Soft drinks

11.0 ENVIRONMENTALSTUDIES

11.1 Define the term environment and explain the scope and importance of environmental studies

11.2 Define the segments of environment 1).Lithosphere, 2).Hydrosphere, 3).Atmosphere, 4).Biosphere,

11.3 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) eco system12) Producers13) Consumers 14) Decomposers with examples

11.4 State the renewable and non renewable energy sources with examples.

11.5 Explain biodiversity and threats to biodiversity

11.6 Define air pollution and classify the air pollutants-based on origin and physical state of matter.

11.7 Explain the causes, effects of air pollution on human beings, plants and animals and control methods of air pollution.

11.8 State the uses of forest resources.

11.9 State the deforestation and its causes and effects.

11.10 Explain the 1.) Green house effect , 2) Ozone layer depletion and 3) Acidrain

11.11 Define Water pollution, explain the causes, effects and control methods of Water pollution.

COURSE CONTENT

ENGINEERING CHEMISTRY AND ENVIRONMENTAL STUDIES

UNIT I

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 covalentbondwithexamples–Properties of Ionic and Covalent compounds- structures of ionic crystals (NaCl and CsCl).

UNIT II

Solutions

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

UNIT III

Acids and Bases

Introduction – Theories ofacidsand 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.

UNIT IV

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 andni chrome.

UNIT V

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 .

UNIT VI

Corrosion

Introduction - factors influencing corrosion - composition, stress and concentration cells– rustingofironand its mechanism – prevention of corrosion by coating methods, cathodic protection methods.

UNIT VII

Water technology

Introduction–soft and hard water–causes of hardness–types of hardness

–disadvantages of hard water – degree of hardness (ppm and mg/lit) – softening methods – per mutit process – ion exchange process– qualities of drinking water –Chemistry involved in treatment of water (Coagulation, Chlorination, deflouridation) - Osmosis, Reverse Osmosis – Applications of Reverse osmosis.

UNIT VIII

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.

UNIT IX

Fuels

Definition and classification of fuels–characteristics of good fuel-composition and uses of gaseous fuels.

UNIT X

Chemistry in daily life

Basic composition, applications, health aspects and pollution impacts of soaps and detergents, vinegar, insect repellants, soft drinks, activated charcoal.

UNIT XI

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.

Table specifying the scope of syllabus to be covered for unit test 1, unit test 2 and unit test 3

Unit Test	**Learning outcomes to be covered**
Unit Test - 1	**From 1.1 to 4.7**
Unit Test - 2	**From 5.1 to 8.11**
Unit Test - 3	**From 9.1 to 11.11**

REFERENCEBOOKS

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 Engineering Chemistry

Model question paper for Unit Test with Cos mapped

UNIT TEST –I

Model Question Paper (C-20)

ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES (104)

TIME: 90 minutes **Total Marks:40**

PART-A

16 Marks

Instructions: (1)Answer all questions.
(2) First question carries 4 marks and each of rest carries 3 marks.
(3) Answers for Q.No. 2 to 5 should be brief and straight to the point and shall not exceed five simple sentences.

1. a. Number of neutrons in $_{11}Na^{23}$ is ----------(CO1)
   b. The molarity and normality of HCl is the same (True or False)(CO1)

c. What is the p^H range of base?(CO1)
d. Graphite is a good conductor of electricity (Yes or No)(CO1)

2. Define Covalent bond. Explain the formation of covalent bond in Oxygen and Nitrogen molecules.(CO1)
3. Define mole. Calculate the number of moles present in 50 gm of $CaCO_3$ and 9.8 gm of H_2SO_4.(CO1)
4. Define P^H. Calculate the P^H of 0.001M HCl and 0.01M NaOH solution.(CO1)
5. Write the composition and applications of German silver and Nichrome.(CO1)

PART – B

3x8M = 24M

Answer either (A) or (B) from each questions from Part-B.
Each question carries 8 marks.

6. A) Explain Postulations of Bhor's atomic theory. Give its limitations.(CO1)

(OR)

B) Explain the significance of Quantum numbers.(CO1)

7. A) Express molarity normality with mathematical equation. Calculate the molarity and normality of 10gm of NaOH present in 500 ml solution.(CO1)

(OR)

B) Explain Bronsted-Lowry theory of acids and bases. Give its limitations.(CO1)

8. A) Explain Froth floatation process.(CO1)

(OR)

B) Explain Electrolytic refining processing of copper.(C01)

Model Question Paper (C-20)

ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES (104)

TIME: 3hrs **Total Marks:80**

PART-A

Instructions: (1)Answer all questions.
(2) each question carries 3 marks.

Answer all questions. Each question carries three marks.
3x10=30M

1. Draw the shapes of s and p orbitals. (CO1)
2. Define mole. Find the mole number of 10 g of $CaCO_3$ (CO1)

3. Define Buffer solution.. Give any two examples. (CO1)
4. Define chemical equivalent and electrochemical equivalent. Give their relation. (CO2)
5. State name of the salts and their formulae that cause hardness. (CO3)
6. Write any three disadvantages of using plastics. (CO4)
7. Classify the fuels based on their occurrence. (CO4)
8. Mention the basic chemical composition and applications of vinegar. (CO4)
9. List out any three threats to biodiversity. (CO5)
10. Define pollutant and contaminant. Give an example each. (CO5)

PART – B

Each question carries eight marks.

8x5=40M

11. A) Explain Bhor's atomic theory and give its limitations. (CO1)

(OR)

B) Explain ionic bond formation and covalent bond formation with one example each(CO1)

12. A) Calculate the molarity and normality of 250 ml of sodium carbonate solution that contains 10.6 gm of sodium carbonate. (CO1)

(OR)

B) Explain Bronstead and Lowry theory of acids and bases. Give its limitations.(CO1)

13. A) Explain froth floatation and electrolytic refining of copper with neat diagrams.(CO1)

(OR)

B) Explain the construction and working of galvanic cell. (CO2)

14. A) Explain Cathode protection methods. (CO2)

(OR)

B) Explain ion-exchange of softening of hard water with a neat diagram. (CO3)

15. A) Explain addition and condensation polymerisation with an example each.(CO4)

(OR)

B) Explain the causes and effects of air pollution. (CO5)

PART –C

Question carries ten marks **10x1 =10M**

16. Describe methods of preparation and applications of Polystyrene and Teflon. (CO4)

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
AI-105	**Basics Of Computers and AI**	3	90	20	80

S.No.	Chapter/Unit Title	No.of Periods	CO's Mapped
1.	Fundamentals of Computers	15	CO1,CO3,CO4
2.	Programming Methodology	10	CO2
3.	Operating System basics	20	CO1,CO3
4.	Computer Hardware and Networking Basics	25	CO1,CO4,CO5
5.	Fundamentals of Artificial Intelligence	20	CO2,CO6
Total Periods		90	

Course Objectives	i) To know the fundamentals of Computers ii)To familiarize programming methodologies like algorithms and flowcharts iii)To understand Operating system basics iv)To familiarize Machine Learning and Artificial Intelligence

	At the end of the course the student able to learn following:		
Course Outcomes	CO1	AI-105.1	Explain computer fundamentals
	CO2	AI-105.2	Explain various flowchart, algorithm methods
	CO3	AI-105.3	Explain the importance of Basic Computer operating systems
	CO4	AI-105.4	Analyse functioning of various Hardware components
	CO5	AI-105.4	Explain Networking process in computers
	CO6	AI-105.5	Explain basics of Artificial Intelligence and Machine Learning

PSO Matrix:

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
AI-105.1	**3**							**3**	**1**	**1**
AI-105.2	**1**	**2**	**2**	**1**		**3**		**1**	**3**	**1**
AI-105.3	**3**	**1**		**1**		**1**	**1**	**3**	**1**	**1**
AI-105.4	**3**		**2**	**2**	**1**		**1**	**2**	**1**	**2**
AI-105.5	**3**		**2**		**1**	**1**	**1**	**2**	**1**	**2**
Average	**2.6**	**1.5**	**2**	**1.3**	**1**	**1.7**	**1**	**2.2**	**1.4**	**1.4**

3 =Strongly mapped, 2 = Moderately mapped, 1 = Slightly mapped

Learning Outcomes:

1.0 Fundamentals of Digital Computer

1.1. Define various terms related to computers – Computer, Hardware , Software, Firmware, High Level Language , Low Level Language

1.2. Draw and explain block diagram of a Computer in detail

1.3. Describe the current family of CPUs used in Computers.
1.4. State the use of storage devices used in a Computer.
1.5. List the two types of memory used in a Computer.
1.6. State the importance of cache memory.
1.7. Explain the generations of computers.
1.8. Classification of computers - based on a) size, b) processor.
1.9. State the importance of binary number system for use in Digital Computers

2.0 Implement Programming Methodology.

2.1. State the different steps involved in problem solving.
2.2. Define algorithm.
2.3. List four characteristics of algorithm.
2.4. Define a program
2.5. Differentiate between program and algorithm.
2.6. State the steps involved in algorithm development.
2.7. Differentiate between algorithm and flowchart.
2.8. Develop algorithms for simple problems.
2.9. Draw the symbols used in flowcharts.
2.10. Draw flowcharts for simple problems.

3.0 Operating Systems basics

3.1. Describe the need for an operating system.
3.2. List the various operating systems used presently.
3.3. List and explain
  3.3.1. Types of dos commands
  3.3.2. Internal Commands
  3.3.3. External Commands
  3.3.4. Features of Windows desktop.
  3.3.5. Components of a Window.
3.4. State the function of each component of a Window.
3.5. Describe the Method of starting a program using start button
3.6. Explain usage of maximize, minimize, restore down and close buttons.
3.7. State the meaning of a file ,folder.
3.8. Describe the Method of viewing the contents of hard disk drive using Explorer
3.9. Describe the Method of finding a file using search option.
3.10. Use control panel for
  3.10.1. Installing and uninstalling software
  3.10.2. Installing and uninstalling hardware
  3.10.3. Changing the system date and time
  3.10.4. Installing a printer
3.11. ExplainDrive space using system tool option of Accessories group
3.12. Explain Disk defragmentation using System tools
3.13. Explain the procedure for changing resolution, color, appearance, screensaver options of the display

4.0 Computer Hardware and Networking Basics

4.1 Hardware Basics
  4.1.1 Identify hardware used for I/P, O/P & inside computer case, system board components used for communication among devices
  4.1.2 Software - 3 types of Software:ROM BIOS, OS, application software
  4.1.3 Explain Functions of BIOS
  4.1.4 Explain boot process
  4.1.5 Explain POST and important beep codes

4.1.6 Describe about different connectors.

4.2 Networking Basics

4.1.1. Explain meaning of a computer network.
4.1.2. Describe the concept of a Local Area Network,Wide Area Network
4.1.3. Compare Internet and Intranet
4.1.4. Describe about internet service provider.
4.1.5. Explain the role of a modem in accessing the Internet.
4.1.6. Describe address format and IP address
4.1.7. What is browser and List various browsers
4.1.8. Explain the role of search engines with examples.
4.1.9. Explain Internet Security.

5.0 Fundamentals of Artificial Intelligence

5.1. Introduction to Artificial Intelligence

5.1.1. Introduction
5.1.2. Define AI
5.1.3. History of AI
5.1.4. Types of AI
5.1.5. Features of AI
5.1.6. Intelligent systems
5.1.7. Foundations of AI
5.1.8. Tic-tac-toe game playing
5.1.9. History of AI languages
5.1.10. Current Trends in AI
5.1.11. List searching algorithms
5.1.12. Applications of AI
5.1.13. Terminology of AI

5.2. Introduction to Machine Learning

5.2.1. Define Machine Learning,Compare Traditional Programming with Machine Learning
5.2.2. List the applications and key elements of Machine Learning
5.2.3. Define the terms in relation to approaches to Machine Learning (Decision tree learning, Association rule learning, Artificial neural networks, Deep Learning, Inductive Learning, Genetic algorithms, Clustering)
5.2.4. Explain Inductive Learning
5.2.5. Classify the Machine Learning

5.3. Introduction to Big data

5.3.1. Define and list sources of Big data
5.3.2. Evolution of data/big data
5.3.3. List and explain the characteristics of big data – the three V‘s of big data
5.3.4. Describe Storing and selecting of Big Data
5.3.5. State the Need of Big Data
5.3.6. List types of tools used in Big Data
5.3.7. List applications of big data

COURSE CONTENT

1.0 Fundamentals of Digital Computer

Block diagram of a digital computer, functional parameters of CPU, Clock speed and word length, Functional blocks of a CPU: ALU and Control unit, types of memory RAM, ROM, purpose of cache memory

2.0 Programming Methodology.

Steps involved in problem solving - Define algorithm , Program - Characteristics of algorithm - Differentiate between program and algorithm- Steps involved in algorithm development - Differentiate algorithm and flowchart - Algorithms for simple problems - Symbols used in flowcharts -Flowcharts for simple problems.

3.0 Understand Operating Systems

Need for an operating system - List the various operating systems - Types of commands, Internal & External Commands Features of Windows desktop - Components of a Window - Function of each component of a Window - Method of starting a program using start button - Maximize, minimize, restore down and close buttons- Meaning of a file and folder -Viewing the contents of hard disk drive using explorer -Finding a file - Formatting a floppy disk using explore option - Installing and uninstalling new software using control panel - installing and un installing a new hardware using control panel - Drive space - disk defragmentation - Installing a printer - Changing resolution, colour, appearance and screensaver options of the display - Changing the system date and time.

4.0 Computer Hardware and Networking Basics

Hardware Basics- I/P, O/P - inside computer case- system board components - 3 types of Software - BIOS- boot process - POST - different connectors. Networking Basics - computer network - Local Area Network - Wide Area Network - Compare Internet and Intranet - internet service provider - role of a modem - address format and IP address - browser - search engines with examples -Describe Internet Security.

5.0 Fundamentals of Artificial Intelligence

Introduction – Definition - History of AI - Types of AI -Features of AI - intelligent systems- foundations of AI - Tic-tac-toe game playing - History of AI languages - Current Trends in AI- searching algorithms- Applications - Terminology of AI

Introduction to Machine Learning - Compare Traditional Programming with Machine Learning- applications -know the key elements- Define the terms - Decision tree learning,Association rulelearning,Artificial neural networks,DeepLearning,InductiveLearning,Geneticalgorithms,Clustering- Explain Inductive Learning- Classify the Machine Learning -List the applications

Introduction to Big data - Big data-Evolution -characteristics – the three V‘s -Storing - Selecting - Need of Big Data -sources of big data -types of tools used - applications

REFERENCE BOOKS

1. Information Technology - Curtin.
2. Computer Science Theory & Application - E. Balaguruswamy, B. Sushila
3. Introduction to Computers (Special Indian Edition) - Peter Norton

4.Big Data Basics part1 and 2 in www.mssqltips.com
5.Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-GrawHill
6.Introduction to AI & Expert System: Dan W.Patterson, PHI.
7.Artificial Intelligence by Luger (Pearson Education)
8.Russel&Norvig, Artificial Intelligence: A Modern Approach, Pearson Education
9.Introduction to Machine learning, Nils J.Nilsson
10. Machine learning for dummies, IBM Limited ed,by Judith Hurwitz and Daniel Kirsch
11.Introduction to Machine Learning with Python A guide for data scientists, Andreas, C.Muller& Sarah Guido, O'Reilly

ModelBlue Print:

S.No.	Chapter/Unit title	No.of periods	Weightage Allocated	Marks Wise Distribution of Weightage				Question wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Fundamentals of Digital Computers	15	14	3	11			1	2			CO1,CO3,CO4
2	Programming Methodologies	10	24	3	3	8	10	1	1	1	*	CO2
3	Operating system basics	20	14	3	3	8		1	1	1		CO1,CO3
4	Computer Hardware and Networking Basics	25	24	3	11		10	1	2		*	CO1,CO4,CO5
5	Fundamentals of Artificial Intelligence	20	14	6	8			2	1			CO2,CO6
	Total	90	70+(10*)=80					6	7	2		

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1.1 to 3.3
Unit test-2	From 3.4 to 4.1
Unit test-3	From 4.2 to 5.7

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING
MODEL PAPER
Basics Of Computers and AI
UNIT TEST-1
SCHEME: C-20SUBJ CODE:AI-105

MAX MARKS:40 TIME: 90Minutes

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PART-A

16Marks

Instructions:1) Answer all questions

2)First question carries 4marks, and each question of remaining carries 3marks

1. a)All computer physical components are treated as software(True/False) (CO1)

b) ----------is the fastest memory in the computer (CO2)

c)Step by step procedure to solve problem is ---------- (CO2)

d)Which one of the following is not an internal command [ ] (CO3)

i)FORMAT II)RD III)COPY IV)CLS

2) State the importance of binary number system for use in Digital Computers (CO1)
3)List different steps involved in problem solving (CO2)
4) What is the need for an operating system? (CO3)
5)Write about nalog computers. (CO1)

PART-B 3X8=24Marks

Instructions:1) Answer all questions
2)Each question carries 8 Marks
3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer

6. a) Draw and explain block diagram of computer in detail (CO1)

Or

b) Explain various generation of computers (CO1)

7. a) Draw the flow chart to find biggest of three numbers (CO2)

Or

b) Write an algorithm to find the area of triangle when base and height are given.(CO2)

8. a) Explain any three external commands in detail (CO3)

Or

b) Explain components of a window. (CO3)

BOARD DIPLOMA EXAMINATIONS
DIPLOMA IN ARTIFICIAL INTELLIGENCE
MODEL PAPER – YEAR END EXAMINATION
Basics Of Computers and AI

SCHEME: C-20 SUBJ CODE:AI-105
MAX MARKS:80 TIME: 3HOURS

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PART-A

10X3=30Marks

Note: Answer all questions

1. Define terms Hardware and Software. (CO1)

2. State the importance of binary system usage in Digital Computers (CO1)

3. Define algorithm (CO2)

4. State the different steps involved in problem solving (CO2)

5. List the features of Windows desktop (CO3)

6. State the meaning of a file and folder (CO3)

7. What is intranet? (CO5)

8. List various browsers (CO5)

9. List the features of Machine Learning (CO6)

10. List the sources of big data (CO6)

PART-B

5x8=40Marks

Note: Answer all questions

11.a) Explain the generations of computers? (CO1)

OR

11.b) i) State the use of storage devices used in a Computer. (CO1)

ii) State the importance of cache memory. (CO1)

12.a). Differentiate algorithm and flowchart with suitable examples? (CO2)

OR

12.b). Explain in detail the characteristics of an algorithm. (CO2)

13.a). Explain about at least 10 Internal Commands and 5 External Commands. (CO3)

OR

13.b). Explain the procedure for changing resolution, color, appearance, screensaver options of the display. (CO3)

14.a). Explain 3 types of Software in detail. (CO4)

OR

14.b). Explain Internet Security. (CO5)

15.a). Explain the characteristics of Big data. (CO6)

OR

15.b). Explain Inductive Learning. (CO6)

PART-C

1X10=10Marks

16. Write an Algorithm to find the area of triangle if and only if a triangle is formed with the given three sides. (CO2)

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
AI-106	Programming in C	5	150	20	80

S.No.	Chapter/Unit Title	No.of Periods	CO's Mapped
1.	Introduction to C Language	20(10,10)	CO1,CO2
2.	Input and output statements, Operators and Expressions in C.	25(8,12, 5)	CO1,CO2,C3
3.	Decision making, iterative and other control statements	40(5,20,15)	CO1,CO2,CO3
4.	Arrays and strings, Structures and Unions	30(5,15,10)	CO1,CO2,CO3
5.	User defined functions, pointers, file management and pre-processor directives.	35(3,5,10,10,7)	CO1,CO2,CO3,CO4,CO5
	Total Periods	150	

Course Objectives	• To Relate basics of programming language constructs using C Language • To classify and implement data types, derived data types, pointers, files, statements • To analyse and develop effective modular programming • To construct mathematical, logical and scientific problems and real time applications using C language

CO NO		COURSE OUTCOMES
CO1	AI-106.1	Develop, compile and debug programs using C- fundamentals and different programming statements in C language.
CO2	AI-106.2	Evaluate various operations using primary and derived data types in C.
CO3	AI -106.3	Analyse programs using predefined functions, modules and recursive techniques
CO4	AI-106.4	Write scientific and logical programs using pointers, file pointers
CO5	AI-106.5	Develop programs using information passing

CO-PO/PSO MATRIX

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
AI-106.1	**3**		**2**	**2**				**3**	**2**	
AI-106.2				**2**				**3**	**3**	
AI-106.3		**2**	**3**	**3**				**3**	**1**	**2**
AI-106.4	**3**		**1**	**1**	**2**			**3**	**2**	**2**
AI-106.5			**2**	**2**		**2**	**2**	**3**	**2**	**3**
Average	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**3**	**2**	**2.3**

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

Learning Objectives

1.0 Introduction to C-Language

1.1 Describe the history of C-language, structure of C-language program
1.2 Describe the programming style of C language
1.3 Explain the steps involved in Editing, compiling ,executing and debugging of C program
1.4 Describe character set, C-Tokens, Keywords, Identifiers, Constants, Variables
1.5 Define Data Type
1.6 Classify Data Types and explain them with examples.
1.7 Explain declaration of constants and variables
1.8 Explain initializing values to variables in declaration
1.9 Explain about user defined data types with a simple program
1.10 Explain the usage of type qualifiers

2.0 Input and output statements, Operators and Expressions in C

2.1 Explain the importance of Pre-processor Directive #include
2.2 Illustrate 1) Reading a character using getch(), getche() and getchar()
2) writing a character using putch(), putchar()
3) formatted input using scanf() & write sample programs using it.
4) formatted output usingprintf()& write sample programs using it.
2.3 Explain character functions
2.4 Define an operator, an expression
2.5 Explain 1) Various arithmetic operators and explain the evaluation of arithmetic expressions
with example.
2) Various relational operators and discuss evaluation of relational expressions
3) Various logical operators and discuss evaluation of logical expressions
2.6 Explain the difference between unary and binary operators
2.7 Describe various assignment operators, increment and decrement operators
2.8 Illustrate nested assignment
2.9 Explain conditional operators with an example
2.10 Explain 1) Bit-wise operators and explain each with an example
2) Special operators with examples
3) Precedence and Associativity of operators

2.11 Describe evaluation of compound expression
2.12 Illustrate type conversion techniques
2.13 Write sample programs by using all the operators

3.0 Decision making, iterative and other control statements

3.1 Explain decision making statements and its need in programming
3.2 Explain
1. Simple if and if-else statement with syntax and sample program
2. Nested if..else statements with syntax and sample program
3. if-else-if ladder with syntax and sample program
4. switch statement with syntax and sample program

3.3 State the importance of break statement with switch and illustrate
3.4 Compare
1. Conditional operator with if-else statement
2. if-else with switch statement

3.5 Define looping or iteration
3.6 List and explain iterative statements with syntax and examples
3.7 Compare different loop statements
3.8 What is nested loop and illustrate.
3.9 Explain the usage of goto, break and continue statements with loop statements
3.10 Differentiate break and continue statements.

3.11 Define structured programming.

4.0 Arrays, strings, Structures and Unions

4.1 Define Array

4.2 Describe

1. Declaration and initialization of One Dimensional(1D) Array with syntax and sample programs.
2. Accessing the elements in 1D-Array with sample programs.
3. Reordering an array in ascending order.

4.3 Explain declaration and initialization and usage of two Dimensional(2D)Arrays.

4.4 Illustrate the concept of arrays with sample programs on matrix addition, subtraction and matrix multiplication

4.5 DefineString

4.6 Describe

1. Declare and initialize of String variables.
2. gets() and puts()
3. Reading and displaying of strings from terminal with sample programs.
4. Explain about various String handling functions with sample programs.

4.7 Explain Character arithmetic.

4.8 Define a structure.

4.9 Explain

1. Initializing structure, Declaring structure, Declaring Structure Variables.
2. Accessing of the structure members
3. Structure assignment.
4. How to find size of a structure.
5. Nested structure concept.
6. Structures containing arrays
7. Array of structures

4.10 Define Union, declare, initialize and use of union.

4.11 Distinguish between Structures and Unions

4.12 Write sample programs for all the concepts of structures and unions

5.0 User defined functions, pointers, file management and preprocessor directives

5.1 Explain

1. Need of user defined functions
2. Advantages of the functions
3. Elements of function
4. Return values and their types

5.2 Define a function call, function prototype

5.3 Explain

1. Function declaration in programs
2. Functions with no arguments and no return values with sample programs
3. Functions with arguments with no return values with sample programs
4. Functions with arguments with return values with sample programs
5. Functions with no arguments with return values with sample programs
6. Functions that return multiple values with sample programs
7. Recursion with sample programs
8. Passing arrays to functions with sample programs
9. Structure as function arguments and structures as function values.
10. Structures containing pointers.
11. Self referential structures with examples.
12. Storage classes-auto, register, static, extern
13. Scope, visibility and lifetime of variables in functions

5.4 Differentiate Local and External variables
5.5 Define Global variable
5.6 Discuss passing the global variables as parameters using sample programs
5.7 Explain
1. Declaration and initialization of Pointers.
2. Accessing the address of a variable using &operator
3. Accessing the value of a variable through pointer
4. Pointer Arithmetic
5. Precedence of address and de-referencing operators.
6. Relationship between arrays and pointers.
7. Accessing array elements using pointers
8. Pointers as function arguments
9. Pointer arrays with examples.

5.8 Differentiate between address and de-referencing operators.
5.9 Explain
1. Dynamic memory management functions with examples.
2. Structures containing pointers.
3. Pointer to structure.
4. Self referential structures with examples.

5.10 Explain
1. Files and how to declare file pointer to a file
2. Illustrate the concept of file opening using various modes
3. Illustrate the concept of closing of a file
4. Illustrate the concept of Input / Output operations on a file
5. Illustrate the concept of random accessing files
6. Explain different file handling functions

5.11 Explain
1. Preprocessor directives
2. Need of preprocessor directives.

5.12 Write
1. Simple programs using preprocessor directives.
2. Simple program using command line arguments(argc and argv)

COURSE CONTENT

1. **Introduction to C Language**: History of C language - importance of C Define language - structure of C language - programming style of C language - steps involved in executing the C program-Character set - C Tokens - Keywords and Identifiers- Constants and Variables - Data Types and classification - declaration of constants and variables-initializing values to variables-user defined data types-usage of type qualifiers.
2. **Input and output statements, Operators and Expressions in C:** importance of Pre-processor #include-reading and writing a single character functions- formatted input and output statements-operators-classification of operators-operator precedence and associativity-expressions and expression evaluation-type conversion techniques.
3. **Understand Decision making, iterative and other control statements :**simple if,if-else, if else ladder, nested if-else-switch statement - else if, nested if , else if ladder, switch statements- Classification of various loop statements- while statement – do.. while statement ram - for loop statement - nesting of loops- Comparisons of different loop statements –goto statement-break and continue statements –concept of structured programming
4. **Understand Arrays and strings , basics of Structures and Unions:** Arrays -One Dimensional Arrays – array programs -two Dimensional Arrays- programs on matrix - Strings –- String handling functions - Structure- Array of structures - Nested structures- pointer to structure Self referential structures - Union and illustrate use of a union – difference between Structures and Union
5. **Understand User defined functions, basics of pointers, file management and preprocessor directives:** Function – user defined functions – Advantages - Recursion concept - parameter passing –storage classes - scope, visibility and lifetime of variables in

functions- Local and External variables -Global variable- - Pointer - Differentiate address and de-referencing operators - Pointer Arithmetic- precedence of address and de- referencing operators - -Relationship between Arrays and Pointers - Pointers as Function Arguments -

6. Dynamic memory management-

7. Files - file pointers - file opening in various modes - Concept of closing of a file –operations on files - Need of Preprocessor directives - Various Preprocessor directives- Macros – Command line arguments

S. No.	Chapter/Unit title	No.of periods	Weightage Allocatd	Marks Wise Distribution of Weightage				Question wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Introduction to CLanguage	20	14	6	8			2	1			CO1,CO2
2	Input and output statements, Operators and Expressions inC .	25	14		6	8	*		2	1	*	CO1,CO2,C3
3	Decisionmaking, iterative and other control statements	40	14		6	8	*		2	1	*	CO1,CO2,CO3
4	Arrays and strings , Structures and Unions	30	14	3	3	8	*	1	1	1	*	CO1,CO2,CO3
5	User definedfunctions, pointers, file management and pre-processor directives	35	14	3	3	8	*	1	1	1	*	CO1,CO2,CO3,CO4,CO5
	Total *	150	70 +10(*)	12	26	32	10	4	7	4	1	CO1,CO2,CO3,CO4

REFERENCE BOOKS

1 Programming in ANSI C E. Balaguruswamy, TataMcGrawHill

2 Programming with C Gottfried, Tata McGraw Hill

3 C The complete Reference Schildt Tata McGrawHill

Model Blue print

Note: Part-C: 10 marks single analytical question may be chosen from any or combination of starred chapters

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1.1 to 2.13
Unit test-2	From 3.1 to 4.6
Unit test-3	From 4.7 to 5.12

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING
MODEL PAPER
C PROGRAMMING
UNIT TEST-1

SCHEME: C-20 SUBJ CODE:AI-106
MAX MARKS:40 TIME: 90Minutes

……
…

PART-A **16Marks**

Instructions:1) Answer all questions
2) First question carries 4marks, and each question of remaining carries 3 marks

1. a) Int is a Data type in C language.(True/False) (CO1)

b) 'a' is an example for _____ constant. (CO1)

c) scanf() is used for _____. (CO2)

d) Which one of the following is a Relational operator [ ] (CO2)

I)+ II)- III)* IV)>=

2) List any three data types of C language. (CO1)

3) Define a) Keyword b) Identifier c) Constant (CO1)

4) Write a sample program using Conditional operator? (CO2)

5) Distinguish between pre-increment and post-increment operators. (CO2)

PART-B
3X8=24Marks

Instructions:1) Answer all questions
2)Each question carries 8 Marks
3)Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer

6.a) Write the C-Programming structure and explain each part of it (CO1)

(Or)

b) Explain various generation of computers (CO1)

7.a) Explain Arithemetic, Relational, Logical operators with examples. (CO2)

Or

b) Evaluate the following C-Expression and write the final value (CO2)

X= ((2 + 6 / 2 + 3 * 6) – ((4 + 6) / 2 +5) /10) + 1) / 5.0

8. a) Illustrate Type Conversion techniques in detail (CO2)

Or

b) Write the C-program using formatted input and output functions. (CO2)

BOARD DIPLOMA EXAMINATIONS
DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING
MODEL PAPER - END EXAMINATION
PROGRAMMING IN C

SCHEME: C-20 SUBJ CODE:AI-106
MAX MARKS:80 TIME: 3HOURS

PART-A

Note: Answer all questions. Each question carries 3 marks **10 X 3=30M**

1. Define an identifier and write two valid identifiers 1+2CO1
2. Write a short note on type qualifiers 3CO1
3. Write the syntax of formatted output statement 3CO1

4.	Write a program to print the biggest of two numbers using conditional operators	3	CO3
5.	Differentiate between break and continue	3	CO3
6	What is nesting? Give an example.	3	CO2
7	What is an array? how to declare an array?	1+2	CO2
8	List any three sting functions	3	CO2
9	Define a pointer. Write the syntax to declare a pointer variable	1+2	CO4
10	State the importance of "void"	3	CO4

PART-B

Note: 1. Answer all the question and making use of internal choice.
2. Each question carries 8 marks **5 X 8=40M**

11(a).Write the C-Programming structure and explain each part of it 4+4 C-01

OR

11(b).List and explain different data types supported by C-Language8 CO1

12(a).Explain all the operators supported by C-language with examples8 CO2

OR

12(b).Evaluate the following C-Expression and write the final value8 CO2
X= ((2 + 6 / 2 + 3 * 6) – ((4 + 6) / 2 +5) /10) + 1) / 5.0

13(a).Write a program to print the following pattern 8 CO3

```
        1
      1   2   1
    1   2   3   2   1
" "  up to nth level
```

OR

13. a) Explain any four control statements in C-language. 6 CO3

14(a).Write eight differences between structures and unions 8 CO3

(OR)

14(b). Write a C-program to input 3X4 matrix and print in the form of matrix8 CO3

15(a). Write a program to calculate the factorial of a function using recursive concept with the help of parameter passing and return value 8 CO3 & CO5

(OR)

15(b). Explain any four file handling functions. 8 CO4

PART-C

Note: Answer the following question, This question carries 10 Marks **1 X10=10M**

17. Write C-Program to print only prime numbers from the first n Fibonacci numbers- 10MCO3

Course code	Course Title	No. of Periods per week	Total No. of Periods	Marks for FA	Marks for SA
AI-107	**Engineering Drawing**	6	180	40	60

TIME SCHEDULE

S.No	Major Topics	No. of Drawing plates	No. Of Periods	Marks to be awarded	Short Answer Questions	Essay type Questions
1	Importance of Engineering Drawing	--	01	-	-	-
2	Engineering Drawing Instruments	01	05	-	-	-
3	Free hand lettering & Numbering	01	06	05	1	-
4	Dimensioning Practice	01	09	05	1	-
5	Geometrical constructions	03	24	15	1	1
6	Projections of Points, Lines, Planes & Auxiliary Planes	03	21	05	1	
7	Projections of Solids	01	12	10		1
8	Sections of Solids	01	21	10	-	1
9	Orthographic	01	30	10	-	1

	Projections					
10	Isometric Views	01	30	10	-	1
11	Developme nt of surfaces	01	21	10	-	1
Total		**14**	**180**	**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**	AI-107.1	Practice the use of engineering drawing instruments
	CO2	AI-107.2	Familiarise with the conventions to be followed in engineering drawing as per BIS
	CO3	AI-107.3	Construct the i) basic geometrical constructions ii) engineering curves
	CO4	AI-107.4	Visualise and draw the orthographic projections of i) Points ii) Lines ii) Regular Planes iv) Regular Solids V) Sections of Regular Solids
	CO5	AI-107.5	Visualise and draw the isometric views of machine components
	CO6	AI-107.6	Draw the developments of surfaces of regular solids and use them to make the components used in daily life

PO-CO Mapping

Course Code :	**Course Title: ENGINEERING DRAWING** **Number of Course Outcomes: 06**	**No. of Periods:** **180**

AI-107					
POs	**Mapped with CO No.**	**CO Periods addressing PO in Column 1**		**Level (1,2,3)**	**Remarks**
		No	**%**		
PO1	CO2, CO3, CO4, CO5, CO6	50	42	3	**>40% Level 3**
PO2	CO1, CO2, CO3, CO4, CO5, CO6	30	25	2	**Highly addressed**
PO3	CO1, CO2, CO3, CO4, CO5, CO6	30	25	2	**25% to 40% Level 2 Moderately Addressed**
PO4					
PO5					**5 to 25% Level 1**
PO6					**Low addressed**
PO7	CO1, CO2, CO3, CO4, CO5, CO6	10	08	1	**<5% Not addressed**

AI-107	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2				1	2	3	1
CO2	3	2	2				1	2	3	1
CO3	3	2	2				1	2	3	1
CO4	3	2	2				1	2	3	1
CO5	3	2	2				1	2	3	1
CO6	3	2	2				1	2	3	1

3: High, 2: Moderate,1: Low

LEARNING OUTCOMES

Upon completion of the course the student shall 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: (Having two exercises)

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: (Having 5 to 6 exercises)

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: (Having 08 to10 exercises)

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

5.2 Draw the conics using general and special methods,

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

5.4 Identify the applications of the above constructions in engineering practice.

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 Identify the need of Auxiliary views for a given engineering drawing.

6.5 Draw the auxiliary views of a given engineering component .

Drawing Plate -7: Having problems up to projection of points and Lines (15 exercises)

Drawing Plate -8: Having problems of projection of planes (6 exercises)

Drawing Plate -9: Having problems on auxiliary planes (Having 4 exercises)

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: Having problems of projection of solids (10 exercises)

8.0 Appreciate the need of Sectional Views

8.1 Identify the need to draw sectional views.

8.2 Differentiate between true shape and apparent shape of section

8.3 Draw sectional views and true sections of regular solids by applying the principles of hatching.

Drawing Plate–11: Having problems of section of solids (6 exercises)

9.0 Apply principles of orthographic projection

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

9.2 Draw the minimum number of views needed to represent a given object fully.

Drawing Plate 12 : (Having 10 to 12 exercises)

10.0 Prepare pictorial drawings

10.1 identify the need of pictorial drawings.

10.2 Differentiate between isometric scale and true scale.

10.3 Prepare Isometric views from the given orthographic drawings.

Drawing plate 13: (Having 10 to 12 exercises)

11.0 Interpret Development of surfaces of different solids

11.1 State the need for preparing development drawing.

11.2 Draw the development of simple engineering objects and their truncations (cubes, prisms, cylinders, cones, pyramid)

11.3 Prepare development of surface of engineering components like

i) funnel ii) 90^0 elbow iii) Tray

Drawing plate No. 14: (Having 05 exercises)

Competencies and Key competencies to be achieved by the student

S.No	Major topic	Key Competency
1.	Importance of Engineering Drawing	• Explain the linkages between Engineering drawing and other subjects of study in Diploma course.
2.	Engineering Drawing Instruments	• Select the correct instruments to draw various entities in different orientation
3.	Free hand lettering & Numbering	• Write titles using sloping and vertical lettering and numerals as per B.I.S (Bureau of Indian standards)
4.	Dimensioning Practice	• Dimension a given drawing using standard notations and desired system of dimensioning
5.	Geometrical construction	• Construct ellipse, parabola, rectangular hyperbola, involute, cycloid and helix from the given data.
6.	Projection of points, Lines, Planes & Solids	• Draw the projections of points, straight lines, planes & solids with respect to reference planes (HP& VP)

7.	Auxiliary views	• Draw the auxiliary views of a given Engineering component • Differentiate between Auxiliary view and apparent view
8.	Sections of Solids	• Differentiate between true shape and apparent shape of section • Apply principles of hatching. • Draw simple sections of regular solids
9.	Orthographic Projection	• Draw the minimum number of views needed to represent a given object fully.
10.	Isometric Views	• Differentiate between isometric scale and true scale. • Draw the isometric views of given objects,.
11.	Development of surfaces	• Prepare development of Surface of regular solids and other components like i) funnel ii) 90^0 elbow iii) Tray

COURSE CONTENT

NOTES:

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.**

UNIT I
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.

UNIT II
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,

UNIT III
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

UNIT IV
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.

UNIT V
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

UNIT VI

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.

UNIT VII

Projections of regular solids

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

UNIT VIII

Sections of Solids

Need for drawing sectional views – what is a sectional view - Hatching – Section of regular solids inclined to one plane and parallel to other plane

UNIT IX

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.

UNIT X

Pictorial Drawings

Brief description of different types of pictorial drawing viz., Isometric, oblique, and perspective and their use - Isometric drawings: Isometric axes, angle between them, meaning of visual distortion in dimensions - Need for an isometric scale, difference between Isometric scale, and true 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 – Drawing the isometric views for the given orthographic projections -Use of box / offset method

UNIT XI

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 and parallel to the other -Development of simple solids like cubes, prisms, cylinders, cones, pyramid and truncation of these solids-Types of development: Parallel line and radial line development -Procedure of drawing development of funnels, 90^0 elbow pipes, Tray.

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.

C-20-AI-107

BOARD DIPLOMA EXAMINATIONS

MODEL QUESTION PAPER

DAIE – I-YEAR

ENGINEERING DRAWING

Instructions: 01. All the dimensions are in mm
02. Use first angle projections only
03. Due weightage will be given for the dimensioning and neatness

PART – A **05 x 04=20**

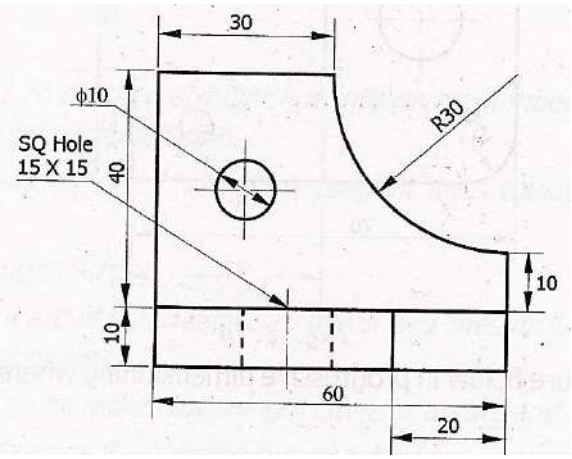
01. Answer all the questions

02. Each question carries FIVE marks

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

ORTHOGRAPHIC PROJECTIONS

02. Redraw the given fig. and dimension it according to SP-46:1988.Assume suitable scale



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

04. Draw the projections of a regular pentagon of side length 40 mm inclined to the H.P. by 30^0 and perpendicular to V.P. using auxiliary plane method

PART – B **10 X 04 = 40**

01. Answer any FOUR of the following questions

02. Each question carries TEN marks

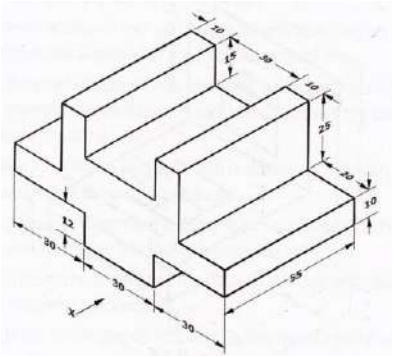
05. Draw the involute of a circle of diameter 30 mm and also draw a tangent to the curve at a distance of 60 mm from the centre of the circle.

06. A right circular cone of height 80 mm and base radius 60 mm is resting in the H.P. on one of its generators and its axis is parallel to V.P. Draw the projections of the solid.

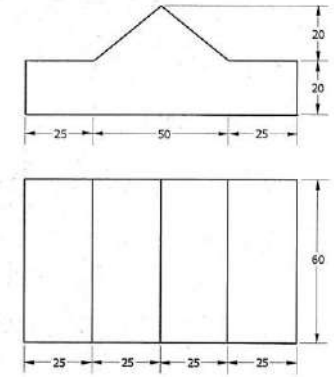
07. A regular hexagonal prism of height 80 mm and base side 40 mm is resting in the H.P. on its base. It is cut by an auxiliary inclined plane of 60^0 inclination passing through the axis at a distance of 30 mm from the top base. Draw the sectional views of the solid and the true section.

08. A pentagonal pyramid of height 80 mm and base side 40 mm is resting in the H.P. on its base such that one of the sides of the base is perpendicular to the V.P. It is cut by a section plane perpendicular to the V.P. and inclined to the H.P. by 60^0 and passing through the axis at a distance of 25 mm from the base. Draw the development of the lateral surface of the truncated pyramid.

09. Draw the front view, top view and left side view of the object shown in the fig.



10. Draw the isometric view of the component whose orthographic projections are given below



Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
AI-108	**Programming in C Lab**	**06**	180	40	60

S No	Chapter/ Unit Title	No. of Periods	COs Mapped
1.	Fundamentals and Input /Output statements	15	CO1,CO2
2.	Control statements	45	CO1,CO2,CO4
3.	Arrays, structures and unions	60	CO1,CO2,,CO3,CO4
4.	User defined functions, storage classes, pointers, files and macros	60	CO1,CO2,CO3,CO4,CO5
	Total	180	

COURSE OBJECTIVES	**Upon completion of the course the student shall be able to** 1. Edit, compile and debug execution of C-Programs 2. Learn the syntax of all the statements, keywords, user defied identifiers and usage of writing statements in C-Program. 3. Evaluate all the expressions using different primary types of data, derived data, operators and with their precedence, 4. Write C-programs using I/O statements, decision making statements. 5. Write structured and modular C-programs 6. Write C-programs on text files using different file operating modes and file pointers. 7. Write C-programs to implement dynamic memory allocation using pointer concepts

CO No		COURSE OUTCOMES
CO 1	AI-108.1	Perform Edit, compile and debug and execution of C-Programs (12)
CO 2	AI-108.2	Develop programs using different predefined functions, keywords, user defined identifiers(18)

CO 3	AI-108.3	Evaluate different expressions using available C-operators and valid data supported by C-language(24)
CO 4	AI-108.4	Develop C-programs using control statements, array's, structures, unions, files (90)
CO 5	AI-108.5	Develop C-programs using user defined functions and recursion (24)
CO 6	AI-108.6	Develop C-programs to implement dynamic memory concept(12)

CO-PO/PSO MATRIX

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
AI-108.1	**2**	**2**			**1**			**2**		
AI-108.2	**2**	**3**		**2**					**2**	**2**
AI-108.3					**2**			**2**		**3**
AI-108.4	**2**		**3**	**2**	**3**	**3**	**2**		**2**	**2**
AI-108.5	**2**			**2**	**3**	**2**			**2**	**2**
AI-108.6				**2**	**3**				**2**	**2**
Average	**2**	**2.5**	**3**	**2**	**2.4**	**2.5**	**2**	**2**	**2**	**2.2**

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

LEARNING OUTCOMES:

Fundamentals and Input /Output statements

1. Exercise on structure of C Program
2. Exercise on Keywords and identifiers
3. Exercise on constants and variables
4. Execution of simple C program
5. Exercise on operators and expressions
6. Exercise on special operators
7. Exercise on input and output of characters
8. Exercise on formatted input and output
9. Exercise on escape sequence characters

Control statements

(Note: Every statement must be repeated with at least 5 different applications)
10. Exercise on simple if statement
11. Exercise on if..else statement
12. Exercise on if..else..if ladder statement
13. Exercise on switch statement
14. Exercise on conditional operator comparing with if-else statement

15. Exercise on while statement
16. Exercise on for statement
17. Exercise on do. While statement

Arrays, structures and unions

18. Exercise on one dimensional arrays
19. Exercise on two dimensional arrays
20. Exercise on strings
21. Exercise on structure
22. Exercise on union
23. Exercise on array of structures

User defined functions, storage classes, pointers, files ,and macros

24. Exercise on user-defined function
25. Exercise on storage classes
26. Exercise on parameter passing techniques
27. Exercise on recursion
28. Exercise on pointers
29. Exercise on text files
30. Exercise on macros

The competencies and key competencies to be achieved by the student

S.No.	Name of the experiment	Objectives	Key Competencies
1	Exercise on structure of C program	For a given C program, identify the different building blocks	❖ Identify different building block in a C program
2	Exercise on Keywords and identifiers	For a given C program identify the keywords and identifiers	❖ Identify different keywords ❖ Check whether the keywords are in lowercase ❖ Differentiate identifiers and keywords
3	Exercise on constants and variables	For a given C program identify the constants and variables	❖ Identify the constants ❖ Identify the variables ❖ Declare variables with proper names ❖ Know the assignment of values to variables
4	Execution of simple C program	Execute a simple C program	❖ Acquaint with C program editing ❖ Compile the program ❖ Rectify the syntactical errors ❖ Execute the program
5	Exercise on operators and expressions	Write a C program that uses different arithmetic operators	❖ Identify different arithmetic operators ❖ Build arithmetic expressions ❖ Identify the priorities of operators ❖ Evaluate arithmetic expression ❖ Compile the program ❖ Rectify the syntactical errors ❖ Execute the program ❖ Check the output for its correctness
6	Exercise on special	Write a C program that uses	❖ Identify different special operators ❖ Build expressions using special operators

	operators	special operators	❖ Compile the program ❖ Rectify the syntactical errors ❖ Execute the program ❖ Check the output for its correctness
7	Exercise on input and output of characters	Write a C program for reading and writing characters	❖ Know the use of getchar() function ❖ Know the use of putchar() function ❖ Compile the program ❖ Rectify the syntactical errors ❖ Execute the program ❖ Check whether the correct output is printed for the given input
8	Exercise on formatted input and output	Write a C program using formatted input and formatted output	❖ Know the use of format string for different types of data in scanf() function ❖ Know the use of format string for different types of data in printf() function ❖ Check whether the data is read in correct format ❖ Check whether the data is printed in correct format
9	Exercise on Escape Sequence Characters	Write a C program using Escape Sequence Characters	❖ Know the use of Escape sequence characters ❖ Use the Escape sequence characters ❖ Check whether the data is read in correct format ❖ Rectify the syntax errors ❖ Check the output for correctness
10	Exercise on simple if statement	Write a C program using simple if statement	❖ Build a relational expression ❖ Use the if statement for decision making ❖ Rectify the syntax errors ❖ Check the output for correctness
11	Exercise on if..else statement	Write a C program using if..else statement	❖ Build a relational expression ❖ Use the if..else statement for decision making ❖ Rectify the syntax errors ❖ Check the output for correctness
12	Exercise on else..if ladder statement	Write a C program using else..if ladder statement	❖ Use else..if ladder statements with correct syntax ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check the output for correctness
13	Exercise on switch statement	Write a C program using switch statement	❖ Use switch statement with correct syntax ❖ Identify the differences between switch and else..if ladder ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check the output for correctness
14	Exercise on conditional operator	Write a C program using (**? :**) conditional operator	❖ Build the three expressions for conditional operator ❖ Use conditional operator with correct syntax ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Differentiate conditional operator and if..else statement
15	Exercise on while statement	Write a C program using while statement	❖ Build the termination condition for looping ❖ Use while statement with correct syntax ❖ Check whether correct number of iterations are performed by the while loop ❖ Rectify the syntax errors ❖ Debug logical errors
16	Exercise on	Write a C program using for	❖ Build the initial, increment and termination conditions for looping

	forstatement	statement	❖ Use for statement with correct syntax ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check whether correct number of iterations are performed by the **for** loop ❖ Differentiate **for** and **while** statements
17	Exercise on **do..while** statement	Write a C program using do statement	❖ Build the termination condition for looping ❖ Use do statement with correct syntax ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check whether correct number of iterations are performed by the while loop ❖ Differentiate **do..while, while** and **for** statements
18	Exercise on one dimensional arrays	Write a C program to create and access one dimensional array	❖ Create a one dimensional array with correct syntax ❖ Store elements into array ❖ Read elements from array ❖ Validate boundary conditions while accessing elements of array ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check for the correctness of output for the given input
19	Exercise on two dimensional arrays	Write a C program to create and access two dimensional array	❖ Create a two dimensional array with correct syntax ❖ Store elements into array ❖ Read elements from array ❖ Validate boundary conditions while accessing elements of array ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check for the correctness of output for the given input
20	Exercise on strings	Write a C program for reading and writing strings	❖ Declare and initialize string variables ❖ Read strings from keyboard ❖ Print strings to screen
21	Exercise on structure	Write a C program using structure	❖ Define a structure with correct syntax ❖ Identify different members of a structure ❖ Declare a structure variable ❖ Access different members of structure ❖ Observe the size of the structure ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check for the correctness of output for the given input
22	Exercise on union	Write a C program using union	❖ Define a union with correct syntax ❖ Identify different members of a union ❖ Declare a union variable ❖ Access different members of union ❖ Observe the size of the union ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check for the correctness of output for the given input
23	Exercise on array of structures	Write a C program to create an array of structures and store and retrieve data from	❖ Define a structure with correct syntax ❖ Identify different members of a structure ❖ Declare a structure variable ❖ Create an array of structure ❖ Access individual element of the array of

		that array	structure ❖ Access different members of structure ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check for the correctness of output for the given input
24	Exercise on user-defined function	Write a C program to define and call user-defined functions	❖ Identify the different parts of function declaration ❖ Define function with correct syntax ❖ Classify functions based on it parameters and return types ❖ Identify parameters passed ❖ Identify parameter passing method used ❖ Identify return value ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check for the correctness of output for the given input
25	Exercise on storage classes	Write a C program using different storage classes	❖ Know the use of different storage classes ❖ Use the different storage classes ❖ Check whether the scope of variables is correctly defined or not. ❖ Rectify the syntax errors ❖ Check the output for correctness
26	Exercise on parameter passing techniques	Write a C program using parameter passing techniques	❖ Know the use of parameter passing ❖ Use the different parameter passing techniques ❖ Check whether the parameters passed correctly or not. ❖ Rectify the syntax errors ❖ Check the output for correctness
27	Exercise on recursion	Write a C program using recursion	❖ Identify where recursive call is made in the function ❖ Validate the termination condition ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check for the correctness of output for the given input
28	Exercise on pointers	Write a C program using pointer data type	❖ Declare pointer variable ❖ Initialize pointer variable ❖ Access a variable through its pointer ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check for the correctness of output for the given input
29	Exercise on text files	Write a C program to create a text file, write data into it and read data from it	❖ Define a file pointer ❖ Use the various modes of file opening ❖ Close the file ❖ Write text into file ❖ Read text from file ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check for the correctness of output for the given input
30	Exercise on macros	Write a C program using macros	❖ Know the need of macros ❖ Use the macros/preprocessor directives ❖ Rectify the syntax errors ❖ Debug logical errors ❖ Check for the correctness of output for the given input

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
AI-109-A (common to all branches)	**Physics Laboratory**	1.5	45	20	30

TIMESCHEDULE

S.No	Name of the Experiment	No.of Periods
1.	Hands on practice on Vernier Calipers	03
2.	Hands on practice on Screw gauge	03
3.	Verification of Parallelogram law of forces and Triangle law of forces	03
4.	Simple pendulum	03
5.	Velocity of sound in air – (Resonance method)	03
6.	Focal length and Focal power of convex lens (Separate & Combination) (**Single lens only**)	03
7.	Refractive index of solid using traveling microscope	03
8.	Boyle's law verification	03
9.	Meter bridge	03
10.	Mapping of magnet lines of force and locate null points	03
	DEMONSTRATION EXPERIMENTS	
11.	Surface tension of liquid using traveling microscope	03

12.	Coefficient of viscosity by capillary method	03
	Revision	06
	Test	03
	Total:	**45**

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 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.

7.0 Determine the refractive index of a solid using travelling microscope

8.0 Verify the Boyle's law employing a Quill tube

9.0 Determine the specific resistance of material of a wirel using Meter Bridge

10.0 Drawing magnetic lines of force under N-S and N-N methods and locate null points

11.0 Determine the surface tension of a liquid using travelling Microscope (**Demo)**

12.0 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. Hands on practice on Vernier Calipers(03)	• Find the Least count • Fix the specimen in posit • Read the scales • Calculate the physical quantities of given object	• Read the scales • Calculate the requisite physical quantities of given objects
2. Hands on practice on Screw gauge(03)	• Find the Least count • Fix the specimen in posit • Read the scales • Calculate thickness of glass place and cross section of wire and other quantities	• Read the scales • Calculate thickness of given glass plate • Calculate cross section of wire and other quantities
3. Verification of Parallelogram law of forces and Triangle law of forces(03)	• Fix suitable weights • Note the positions of threads on drawing sheet • Find the angle at equilibrium point • Construct parallelogram • Compare the measured diagonal • Construct triangle • Find the length of sides • Compare the ratios	• Find the angle at equilibrium point • Constructing parallelogram • Construct triangle • Compare the ratios of force and length
4. Simple pendulum(03)	• 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 $l\text{-}T^2$ graph	• Find the time for number of oscillations • Find the time period • Calculate the acceleration due to gravity • Draw l-T and $l\text{-}T^2$ graph

5. Velocity of sound in air –Resonance method (03)	• Arrange the resonance apparatus • Adjust the reservoir level for booming sound • Find the first and second resonating lengths • Calculate velocity of sound	• Adjust the reservoir level • Find the first and second resonating lengths • Calculate velocity of sound at room temperature • Calculate velocity of sound at 0^0 C
6. Focal length and Focal power of convex lens (Separate & Combination) (03)	• 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	• Calculate the focal length and power of convex lens • Draw u-v and 1/u – 1/v graphs
7. Refractive index of solid using traveling microscope(03)	• Find the least count of vernier on microscope • Place the graph paper below microscope • Read the scale • Calculate the refractive index of glass slab	• Read the scale • Calculate the refractive index of glass slab

8. Boyle's law verification (03)	• 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 calculated value P x l	• Find the length of air column • Find the pressure of enclosed air • Find the value P x l
9. . Meter bridge(03)	• Make the circuit connections • Find the balancing length • Calculate unknown resistance • Find the radius of wire • Calculate the specific resistance	• Find the balancing length • Calculate unknown resistance • Calculate the specific resistance
10. Mapping of magnet lines of force(03)	• 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	• Draw magnetic lines of force • Locate the neutral points along equatorial and axial lines
11. Surface tension of liquid using traveling microscope(03)	• 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	• Read the scale • Calculate height of liquid rise • Calculate the surface tension of water

12.. Coefficient of viscosity by capillary method(03)	• 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	• 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 :

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 code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
AI-109-B (common to all branches)	**Chemistry Laboratory**	1.5	45	20	30

CO1	Operate and practice volumetric apparatus and preparation of standard solution
CO2	Evaluate and judge the neutralization point in acid base titration
CO3	Evaluate the end point of reduction and oxidation reaction
CO4	Judge the stable end point of complex formation, stable precipitation
CO5	Judge operate and demonstrate and perform precise operations with instrument for investigation of water pollution parameters

TIMESCHEDULE

S.No	Name of the Experiment	No.ofPeriods	Mapped with
1.	a) Recognition of chemical substances and solutions used in the laboratory by senses. b) Familiarization of methods for Volumetric analysis	03	CO1
2.	Preparation of Std Na_2CO_3 and making solutions of different	03	CO1
3.	EstimationofHClsolutionusingStd.Na_2CO_3solution	03	CO2
4.	Estimation of NaOHusing Std. HCl solution	03	CO2
5.	Estimation of H_2SO_4usingStd.NaOH solution	03	CO2
6.	Estimation of Mohr's Salt usingStd.$KMnO_4$	03	CO3
7.	Determination of acidity of water sample	03	CO2
8.	Determination of alkalinity of water sample	03	CO2
9.	Determination of total hardness of water using Std. EDTA	03	CO4
10.	Estimation of Chlorides present in water sample	03	CO4
11.	Estimation of Dissolved Oxygen(D.O)in water sample	03	CO5
12.	Determination of PH using PHmeter	03	CO5
13.	Determination of conductivity of water and adjusting ionic	03	CO5
14.	Determination of turbidity of water	03	CO5
15.	Estimation of total solids present in water sample	03	CO5
	Total:	**45**	

Objectives:

Upon completion of the course the student shall be able to

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. Na_2CO_3solutionfor estimation of HCl

4.0 Conduct titrations adopting standard procedures and using Std.HClsolution for estimation of NaOH

5.0 Conduct titrations adopting standard procedures and using Std. NaOH solution for estimation of H_2SO_4

6.0 Conduct titrations adopting standard procedures and using Std.$KMnO_4$solution for estimation of Mohr's Salt

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 if available)

8.0 Conduct titrations adopting standard procedures to determine the alkalinity of given samples of water (One ground water and one surface / tap water)

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 / tap water)

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 / tap water)

12.0 Conduct the test on given samples of water / solutions (like soft drinks, sewage, etc.) to determine their pH using standard pH meter

13.0 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

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 / tap water)

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 Std Na_2CO_3 and making solutions of different dilution(03)	▪ Weighing the salt to the accuracy of .01 mg ▪ Measuring the water with volumetric flask, measuring jar, volumetric pipette and graduated pipette ▪ Making appropriate dilutions	▪ Weighing the salt to the accuracy of .01 mg ▪ Measuring the water with volumetric flask, measuring jar, volumetric pipette and graduated pipette ▪ Making appropriate dilutions
Name of the Experiment (No of Periods)	**Competencies**	**Key competencies**
Estimation of HCl solution using Std. Na_2CO_3solution (03)	▪ Cleaning the glassware and rinsing with appropriate solutions ▪ Making standard solutions ▪ Measuring accurately the standard solutions and titrants ▪ Filling the burette with titrant	▪ Making standard solutions ▪ Measuring accurately the standard solutions and titrants ▪ Effectively Controlling the flow of the titrant ▪ Identifying the end point ▪ Making accurate observations
Estimation of NaOH using Std. HCl solution (03)		
Estimation of H_2SO_4usingStd. NaOH solution (03)		
Estimation of Mohr's Salt usingStd.$KMnO_4$ (03)		
Determination of acidity of water sample (03)		
Determination of alkalinity of water sample (03)		

Determination of total hardness of water using Std. EDTA solution (03)	▪ Fixing the burette to the stand ▪ Effectively Controlling the flow of the titrant ▪ Identifying the end point ▪ Making accurate observations	
Estimation of Dissolved Oxygen(D.O)in water sample (By titration method) (03)		
Estimation of Dissolved Oxygen(D.O)in water sample (By electrometric method) (03)	▪ Familiarize with instrument ▪ Choose appropriate 'Mode' / 'Unit' ▪ Prepare standard solutions / buffers, etc. ▪ Standardize the instrument with appropriate standard solutions ▪ Plot the standard curve ▪ Make measurements accurately ▪ Follow Safety precautions	▪ Prepare standard solutions / buffers, etc. ▪ Standardize the instrument with appropriate standard solutions ▪ Plot the standard curve ▪ Make measurements accurately
Determination of pH using pH meter (03)		
Determination of conductivity of water and adjusting ionic strength to required level (03)		

Determination of turbidity of water (03)		
Name of the Experiment **(No of Periods)**	**Competencies**	**Key competencies**
Estimation of total solids present in water sample (03)	▪ Measuring the accurate volume and weight of sample ▪ Filtering and air drying without losing any filtrate ▪ Accurately weighing the filter paper, crucible and filtrate ▪ Drying the crucible in an oven	▪ Measuring the accurate volume and weight of sample ▪ Filtering and air drying without losing any filtrate ▪ Accurately weighing the filter paper, crucible and filtrate

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	
C)	Viva-voce	5M
	Total	30M

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
AI-110(common to all branches)	**Computer Fundamentals Lab**	3	90	40	60

Time schedule:

S.No.	Chapter/Unit Title	No. of sessions each of 3 periods duration	No.of Periods
1.	Computer hardware Basics	2	6
2.	Windows Operating System	2	6
3.	MS Word	8	24
4.	MS Excel	7	21
5.	MS PowerPoint	5	15
6.	Adobe Photoshop	6	18
	Total periods	30	90

S.No.	Chapter/Unit Title	No.of Periods	CO's Mapped
1.	Computer hardware Basics	6	CO1
2.	Windows Operating System	6	CO1
3.	MS Word	24	CO2
4.	MS Excel	21	CO3
5.	MS PowerPoint	15	CO4
6	Adobe Photoshop	18	CO5
	Total periods	90	

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 iv) To use Adobe Photoshop in image editing.

	At the end of the course students will be able to		
Course Outcomes	CO1	AI-110.1	Identify hardware and software components
	CO2	AI-110.2	Prepare documents with given specifications using word processing software
	CO3	AI-110.3	Use Spread sheet software to make calculation and to draw various graphs / charts.
	CO4	AI-110.4	Use Power point software to develop effective presentation for a given theme or topic.
	CO5	AI-110.5	Edit digital or scanned images using Photoshop

CO-PO/PSO MATRIX

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
AI-110.1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**
AI-110.2	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**
AI-110.3	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**
AI-110.4	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**
AI-110.5	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**
Average	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**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

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

III. Practice with MS-WORD

6. To familiarize with Ribbon layout of MS Word
   Home – Insert - Page layout – References – Review- View.
7. To practice Word Processing Basics
8. To practice Formatting techniques
9. To insert a table of required number of rows and columns
10. To insert Objects, Clipart and Hyperlinks
11. To use Mail Merge feature of MS Word
12. To use Equations and symbols features

IV. Practice with MS-EXCEL

13. To familiarize with MS-EXCEL layout
14. To access and enter data in the cells
15. To edit a spread sheet- Copy, Cut, Paste, and selecting Cells
16. To use built in functions and Formatting Data
17. To create Excel Functions, Filling Cells
18. To enter a Formula for automatic calculations
19. To sort and filter data in table.
20. To present data using Excel Graphs and Charts.
21. To develop lab reports of respective discipline.
22. To format a Worksheet in Excel, Page Setup and Print

V. Practice with MS-POWERPOINT

23. To familiarize with Ribbon layout features of PowerPoint 2007.
24. To create a simple PowerPoint Presentation
25. To set up a Master Slide in PowerPoint

26. To insert Text and Objects
27. To insert a Flow Charts
28. To insert a Table
29. To insert a Charts/Graphs
30. To insert video and audio
31. To practice Animating text and objects
32. To Review presentation

VI. Practice with Adobe Photoshop

33. To familiarize withstandard toolbox
34. To edit a photograph.
35. To insert Borders around photograph.
36. To change Background of a Photograph.
37. To change colors of Photograph.
38. To prepare a cover page for the book in your subject area.
39. To adjust the brightness and contrast of the picture so that it gives an elegant look.
40. To type a word and apply the shadow emboss effects.

Key competencies:

Expt No	Name of Experiment	Competencies	Key competencies
1 (a).	To familiarize with Computer system and hardware connections	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 b. Identify and connect various peripherals c. Identify and connect the cables used with computer system d. Identify various ports on CPU and connect Keyboard & Mouse	Connect cables to external hardware and operate the computer
1 (b).	To Start and Shut down Computer correctly	a. Log in using the password b. Start and shut down the computer c. Use Mouse and Key Board	a. Login and logout as per the standard procedure b. Operate mouse &Key Board
1 (c).	To Explore Windows Desktop	a. Familiarize with Start Menu, Taskbar, Icons and Shortcuts b. Access application programs using Start menu, Task manager c. Use Help support	a. Access application programs using Start menu b. Use taskbar and Task manager
2.	To check the software details of the computer	a. Find the details of Operating System being used b. Find the details of Service Pack installed	Access the properties of computer and find the details
3.	To check the hardware present in your computer	a. Find the CPU name and clock speed b. Find the details of RAM and Hard disk present c. Access Device manager using	a. Access device manager and find the details b. Type /Navigate the correct path and

		Control Panel and check the status of devices like mouse and key board d. Use My Computer to check the details of Hard drives and partitions e. Use the Taskbar	Select icon related to the details required
4.	Working with Files and Folders	a. Create folders and organizing files in different folders b. Use copy / paste move commands to organize files and folders	a. Create files and folders Rename , arrange and search for the required folder/file
	Working with Files and Folders Continued....	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	b. Restore deleted files from Recycle bin
5.	To use Windows Accessories: Calculator – Notepad – WordPad – MS Paint	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	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	a. Create/Open a document b. Use Save and Save as features c. Work on two Word documents simultaneously d. Choose correct Paper size and Printing options	a. Create a Document and name appropriately and save b. Set paper size and print options
7.	To practice Word Processing Basics	a. Typing text b. Keyboard usage 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	a. Use key board and mouse to enter/edit text in the document. b. Use shortcuts c. Use spell check/ Grammar features for auto corrections.
8.	To practice Formatting techniques	a. Formatting Text b. Formatting Paragraphs	a. Format Text and paragraphs and use

		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	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	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 b. Changing the background colour of the table c. Use table design tools d. Use auto fit – fixed row/ column height/length – Even distribution of rows / columns features e. Convert Text to table and Table to Text f. Use Sort feature of the Table to arrange data in ascending/descending order	a. Insert table in the word document and edit b. Use sort option for arranging data.
10.	To Insert objects, clipart and Hyperlinks	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.	a. Insert hyperlinks &Bookmarks b. Create organization charts/flow charts
11.	To Use Mail merge feature of MS Word	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.	a. Explore various symbols available in MS Word 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	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	a. Familiarize with excel layout and use b. Use various features available in toolbar
14.	To access and Enter data in the cells	a. Move Around a Worksheets-Quick access -Select Cells	a. Access and select the required cells

		b. Enter Data-Edit a Cell-Wrap Text-Delete a Cell Entry-Save a File-Close Excel	by various addressing methods b. Enter data and edit
15.	To edit spread sheet Copy, Cut, Paste, and selecting cells	a. Insert and Delete Columns and Rows-Create Borders-Merge and Center b. Add Background Color-Change the Font, Font Size, and Font Color c. Format text with Bold, Italicize, and Underline-Work with Long Text-Change a Column's Width	Format the excel sheet
16.	To use built in functions and Formatting Data	a. Perform Mathematical Calculations verify -AutoSum b. Perform Automatic Calculations-Align Cell Entries	Use built in functions in Excel
17.	To enter a Formula for automatic calculations	a. Enter formula b. Use Cell References in Formulae c. Use Automatic updating function of Excel Formulae d. Use Mathematical Operators in Formulae e. Use Excel Error Message and Help	Enter formula for automatic calculations
18.	To Create Excel Functions, Filling Cells	a. Use Reference Operators b. Work with sum, Sum if , Count and Count If Functions c. Fill Cells Automatically	a. Create Excel sheets involving cross references and equations b. Use the advanced functions for conditional calculations
19.	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 work sheet	a. Refine the data in a worksheet and keep it organized b. Narrow a worksheet by selecting specific choice
20.	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
21.	To develop lab reports of respective discipline	ate Lab reports using MS Word and Excel	a. Insert Practical subject name in Header and page numbers in Footer
22.	To format a Worksheet in Excel, page setup and	a. Shade alternate rows of data b. Add currency and percentage	a. Format Excel sheet b. Insert headers

	print	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	&footers and print
23.	To familiarize with Ribbon layout &features of PowerPoint 2007.	Use various options in PowerPoint a. Home b. Insert c. Design d. Animation e. Slideshow f. View g. Review	Access required options in the tool bar
24.	To create a simple PowerPoint Presentation	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	a. Create simple PowerPoint presentation with photographs/ClipArt and text boxes b. Use bullets option
25.	To Set up a Master Slide in PowerPoint and add notes	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 f. Add Notes to a PowerPoint Presentation	a. Setup Master slide and format b. Add notes
26.	To Insert Text and Objects	a. Insert Text and objects b. Set Indents and line spacing c. Insert pictures/ clipart d. Format pictures e. Insert shapes and word art f. Use 3d features g. Arrange objects	Insert Text and Objects Use 3d features
27.	To insert a Flow Chart / Organizational Charts	a. Create a Flow Chart in PowerPoint b. Group and Ungroup Shapes c. Use smart art	Create organizational charts and flow charts using smart art
28.	To insert a Table	a. PowerPoint Tables b. Format the Table Data c. Change Table Background d. Format Series Legend	Insert tables and format
29.	To insert a Charts/Graphs	a. Create 3D Bar Graphs in PowerPoint b. Work with the PowerPoint	Create charts and Bar graphs, Pie Charts and format.

		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	
30.	To Insert audio & video, Hyperlinks in a slide Add narration to the slide	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	a. Insert Sounds and Video in appropriate format. b. Add narration to the slide c. Use hyperlinks to switch to different slides and files
31.	To Practice Animation effects	a. Apply transitions to slides b. To explore and practice special animation effects like *Entrance, Emphasis, Motion Paths &Exit*	Add animation effects
32.	Reviewing presentation	a. Checking spelling and grammar b. Previewing presentation c. Set up slide show d. Set up resolution e. Exercise with Rehearse Timings feature in PowerPoint f. Use PowerPoint Pen Tool during slide show g. Saving h. Printing presentation (a) Slides (b) Hand-out	a. Use Spell check and Grammar feature b. Setup slide show c. Add timing to the slides d. Setup automatic slide show
33	To familiarize withstandard toolbox	a. Open Adobe Photoshop b. Use various tools such as 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	photograph and save it in Photoshop
34	To edit a photograph	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	to edit image by using corresponding tools.

35	To insert Borders around photograph	a. Start with a single background layer b. Bring the background forward c. Enlarge the canvas d. Create a border color e. Send the border color to the back f. Experiment with different colors	) create a border or frame around an image to add visual interest to a photo
36	To change Background of a Photograph	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.	) swap background elements using the Select and Mask tool and layers.
37	To change colors of Photograph	a. Change colors using:)lour Replacement tool **Hue/Saturation adjustment layer tool**	Able to control color saturation
38	To prepare a cover page for the book in subject area	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
39	To adjust the brightness and contrast of picture to give an elegant look	a. open a file b. Go to image→ adjustments→ Brightness/Contrast. f. adjust the brightness and contrast g. save the image	Able to control brightness/contrast.
40	To type a word and apply the shadow emboss effects	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, bevel and emboss→ contour→ satin→ gradient overlay d. Save the image.	Able to apply shadow emboss effects

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1 to 8
Unit test-2	From 9 to 22
Unit test-3	From 23 to 40

I Year Internal Lab Examination

UNIT TEST - I
MODEL QUESTION PAPER
COMPUTER FUNDAMENTALS LAB

SCHEME: C-20 **SUBJ CODE: AI-110**

MAX MARKS:40 **Time:90Min**

……

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. Identify the components on motherboard.
4. Perform the process of placing processor on CPU slot.
5. Perform the process of removing and placing the RAM in the corresponding slot.
6. Identify the CMOS battery and test whether it is working it or not.
7. Find details of following:
   a) Operating System being used.
   b) Processor name
   c) RAM
   d) Hard disk
8. Create a folder by your name, search a file or folder and find its path.
9. Draw the National Flag using MS Paint.
10. Create a word document that contains TEN names of your classmates (boys-5 & girls-5) and perform the following tasks:
    a) Save the document to your desktop.
    b) Sort the names in each list alphabetically.
    c) Set line spacing to 1.15.
    d) Use bullet points for the names in both lists separately.

I Year Internal Lab Examination

UNIT TEST - II
MODEL QUESTION PAPER
COMPUTER FUNDAMENTALS LAB

SCHEME: C-20 **SUBJ CODE: AI-110**
MAX MARKS:40 **Time:90Min**

……

1. Write individually addressed letters to your friends about the Republic Day celebration using Mail Merge.
2. Create a Word document about your college and insert page numbers in footer and College Name in header.
3. Create your class time table using Tables in MS Word.
4. Create a 2-page document about your College & insert hyperlinks for courses offered in the college and insert Bookmarks next to College Name.
5. Write individually addressed letters to your friends (at least 5 members) to intimate the External Examination time table using Mail Merge.
6. Write an equation $\frac{(x+y)^2}{(x-y)^2} = \frac{x^2+2xy+y^2}{x^2-2xy+y^2}$ in MS word.
7. Create the organizational structure of your college in MS Word.
8. Create a spreadsheet by totalling marks of 3 or more subjects, then calculate percentage and hence find grade based on boundary conditions of FIVE students:
   Grades O >= 90%, A >=80%, B >=70%, C >=60%, D >=50%, E >=40%, F <40%
9. Create a Excel spreadsheet for the following data, making sure that the cell marked with Category (A1) is pasted in cell A1 in the spreadsheet and perform the questions below.

Category (A1)	**Product Name**	**Quantity**	**Inventory**	**Price per Unit**	**Total Price**
Office Supplies	Binder	2	20	12.99	25.98
Office Supplies	Pencil	20	20	0.99	
Electronics	Samsung 4K Smart TV	1	5	399.00	
Electronics	Bluetooth Speakers	4	5	44.49	
Computers	Lenovo X230 12in Laptop	2	2	279.90	

   a). Change the format of the "Total Price" column to "Currency" format.
   b) Calculate Total Price by writing formula.
   c) Turn on filtering for the table.
   d) Sort the table by column "Category" from A to Z.
10. Create a spreadsheet to calculate Cumulative monthly attendance for a period of Three months.

I Year Internal Lab Examination

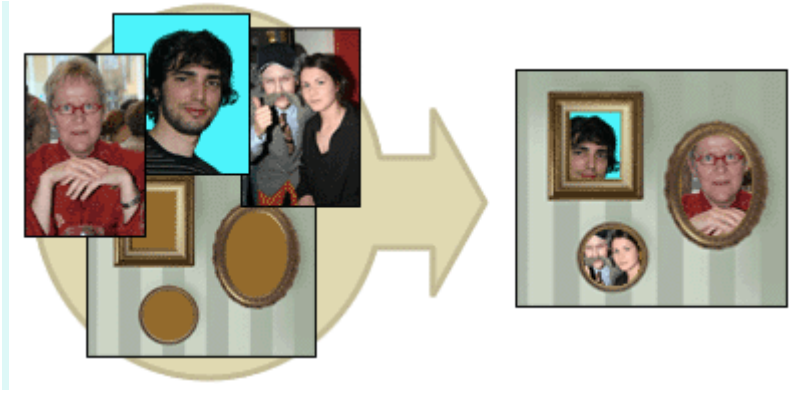
UNIT TEST - III
MODEL QUESTION PAPER
COMPUTER FUNDAMENTALS LAB

SCHEME: C-20 **SUBJ CODE: AI-110 (COMMON)**

MAX MARKS:40 **Time:90Min**

……

1. Create a PowerPoint Presentation about your College in 5 slides only.
2. Create a PowerPoint Presentation on Computer Hardware in minimum 5 slides.
3. Create a PowerPoint Presentation on Computer Fundamentals with *Entrance, Emphasis* effects in minimum 5 slides.
4. Create a PowerPoint Presentation on any topic with special animation effects like *Entrance, Motion Paths & Exit.*
5. Resize the image using photoshop.
6. Change the background of a Photograph.
7. Edit an image by using
   a) Crop tool.
   b) Resize the image
   c) Save the new image with new name keeping original image as it is.
8. A Picture of two parrots (parrots.jpg) is given to you. Make anyone of one of the parrots in Black & White.
9. Convert a color image to monochrome and improve quality of photograph.
10. Copy three pictures and fit into the empty frames.



BOARD DIPLOMA EXAMINATIONS
DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING
MODEL PRACTICAL QUESTION PAPER-YEAR END EXAM
COMPUTER FUNDAMENTALS LAB

SCHEME: C-20 **SUBJ CODE: AI-110**
MAX MARKS:60 **TIME: 3HOURS**

……
…….

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 MS Word
   (a) Change the Font Size
   (b) Change the Font Style
   (c) Change the Text Size
6. Write the procedure to perform the following in MS Word
   (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 MS Word.

8. Write the procedure to perform the following in MS Word:

   (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 $\frac{(x+y)^2}{(x-y)^2} = \frac{x^2+2xy+y^2}{x^2-2xy+y^2}$ and Symbols.
10. Write the procedure to perform the following in MS Excel

    (a) To Modify Column Width

    (b) To Modify Row Height

    (c) Format text in Bold, Italic, and Underline.

11. Write the procedure to create charts and Graphs in MS Excel

12. Write the procedure to create simple Power Point Presentation on your college in Three slides.

13. Write the procedure to perform Animation on Text and Objects in your presentation.

14. Take a photographic image. Give a title for the image. Put the border. Write your names. Write the Name of Institution and Place.

15. Prepare a cover page for the book in your subject area. Plan your own design.

16. You are given a picture of a flower and associated background (Extract.jpg).Extract the Flower only from that and organize it on a background. Select your own background for organization.
17. You are given a picture (BrightnessContrast.jpg). Adjust the brightness and contrast of the picture so that it gives an elegant look.
18. You are given a picture (position.jpg). Position the picture preferably on a plain background of a color of your choice - Positioning include rotation and scaling.
19. Remove the arrows and text from the given photographic image(Filename: photo.jpg).
20. Type a word; apply the following effects. Shadow Emboss.

III SEMESTER

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING

SCHEME OF INSTRUCTIONS AND EXAMINATION

CURRICULUM-2020 (III Semester)

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Semester	Scheme Of Examinations			
		Theory	Practicals		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
THEORY SUBJECTS								
AI-301	Mathematics –II	4		60	3	20	80	100
AI-302	Artificial Intelligence	5	-	75	3	20	80	100
AI-303	Java Programming	5	-	75	3	20	80	100
AI-304	Data Structures through C	6	-	90	3	20	80	100
AI-305	Digital Electronics & Computer Organization	6	-	90	3	20	80	100
PRACTICAL SUBJECTS								
AI-306	Artificial Intelligence Lab using Prolog	-	4	60	3	40	60	100
AI-307	Data Structures Through C Lab	-	6	90	3	40	60	100
AI-308	Java Programming Lab	-	3	45	3	40	60	100
AI-309	Digital Electronics Lab	-	3	45	3	40	60	100
	Total	**26**	**16**	-	-	-	-	**900**

AI-301 common with all branches
AI-303 Common with CM-502
AI-304 Common with CM-304
AI-307 Common with CM-307
AI-309 Common with CM-306

C-20

ENGINEERING MATHEMATICS-II

Course Code	Course Title	No. of Periods/week	Total No. of periods	Marks for FA	Marks for SA
AI-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	(i) To understand the concepts of indefinite integrals and definite integrals with applications to engineering problems. (ii) To understand the formation of differential equations and learn various methods of solving them.

Course Outcomes	Upon completion of the course the student shall be able	
	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.

C-20

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 *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. Evaluateintegrals of suitable powers of *tan x* and *sec x*.

1.8. Evaluate the Standard integrals of the functions of the type

1.9. Evaluate the integrals of the type

.

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 .

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.

3.4Solve 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

C-20

Engineering Mathematics – II

CO/PO – Mapping

AI-301	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.

C-20

Engineering Mathematics – II

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 5% to 25% Level 1 Low addressed <5% Not 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	
PSO 2	CO1, CO2, CO3	40	66.6%	3	
PSO 3	CO1, CO2, CO3	48	75%	3	

C-20

ENGINEERING MATHEMATICS – II

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, cosec x. Integrals of the form where at least one of m and n is odd positive integers. Integrals of suitable powers of tanx. secx and cosecx.cotx by substitution.

Evaluation of integrals which are reducible to the following forms:

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 define 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	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: 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

C-20

Engineering Mathematics – II

Unit Test Syllabus

Unit Test	Syllabus
Unit Test-I	From L.O 1.1 to L.O 2.5
Unit Test-II	FromL.O 2.6 to L.O 3.9

Unit Test I **C –20, AI-301**

State Board of Technical Education and Training, A. P

First Year

Subject name: **Engineering Mathematics-II**
Sub Code: **AI-301**

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. Evaluate $\int x^8 dx$ (CO1)

   b. Evaluate $\int \frac{1}{\sqrt{4-x^2}} dx.$ (CO1)

   c. $\int e^x \left(f(x) + f'(x) \right) dx = e^x f(x) + c$ is true/false (CO1)

   d. 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 $\int e^x\sin 2xdx.$ (CO1)

5. Evaluate $\int_0^{\frac{\pi}{2}}\sin^2 xdx$ (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) Evaluate $\int\frac{1}{5+4\cos x}dx.$ (CO1)

or

B) Evaluate $\int\sin^4 x\cos^3 xdx.$ (CO1)

7. A) Evaluate $\int\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)dx.$ (CO1)

or

B) Evaluate $\int x^4e^{2x}dx.$ (CO1)

8. A) Evaluate $\int_0^{\frac{\pi}{2}}\cos 4x\cos xdx$ (CO2)

or

B) Evaluate $\int_0^{\frac{\pi}{2}}\frac{\sin^{10} x}{\sin^{10} x+\cos^{10} x}dx$ (CO2)

-o0o-

Unit Test II **C –20, AI-301**

State Board of Technical Education and Training, A. P

III Semester

Subject name: **Engineering Mathematics-II**

Sub Code: **AI-301**

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 $\left(y^2 - 2xy\right)dx + \left(2xy + x^2\right)dy = 0.$ (CO3)

or

B) Solve $x\frac{dy}{dx} + \frac{y}{x} = x^3y^6.$ (CO3)

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END EXAM MODEL PAPERS

STATE BOARD OF TECHNICAL EDUCATION, A.P

ENGINEERING MATHEMATICS AI- 301

TIME : 3 HOURS **MODEL PAPER- I** **MAX.MARKS : 80M**

PART-A

Answer All questions. Each question carries THREE marks. 10x3=30M

1. Evaluate $\int\left(2\sin x-3e^{x}+\frac{4}{1+x^{2}}\right)dx.$ **CO 1**
2. Evaluate $\int e^{x}\sin e^{x}dx.$ **CO 1**
3. Evaluate $\int \sin 3x\cos 2xdx.$ **CO 1**
4. Evaluate $\int xe^{x}dx.$ **CO1**
5. Evaluate $\int_{0}^{1}\frac{1}{1+x^{2}}dx.$ **CO 2**
6. Find the mean value of $y=x^{2}$ from $x=0$ to $x=1$ **CO 2**
7. Find the area of the region bounded by the curve $y=\sin x$ from $x=0$ to $x=\pi$ **CO 2**
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 $\left(x^{2}+y\right)dx+\left(y^{2}+x\right)dy=0.$ **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 AI-301

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 $\int\cos^{2}2xdx.$ **CO 1**
3. Evaluate $\int\frac{\tan^{-1}x}{1+x^{2}}dx.$ **CO 1**
4. Evaluate $\int x\cos xdx.$ **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. 1x10=10M

16. Solve $xy^2dy-\left(x^3+y^3\right)dx=0$ **CO3**

Curriculum Gaps identified in this subjects:

1 Unit-I: Indefinite Integration and part of Unit-II: Definite Integration are required for CME branch
2 Part of Unit-II: Appliocations of Definite Integration and Unit-III are not required
3 Instead of Part of Unit-II: Appliocations of Definite Integration and Unit-III , Concepts of Discrete Mathematical Structures may be included which is essential for CME branch students.

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
AI-302	**ARTIFICIAL INTELLIGENCE**	5	75	20	80

S. No.	Chapter/Unit Title	No. of Periods	CO's Mapped
1.	Introduction to PROLOG	15	CO1
2.	Problems and Search Methods in AI	20	CO1, CO2
3.	Knowledge Representation	20	C01, CO3
4.	Game Theory	10	CO4
5.	Fuzzy Logic	10	CO5
Total Periods		75	

Course Objectives	i)	To understand PROLOG
	ii)	To know the Searching techniques of AI
	iii)	To knowledge representation using predicate logic
	iv)	To familiarize Game playing strategies and Fuzzy logic

Course Outcomes	At the end of the course the student able to learn following:		
	CO1	AI-302.1	Describe concepts of PROLOG language
	CO2	AI-302.2	Analyze various searching techniques
	CO3	AI-302.3	Illustrate various knowledge representation techniques
	CO4	AI-302.4	Explain various game paying techniques
	CO5	AI-302.5	Explain fuzzy logic concepts

CO-PO/PSO Matrix:

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
AI-302.1	**1**	**2**	**2**	**3**	**2**	**1**	**3**	**3**	**3**	**2**
AI-302.2	**2**	**1**	**2**	**2**	**2**	**1**	**2**	**3**	**3**	**2**
AI-302.3	**3**	**1**	**1**	**2**	**1**	**1**	**1**	**2**	**3**	**2**
AI-302.4	**2**	**3**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**
AI-302.5	**3**	**3**	**3**	**2**	**2**	**1**	**2**	**3**	**3**	**3**
Average	**2.2**	**2**	**2.2**	**2.2**	**2**	**1.2**	**2.2**	**2.6**	**3**	**2.2**

3=strongly mapped, 2=moderately mapped, 1=slightly mapped

Learning Outcomes:

1.0 Introduction to PROLOG

1.1 State the need of PROLOG.

1.2 List the Key features of prolog
1.3 List the facts and rules of PROLOG
1.4 Describe how to install Prolog in Linux
1.5 List Advantages and Disadvantages of Prolog
1.6 State the Goals and terminology.
1.7 Explain Variables.
1.8 Explain Control Structures
1.9 Illustrate the usage of Arithmetic operators
1.10 State the importance of Matching in PROLOG
1.11 Explain Backtracking
1.12 List and explain the types offcuts
1.13 Explain Recursion
1.14 Define List
1.15 Explain Lists with examples
1.16 Describe Dynamic databases
1.17 List and explain various Input/output operations
1.18 List and explain various Input and Output Streams

2.0 Problems and Search Methods in AI

2.1 Define Artificial Intelligence

2.2 List the AI Problems.

2.3 Explain Underlying Assumption.

2.4 List AI Techniques

2.5 Explain the level of model.

2.6 State the Criteria for success.

2.7 Define the problem as a state space search.

2.8 List the Problem Characteristics.

2.9 Define the production system.

2.10 Explain the Production systems.

2.11 List the Features of Production system.
2.12 Explain about Searching problems, solutions
2.13 Define Un-informed Searching strategy.
2.14 Define Informed Searching strategy
2.15 Explain Un-informed searching methods
- 2.15.1 BFS
- 2.15.2 DFS
- 2.15.3 greedy search
- 2.15.4 brute force search

2.16 Explain Informed searching methods
- 2.16.1 DFS
- 2.16.2 branch and bound

2.16.3 Hill climbing
2.16.4 constraint satisfaction searching
2.16.5 A*

3.0 Knowledge Representation

3.1 Define Knowledge representation

3.2 List and explain the types of Knowledge

3.3 Knowledge representation issues:
- 3.3.1 List and Explain issues in knowledge representation
- 3.3.2 Explain representation on mappings
- 3.3.3 List the approaches to knowledge representation

3.4 Predicate logic:
- 3.4.1 Define predicate logic
- 3.4.2 Illustrate simple facts in logic
- 3.4.3 Illustrate instance and ISA relationships
- 3.4.4 Describe Computable functions and predicates
- 3.4.5 Quote Resolutions

3.5 Representing knowledge as rules
- 3.5.1 Define procedural knowledge
- 3.5.2 Define Declarative knowledge
- 3.5.3 Distinguish Procedural vs Declarative knowledge
- 3.5.4 Define Logic Programming
- 3.5.5 Explain Logic programming
- 3.5.6 Explain forward reasoning
- 3.5.7 Explain Backward reasoning
- 3.5.8 Distinguish Forward vs. Backward reasoning

4.0 GAME THEORY

4.1 Describe Games as Search Problems
4.2 Explain components of Search problem
4.3 Describe **Minimax** search procedures
4.4 Explain Additional refinements
4.5 Define pruning the search tree
4.6 Describe Alpha-Beta Pruning.
4.7 State the purpose of Chance Node
4.8 State the importance of Expected Value
4.9 Illustrate Games that Include an Element of Chance

5.0 FUZZY LOGIC

5.1 Define Fuzzy logic
5.2 Explain basics of fuzzy logic

5.3 State the importance of sets
5.4 Explain Fuzzy sets
5.5 State importance of crisp sets
5.6 Explain Crisp sets
5.7 State importance of fuzzy logic control
5.8 Explain Fuzzy logic control
5.9 State importance of fuzzy inference
5.10 Explain Fuzzy inference
5.11 State fuzzy hedges
5.12 Explain Fuzzy hedges
5.13 State the importance of Alpha cut threshold
5.14 Explain Alpha cut threshold
5.15 State the importance of Neuro fuzzy systems
5.16 Explain Neuro fuzzy systems
5.17 State the importance of fuzzy Bayesian networks
5.18 Explain Fuzzy Bayesian networks

COURSE CONTENTS:

UNIT1:

Introduction to PROLOG

Introduction PROLOG--facts–rules–goals–variables–control–tructures–operatorsmatching–backtracking–cuts–recursion–lists–dynamic database–simple input/output streams

UNIT2:

PROBLEMS AND SEARCH METHODS in AI

Introduction to artificial intelligence–Problems–Problem Spaces–Search Strategies–Uninformed–Informed Search Methods.

UNIT3:

KNOWLEDGE REPRESENTATION

Knowledge representation issues–predicate logic–representing knowledge using rules

UNIT4:

GAME THEORY

Minimax algorithm–alpha-beta pruning–additional refinements–State-of-the-Art Game Programs

UNIT5:

FUZZY LOGIC

Introduction–fuzzy sets–crisp sets–fuzzy logic control–fuzzy inference–fuzzy hedges–alpha cut threshold–neuro fuzzy systems–fuzzy Bayesian networks.

Text/References:

1. Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-Graw Hill.
2. Introduction to AI & Expert System: Dan Watterson, PHI.
3. Artificial Intelligence by Luger (Pearson Education)
4. Russel &Norvig, Artificial Intelligence: A Modern Approach, Pearson Education
5. http://www.nptel.iitm.ac.in/video.php?subjectId=106105077
6. Website for search strategy implementation in python http://code.google.com/p/aima-python/
7. http://www.journals.elsevier.com/artificial-intelligence/
8. https://www.technologyreview.com/s/534871/our-fear-of-artificial-intelligence/
9. http://www.sanfoundry.com/artificial-intelligence-mcqs-inductive-logicunification-lifting-1/

Blue print

S.No.	Chapter/Unit title	No.of periods	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 PROLOG	15	14	3	3	8		1	1	2		C01
2	Problems and Search Methods in AI	20	14	3	11		10	1	2		*	CO1,CO2
3	Knowledge Representation	20	14	6	8		10	2	1		*	CO1,CO3
4	Game Theory	10	14	3	8	3		1	1	1		CO4
5	Fuzzy Logic	10	14		6	8			2	1		CO5
	Total	75	70 +10*	15	36	19	10*	5	7	4	*	

Note: Part-C: 10 marks single analytical question may be chosen from any or combination of starred chapters

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1.1 to 3.1
Unit test-2	From 3.2 to 5.9

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING
MODEL PAPER
ARTIFICIAL INTELLEGENCE
UNIT TEST-1

SCHEME: C-20 SUBJ CODE:AI-302
MAX MARKS:40 TIME: 90Minutes

……

PART-A **16Marks**

Instructions:1) Answer all questions
2) First question carries 4marks, and each question of remaining carries 3marks

1) a) Is Hill climbing informed search method (True/False) (CO2)

b) Predicate Logic is ……. (CO3)

c) PROLOG stands for …… (CO1)

d) Which of the given language is not commonly used for AI? (C01)

1. Python 2. Perl 3. LISP 4. PROLOG

2). List the AI Problems. (CO2)
3).List the approaches to knowledge representation (CO3)
4). what is the principle of fuzzy logic? (CO5)

PART-B

3X8=24Marks

Instructions: 1) Answer all questions
2)Each question carries 8 Marks
3)Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer

5. a) Explain logic variables in PROLOG with an examples (CO1)

Or

b) Explain lists in PROLOG with an examples (CO1)

6. a) Explain about searching problems and solutions (CO2)

Or

b) Explain about Breadth first search algorithm (CO2)

7. a) Explain knowledge representation mappings (CO3)

Or

b) Explain about predicate logic facts . (CO3)

BOARD DIPLOMA EXAMINATIONS
DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING
MODEL PAPER – YEAR END EXAMINATION
ARTIFICIAL INTELLEGENCE

SCHEME: C-20 SUB-CODE: AI-302
MAX MARKS:80 TIME: 3HOURS

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PART-A

Note: Answer all questions. Each question carries 3 marks **10 X 3=30M**

1.	List the facts in PROLOG	CO1
2.	Define Artificial Intelligence?	CO2
3.	Define state space search?	CO2
4.	List the searching strategies in AI	CO2
5.	Write the issues in knowledge representation	CO3
6	List the rules of knowledge representation	CO3
7	What is minimax search technique?	CO4
8	What is fuzzy set?	CO5
9	Write the significance of Alpha cut threshold	CO5
10	Define List in PROLOG	CO1

PART-B

Note: 1. Answer all the question and making use of internal choice.
2. Each question carries 8 marks **5 X 8=40M**

11(a). Explain control structures with an example in PROLOG CO1

OR

11(b). Explain recursion technique in PROLOG CO1

12(a). Explain different levels in Artificial Intelligence CO2

OR

12(b). Explain uninformed search methods CO2

13(a). Describe Computable functions and predicates CO3

OR

13b). Explain logic programming in predicate logic CO3

14(a). Explain Alpha-Beta Pruning method CO4

(OR)

14(b). Explain about additional refinements in Game theory CO4

15(a). Explain Fuzzy logic control with a neat architecture. CO5

(OR)

15(b). Explain Neuro fuzzy systems CO5

PART-C

1 X10=10M

16. Write an algorithm and application of A* CO2

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
AI-303	**Java Programming**	5	75	20	80

S.No.	Chapter/Unit Title	No.of Periods	CO's Mapped

1.	Basics of java and overloading	12	CO1, CO2
2.	Concepts of inheritance, overriding, Interfaces and Packages	14	CO2
3.	I/O Streams and Collections.	14	CO3
4.	Exception handling and multi-threaded programming.	16	CO4
5.	Applets, AWT and Event Handling	19	CO4, CO5
	Total Periods	75	

Course Objectives	i) Apply object-oriented programming paradigm in problem solving on the platform of Sun Microsystems. ii) Acquire skills to design multi-tasking application with the knowledge of multi-threading. iii) Develop graphical user interface with event handling mechanism.

Course Outcomes	At the end of the course the student able to learn following:		
	CO1	AI-303.1	Explain the fundamental concepts of JAVA and Overloading.
	CO2	AI-303.2	Apply reusability features like inheritance and polymorphism.
	CO3	AI-303.3	Analyze modular design for real time applications by using packages concept in projects.
	CO4	AI-303.4	Apply multithreading concepts to implement multitasking and multi programming applications.
	CO5	AI-303.5	Design effective dynamic user interface for any front-end applications using Applets and events.

CO-PO/PSO Matrix:

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
AI-303.1	**2**	**1**	**1**	**2**		**2**	**1**	**2**	**2**	**2**
AI-303.2	**1**	**3**	**3**	**3**	**1**	**3**	**1**	**1**	**3**	**1**
AI-303.3		**2**	**3**	**2**	**2**	**3**	**1**	**1**	**3**	**3**
AI-303.4	**1**	**1**	**3**	**2**	**2**	**3**	**2**	**2**	**3**	**2**
AI-303.5	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**3**
Average	**1.5**	**2.6**	**2.6**	**2.6**	**1.5**	**3**	**1.5**	**2**	**3**	**2**

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

Learning Outcomes:

1.0 Basics of java and overloading

1.1 Describe history and importance of Java in Internet programming.

1.2 Compare Java & C++.

1.3 Explain features of Java.

1.4 Define Byte codes of Java, JVM.

1.5 How to write and executing a Java program.

1.6 Know the primitive data types of java. Describe conversion and casting features.

1.7 Apply one-dimensional and two–dimensional arrays give example programs.

1.8 Describe how to create classes and objects.

1.9 Demonstrate Usage of new operator and methods.

1.10 Explain usage of constructors with an example programs.

1.11 Apply method overloading and construction overloading in applications.

1.12 Describe usage of 'this' pointer,static in variables, methods, and blocks with example.

1.13 Know about string classes.

1.14 Usage of command-line arguments.

1.15 Describe the use of final keyword.

2.0 Concepts of inheritance,overriding, Interfaces and Packages

2.1Explain implementation of inheritance with an example program.

2.2 Illustrate how to implement multilevel inheritance with an example program.

2.3 Explain method overriding and usage of super keyword.

2.4 Describe concept of Interfaces.

2.5 Define an Interface.

2.6 Differences between abstract classes and interface.

2.7 Explain how to implement interfaces with sample program.

2.8 Define a package.

2.9 Explain the concept of class path.

2.10 Describe concept of Access protection.

2.11 Illustrate the mechanism of importing packages.

2.12 Give simple application to design packages with sample programs.

3.0 I/O Streams and Collections.

3.1 List different types of I/O streams.

3.2 Explain how to read and write data through console input and output streams.

3.3 Explain how to use DataInputStreamandDataOutputStreamto access primitive data types.

3.4 Explain various file access operation by using FileStreams.

3.5 Explain sample programs on above streams.

3.6 What is collection frame work and Hierarchy of collection frame work.

3.7 Discusses Array List, LinkedList

3.7.1 Constructors

3.7.2 Methods

3.7.3 Comparisons between above two classes.

3.7.4 Explain Iterator and List Iterator interface methods

3.7.5 Sample programs on Array List and LinkedList

3.8 Discusses List interface and HashSet and HashTable class for following

3.8.1 Constructors

3.8.2 Methods

3.8.3 Sample programs on above.

3.9 Discusses Map interface and HAshMap class for the following

3.9.1 Constructors

3.9.2 Methods

3.9.3 Sample programs on above.

3.10 Explain Enum set and Enum Map classes.

3.11. Design simple programs using collections.

4.0 Exception handling and multi-threaded programming.

4.1 Describe sources of errors.
4.2 Give advantages of Exception handling.
4.3 Types of exceptions:
i. checked,
ii. Unchecked
4.4 Apply following key words to handling exceptions through sample programs

i. Try
ii. Catch
iii. Finally
iv. Throw
v. Throws

4.6 Explain concept of multi-catch statements with example.
4.7 Explain how to write nested try in exception handling with example.
4.8 Describe built in exceptions.
4.9 Describe multithreading.
4.10 Explain Thread life cycle and states
4.11 Explain how to Creating single thread with example program.
4.12 Explain how to Creating multi thread with example program.
4.13 Illustrate thread priorities in multiple threads with an example.
4.14 Describe the concept of synchronization with example program.
4.15 Explain Inter thread communication with example program.
4.16 Explain dead lock.

5.0 Applets, AWT, Event Handling.

5.1 Describe the basics of Applets – Life cycle of an applet.
5.2 Describe steps for design and execute sample applet program
5.3 Explain Graphics class methods
Update()
Paint()
Drawing Lines, Rectangle, circles, polygons
5.4 Working with Color Font classes.
5.5Describe AWT classes

5.6 Explain how to design Frame window with example.

5.7 Describe Types of Events

5.8 List and explain sources of events.

5.9List and explain different event classes.

5.10List and explain event listener interfaces

5.11 Demonstrate event handling mechanism.
5.12 Demonstrate handling mouse events with sample program.
5.13 Demonstrate handling keyboard events with sample program.

5.14Explain how to use AWT controls in applet programming.

a. Labels.
b. Buttons.
c. Text Fields
d. Checkboxes.
e. Lists.
f. Choice
g. Scrollbars.

COURSE CONTENTS

1. Basics of java and overloading: Importance of Java to Internet – Byte codes. Features of Java: OOPS concepts –Data types –type conversions – casting – Arrays. Usage of classes – objects – new – methods – constructors – method overloading, string classes – command line arguments-static members-this pointer

2. Concepts Inheritance Overriding Interfaces and Package: -Usages of Inheritance: inheritance super class, sub classes – Multi level inheritance – super keyword -overriding –Abstract Classes-Interfaces-Packages.

3. concepts of I/O Streams and Collections: I/O streams-Accessing data through console input and output-DataInputStream- DataInputStream –Collection Frame work-ArrayList-LinkedList-Iterator and List Interface-Hash table-Hash Map-Enum Set-Enum Map

4. Exception Handling and Multi threading: – Exception handling: Source of errors – error handling – Exception handling-Multi catch statements- Define thread – life cycle of thread - Multi threading –Synchronization- Inter thread communication – Dead locks – Thread properties.

5. Applets, AWT and Event Handling: Basics of Applets – life cycle of an applet-Working with Graphics-colour-fonts-AWT classes-Event Classes-Listener interfaces-keyboard and Mouse events-AWT controls-Buttons-TextFields-CheckBox-List

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1. The complete reference Java -- PattrickNaughten, Herbert Schildt TMH Company Limited, New Delhi.
2. Programming in JAVA -- P. Radhakrishna, University Press
3. Programming in Java -- Muthu - Thomson
4. Java Foundations of Programming – NIIT, PHI
5. Programming with Java -- Balagurusamy, TMH

Blue Print:

S.No.	Chapter/Unit title	No.of periods	Weightage Allocatd	Marks Wise Distribution of Weightage				Question wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Features and Basics of java	14	14	3	11			1	2			C01
2	concepts of overloading, inheritance, overriding	13	24		14		1*	2	1		1*	CO2
3	concepts of I/O Streams, Interfaces and Packages	13	24	3	3	8	1*	1	1	1	1*	CO3
4	Exception handling and Multi threaded programming.	16	24		6	8	1*		2	1	1*	C04
5	Applets, AWT and Event Handling	19	24	3	11		1*	1	2		1*	CO5
	Total	75	80	15	39	16	10	5	8	2	1	

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1.1 to 3.6
Unit test-2	From 3.7 to 5.14

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING
MODEL PAPER
JAVA PROGRAMMING
UNIT TEST-1

SCHEME: C-20 SUBJ CODE:AI-303
MAX MARKS:40 TIME: 90Minutes

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PART-A **16Marks**

Instructions: 1) Answer all questions
2) First question carries 4marks, and each question of remaining carries 3marks

1. a) is 'this' keyword is refers currently invoked object proprieties (True/False) (CO1)

b) ----------is fully abstract class. (CO2)

c) Which of the following is not a java access specifier [ ] (CO2)

I) public II) default III) private IV) super

d) Which one of the following are java translator [ ] (CO1)

I) interpreter II) compiler III) assembler IV) I &II

2. What is the use of constructor and list different types of constructors? (CO1)

3. Write the differences b/w abstract class and interface (CO2)

4.List different types of I/O streams. (CO3)

5. What is the use of super keyword? (CO3)

PART-B

3X8=24Marks

Instructions: 1) Answer all questions
2)Each question carries 8 Marks
3)Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer

6. a) Explain method over loading with an example. (CO1)

Or

b) Explain how to use static members in java with example. (CO1)

7. a) Explain multilevel inheritance with example program. (CO2)

Or

b) How java implements multiple inheritance with interface? Explain with example. (CO2)

8. a) Explain how to create and import package. (CO3)

Or

b) Describe how to access primitive data types through keyboard with an example. (CO3)

Diploma in ARTIFICIAL INTELLIGENCE Engineering

Java Programming-AI-303

Part-A

Answer All Questions each carries three marks 10X3=30

1.	Define Byte code and JVM	CO3
2.	What is the use of label break?	CO1
3.	Define overriding and give the syntax.	CO2
4.	What is the use of super keyword?	CO3
5.	List different Access modifiers in java.	CO4
6.	Write any three methods in DataInputStream and DataOutputStream.	CO4
7.	Write the advantages of exceptions.	CO4
8.	List different methods in thread life cycle.	CO4
9.	What is an event? List different event Listeners.	CO5
10.	Write different constructors in TextField.	CO5

Part-B

Answer All Questions carries eight marks 5X8=40

11.(a) Explain the features of Java programming CO1

(or)

(b) What is constructor? Describe usage of constructor with example. CO2

12. (a) Explain over loading and overriding with example CO2

(or)

(b) Explain how to implements multi level inheritance with example CO2

13. (a) Explain how to read and write primitive data using streams with an example. CO3

(or)

(b) Explain how to create and import packages in java. CO3

14. (a) Write a java program to apply multi catch statements. CO4

(or)

(b) Explain how to create multiple threads with an example. CO4

15. (a) Explain about key events. CO5

(or)

(b) Explain List control with an example. CO5

Part-C

Answer the following Question **1X10=10Marks**

16. Design an applet program that implements simple calculator with basic arithmeticoperations? CO5

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
AI-304	**Data Structures Through C**	**5**	**75**	**20**	**80**

S.No.	Chapter/Unit Title	No.of Periods	CO's Mapped
1.	Introduction to Data structures Sequential Storage Representation	25	CO1
2.	Linked Storage Representation-Linked Lists	15	CO2
3.	Linear Data Structures-Stacks	10	CO1,CO2,CO3
4.	Linear Data Structures-Queues	10	CO1,CO2,CO4
5.	Non Linear Data Structures-Trees	15	CO1,CO2,CO5
	Total Periods	75	

Course Objectives	At the end of the course students will be able to i)To know the various types of Data Structures ii)To familiarize with the representation of Data Structures iii)To use various Data structures in organizing data iv)To reinforce theoretical concepts by writing relevant programs

Course Outcomes	CO1	AI-304.1	Illustrate various techniques of sorting and searching
	CO2	AI-304.2	Explain the operations on Various Linked Lists
	CO3	AI-304.3	Apply the operations of Stack.
	CO4	AI-304.4	Explain the operations of different types of Queue.
	CO5	AI-304.5	Apply Binary tree traversal techniques.

CO-PO/PSO MATRIX

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
AI-304.1	1	1	2					2		2
AI-304.2	2	3	3						3	2
AI-304.3	1	1	2	3	2		3	2	2	2
AI-304.4	3	3	2				2	2	2	2
AI-304.5	3	3	2	3	2	3	2		3	3
Average	2	2.2	2.2	3	2	3	2.3	2	2.5	2.2

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

Learning Outcomes:

1. Introduction to Data Structures

1.1 Understand various types of Data Structures

1.1.1. Define Data Structure and classify them
1.1.2. Explain Linear Data Structures
1.1.3. Describe Non-Linear Data Structures
1.1.4. Explain Data Types and Abstract Data Types
1.1.5. Explain about Space and Time Complexities

1.2 **Sequential Storage Representation**

1.2.1 Various Sorting Techniques

1.2.1.1 Define Sorting
1.2.1.2 State the need of Sorting
1.2.1.3 List the methods of Sorting
1.2.1.4 Explain the following for Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort
a) Sorting technique,
b) Algorithm and complexity
c) Program

1.2.2 **Various Searching Techniques**

1.2.2.1 Define searching
1.2.2.2 State the need of searching
1.2.2.3 List two types of searching
1.2.2.4 Explain the following for Linear Search, Binary Search with Recursion and with-out Recursion..
a) Searching technique.
b) Algorithm and complexity
c) Program

2 Linked Storage Representation –Linked Lists

2.1 List the advantages & disadvantages of Linked Lists over Arrays
2.2 State the purpose of Dummy Header
2.3 Explain the following for Singly Linked List, Singly Circular Linked List, Doubly Linked List and Doubly Circular Linked List.
a) Structure
b) Creation
c) How to represent a node using 'C' Structure
d) Perform insertion, deletion, traverse and sort operations
e) Perform search and replace an element
f) C Program with all operations.
2.4 List the advantages of a Singly Circular Linked List over a Singly Linked List
2.5 Describe the changes require in a singly linked list program to make it the Singly Circular List.
2.6 List the advantages of a Doubly Circular Linked List over a Doubly Linked List
2.7 Describe the changes require in doubleminded List program to make it the Doubly Circular List.

3 Linear Data Structures-Stacks

3.1 Define Stack
3.2 Explain the push, pop and display operations of a Stack

3.3 Explain array implementation of a Stack with various operations.
3.4 Explain the program for Array implementation of a Stack with various operations.
3.5 Explain Linked List implementation of a Stack with various operations.
3.6 Explain the program for Linked List implementation of a Stack with various operations.
3.7 List the applications of Stacks
3.8 Convert Infix expression to Postfix expression
3.9 Explain the program for Conversion of Infix expression to Postfix expression
3.10 Evaluate Postfix expression
3.11 Explain the program for Evaluating Postfix expression

4 Linear Data Structures-Queues

4.1 Define Queue
4.2 Explain the insertion, deletion and display operations on Queues
4.3 Explain array implementation of a Queue with various operations.
4.4 Explain the program for Array implementation of a Queue with various operations.
4.5 Explain Linked List implementation of a Queue with various operations.
4.6 Explain the program for Linked List implementation of a Queue with various operations.
4.7 Know about Circular Queues
4.8 Explain array implementation of a Circular Queue with various operations
4.9 Explain the program for Array implementation of a Circular Queue with various operations
4.10 Explain Linked List implementation of a Circular Queue with various operations.
4.11 Explain the program for Linked List implementation of a Circular Queue with various operations.
4.12 List the application of Queues
4.13 Know about Priority Queues

5 Non-Linear Data Structures-Trees

5.1 Define a Tree
5.2 Explain the terminology related to Tree
5.2.1 Root, Edge, Parent, Child, Siblings, Leaf, Internal nodes, Degree, Level, Height, Depth, Path, Sub tree, Forest.
5.3 Define Binary Tree
5.4 Differences between General Tree and Binary Tree.
5.5 Conversion of General Trees to Binary Trees
5.6 Explain the linear representation and linked list representation of a Binary Tree
5.7 Define Binary Search Tree
5.8 Differences between Binary Search Tree and Binary Tree
5.9 Perform various traversals on Binary Search Trees
5.10 Construct a Binary Tree using In-order and Preorder Traversals
5.11 Construct a Binary Tree using In-order and Post-order Traversals
5.12 Know the importance of Binary Search Trees over General Trees
5.13 Perform insertion, deletion, search and various traversal operations on a Binary Search Tree.
5.14 Explain the program of Binary Search Tree with all operations.
5.15 List the Applications of trees

COURSE CONTENT

1. Introduction to Data Structures

Data structures – Linear &nonlinear, data types and abstract data types, algorithm analysis for time and space requirements.

Sequential Storage Representation – **Sorting -** Introduction to different sorting techniques –Bubble, Selection, Insertion, Quick & Merge. **Searching –** Introduction to different searching techniques – Linear and Binary.

2. Linear data structures-Linked Lists

Linked Lists – Types - Singly Linked Lists – Create, insert, delete, sort, search and replace an element in a linked list –, Singly Circular Linked Lists - Create, insert, delete, sort, search and replace an element in a linked list, - Doubly Linked Lists – Create, insert, delete, sort, search and replace an element in a linked list, - Doubly Linked Lists – Create, insert, delete, sort, search and replace an element in a linked list.

3. Linear data structures-Stacks

Stacks- Implementation of stacks, application of stacks, converting infix to postfix expression and postfix expression evaluation.

4. Linear data structures-Queues

Queues–Implementation of queues- Application of queues- know about Circular queues, and Priority queue.

5. Non-Linear data structures-Trees

Trees- Trees- Trees Terminology–Binary trees –Representation – Linear and Linked list representation-Binary Search Tree-various operations-Tree Traversals-Tree Conversions& Applications

REFERENCE BOOKS

1. Data Structures: A Pseudocode Approach with C - Gilberg / Forouzan
2. Data Structures using 'C' - Tanenbaumlangsam and Augonstein (PHI).
3. Data structures through C - YashwanthKanetkar
4. An Introduction to data structures with applications - Tremblay & Sorenson

ModelBlue Print:

S.No.	Chapter/ Unit title	No.of periods	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 Data structures, Sequential Storage Representation	25	30	8	6	3	10	1	2	1	*	CO1
2	Linked Storage Representation-Linked Lists	15	24	3	8	3	10	1	1	1	*	CO2
3	Linear Data Structures-Stacks	10	21	3	3	8	10	1	1	1	*	CO1,CO2,CO3
4	Linear Data Structures-Queues	10	21	3	8		10	1	1		*	CO1,CO2,CO4
5	Non Linear Data Structures-Trees	15	24	3	3	8	10	1	1	1	*	CO1,CO2,CO5
	Total	75	70+*	20	28	22		5	6	1		

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1.1 to 2.7
Unit test-2	From 3.1 to 5.15

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING
MODEL PAPER
Data Structures through C
UNIT TEST-1

SCHEME: C-20 SUBJ CODE:AI-304
MAX MARKS:40 TIME: 90Minutes

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PART-A **16Marks**

Instructions:1) Answer all questions
2) First question carries 4marks, and each question of remaining carries 3 marks

1. a) Array is a non-linear Data Structure.(True/False) (CO1)
   b) Re-arranging of adjacent elements followed in _____ type of sorting. (CO1)
   c) Single Linked List node consists of _____ fields. (CO2)
   d) Which one of the following is not a sorting technique [ ] (CO1)
   i)MergeII) Bubble III) Binary IV) Quick
2) Define sorting and searching. (CO1)
3) List any three Linear Data Structures. (CO1)
4) How to represent a node in Singly Linked list. (CO2)
5) Distinguish Singly Linked list and doubly linked list. (CO2)

PART-B

3X8=24Marks

Instructions: 1) Answer all questions
2)Each question carries 8 Marks
3)Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer

6. a) Explain Bubble sort technique. (CO1)

(Or)

b) Explain Quick Sort technique. (CO1)

7. a) Explain Binary Search technique using Recursion. (CO1)

(Or)

b) Write a C program to implement Singly Linked list with all operations. (CO2)

8. a) Write a C program to implement Doubly Linked list with all operations. (CO2)

(Or)

b) Explain Circular Doubly Linked List. (CO2)

BOARD DIPLOMA EXAMINATIONS
DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING
MODEL PAPER - END EXAMINATION
Data Structures through C

SCHEME: C-20 SUBJ CODE: AI-304
MAX MARKS: 80 TIME: 3HOURS

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PART - A

Answer all the Questions. Each Question Carries 3 marks

1. What is Linear Data Structure and Non-Linear Data Structure? (CO1)
2. List the abstract Data Types. (CO1)
3. Define Space and Time Complexities. (CO1)
4. List any three operations of Linked List. (CO2)
5. Write the structure code for declaring Doubly circular Linked List. (CO2)
6. Convert the following into postfix expression: a+b*c/d^e. (CO3)
7. Evaluate the following expression:3^2+15/5*6. (CO3)
8. Define Priority Queue. (CO4)
9. Compare Binary Tee and Binary Search Tree. (CO5)
10. List the applications of Trees. (CO5)

PART-B

Answer all the Questions. Each Question Carries 8 marks

11. Explain the method of Bubble Sort. (CO1)

Or

Write C program for Binary Search using Recursion. (CO1)

12. Write C Program to Implement Single Linked List with all operations. (CO2)

Or

Write C Program to implement Double Linked List with all operations .(CO2)

13. Explain Linked list implementation of Stack with all operations. (CO3)

Or

Write C program for Evaluation of Post Fix expression using Stacks. (CO3)

14. Explain all the operations of Circular Queues. (CO4)

Or

Write C Program for implementation of Queues using linked lists. (CO4)

15. Explain the Linear representation and Linked representation of Binary Tree (CO5)

Or

Explain the terminology related to Trees with examples. (CO5)

PART-C **10 marks**

16. Write a C program to implement BINARY SEARCH TREE with insertion, deletion, various traversals and search operations. (CO5)

Course	Course Title	No. of	Total No. of	Marks for	Marks for

code		Periods/Weeks	periods	FA	SA
AI-305	Digital Electronics & Computer Organization	6	90	20	80

S.No.	Chapter/Unit Title	No.of Periods	CO's Mapped
1.	Logic Gates ,Boolean Algebra and basic Combinational circuits	20	CO1,CO3
2.	Flip-Flops, Counters& Registers	30	CO1,CO2
3.	Information representation & CPU Organization	20	CO1,CO2,CO3
4.	Memory Organization	10	CO2,CO4
5.	I/O Organization	10	CO3,CO4,CO5
Total Periods		90	

Course Objectives	i) To acquire the basic knowledge of digital logic levels and apply of knowledge to understand digital logic circuits. ii) To prepare students to perform the analysis and design of various digital electronics circuits iii)To know about Processor organization, information Representation iv)To understand how memory and i/o is organized in an effective way

	At the end of the course the student able to learn following:		
Course Outcomes	CO1	AI-305.1	Describe fundamental concepts and techniques used in digital electronics, the switching algebra theorems and logic gates
	CO2	AI-305.2	Analyse the operation of flip flops, counting circuits, Registers
	CO3	AI-305.3	Explain the Basic computer organization techniques and information representation
	CO4	AI-305.4	Explain Memory organization
	CO5	AI-305.5	Describe Handling of peripheral organization

CO-PO/PSO Matrix:

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
AI-305.1	3	2	2		1		2	2	1	3
AI-305.2	2	2	2	1	1		2	2	1	2
AI-305.3	2	1			1	1	2	3	1	1
AI-305.4	2	1	1		1	1	2	3	2	1
AI-305.5	2		2		1	1	2	3	1	1
Average	**2.2**	**1.5**	**1.75**	**1**	**1**	**1**	**2**	**2.6**	**1.2**	**1.6**

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

Learning Outcomes:

1.0 Circuits

1.1 Boolean algebra
- 1.1.1 Explain AND, OR, NOT operations with truth tables.
- 1.1.2 Explain the working of EX-OR and EX-NOR operations with truth tables.
- 1.1.3 List the different postulates in Boolean algebra.
- 1.1.4 State De-Morgan's theorems.
- 1.1.5 Prove De-Morgan's theorems using truth tables.
- 1.1.6 Apply De-Morgan 's theorems and other postulates of Boolean algebra to simplify the given Boolean expression.
- 1.1.7 Write Boolean expression for given truth table.
  - 1.1.7.1 Using Sum-Of-Products (SOP) method
  - 1.1.7.2 Using Product-Of-Sums (POS)method
- 1.1.8 Use K – map to simplify Boolean expression (up to 4 variables).
  - 1.1.8.1 Using Two variable K-Map
  - 1.1.8.2 Using Three variable K-Map
  - 1.1.8.3 Using Four variable K-Map

1.2 Logic Gates
- 1.2.1 Define Logic gate
- 1.2.2 List basic gates
- 1.2.3 Define OR gate
- 1.2.4 Explain OR gate with logic symbol and truth table.
- 1.2.5 Define AND gate
- 1.2.6 Explain AND gate with logic symbol and truth table.
- 1.2.7 Define NOT gate
- 1.2.8 Explain NOT gate with logic symbol and truth table.
- 1.2.9 What is universal gate? List universal gates
- 1.2.10 Define NOR gate
- 1.2.11 Explain NOR gate with logic symbol and truth table.
- 1.2.12 Define NAND gate
- 1.2.13 Explain NAND gate with logic symbol and truth table.
- 1.2.14 Define EX-OR and EX-NOR gates

1.2.15 Explain the working of EX-OR and EX-NOR gates with truth tables.
1.2.16 Implement AND, OR, NOT, EX-OR gates using NAND gates only
1.2.17 Implement AND, OR, NOT, EX-OR gates using NOR gate only.

1.3 Basic Combinational Circuits

1.3.1 Define the Half Adder. Explain the function of Half Adder.
1.3.2 Draw Half-Adder circuit using an exclusive OR and an AND gate.
1.3.3 Draw a Half–Adder using only NAND gates or only NOR gates.
1.3.4 Define the Full Adder. Explain the function of Full Adder.
1.3.5 Construct Full Adder using two Half-Adder and an OR gate
1.3.6 Define the parallel Adder
1.3.7 Explain the function of parallel Adder using logic symbol.
1.3.8 Draw and explain 4-bit parallel adder using full adders.
1.3.9 Explain the working of a serial adder with a block diagram.
1.3.10 List the advantage and disadvantages of a serial adder
1.3.11 List the advantage and disadvantages of a parallel adder.
1.3.12 Distinguish between serial adder and parallel adder.
1.3.13 Explain the operation of a digital comparator circuit for two 4-bit words.

2.0 Flip-Flops,Counters,Registers

2.1 FLIP-FLOPS

2.1.1 List the details of different logic families**.**
2.1.2 Define positive and negative logic levels.
2.1.3 Define Flip flop
2.1.4 Draw and explain the basic principle of operation of a Flip-flop.
2.1.5 Define Latch.
2.1.6 Explain the working of a NAND latch circuit with truth table and Timing diagram
2.1.7 Explain the working of a NOR latch circuit with truth table and Timing diagram
2.1.8 Differentiate between Latch and Flip-flop.
2.1.9 Define Triggering
2.1.10 List the types of Triggering
2.1.11 Draw and explain the concept of edge triggering (positive, negative)
2.1.12 Draw and explain the concept of level triggering. (Positive, negative)
2.1.13 Explain with block diagram, waveforms and truth tables the working of RS Flip-flop.
2.1.14 Explain with block diagram, waveforms and truth tables the working of working of-flop.
2.1.15 Explain with block diagram, waveforms and truth tables the working of Flip-flop.
2.1.16 Explain with block diagram, waveforms and truth tables the working of Flip-flop.
2.1.17 Explain with block diagram, waveforms and truth tables the working of T Flip-flop.
2.1.18 Distinguish between synchronous and asynchronous inputs of flip-flop and state their functions.
2.1.19 Draw and explain the need for a Master-Slave flip-flop.

2.1.20 Explain the working of a Master-Slave flip-flop using suitable circuit diagram and truth table.

2.2 Counters

2.2.1 Define Counter
2.2.2 List the types of counters.
2.2.3 Define Synchronous counter
2.2.4 Define Asynchronous counter
2.2.5 Distinguish between asynchronous and synchronous counters.
2.2.6 Draw and explain module-8 ripple counter circuit diagram with waveforms and truth tables
2.2.7 Draw and explain module-16 ripple counter circuit diagram with waveforms and truth tables
2.2.8 Draw and explain module-10 (decade) Asynchronous counter circuit diagram with waveforms and truth tables
2.2.9 Draw and explain module-8 synchronous counter circuit diagram with waveforms and truth tables
2.2.10 Draw and explain module-16 synchronous counter circuit diagram with waveforms and truth tables
2.2.11 Draw and explain module-10 synchronous counter circuit diagram with waveforms and truth tables
2.2.12 List the draw backs of ripple counters.
2.2.13 List the advantages of synchronous counters
2.2.14 Programmable counter
2.2.15 Draw and explain the need for a Programmable counter
2.2.16 Explain how to design Programmable counter circuit diagram
2.2.17 Draw and explain the operation of a 4-bit ring counter.
2.2.18 List the applications of counter.

2.3 Register

2.3.1 Define Register
2.3.2 State the need of Register.
2.3.3 List the methods of data transfer in register.
2.3.4 List the types of Registers
2.3.5 Define Serial in – Serial out register
2.3.6 Define Serial in – Parallel out register
2.3.7 Define Parallel in – Serial out register
2.3.8 Define Parallel in – Parallel out register
2.3.9 Explain the working of serial in – serial out register with circuit diagram.
2.3.10 Explain the working of serial in – parallel out register with circuit diagram.
2.3.11 Explain the working of shift left Register with circuit diagram.
2.3.12 Explain the working of shift right registers with circuit diagram.
2.3.13 Explain the working of universal shift register.
2.3.14 Draw and explain the use of shift register as memory.

3.0 CPU Organization Information representation and Arithmetic Operation

3.1 CPU Organization

3.1.1 Draw the functional block diagram of Digital computer and explain the function of each unit.
3.1.2 Define Register

3.1.3 State the purpose of
- 3.1.3.1 Accumulator
- 3.1.3.2 Program counter
- 3.1.3.3 Instruction Register
- 3.1.3.4 Memory Buffer Register
- 3.1.3.5 Memory Address Register

3.1.4 Draw the block diagram of simple accumulator-based CPU.
3.1.5 Explain the function of each unit
3.1.6 Define the terms micro-operation, macro-operation,
3.1.7 Define instruction cycle, fetch cycle and execution cycle.
3.1.8 What is stored program concept
3.1.9 Describe the sequential execution of a program stored in memory by the CPU

3.2 **Information representation and Arithmetic Operation**
3.2.1 Explain the basic types of information representation in a computer.
3.2.2 Define floating point representation and fixed-point representation of numbers.
3.2.3 Illustrate the floating point and fixed-point representations with example.
3.2.4 Distinguish between Fixed point and Floating-point representations.
3.2.5 What is Instruction format
3.2.6 Define Opcode, Operand and address.
3.2.7 Explain different types of instructions with examples
- 3.2.7.1 Zero address instructions
- 3.2.7.2 One address instruction
- 3.2.7.3 Two address instructions
- 3.2.7.4 Three address instructions

3.3 List and explain various addressing modes.

4.0 Memory Organization
4.1 Distinguish between main and auxiliary memory.
4.2 State the need for memory hierarchy in a computer.
4.3 Explain memory hierarchy in a computer in detail
4.4 State the significance of various memory device characteristics: access time, access rate, alterability, permanence of storage, cycle time.
4.5 Discuss Associative Memory
4.6 Explain the principle of virtual memory organization in a computer system
4.7 Explain virtual address and physical address organization.
4.8 State the principle of locality of reference
4.9 Explain Cache memory organization.
4.10 Analyze the importance of the principle of memory interleaving in a computer.

5.0 I/O Organization
5.1 List the any five peripheral devices that can be connected to a computer.
5.2 Define Interface.
5.3 Explain the need for an interface.
5.4 List modes of date transfer.
5.5 Explain synchronous and asynchronous data transfer.
5.6 Compare synchronous and asynchronous data transfer.

5.7 Explain hand shaking procedure of data transfer.
5.8 Explain programmed I/O method of data transfer.
5.9 Explain interrupted initiated I/O.
5.10 Explain DMA controlled transfer.
5.11 Explain priority interrupt, polling, and daisy chaining priority.
5.12 Write about bus system
5.13 List the four bus systems.
5.14 Differentiate between I/o bus and memory bus

COURSE CONTENTS

1. Boolean algebra and Logical Gates: AND, OR, NAND, NOT, NOR & EX-OR gates. Logical definitions – Symbols – truth tables. Boolean theorems, Boolean simplifications of Boolean expressions, Using De-Morgan 's theorems, Formation and implementation of Logic expressions, Karnaugh 's mapping, Applications involving developing of combinational logic circuits. Half-Adder, Full-adder, Subtractor series – Parallel Binary adder.

2. FLIP FLOP: Different logic families**,** Basic principles of Flip Flop operation (with help of wave form & truth tables) of RS, T, D, JK and Master Slave JK flip flop concept of Edge Triggering and Level Triggering, Synchronous and Asynchronous device.

Counters: Basic Asynchronous, Synchronous Binary and Decade counter and the Ripple counter, their use Decade counter, Ring counter.

Registers: Shift registers, Serial, Parallel register, Serial-in Parallel out, Parallel-in– serial out devices, Universal shift registers, Applications.

3. Processor Organization - functional block diagram of Digital computer -Simple accumulator-based CPU and function of each unit. -Stored program concept

Information representation and Arithmetic Operation- Basic types of information representation - floating point representation and fixed-point representation of numbers, Operand, Opcode and address - zero address, one address, two address and three address instructions - different addressing modes.

4.Organization of Computer Memory system - Main and auxiliary memory -Need for memory hierarchy in a computer -Significance of various memory devices characteristics: access time, access rate, alterability, permanence of storage, cycle time - Associative Memory-Virtual memory organization in a computer system - Virtual address and physical address organization. -Principle and advantage of cache memory organization- Principle of memory interleaving in a computer

5.Input and output organization - Peripheral devices -Need for an Interface-Three modes of date transfer - Synchronous and asynchronous data transfer -Hand shaking procedure of data transfer - Programmed I/O method of data Transfer-Interrupted initiated I/O-DMA controlled transfer-Priority interrupt, polling, and daisy chaining priority-Bus systems

REFERENCE BOOKS

1. Digital principles and applications -- Malvino and leach
2. Digital Electronics -- Bignell - Thomson
3. Modern Digital Electronics -- R.P. Jain
4. Computer System Architecture -- Morris Mano.

Model Blue Print:

S.No.	Chapter/Unit title	No.of periods	Weightage Allocated	Marks Wise Distribution of Weightage				Question wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1.	Logic Gates, Boolean Al and basic Combinationa	20	14	3	11			1	2			CO1, CO3
2.	Flip-flops, Counters and Registers	30	24	6	11		10	2	2		*	CO1, CO2
3	Information representation & CPU Organization	20	14	3	11			1	2			CO1, CO2, CO3
4.	Memory Organization	10	14	3	11		10	1	2			CO2, CO4
5.	I/O Organization	10	14	3	8		10	1	1			CO3, CO4, CO5
	TOTAL	90	70+10*	18	52			6	9			

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1 to 2
Unit test-2	From 3 to 5

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING
MODEL PAPER
DIGITAL ELECTRONICS & COMPUTER ORGANIZATION
UNIT TEST-1

SCHEME: C-20 SUBJ CODE:AI-305
MAX MARKS:40 TIME: 90Minutes

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PART-A **16Marks**

Instructions:1) Answer all questions
2) First question carries 4marks, and each question of remaining carries 3marks

1. a) K-map is not used to simplify Boolean expression (True/False) (CO1)

b) ----------is the base of octal number system (CO1)

c)logic gate gives----------number of outputs (CO2)

d) TTL stands for ---------- (CO2)

2) Convert 101010_2 into decimal number (CO1)

3) State and prove Demorgan's theorems using truth table (CO2)

4) Implement OR gate using NAND gate (CO2)

5) Define positive and negative logic levels of FLIP FLOP (CO2)

PART-B 3X8=24Marks

Instructions: 1) Answer all questions
2)Each question carries 8 Marks
3)Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer

6. a) Explain parallel Adder in detail with neat diagram. (CO1)

Or

b) Explain 4-Bit comparator in detail with neat diagram. (CO1)

7. a) Explain JK Flip Flop in detail with neat diagram. (CO2)

Or

b) Explain Dem organ's Asynchronous counter in detail with neat diagram. (CO2)

8. a) Explain Programmable counter in detail with neat diagram. (CO2)

Or

b) Explain Shift Left Register in detail (CO2)

BOARD DIPLOMA EXAMINATIONS
DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING
MODEL PAPER – END EXAMINATION
DIGITAL ELECTRONICS& COMPUTER ORGANIZATION

SCHEME: C-20 SUBJ CODE:AI-305
MAX MARKS:80 TIME: 3HOURS

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…

PART-A 10X3=30Marks

Note: Answer all questions

1. Draw Half Adder diagram. (CO1)

2. What is Universal Gate and List them. (CO1)

3 Define positive and negative logic levels (CO2)

4 Write any three differences between Asynchronous and Synchronous counters (CO2)

5 What is Accumulator and program counter? (CO3)

6Define opcode, operand and address. (CO3)

7State the need for memory hierarchy in a computer (CO4)

8State the principle of locality of reference (CO4)

9List modes of date transfer (CO5)

10List the four bus systems (CO5)

PART-B 5x8=40Marks

Note: Answer all questions

11.A. Draw and explain 4-bit parallel adder using full adders. (CO1)

OR

11.B Draw and explain 4bit comparator (CO1)

12.A. Explain Master JK Flip Flop in detail with neat diagram (CO2)

OR

12.B Explain 16-bit Asynchronous counter in detail (CO2)

13.A. Explain the stored program concept? (CO3)

OR

13.B List and explain various addressing modes (CO3)

14.A. State the significance of various memory device characteristics: access time, access rate, alterability, permanence of storage, cycle time. (CO4)

OR

14.B. Explain virtual address and physical address organization? (CO4)

15.A. Explain DMA controlled transfer in detail? (CO5)

OR

15.B Explain hand shaking procedure of data transfer in detail? (CO5)

PART-C

1X10=10Marks

16. Simplify the Boolean expression AB + A (B + C) + B (B + C) using Karnaugh map. Boolean laws and draw the logic circuit for reduced expression.
(CO1)

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
AI-306	**Artificial Intelligence Lab using prolog**	**04**	60	40	60

S No	Chapter/ Unit Title	No. of Periods	COs Mapped
1.	Installation and study of Prolog environment	10	CO1, CO2, CO3
2.	Study and write programs on Input/CO2, CO types, rules	20	CO1, CO2, CO3
3.	Study and write Programs on Goal finding, backtracking, objects, strings, set operations	15	CO1, CO4
4.	Programs on various applications	15	CO1, CO5
	Total	60	

COURSE OBJECTIVES	**Upon completion of the course the student shall be able to** 1. Installation&Study of prolog. 2. Use Edit, compile and execution of prolog programs 3. Usage of prolog environment 4. To Write AI program using various prolog constructs like facts, objects, predicates and variables, Goal finding, backtracking, objects, strings, set operations 5. Write AI programs on various applications using prolog

CO No		COURSE OUTCOMES
CO1	AI-306.1	Demonstrate Installation of prolog and edit, compile and execution of simple prolog programsusing statements, keywords, user defined identifiers
CO2	AI-306.2	Practice programsusing facts, objects, predicates, variables and arithmetic operators
CO3	AI-306.3	Execute prolog program on recursion, Lists, dynamic database
CO4	AI-306.4	Prepare Programs on Goal finding, backtracking, objects, strings, set operations
CO5	AI-306.5	Use prolog programs on various applications

Learning outcomes:

1. Installation of GNU-Prolog, Study of Prolog (GNU-Prolog)
2. Write a prolog program of facts, objects, predicates and variables in PROLOG.
3. Write a prolog program of Rules and Unification in PROLOG.
4. Write a prolog program of "cut" and "fail" predicate in PROLOG.
5. Write a prolog program of arithmetic operators, simple input/output and compound goals in PROLOG.
6. Write a prolog program of recursion in PROLOG.
7. Write a prolog program of Lists in PROLOG.
8. Exercise on dynamic database in PROLOG.
9. Implement string operations like substring, string position, palindrome etc.
10. Write a prolog program to implement all set operations (Union, intersection, complement etc.)
11. Write a prolog program to maintain family tree.
12. Write a prolog program to solve "Water Jug Problem".
13. Write program to solve 4-queens problem.
14. Write a program for Tic-Tac-Toe problem.

KEY COMPETENCIES

Exp. No.	Name of the experiment	Objectives	Key Competencies
1	Installation of gnu-prolog	(a) Study of Prolog (gnu-prolog) (b) Installation of prolog	a) identify the errors during the installation b) observe the installation completion
2	Exercise on facts, objects, predicates and variables in PROLOG.	(a) Write a program for facts using prolog (b) Write a program objects using prolog (c) Write a program for predicates using prolog (d) Write a program for variables using prolog	(a) Compile the program and rectify the errors. (b) Execute the program (c) Observe the output.
3	Exercise on Rules and Unification in PROLOG.	(a) Write a program on Rules in prolog (b) Write program on Unification in prolog	(a) Provide the terms as input. (b) use parent method for matching terms (c) Observe the output.
4	Exercise on "cut" and "fail" predicate in PROLOG	(a)Write a program on cut in prolog (b)Write a program on fail in prolog	(a) use different methods for cut and fails predicates (b) observe the errors (c) observe the output

5	Exercise on arithmetic operators, simple input/output and compound goals in PROLOG.	Write a program on (a) arithmetic operators (b) input /output (c) goals in prolog	(a) use different terms as input (b) call the different methods (c) observe the errors (d) observe the output
6	Exercise on recursion in PROLOG	(a) Write a program using recursion in prolog	(a) Use the structures and objects (b) Understand the matching (c) Observe the errors (d) Observe the result
7	Exercise on Lists in PROLOG.	(a) Write a program on lists	(a) Use different operations like membership, length, concatenation, append, insertion (b) Check the errors (c) Observe the output
8	Exercise on dynamic database in PROLOG	(a) Write a program on database in prolog	(a) Create database (b) Use different manipulations (c) Check the errors (d) Observe the result
9	Exercise on string operations in prolog	Write a program on (a) String comparison (b) String copy (c) String reverse (d) Substring (e) Position of the string	(a) Use different string operations (b) Check the errors (c) Observe the output
10	Exercise on all set operations (Union, intersection, complement, difference) in prolog	(a) Write a program on set operations in prolog	(a) Use different operations like union Intersection, difference (b) Observe the errors (c) Observe the output
11	Exercise on maintain family tree in prolog	(a) Write a program on creation of family tree in prolog	(a) Create the family tree (b) Check the errors (c) Observe the output
12	Exercise on “Water Jug Problem” in prolog	(a) Write a program to implement water-Jug problem.	(a) use water jug concept (b) observe the errors (c) check the output
13	Exercise on 4-queens problem in prolog	(a) Write a program to implement the 4-queens problem in prolog	(a) Use 4-queens instead of N (b) Observe the errors (c) Observe the output
14	Exercise on Tic-Tac-Toe	(a) Write a program on Tic-Tac-Toe	(a) Create the Tic-Tac-Toe (b) Check the errors (c) Observe the output

Course Code	Course Title	No. of periods/week	Total No. of periods	Marks for FA	Marks for SA
AI-307	**Data Structures Through C Lab**	6	90	40	60

S.No.	Chapter/Unit Title	No. of Periods	CO's Mapped
1.	Introduction to Data structures Sequential Storage Representation	24	CO1
2.	Linked Storage Representation-Linked Lists	24	CO2
3.	Linear Data Structures-Stacks	15	CO1, CO2, CO3
4.	Linear Data Structures-Queues	18	CO1, CO2, CO4
5.	Non-Linear Data Structures-Trees	9	CO1, CO2, CO5
	Total Periods	90	

Course Objectives	At the end of the course students will be able to
	i)To know the various types of Data Structures ii)To familiarize with the representation of Data Structures iii)To use various Data structures in organizing data iv)To reinforce theoretical concepts by writing relevant programs

Course Outcomes	CO1	AI-307.1	Execute C programs on sorting and searching techniques
	CO2	AI-307.2	Develop C programs on the various Linked Lists operations.
	CO3	AI-307.3	Design C programs on the operations of Stack data structure
	CO4	AI-307.4	Execute C programs on the operations of Queue data structure
	CO5	AI-307.5	Write C programs on the operations of Binary Trees

CO-PO/PSO MATRIX

CO NO.	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**
AI-307.1	**1**	**1**	**1**				**2**	**2**	**2**	**2**
AI-307.2	**2**	**2**	**2**					**1**		
AI-307.3	**3**	**3**	**3**	**3**		**3**	**2**	**3**	**3**	**3**
AI-307.4	**2**	**2**	**2**		**2**	**2**	**3**	**2**	**2**	**2**
AI-307.5	**2**	**2**	**2**			**3**	**2**		**2**	**2**
Average	**2**	**2**	**2**	**3**	**2**	**2.6**	**2.3**	**2**	**2.3**	**2.3**

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

Learning out comes:

Write C Program to Implement

1. BUBBLE SORTING using Functions.
2. SELECTION SORTING using Functions.
3. INSERTION SORTING using Functions.
4. MERGE SORTING on two sorted list using Functions.
5. QUICK SORTING using Functions.
6. LINEAR SEARCHING using Functions.
7. BINARY SEARCHING with-out RECURSION.
8. BINARY SEARCHING with RECURSION.
9. SINGLY LINKED LIST with insert, delete, display, sort, find and replace operations.
10. SINGLY CIRCULAR LINKED LIST with insert, delete, display, sort, find and replace operations.
11. DOUBLY LINKED LIST with insert, delete, display, sort, find and replace operations.
12. DOUBLY CIRCULAR LINKED LIST with insert, delete, display, sort, find and replace operations
13. STACK with insertion, deletion and display operations using arrays.
14. STACK with insertion, deletion and display operations using linked lists.
15. Conversion of arithmetic expression to post-fix expression using STACKS.
16. Evaluation of post-fix expression using STACKS.
17. QUEUES with insertion, deletion and display operations using arrays.
18. QUEUES with insertion, deletion and display operations using linked lists.
19. CIRCULAR QUEUE with insertion, deletion and display operations using arrays.
20. CIRCULAR QUEUE with insertion, deletion and display operations using Linked List.
21. BINARY SEARCH TREE with insertion, deletion, various traversals and search operations.

Time Schedule:

S. No	Experiment Name	Allotted Periods
1	BUBBLE SORTING using Functions.	3
2	SELECTION SORTING using Functions.	3
3	INSERTION SORTING using Functions.	3
4	MERGE SORTING on two sorted list using Functions.	3
5	QUICK SORTING using Functions.	3
6	LINEAR SEARCHING using Functions.	3
7	BINARY SEARCHING with-out RECURSION.	3
8	BINARY SEARCHING with RECURSION.	3
9	SINGLY LINKED LIST with insert, delete, display, sort, find and replace operations.	6
10	SINGLY CIRCULAR LINKED LIST with insert, delete, display, sort, find and replace operations.	6
11	DOUBLY LINKED LIST with insert, delete, display, sort, find and replace operations.	6
12	DOUBLY CIRCULAR LINKED LIST with insert, delete, display, sort, find and replace operations	6
13	STACK with insertion, deletion and display operations using arrays.	3
14	STACK with insertion, deletion and display operations using linked lists.	6
15	Conversion of arithmetic expression to post-fix expression using STACKS.	3
16	Evaluation of post-fix expression using STACKS.	3
17	QUEUES with insertion, deletion and display operations using arrays.	3
18	QUEUES with insertion, deletion and display operations using linked lists.	6
19	CIRCULAR QUEUE with insertion, deletion and display operations using arrays.	3
20	CIRCULAR QUEUE with insertion, deletion and display operations using Linked List.	6
21	BINARY SEARCH TREE with insertion, deletion, various traversals and search operations.	9

DATA STRUCTURES LAB OBJECTIVES AND KEY COMPETENCIES			
S. No	Name of the Experiment	Objectives	Key Competencies
1	Exercise on bubble sort	Write a C program for i. Implementing Bubble sort ii. Printing the list after every pass iii. Printing the list after Bubble sort is performed	❖ Correct syntactical errors ❖ Debug logical errors ❖ Observe whether Bubble sort algorithm is properly implemented ❖ Check whether the sorted list is generated after the Bubble sort is performed for the given unordered list ❖ Check the efficiency of the program if the given list is almost sorted
2	Exercise on Selection sort	Write a C program for i. Implementing selection sort ii. Printing the list after every pass iii. Printing the list after selection sort is performed	❖ Correct syntactical errors ❖ Debug logical errors ❖ Observe whether selection sort algorithm is properly implemented ❖ Check whether the sorted list is generated after the selection sort is performed for the given unordered list
3	Exercise on insertion sort	Write a C program for i. Implementing insertion sort ii. Printing the list after every pass iii. Printing the list after insertion sort is performed	❖ Correct syntactical errors ❖ Debug logical errors ❖ Observe whether insertion sort algorithm is properly implemented ❖ Check whether the sorted list is generated after the insertion sort is performed for the given unordered list
4	Implement a program for merge sort on two sorted lists of elements	Write a C program for i. Implementing merge sort ii. Printing the list after every pass iii. Printing the list after merge sort is performed	❖ Correct syntactical errors ❖ Debug logical errors ❖ Check whether two separate sorted lists are properly stored in separate arrays ❖ Observe whether Merge sort algorithm is

DATA STRUCTURES LAB OBJECTIVES AND KEY COMPETENCIES			
S. No	Name of the Experiment	Objectives	Key Competencies
			properly implemented ❖ Check whether the sorted list is generated after the Merge sort is performed for the given two separate lists
5	Exercise on Quick sort	Write a C program for i. Implementing Quick sort ii. Printing the list after every pass iii. Printing the list after Quick sort is performed	❖ Correct syntactical errors ❖ Debug logical errors ❖ Observe whether Quick sort algorithm is properly implemented ❖ Check whether the sorted list is generated after the Quick sort is performed for the given unordered list ❖ Check the efficiency of the program if the given list is almost sorted
6	Exercises on linear search	Write a C program for i. Implementing Linear Search ii. Print the proper result for successful and unsuccessful search	❖ Correct syntactical errors ❖ Debug logical errors ❖ Check whether Linear Search algorithm is properly implemented ❖ Observe the result for the search element is present in the list ❖ Observe the result for the search element is not present in the list
7	Exercise on binary search with-out Recursion	Write a C program for i. Implementing Binary Search ii. Print the proper result for successful and unsuccessful Binary search	❖ Correct syntactical errors ❖ Debug logical errors ❖ Check whether Binary Search algorithm is properly implemented ❖ Observe the result for the search element is present in the list ❖ Observe the result for the search element is not present in the list
8	Exercise on binary search with Recursion	Write a C program for I. Implementing Binary Search	❖ Correct syntactical errors ❖ Debug logical errors

DATA STRUCTURES LAB OBJECTIVES AND KEY COMPETENCIES			
S. No	Name of the Experiment	Objectives	Key Competencies
		II. Print the proper result for successful and unsuccessful Binary search	❖ Check whether Binary Search algorithm is properly implemented ❖ Observe the Base Condition ❖ Observe the intermediate results in stack ❖ Observe the result for the search element is present in the list ❖ Observe the result for the search element is not present in the list
9	Exercises on creation, insertion, deletion, display, sorting, find and replace of elements in a singly linked list	Write a C program for i. Creation of linked list ii. Inserting an element in Linked list iii. Check for deletion of a node if no element is present and print error message iv. Delete an element from the Linked list v. Display all the elements from the linked list vi. Sorting of elements vii. Find and replace of element	❖ Rectify syntactical errors ❖ Debug logical errors ❖ Study node structure ❖ Validate whether the memory allocation is done for the node ❖ Confirm whether the addition of node is done at the end ❖ Correct if deletion of an element in an empty list ❖ Confirm whether deletion of required node is done ❖ Observe whether all the elements of the linked list are displayed in proper order ❖ Observe whether all the elements of the linked list are sorted in proper order ❖ Observe whether find and replace of element in the linked list
10	Exercises on creation, insertion, deletion, display, sorting, find and replace of elements in a singly circular linked list	Write a C program for I. Creation of linked list II. Inserting an element in Linked list II. Check for deletion of a node if no element is present and print error message	❖ Rectify syntactical errors ❖ Debug logical errors ❖ Study node structure ❖ Validate whether the memory allocation is done for the node ❖ Confirm whether the addition of node is done

DATA STRUCTURES LAB OBJECTIVES AND KEY COMPETENCIES			
S. No	Name of the Experiment	Objectives	Key Competencies
		V. Delete an element from the Linked list V. Display all the elements from the linked list VI. Sorting of elements II. Find and replace of element	at the end ❖ Correct if deletion of an element in an empty list ❖ Confirm whether deletion of required node is done ❖ Observe whether all the elements of the linked list are displayed in proper order ❖ Observe whether all the elements of the linked list are sorted in proper order ❖ Observe whether find and replace of element in the linked list
11	Exercises on creation, insertion, deletion, display, sorting, find and replace of elements in a Double linked list	Write a C program for iii. Creation of linked list ix. Inserting an element in Linked list x. Check for deletion of a node if no element is present and print error message xi. Delete an element from the Linked list xii. Display all the elements from the linked list iii. Sorting of elements iv. Find and replace of element	❖ Rectify syntactical errors ❖ Debug logical errors ❖ Study node structure ❖ Validate whether the memory allocation is done for the node ❖ Confirm whether the addition of node is done at the end ❖ Correct if deletion of an element in an empty list ❖ Confirm whether deletion of required node is done ❖ Observe whether all the elements of the linked list are displayed in proper order ❖ Observe whether all the elements of the linked list are sorted in proper order ❖ Observe whether find and replace of element in the linked list
12	Exercises on creation, insertion, deletion, display, sorting, find and replace of elements in a doubly circular linked list	Write a C program for xv. Creation of linked list vi. Inserting an element in Linked list vii. Check for deletion of a	❖ Rectify syntactical errors ❖ Debug logical errors ❖ Study node structure ❖ Validate whether the memory allocation is

DATA STRUCTURES LAB OBJECTIVES AND KEY COMPETENCIES			
S. No	Name of the Experiment	Objectives	Key Competencies
		node if no element is present and print error message iii. Delete an element from the Linked list ix. Display all the elements from the linked list xx. Sorting of elements xi. Find and replace of element	done for the node ❖ Confirm whether the addition of node is done at the end ❖ Correct if deletion of an element in an empty list ❖ Confirm whether deletion of required node is done ❖ Observe whether all the elements of the linked list are displayed in proper order ❖ Observe whether all the elements of the linked list are sorted in proper order ❖ Observe whether find and replace of element in the linked list
13	White program to Implement a stackusingArrays	Write a C program for i. Creation of Stack consisting of elements using arrays ii. Insertion of new element is done by push () function call iii. Deletion of last element is done by pop () function call iv. Print error message for 'empty stack' if no elements are present for pop () function call v. Print error message for 'stack full' if number of elements exceed size of Stack array	❖ Correct syntactical errors ❖ Debug logical errors ❖ Observe declaration of stack using arrays ❖ Validate whether a new element is inserted at the top by push () function call ❖ Check whether only the top element is deleted by pop () function call ❖ Verify for empty stack condition in pop () ❖ Verify for stack full condition in push ()
14	Write a program to Implement a stackusingLinked List	Write a C program for i. Creation of Stack consisting of elements using Linked List ii. Insertion of new element is done by push () function call iii. Deletion of last element is done by pop	❖ Correct syntactical errors ❖ Debug logical errors ❖ Study node structure ❖ Validate whether the memory allocation is done for the node ❖ Observe declaration of stack using Linked List

DATA STRUCTURES LAB OBJECTIVES AND KEY COMPETENCIES			
S. No	Name of the Experiment	Objectives	Key Competencies
		() function call iv. Print error message for 'empty stack' if no elements are present for pop () function call	❖ Validate whether a new element is inserted at the top by push () function call ❖ Check whether only the top element is deleted by pop () function call ❖ Verify for empty stack condition in pop ()
15	Write a program for conversion of giveninfix arithmetic expression intopostfix expression	Write a C program for I. Conversion of infix expression into postfix expression using stacks concept II. Printing the postfix expression	❖ Correct syntactical errors ❖ Debug logical errors ❖ Observe declaration of stack using arrays ❖ Check whether the final expression is postfix expression or not.
16	Write a program for Evaluation of post-fix expression using STACKS.	Write a C program for i. Evaluation of post-fix expression using STACKS ii. Printing the evaluated result	❖ Correct syntactical errors ❖ Debug logical errors ❖ Observe declaration of stack using arrays ❖ Check whether the result is correctly evaluated or not.
17	Writea program to implement a queue usingarrays	Write a C program for i. Creation of Queue consisting of elements using arrays ii. Insertion of new element is done by add_Queue () iii. Print error message for 'empty queue' if no elements are present for deletion of an empty queue. iv. Print error message for 'queue full' if number of elements exceed size of Queue array upon insertion of new element. v. Deletion of first element is done by delete Queue ()	❖ Correct syntactical errors ❖ Debug logical errors ❖ Observe declaration of Queue using arrays ❖ Validate whether a new element is inserted at the end of the array by add_Queue () ❖ Verify for empty Queue condition for deletion of an element ❖ Verify for Queue full condition upon insertion of a new element ❖ Check whether only the first element is deleted by delete Queue ()

DATA STRUCTURES LAB OBJECTIVES AND KEY COMPETENCIES			
S. No	Name of the Experiment	Objectives	Key Competencies
18	Writea program to implement a queue usinglinkedlist	Write a C program for i. Creation of Queue consisting of elements using Linked List ii. Insertion of new element is done by add_Queue () iii. Print error message for 'empty queue' if no elements are present for deletion of an empty queue. iv. Deletion of first element is done by delete Queue ()	❖ Correct syntactical errors ❖ Debug logical errors ❖ Study node structure ❖ Validate whether the memory allocation is done for the node ❖ Validate whether a new element is inserted at the end of the Linked List by add_Queue () ❖ Verify for empty Queue condition for deletion of an element ❖ Check whether only the first element is deleted by delete Queue ()
19	Write program to implementa circularqueueusingarrays	Write a C program for vi. Creation of circular Queue consisting of elements using arrays vii. Insertion of new element is done by add_Queue () iii. Print error message for 'empty queue' if no elements are present for deletion of an empty queue. ix. Print error message for 'queue full' if number of elements exceed size of Queue array upon insertion of new element. x. Deletion of first element is done by delete Queue () at the front end	❖ Correct syntactical errors ❖ Debug logical errors ❖ Observe declaration of circular Queue using arrays ❖ Validate whether a new element is inserted at the rear end of the array by add_Queue () ❖ Verify for empty Queue condition for deletion of an element ❖ Verify for Queue full condition upon insertion of a new element ❖ Check whether only the first element is deleted by delete Queue () at the front end
20	Writea program to implementcircularqueueusingLinkedLists	Write a C program for xi. Creation of circular Queue consisting of elements using Linked List xii. Insertion of new element is done by add_Queue()	❖ Correct syntactical errors ❖ Debug logical errors ❖ Study node structure ❖ Validate whether the memory allocation is done for the node ❖ Observe declaration of

DATA STRUCTURES LAB OBJECTIVES AND KEY COMPETENCIES			
S. No	Name of the Experiment	Objectives	Key Competencies
		iii. Print error message for 'empty queue' if no elements are present for deletion of an empty queue. iv. Deletion of first element is done by delete_Queue() at the front end	circular Queue using Linked List ❖ Validate whether a new element is inserted at the rear end of the Linked List by add_Queue() ❖ Verify for empty Queue condition for deletion of an element ❖ Check whether only the first element is deleted by delete_Queue () at the front end
21	Write a C program to BINARY SEARCH TREE with insertion, deletion, various traversals and search operations.	rite a C program for i. Creation of Binary Trees ii. Insertion of a node iii. Deletion of a node iv. Perform In-order Traversal of the binary tree v. Perform Pre-order Traversal of the binary tree vi. Perform Post-order Traversal of the binary tree	❖ Correct syntactical errors ❖ Debug logical errors ❖ Observe proper definition of elements in a Binary Search Tree ❖ Check whether the node is properly inserted in the Binary Tree ❖ Check whether the node is properly deleted in the Binary Tree ❖ Observe the root node after deleting root node element ❖ Validate whether the Tree in-order traversal is properly done ❖ Validate whether the Tree pre-order traversal is properly done ❖ Validate whether the Tree post-order traversal is properly done

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
AI-308	**Java Programming Lab**	3	45	40	60

S.No.	Chapter/Unit Title	No. of Periods	CO's Mapped
1.	Basics, overloading, inheritance, overriding	16	CO1, CO2
2.	Streams, Interfaces and Packages and Collections.	10	CO2, CO3
3.	Exceptions and Multi-threaded programming.	14	CO3, CO4
4.	Applets and Event Handling	20	CO5
	Total Periods	45	

Course Objectives	i) Design object-oriented programming paradigm ii) Able to develop multi-tasking application with the knowledge of multi-threading. iii) Familiarized to develop graphical user interface with event handling mechanism.

Course Outcomes	CO1	Perform object-oriented programming concepts in problem solving, syntax and semantics of object-oriented paradigm.
	CO2	Design applications with reusability features like inheritance and polymorphism.
	CO3	Develop modular programs for real time applications by using packages concept in projects.
	CO4	Develop programs using threads and multithreading concepts.
	CO5	Design effective dynamic user interface for any front-end applications using Applets and events.

CO-PO/PSO Matrix:

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
AI-308.1	2	1	3	2		2	1	2	3	3
AI-308.2	1	3	3	3	1	3	2	2	3	3
AI-308.3	1	2	3	2	2	3	1	2	3	3
AI-308.4	1	1	3	2	2	3	2	2	3	3
AI-308.5	3	3	3	3	2	3	2	2	3	3
Average	1.5	2.6	3	2.6	1.5	3	1.6	2	3	3

3=strongly mapped, 2=moderately mapped, 1=slightly mapped

Learning Outcomes

1. Exercise programs using Java built-in data types.
2. Exercise programs on conditional statements and loop statements.
3. Exercise programs on I/O Streams
   i) Reading data through Keyboard
   ii) Reading and writing Primitive data types using DataInputStream and DataOutputStream.
   iii) Perform Reading and Writing operations on files using File Streams.
4. Exercise programs on Strings.
5. Exercise program to create class and objects and adding methods.
6. Exercise programs using constructors and construction over loading.
7. Exercise programs on command line arguments.
   i) Input as command line arguments and perform operation on that data.
   ii) Input as command line arguments and update manipulated data in Files.
8. Exercise programs using concept of overloading methods.
9. Exercise programs on inheritance.
10. Write a program using the concept of method overriding.
11. Exercise on packages.
    i) Creation of packages
    ii) Design module to importing packages from other packages.
12. Exercise programs on interfaces.
13. Exercise programs on Collections.
    i) Write a java program to search a student mark percentage based on pin number using Array list.
    ii) Write a java program to create linked list to perform delete, insert, and update data in linked list with any application.
    iii) Write a java program to search an element from hash table.
    iv) Write a java program to sorting employee details using hash map.
14. Exercise on exception handling.
    i) Programs on try, catch and finally.
    ii) Programs on multiple catch statements
    iii) Programs on nested try statements.

15. Exercise on multithreading
    i) Programs on creation of single and multiple threads.
    ii) Programs on adding priorities to multiple threads.
    iii) Programs on Inter thread communication.
16. Exercise on applets

i) Programs on Graphics and colors.

ii) Simple animations using threads and graphics.

17. Exercise on AWT controls

i) Program to handle mouse events.

ii) Program to handle keyboard events.

iii) Programs to illustrate Text Fields and Button control.

iv) Programs to illustrate Check Box and List control.

v) Write an application program to illustrate multiple controls.

Mini Project: Student has to develop a Mini project applying the skills acquired from the learning outcomes of this course.

KEY COMPETENCIES

Exp. No.	Name of the experiment	Objectives	Key Competencies
1	Exercise programs using Java built-in data types.	(a) Write programs using the primitive data types. (b) Display the data.	(a) Identify the data types. (b) Use printing () method. (c) Compile the program. (d) Rectify the errors. (e) Observe the output.
2	Exercise programs on conditional statements and loop statements.	(a) Write program using if statement and switch (b) Write program using while, do and for constructs.	(a) Know the usage of IF and switch statements. (b) Compile the program and rectify the errors. (c) Observe the output.
3	Exercise programs on I/O Streams	(a) Write a program to give values to variables interactively through the keyboard. (b) Write program to read and write primitive data types. (c) Write programs to handle Files.	(a) Use different data types. (b) Use read Line () method. (c) Use printing () method. (d) Use DataInputStream and printing (. (e)use File Streams Observe the output.
4	Exercise programs on Strings.	(a) Write a program to manipulate Strings (b) Write a program to arrange array of strings in ascending order	(a) Create String objects (b) Use string class methods (c) Observe the output.
5	Exercise program to create class and objects and adding methods.	(a) Write a program to create a class and create objects. (b) Write a program to create class adding methods and access class members.	(a) Create class. (b) Declare methods. (c) Create objects. (d) Write main method.

			(e) Access class members.
6	Exercise programs using constructors and construction over loading.	(a) Write a program using default constructor. (b) Write a program using parameterized constructor.	(a) Declare and define constructor. (b) Call default constructor. (c) Call parameterized constructor. (d) observe constructor overloading.
7	Exercise programs on command line arguments.	(b) Write a program to illustrate usage of command line arguments. (b) Write a program to read data as command line arguments and update it into Files.	(a) Use command line arguments. (b) Run the program. (c) Understand usage of Files. (c) Observe the output.
8	Exercise programs using concept of overloading methods.	(a) Write a program to illustrate method overloading. (b) Write a program to illustrate method overloading using constructors.	(a) Observe method overloading. (b) Overload constructor methods.
9	Exercise on inheritance.	(a)Write a program to illustrate single inheritance. (b)Write a program to illustrate multiple inheritance.	(a) Create base class. (b) Write base class constructor. (c) Create derived class. (d) Use extends keyword. (e) Use super keyword. (f) Write derived class constructor.
10	Write a program using the concept of method overriding.	Write a program using the concept of method overriding.	(a) Use method overriding. (b) Use this keyword. (c) use super keyword
11	Exercise on importing packages.	Write a program to create and importing package.	(a) Create package. (b) Use of access specifiers. (b) Use package.

			(c) Use import keyword.
12	Exercise on interfaces.	Write a program to illustrate multiple inheritance using interfaces.	(a) Define interface. (b) Use extends keyword. (c) Use implements keyword. (d) Access interface variables.
13	Exercise programs on Collections.	(a) Write a java program to search a student mark percentage based on pin number using Array list. (b)Write a java program to create linked list to perform delete, insert, and update data in linked list with any application. (c)Write a java program to search an element from hash table. (d)Write a java program to sorting employee details using hash map.	(a) Define collection classes (b) use ArrayList, LinkedList (c) use Hash Map, Hash Table (d) apply List and Iterator Interface (e) use Enum Set, and Enum Map
14	Exercise on exception handling	(a) Write a program to illustrate exception handling. (b) Write a program to illustrate exception handling using multiple catch statements. (c) Write a program to illustrate exception handling using nested try.	(a) Use try – catch. (b) Use multiple catch blocks. (c) Use finally statement. (d) use Nested try
15	Exercise on multithreading	(a) Write a program to create single a thread by extending the thread class.	(a) Use extends, new. (b) Use run () and start () methods.

		(b) Write a program to create a single thread by implementing the runnable interface. (c) Write a program to create multiple threads. (d) Write a program to illustrate thread priorities. (e) Write a program to illustrate inter thread communication.	(c) Observe thread execution. (d) Use implements runnable interface. (e) Use setPriority() and getPriority() methods. (f) use wait(),notify() methods
16	Exercise on applets.	Write a program to create simple applet to display different shapes with colors. Write an applet program to design simple animation.	(a) Use <applet>…</applet> tag. (b) Add applet to html file. (c) Run the applet. (d) use graphics methods (e) use threads and graphics.
17	Exercise on AWT controls	(a) Write an applet program to handle key events. (b) Write an applet program to handle mouse events. (c) Write an applet program to illustrate Text Field and button control. (d) Write an applet program to illustrate Check box and List control. (e) Write an applet program to illustrate multiple controls.	(a) Use keyboard event methods (b) Use mouse event methods (c) Use Text Field class methods (d) Use button class methods (e) Use Check box and List class methods

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
AI-309	Digital Electronics lab	3	45	40	60

S No	Chapter/ Unit Title	No. of Periods	COs Mapped
1	Logic Gates	10	CO1
2	Combinational logic circuits	10	CO2
3	Sequential Logic Circuits	15	CO3
4	Additional combination circuits	10	CO4
	TOTAL	45	

Course Objectives	1. To construct different combinational, sequential logic circuits and obtain truth tables. 2. To simulate combinational and sequential logic circuits using simulation software 3. To learn the practical importance of Digital Electronic Circuits.

Course Outcomes	At the end of the course the student able to learn following		
	CO1	AI-309.1	Demonstrate the truth tables of logic gates
	CO2	AI-309.2	Design combinational logic circuits and verify truth tables.
	CO3	AI-309.3	Design Sequential logic circuits and verify truth tables.
	CO4	AI-309.4	Formulate Additional combination circuits

CO-PO/PSO Matrix:

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
AI-309.1	2	2	3	3	1	2	1	2	3	1
AI-309.2	2	2	3	3	2	2	1	2	3	1
AI-309.3	2	2	3	3	2	2	1	2	3	1
AI-309.4	2	2	3	3	2	2	2	2	3	2
Average	2	2	3	3	1.75	2	1.25	2	3	1.25

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

LEARNING OUTCOMES:

Logic Gates

1. Identification of Digital ICs and noting down pin details from data sheets. Identify the given digital ICs and draw the pin diagrams. (use TTL and CMOS ICs of AND, OR, NOT, NAND, NOR and XOR gates with two and three inputs)
2. Verify the truth tables of AND, OR,NOT, NAND, NOR, XOR Gates.
3. Realize AND, OR, NOT, XOR gates using 2 input NAND and NOR Gates.
4. Verify Demorgan‘s Laws using given digital trainer kit and given TTLgates.

Combinational logic circuits

5. Implement Half adder circuit using TTL/CMOS gates, and verify the truth tables
6. Implement Full adder circuits using TTL/CMOS gates, and verify the truth tables
7. Verify parallel adder using simulator software
8. Verify the function of 4-bit magnitude comparator 7485 IC

Sequential Logic Circuits

9. Verify the truth tables RS, JK, T and D Flip-flops
10. Construct a ripple counter using JK-FFs and obtain its timing waveforms
11. Verify the function of 7490 as decade and modulus counter, obtain timing waveforms.
12. verify the function of up/down counter using 74190/ 74193, change the modulus of the counter and verify
13. To construct and verify the function of mod-16 Synchronouscounters
14. Verify the function of shift register (ICs like 7495, 74194 etc.)

Additional Combinational logic circuits

15. Verify the truth table of Multiplexer IC 74153
16. Verify the truth table of BCD to 7 segment Decoder 7448 IC
17. Verify the Truth table of 74148 Encoder & 74138 Decoder IC

KEY COMPENTANCIES:

1) Verification of respective experiments for the correct ness of outputs as per the designated inputs (logic gates, flip flops, counters, registers, combinational circuits)
2) Familiarization with various ICs
3) Usage of Bread boards
4) Usage of connectors
5) Usage of simulator softwares
6) Usage of Digital trainer kits

NOTE: 1) The student can implement above experiments either by using hardware components or by simulators to get acquaintance to various digital electronic experiments

2)Emphasis should be given to make use of IC trainers and bread boards to get acquainted with experience of using individual physical components at least for 50 percent of above experiments

C-20

ENGINEERING MATHEMATICS-III

Course Code	Course Title	No. of Periods/week	Total No. of periods	Marks for FA	Marks for SA
AI-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	(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	Upon completion of the course the student shall be able to	
	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 – III

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 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 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 and 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 and expand simple functions.

3.6 Write Fourier series expansion of a function over the interval $(0, 2l)$ and and expand simple functions.

3.7 Write half-range Fourier sine and cosine series of a function over the interval $(0, \pi)$ and and expand simple functions.

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	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.

C-20

Engineering Mathematics – III

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 25% to 40% Level 2 Moderately addressed 5% to 25% Level 1 Low addressed <5% Not 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					
6					
7					
PSO 1	CO1, CO2, CO3	37	82.2%	3	
PSO 2	CO1, CO2, CO3	45	100%	3	
PSO 3	CO1, CO2, CO3	36	80%	3	

ENGINEERING MATHEMATICS – III

(Common Subject)

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(constant), e^{ax}, sinax, cosax, 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 and , Euler's formulae , sufficient conditions for existence of Fourier series expansion of a function, Fourier series expansion of basic functions limited to k(constant), and their combinations over the intervals , Fourier series for even and odd functions over , Fourier half-range sine and cosine series over and

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	18	33	11	11	11	0	2	2	2	0	CO2

	Laplace Transforms											
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 – III

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

C –20, AI-401

State Board of Technical Education and Training, A. P
IV SEMESTER
Subject name: **Engineering Mathematics-III**
Sub Code: **AI -401**

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 $\left(D^2+4\right)y=0$ (CO1)
   b. For given differential equation $f(D)y=0$, if roots of auxiliary equation are 1,-1,then $y=$ _____ (CO1)
   c. $L\left\{e^{3t}\right\}=$ _____ (CO2)

d. $L\{f(t)\} = \overline{f}(s)$ then $L\{e^{at} f(t)\} = \overline{f}(s+a)$: State TRUE/FALSE (CO2)

2. Solve $\left(D^2 - 2D + 1\right) y = 0.$ (CO1)

3. Find the particular integral of $\left(D^2 + D + 4\right) y = e^x$ (CO1)

4. Evaluate $L\left\{(t-1)^2\right\}$ (CO2)

5. Evaluate $L\left\{t^2 + 2\cos t + 3\sin t\right\}$ (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 $\left(D^4 - 5D^2 + 4\right) y = 0.$ (CO1)

or

B) Solve $\left(D^2 + D - 6\right) y = 1 + e^{-3x}.$ (CO1)

7. A) Solve $\left(D^2 + 3D + 2\right) y = x^2 + \sin x.$ (CO1)

or

B) Solve $\left(D^2 - D\right) y = 2e^x + 3\cos x.$ (CO1)

8. A) Evaluate $L\left\{e^{3t}\cos^2 t\right\}$ (CO2)

or

B) Evaluate $L\left\{e^t (t+1)^2\right\}$ (CO2)

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Unit Test II

C –20, AI-401

State Board of Technical Education and Training, A. P

IV SEMESTER

Subject name: **Engineering Mathematics-III**

Sub Code: **AI-401**

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. $L\{f(t)\} = \overline{f}(s)$ then $L\{tf(t)\} = -\frac{d}{ds}\left(\overline{f}(s)\right)$: 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)

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END EXAM MODEL PAPER
STATE BOARD OF TECHNICAL EDUCATION, A.P
ENGINEERING MATHEMATICS –AI- 401

TIME : 3 HOURS **MODEL PAPER- I** **MAX.MARKS : 80M**

PART-A

Answer All questions. Each question carries THREE marks. **10x3=30M**

1. Solve $\left(D^2-3D+2\right)y=0.$ **CO 1**
2. Solve $\left(D^2+D+1\right)y=0.$ **CO 1**
3. Find the particular integral of differential equation $\left(D^2+4\right)y=\sin 2x.$ **CO 1**
4. Find the particular integral of differential equation $\left(D^2+3D+2\right)y=e^{3x}.$ **CO 1**
5. Find $L\left\{2e^{3t}+\sin 3t+\cosh t\right\}.$ **CO2**
6. Find $L\left\{e^t\cos 4t\right\}.$ **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 $\left(D^3-6D^2+11D-6\right)y=0.$ **CO 1**

Or

B) Solve $\left(D^2-9\right)y=e^{3x}+e^{-3x}.$ **CO 1**

12. A) Solve $\left(D^2-4D+4\right)y=\sin 3x.$ **CO1**

Or

B) Solve $\left(D^2+2D+2\right)y=x^2+x+1.$ **CO1**

13. A) Evaluate $L\left\{te^t\cos t\right\}.$ **CO2**

Or

B) Evaluate $L\left\{t^2\cos 2t\right\}.$ **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. 1x10=10M

16. Find the Fourier expansion of $f(x) = x + x^2$ in the interval $(-\pi, \pi)$ and hence deduce that $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + = \frac{\pi^2}{12}$. **CO3**

STATE BOARD OF TECHNICAL EDUCATION, A.P

ENGINEERING MATHEMATICS – AI-401

TIME : 3 HOURS **MODEL PAPER- 2** **MAX.MARKS : 80M**

PART-A

Answer All questions. Each question carries THREE marks. 10x3=30M

1. Solve $\left(D^2+4D+4\right)y=0.$ **CO 1**
2. Solve $\left(D^2+9\right)y=0.$ **CO 1**
3. Find the particular integral of differential equation $\left(D^2-4D+3\right)y=e^{4x}.$ **CO 1**
4. Find the particular integral of differential equation $\left(D^2-4D-5\right)y=\cos 2x.$ **CO 1**
5. Find $L\left\{2-e^{-2t}+\sinh 6t\right\}.$ **CO2**
6. Find $L\left\{e^{-2t}t^2\right\}.$ **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 $\left(D^3+1\right)y=0.$ **CO 1**

Or

B) Solve $\left(D^2+D-6\right)y=e^{3x}+e^{-3x}.$ **CO 1**

12. A) Solve $\left(D^2-3D+2\right)y=\cos 3x.$ **CO1**

Or

B) Solve $\left(D^2+2D+1\right)y=2x+x^2.$ **CO1**

13. A) Evaluate $L\left\{e^{3t}\cos^2 t\right\}.$ **CO2**

Or

B) Evaluate $L\left\{t^2\cos 2t\right\}$. **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 $0 \prec x \prec 2\pi$ and hence deduce that $\frac{1}{1^2}+\frac{1}{2^2}+\frac{1}{3^2}+---=\frac{\pi^2}{6}$.

CO3

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
AI-402	**Python Programming**	5	75	20	80

S.No.	Chapter/Unit Title	No.of Periods	CO's Mapped
1.	Python Programming Introduction	10	CO1, CO2
2.	Standard Data Types and Control Flow	15	CO1,CO2
3.	Data Structures	15	CO1,CO2,CO3
4.	Functions	15	CO1, CO2, CO4
5.	Object Oriented Programming in Python and File Handling and Exception Handling	20	CO1, CO2, CO5
	Total Periods	75	

Course Objectives	i)To know the fundamentals Python programming ii)To understand fundamental syntactic information about 'Python' iii) To develop various python programs

Course Outcomes	CO1	AI-402.1	Explain Basic constructs like operators, expressions and components of python programming as well as Editing and Debugging
	CO2	AI-402.2	Write Python programs using expressions, operators, Control statements, Loops
	CO3	AI-402.3	Develop Python programs using Data structures
	CO4	AI-402.4	Write python programs using Functions
	CO5	AI-402.5	Develop Python application programs using OOP Concept, FILES, Exception

CO-PO/PSO Matrix:

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
AI-402.1	3	1	2	1	1	1		2	1	
AI-402.2	3	2	2	1	1	1	1	2	2	2
AI-402.3	3	2	2	1	1	1		2	2	2
AI-402.4	3	1	2	1	2	3	1	2	2	2
AI-402.5	3	1	2	1	1	3	2	2	2	2
AI-402.6	3	1	2	3	2	3	2	2	2	1
Average	3	1.3	2	1.3	1.3	2	1.3	2	1.8	1.8

3=strongly mapped, 2=moderately mapped, 1=slightly mapped

Learning Outcomes:

6.0 Introduction

6.1. History of Python.
6.2. Python features
6.3. Applications of Python
6.4. Know about Python Integrated Development and Learning Environment (IDLE)
6.5. Running Python Scripts
6.6. Identifiers, Keywords, Indentation, Variables
6.7. Input and Output
6.8. Operators
6.9. Operator precedence
6.10. Steps in Develop a simple python program and execution

7.0 Standard Data Types and Control Flow

7.1. Know the different object (data) types present in Python.
7.2. Control Flow
2.2.1 If
2.2.2 If-Else
2.2.3 For Loop
2.2.4 While loop
2.2.5 Break
2.2.6 Continue

8.0 Understand Data Structures

8.1. Python Lists
8.2. Basic List Operations
8.3. Built-in List Functions and Methods
8.4. Tuples
8.5. Sets
8.6. Dictionaries

9.0 Function Basics

4.1 Introduction
4.2 Function Arguments: Default arguments, Variable Length arguments
4.3 Anonymous Functions
4.4 Return Statement
4.5 Scope of variables: Local Variables and Global Variables
4.6 Python Variable: Namespace and scoping
4.7 Python Packages

10.0 Object Oriented Programming in Python and File Handling and Exception Handling

5.1 Creating Classes
5.2 Creating Objects
5.3 Method Overloading and Overriding
5.4 Data Hiding
5.5 Data Abstraction

5.6 Opening files in different modes
5.7 Processing files
5.8 Closing a file
5.9 Exception Handling

COURSE CONTENT

UNIT – I:

Introduction: History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Python IDLE, Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation- Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations

UNIT – II:

Standard Data Types and Control Flow : Types - Integers, Strings, Booleans Control Flow- if, if-elif-else, for, while, break, continue, pass

UNIT – III:

Data Structures Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences, Comprehensions.

UNIT – IV:

Functions - Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions(Function Returning Values), Scope of the Variables in a Function - Global and Local Variables, **Modules**: Creating modules, import statement, from. Import statement, name spacing, **Python packages**, Introduction to PIP, Installing Packages via PIP, Using Python Packages

UNIT – V:

Object Oriented Programming OOP in Python: Classes, 'self variable', Methods, ConstructorMethod, Inheritance, Overriding Methods, Data hiding,

File Handling: Open Files, File Processing and Closing a File

Error and Exceptions: Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions

REFERENCE BOOKS

1. Python Programing by K. Nageswara Rao, Shaikh Akbar - Scitech Publications (India) Pvt. Ltd.

2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
3. Learning Python, Mark Lutz, Orielly
4. Think Python, Allen Downey, Green Tea Press
5. Core Python Programming, W.Chun, Pearson.
6. Introduction to Python, Kenneth A. Lambert, Cengage

ModelBlue Print:

S.No.	Chapter/Unit title	No.of periods	Weightage Allocatd	Marks Wise Distribution of Weightage				Question wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Python Programming Introduction	10	11	8	3			1	1			CO1, CO2
2	Standard Data Types and Control Flow	15	24	3	8	3	10	1	1	1	*	CO1,CO2
3	Data Structures	15	24	3	3	8	10	1	1	1	*	CO1,CO2,CO3
4	Functions	15	24	3	3	8	10	1	1	1	*	CO1, CO2,CO4
5	Object Oriented Programming in Python and File Handling and Exception Handling	20	26	3	6	8	10	1	2	1	*	CO1,CO2,CO5
	Total *	75	70+10*									

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1.1 to 3.6
Unit test-2	From 4.1 to 5.9

DIPLOMA IN ARTIFICAL ENGINEERING
MODEL PAPER
Python Programming
UNIT TEST-1

SCHEME: C-20 SUBJ CODE:AI-402
MAX MARKS:40 TIME: 90Minutes

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PART-A **16Marks**

Instructions:1) Answer all questions
2) First question carries 4marks, and each question of remaining carries 3marks

1. a) Mathematical operations can be performed on a string.(True/False) (CO1)

b) _____ has the highest precedence in the expression. (CO1)

c)~4 evaluate to _____ (CO1,CO2)

d) What is the output when we execute list("hello")?
i) ['h', 'e', 'l', 'l', 'o']
ii) ['hello']
iii) ['llo']
iv) ['olleh'] (CO3)

2. List features of Python. (CO1)
3. Write the rules for choosing names of variables. (CO1)
4) What are the different operations that can be performed on a list? (CO3)
5)write about if statement with an example. (CO2)

PART-B
3X8=24Marks

Instructions:1) Answer all questions
2)Each question carries 8 Marks
3)Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer

6. a) Explain about the need for learning python programming and its importance. (CO1)

Or

b) Explain the basics for executing a python program using REPL(Shell) with an example.(CO1)

7. a) What are the different loop control statements available in python? Explain with suitable examples. (CO2)

Or

b) Write in brief about Tuple in python. Write operations with suitable examples. (CO3)

8. a)Write a python program that prints the intersection of two lists. (without using list comprehensions/sets). (CO3)

Or

b) List and explain different arithmetic operators supported by Python. Discuss about their precedence and associativity. (CO1)

MODEL PAPER – END EXAMINATION

Python Programming

SCHEME: C-20 SUBJ CODE:AI-402

MAX MARKS:80 TIME: 3HOURS

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PART-A 10X3=30Marks

Note: Answer all questions

1. Write in brief about the applications of Python. CO1
2. List data types used in Python. CO1
3. Demonstrate the use of continue in loop statement. CO2
4. List different methods used in Python lists. CO3
5. Write in brief about sets in Python. CO3
6. List different types of arguments in Python. CO4
7. Can a Python function return multiple values? If yes, how it works? CO4
8. List Object oriented features supported by Python. CO5
9. List different modes in File opening. CO5
10. Define Exception. CO5

PART-B 5x8=40Marks

Note: Answer all questions

11. Explain about Python IDLE. CO1

or

Explain about running Python scripts. CO1

12. Explain about different data types in Python. CO1

or

Explain different conditional control flow statements in Python with examples. CO2

13. Explain in detail about dictionaries in Python. CO3

or

Write in brief about Sequence operations with suitable examples in python. CO3

14. Explain how to create a user defined exceptions. CO5

or

What are the two ways of importing a module? Which one is more beneficial? Explain. CO5

15. Explain how to implement inheritance in Python. CO5

Or

How to handle an exception using try except block? Explain with the help of a program. CO5

PART – C 1X10=10Marks

16. Write a Python program to read a word and print the number of letters, vowels and percentage of vowels in the word using a dictionary. CO1, CO2, CO3, CO4

A Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
AI-403	**Operating**	5	75	20	80

	Systems				

S.No.	Chapter/Unit Title	No. of Periods	CO's Mapped
1.	Introduction to Operating system	15	CO1
2.	Process management	20	CO2, CO6
3.	ck handling techniques	15	CO3, CO6
4.	Memory management	15	CO4, CO6
5.	heduling and File management	10	CO5, CO6
	Total Periods	75	

Course Objectives	i)To know about the basics of Operating Systems ii)To familiarize with process management, Scheduling algorithms, Synchronization and deadlock techniques iii)To understand various Memory management techniques iv)To familiarize with File management

Course Out comes	CO1	AI-403.1	Explain basic concepts of Operating System
	CO2	AI-403.2	Analyse a given process scheduling algorithm
	CO3	AI-403.3	Describe Semaphores, synchronization and Deadlock handling techniques
	CO4	AI-403.4	Use memory management techniques and page replacement algorithms
	CO5	AI-403.5	UseDisk scheduling algorithms and File allocation methods
	CO6	AI-403.6	Analyze functionalities of different operating systems

CO-PO/PSO MATRIX

CO NO.	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
AI-403.1	**2**							**1**	**1**	**1**
AI-403.2	**2**	**2**	**3**					**2**	**1**	**2**
AI-403.3	**1**	**2**	**2**	**3**	**2**	**3**		**3**	**2**	**3**
AI-403.4	**2**		**3**			**3**		**2**	**2**	**2**
AI-403.5	**2**	**2**	**3**					**3**	**3**	**2**
AI-403.6	**3**	**3**		**2**	**2**		**3**	**3**	**3**	**3**
Average	**2**	**2.3**	**2.8**	**2.5**	**2**	**3**	**3**	**2.3**	**2**	**2.2**

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

Learning Outcomes:

1.0 Introduction to operating systems

1.1 Define an operating system

1.2 Discuss history of operating system

1.3 Discuss about various types of operating systems

1.4 Distinguish spooling and buffering

1.5 Explain the concepts multiprogramming and timesharing

1.6 Differentiate between distributed and real time systems

1.7 Describe multiprocessor systems

1.8 Describe the operating system components

1.9 Discuss operating system services

1.10 Define system call with an example

1.11 List and explain different types of system calls

1.12 Define single user, multi user operating system structure

2.0 Process management

2.1 Define process and process control block

2.2 Explain process state diagram

2.3 Describe process creation and termination

2.4 Discuss the relation between processes

2.5 Define Thread and describe multithreading

2.6 Explain scheduling concepts

2.7 Describe scheduling queues and schedulers

2.8 Explain CPU scheduling and scheduling criteria

2.9 Explain various scheduling algorithms

2.9.1 FCFS

2.9.2 SJF

2.9.3 Round Robin

2.9.4 Priority

2.9.5 Multilevel Scheduling

3.0 Deadlock handling techniques

3.1 Describe semaphores

3.2 Explain inter process communication

3.3 Define Deadlock

3.4 State the necessary conditions for arising deadlocks

3.5 State various techniques for deadlock prevention

3.6 Discuss Deadlock avoidance and detection

3.7 Describe the process of recovering from deadlock

4.0 Memory management

4.1 Describe briefly address binding, dynamic loading, dynamic linking

4.2 Define overlays

4.3 Describe briefly on swapping

4.4 Explain single partition allocation

4.5 Explain multiple partition allocation

4.6 Explain the concept of fragmentation

4.7 Explain paging concept

4.8 Explain how logical address is translated into physical address

4.9 Explain segmentation and segmentation with paging

4.10 Define virtual memory techniques

4.11 Describe demand paging

4.12 Describe page replacement

4.13 Discuss on page replacement algorithms

4.13.1 FIFO

4.13.2 LRU

4.13.3 Optimal

4.14 Explain the concept of thrashing

4.15 Explain working set model and page fault frequency

5.0 Disk scheduling and File management

5.1 List out various disk performance parameters

5.2 Disk scheduling algorithms

5.2.1 FIFO

5.2.2 SSTF

5.2.3 SCAN

5.3 Define file management

5.4 List and explain various file operations

5.5 List and explain various access methods

5.6 List and explain various allocation methods

5.6 List and explain directory structure

5.7 Explain disk organization and structure

COURSE CONTENT

1.0 Introduction to operating systems

Operating System –Evolution of operating system-Types of Operating Systems - Multi Programming and Time Sharing - Distributed and Real time Systems - spooling and buffering - Multi processor systems-Components of Operating Systems - operating System Services - system Calls - single

User and Multi user operating System Structure.

2. Process management

Processes - Sequential Processes - Process State Diagram - Process Control Block - Process Creation and Termination - Relations between Processes - Threads and Multi-Threading - Scheduling Concepts - Schedulers - CPU scheduling and Scheduling criteria - scheduling algorithms.

3. Deadlock handling techniques

Inter Process Communications - semaphores – monitors

Deadlocks - principal of deadlock - deadlock prevention - deadlock detection - deadlock avoidance.

4. Memory management

Address binding -Dynamic Loading- dynamic linking-overlays-swapping- memory allocation-fragmentation-paging-segmentation- segmentation with paging-

Benefits of virtual memory - virtual memory techniques - demand paging - page replacements - page replacement algorithms – thrashing.

5.Disk scheduling and File management

Disk performance parameters - Disk scheduling algorithms–

Introduction to file systems - File Management-File Operations - Access methods - Directory structure organization - File Protection.

REFERENCE BOOKS

1. Operating Systems --Silberschatz and Galvin
2. Operating Systems -- William Stallings, PHI
3. Operating Systems --Dietel and Dietel
4. Operating Systems -- Dhamdhere (TMH)
5. Advanced Operating Systems -- anenbaum

ModelBlue Print:

S.No.	Chapter/ Unit title	No.of periods	Weightage Allocatd	Marks Wise Distribution of Weightage				Question wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Introduction to Operating system	15	14	6	8			2	1			CO1
2	Process management	20	14	6	8			2	1			CO2, CO6
3	Deadlock	15	24	3	3	8	10	1	1	*	*	CO3, CO6

	handling techniques											
4	Memory management	15	14	6	8			2	1			CO4, CO6
5	Disk scheduling and File management	10	24	3	11		10	1	2		*	CO5, CO6
	Total	75	70+*10					8	6			

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1.1 to 3.2
Unit test-2	From 3.3 to 5.7

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING
MODEL PAPER
OPERATING SYSTEMS
UNIT TEST-1

SCHEME: C-20 SUBJ CODE:AI-403

MAX MARKS:40 TIME: 90Minutes

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PART-A **16Marks**

Instructions:1) Answer all questions
2) First question carries 4marks, and each question of remaining carries 3 marks

1. a) Operating system is a Hardware. (True/False) (CO1)
b) Operating system is also known as _____ manager. (CO1)
c) Full form of FCFS is _____. (CO2)
d) Which one of the following is not a process state [] (CO2)
i)New II) Scheduling III) Suspend IV) Running
2) List any three types of Operating Systems. (CO1)
3) Define spooling and buffering. (CO1)
4) Draw Process state diagram. (CO2)
5) Distinguish between process and Thread. (CO2)

PART-B
3X8=24Marks

Instructions:1) Answer all questions
2)Each question carries 8 Marks
3)Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer

6.a) Explain the concept of Multiprogramming and Time sharing. (CO1)

(Or)

b) Explain various system calls with an example. (CO1)

7.a) Differentiate Distributed and Real-time systems. (CO1)

(Or)

b) Explain various operating system services. (CO1)

8. a) Explain various CPU scheduling algorithms. (CO2)

(Or)

b) Describe Inter process communication. (CO2)

BOARD DIPLOMA EXAMINATIONS
DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING
MODEL PAPER - END EXAMINATION
OPERATING SYSTEMS

SCHEME: C-20 SUBJ CODE:AI-403
MAX MARKS:80 TIME: 3HOURS

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PART-A 10X3=30Marks

Note: Answer all questions

1.	Define Operating system	(CO1)
2.	List different types of system calls	(CO1)
3	what is program and process	(CO2)
4	Write multithreading	(CO2)
5	what are necessary conditions for deadlock	(CO3)
6	Define Semaphore	(CO3)
7	what is address binding	(CO4)
8	Define Overlay	(CO4)
9	What is disk scheduling	(CO5)
10	List the file allocation methods	(CO5)

PART-B 5x8=40Marks

Note: Answer all questions

11.A. Differentiate multiprogramming and time sharing? (CO1, CO6)

OR

11.B Explain in detail about OS services? (CO1)

12.A. Draw and explain process state diagram? (CO2)

OR

12.B Explain various scheduling algorithms (CO2)

13.A. Explain inter process communication (CO2)

OR

13.B Discuss Deadlock avoidance and detection (CO2)

14.A. Explain paging concept (CO5)

OR

14.B Define virtual memory techniques (CO5)

15.A Explain Disk scheduling algorithms. (CO2, CO5)

OR

15.B Explain disk organization and structure (CO5)

PART-C 1x10=10Marks

17. Describe what happens when a system call is made, including how the kernel code for the specific system call is invoked with the correct parameters passed and any other relevant details? (CO3, CO6)

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
AI-404	**DBMS**	6	90	20	80

S.No.	Chapter/Unit Title	No. of Periods	CO's Mapped
1.	Concepts of DBMS & RDBMS	18	CO1, CO2
2.	Concepts of SQL	22	CO3
3.	Basics of PL/ SQL	15	CO4
4.	Advance PL/SQL	15	CO5
5.	Concepts ofNoSQL&MongoDB.	20	CO6, CO7
	Total Periods	90	

Course Objectives	i)To know the fundamentals of DBMS ii)To familiarizeinsert, retrieve, update, delete data in database iii)To familiarize programming skills for insert, retrieve, update, delete data in database

Course Out comes			
	CO1	AI-404.1	Describe fundamentals, types and Overall structure of DBMS.
	CO2	AI-404.2	Apply SQL commands to create tables
	CO3	AI-404.3	Apply SQL commands to retrieve, update and delete data from the Relational data bases.

	CO4	AI-404.4	Describe PL/SQL programming constructs, control statements and sub programs.
	CO5	AI-404.5	Apply cursors, triggers and Exception handling concepts
	CO6	AI-404.6	Explain the connects of NOSQL databases.
	CO7	AI-404.7	Use NoSQL commands to create, update, modify and retrieve data from the MongoDB data base.

CO-PO/PSO MATRIX

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
AI-404.1	**2**							**2**		
AI-404.2		**2**							**2**	**3**
AI-404.3			**2**			**3**		**2**		
AI-404.4				**3**					**3**	**3**
AI-404.5					**2**	**3**		**2**		
AI-404.6	**2**							**3**		
AI-404.7			**2**			**3**	**3**	**2**		
Average	**2**	**2**	**2**	**3**	**2**	**3**	**3**	**2.2**	**2.5**	**3**

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

Learning Outcomes:

1.0 Concepts of DBMS &RDBMS

1.1 Define Database Management System (DBMS)
1.2 List the advantages of DBMS
1.3 Explain Database Abstraction, Data Independence
1.4 Define Instances and Schemas
1.5 Explain Data Models.
1.6 Define Database languages DDL, DML, TCL
1.7 Explain Database Administrator, Users and Database System Architecture with diagram.
1.8 Define Entity, Entity sets, Relationship, Relationship sets, Super Key, Candidate Key and Primary Key, Foreign Key
1.9 Explain Mapping Cardinalities.
1.10 List the symbols used in ER model.
1.11 Know The Entity-Relationship Model.
1.12 Reduce the ER-diagrams totable
1.13 Explain Generalization, Specialization &Aggregation.
1.14 Explain Functional Dependencies, Normalizations– 1 NF, 2 NF and 3NF
1.15 Explain E.F.CODD‘s rules fords

2.0 Concepts ofSQL

2.1 Explain SQL and benefits ofSQL.
2.2 Describe about Embedded SQL and Lexical conventions
2.3 Describe Naming of the Objects and parts and how to refer them.
2.4 Explain literals &different data types like character, number, long, date, raw andlongrawetc.
2.5 Illustrate the comments within SQLStatement
2.6 Explain SQL Operators
2.7 Describe Data Definition Language commands CREATE, ALTER and DROP.
2.8 Explain integrity constraints through creating a table and altering table.
2.9 Describe Data Manipulation Language commands INSERT, UPDATE and DELETE

2.10 Explain SELECT statement with WHERE, ORDER BY, GROUP BY and HAVING clauses with examples
2.11 List and explain single row (Number, character, date and conversion) functions
2.12 List and character, date
2.13 Explain Transaction Control Commands COMMIT, SAVEPOINT, ROLLBACK, GRANT, and REVOKE.
2.14 Explain Subqueries with examples
2.15 Explain Joins (Equi Join, Non-Equi Joins, Inner Join, Outer Join, cross join and Self join) with syntax and examples.

3.0 PL/SQL

3.1 Explain PL/SQL Block structure.
3.2 List the features ofPL/SQL
3.3 Explain the data types of PL/SQL
3.4 Illustrate declarations and naming conventions ofvariables
3.5 Explain PL/SQL tables and user defined records.
3.6 Explain decision making statements and illustrate
3.7 Explain looping statements and illustrate
3.8 Define procedure and function
3.9 Describe the advantages of subprograms.
3.10 Explain handling procedures and functions with example programs.
3.11 Explain the parameter modes in PL/SQL with examples (in, out and in out)
3.12 Define Recursion
3.13 Explain Recursion with an example program.

4.0 Advance PL/SQL

4.1 Define cursor.
4.2 Explain implicit cursor
4.3 Explain explicit cursors.
4.4 Define trigger
4.5 List Advantages of triggers
4.6 Explain database triggers.
4.7 Define the term Exception handling
4.8 List the advantages of Exception handling
4.9 Illustrate built-in Exceptions
4.10 Illustrate User defined Exceptions

5.0 Concepts ofNoSQL&MongoDB.

5.1 No SQL
- 5.1.1 Know the Classification of Databases: RDBMS, Elapines.
- 5.1.2 Introduction to NoSQL& its need.
- 5.1.3 Compare RDBMS and NoSQL
- 5.1.4 List the Advantages and Disadvantages of NoSQL
- 5.1.5 Know about the ACID and BASE system.
- 5.1.6 Compare ACID and BASE properties
- 5.1.7 Classify NoSQL as Key-value stores, Column-oriented, Graph and Document oriented Databases.
- 5.1.8 Explain about Key-value stores Databases, Column-oriented Databases, Graph Databases, Document oriented Databases.

5.2 MongoDB
- 5.2.1 What is mongoDB.
- 5.2.2 List the advantages of MongoDB

5.2.3 Explain the Creation, Dropping, Creation of Collection & Dropping of Collection of Database in MongoDB
5.2.4 Explain the Datatypes ofMongoDB.
5.2.5 Explain Inserting Document, Query Document, Update Document, Deleting Document &Sorting Document.

COURSE CONTENT

1. Concepts of DBMS & RDBMS

Define DBMS –Purpose of DBMS - Data Abstraction – Data Models – Instances and Schemas – Data Independence – Data Definition Language - Data Manipulation Language – Database Administrator - Database Users – Database system Structure.

Entities – Relationships and Relationship sets – Mapping constraints – Entity – Relationship Diagram – Super key, Candidate key and Primary key - Reducing E- R Diagrams to tables – Generalization and Specialization – Aggregation – Functional Dependencies - Normal forms 1NF , 2 NF , 3 NF- E.F.CODD‘s rules for RDBMS

2. Concepts of SQL

Benefits of SQL – Embedded SQL – Lexical conventions – Naming objects and parts – Referring objects and parts – Literals – Text –Integer – Number – Data types – Character data types – Number data type – Long data type –Raw and Long Raw data types –Pseudo columns – comments within SQL statements – comments on schema objects.

Operators – Unary and Binary operators – Precedence- Arithmetic operators – character operators – comparison operators – logical operators- set operators – other operators –DDL Commands – Integrity Constraints – DML Commands - functions – single row functions – numeric functions – character functions – date functions – conversion functions – other functions- Group functions. Transaction control commands-Sub queries - Joins.

3. Basics of PL/SQL

Main features – architecture – advantage of PL/SQL – fundamentals – character set – Lexical units – Data types – data type conversion – declarations – naming conventions – scope and visibility – assignments – expressions and comparisons – PL/SQL tables – user defined records.

Conditional control- IF statement – sequential control- GOTO and NULL statements. SQL support – national language support – Remote Access

Advantages of subprograms – procedures – Functions RETURN statement – forward declarations – actual versus formal parameters – positional and named notation - parameter modes – recursion

4. Advanced PL/SQL

Cursors – Implicit cursor – Explicit cursor – Triggers – Advantages - creating trigger – raising trigger - Advantages of Exceptions – predefined Exceptions – user defined Exceptions.

5. NoSQL& Basics of MongoDB

Classification of Databases: RDBMS, OLAP, NoSQL.-Introduction to NoSQL- need for NoSQL – Comparison of RDBMS and NoSQL- Advantages and Disadvantages of NoSQL - BASE system – ACID System – Comparison of ACID and BASE properties – Classification of NoSQL as Key-value stores, Column-oriented, Graph and Document oriented Databases - Key-value stores Databases - Column-oriented Databases - Graph Databases - Document oriented Databases

Introduction to MongoDB - advantages of MongoDB - applications of MongoDB - Installation of MongoDB - Creation of Database - Dropping of Database - Creation of Collection - Dropping of Collection - Data types of MongoDB - different Commands of MongoDB - Inserting Document - Query Document - Updating Document – Deleting Documents - Sorting Documents

REFERENCE BOOKS

1. Database System Concepts -- Silberschatz, Henry F. Korth, S. Sudarshan
2. Oracle Database 11g :The Complete Reference -- Kevin Loney
3. Understanding ORACLE -- James T. Peary & Joseph G. Laseer.
4. RDBMS with ORACLE -- Rolland.
5. ORACLE series books of ORACLE Press -- TMH.
6. Starting out with Oracle – Covering Databases -- John Day &CraigVan
7. PL/SQL, Developer Tools & DBA -- Slyke, Dreamtech
8. www.nosql-database.org
9. www.mongodb.org

BluePrint:

S.No.	Chapter/ Unit title	No. of	Weightage	Marks Wise Distribution of Weightage				Question wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Concepts of DBMS & RDBMS	18	24	6	8		10	2	1		*	CO1, CO2
2	Concepts of SQL	22	24	3	8	3		2	1			CO2, CO3
3	Basics of PL/ SQL	15	24	6	8		10	2	1		*	CO4
4	Advance PL/SQL	15	24	6	8		10	2	1		*	CO4, CO5
5	Concepts of 1, CO2.	20	24	6	8		10	2	1		*	CO1, CO2, CO6, CO7
	Total	90	70+ *	27	32	8		9	4		1	

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1.1 to 3.5
Unit test-2	From 3.6 to 5.2.5

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING
MODEL PAPER
DBMS
UNIT TEST-1

SCHEME: C-20 SUBJ CODE:AI-404
MAX MARKS:40 TIME: 90Minutes

……

PART-A **16Marks**

Instructions:1) Answer all questions
2) First question carries 4marks, and each question of remaining carries 3 marks

1. a) File system is more advantageous than DBMS. (True/False) (CO1)
   b) Entity is defined as ……. (CO1)
   c) Full form of DML is ……. (CO1)
   d) Which one of the following is not a Database Language [] (CO1)
   i) DMLII)DDL III)TCL IV)TLL
2) Define Instance & Schema. (CO1)
3) List any three data types in SQL. (CO2)
4) Write the syntax for CREATE command in SQL. (CO2)
5) Differentiate CHAR and VARCHAR data types in SQL. (CO2)

PART-B
3X8=24Marks

Instructions:1) Answer all questions
2)Each question carries 8 Marks
3)Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer

6. a) Explain Database System Architecture (CO1)
(Or)
   b) Explain Generalization, Specialization and Aggregation (CO1)

7. a) Explain ER diagram with an example. (CO1)
(Or)
   b) Explain TCL commands in SQL in detail. (CO2)

8. a) Explain SELECT statement with syntax and example. (CO3)
(Or)
   b) Explain Joins in SQL. (CO3)

BOARD DIPLOMA EXAMINATIONS
DIPLOMA IN ARTFICIAL INTELLIGENCE ENGINEERING
MODEL PAPER - END EXAMINATION
DBMS

SCHEME: C-20 SUBJ CODE: AI-404
MAX MARKS: 80 TIME: 3HOURS

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PART-A **10x3=30M**

***Instructions** :1. Answer**all** questions.*
*2.Each question carries **Three** marks.*
3.Answers should be brief and straight to the point and should not exceed five simple sentences.

1. DefineDatabaseManagement System. (CO1)
2. Define Primary Key. (CO1)
3. List any three integrity constraints. (CO1)
4. Write a SQL Query to retrieve maximum value from sal column of employee table. (CO3)
5. List any three features of PL/SQL. (CO4)
6. What is Recursion. (CO4)
7. Define Cursor. (CO4)
8. List any three Built-in Exceptions. (CO5)
9. Compare features of RDBMS with that of NoSQL. (CO6)
10. List any three advantages of MogoDB. (CO7)

[Cont..,

PART-B **5x8=40M**

***Instructions** : 1. Each question carries **EIGHT** marks.*
2. Answers should be comprehensive and criteria for valuation is the content but not the length of the answer.

11. A) Explain Database System Architecture (CO1)

OR

B) Explain Generalization, Specialization and Aggregation (CO1)

12. A) Explain SELECT statement with syntax and example (CO3)

OR

B) Explain Joins in SQL (CO3)

13. A) Write a PL/SQL procedure to find biggest of three given numbers. (CO4)

OR

B) Write a PL/SQL program to find factorial of a given number. (CO4)

14. A) Explain Implicit cursors in PL/SQL (CO5)

OR

B) Explain Trigger in PL/SQL with example. (CO5)

15. A) Explain Column-oriented Databases in NoSQL. (CO6)

OR

B) Explain Inserting Document in MongoDB. (CO7)

PART – C 1x10 = 10M

16. Normalize the following table to 2NF and 3NF (CO2)

NO	NAME	Class	SubID	Marks
1	Rajesh	8	1	45
1	Rajesh	8	2	60
2	Shekar	9	1	45
2	Shekar	9	2	60

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
AI-405	**Introduction to Machine Learning**	5	75	20	80

S. No.	Chapter/Unit Title	No. of Periods	CO's Mapped
1.	Introduction to Machine Learning	20	C01
2.	Supervised Learning	15	CO2, CO3
3.	Decision Trees and Neural Networks	15	CO2, CO3
4.	Unsupervised Learning and Pre-processing.	15	CO4, CO5
5.	Clustering	10	CO4, CO5
	Total Periods	75	

Familiarize with Neural Networks

Course Objectives	i)To know various Machine learning techniques ii)To familiarize Neural Networks iii)To understand supervised learning iv)To understand unsupervised learning

Course Outcomes	At the end of the course the student able to learn following:		
	CO1	AI-405.1	Explain Machine learning techniques
	CO2	AI-405.2	Explain Supervised Learning
	CO3	AI-405.3	Analyse Decision Trees and Neural Networks
	CO4	AI-405.4	ExplainUnsupervised Learning and Pre-processing.
	CO5	AI-405.5	Analyse Clustering Techniques

CO-PO/PSO Matrix:

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
AI-405.1	**2**	**3**	**2**	**2**	**1**	**1**	**3**	**3**	**3**	**3**
AI-405.2	**2**	**2**	**3**	**3**	**1**	**1**	**3**	**3**	**3**	**3**
AI-405.3	**3**	**3**	**2**	**2**	**1**	**1**	**3**	**3**	**3**	**3**
AI-405.4	**2**	**2**	**3**	**2**	**1**	**1**	**3**	**3**	**3**	**3**
AI-405.5	**3**	**3**	**3**	**3**	**1**	**1**	**3**	**3**	**3**	**3**
Average	**2.4**	**2.6**	**2.6**	**2.4**	**1**	**1**	**3**	**3**	**3**	**3**

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

Learning Outcomes:

1. **Introduction to Machine Learning**
    - 1.1.Introduction
        - 1.1.1. Define machine learning
        - 1.1.2. Describe disciplines that have contributed to machine learning
        - 1.1.3. List Varieties of Machine Learning
    - 1.2.Learning Input-Output Functions
        - 1.2.1. List different Types of Learning
        - 1.2.2. Explain about Input Vectors
        - 1.2.3. Describe Training Regimes
        - 1.2.4. Define Noise
        - 1.2.5. Describe Performance evaluation
    - 1.3.Explain how Learning Requires Bias
    - 1.4.List Sample Applications of machine learning
    - 1.5.Boolean Functions
        - 1.5.1. Representation
            - 1.5.1.1.Explain functions of Boolean Algebra
            - 1.5.1.2.Draw Diagrammatic Representations
        - 1.5.2. Classes of Boolean Functions
            - 1.5.2.1. Define Terms and Classes

1.5.2.2.Explain DNF Functions
1.5.2.3.Explain CNF Functions
1.5.2.4.Describe Decision Lists
1.5.2.5.Explain Symmetric and Voting Functions
1.5.2.6.Describe Linearly Separable Functions

1.6.Using Version Spaces for Learning
1.6.1. Describe Version Spaces and Mistake Bounds
1.6.2. Explain about Version Graphs
1.6.3. Describe Learning as Search of a Version Space
1.6.4. Explain about The Candidate Elimination Method

2. **Supervised Learning**
2.1. Major types of supervised machine learning problems
2.1.1. Explain Classification
2.1.2. Explain Regression
2.2. Analyse Criteria to build a Model
2.2.1. Describe Generalization
2.2.2. Describe Overfitting
2.2.3. Describe Underfitting
2.3. Describe Relation of Model Complexity to Dataset Size
2.4. Supervised Machine Learning Algorithms
2.4.1. Prepare Some Sample Datasets
2.4.2. k-Nearest Neighbors
2.4.2.1.Illustrate k-Neighbor's classification
2.4.2.2.Analyse K-Neighbors Classifier
2.4.2.3.State the importance of k-Neighbor's regression
2.4.2.4.State the importance K-Neighbors Regressor
2.4.2.5. Explain Strengths, weaknesses, and parameters
2.4.3. Linear Models
2.4.3.1.Illustrate Linear regression (aka ordinary least squares)
2.4.3.2. Illustrate Linear models for classification
2.4.3.3.State the importance for multiclass classification
2.4.3.4. Explain Strengths, weaknesses, and parameters
2.4.4. Explain Naive Bayes Classifiers
2.4.5. Instance-based learning
2.4.5.1.State the importance of instance-based learning
2.4.5.2.Explain k-nearest neighbor learning
2.4.5.3.Explain Locally Weighted Regression

3. **Decision Trees and Neural Networks**
3.1.**Decision Tree**
3.1.1. State the purpose of decision trees
3.1.2. Illustrate the process of building decision trees
3.1.3. Illustrate the process of Controlling complexity of decision trees
3.1.4. Analyse decision trees
3.1.5. Explain feature importance in trees
3.1.6. Explain Strengths, weaknesses, and parameters
3.2.**Decision Tree Algorithms**
3.2.1. measures of impurity for evaluating splits in decision trees

3.2.2. Explain ID3 Algorithm
3.2.3. Explain C4.5 Algorithm
3.2.4. Explain pruning the tree
3.2.5. strengths and weakness of decision tree approach

3.3.**Neural Networks**

3.3.1. Introduction to Neural Networks
3.3.2. Define a Neural Network
3.3.3. Describe Special Cases of Linearly Separable Function
3.3.4. Explain about Error-Correction Training of a TLU .
3.3.5. Describe Weight Space
3.3.6. Explain The Widrow-Hoff Procedure
3.3.7. Explain how to train a TLU on Non-Linearly-Separable Training Sets

4. **Unsupervised Learning and Pre-processing.**

4.1. List Challenges in Unsupervised Learning
4.2. List Types of Unsupervised Learning
4.3. Describe Pre-processing and Scaling
4.4. List and explain different Kinds of Pre-processing
4.5. Explain Applying Data Transformations with examples
4.6. State the importance of Scaling Training and Test Data
4.7. Explain Scaling Training and Test Data the Same Way
4.8. Explain the Effect of Pre-processing on Supervised Learning
4.9. Dimensionality Reduction, Feature Extraction, and Manifold Learning
4.9.1. Principal Component Analysis (PCA)
4.9.1.1.Define PCA
4.9.1.2.Explain Applying PCA to the cancer dataset for visualization
4.9.1.3.Define Eigenfaces
4.9.1.4.Explain Eigenfaces for feature extraction
4.9.2. Non-Negative Matrix Factorization (NMF)
4.9.2.1.Define NMF
4.9.2.2.Describe Applying NMF to synthetic data Comparing and Evaluating Clustering Algorithms
4.9.2.3.Describe Applying NMF to face images
4.9.3. State the importance of Manifold Learning
4.9.4. Explain Manifold Learning with t-SNE

5. **Clustering**

5.1.State the importance of Clustering
5.2.Explain Clustering
5.3.k-Means Clustering
5.3.1. Describe Failure cases of k-means
5.3.2. Describe Vector quantization, or seeing k-means as decomposition
5.3.3. Explain K-Means Clustering
5.4.Agglomerative Clustering
5.4.1. Explain Hierarchical clustering and dendrograms
5.5.Comparing Clustering Algorithms

COURSE CONTENT

UNIT1:

Introduction to Machine Learning
Introduction: Preliminaries–what is machine learning–Types of machine learning–learning input/output functions, bias–sample application–Boolean functions and their classes–CNF–DNF–decision lists–Using Version spaces for learning–Mistake bounds–version graphs–learning search of a version space–candidate elimination methods

UNIT2:

Supervised Learning
Major types of supervised machine learning problems–Analyse Criteria to build a Model–Describe Relation of Model Complexity to Dataset Size–Supervised Machine Learning Algorithms–Prepare Some Sample Datasets–k-Nearest Neighbours–Linear Models–Explain Naive Bayes Classifiers-Instance–based learning

UNIT3:

Decision Trees and Neural Networks
Decision Tree–purpose–Explain decision tree concepts–Decision Tree Algorithms–Introduction to Neural Networks

UNIT4

Unsupervised Learning and Pre-processing
Challenges–Types–Pre-processing–Scaling–Data Transformations–Scaling Training and Test Data–Dimensionality Reduction–Feature Extraction–and Manifold Learning–Principal Component Analysis (PCA)–Eigenfaces–Non-Negative Matrix Factorization (NMF)–Manifold Learning with t-SNE

UNIT5:
Clustering: Importance of Clustering–k-Means Clustering–Agglomerative Clustering–Comparing Clustering

Text/References:

1.Introduction to Machine learning with of Clustering C. Müller & Sarah Guido
2.Introduction to Machine learning, Nils J.Nilsson
3. Machine learning for dummies, IBM Limited ed, by Judith Hurwitz and Daniel Kirsch
4. Introduction to Machine Learning with Python A guide for data scientists, Andreas, C.

Muller & Sarah Guido, O'Reilly
5. Machine Learning – Tom M. Mitchell, - MGH

BLUE PRINT

S.No.	Chapter/Unit title	No. of periods	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 Machine Learning	20	14	6	8			2	1			C01
2	Supervised Learning	15	14	6	8		10*	2	1		*	CO2, CO3
3	Decision Trees and Neural Networks	15	17	9	8		10*	3	1		*	CO2, CO3
4	Unsupervised Learning and Pre-processing.	15	14	6	8			2	1			CO4, CO5
5	Clustering	10	11	3	8		10*	1	1		*	CO4, CO5
	Total *	75	70 +10*	30	40		10*	8	5		*	

Note: Part-C: 10 marks single analytical question may be chosen from any or combination of starred chapters

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1.1 to 3.1.6
Unit test-2	From 3.1.7 to 5.5

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING
MODEL PAPER
MACHINE LEARNING
UNIT TEST-1

SCHEME: C-20 SUBJ CODE:AI-405
MAX MARKS:40 TIME: 90Minutes

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PART-A **16Marks**

Instructions:1) Answer all questions
2) First question carries 4marks, and each question of remaining carries 3marks

2) a) Machine Learning is a field of Artificial Intelligence (True/False) (CO1)

b) Decision list is……. (CO1)

c) Version graph is…… (CO1)

d) ML is a field of AI consisting of learning algorithms that?
(CO1)

i)Improve their performance ii) At executing some taskiii) Over time with experience
iv)All of the above

2) Define machine learning. (CO1)
3)Define classification (CO2)
4)State the purpose of decision trees (CO3)

PART-B
3X8=24Marks

Instructions: 1) Answer all questions
2)Each question carries 8 Marks
3)Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer

5. a) Explain about CNF and DNF Functions (CO1)

Or

b) Explain about The Candidate Elimination Method (CO1)

6. a) Explain Classification in detail (CO2)

Or

b) Explaink-Nearest Neighbours (CO2)

7. a) Explain decision trees (CO3)

Or

b) Explain Strengths, weaknesses, and parameters (CO3)

BOARD DIPLOMA EXAMINATIONS
DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING
MODEL PAPER – YEAR END EXAMINATION
MACHINE LEARNING

SCHEME: C-20 SUB-CODE: AI-405
MAX MARKS:80 TIME: 3HOURS

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PART-A

Note: Answer all questions. Each question carries 3 marks 10 X 3=30M

1. What is importance of machine learning CO1
2. Define a Boolean function CO1
3. Define Regression CO2
4. Define over drifting CO2
5. 5. Define a Neural Network CO3
6. State the importance of controlling complexity of decision tree CO3
7. List Types of Unsupervised Learning C04
8. Define Non-Negative Matrix Factorization CO4
9. State the importance of Clustering CO5
10. What is k-Means Clustering CO5

PART-B

Note: 1. Answer all the question and making use of internal choice.
2. Each question carries 8 marks 5 X 8=40M

11(a). Explain about The Candidate Elimination Method CO1

OR

11(b). Explain about applications of machine learning CO1

12 (a). Illustrate k-Neighbour's classification CO2

OR

12(b)Explain Naive Bayes Classifiers CO2

13(a)Explain ID3 Algorithm in detail CO3

OR

13b) Explain about Error-Correction Training of a TLU in Neural Networks CO3

14(a). Explain A Generic ILP Algorithm with example CO4

(OR)

14(b). Explain Manifold Learning with t-SNE in detail CO4

15(a). Explain K-Means Clustering CO5

(OR)

15(b). Comparing and Evaluating Clustering Algorithms CO5

PART-C

1 X10=10M

16. Distinguish between any two Decision Tree Algorithms 10M CO3

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
AI-406	Python Programming Lab	4	60	40	60

COURSE OBJECTIVES	Upon completion of the course the student shall able to learn 8. Basics of Python programming 9. Decision Making and Functions in Python 10. Object Oriented Programming using Python.	
CO No.	COURSE OUTCOMES	
CO 1	AI-406.1	Execute Simple python programs
CO 2	AI-406.2	Execute Python programs using expressions, operators
CO 3	AI-406.3	Demonstrate Python programs using Lists
CO 4	AI-406.4	Execute python programming using Functions, packages
CO 5	AI-406.5	Develop Python programs using OOP Concepts and exceptions
CO 6	AI-406.6	Demonstrate Debugging of Python Programs

CO-PO/PSO MATRIX

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
AI-406.1	2	2	2	1	2			3		2
AI-406.2	2	3	2					2		2
AI-406.3	3	3	2	3		2	2	2		
AI-406.4	2	2	2		2	3	1	2	3	
AI-406.5	3	3	2		2	2	2	2	2	
AI-406.6	2	1		3			3	1		

Average	2.3	2.3	2	2.3	2	2.3	2	2	2.5	2

3=strongly mapped, 2=moderately mapped, 1=slightly mapped

LEARNING OUTCOMES

1. Write and execute simple python Program.
2. Write /execute simple 'Python' program: Develop minimum 2 programs using different data types (numbers, string, tuple, list, dictionary).
3. Write /execute simple 'Python' program: Develop minimum 2 programs using Arithmetic Operators, exhibiting data type conversion.
4. (i)Write simple programs to convert U.S. dollars to Indian rupees.

   (ii) Write simple programs to convert bits to Megabytes, Gigabytes and Terabytes.
5. Write simple programs to calculate the area and perimeter of the square, and the volume & perimeter of the cone.
6. Write program to: (i) Determine whether a given number is odd or even. (ii) Find the greatest of the three numbers using conditional operators.
7. Write a program to: i) Find factorial of a given number. ii) Generate multiplication table up to 10 for numbers 1 to 5
8. Write a program to: Create a list, add element to list, delete element from the lists.
9. Write a program to: Sort the list, reverse the list and counting elements in a list.
10. Write a program to: Create dictionary, add element to dictionary, delete element from the dictionary.
11. Write a program to: To calculate average, mean, median, and standard deviation of numbers in a list.
12. Write a program to: To print Factors of a given Number.
13. File Input/output: Write a program to: i) To create simple file and write "Hello World" in it. ii) To open a file in write mode and append Hello world at the end of a file.
14. Write a program to :i) To open a file in read mode and write its contents to another file but replace every occurrence of character 'h' ii) To open a file in read mode and print the number of occurrences of a character 'a'.
15. Write a Program to: Add two complex number using classes and objects.
16. Write a Program to: Subtract two complex number using classes and objects.
17. Write a Program to: Create a package and accessing a package.

TIME SCHEDULE

Sl. No.	Major Topic	Periods	CO'S mapped

1.	Write and execute simple python Program.	3(2,1)	CO1,CO6
2.	Write /execute simple 'Python' program: Develop minimum 2 programs using different data types (numbers, string, tuple, list, dictionary).	4(2,1,1)	CO1,CO2,CO6
3.	Write /execute simple 'Python' program: Develop minimum 2 programs using Arithmetic Operators, exhibiting data typeconversion.	4(2,1,1)	CO1,CO2,CO6
4.	(i)Write simple programs to convert U.S. dollars to Indian rupees. (ii) Write simple programs to convert bits to Megabytes, Gigabytes and Terabytes	3(1,1,1)	CO1,CO2,CO6
5.	Write simple programs to calculate the area and perimeter of the square, and the volume & perimeter of the cone.	3(1,1,1)	CO1,CO2,CO6
6.	Write program to: (i) Determine whether a given number is odd or even. (ii) Find the greatest of the three numbers using conditional operators.	3(1,1,1)	CO1,CO2,CO6
7..	Write a program to: i) Find factorial of a given number. ii) Generate multiplication table up to 10 for numbers 1 to 5.	4(2,1,1)	CO1,CO2,CO6
8.	Write a program to: To print Factors of a given Number.	3(2,1)	CO4,CO6
9.	Write a program to: Create a list, add element to list, delete element from the lists.	3(1,1,1)	CO1,CO3,CO6
10.	Write a program to: Sort the list, reverse the list and counting elements in a list.	3(1,1,1)	CO2,CO3,CO6
11.	Write a program to: Create dictionary, add element to dictionary, delete element from the dictionary.	4(2,1,1)	CO2,CO3,CO6
12.	Write a program to: To calculate average, mean, median, and standard deviation of numbers in a list.	3(1,1,1)	CO2,CO3,CO6
13.	File Input/output: Write a program to: i) To create simple file and write "Hello World" in it. ii) To open a file in write mode and append Hello world at the end of a file.	4(2,2)	CO1,CO6
14.	Write a program to :i) To open a file in read mode and write its contents to another file but replace every occurrence of character 'h' ii) To open a file in read mode and print the number of occurrences of a character 'a'.	4(2,2)	CO1,CO6
15.	Write a Program to: Add two complex number using classes and objects.	4(2,2)	CO5,CO6
16.	Write a Program to: Subtract two complex number using classes and objects	3(2,1)	CO5,CO6

17.	Write a Program to: Create a package and accessing a package.	2(1,1)	CO5,CO6
Total :		60	

KEY COMPETENCIES

Sl.No	Name of the Experiment	Objectives	Key Competencies
1.	Write and execute simple python Program.	Write a simple python program to print Hello World! and debug and execute	1. Know the usage of Python IDLE 2. Edit and save the program 3. Check for the syntax errors and clear the errors 4. Run the program and check for the output.
2.	Write /execute simple 'Python' program: Develop minimum 2 programs using different data types (numbers, string, tuple, list, dictionary).	Write a Python program to identify different data types.	1. Identify different data types 2. Write basic python program using datatypes 3. Evaluate arithmetic expression 4. Run the program 5. Rectify the syntactical errors 6. Execute the program 7. Check the output for its correctness
3.	Write /execute simple 'Python' program: Develop minimum 2 programs using Arithmetic Operators, exhibiting data type conversion.	Write a Python program to identify arithmetic operators and data type conversion	1. Identify different arithmetic operators 2. Build arithmetic expressions 3. Identify the priorities of operators 4. Evaluate arithmetic expression 5. Run the program 6. Rectify the syntactical errors 7. Execute the program Check the output for its correctness

4.	(i)Write simple programs to convert U.S. dollars to Indian rupees. (ii) Write simple programs to convert bits to Megabytes, Gigabytes and Terabytes.	Write a Python program to identify arithmetic operators and data type conversion	1. Identify different arithmetic operators 2. Build arithmetic expressions 3. Identify the priorities of operators 4. Evaluate arithmetic expression 5. Run the program 6. Rectify the syntactical errors 7. Execute the program Check the output for its correctness
5.	Write simple programs to calculate the area and perimeter of the square, and the volume & perimeter of the cone.	Write a Python program to identify arithmetic operators and data type conversion	1. Identify different arithmetic operators 2. Build arithmetic expressions 3. Identify the priorities of operators 4. Evaluate arithmetic expression 5. Run the program 6. Rectify the syntactical errors 7. Execute the program Check the output for its correctness
6.	Write program to: (i) Determine whether a given number is odd or even. (ii) Find the greatest of the three numbers using conditional operators.	Write a Python program to identify conditional statements in Python.	1. Build a relational expression 2. Use the if statement for decision making 3. Rectify the syntax errors 4. Check the output for correctness
7.	Write a program to: i) Find factorial of a given number. ii) Generate multiplication table up to 10 for numbers 1 to 5.	Write a Python program to identify loops statements in Python.	1. Build the termination condition for looping 2. Use while statement with correct syntax 3. Check whether correct number of iterations are performed by the while loop 4. Rectify the syntax errors 5. Debug logical errors

8.	Write a program to: To print Factors of a given Number.	Write a Python program to identify loops statements in Python.	1. Build the termination condition for looping 2. Use while statement with correct syntax 3. Check whether correct number of iterations are performed by the while loop 4. Rectify the syntax errors Debug logical errors
9.	Write a program to: Create a list, add element to list, delete element from the lists.	Write a Python program to identify various lists and list manipulation methods in Python.	1. Create a one list with correct syntax 2. Create a list 3. Read elements from list 4. Add elements to list 5. Delete elements 6. Rectify the syntax errors 7. Debug logical errors 8. Check for the correctness of output for the given input
10.	Write a program to: Sort the list, reverse the list and counting elements in a list.	Write a Python program to identify various lists and list manipulation methods in Python.	1. Create a one list with correct syntax 2. Create a list 3. Read elements from list 4. Add elements to list 5. Delete elements 6. Rectify the syntax errors 7. Debug logical errors 8. Check for the correctness of output for the given input
11.	Write a program to: Create dictionary, add element to dictionary, delete element from the dictionary.	Write a Python program to identify various dictionary and dictionary manipulation methods in Python.	1. Create a one dictionary with correct syntax 2. Create a dictionary 3. Read elements from list 4. Add elements to dictionary 5. Delete elements from dictionary 6. Rectify the syntax errors 7. Debug logical errors 8. Check for the correctness of output for the given input
12.	Write a program to: To calculate average, mean, median, and standard deviation of numbers in a list.	Write a Python program to identify various statistical functions.	1.Create a list 2. add elements to list 3. perform statistical functions on that list

13.	File Input/output: Write a program to: i) To create simple file and write “Hello World” in it. ii) To open a file in write mode and append Hello world at the end of a file.	Write a Python program to identify the steps to create a file and append to file.	1. Create a Python file 2. Add contents to file
14.	Write a program to: i) To open a file in read mode and write its contents to another file but replace every occurrence of character ‘h’ ii) To open a file in read mode and print the number of occurrences of a character ‘a’.	Write a Python program to identify the steps to open a file in read/write mode.	1. Open a Python file in write mode 2. Add contents to the file 3. Open a Python file in Read mode 4. Print the file
15.	Write a Program to: Add two complex number using classes and objects.	Write a Python program to identify the steps to create class and create an object in Python.	1. Create a class using Python 2. Create an object in Python 3. Debug the python program 4. Check the correctness
16	Write a Program to: Subtract two complex number using classes and objects	Write a Python program to identify the steps to create class and create an object in Python.	1. Create a class using Python 2. Create an object in Python 3. Debug the python program Check the correctness
17.	Write a Program to: Create a package and accessing a package.	Write a Python program to practice in creating packages and accessing packages	1. Create a package using Python 2. Access the package in Python 3. Debug the python program heck the correctness

Course Code	Course title	No of periods/week	Total no of periods	Marks for FA	Marks for SA
AI-407	**Machine Learning Lab**	**06**	90	40	60

S No	Chapter/ Unit Title	No. of Periods	COs Mapped
1.	Recalling of Python /Java programming environment	5	CO1
2.	Implementation of various Supervisory Learning programs using Python/java	45	CO1, CO2, CO5
3.	Implementation of various Un-Supervisory Learning programs using Python/java	25	CO1, CO3, CO5
4	Implementation of Instance based Learning programs using Python/java	15	CO1, CO4, CO5
	Total	90	

COURSE OBJECTIVES	Upon **On completion of the course the student shall be able to** 6. Execute the Python/Java programs 7. Execute the programs on Supervisory and Un-Supervisory Learning 8. Execute the programs on Instance based Learning

CO No		COURSE OUTCOMES
CO 1	AI-407.1	Practice Python/Java programming environment
CO 2	AI-407.2	Demonstrate Python/Java programs for the Supervisory machine learning algorithms.

CO 3	AI-407.3	Demonstrate Python/Java programs for the Un-Supervisory machine Learning algorithms.
CO 4	AI-407.4	Apply appropriate data sets to the Machine Learning algorithms.
CO 5	AI-407.5	Apply Machine Learning algorithms to solve real world problems.

Learning Outcomes:

1. Demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.

2. Demonstrate for a given set of training data examples stored in a .CSV file and the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.

3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

4. Demonstrate Decision Tree algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.

5. Write a program to implement *k*-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.

6. Write a program to implement the **naïve Bayesian classifier** for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

7. Write a program to implement K-Means Clustering to classify the data set. Use an appropriate data set for building the K-Means Clustering and apply this knowledge to classify a new sample.

8. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

KEY COMPETENCIES

Exp. No.	Name of the experiment	Objectives	Key Competencies
1	FIND-S	(a) Installation of python/JAVA (b) Write a Program for FIND-S	a) Familiarize using a data set

	Algorithm	Algorithm	b) observe the installation completion c)Execute the Program d)observe the output
2	Candidate Elimination Algorithm	(a) Write a program for candidate Elimination Algorithm (b) Apply the Program on different data sets	(a) Compile the program and rectify the errors. (b) Execute the program (c) Observe the output for different data sets.
3	ID3 algorithm.	(a) Write a program for ID3 Algorithm based on decision tree (b) Build a decision tree using an appropriate data set (c) Classify a new sample	(a) Write the program for ID3 Algorithm (b) Execute the program (c) Observe the output.
4	Decision Tree Algorithm	(b) Write a program to implement Decision Algorithm (c) Apply the program on appropriate dataset	(e) Write the program (f) Observe the errors (g) Draw graphs
5	K-Nearest Neighbour Algorithm	(a) Write a program for nearest neighbor algorithm (b) Apply the program on iris data set.	(e) Use ML library functions of python or java (f) Execute the program on iris dataset (g) Observe the errors (h) Print right and wrong predictions as output
6	Build Naive Bayesian Algorithm	(a) Write a program to implement Naive Bayesian	(d) Write the program (e) Observe the errors (f) Test the program using different data sets
7	K-Means Clustering Algorithm	(a) Write a program to implement K-Means Clustering (b) Apply the data set	(a) Use python or java language (b) Execute the program with data set (c) Observe the errors (d) Check the result
8	Locally Weighted Regression algorithm	(c) Write a program to implement Locally Weighted Regression algorithm (a) Apply the data set	(a) Use python or java language (b) Execute the program with data set (c) Observe the errors (d) Check the result with different data set

Reference:

1. https://deepakdvallur.weebly.com/machine-learning-laboratory.html

2. https://github.com/DaNgLiN/ML-LAB-PROGRAM-vtu--15csl76
3. http://vtu.babivenu.in/wp-content/uploads/2019/08/CSE-7th-Sem-MACHINE-LEARNING-LABORATORY-csml1819.pdf
4. https://www.tutorialspoint.com/machine_learning_with_python/machine_learning_with_python_tutorial.pdf

Communication Skills

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks for FA	Marks for SA
AI- 408	Communication Skills	3	45	40	60

S. No.	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 AI-408	**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 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
GOOD (9-10*)	Speaks at length without noticeable effort or loss of coherence. May demonstrate language-related hesitation at times, or some repetition and/or self-correction.	Uses vocabulary resources flexibly during discussion. Uses paraphrase effectively.	Uses a range of complex structures with some flexibility.
	Uses a range of connectives and discourse markers with some flexibility. **Articulates and adapts to near naturalization.**	Uses some less common vocabulary and shows some awareness of style and collocation	Mostly produces error-free sentences.
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/ topic (individual to an audience)	9	10					CO1, CO2, CO 3
4	Role play an imaginary work-place 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 communication/ content	6	10					CO1, CO2, CO 3
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 practic	Marks Wise Distribution of	Marks allotment for each Student in the Rubric*				Mapping of COs
				Poor 0-2	Fair 3-5	Competent 6-8	Good 9-10	

		al work	Weightage					
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/ topic (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/ topic (individual to an audience)	3	10					
2	Role play an imaginary work-place 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 topic 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.

Course Code	Course Title	No. of periods/week	Total No. of periods	Marks for FA	Marks for SA
AI-409	**DBMS Lab**	6	90	40	60

COURSE OBJECTIVES	**Upon completion of the course the student shall able to learn** 11. Insert, update, delete and select data into/from Relation Database 12. Develop PL/SQL programs 13. Insert, update, delete and select data from MongoDB

Course	CO1	AI-409.1	Develop SQL Queries to Create, modify and drop tables

Outcomes	CO2	AI-409.2	Develop SQL Queries to Insert, update, delete data from tables.
	CO3	AI-409.3	Execute SQL Queries to display data on different conditions from different tables
	CO4	AI-409.4	Execute PL/SQL Programs
	CO5	AI-409.5	Demonstrate the usage of cursors and triggers
	CO6	AI-409.6	Execute commands to Insert, update, delete and select data in NOSQL and MongoDB databases

CO-PO/PSO MATRIX

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
AI-409.1	2		3			2	3	3	2	
AI-409.2	2	2	1			2			2	
AI-409.3	2		1					2		2
AI-409.4	2	2	3	3	3	3		2	2	2
AI-409.5	2	3				3	3			
AI-409.6	2			3		3		2	2	
Average	2	2.3	2	3	3	2.6	3	2.3	2	2

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

LEARNING OUTCOMES

1. Know installation of Oracle
2. Exercise on creating tables.
3. Exercise on inserting records
4. Exercise on updating records
5. Exercise on modifying the structure of the table
6. Exercise on Select command
7. Exercise on querying the table using clauses like WHERE, ORDER BY, IN, AND, OR, NOT, IS NULL
8. Exercise on GROUP BY, HAVING
9. Exercise on Number functions, character functions, conversion functions and date functions, group functions
10. Exercise on set operators
11. Exercise on sub queries
12. Exercise on Joins
13. Exercise on various date and number format models
14. Exercise on creating tables with integrity constraints
15. Write programs using PL/SQL control statements
16. Exercise on PL/SQL exception handling
17. Exercise on Procedures
18. Exercise on Functions
19. Exercise on Recursion

20 Exercise on Cursors
21 Exercise on Triggers
22 Exercise on Installation ofMongoDB
23 Exercise on Creation and Dropping ofDatabase
24 Exercise on Creation and Dropping ofCollections.
25 Exercise on Commands of MongoDB- Insert, update, find, delete and sorting ofDocuments.

Mini Project: Student has to develop a Mini project applying the skills acquired from the learning outcomes of this course.

Time Schedule:

Sloe	Name of the Experiment	Periods
1	Know installation of Oracle	1
2	Exercise on creating tables.	1
3	Exerciseoninserting records	1
4	Exerciseonupdating records	1
5	Exercise on modifying the structure of the table	1
6	on updating command	2
7	Exercise on querying the table using clauses like WHERE, ORDER, IN, AND, OR, NOT, IS NULL	18
8	Exercise on GROUP BY, HAVING	2
9	Exercise on Number functions, character functions, conversion functions and date functions, group functions	3
10	ExerciseonSET operators	2
11	Exercise on sub queries	3
12	Exercise on Joins	3
13	Exercise on various date and number format models	1
14	Exercise on creating tables with integrity constraints	1
14	Write programs using PL/SQLcontrol statements	6
15	Exercise on PL/SQL built-in exception handling	2
16	Exercise on PL/SQLin user defined exception handling	2
17	Exercise on Procedures	2
18	Exercise on Functions	1

Sloe	Name of the Experiment	Periods
19	Exercise on Recursion	1
20	Exercise on Cursors	1
21	Exercise on Triggers	1
22	Exercise on Installation of MongoDB	1
23	Exercise on Creation and Dropping of Database	1
24	Exercise on Creation and Dropping of Collections	1
25	Exercises on commands of MongoDB	1
Total		60

KEY COMPETENCIES

Sl. No	Name of	Objectives	Key Competencies
1	Know installation of Oracle	Perform the following: i. To identify the version of Oracle being installed ii. To understand the RAM and HDD requirements for Oracle installation iii. To comprehend the installation steps correctly iv. Setting up of Oracle Administrative Password v. Configuring the Oracle database after post- installation steps of Oracle viz configuring administrative rights for performing vi. To login to Oracle as administrator account and Oracle user account	❖ Observe Oracle version being installed ❖ Observe the RAM & HDD requirements ❖ Rectify for any Oracle installation errors ❖ Able to login as Administrator and as Oracle user account
2	Exercise on	Perform the following: i. To login with Oracle user account ii. To give correct syntax for table creation iii. To give correct data type for the required fields with appropriate size iv. To display the structure of the table	❖ Correct Table creation syntax errors ❖ Correct the wrong data types and inappropriate sizes for the respective fields ❖ Check for displaying the structure of the table

Sl. No	Name of	Objectives	Key Competencies
3	Exercise on i	Perform the following: i. Check for the required table present already ii. To insert the records correctly iii. To display the records correctly	❖ Correct syntax errors for Insertion of record ❖ Check for insertion of proper values for the required fields ❖ Verify the correct values pertaining to the record are inserted in the required table ❖ Check for displaying of the records correctly
4	Exercise on u	Perform the following: i. Check for the required table present already ii. To update the records correctly iii. To display the updated records	❖ Correct syntax errors for updating of record ❖ Check for updating ❖ Check for displaying of the updated records correctly
5	Exercise on modifying the structure of the table	Perform the following i. To identify the required table, present in the system already ii. To add new column iii. To display the records correctly	❖ Correct syntax errors in modifying the structure of the table ❖ Check whether required field is newly added to the existing table ❖ Check for displaying of the modified table correctly
6	Exercise on S	Perform the following i. To identify the required table, present already ii. To display the records in the required table	❖ Check for syntax error in usage of Select command ❖ Check whether Select command is given correctly to display all the records
7	Exercise on querying the table using clauses like WHERE, ORDER, IN, AND, OR, NOT, IS NULL	Perform the following: i. To use the Select command ii. To use the clauses WHERE, ORDER, IN, AND, OR, NOT, IS NULL along with Select command on the given records in the table	❖ Check for syntax error in usage of Select command with appropriate clauses ❖ Check whether Select command along with appropriate clause is given correctly for the required condition ❖ Check the usage of clauses WHERE, ORDER, IN, AND, OR, NOT along with Select command appropriately

Sl. No	Name of	Objectives	Key Competencies
8	Exercise on GROUP BY, HAVING	Perform the following: i. To use the Select command To use the clauses GROUP BY, HAVING along with Select command on the given records in the table	❖ Check for syntax error in the usage GROUP BY, HAVING ❖ Check for usage of GROUP BY, HAVING ❖ Verify output values based on certain condition on few records
9	Exercise on Number functions, character functions, conversion functions and date functions, group functions	Perform the following i. To use functions ii. To use set command along with WHERE condition, GROUP BY, HAVING	❖ Check for syntax error of various functions ❖ Check for usage of various functions ❖ Verify output values based on certain condition on few records
10	Exercise on	Perform the following iii. To use set command iv. To use set command along with WHERE condition	❖ Check for syntax error in the usage of SET command ❖ Check for usage of SET command for updating values based on certain condition on few records
11	Exercise on sub queries	Perform the following i. To use Select command ii. To use appropriate Operators IN	❖ Check for the syntax error in usage of sub queries ❖ Check for the correctness of the usage of appropriate operators used
12	Exercise on Joins	Perform the following i. To create two tables ii. To use the common field if two tables aroused iii. To know different types of Joins	❖ Check for the correctness of the syntax used for joining ❖ Check if the join is created between two tables ❖ Check if self join is created
13	Exercise on various date and number format models	Perform the following: i. To use date formats correctly ii. To use number formats correctly	❖ Check for the syntax of the date formats ❖ Check for the syntax of the number formats

Sl. No	Name of	Objectives	Key Competencies
14	Exercise on creating tables with integrity constraints	Perform the following i. Create Primary key ii. Create Foreign key or referential integrity constraint iii. Create NOT NULL constraint iv. Create UNIQUE Key constraint v. Create CHECK constraint	❖ Check for the syntax errors in usage of all types of Integrity constraints ❖ Check whether different types of Integrity constraints are used
14	Write programs using PL/SQL c	Perform the following i. To use IF. ELSE statements ii. To use iterative statements – Simple loop, While Loop, For Loop	❖ Check for the syntax of IF. ELSE statements ❖ Check for the syntax of all iterative statements
15	Exercise on PL/SQL built-in e	Perform the following i. Know about types of Exception handling ii. To handle built-in Exceptions	❖ Check for handling of built- in Exceptions ❖ Check for raising of user defined Exception ❖ Check for handling of user defined Exception with appropriate error messages
16	Exercise on PL/SQL in user defined exception handling	Perform the following i. To declare user defined exception ii. To raise user defined exception iii. To handle user defined exception	❖ Check for declaration of user defined exception ❖ Check for proper raising of exceptions ❖ Check for proper handling of user defined exception with appropriate error messages
17	Exercise on Procedures	Perform the following i. To know the concept of stored procedures ii. To declare procedures iii. The type of parameters IN, IN OUT, OUT iv. To call procedures from other procedures	❖ Check for proper declaration of procedures ❖ Check for syntax ❖ Check for proper calling of procedures

Sl. No	Name of	Objectives	Key Competencies
18	Exercise on Functions	Perform the following i. To know the concept of stored functions ii. To declare function with return data iii. To call functions from other functions	❖ Check for proper declaration of function ❖ Check for syntax of parameters and its data type ❖ Check for proper return data type from the functions ❖ Check for variable assignment to get the returned value from the function
19	Exercise on Recursion	Perform the following i. To know the concept of stored functions and stored procedures ii. To call the procedure and function by itself ii. To place a condition to terminate from calling itself	❖ Check for the syntax of stored function or procedure ❖ Check for calling the function or procedure in the same function / procedure ❖ Check for the condition to terminate from calling itself
20	Exercise on Cursors	Perform the following i. To know the concept cursors ii. To know the fetch data from database	❖ Check for the syntax of cursor ❖ Check for open cursor, fetch data, close cursor ❖ Check for the result
21	Exercise on Triggers	Perform the following i. To know the concept of triggers ii. Validation before and after insert, before and after update and, before and after delete data	❖ Check for the syntax of trigger ❖ Write a trigger which raises before insert data ❖ Raise trigger ❖ Repeat the procedure for remaining ❖ Check for the result
22	Exercise on Installation of MongoDB	Perform the following i. To download and install MongoDB	❖ Observe MongoDB version being installed ❖ Observe the RAM & HDD requirements ❖ Rectify for any MongoDB installation errors Able to login as Administrator

Sl. No	Name of	Objectives	Key Competencies
23	Exercise on Creation and Dropping of Database	Perform the following i. Create the Database ii. Drop the Database	❖ Know the use of create Database () and drop Database () ❖ Correct Database creation syntax errors ❖ Check for displaying the database name
24	Exercise on Creation and Dropping of Collections	Perform the following i. Create the Collection ii. Drop the Collection	❖ Know the use of create Collection () and drop () ❖ Correct Database creation syntax errors ❖ Check for collection name ❖ Check for the collection dropped
25	Exercises on commands of MongoDB	Execute the following commands of MongoDB i. Insert the Document ii. update the Document iii. find the Document iv. Delete the Document v. sort the Documents	❖ Know the syntax of insert (), update (), find (), remove (), sort () functions. ❖ Correct syntax errors. ❖ Check out for different input values.

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
AI-501	**Industrial Management and Entrepreneurship**	5	75	20	80

S.No.	Chapter/Unit Title	No. of Periods	CO's Mapped
1.	Principles and functions of Industrial Management	08	CO1
2.	Organisation structure & Organisational behaviour	16	CO2
3.	Production Management	12	CO3
4.	Materials Management, Maintenance management & Industrial Safety	19	CO4

5.	Entrepreneurship Development & Quality management.	20	CO5
	Total Periods	**75**	

Course Objectives	Upon completion of the course the student shall be able to 1. Understand the principles and functions of industrial management, organisation structure and organisationalbehaviour. 2. Understand the production management, materials management, maintenance management and industrial safety. 3. Understand the entrepreneurship development and trends in management.

CO No.		**COURSE OUTCOMES**
CO1	AI-501.1	Explain various principles and functions of industrial management.
CO2	AI-501.2	Explain organization structure and organizational behavior.
CO3	AI-501.3	Apply CPM and PERT techniques in production management.
CO4	AI-501.4	Explain materials management techniques, maintenance management and industrial safety.
CO5	AI-501.5	Describe Entrepreneurship Development and Quality management aspects.

CO-PO/PSO Matrix:

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
AI-501.1	**2**				**2**	**2**		**2**		
AI-501.2	**2**			**2**	**2**	**2**		**2**		
AI-501.3	**1**	**3**	**3**	**2**		**3**			**3**	**3**
AI-501.4	**2**			**2**	**2**	**2**		**2**		**2**
AI-501.5	**3**		**1**		**2**	**2**	**3**	**2**		**2**
Average	**2**	**3**	**2**	**2**	**2**	**2.2**	**3**	**2**	**3**	**2.3**

3=strongly mapped, 2=moderately mapped, 1=slightly mapped

Learning outcomes:

Principles and functions of Industrial Management

1.1 Define industry, commerce (Trade) and business.
1.2 Know the need for management.
1.3 Understand the evolution of management
1.4 Understand functions of Management.
1.5 Explain the principles of scientific management.
1.6 Explain the principles of management.
1.7 Differentiate between management and administration.
1.8 Understand the nature of management as a profession
1.9 Differentiate between supervisory, middle and Top-level management
1.10 Explain the importance of managerial skills (Technical, Human, Conceptual)

2.0 Organisation Structure & organisational behaviour

2.1 Explain the philosophy and need of organisation structure of an industry.
2.2 Discuss the line, staff and Functional organisations
2.3 Explain the Authority and Responsibility Relationships
2.4 List the differences between Delegation and decentralization
2.5 Explain the factors of effective organization
2.6 Outline the communication process
2.7 State motivational theories.
2.8 State Maslow's Hierarchy of needs.
2.9 List different leadership models.
2.10 Explain the trait theory of leadership
2.11 Explain behavioural theory of Leadership
2.12 Explain the process of decision-making.
2.13 Assessing Human resource requirements
2.14 Describe the concept of Job analysis, Job description and specifications
2.15 Explain the process of recruitment, selection, training and development
2.16 List and explain types of business ownerships
2.17 Differentiate between the business ownerships
2.18 State the objectives of Employee participation
2.19 Give the meaning and definition social responsibilities
2.20 Explain corporate social responsibilities

3.0 Production management

3.1 Identify the factors of Plant Location
3.2 List the objectives of plant Layout
3.3 State the principles of plant Layouts
3.4 Explain the types of plant Layouts
3.5 Relate the production department with other departments.
3.6 State the need for planning and its advantages.
3.7 State different types of production.
3.8 Explain the stages of Production, planning and control.
3.9 List the basic methods forecasting
3.10 Explain routing methods.
3.11 Explain scheduling methods.
3.12 Explain dispatching.
3.13 Explain Break Even Analysis
3.14 Define supply chain Management, competitive strategy, Supply chain strategy
3.15 Explain project scheduling.
3.16 Draw CPM and PERT networks.
3.17 Identify the critical path.
3.18 Simple numerical problems on CPM and PERT.

4.0 Materials Management, Maintenance management & Industrial Safety

4.1 Explain the importance and functions of materials management in Industry.
4.2 State an expression for inventory control.
4.3 Explain ABC analysis.
4.4 Define safety stock and reorder level
4.5 State an expression for economic ordering quantity.
4.6 State the functions of Stores Management,
4.7 Explain types of store layouts.
4.8 List out store's equipment and stores records.
4.9 Explain general purchasing procedures
4.10 Explain tendering, E-tendering and E-procurement procedures
4.11 List purchase records.
4.12 Explain the Bin card.

4.13 Describe Cardex method.
4.14 List the applications of RFIDin material management

4.15 Explain Objectives and activities of maintenance management
4.16 Explain the importance of maintenance management in Industry.
4.17 Explain the importance of Preventive maintenance
4.18 State the need for scheduled maintenance
4.19 Differentiate between scheduled and preventive maintenance
4.20Know the principles of 5 s for good housekeeping
4.21 Explain the importance of safety at Work place.
4.22 List the important provisions related to safety.
4.23 Explain hazard and accident.
4.24 List any six different hazards in the Industry.
4.25 Explain any six causes of accidents.
4.26 Explain the direct and indirect causes of accidents.
4.27Explain the types of emission from process Industries, their effects environmentandcontrol
4.28Describe the principles of solid waste management

5.0 Entrepreneurship Development&Quality management.

5.1 Define the word entrepreneur.
5.2 Explain the requirements of an entrepreneur.
5.3 Determine the role of entrepreneurs in promoting Small Scale Industries.
5.4 Describe the details of self-employment schemes.
5.5 Characteristic of successful entrepreneurs
5.6 Explain the method of site selection.
5.7 List the financial assistance programmes.
5.8 List out the organizations that help an entrepreneur
5.9 Know the use of EDPProgrammes
5.10Understand the concept of make in India, Zero defect and zero effect
5.11Understand the importance forstartups
5.12 Explain the conduct of demand surveys
5.13 Explain the conduct of a market survey
5.14 Evaluate Economic and Technical factors.
5.15 Prepare feasibility report study
5.16 Explain the concept of quality.
5.17 List the quality systems and elements of quality systems.
5.18 State the principles of quality Assurance.
5.19 Explain management information system (MIS)
5.20 Explain the basic concepts of TQM
5.21 State the Pillars of TQM
5.22 List the evolution of ISO standards.
5.23 Explain ISO standards and ISO 9000 series of quality systems.
5.24 List the beneficiaries of ISO 9000.
5.25 Explain the concepts of ISO 14000
5.26 Give the overview of PDCA cycle
5.27 State Kaizen strategy.

Course Content

1. **Principles and functions of Industrial Management**

Introduction: Industry, Commerce and Business; Definition of management; Functions of management - Principles of scientific management of ISO, Principles of Management by Henry Fayol; Administration and management; levels of management; managerial skills;

2. Organisation Structure & organisational behaviour

Organizing - Process of Organizing; Line, Staff and functional Organizations, Decentralization and Delegation, Communication, Motivational Theories; Leadership Models; Human resources development; recruitment selection training and development, Forms of Business ownerships: Types – Sole proprietorship, Partnership, Joint Stock Companies, Cooperative Organization; objectives of employee participation, Corporate Social responsibility;

3. Production management

Definition and importance; objectives and principles of plant layout, Plant location and types of layouts; Types of production -job, batch and mass; production Planning and Control: basic methods of forecasting, routing, scheduling, dispatching and follow up; Break even analysis; Project scheduling; Application of CPM and PERT techniques; simple numerical problems;

4. Materials Management, Maintenance management & Industrial Safety

Materials in industry, Importance and functions of materials management, Basic inventory control model, ABC Analysis, Safety stock, re-order level, Economic ordering quantity, Stores Management: Stores layout, stores equipment, Stores records, purchasing procedures, tendering, e-tendering, e-procurement; purchase records, Bin card, Cardex, RFID Applications in materials management, Objectives and importance of maintenance management, Different types of maintenance, Schedules of preventive maintenance, scheduled maintenance Advantages of preventive maintenance, Advantages of scheduled maintenance, Importance of Safety at work places; industrial hazards; Causes of accidents.5S Principles

5. Entrepreneurship Development& Quality Management.

Definition of Entrepreneur; Requirements of entrepreneur, Role of Entrepreneur; Entrepreneurial Development, Details of self-employment scheme, financial assistant programmers, organizations that help entrepreneurs (SSI, MSME, DIC, Banks) Concept of Make in India, ZERO defect, Zero Effect, Concept of Start-up Company, Demand survey and Market survey; Preparation of Feasibility study reports

Concept of quality, quality systems and its terms, principles of quality assurance, Introduction to Management Information System (MIS); Total Quality Management (TQM), ISO 9000 series, ISO-14000, Deming's PDCA Cycle (Plan, Do, Check and Action). Kaizen Strategy (continuous improvement)

REFERENCE BOOKS

1. Industrial Engineering and Management - O.P Khanna
2. Production Management - Buffa.
3. Engineering Economics and Management Science - Banga &Sharma.
4. Personnel Management -Flippo.
5. Production and Operations Management –S.N. Chary
6. Converging_Technologies_for_Smart_Environments_and_Integrated_Ecosystems_IERC _Book_ Open_Access_2013pages-54-76
7. Supply Chain Management –Sunil Chopra and Meindl, PHIpublishers
8. 5 S made easy by DavidVisco

Blueprint:

S.No.	Chapter/ Unit title	No. of periods	Weightage	Marks Wise Distribution of Weightage				Question wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Principles and functions of Industrial Management	08	11	3	8			1	1			CO1
2	Organisation structure & Organisational behaviour	16	24	3	11		10	1	2		*	CO2
3	Production Management	12	24	3	11		10	1	2		*	CO3
4	Materials Management, Maintenance management & Industrial Safety	19	24	11	3		10	2	1		*	CO4
5	Entrepreneurship Development & Quality management.	20	27	14	3		10	2	1		*	CO5

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1.1 to 3.18
Unit test-2	From 4.1 to 5.27

DIPLOMA IN ARTIFICIAL ENGINEERING
MODEL PAPER
Industrial Management and Entrepreneurship
UNIT TEST-1

SCHEME: C-20 SUBJ CODE:AI-501
MAX MARKS: 40 TIME: 90Minutes

……

PART-A **16 Marks**

Instructions:1) Answer all questions
2) First question carries 4marks, and each question of remaining carries 3marks

1. a) Management and Administration are synonyms (True/False) (CO1)

b) Maslow's Hierarchy of needs states ……. (CO2)

c) CPM stands for……. (CO3)

d) Which one the following is not a managerial skill [] (CO3)

i) Technical II) Commercial III) Human IV) Conceptual

2) Define supervisory management. (CO1)
3) Differentiate delegation and decentralization. (CO2)
4) List the objectives of plant Layout. (CO3)
5) Define project scheduling. (CO3)

PART-B 3 X 8=24Marks

Instructions: 1) Answer all questions
2)Each question carries 8 Marks
3)Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer

6.A. Explain the principles of management. (CO1)

(Or)

Explain the nature of management as a profession. (CO1)

7.A. Describe line, staff and functional organizations. (CO2)

(Or)

B.Explain the Concept of Job Analysis, Job Description & specification. (CO2)

8. A. Explain Break-Even Analysis. (CO3)

(Or)

B. In the table below a list of activities are there and their duration is given: (CO3)

y											
on											

(a) Prepare the network.
(b) Identify critical path.
(c) Calculate the project completion.

BOARD DIPLOMA EXAMINATIONS

DIPLOMA IN ARTIFICIAL ENGINEERING
MODEL PAPER –END EXAMINATION
Industrial Management and Entrepreneurship

SCHEME: C-20 SUBJ CODE:AI-501
MAX MARKS:80 TIME: 3HOURS

……

PART - A

Answer all the Questions. Each Question Carries 3 marks

1. Define industry, commerce and business. (CO1)
2. Write the advantages of line and staff organization. (CO2)
3. What are the types of leadership? (CO2)
4. Define the following (CO3)
   (a) Routing
   (b) Scheduling
5. State the importance of materials management (CO3)
6. Differentiate between bankcard and cardex method (CO4)
7. List any three important provisions related to safety (CO4)
8. Define the term Entrepreneur. (CO5)

9. List the financial assistance programs. (CO5)
10. State the benefits of ISO 9000 series. (CO5)

PART – B

Answer all the Questions. Each Question Carries 8 marks

11.A. Explain the principles of scientific management. (CO1)

OR

Explain the importance of managerial skills (CO1)

12.A. Define motivation. Explain Maslow's need hierarchy theory. (CO2)

or

B. Explain the types of business ownerships. (CO2)

13. A. Explain the stages of production, planning and control (CO3)

Or

B. In the table below a list of activities are there and their duration is given :(CO3)

y											
on											

(d) Prepare the network.
(e) Identify critical path.
(f) Calculate the project completion.

14. A. Explain ABC analysis with the help of neat sketch. (CO4)

Or

B. Explain the importance of maintenance management in industry. (CO4)

15. A. Explain the details of self-employment schemes. (CO5)

Or

B. Explain the role of entrepreneurs in promoting small scale industries. (CO5)

PART – C 1X10=10Marks

16. Explain the importance of safety at work place and any five causes of accidents in industry. a(CO4)

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
AI-502	Software Engineering	5	75	20	80

S.No.	Chapter/Unit Title	No. of Periods	CO's Mapped
1.	Basics of Software Engineering Designs & Life Cycle Models	10	C01
2.	Software Project Management	18	CO2
3.	Requirement Analysis & Specifications	7	CO1, C03

4.	Software Design, Coding	25	CO1, CO3, CO5
5.	Software testing, Debugging, Reliability, Quality Management & Maintenance	15	CO4, CO5
	Total Periods	75	

Course Objectives	i)To know the fundamentals of software engineering life cycle modes ii)To familiarize project managements iii)To design software projects with the help of software engineering principles and UML models

Course Outcomes	At the end of the course the student able to learn following:		
	CO1	AI-502.1	Explain Software life cycle models and basics of software engineering.
	CO2	AI-502.2	Describe Software Project Management
	CO3	AI-502.3	Prepare SRS document
	CO4	AI-502.4	Apply Design, coding& testing techniques.
	CO5	AI-502.5	Apply quality and reliability metrics

CO-PO/PSO Matrix:

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
AI-502.1	3	2	3	2	2	1	1	2	2	2
AI-502.2	3	3	3	3	1	3	2	2	2	3
AI-502.3	3	3	1		3		1	2	2	3
AI-502.4	3	3	3	3	2	2	2	2	3	3
AI-502.5	3	2	3	3	2	2	3	2	2	3
Average	3	2.6	2.6	2.6	2.75	2	1.8	2	2.2	2.8

3=strongly mapped, 2=moderately mapped, 1=slightly mapped

Learning Outcomes:

1.0 Basics of Software Engineering Designs & Life Cycle Models

1.1 Know the Evolution and Impact of the Software Engineering

1.1.1 Evolution of an Art to an Engineering Discipline

1.1.2 A Solution to the Software Crisis?

1.2Know the difference between Programs and Software Products

1.3Understand the evolution of Software Engineering Design

1.3.1 Early Computer Programming

1.3.2 High Level Language Programming

1.3.3 Control Flow-Based Design

1.3.4 Data Structure-Oriented Design

1.3.5 Data Flow-Oriented Design

1.3.6 Object Oriented Design

1.3.7 Other Developments

1.4 Explain the Software Life Cycle Models

1.4.1 Classical Waterfall Model

1.4.2 Iterative Water fall Model

1.4.3 Prototyping Model

1.4.4 Evolutionary Model

1.4.5 Spiral Model

1.4.6 Comparison of Different Life Cycle Models

2.0 Software Project Management

2.1 Know the Responsibilities of a Software Project Manager

2.4.5.1 Job Responsibilities of a Software Project Manager

2.4.5.2 Skills Necessary for Software Project Management

2.2 Know about Software Project Planning

2.2.1 The SPMP Document

2.3State the Metrics for Project Size Estimation

2.3.1 Lines of Code

2.3.2 Function Point Metric

2.4 Explain the three Project Estimation Techniques

2.4.1 Empirical Estimation Technique

2.4.2 Heuristic Technique

2.4.3 Analytical Estimation Technique

2.5. Explain the two different works of Staffing Level Estimations

2.5.1 Norden's Work

2.5.2 Putnam's Work

2.6 Understand the four ways of Scheduling

2.6.1 Work Break Down Structure

2.6.2 Activity Networks and Critical Path Method

2.6.3 Gantt Charts

2.6.4 PERT Charts

2.7 Learn how to do Staffing – "Who is a Good Software Engineer?"

2.9 Explain Risk Management

2.9.1 Risk Identification

2.9.2 Risk Assessment

2.9.3 Risk Containment

3.0 Requirement Analysis & Specifications

3.1 Requirements Gathering and Analysis

3.2 Software Requirement Specifications (SRS)

3.2.1Contents of the SRS Document

3.2.2 Functional Requirements

3.2.3 How to identify the Functional Requirements

3.3. How to Document the Functional Requirements Traceability

3.4. Characteristics of a Good SRS Document

3.5. Examples of Bad SRS Document

3.6. Organization of the SRS Document

4.0 Software Design, Coding & Testing

4.1 What is a good Software Design?

4.2 Define and Classify Cohesion and Coupling

4.2.1 Classification of Cohesiveness

4.2.2 Classification of Coupling

4.3 Know the two approaches of Software Design

4.3.1 Function-Oriented Design

4.3.2 Object-Oriented Design

4.3.3 Function-Oriented vs Object-Oriented Design

4.4. Understand the concept of User Interface Design

4.4.1 List the Characteristics of a good User Interface.

4.4.2 Understand the Basic Concepts - User Guidance and Online Help - Mode Based vs Modeless Interface -Graphical User Interface (GUI) vs Text-Based User Interface.

4.4.3 List the two types of User Interfaces - Command Language Based Interface - Menu Based Interface - Direct Manipulation Interfaces.

4.4.4 Know about Component Based GUI Development Window System and Types of Widgets.

4.5. Study the concepts of the Unified Modelling Language

4.5.1. List the goals ofUML

4.5.2. Know the role of UML in Object orientedDesign

4.5.3. List the building blocks of UML: Things, Relationships, and Diagrams

4.5.4. Explain the UML building blocks

4.5.5. Know the different symbols used in UMLnotation

4.5.6.Classify and list standard UMLdiagrams

4.6. Know the purpose of Classdiagram and draw simple class diagrams

4.7. Use casediagram

4.7.1. Define the term Use case

4.7.2. Know the purposes of Use case diagram

4.7.3. Learn to draw the Use case diagram

4.8. Interaction diagram

4.8.1. Know the purposes of Interaction diagram

4.8.2. List the types of interaction diagrams: Sequence diagram and Collaboration diagram

4.8.3. learn to draw the Interaction diagrams

5.0 learn, Quality Management & Maintenance

5.1. Understand the concept of Software Coding and Testing

5.1.4.5. Coding Standards and Guidelines - Code Review- Code Walk-Throughs - Code Inspection.

5.1.2 Clean Room Testing - Software Documentation- Software Testing

5.1.3 Know What is Testing?

5.1.4 Differentiate Verification and Validation -

5.1.5 List 3Designs of Test Cases –

5.1.6 Differentiate Testing in the Large vs Testing in the Small-

5.1.7 Understand Unit Testing - Driver and Stub Modules-

5.1.8 Understand box Testing and White Box Testing.

5.1.9 Explain Open-source software testing tools – Selenium, Bugzilla

5.2 Explain the concept of Debugging

5.2.1 Explain the Debugging Approaches.

5.2.2 List the Debugging Guidelines.

5.2.3 Program Analysis Tools - Static Analysis Tools - Dynamic Analysis Tools.

5.2.4 List and Explain the four Integration Testing's - Phases vs Incremental Integration Testing-System Testing - Performance Testing.

5.3. Understand the concept of Software Reliability

5.3.1 Differentiate Hardware Reliability and Software Reliability

5.3.2 List the different Reliability Metrics

5.3.3 Understand the Reliability Growth Modeling

5.4. Define Statistical Testing

5.5. Define Software Quality

5.6. Software Quality Management System

5.6.1 Understand the Evolution of Quality Systems

5.7. Define SEI Capability Maturity Model

COURSE CONTENT

1. Introduction to Software Engineering- Life Cycle Models.

2. Software Project Management- Responsibilities of a Software Project Manager- Project planning – Metrics-Project Estimation Techniques- Staffing Level Estimation - Scheduling – Risk Management

3. Requirement Analysis and Specification: Requirement Gathering and Analysis - SRS document

4. Software Design, Coding and Testing: Good software design, Cohesion and Coupling, Software Design Approaches, User interface Design, Software Coding and

Goals of UML - Role of UML in Object oriented Design - Building blocks of UML : Things, Relationships, and Diagrams - Symbols used in UML notation - Classify and list standard UML diagrams - Class diagram, purposes of class diagram, draw the class diagram - Use case diagram, define the term Use case, purposes of Use case diagram, draw the Use case diagram - Interaction diagram, purposes of Interaction diagram, the types of interaction diagrams : Sequence diagram and Collaboration diagram, draw the Interaction diagrams.

5. Software Testing, Debugging, Reliability, Quality Management and maintenance – Testing, Debugging software Reliability- Statistical Testing, Software Quality, Software Quality Management System, SEI capability Maturity Model

REFERENCE BOOKS

1. Fundamentals of Software Engineering – Rajab Mall (PHI)Second Edition.
2. Software Engineering - Javadekar (TMH)
3. Software Engineering Concepts - Fairley (TMH)
4. Pankaj Jalote international approach to software engineering ":2nd edition Narosal publishing house 1997
http://www.tutorialspoint.com/uml/
6.The Unified Modelling Language User guide…Grady Booch

Model Blue Print:

S.No.	Chapter/ Unit title	No. of periods	Weightage Allocated	Marks Wise Distribution of Weightage				Question wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Basics of Software Engineering Designs & Life Cycle Models	10	24	6	8			2	1		*	C01
2	Software Project Management	18	24	3	3	8	10	1	1	1	*	CO2
3	Requirement Analysis & Specifications	7	21	3	8		10	1	1		*	CO1, C03
4	Software Design, Coding	25	24	3	11		10	1	2		*	CO1, CO3, CO5
5	Software testing, Debugging,	15	17	6	11			2	2			CO4, CO5

	Reliability, Quality Management & Maintenance											
	Total	75	70+10*									

- * Only one question will be given

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1.1 to 3.6
Unit test-2	From 4.1 to 5.7

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING
MODEL PAPER
SOFTWARE ENGINEERING
UNIT TEST-1

SCHEME: C-20 SUBJ CODE:AI-502
MAX MARKS:40 TIME: 90Minutes

……

PART-A

16 Marks

Instructions:1) Answer all questions
2) First question carries 4marks, and each question of remaining carries 3marks

4.5. a) Water fountain model is not a software life cycle model (True/False) (CO1)

b) Set of instructions is ……. (CO1)

c) SPMP stands for ---------- (CO2)

d) Which one the following is not an external interface requirement [] (CO3)

i) User Interface II) Hardware Interface III) personal interface IV) Software interface

2) What is software crisis and how do you solve it? (CO1)
3) List any three job responsibilities of software project manager. (CO2)
4) Describe Lines of code? (CO2)
5) What is the purpose of Requirements Traceability? (CO3)

PART-B 3 X 8=24Marks

Instructions: 1) Answer all questions
2)Each question carries 8 Marks
3)Answer should be comprehensive and the criterion for valuation is the content but not

the length of the answer

6. a) Explain Classical water fall model in detail. (CO1)

Or

b) Explain spiral model in detail (CO1)

7. a) Explain the two different works of Staffing Level Estimations. (CO2)

Or

b) Explain Risk Management. (CO2)

8. a) Explain functional requirements in detail. (CO3)

Or

b) Explain Requirement gathering and analysis (CO3)

BOARD DIPLOMA EXAMINATION

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING
MODEL PAPER-END EXAMINATION
SOFTWARE ENGINEERING

SCHEME: C-20 SUBJ CODE:AI-502
MAX MARKS:80 TIME: 3HOURS

……

PART-A 10X3=30Marks

Note: Answer all questions

1. Define the term High Level Language Programming (CO1)

2. Write the Solution to the Software Crisis (CO1)

3. State the Responsibilities of a Software Project Manager (CO2)

4. State the Metrics for Project Size Estimation (CO2)

5. What is Requirement analysis (CO1, CO3)

6. Define Cohesion and Coupling (CO4)

7. List the Characteristics of a good User Interface (CO4)

8.List any three Debugging Guidelines (CO5)

9. Define Software Quality (CO5)

10. List the different Reliability Metrics (CO5)

PART-B 5x8=40Marks

Note: Answer all questions

14.5.A. Explain the Software Life Cycle Models? (CO1)

OR

14.5. B Differentiate Data Structure-Oriented Design and Data Flow-Oriented Design (CO1)

12.A. Explain the three Project Estimation Techniques? (CO2)

OR

12.B Explain the two different works of Staffing Level Estimations? (CO2)

13.A. Explain about Organization of the SRS Document? (CO3)

OR

13.B Explain in detail about Software Requirement Specifications? (CO1, CO3)

14.A. Explain the two approaches of Software Design? (CO4)

OR

14.B Explain the concept of Debugging? (CO5)

15.A. Explain the concept of Software Reliability? (CO5)

OR

15.B Explain in detail about Software Quality Management System? (CO5)

PART-C

1X10=10Marks

16. Develop a software project for Library management system by following Software life cycle model? (CO1, CO2, CO3,CO4, CO5)

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
AI-504	**Internet of Things**	5	75	20	80

S.No.	Chapter/Unit Title	No. of Periods	CO's Mapped
1.	Introduction of IOT	10	CO1
2.	Data Protocols	15	CO1, CO2
3.	Communication Technologies	18	CO1, CO3
4.	Wireless Sensor Networks	22	CO4
5.	Cloud Computing	10	CO1, CO5
	Total Periods	75	

Course Objectives	i)To assess the vision of IoT. ii)To classify Real World IoT applications in various Domains. iii)To understand design methodology for IoT platforms.

Course Outcomes	At the end of course student able to learn the following:		
	AI-504.1	CO1	Explain the basic concepts like usage of sensors, components and frequently used technologies of IoT from a global context
	AI-504.2	CO2	Apply Data protocols of IoT
	AI-504.3	CO3	Describe various communication technologies of IOT
	AI-504.4	CO4	Illustrate the use of sensor networks in applications of various domains
	AI-504.5	CO5	Explain Integrating IOT with cloud computing

CO-PO/PSO Matrix:

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
AI-504.1	3	1	1	2	2		3	2	2	2
AI-504.2	2	1	3	2	2	1	3	2	3	3
AI-504.3	3	1	1	2	2		3	2	3	3
AI-504.4	3	3	3	3	3	3	3	2	3	3
AI-504.5	3	2	1	2	2	3	3	3	2	3
Average	2.8	1.6	1.8	2.2	2.5	2.3	3	2.2	2.6	2.8

3=strongly mapped, 2=moderately mapped, 1=slightly mapped

Learning Outcomes:

1: Introduction of IOT

1.1. INTRODUCTION:
- 1.1.1. Define IOT and list its Features
- 1.1.2. List the components of IoT: hardware, software, technology and protocols
- 1.1.3. List Applications, various Technologies of IOT
- 1.1.4. List advantages and disadvantages of IoT
- 1.1.5. Describe various connecting technologies
- 1.1.6. Sensors
  - 1.1.6.1. Need of sensor
  - 1.1.6.2. Features of Sensors
  - 1.1.6.3. Classify Sensors based on output, on data types
- 1.1.7. Define actuator and list its types
- 1.1.8. List and explain functional Components of IOT
- 1.1.9. Explain service-oriented architecture of IOT
- 1.1.10. List IOT challenges

1.2 Various Connectivity Technologies in IOT:
- 1.2.1 6LoWPANs Technologies
  - 1.2.1.1 Features
  - 1.2.1.2 Addressing
  - 1.2.1.3 List and explain different packet formats
  - 1.2.1.4 Explain 6LoWPAN protocol stack architecture
- 1.2.2 List and Explain Routing protocols (Loading, RPL)
- 1.2.3 RFID Technologies
  - 1.2.3.1 What is RFID
  - 1.2.3.2 List the features
  - 1.2.3.3 Explain Working principle
  - 1.2.3.4 Applications

1. DATA PROTOCOLS

1.1. Message Queue Telemetry Transport (MQTT)
- 1.1.1. Define and explain MQTT
- 1.1.2. List components, Methods, Applications
- 1.1.3. Define and explain Secure MQTT

1.2. Constrained Application Protocol (CoAP)
- 1.2.1. Define and explain CoAP
- 1.2.2. List and explain CoAP message types

1.3. Extensible Messaging and Presence Protocol (XMPP)
- 1.3.1. List Features of XMPP
- 1.3.2. Explain XMPP
- 1.3.3. Describe core XMPP Technologies
- 1.3.4. List applications of XMPP

1.4. Advanced Message Queuing Protocol (AMQP)
- 1.4.1. List Features of AMQP
- 1.4.2. Explain AMQP in detail
- 1.4.3. List applications of XMPP

2. Communication Technologies

2.1. IEEE 802.15.4
2.1.1. List features of IEEE 802.15.4
2.1.2. Explain IEEE 802.15.4
2.1.3. List IEEE 802.15.4 Variants
2.1.4. List and explained 802.15.4 Types

2.2. ZIGBEE
2.2.1. What is ZIGBEE
2.2.2. List features, components, different topologies, types, applications ZIGBEE
2.2.3. Explain different topologies of ZIGBEE
2.2.4. Explain ZIGBEE types

2.3. Near field communication (NFC)
2.3.1. What is NFC
2.3.2. List types and applications of NFC
2.3.3. Explain working principle of NFC
2.3.4. Describe modes of operation of NFC

2.4. Bluetooth
2.4.1. What is the purpose of Bluetooth?
2.4.2. List features, functions, applications of Bluetooth
2.4.3. Explain Bluetooth technology in detail
2.4.4. Describe Pico Net

4Wireless Sensor Networks

4. Wireless Sensor Networks

4.1. What is Wireless Sensor Network and list its application

4.2. List and types of Sensor networks: Single Source Single Object Detection, Single Source Multiple Object Detection, Multiple Source Single Object Detection, Multiple Source Multiple Object Detection
4.3. What are the Challenges in Wireless Sensor Networks?
4.4. Explain node Behaviour in WSNs
4.5. Explain Information theoretic self- management in WSN
4.6. Applications of WSN
4.7. Explain Wireless Multimedia Sensor Networks (WMSN)
4.8. Explain Stationary Wireless Sensor Networks
4.9. Explain Mobile Wireless Sensor Networks
4.10. What is Machine to Machine Communications (M 2 M)
4.11. Lists applications, features of M2M
4.12. List and explain M2M sensor nodes
4.13. Explain Role of IOT in automation of the following applications
- 4.13.1. Health care applications
- 4.13.2. Smart Home,
- 4.13.3. Smart Cities,
- 4.13.4. Smart class rooms
- 4.13.5. Smart Energy
- 4.13.6. Smart Transportation and Mobility
- 4.13.7. Smart Factory

5. Cloud Computing

5.1. What is cloud computing, state its importance and Recent Trends in Computing
5.2. Evolution of cloud computing
5.3. Draw and explain NIST Visual Model of Cloud Computing
5.4. List features of Cloud computing
5.5. List and explain components of cloud computing
5.6. List and explain different service models in cloud computing
5.7. Compare different service models
5.8. List and explain different deployment models or types of clouds
5.9. Differentiate between private cloud and public cloud
5.10. Compare traditional data centre and Cloud storage
5.11. Describe how data is managed in cloud (DBaaS)
5.12. Explain security concepts in cloud
5.13. What is cloud simulator and List different types?

COURSE CONTENT

UNIT1: Introduction of IOT

INTRODUCTION to IOT – Definition – Applications – Technologies – Sensor features –Types – Actuator list – Components – Challenges
Connectivity technologies - 6LoWPAN –Features – Addressing –Routing
RFID – features – working principle – Applications

UNIT2: DATA PROTOCOLS

MQTT – Definition – features – components – applications – MQTT – SMQTT
CoAP- Definition – message types
XMPP – features – core technologies – applications

AMQP- Features-applications

UNIT3: Communication Technologies
IEEE 802.15.4 – features – variants – types
ZIGBEE –features – components – technologies – types – applications
NFC – types –modes – applications
Bluetooth - purpose –features - Technologies- applications

UNIT4: Wireless Sensor Networks

Wireless Sensor Networks- Applications -Types-Challenges-node Behaviour-Information theoretic self- management-Applications-WMSN-.
Stationary Wireless Sensor Networks-Mobile Wireless Sensor Networks-M 2 M-applications - features-sensor nodes- Role of IOT in automation of applications - Health care -Smart Home-Smart Cities

UNIT5: Cloud Computing

Cloud Computing-Evolution-NIST Visual Model-features -components - service models-Compare different service models-deployment models -Differentiate between private cloud - Compare traditional data centre and Cloud storage-DBaaS -security concepts - cloud simulators- applications

REFERENCE BOOKS

1)https://onlinecourses-archive.nptel.ac.in/

2) Vijay Madisetti, ArshdeepBahga, "Internet of Things: A Hands-On Approach", Orient BlackswanPvt., Ltd., New Delhi, 2015.

3) WaltenegusDargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice", A John Wiley and Sons, Ltd., Publication, 2010.

4)Jeeva Jose, "Internet of Things", (ISBN: 978-93-86173-591) KBP House,1st edition,2018.

5) Interconnecting Smart Objects with IP: The Next Internet, Jean-Philippe Vasseur, Adam Dunkels, Morgan Kuffmann

6) Designing the Internet of Things , Adrian McEwen (Author), Hakim Cassimally

7) Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems, Dr.OvidiuVermesan, Dr. Peter Friess, River Publishers

8) Internet of Things (A Hands-on-Approach) , Vijay Madisetti , ArshdeepBahga

9) 6LoWPAN: The Wireless Embedded Internet, Zach Shelby, Carsten Bormann, Wiley

10) Building the internet of things with ipv6 and mipv6, The Evolving World of M2M Communications, Daniel Minoli John Wiley & Sons

11) Recent research/white papers

Blue Print:

S.No.	Chapter/ Unit title	No.of periods	Weightage	Marks Wise Distribution of Weightage				Question wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	

1	Introduction of IOT	10	14		1	1				1		CO1
2	DATA PROTOCOLS	15	24		1	1		1			*	CO1,CO2
3	Communication Technologies	20	24		1	1				1	*	CO1, CO3
4	Wireless Sensor Networks	20	14		1	1			1		*	CO4
5	Cloud Computing	10	14	1	1				1			CO1, CO5

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1.1 to3.2
Unit test-2	From 3.3 to 5.13

DIPLOMA IN ARTIFICIAL INTELLIGENCE ENGINEERING
MODEL PAPER
Internet of Things
UNIT TEST-1

SCHEME: C-20 SUBJ CODE:AI-504
MAX MARKS:40 TIME: 90Minutes

……

PART-A **16Marks**

Instructions:1) Answer all questions
2) First question carries 4marks, and each question of remaining carries 3marks

1. a) Sensors are not used in IOT (True/False) (CO1)

b) IOT technology used in Fast Tag is---------- (CO1)

c) ----------, ----------are two of Cap message types (CO2)

d) Which one of the following is Communication Technology of IOT (CO1)

i) ZIGBEE II) XMPP III) AMQP IV) HTML

2) List any three IOT challenges (CO1)
3) List any three features of XMPP. (CO2)
4) Define Secure MQTT (CO2)
5)What is IEEE 802.15.4 (CO3)

PART-B
3X8=24Marks

Instructions: 1) Answer all questions

2)Each question carries 8 Marks
3)Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer

6. a) Explain service-oriented architecture of IOT (CO1)

Or

b) List and explain Routing protocols. (CO1)

7. a) Explain XMPP in detail (CO2)

Or

b) Explain AMQP in detail (CO2)

8. a) List and Explain IEEEE 802.15.4 types in detail (CO3)

Or

b) Explain different topologies of ZIGBEE. (CO3)

BOAR DIPLOMA EXAMINATIONS

DIPLOMA IN ARITIFICALINTELLIGENCE ENGINEERING
MODEL PAPER –END EXAMINATION
Internet of Things

SCHEME: C-20 SUBJ CODE:AI-504
MAX MARKS:80 TIME: 3HOURS

……

PART-A 10X3=30Marks

Note: Answer all questions

1. What is the need of Sensor. (CO1)

2. List any three applications of RFID (CO1)

3. Define MQTT (CO2)

4. List any three features of XMPP (CO2)

5. List IEEE 802.15.4 types (CO3)

6. List applications of Bluetooth (CO3)

7.What is Wireless Sensor Network (CO4)

8. List M2M features (CO4)

9 List features of Cloud computing (CO5)

10 What is cloud simulator (CO5)

PART-B 5x8=40Marks

Note: Answer all questions

11.A List and explain functional Components of IOT (CO1)

OR

11.B Explain 6LoWPAN protocol stack architecture (CO1)

12.A. List and explain CoAP message types (CO2)

OR

12.B Explain core XMPP Technologies (CO2)

13.A. List and explain ZIGBEE types (CO3)

OR

13.B Explain working principle of NFC (CO3)

14.A. Explain Information theoretic self- management in WSN (CO4)

OR

14.B Explain Wireless Multimedia Sensor Networks (CO4)

15.A. List and explain components of cloud computing (CO1, CO5)

OR

15.B Explain security concepts in cloud (CO1, CO5)

PART-C 1X10=10Marks

16. Explain Health care application of IOT in detail. (CO1, CO4)

Course Code	**Course title**	**No of periods/ week**	**Total no of periods**	**Marks for FA**	**Marks for SA**
AI-506	Computer Hardware & Network Maintenance Lab	06	90	40	60

S No	Chapter/ Unit Title	No. of Periods	COs Mapped
1.	**Computer Hardware**	45	CO1, CO2, CO3
2.	Computer Networking	30	CO3.CO4.CO5
3.	Network Maintenance through server	15	CO4, CO5, CO6
	Total	90	

COURSE OBJECTIVES	14. Identify all the components of mother board. 15. Modify AIOS settings as required 16. Troubleshoot desktop computer 17. Troubleshoot individual resources like keyboard, Monitor, Printers 18. Install drives, NIC cards, modems (internal, external) 19. Install network devices, design and develop network. 20. Understand Ip address classes and subnetting 21. Prepare cross and straight Ethernet cables 22. Install and configure proxy server 23. Install any network operating system and Control/maintain the network and network resources using server administration. 24. Troubleshoot the entire network 25. Setting up VPN

Course Outcomes	CO1	AI-506.1	Assemble the PC with suitable components.
	CO2	AI-506.2	Troubleshoot desktop system and individual peripheral devices.
	CO3	AI-506.3	Demonstrate configuring computer network with sub-netting
	CO4	AI-506.4	Perform user and group management techniques through Network Server
	CO5	AI-506.5	Troubleshoot the computer network.
	CO6	AI-506.6	Configure any network device.

CO-PO/PSO MATRIX

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
AI-506.1	**2**	**1**	**2**					**2**		
AI-506.2	**3**	**3**	**1**	**3**				**2**		
AI-506.3	**2**	**2**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**2**
AI-506.4	**2**	**2**	**2**			**2**	**2**	**2**		**2**
AI-506.5	**3**	**3**	**1**	**3**				**2**		

AI-506.6	**2**	**2**	**3**	**2**	**3**	**2**	**2**	**2**		**2**
Average	**2.3**	**2.2**	**2**	**2.5**	**3**	**2**	**2**	**2**	**2**	**2**

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

Learning Outcomes:

Computer Hardware

1.
   a. Identify and note down mother board, Components and Chips
   b. Identify various Internal and External slots in the mother board and clean them with blower/ Brush.
   c. Practice Inserting and Removing RAM with care
   d. Measure the Output voltages of SMPS

2. Perform various operations and modifications required for CMOSsetup.
3. Print the summary of your system Hardware and verify for correctness
4. Upgrading memory and verify the effect after upgrading.
5. Hard drive, optical drive installation.
6. How to recover lost data on hard drive.
7. Trouble shooting keyboard and monitor
   a. few keys do network.
   b. keyboard does not work at all.
   c. key continuous to repeat after being released.
   d. key produces wrong character.
   e. Power light (led) does not go on, no picture.
   f. Power LED light is on no picture power up.
   g. Power on but monitor display wrong character.
   h. Monitor flickers has wary lines.
   i. Screen goes blank 30 seconds or minute after the keyboard is left untouched
8. Printer Problems

a. laser printer:
   I. Printer never leaves warm-up mode.
   II. Paper Jam message is displayed
   III. Printed messages are distorted
   IV. RE-filling and replacing cartridge
   V. Replacing damaged drum with new one.
   VI. Perform head cleaning

b. Dot Matrix Printer
   I. Print head moves back and forth but nothing prints.
   II. Print self-test works but printing from a computer application does not work etc.,

9. Installation of Network card.
10. Dis-assembling and assembling of working desktop.

Computer Networking

11. Preparing the Ethernet cable for cross and direct connections using crimping tool and test using LAN tester.

12. Installation of a switch and connecting systems to a network switch.
13. Installation of a modem (internal, external or USB) and connecting to internet.
14. Using FTP for uploading and downloading files.
15. Installation and configuring the proxy server for internet access.
16. Setting of particular IP address to an existing terminal system
17. Installation of network operating system

Network Maintenance through server

18. Creating and managing user accounts through network server.
19. Configuration of DHCP and DNS
20. Exercise on File/Folder accessing rights for sharing
21. Exercise on remote desktop.
22. Exercise on setting up of VPN on network

The competencies and key competencies to be achieved by the student

S.No.	Name of the experiment	Objectives	Key Competencies
1	Exercise on Identification and familiarization of various components of computer system.	Identification and familiarization of various components of computer system.	❖ Identify and note down mother board, Components and Chips. ❖ Identify various Internal and External slots in the mother board and clean them with blower/ Brush. ❖ Practice Inserting and Removing RAM with care. ❖ Measure the Output voltages of SMPS.
2	Exercise on various operations and modifications required for Close-up.	Perform various operations and modifications required for CMOS setup.	❖ Identify location of CMOS battery on mother board. ❖ Know how to replace CMOS battery. ❖ Identify keyboard key for entering BIOS setup. ❖ Setup CMOS settings ❖ Check the status of CMOS settings after replacement.
3	Exercise on Print the summary of your system Hardware and verify for correctness	Print the summary of your system Hardware and verify for correctness	❖ Know how to open system summary window ❖ Check whether all the hardware peripherals are working properly or not. ❖ Know how to install device drivers ❖ Know how to enable and disable hardware peripherals. ❖ Print the hardware summary page.
4	Close-up memory	Upgrading memory and	❖ Know the location of RAM slots ❖ Know how to insert or replace RAM chips

	and verify the effect after upgrading.	verify the effect after upgrading.	❖ Check the system properties for confirming the RAM upgradation.
5	Exercise on Hard drive, optical drive installation.	Hard drive, optical drive installation.	Hard drive: ❖ Identify the Hard drive slot. ❖ Know how to remove power supply and SATA cables from Hard drive. ❖ Unscrew Hard drive from computer case ❖ Replace new Hard drive and fix it in computer case ❖ Know how to connect power supply cable and SATA cables to Hard drive ❖ Check for the working condition of new Hard Drive. Optical drive: ❖ Identify the Optical drive slot. ❖ Know how to remove power supply and SATA cables from Optical drive. ❖ Unscrew Optical drive from computer case ❖ Replace new Optical drive and fix it in computer case ❖ Know how to connect power supply cable and SATA cables to Optical drive ❖ Check for the working condition of Optical drive.
6	Exercise on recovery of lost data on hard drive.	How to recover lost data on hard drive.	❖ Verify the available recovery tools of Operating system. ❖ Know how to recover lost data on Hard drive using Restore point. ❖ Know how to recover lost data on Hard drive using Recovery Image.
7	Exercise on Trouble shooting keyboard and monitor.	Trouble shooting keyboard and monitor.	❖ few keys do not work. ❖ keyboard does not work at all. ❖ Key continuous to repeat after being released. ❖ key produces wrong character. ❖ Power light (led) does not go on, no picture. ❖ Power LED light is on no picture power up. ❖ Power on but monitor display wrong character. ❖ Monitor flickers has wary lines. ❖ Screen goes blank 30 seconds or minute after the keyboard is left untouched
8	Exercise on Printer Problems	Printer Problems	laser printer: ❖ Printer never leaves warm-up mode. ❖ Paper Jam message is displayed ❖ Printed messages are distorted ❖ RE-filling and replacing cartridge

			❖ Replacing damaged drum with new one. ❖ Perform head cleaning DMP ❖ Print head moves back and forth but nothing prints. ❖ Print self-test works but printing from a computer application does not work etc.,
9	Exercise on Installation of Network card.	Installation of Network card.	❖ Identify the slot for placing NIC card ❖ Know how to place NIC card ❖ Install required NIC driver ❖ Check for working status of NIC card
10	Exercise on Dis-assembling and assembling of working desktop.	Dis-assembling and assembling of working desktop.	❖ Identify all the peripherals of Desktop computer. ❖ Check the working condition of system before dis-assembling it. ❖ Dis-assemble all the peripherals. ❖ Assemble all the peripherals. ❖ Check the working condition of system after assembling it.
11	Exercise on Preparing the Ethernet cable for cross and direct connections using crimping tool and test using LAN tester.	Preparing the Ethernet cable for cross and direct connections using crimping tool and test using cable tester.	❖ Know the color pattern of Ethernet cable for direct connection. ❖ Prepare UTP cable for direct connection using crimping tool. ❖ Check the working condition of cable using LAN tester. ❖ Know the color pattern of Ethernet cable for cross connection. ❖ Prepare UTP cable for cross connection using crimping tool. ❖ Check the working condition of cable using LAN tester.
12	Exercise on Installation of a switch and connecting systems to a network switch.	Installation of a switch and connecting systems to a network switch	❖ Know the purpose of switch ❖ Run Ethernet cables from switch to individual computers ❖ Connect Ethernet cables of computers to switch. ❖ Check the network status of the connection in computer system.
13	Exercise on Installation of a modem (internal, external or USB) and connecting to internet.	Installation of a modem (internal, external or USB) and connecting to internet.	Internal modem ❖ Identify PCI slot for placing Internal modem ❖ Connect internal modem ❖ Install required modem driver ❖ Check for the working condition External modem ❖ Connect External modem ❖ Install required modem driver

			❖ Check for the working condition USB modem ❖ Connect USB modem ❖ Install required modem driver Check for the working condition
14	Exercise on Using FTP for uploading and downloading files.	Using FTP for uploading and downloading files.	❖ Know about FTP protocol ❖ Know how to upload file using FTP ❖ Know how to download file using FTP
15	Exercise on Installation and configuring the proxy server for internet access	Installation and configuring the proxy server for internet access	❖ Know about proxy server. ❖ Know how to install proxy server. ❖ Know how to configure proxy server.
16	Exercise on Setting of particular IP address to an existing terminal system	Setting of particular IP address to an existing terminal system	❖ Know about IP addresses ❖ Know how to set IP addresses to the computer systems in a LAN
17	Exercise on Installation of network operating system	Installation of network operating system	❖ Know about Network operating systems. ❖ Know about different network operating systems. ❖ Install any Network operating systems ❖ Configure the system with the proper settings.
18	Exercise on Creating and managing user accounts through network server.	Creating and managing user accounts through network server.	❖ Know how to create user accounts ❖ Know how to modify user accounts ❖ Know how to delete user accounts
19	Exercise on Configuration of DHCP and DNS.	Configuration of DHCP and DNS.	❖ Know about static IP address, dynamic IP address ❖ Know about DHCP ❖ Configure the DHCP ❖ Know about DNS ❖ Configure the DNS
20	Exercise on File/Folder accessing rights for	File/Folder accessing rights for sharing.	❖ Know the different accessing rights ❖ Know how to give access rights ❖ Know how to remove access rights ❖ Know how to share file/folders

	sharing		
21	Exercise on remote desktop.	Exercise on remote desktop.	❖ Know about remote login ❖ Know how to login to the remote desktop
22	Exercise on setting up of VPN on network	Exercise on setting up of VPN on network	❖ Know about VPN ❖ Know how to configure VPN service

Course Code	Course Title	No. of periods/ week	Total No. of periods	Marks for FA	Marks for SA
AI-507	**Multimedia Lab**	**3**	**45**	**40**	**60**

S.NO	**MAJOR TOPICS**	**NO. OF PERIODS**	**CO's mapped**
1	MS Access - create Database, create table with and without constraints, Insert, delete, update records, implement queries, create relationship between two tables	10	CO1
2	PageMaker - Creation of publication using tools, text, shapes, etc., Custom template, colors, text block, Objects, Styles, Page elements, Printing the documents	19	CO2
3	Telugu Software – Anu Script Manager, Usage in Page Maker, Key board acquaintance	5	CO3
4	Photoshop – Different tools, Working with Layers, Working with painting tools, Colors, Brushes	11	CO4
	TOTAL	45	

Course Objectives	(i) Familiarise with the features of MS Access. (ii) Familiarise with the features of Adobe PageMaker (iii) Familiarise with Telugu software (iv) Familiarise with the features of Adobe Photoshop

Course Outcomes	At the end of the course the student able to learn following		
	CO1	CM-507.1	Demonstrate the concepts of databases, tables, manipulating records, queries and establishing relationship among tables.
	CO2	CM-507.2	Design publication files such as Textbooks, Visiting Cards, Invitation Cards, etc. using Adobe PageMaker
	CO3	CM-507.3	Use Telugu Typing software (Anu Script Manager) in Adobe Page maker
	CO4	CM-507.4	Use the Adobe Photoshop, Design and enhance the quality all types of picture files

CO-PO/PSO MATRIX

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
AI-507.1	3	2	3	1		3	3	2		2
AI-507.2	2	2	3		2		2	2		
AI-507.3	1	1	2	3	2		2		3	
AI-507.4		3	3	2		2		2	2	2
Average	2	2	2.8	2	2	2.5	2.3	2	2.5	2

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

Learning Outcomes:

Practice with MS-Access

1. To create Database
2. To Create table with and without constraints
3. To Insert, delete, update records
4. To implement queries
5. To create relationship between two table

Practice with Adobe Page Maker

6. Exercise on Installation, invoking and familiarizing Adobe Page Maker.
7. Exercise on Page Maker Tools.
8. Exercise on pallets and formatting pages
9. Exercise on text formatting
10. Exercise on Advanced text formatting
11. Exercise on Graphics tools
12. Exercise on object transformations.
13. Exercise on colour options.

14. Exercise on graphics with layers using photoshop plug-ins
15. Exercise on import and export options.
16. Exercise on creating visiting card
17. Exercise on creating book cover page
18. Exercise on creating hotel menu card
19. Exercise on creating invitation card
20. Exercise on creating brochure
21. Exercise on Anuscript for preparing Visiting card, Brochure in Telegu.
22. Exercise on Anuscript for preparing Telegu invitation card.

Practice with Adobe Photoshop

23. Exercise on Installation, invoking and familiarizing Adobe Photoshop
24. Exercise on Images
25. Exercise on Resizing & Cropping Images
26. Exercise on Working with Basic Selections
27. Exercise on Layers
28. Exercise on Painting in Photoshop
29. Exercise on Photo Retouching
30. Exercise on Colour Correction
31. Exercise on Quick Mask Mode
32. Exercise on Pen Tool
33. Exercise on Creating Special Effects
34. Exercise on Exporting Your Work
35. Exercise on Logo Creation

Mini Project: Student has to develop a Mini project applying the skills acquired from the learning outcomes of this course.

KEY COMPETENCIES

Exp No	Name of the Experiment	Objectives	Key Competencies
1	To create database	c. Open MS Access d. Create database e. save	tabase creation
2	To create table	e. Open MS Access f. Create database g. Create table h. Use primary key	ble creation
3	To insert/delete/update records into table	g. Open Msaccess h. Create database i. Crate table j. Insert/delete/update records	le to insert/update/delete and delete and update records into the table
4	To implement queries	f. Open msaccess g. Create database Crate table h. Use Select command	le to display contents of the table based on the user requirement
5	Create relationships between tables	h. Create table i. Create one more table	le to link tables

		j. Insert records k. Use relationship option	
6	Exercise on Installation, invoking and familiarizing Adobe Page Maker.	Installation, invoking and familiarizing Adobe Page Maker.	❖ Installing page maker ❖ Familiarize with PageMaker environment
7	Exercise on Page Maker Tools.	Page Maker Tools.	❖ Using Tool box, zero position, pointer tool, text tool, rotate tool, crop tool, oblique line tool, constrained line tool, box tool, rectangle frame, circle tool, circular frame, polygon tool, polygon frame, hand tool and zoom tool,
8	Exercise on pallets and formatting pages	pallets and formatting pages	❖ Use of paper size, page size, control pallet, colour pallet, styles pallet, layers pallet, master page pallet, hyperlink pallet and measurement system, grids, rulers and guides, insert pages.
9	Exercise on text formatting	text formatting	❖ Know the purpose of master pages, placing a text, Formatting text (size, styles), Paragraph setting, tab setting, bullets, numbering, hyphenation setting, setting and creating styles, rotating text and colour to text and save the document.
10	Exercise on Advanced text formatting	Advanced text formatting	❖ use spell check, divide the text into columns, work with indexes and pagination, use the find feature and save the document.
11	Exercise on Graphics tools	Graphics tools	❖ Create a document to work with graphics with the help of line tool, box tool, ellipse tool, polygon tool, rounded corners, fill, stroke and to place various graphics (at least 2 for each graphic tool) and save the document.
12	Exercise on object transformations.	object transformations.	❖ Transform the objects such as transforming a rectangle, resizing an ellipse, inserting cropping an image.

13	Exercise on color options.	color options.	❖ Adding colour to a graphic shape, creating own colors with RGB, editing, copying, removing and replacing colors, grouping and ungrouping objects, linking objects, masking objects and save the document.
14	Exercise on graphics with layers using photoshop plug-ins	graphics with layers using photoshop plug-ins	❖ Create a document of five pages containing text and graphics and work with layers, moving objects between layers using layer options, using stacking order, using photoshop plug-ins
15	Exercise on import and export options.	import and export options.	❖ Create a new document and import text from HTML, Misword, spreadsheet, photo CD, acquiring tiff image, managing linked files, to use export options to export text and graphics to jpeg format and to print the document, to publish the document in internet and save it,
16	Exercise on creating visiting card	creating visiting card	❖ Create visiting card with text and graphics on both sides with proper formatting.
17	Exercise on creating book cover page	creating book cover page	❖ Create front and back cover page of a book with text and graphics with proper formatting.
18	Exercise on creating hotel menu card	creating hotel menu card	❖ Create a hotel menu card with text and graphics with proper formatting.
19	Exercise on creating invitation card	creating invitation card	❖ Create an invitation card with text and graphics with proper formatting for required no. of pages.
20	Exercise on creating brochure	creating brochure	❖ Create a brochure for the firms like real estate companies, hospitals, educational institutions etc.,

21	Exercise on Anuscript for preparing Visiting card, Brochure	Anuscript for preparing Visiting card, Brochure	❖ Visiting card, Brochure preparation using Anuscript in Telugu
22	Exercise on Anuscript for preparing telugu invitation card.	Anuscript for preparing telugu invitation card.	❖ Invitation card preparation using Anuscript in Telugu
23	Exercise on Installation, invoking and familiarizing Adobe Photoshop	Installation, invoking and familiarizing Adobe Photoshop	❖ Exploring the Toolbox ❖ The New CS4 Applications Bar & the Options Bar ❖ Exploring Panels & Menus ❖ Creating & viewing a New Document ❖ Customizing the Interface ❖ Setting Preferences
24	Exercise on Images	Working with Images	❖ Zooming & Panning an Image ❖ Working with Multiple Images, Rulers, Guides & Grids ❖ Undoing Steps with History ❖ Adjusting Colour with the New Adjustments Panel ❖ The New Masks Panel & Vibrance Colour Correction Command ❖ The New Note Tool & the Save for Web & Devices Interface ❖ The New Auto-Blend & Auto-Align Layers Commands ❖ The New 3D Commands
25	Exercise on RESIZING & CROPPING IMAGES	RESIZING & CROPPING IMAGES	❖ Understanding Pixels & Resolution ❖ The Image Size Command ❖ Interpolation Options ❖ Resizing for Print & Web ❖ Cropping & Straightening an Image ❖ Adjusting Canvas Size & Canvas Rotation
26	Exercise on WORKING WITH BASIC SELECTIONS	WORKING WITH BASIC SELECTIONS	❖ Selecting with the Elliptical Marquee Tool ❖ Using the Magic Wand & Free Transform Tool ❖ Selecting with the Regular & Polygonal Lasso Tools ❖ Combining Selections

			❖ Using the Magnetic Lasso Tool ❖ Using the Quick Selection Tool & Refine Edge ❖ Modifying Selections
27	Exercise on LAYERS	Working on Layers	❖ Understanding the Background Layer ❖ Creating, Selecting, Linking & Deleting Layers ❖ Locking & Merging Layers ❖ Copying Layers, Using Perspective & Layer Styles ❖ Filling & Grouping Layers ❖ Introduction to Blending Modes ❖ Blending Modes, Opacity & Fill ❖ Creating & Modifying Text
28	Exercise on PAINTING IN PHOTOSHOP	PAINTING IN PHOTOSHOP	❖ Using the Brush Tool ❖ Working with Colors & Swatches ❖ Creating & Using Gradients ❖ Creating & Working with Brushes ❖ Using the Pencil & Eraser Tools ❖ Painting with Selections
29	Exercise on PHOTO RETOUCHING	PHOTO RETOUCHING	❖ Using The Red Eye Tool ❖ The Clone Stamp Tool ❖ The Patch Tool & the Healing Brush Tool ❖ The Spot Healing Brush Tool ❖ The Colour Replacement Tool ❖ The Toning & Focus Tools ❖ Painting with History
30	Exercise on COLOR CORRECTION	COLOR CORRECTION	❖ Using Colour Spaces &Colour Modes ❖ The Variations Command ❖ The Auto Commands ❖ Adjusting Levels ❖ Adjust Curves, Non-Destructively, with Adjustment Layers
31	Exercise on QUICK MASK MODE	Using QUICK MASK MODE	❖ Using Quick Mask Options ❖ Painting a Selection ❖ Saving & Removing a Selection from the Background
32	Exercise on PEN TOOL	Working with the PEN TOOL	❖ Understanding Paths & the Pen Tool ❖ Creating Straight & Curved Paths ❖ Creating Combo Paths

			❖ Creating a Clipping Path
33	Exercise on CREATING SPECIAL EFFECTS	CREATING SPECIAL EFFECTS	❖ Getting Started with Photoshop Filters ❖ Smart Filters ❖ Creating Text Effects ❖ Applying Gradients to Text
34	Exercise on Photo Shop Credits	EXPORTING YOUR WORK	❖ Saving with Different File Formats ❖ Saving for Web & Devices ❖ Printing Options ❖ Photo shop Credits
35	Exercise on Logo Creation	Logo Creation	❖ To apply all the tools ❖ Prepare college logo ❖ Prepare logo for industry

Life Skills

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks for FA	Marks for SA
AI- 508	**Life Skills**	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

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.

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
	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.

CO4	Shows aptitude for working in teams in a stress free manner and sometimes/ very often/ mostly display leadership traits.

CO-PO Matrix

Course Code AI-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 16 -59%: Level 2 Up to 15%: Level 1
PO6	CO1, CO2, CO3, CO4	27	45%		
PO7	CO1, CO2, CO3, CO4	7	30%		

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	**Thinking** is **extremely logical** and suggested course of action is **feasibile** Shows **creativity and uniqueness** Exhibits **expert use of expression** (organizational devices and discourse markers) that denote clarity in thought.	Exhibits **courtesy to all most appropriately** with **confidence**
Very Good 8/9	**Thinking** is **clear and logical** Suggested **course of action is feasible** Shows **traces of creativity** Exhibits **good expression** (organizational devices and discourse markers) that denote clarity in thought.	Exhibits **courtesy to all to a considerable level.**
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 :**
   - 9.1 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 :***
   - 10.1 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!***

10.1Understand the need for team skills / team building

10.2Demonstrate 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.

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
AI-509	**PROJECT WORK**	6	90	40	60

Course Objectives	i)To inculcate team spirit among students ii)To apply software life cycle models iii)To the tools and deploy project

	At the end of course student able to learn the following:		
Course Outcomes	CO1	AI-509.1	Identify the hardware, software problems and their feasibility
	CO2	AI-509.2	Prepare SRS document based on gathered and analysed requirements
	CO3	AI-509.3	Design the plan document based on SRS
	CO4	AI-509.4	Code and test the software based on the design document
	CO5	AI-509.5	Practice software maintenance skills and maintaining quality and reliability
	CO6	AI-509.6	Calculate software metrics like cost, loc, scheduling, manpower and other resources.

CO-PO/PSO Matrix:

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
AI-509.1	3	2	1	3	1			2	3	
AI-509.2	3	2	3	1	2	1		2	3	2
AI-509.3	3	2	3	1	2	1		2	3	2
AI-509.4	3	2	3	3	3	1		2	3	2
AI-509.5	3		2	2	3	3	3	2	3	2
AI-509.6	3	2		2	1	3	3	2	3	2
Average	3	2	2.4	2	2.2	1.8	3	2	3	2

3=strongly mapped, 2=moderately mapped, 1=slightly mapped

LEARNING OUTCOMES

1. Identify different works to be carried out in the Project
2. Collect data relevant to the project work
3. Carryout need survey and identify the problem(project)
4. Select the most efficient software life cycle from the available choices based on preliminary investigation
5. Estimate the cost of project, technological need, computer skills, materials and other equipment
6. Prepare the plan and schedule of starting time and sequence of operations to be carried out at various stages of the project work in detail
7. Prepare SRS document
8. Design the required elements of the project work as per standard models such as UML
9. Develop the working software modules required for the project work
10. Prepare critical activities at various stages of the project work
11. Test, Debug, verify and validate the project
12. Record the results
13. Preparation of project report (and user manual if necessary) to enable the client to maintain the project

Key competencies (Guide lines)

THE PROJECT CAN BE CHOSEN FROM THE FOLLOWING DOMAINS:

1. SOFTWARE PROJECTS
    a. Web site designing
    b. Banking
    c. Income tax calculation package
    d. Examination's cell.
    e. Student database management
    f. Library management

g. Stores Management
h. Staff data management
i. Payrolls
j. Inventory Control
k. Hostel management
l. Tourism package
m. Institution management software
n. Anti-Virus software development.
o. Folder-locking.
p. Terminate stay resident systems.

2. HARDWARE and NETWORKING PROJECTS
    a. QLAN establishing
    b. Using interfacing devices
    c. Voice synthesizer
    d. Voice recognizer
    e. Printer sharer
    f. ADD ON cards or any relevant

3. SOFTWARE AND HARDWARE PROJECTS
    b. Using interfaces, microcontrollers. Microprocessors and PCs
    c. Inter-cum
    d. Assembling computer along with peripherals.
    e. Traffic light controller
    f. Stepper motor related
    g. Lift controllers
    h. Level controllers
    i. Temperature controllers

4. To develop above projects and deploy in cloud platform

5. To develop IOT based applications

6. To maintain the software products based on the ever-changing needs of and quality measures required by the clients

7. To develop Artificial Intelligence related projects like chatbot
    a. Create virtual help desk assistant
    b. Create virtual tutor or teacher
    c. Create virtual driving assistant
    d. Create virtual email, complaints, or content distributor
    e. Create virtual home assistant
    f. Create virtual operations assistant
    g. Create virtual entertainment assistant
    h. Create virtual phone assistant
    i. Create a Greetings chatbot
    j. Create a chatbot to find the distance between two areas using google maps.
    k. Create a Iscan chatbot
    l. Create a chatbot for booking bus ticket
    m. Create a chatbot for booking Train ticket
    n. Create a weather chatbot

o. Create a admissions conversation bot
p. Create a virtual Reception chatbot
q. Creating Banking assistant chatbot
r. Create virtual assistant bot using Alexa.
s. Trouble external API programs in chatbot
t. Building a Conversational AI Chatbot with AWS Lambda Function
u. Building a Conversational AI Chatbot with Amazon EFS
v. Practice working with Lambdas
w. Installing Node and NPM

Evaluation Scheme for the Project Work

S. No.	Tasks	Max. Marks Allotted for each task INTERNAL /EXTERNAL (40+60=100)
1.	Feasibility study of the problem	4/6
2.	Requirement Analysis of the problem, SRS document preparation	4/8
3.	Designing the problem	6/10
4.	Implementation	8/10
5.	Testing and verification	10 /16
6.	Project report preparation and presentation	8/10
	Total:	**40/60 (100)**

C-20 DAIE 6th Semester

INDUSTRIAL TRAINING (In-house/Industry)

Course Code	Course title	No of periods/week	Duration	Marks for FA	Marks for SA
AI-601	**INDUSTRIAL TRAINING (In-house/Industry)**	42	6 months	240	60

S No	Unit Title	Duration	COs Mapped
1	Application of Knowledge acquired.	1 month	CO1
2	Skill Acquirement.	2 months	CO2
3	Participate in product development.	2 months	CO3
4	Perform onsite service.	1 month	CO4
	Total	6 months	

Course Objectives	1.Expose to real time working environment 2. Enhance knowledge and skill already learnt in the institution 3. Acquire the required skills in SDLC phases. 4. Instil the good qualities of integrity, responsibility and self confidence.

CO No		**COURSE OUTCOMES**
CO1	**CM-601.1**	Analyse the task/problem based on knowledge and skill already learnt about Software Life Cycle phases in the institution.
CO2	**CM-601.2**	Perform design, coding, testing of the product.
CO3	**CM-601.3**	Regulate product development, quality testing and maintenance production by exhibiting the strength, teamwork spirit and self-confidence
CO4	**CM-601.4**	Prepare product document, gain the skills in deploying product at customer site, training the end user, maintaining the system.

CO-PO/PSO MATRIX

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CM-601.1	3					3		3	3	
CM-601.2	3			2	3	3	3	3	3	
CM-601.3	3	3	3	3	3	3	3	3	3	3
CM-601.4	3	3	3	3	3	3	3	3	3	3

Average	3	3	3	2.7	3	3	3	3	3	3

3=strongly mapped
2=moderately mapped
1=slightly mapped

LEARNING OUTCOMES :

	At the end of the Industrial training the student shall be able to perform the following skills		
Training module no.	**Topic**	**Skills to be acquired**	**No. Of weeks**
Module 1	**Problem Study& Analysis**	1. Select a task / problem related to Artificial Intelligence. 2. Analyse the problem 3. Identity the I/O & Processing. 4. Identify the scope of any existing systems. 5. Determine the objectives for the proposed new system. 6. Identify funding and resources. 7. Judge the feasibility of the task. 8. Gather and analyse the requirements from the user. 9. Prepare the Software Requirements Specification (SRS) document. 10. Set the project schedule at various time frames	**04**
Module 2	**Planning**	1. Prepare Design/plan document for overall system architecture based on SRS. 2. Subdivide the components of design 3. Apply Traceability 4. Arrange required hardware and software resources based on plan document. 5. Install required Software. 6. Write simple programs	**04**
Module 3	**Coding & Testing**	1. Follow coding guidelines. 2. Prepare the code as per the design using modular programming as units. 3. Repeat Traceability. 4. Prepare the testing document with different test cases. 5. Test& Debug independent units of code 6. Test & Debug dependent units of code 7. Repeat Traceability.	**10**
Module 4	**Integration Testing**	1. Combine some units to conduct modular testing. 2. Combine all units to conduct integrated testing. 3. Verify and validate the system. 4. Prepare the testing document.	**03**
ModuleDemonstrate5	**Software Deployment**	1. Check that the requirements are met by conducting System Testing 2. Check that customer/end user satisfies with the	**02**

		Software product by conducting Acceptance Testing 3. Prepare Site for deploying Software product 4. Deploy the Software at the customer site.	
Module 6	**Product maintenance**	1. operation of the system. 2. Provide security enforcement. 3. Provide maintenance to the system after installation. 4. Explain customer relationship importance	**01**
		TOTAL NUMBER OF WEEKS	**24**

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Scheme of Evaluation

SI.No.	**Subject**	**Duration**	**Scheme of Evaluation**		
			Item	**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 the Industry (After 20 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 Learning Outcomes during first and second assessment

Sl.No	**Learning Outcome**	**Max Marks Allotted For first assessment**	**Max Marks Allotted For second assessment**
1	Apply knowledge and skill already learnt about Software Life Cycle phases in the institution to gather and analyse	**50**	

	requirements of the task.		
2	Acquire the required skills of preparing the design/ plan based on SRS document.	**50**	**10**
3	Acquire the required skills of preparing the Software code and testing of the Software Product.	**20**	**50**
4	Involve in product quality testing and maintenance production by exhibiting the strength, teamwork spirit and self-confidence.		**30**
5	Prepare product document, gain the skills in deploying product at customer site, training the end user, maintaining the system.	-	**30**
	Total	120	120

GUIDELINES FOR INDUSTRIAL TRAINING OF DIPLOMA IN ARTIFICAL INTELLIGENCE ENGINEERING PROGRAMME

- Duration of the training: 6 months.
- Eligibility: The As per SBTET norms
- Training Area: Students can be trained in either in In-house/Industry/Cisco CCNA certification
- The Industrial Training shall carry maximum 300 marks
- Pass mark is 50% in assessment at industry (first and second assessment put together) and also 50% in final summative assessment at the institution level
- Formative assessment at industry level shall be carried out by the representative of the industry, where the student is undergoing training and the faculty from the concerned section in the institution.

- If the student fails to secure 50% marks in assessment at industry (first and second assessment put together), the student should reappear for 6 months industrial training at his/her own expenses.
- 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.
- Final summative assessment at institution level is done by both internal, external examiners and faculty members who assessed the students during industrial training.
- During industrial training the candidate should maintain a minimum of 90% attendance.

- If the student fails to secure 90% attendance during industrial training, the student should reappear for 6 months industrial training at his/her own expenses.