

**C21\_ Curriculum**  
**DIPLOMA IN MINING ENGINEERING**



**OFFERED BY**  
**STATE BOARD OF TECHNICAL EDUCATION & TRAINING,**  
**TELANGANA: HYDERABAD**

## I SEMESTER

	Course Code	Course Name	Teaching Scheme					Examination Scheme							
			Instruction periods per week			Total Periods per semester	Credits	Continuous internal Evaluation(CIE)			Semester end examination (SEE)				
			L	T	P			Mid Sem1	Mid Sem 2	Internal Evaluation	Max marks Min marks	Total Marks	Min marks for passing including CIE		
1	HU-101	Basic English	4	1	0	75	3	20	20	20	40	14	100	35	
2	SC-102	Basic Engineering Mathematics	4	1	0	75	3	20	20	20	40	14	100	35	
3	SC-103	Basic Physics	4	1	0	75	3	20	20	20	40	14	100	35	
4	SC-104	General Engineering Chemistry	4	1	0	75	3	20	20	20	40	14	100	35	
5	MN-105	Basics of Mining Engineering	4	1	0	75	3	20	20	20	40	14	100	35	
6	ME-106	Basic Engineering Drawing	1	0	2	45	1.5	20	20	20	40	20	100	50	
7	ME-107	Basic Auto Cad Lab	1	0	2	45	1.5	20	20	20	40	20	100	50	
8	MN-108	Basic Mining Workshop Lab	1	0	2	45	1.5	20	20	20	40	20	100	50	
9	SC-109	Basic Science Lab	1	0	2	45	1.5	20	20	20	40	20	100	50	
10	CS-110	Basic Computer Science Lab	1	0	2	45	1.5	20	20	20	40	20	100	50	
11	MN-111	Skill Upgradation	0	0	8	120	2.5	0	0	<b>Rubrics</b>		--	-		
Activities: student performance is to be assessed through Rubrics															

## HU-101 - Basic English

Course Title	Basic English	Course Code	HU-101
Semester	I	Course Group	Foundation
Teaching Scheme in Minutes (L:T)	4:1:0	Credits	3
Methodology	Communicative Language Teaching + Assignments	Total Contact Hours	75
CIE	60 Marks	SEE	40 Marks

**Prerequisites:** Basic knowledge of English Language

### COURSE CONTENTS

#### MODULE 1: VOCABULARY

**Duration: 12 Periods – ( L 8 P 4 )**

1. How to Use a Dictionary
  - a) How to locate a word
  - b) Different kinds of dictionaries
  - c) Uses of dictionaries and digital dictionaries
2. Building Vocabulary
  - a) Words from other languages – Greek, Latin, French, Sanskrit, Hindi, and Telugu.
  - b) Words from names of people (Eponyms) with focus on terms used in science and technology.
  - c) Word Forms – Focus on words from Science and Technology.
3. Words Often Confused
  - a) Homonyms, Homophones.
  - b) Heteronyms, Heterophones
  - c) Capitonyms

#### MODULE 2: READING

**Duration: 12 Periods – ( L 8 P 4 )**

1. Purpose of Reading
2. Types of Reading
3. Types of Paragraphs and Questions (F I V E )

#### MODULE 3: SPEAKING

**Duration: 12 Periods – ( L 8 P 4 )**

1. Need for English
2. Classroom English

3. Expressing Feelings
4. Expressing Likes & Dislikes
5. Making Requests
6. How to Introduce Oneself
7. Expressing obligations.

**MODULE 4: GRAMMAR I**

**Duration: 12 Periods – ( L 8 P 4 )**

1. Basic Sentence Patterns
2. Tenses
3. Voice

**MODULE 5: GRAMMAR II**

**Duration: 15 Periods – ( L 10 P 5 )**

1. Adjectives
2. Prepositions
3. Asking Questions

**MODULE 6: WRITING**

**Duration: 12 Periods – ( L 8 P 4 )**

1. Paragraph Writing – I
2. Paragraph Writing – II
3. Letter Writing – I
4. Letter Writing – II

**COURSE OUTCOMES**

<b>No.</b>	At the end of the course, the students will have the ability to:
<b>101.1</b>	Use a dictionary and acquire vocabulary for social interaction.
<b>101.2</b>	Comprehend, identify main ideas, make inferences, visualize, and answer questions. Analyze and evaluate the written material.
<b>101.3</b>	Speak and write grammatically correct sentences, communicate effectively, express their likes, dislikes, feelings, make requests, express obligations and introduce themselves.
<b>101.4</b>	Use verbs in the different tenses according to the situations. Use Voice to express an action clearly
<b>101.5</b>	Describe people and objects, ask questions, use prepositions and write grammatically correct sentences.
<b>101.6</b>	Convey ideas in the form of paragraphs and letters

**CO-PO Matrix**

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	Mapping POs
101.1	-	-	-	-	3		3	5,7
101.2	-	-	-	-	3	2	3	5,6,7
101.3	-	-	-	-	3	3	3	5,6,7
101.4	-	-	-	-	2	2	3	5,6,7
101.5	-	-	-	-	2	2	3	5,6,7
101.6		-	--	--	2		3	5,7

Test	Units	Marks	Pattern
<b>Mid Sem- I</b>	1. Vocabulary 2. Reading	20	Part A: 4 short answer questions Part B: 2 short essay questions with internal choice Part C: 2 essay questions with internal choice
<b>Mid Sem - II</b>	1. Speaking 2. Grammar-1	20	Part A: 4 short answer questions Part B: 2 short essay questions with internal choice Part C: 2 essay questions with internal choice
<b>Slip Test 1</b>	1. Vocabulary 2. Reading	5	2 questions out of 3 questions
<b>Slip Test 2</b>	1. Speaking 2. Grammar-1	5	2 questions out of 3 questions
<b>Assignment</b>	One assignment per one semester	5	Different assignments of higher order questions that develop problem solving skills and critical thinking should be given
<b>Seminars</b>	One seminar per one semester	5	Oral presentations using audio–visual equipment, charts, etc.
	<b>Total</b>	<b>60</b>	

MID SEM - I EXAM					
S. No.	Unit Name	R	U	A	Remarks
1	Unit - I	1, 2	5 (a) 5 (b)	7 (a) 7 (b)	
2	Unit - II	3, 4	6 (a) 6 (b)	8 (a) 8 (b)	
Total Questions		4	4	4	
MID SEM - II EXAM					
S. No.	Unit Name	R	U	A	Remarks
1	Unit - I	1, 2	5 (a) 5 (b)	7 (a) 7 (b)	
2	Unit - II	3, 4	6 (a) 6 (b)	8 (a) 8 (b)	
Total Questions		4	4	4	

SEMESTER END EXAM						
Sl. NO.	Unit No.	Question to be set for SEE			Remarks	
		R		U	A	
1	I	4	1	9 (a)	13 (a)	
2	II					
3	III		2	10 (a)	14 (a)	
4	IV					
5	V		3	5, 6	9 (b)	13 (b)
					11 (a)	15 (a)
		11 (b)			15 (b)	
6	VI		7, 8	10 (b)	14 (b)	
				12 (a)	16 (a)	
				12 (b)	16 (b)	
Total Questions		8		8	8	

**Legend:**

**Remembering: one mark**

**Understanding: three marks**

**Application: five marks**

### **Suggested Student Activities:**

- Practice conversation / dialogue / speech and answer the questions.
- Group discussions.
- Seminars.
- Review a movie.
- Review a book.
- Narrating a story.
- Chain stories.
- JAM.
- Speak about incidents /events /memories /dreams /role model.
- Interviews of famous personalities.
- Reading for main ideas and specific details.
- Summarizing.
- Picture description.
- Writing a recipe.
- Describing a process.
- Giving directions using maps.
- Surveys.
- Filling forms.
- e-mail etiquette.
- Preparing reports on field visits, experiments, projects.
- General English for competitive exams – Practice the previous year’s question papers of SSC, RRB, TS TRANSCO, TSGENCO, etc.

### **REFERENCES:**

1. Practical English Grammar by A.J Thomson and A.V. Martinet
2. A Course in Phonetics and Spoken English by J. Sethi and P.V Dhamija
3. Word Power Made Easy by Norman Lewis.
4. Keep Talking by Friederike Klippel.
5. More Grammar Games by Mario Rinvoluceri and Paul Davis.
6. Essential English Grammar by Raymond Murphy.
7. Spoken English-A Self Learning Guide to Conversation Practice by V Sasi Kumar.

### **E-learning resources:**

1. [www.duolingo.com](http://www.duolingo.com)
2. [www.bbc.co.uk](http://www.bbc.co.uk)
3. [www.babbel.com](http://www.babbel.com)
4. [www.merriam-webster.com](http://www.merriam-webster.com)
5. [www.ello.org](http://www.ello.org)
6. [www.lang-8.com](http://www.lang-8.com)

7. youtube.com
8. Hello English (app)
9. mooc.org
10. <https://onlinecourses.nptel.ac.in>
11. <https://www.indeed.com/career-advice/>
12. Dictionary.com
13. Online Dictionaries
14. <https://englishsentences.com>
15. <https://englishcub.com/vocabulary/dictionary-thesaurus.htm>
16. TEDx talks.
17. Toastmasters International on YouTube.

**BOARD DIPLOMA EXAMINATION (C-21)**  
**MID SEMESTER EXAMINATION – I**  
**HU-101-BASIC ENGLISH**

**Time: 1 Hour**

**Total Marks: 20**

**PART - A**

**1 X 4 = 4**

*Instructions: Answer all the questions. Each question carries one mark.*

1. Choose the correct guide words for the following words.

1. Pool:

- |                  |                   |
|------------------|-------------------|
| a. Play, Portico | b. Poem, Poet     |
| c. Prosper, Pull | d. Porpoise, Pout |

2. Monkey:

- |                |                |
|----------------|----------------|
| a. Money, Monk | b. Mole, Mount |
| c. Moon, Most  | d. More, move  |

2. \_\_\_\_\_ is the Unit of Electric Current in SI Units named after Andre Marie Ampere.

3. Read the following passage and answer the question.

There once was a Bald Man who sat down after work on a hot summer's day. A Fly came up and kept buzzing about his bald pate, stinging him from time to time. The Man aimed a blow at his little enemy, but his palm came on his head instead; and again the Fly tormented him. But this time the Man was wiser, and said: "You will only injure yourself if you take notice of despicable enemies."

- i) How can you say that the man has become wiser?

4. Read the following passage and answer the question.

An Eagle was soaring through the air when suddenly it heard the whizz of an Arrow, and felt itself wounded to death. Slowly it fluttered down to the earth, with its life- blood pouring out of it. Looking down upon the Arrow with which it had been pierced, it found that the shaft of the Arrow had been feathered with one of its own plumes. "Alas!" it cried, as it died. "We often give our enemies the means for our own destruction."

- i) What did the eagle discover before its death?

**PART - B**

**3 X 2 = 6**

*Instructions: Answer the following questions. Each question carries three marks*

5. a) Read the following and use correct words in the blanks.

I went to \_\_\_\_\_ (meat/ meet) the \_\_\_\_\_ (Principle / Principal) but he was on \_\_\_\_\_ (live/ leave) for a \_\_\_\_\_ (weak / week). I had to \_\_\_\_\_ (weight / wait) in the room before I was \_\_\_\_\_ (allowed / aloud) to go out.

( OR )

b) Use the following set of words in sentences of your own to express the difference in the meaning.

- i) break - brake      ii) stationery - stationary      iii) waste - waist

6. a) Read the passage and answer the questions.

When I woke up it was broad daylight and the weather had cleared. The storm abated. The Ship was lifted off at night from the sand where she lay by the tie and was driven up almost as far as the rock where I have been bruised by the dashing. As the ship was upright and within a mile, I wish to board it to save necessary things for my use.

- (i) How was the weather in the morning?  
(ii) What had happened to the ship at night?  
(iii) Why did he wish to board the ship?

( OR )

b) Read the passage and answer the questions.

O. Henry's original name was William Sidney Porter, he was born on 11th September, in 1862, Greensboro, North Carolina, U.S. He died on 5th June, 1910, New York. He was an American short story writer whose tales romanticized the commonplace - in particular the life of ordinary people in New York City. His stories expressed the effect of coincidence on character through humour, grim or ironic, and often had surprise endings, a device that became identified with his name and cost him critical favour when its vogue had passed.

- (i) Who was William Sidney Porter?  
(ii) What did his stories deal with?  
(iii) What was the name he took up to write stories?

**PART-C**

**5 X 2 = 10**

*Instructions:* Answer the following questions. Each question carries five marks

7. a) Write the basic uses of a dictionary.

( OR )

b) How will you look up the word, "Travel", in the dictionary.

8. a) Read the passage and answer the questions.

An owl is a bird. There are two basic types of owls: typical owls and bam owls. Owls live in almost every country of the world. Owls are mostly nocturnal, meaning they are awake at night. Owls are predators – they hunt the food that they eat. Owls hunt for mince and other small mammals, insects and even fish. Owls are well adapted for hunting. Their soft, fluffy feathers make their flight nearly silent. They have very good hearing which helps them to hunt well in the darkness. The sharp hooked beaks and claws of the owl makes it very easy to tear apart their prey quickly, although owls also eat some prey whole.

Owl's eyes are unusual. Like most predators, both the eyes of the owl face front. The owl cannot move its eyes. Owls are far – sighted, which means they can see very well far away.... But they can't see dose very well at all. Fortunately, their distant vision is what they use for hunting and they see far away even in low light. Owls have facial disks around their eyes, tufts of feathers in a circle around each eye. These facial disks are thought to help the Owl's hearing. Owls can turn their heads 180 degrees is all the owl needs to see what's going on all around it. Perhaps because of the Owl's mysterious appearance, especially its round eyes and flexible neck, there are a lot of myths and superstitions about Owls. Many cultures believe that Owls are unusually wise. Because owls are nocturnal, some cultures associate owls with bad omens. The screech of the bam owl is considered by many to sound early human, like a person screaming. However, owls probably do not interact with fates of human at all. In fact, some owl species may become extinct because of humans.

- (i) How can you say that an owl is a predator? List a few special features present in predators.
- (ii) What helps owls in hunting?
- (iii) Why are myths and superstitions associated with an owl?
- (iv) Pick out the words from the passage which means:
  - a) A sign of something that will happen in the future.
  - b) In a strange frightening mysterious way.
- (v) What will you do if you see an owl with owlets in your college premises?

( OR )

b) Read the passage and answer the questions.

Marie Curie was born in Poland in 1867. She was the youngest of five children. Her father was a professor. Marie won a gold medal when she graduated from high school. She and her sister did private tutoring to earn money. At Sorbonne University she studied Mathematics and Physics. She earned a master's degree in Physics and with the help of a scholarship earned a master's in Mathematics. Later she received a doctorate in Physics. She met Pierre Curie and married him in 1895. Together they discovered two new radioactive elements. They named them Polonium and Radium. They received the Nobel Prize in the year 1903 for the discovery of Radioactivity along with Hennery Becquerel. In 1911 she received another Nobel Prize for the discovery of Polonium and Radium. In 1923 the French government gave her a pension of forty thousand Francs a year in recognition of her lifetime work in France. Many people have benefited from the discoveries made by Pierre and Marie Curie.

- (i) When and where was Marie Curie born?
- (ii) Why were they awarded the Nobel Prize?
- (iii) Write the antonyms for the following words:
  - a) Benefit
  - b) Youngest
- (iv) Why did the French government give her a pension?
- (v) How can you say many people have benefitted from discoveries made by Pierre and Marie Curie?

**BOARD DIPLOMA EXAMINATION (C-21)**  
**MID SEMESTER EXAMINATION – I**  
**HU-101- BASIC ENGLISH**

**Time: 1 Hour**

**Total Marks: 20**

**PART - A**

**1 X 4 = 4**

*Instructions: Answer all the questions. Each question carries one mark.*

1. Write a sentence to express the trait you like in your friend.
2. Rewrite the sentence using a word of obligation.
  - a) The teacher advised the students to work hard in order to get good marks.
3. Read the following sentence and write the sentence pattern.
  - a) I teach students.
  - b) Farmers are hard working.
4. Fill in the blank with the appropriate form of the verb.
  - a) He \_\_\_\_\_ (live) in that house since 2015.

**PART - B**

**3 X 2 = 6**

*Instructions: Answer the following questions. Each question carries three marks.*

5.
    - a) Write one expression used by the teacher.
      - (i) When the Class is noisy.
      - (ii) When a student is distracted.
      - (iii) When a student is permitted to leave early.
- OR**
- b) Write the feelings you express in the following situations.
    - (i) The train you have been waiting for hours has been cancelled.
    - (ii) Your mother says she is proud of you.
    - (iii) You forgot that a holiday was declared and went to college.
6.
    - a) Change the voice of the following sentences.
      - (i) He eats only vegetarian food.
      - (ii) Ethical hacking has been learnt by Gaurav.
      - (iii) Submit your application.

**OR**

- b) Fill in the blanks with simple past and past continuous forms of the verbs given in the brackets.

When the children \_\_\_\_i\_\_\_\_ (Play) in the park, they \_\_\_\_ii\_\_\_\_ (hear) the whimper of a small puppy. The friends \_\_\_\_iii\_\_\_\_ (search) under the bushes and

\_\_\_\_iv\_\_\_\_ (find) a white puppy. When they \_\_\_\_v\_\_\_\_ (try) to pacify it a big dog suddenly \_\_\_\_vi\_\_\_\_ (appear).

**PART-C**

**5 X 2 = 10**

*Instructions: Answer the following questions. Each question carries five marks.*

7.

a) Write three difficulties faced by students while learning English. Give suggestion to overcome these difficulties.

**OR**

b) Write your introduction in a formal situation (You are Anish studying in class XII)

8.

a) Write a sentence using each of the given sentence patterns.

- a) S V                      b) S V O                      c) S V S C                      d) S V O OC  
e) S VIODO

**OR**

b) Write your routine using ten verbs.

**BOARD DIPLOMA EXAMINATION (C-21)**  
**END SEMESTER EXAMINATION**  
**HU-101- BASIC ENGLISH**

**Time: 2 Hours**

**Total Marks: 40**

**PART – A**

**8 X 1 = 8**

**Instructions:** *1. Answer all the questions.*

*2. Each question carries one mark.*

1. Read the sentence and capitalize the words which represent the name of a country, month:
  - a. He bought a jersey in jersey.
  - b. They may come in may.
  
2. Rewrite the following sentence in the form of a request: to a friend, to your teacher.  
Lend me your pen.
  
3. Frame “Yes” or “No” question for the following statement.  
I have understood the problem.
  
4. Write the feeling you undergo in the following situation.  
You see a small child working in a hotel at mid night while returning from a party.
  
5. Fill in the blanks with suitable prepositions.  
Sreeni was angry \_\_\_\_\_ her mother \_\_\_\_\_ not permitting her to go to a late-night party.
  
6. Write a sentence about your teacher using two adjectives.
  
7. Write the salutation written to your friend while writing a letter.
  
8. Read the given paragraph and write the topic sentence.

The white Rhino is the largest mammal weighing around 300 Kgs. It has become endangered as humans hunt it for its horns. It has a wide mouth used for grazing and is the most social of all rhino species. White rhinoceroses are found in grassland and savannah habitat. Herbivore grazers that eat grass, preferring the shortest grains, the white rhinoceros is one of the largest pure grazers. It drinks twice a day if water is available, but if conditions are dry it can live four or five days without water. It spends about half of the day eating, one third resting, and the rest of the day doing various other things.

**PART- B**

**4 X 3 = 12**

**Instructions:** *1. Answer the following questions.*

*2. Each question carries three marks.*

9.
  - a) Read the following passage and answer the questions.

During the summer holidays, I lost my phone. And for the week that I was phoneless, it felt like a disaster. I love my phone. It gives me quick access to information and allows me to constantly be looped in with my friends, to know exactly what is going on in their lives. So, when I didn't have my phone for a week, I felt a slightly sense of FOMO, or if you are not up to speed with the lingo, fear of missing out. By the end of the week, I would have got used to not having a phone and I would have enjoyed the break from social media. But there was still a lingering sense of sadness at the back of my mind that there would be conversations I had missed, messages that there would be conversations I had missed, messages that had been sent, funny videos shared and night time chats that I would probably never get to see.

- i. What felt like a disaster to the writer?
- ii. Why does the writer love his phone?
- iii. How did the writer feel without the phone?

**OR**

- b) Read the following passage and frame two "Wh" questions and one "Yes No" questions:

Dr Seuss was born on March second 1904. He was an American cartoonist and writer. His real name was Theodor Seuss Geisel. He was born in Springfield, Massachusetts. Dr Seuss liked draw and write even as child. The first book that Dr Seuss wrote was titled "And to think that I saw it on Mulberry Street". He wrote it while on a ocean voyage, returning from a trip to Europe. The rhythm of the ship's engine gave him the feeling for the poetry rhythm in the story. Dr Seuss was not a real doctor. He added the "Dr" to his name to honour his dad, who wanted Theodor to become a doctor. Even though he never became a real doctor, he did write books that helped millions of kids to read. Dr Seuss had also used other names, pen names to write books. These names include Theophrastus Seuss, Theo Le Sieg which is his real name spelled backwards, and Rosetta stone. Dr Seuss wrote more than sixty children's books including some which have been made into movies such as "The Lorax", "The Cat in the Hat", "Horton Hears a Who", and "How the Grinch Stole Christmas". He wrote lots of books for children, even though he and his wife never had children of their own. He died at age 87 in San Diego California, USA.

10.

- a) Write as directed.
  - a) Write a sentence expressing what you like about the rainy season.
  - b) Rewrite the sentence using a word of obligation:  
The Doctor told the patient to reduce the intake of salt, if he wants the healthy life.
- c) Write two hobbies you would express while giving your introduction.

**OR**

- b) Write a paragraph in 100 words about a festival you like.
- 11.
- a) Fill in the blanks with the proper order of adjectives given in brackets
- a) He ate \_\_\_\_\_ (green/ English / round / some) apples.
- b) She has \_\_\_\_\_ (lot of / old / interesting) books.
- c) My grandmother had always been \_\_\_\_\_ (slightly bend / fat / short).

**OR**

- b) Fill in the blank with adjectives or prepositions.
- Tiger is a \_\_\_\_\_ animal that lives \_\_\_\_\_ forests. It is \_\_\_\_\_ animal as it feeds \_\_\_\_\_ other animals. Tigers are very \_\_\_\_\_. The body \_\_\_\_\_ tigers is red or orange with black stripes.
- 12.
- a) Write a letter to your friend asking him to write about his college.

**OR**

- b) Write a paragraph on the importance of physical exercise.

**PART-C**

**4 X 5 = 20**

*Instructions: 1. Answer the following questions.  
2. Each question carries five marks.*

- 13.
- a) Write about five different kinds of dictionaries.

**OR**

- b) Read the following passage and write three “Wh” questions and two “yes No” questions.

One of the results of Technology and population growth is increase of pollution throughout the world. According to United Nation’s report the future of all life on earth will be endangered. If man does not control contamination of the environment, It is time, we learn the full extent of the dangers that face mankind.

For instance, here in Egypt, look at River Nile. It is strange to see how everything is thrown into it as if it were litter basket. Instead of keeping it clean and pure, we pollute it. We our-selves, not our enemies, dirty it with our own hands. Some farmers wash themselves, their clothes, their animals, their pots and pans in its water. They even throw away their dead animals, and birds into it. Some people living in cities and towns throw their old tyres and broken bottles and rusty tins into it. Factories throw their waste chemicals and garbage. In this way the Nile water gets poisoned, kills fish, poisons land, weakens crops and destroys health.

So, it would be foolish to shut our eyes to the dangers of the pollution that man causes to the very thing on which his life depends. Please keep Nile clean.

- 14.
- a) Write five problems faced by students while learning English. Write your suggestions to overcome these problems.

**OR**

- b) Write a paragraph about Covid-19 pandemic in 150 words.
15. a) Describe your favourite place using ten adjectives.

**OR**

- b) Fill in the blanks with suitable prepositions.  
He lives \_\_\_\_\_ (in / on) a beautiful cottage \_\_\_\_\_ (beside / besides) the river. There is a pathway \_\_\_\_\_ (between / among) the two flower beds leading \_\_\_\_\_ (to / from) the cottage. He has been living there \_\_\_\_\_ (since / for) his childhood.
16. a) Write a letter to your friend advising him to work hard to get good marks.

( OR )

- b) Write a letter to the editor of The Times of India about the problems faced by the students during the recent monsoon.

## SC-102-BASIC ENGINEERING MATHEMATICS

Course Title	Basic Engineering Mathematics	Course Code	SC-102
SEMESTER	I	Course Group	Foundation
Teaching Scheme in periods ( L : T : P )	4:1: 0	Credits	3 Credits
Methodology	Lecture + Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

### Pre requisites:

This course requires the basic knowledge of Algebra, Trigonometry in Mathematics at Secondary school level

### Course Outcomes: COs

At the end of the course, the student will have the ability to:

CO 1	Solve simple problems using concepts of Logarithms& Partial Fractions
CO 2	Determine the inverse of a square matrix using matrix algebra
CO 3	Calculate trigonometric ratios of allied and compound angles and Solve simple problems using concepts of multiple and sub multiple angles
CO 4	Understand the concepts of properties of triangles and determine various forms of complex numbers
CO 5	Transform sum or difference of trigonometric ratios into product and vice versa and also solve some problems in inverse trigonometric functions
CO 6	. Solve simultaneous Linear Equations using the concepts of Matrices and Determinants and solve some problems in solutions of triangles

### Course Content:

#### Algebra

#### Unit-I

**Duration: 08Periods (L: 06– T: 02)**

#### 1. Logarithms:

Definition of logarithm and its properties, natural and common logarithms; the meaning of  $e$  and exponential function, logarithm as a function and its graphical representation – Solve some simple problems.

#### 2. Partial Fractions:

Definition of Rational, proper and improper fractions of polynomials. Resolving rational fractions in to their partial fractions covering the types mentioned below:

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

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

## UNIT-II

**Duration: 16 Periods (L: 12 – T:**

**04)**

- 1. Matrices and Determinants:** Definition of matrix, types of matrices-examples, algebra of matrices-equality of two matrices, sum, difference, scalar multiplication and product of matrices. Transpose of a Matrix- Symmetric, Skew symmetric matrices- Minor, cofactor of an element-Determinant of a square matrix up to 3rd order -Laplace's expansion, properties of determinants. Singular and non-singular matrices- Adjoint and multiplicative inverse of a square matrix –related problems.

### Trigonometry:

## Unit-III

**Duration: 14 Periods (L: 12 – T:**

**02)**

- 1. Compound angles:** Formulae of Sin (A±B), Cos (A±B), Tan (A±B), Cot(A±B), and related identities with problems - Derive the values of  $\sin 15^\circ$ ,  $\cos 15^\circ$ ,  $\sin 75^\circ$ ,  $\cos 75^\circ$ ,  $\tan 15^\circ$ ,  $\tan 75^\circ$  etc.-Derive identities like  $\sin(A+B) \sin(A-B) = \sin^2 A - \sin^2 B$  etc.,
- 2. Multiple and sub multiple angles:** Trigonometric ratios of multiple angles 2A, 3A and submultiples angle A/2 with problems - Derive useful allied formulas like

$$\sin^2 A = \left( \frac{1 - \cos 2A}{2} \right) \text{ etc., - Solve simple problems using the above formulae}$$

## Unit – IV

**Duration: 10 Periods (L: 08– T:**

**2.0)**

- 1. Properties of triangles:** Statements of Sine rule, Cosine rule, Tangent rule and Projection rule and solve some simple problems using above rules

2. **Hyperbolic functions:** Definitions of hyperbolic functions – Sin h(x), Cos h(x) , Tan h(x) etc., - identities of hyperbolic functions, inverse hyperbolic functions and expression of inverse hyperbolic functions in terms of logarithms.
3. **Complex Numbers:** Definition of a complex number, Modulus and conjugate of a complex number, Arithmetic operations on complex numbers, Modulus- Amplitude (polar) form, Exponential (Euler) form of a complex number.

## Algebra & Trigonometry

### Unit – V

**Duration: 13Periods (L: 11 – T:**

**2.0)**

1. **Transformations:** Transformation of products into sums or differences and vice versa - Simple problems - Solve problems by applying these formulae to sum or difference or product
2. **Inverse trigonometric functions:** Define inverses of six trigonometric functions along with their domains and ranges - 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 - State various properties of inverse trigonometric functions and identities like  $\sin^{-1}x + \cos^{-1}x = \frac{\pi}{2}$  etc - solve simple problems. like  $\tan^{-1}x + \tan^{-1}y = \tan^{-1}\left(\frac{x+y}{1-xy}\right)$  where  $x \geq 0$ ,  $y \geq 0$ ,  $xy < 1$

### Unit – VI

**Duration: 14 Periods (L:11– T:03)**

1. **Solution of Simultaneous equations using Matrices & Determinants.:** System of linear equations in 3 Variables-Solutions by Cramer's rule, Matrix inversion method – Examples- Elementary row operations on Matrices -Gauss-Jordan method to solve a system of equations in 3 unknown variables
2. **Solutions of triangles:** Solve a triangle when (i) Three sides (SSS) (ii) Two sides and an Included angle (SAS) (iii) One side and two angles are given (SAA) - Simple problems.

## References

1. Text Book of Matrices – by Shanti Narayan
2. Plane Trigonometry - by S. L. Loney
3. NCERT Mathematics Text Books Of Class XI, XII.
4. Intermediate Mathematics Text Books (Telugu Academy)

## Suggested E-Learning references

1. [www.freebookcentre.net/mathematics/introductory-mathematics-books.html](http://www.freebookcentre.net/mathematics/introductory-mathematics-books.html)
2. E-books: [www.mathebook.net](http://www.mathebook.net)

## Suggested Learning Outcomes:

At the end of the course, the student will have the ability to:

### Algebra

#### UNIT – I

##### 1.0 Use Logarithms in engineering calculations

- 1.1 Solve some simple Logarithm problems. Using logarithm properties
- 1.2 Distinguish natural logarithms and common logarithms.
- 1.3 Explain the meaning of e and exponential function.
- 1.4 Understand logarithm as a function and its graphical representation.

##### Resolve Rational Fraction into sum of Partial Fractions in engineering problems

- 1.5 Define the following fractions of polynomials:
  - i) Rational
  - ii) Proper and
  - iii) Improper
- 1.6 Resolving rational fractions of the type mentioned below into partial fractions

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

#### UNIT – II

##### 2.0 Use Matrices for solving engineering problems:

- 2.1 Know the matrix and types of a matrix.
- 2.2 Compute sum, difference, scalar multiplication and product of matrices.
- 2.3 Know the properties of these operations such as associative, distributive, commutative properties with examples and counter examples.
- 2.4 Define the transpose of a matrix and write its properties.
- 2.5 Define symmetric and skew-symmetric matrices.

- 2.6 Resolve a square matrix into a sum of symmetric and skew-symmetric matrices with examples in all cases.
- 2.7 Define minor, co-factor of an element of a 3x3 square matrix with examples.
- 2.8 Expand the determinant of a 3 x 3 matrix using Laplace expansion formula.
- 2.9 Distinguish singular and non-singular matrices.
- 2.10 Apply the properties of determinants to solve problems.
- 2.11 Compute Adjoint and multiplicative inverse of a square matrix.

### **Trigonometry:**

### **UNIT – III**

#### **3.0 Solve simple problems on Compound Angles**

- 3.1 Understand the compound angles and able to write the formulae of Sin (A±B), Cos (A±B), Tan(A±B) and Cot(A±B)
- 3.2 Able to derive the values of Sin15<sup>0</sup>, Cos15<sup>0</sup>, Tan 15<sup>0</sup> and Sin75<sup>0</sup>, Cos75<sup>0</sup>, Tan75<sup>0</sup> etc.
- 3.3 Derive identities like Sin (A+B), Sin (A-B) = sin<sup>2</sup> A – sin<sup>2</sup>B etc.,
- 3.4 Solve simple problems on compound angles.

#### **Solve problems using the formulae for Multiple and Sub-Multiple Angles**

- 3.5 Derive the formulae of multiple angles 2A, 3A etc and sub multiple angles A/2 in terms of angle A of trigonometric functions.
- 3.6 Derive useful allied formulas like  $\sin^2 A = \left( \frac{1 - \cos 2A}{2} \right)$  etc.,
- 3.7 Solve simple problems using the above formulae

### **UNIT – IV**

#### **4.0 Appreciate Properties of triangles:**

- 4.1 Understand the sine, cosine, tangent and projection rules. Solve some simple problems

#### **Represent the Hyperbolic Functions in terms of logarithm functions**

- 4.2 Understand Sinh x, Cosh x and Tanh x and list the hyperbolic identities.
- 4.3 Represent inverse hyperbolic functions in terms of logarithms.

#### **Represent Complex numbers in various forms:**

- 4.4 Understand the complex number, its modulus, and conjugate and list their properties.

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

## UNIT – V

### 5.0 Apply Transformations for solving the problems in Trigonometry:

- 5.1 Derive the formulae on transforming sum or difference of two trigonometric ratios in to a product and vice versa- examples on these formulae.
- 5.2 Solve problems by applying these formulae to sum or difference or product of three or more terms.

### Use Inverse Trigonometric Functions for solving engineering problems:

- 5.3 Know the concept of the inverse of a trigonometric function by selecting an appropriate domain and range.
- 5.4 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.
- 5.5 State various properties of inverse trigonometric functions and identities like  $\sin^{-1}x + \cos^{-1}x = \frac{\pi}{2}$  etc.
- 5.6 Solve some problems like  $\tan^{-1}x + \tan^{-1}y = \tan^{-1}\left(\frac{x+y}{1-xy}\right)$  where  $x \geq 0, y \geq 0$   
And  $xy \leq 1$

## UNIT – VI

### 6.0 Apply Matrices and Determinants in solving system of Linear Equations:

- 6.1 Solve system of linear equations with 2 and 3 unknown variables using Cramer's rule.
- 6.2 Solve system of linear equations with 2 and 3 unknown variables by matrix inversion method
- 6.3 State elementary row operations.
- 6.4 Solve a system of linear equations in 3 unknown variables by Gauss- Jordan method

### Apply Properties of Triangles to solve a triangle.

- 6.5 Solve a triangle when
  - i. Three sides (SSS)
  - ii. Two sides and an included angle (SAS),
  - iii. One side and two angles are given (SAA).

### Suggested Student Activities

1. Student visits Library to refer Standard Books on Mathematics and collect related material.
2. Quiz
3. Group discussion
4. Surprise tests
5. Seminars
6. Home Assignments.
7. Mathematics- for preparing competitive exams and solve some arithmetical ability exam Questions

### CO / PO - MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Mapped POs
CO1	3	1					3	1,2,7
CO2	3	2					3	1,2,7
CO3	3	2					3	1,2,7
CO4	3	2					3	1,2,7
CO5	3	2					3	1,2,7
CO6	3	2					3	1,2,7

### MID SEM-I EXAM

S.No	Unit Name	R	U	A	Remarks
1	Unit-I	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-II	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

### MID SEM -II EXAM

S.No	Unit Name	R	U	A	Remarks
1	Unit-III	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-IV	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

### Semester End Examination

Sl No	Unit No.	Questions to be set for SEE			Remarks	
		R	U	A		
1	I	4	1	9(a)	13(a)	
2	II					
3	III		2	10(a)	14(a)	
4	IV					
5	V	4	3	5, 6	9(b) 11(a) 11(b)	13(b) 15(a) 15(b)
6	VI			7,8	10(b)	14(b)
					12(a) 12(b)	16(a) 16(b)
Total Questions		8	8	8		

Legend:	Remembering (R)	1 Mark
	Understanding (U)	3 Marks
	Application (A)	5 Marks

**BOARD DIPLOMA EXAMINATIONS (C21)**  
**MID SEMESTER EXAMINATIONS - I**  
**SC-102 - BASIC ENGINEERING MATHEMATICS**

**TIME: 1: 00 Hour**

**Max. Marks: 20**

**PART-A**

Instructions: 1. Answer **ALL** questions 04 X 01 = 04

2 Each question carries **ONE** mark

1. Find the value of  $\log_8 2$
2. Define Proper fraction and give an example.
3. If  $A = \begin{bmatrix} 1 & 2 \\ -2 & 3 \end{bmatrix}$  and  $B = \begin{bmatrix} 4 & -1 \\ 3 & 2 \end{bmatrix}$  Then Compute  $3A + 5B$ .
4. Find the value of  $\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix}$ .

**PART-B**

Instructions: 1. Answer All questions 02 X 03 = 06

2. Each question carries **THREE** marks

- 5.
- a) Resolve:  $\frac{x}{(x-1)(x-2)}$  into partial fractions

**OR**

- b) Find the value of  $\log_2 16 + 3\log_8 32$

6.

- a) If  $\begin{pmatrix} 2 & 1 & 2 \\ 1 & 4 & 1 \\ 1 & 3 & 2 \end{pmatrix}$ , then Compute  $A^2 + 2A - 3I$ , where **I** is a unit matrix of order 3

**OR**

- b) Find x if  $\begin{vmatrix} 1 & 0 & 0 \\ 2 & 3 & 4 \\ 5 & -6 & x \end{vmatrix} = 48$

**PART C**

Instructions: 1. Answer All questions

02 X 05 = 10

2. Each question carries **FIVE** marks

7.

a) Resolve  $\frac{9}{(x-1)(x+2)^2}$  into Partial fractions:

**OR**

b) Prove that  $\log\left(\frac{75}{60}\right) - 2\log\left(\frac{5}{9}\right) + \log\left(\frac{32}{243}\right) = \log 2$

8.

a) If  $A = \frac{1}{3} \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ -2 & 2 & -1 \end{bmatrix}$ , then show that  $A^{-1} = A^T$

**OR**

b) Show that  $\begin{vmatrix} b+c & a & a \\ b & c+a & b \\ c & c & a+b \end{vmatrix} = 4abc$ .

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**BOARD DIPLOMA EXAMINATIONS (C21)**  
**MID SEMESTER EXAMINATION**  
**SC-102- BASIC ENGINEERING MATHEMATICS**

TIME: 1: 00 Hour

Max. Marks: 20

**PART-A**

Instructions: 1. Answer **ALL** questions 04 X 01 = 04

2 Each question carries **ONE** mark

1. Write the formulae for Sin (A - B) and Cos (A - B)
2. If  $\tan A = 2$ , Find the value of  $\cos 2A$ .
3. Write the formula for Cosine rule.
4. Find the Modulus of  $\frac{2}{3+2i}$

**PART-B**

Instructions: 1. Answer All questions 02 X 03 = 06

2. Each question carries **THREE** marks

5.

a) Show that  $\frac{\cos 27^\circ + \sin 27^\circ}{\cos 27^\circ - \sin 27^\circ} = \tan 57^\circ$

**OR**

b) Prove that  $\cos 20^\circ \cos 30^\circ \cos 40^\circ \cos 80^\circ = \frac{\sqrt{3}}{16}$ .

6.

a) Write any 3 formulae from Hyperbolic functions.

**OR**

b) Find the modulus of  $\frac{1}{2+4i}$

### PART C

Instructions: 1. Answer All questions

02 X 05 = 10

2. Each question carries **FIVE** marks

7.

a) Prove that 
$$\frac{(\tan A + \sec A - 1)\cos A}{\sin A + \cos A - 1} = \frac{1 + \sin A}{\cos A}$$

**OR**

b) Prove that 
$$\cos^2 A + \cos^2 (60^\circ + A) + \cos^2 (60^\circ - A) = \frac{3}{2}$$

8.

a) Find the additive and multiplicative Inverse of  $4 + 3i$

**OR**

b) Express the complex number  $\frac{1+i}{1-i}$  in Exponential form

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**BOARD DIPLOMA EXAMINATION (C-21)**  
**SEMESTER END EXAMINATION**  
**SC-102- BASIC ENGINEERING MATHEMATICS**

Time: 2 hours

[Total Marks: 40]

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**PART-A**

Instructions: 1. Answer **ALL** questions 08 X 01 = 08

2 Each question carries **ONE** mark

1. Define proper fraction.
2. Write the formula for  $\cos(A + B)$  and  $\tan(A + B)$
3. Define solution of a triangle.
4. Find the value of  $\log_4 16$ .
5. Convert  $\sin 6\theta + \sin 8\theta$  in to product
6. If  $\sin^{-1} \frac{3}{5} = A$  then find  $\cot A$ .
7. List the elements of a triangle ABC.
8. What is the formula for the solution of triangle ABC when three sides are given

**PART-B**

Instructions: 1. Answer All questions 04 X 03 = 12

2. Each question carries **THREE** marks

9 (a) Resolve :  $\frac{9}{(x-1)(x+2)^2}$  into Partial fractions:

9 (b) Prove that  $\frac{\sin 8\theta + \sin 6\theta}{\cos 8\theta + \cos 6\theta} = \tan 7\theta$

10 (a) Express  $\frac{9}{4+3i}$  in the form of  $a + bi$ .

Or

10(b) Solve the triangle ABC with  $a=2$ ,  $A=30^\circ$ ,  $C=30^\circ$ .

11(a) Prove that  $\sin 50^\circ - \sin 70^\circ + \sin 10^\circ = 0$ .

Or

11(b) Prove that  $\tan^{-1} \frac{2}{7} + \tan^{-1} \frac{1}{5} = \tan^{-1} \frac{17}{33}$ .

12(a) Solve  $\begin{bmatrix} 3 & 2 \\ 2 & -3 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 4 \\ 7 \end{bmatrix}$ .

Or

12 (b) Find the angle C in any triangle ABC if  $b = \sqrt{2}$ ,  $c = \sqrt{3}$ ,  $B = 45^\circ$ .

**PART C**

Instructions: 1. Answer All questions

04 X 05 = 20

2. Each question carries **FIVE** marks

13(a) Find the Adjoint of the matrix  $\begin{bmatrix} 1 & 3 & 4 \\ -1 & 2 & 1 \\ 0 & 3 & 3 \end{bmatrix}$

Or

13 (b) Prove that  $\sin \theta + \sin(120^\circ + \theta) - \sin(120^\circ - \theta) = 0$

14 (a) Prove that  $\cos 6^\circ \cdot \cos 42^\circ \cdot \cos 66^\circ \cdot \cos 78^\circ = \frac{1}{6}$

(b) Solve:  $x + y + z = 6$ ,  $x + 2y + 3z = 14$ ,  $x + 4y + 9z = 3$  by using inverse Matrix method.

15(a) In any triangle ABC prove that  $\sin 2A + \sin 2B + \sin 2C = 4 \sin A \sin B \sin C$

15(b) if  $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \frac{\pi}{2}$  then prove that  $xy + yz + zx = 1$

16(a) Solve:  $x + 2y - z = -3$ ,  $3x + y + z = 4$ ,  $x - y + 2z = 6$  by Cramer's Rule.

Or

16 (b) Solve the triangle ABC with  $a = 1$ ,  $b = 2$ ,  $c = \sqrt{2}$ .

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### SC-103 BASIC PHYSICS

Course Title	Basic Physics	Course Code	SC-103
Semester	Semester-I	Course Group	Foundation
Teaching Scheme in Pds(L:T:P)	4:1:0	Credits	3
Type of course	Lecture+Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

**Pre requisites:** High School Science and Mathematics

**Course Objectives:** After studying this course, the student will be able to understand and appreciate the role of Physics in different areas of engineering and technology.

**Course outcomes:** On successful completion of the course, the student will have the ability to attain below Course Outcomes (CO):

CO1	Identify physical quantities, select their units for use in engineering solutions, and make measurements with accuracy by minimizing different types of errors.
CO2	Apply laws of Vectors as tools to solve engineering problems
CO3	Explain friction on horizontal and inclined surfaces, analyze projectile and circular motions and apply the formulation to projectiles and central forces and solve engineering problems
CO4	Explain Hooke's law, properties of fluids viz surface tension, viscosity and significance of Reynolds's number and apply Bernoulli's principle to solve engineering problems
CO5	Apply conservation laws to various energy sources
CO6	Apply Heat and thermodynamic processes and formulate to understand engineering problems

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	-	-	-	-	-	2
CO2	3	1	-	-	-	-	2
CO3	3	1	-	-	-	-	2
CO4	3	1	-	1	-	-	2
CO5	3		-	-	1	-	2
CO6	3	1	-	-	-	-	2
	3	1		1	1		2

## SC-103 - BASIC PHYSICS

### Course Contents

#### 1. UNIT - 1 UNITS, DIMENSIONS AND MEASUREMENTS

**Duration: 12 periods**

Physical quantity – Fundamental and derived quantities, unit – definitions – system of units – Advantages of S.I. units

Dimensions and dimensional formula – definitions, units and dimensional formulae for physical quantities, Dimensionless quantities, Principle of homogeneity, Applications of dimensional analysis – Checking the correctness of physical equations – conversion of unit from one system to another system – problems on density, force and energy

Error in measurement – accuracy and precision of instruments, rules for representing significant figures-Numerical problems

#### 2. UNIT – 2 VECTORS

**Duration: 13 periods**

Scalar and Vector quantities – definition and examples, representation of a vector, Classification of vectors - Proper vector, Equal vectors, Unit vector, Negative vector, null vector and Position vector, Resolution of a vector.

Lami's theorem, Parallelogram law of vectors – statement- expression for magnitude and direction of resultant vector –derivation- illustrations(working of sling and flying bird), Representation of a vector in unit vectors  $\mathbf{i}$ ,  $\mathbf{j}$  and  $\mathbf{k}$ . – numerical problems.

Scalar product of vectors- application to work done by force and power – properties of scalar product. – Numerical problems.

Vector product of vectors– Right hand thumb rule and right hand screw rule - application to torque - properties of vector product - Application to area of parallelogram and triangle -numerical problems.

#### 3. UNIT -3 MECHANICS

**Duration: 13 periods**

Concept of Friction - Normal reaction, Angle of friction, Motion of a body over a rough horizontal surface - expressions for Acceleration, Displacement, Time taken to

come to rest - derivations, inclined plane - Motion of a body over a smooth inclined plane and rough inclined plane—forces acting on the body -angle of repose, Application of friction – brake system in bicycle– numerical problems

Projectile motion – definition – examples, Horizontal projection - Oblique projection, Expression for path of a projectile in oblique projection –derivation, Maximum height, Time of ascent, Time of descent, Time of flight, Horizontal range and maximum horizontal range in oblique projection– derivations, numerical problems

Circular motion – definition of angular displacement, angular velocity, angular acceleration, frequency and time period, Relation between linear and angular velocity – derivation – related numerical problems, Central force – examples, Expressions for centripetal and centrifugal forces (no derivation), Applications of centripetal and centrifugal forces - Banking of roads and its expression, bending of cyclist and principle of centrifuge - related numerical problems.

#### **4. UNIT – 4 PROPERTIES OF MATTER**

**Duration: 12 periods**

Elasticity – Elastic body –definition - examples, Stress and Strain – definitions and expressions, types of stress and strain, elastic limit - Hooke’s law – statement – modulus of elasticity, significance of stress and strain curve -Young’s modulus – Derivation, numerical problems

Cohesive and Adhesive forces - Surface tension - Capillarity –angle of contact – definition- examples for capillarity- Formula for Surface tension based on capillarity (no derivation), effect of temperature and impurity on surface tension, applications and illustrations of surface tension, numerical problems.

Viscosity - Newton’s formula for viscous force – derivation - Coefficient of viscosity - Poiseuille’s equation (formula only), Effect of temperature on viscosity of liquids and gases, applications of viscosity, numerical problems.

Concept of fluid motion –streamline and turbulent flow, Reynold’s number, equation of continuity, Bernoulli’s theorem (only formula) and applications - related problems.

#### **5. UNIT – 5 CONSERVATION LAWS AND ENERGY SOURCES**

**Duration: 12 periods**

Work, Power and Energy – explanation, Potential Energy and Kinetic energy– examples – expressions for Potential energy and Kinetic energy– derivations, Work-Energy theorem – derivation, Law of conservation of energy – examples, Law of conservation of energy in the case of freely falling body – proof – Illustration of

conservation of energy in the case of simple pendulum, Nonrenewable and renewable energy sources – definition and applications (solar cooker, wind mill and biogas plant), Green House effect, Energy conservation (saving) methods - domestic and industrial, related problems

## **6. UNIT – 6 HEAT**

**Duration: 13 periods**

Heat – thermal expansion of solids – Coefficients of expansions, different scales of temperature- Centigrade and Fahrenheit and their relationship, Bimetallic strip – applications in daily life - electric heater thermostat- circuit breaker-iron box, Boyle’s law – statement, concept of absolute zero - Absolute scale of temperature, Charles’ laws, Ideal gas equation – derivation - value of universal gas constant ‘R’, Gas equation in terms of density, Isothermal and Adiabatic processes - Differences between isothermal and adiabatic processes, Internal energy and External work done, Expression for work done – derivation, first law of thermodynamics –application of first law to isothermal and adiabatic processes, second law of thermodynamics, specific heats of a gas, related numerical problems.

### **LEARNING OUTCOMES:**

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

### **UNITS, DIMENSIONS AND MEASUREMENTS**

- 1.1 Define Physical quantity, fundamental quantity and derived physical quantity.
- 1.2 Classify system of units (FPS, CGS, MKS and SI) and outline advantages of S.I. units.
- 1.3 Write S.I. units of physical quantities.
- 1.4 Define Dimensions and dimensional formulae of physical quantities.
- 1.5 List dimensional formulae of physical quantities.
- 1.6 List dimensionless quantities.
- 1.7 Explain Principle of homogeneity of dimensions.
- 1.8 List the applications of dimensional formulae.
- 1.9 List the limitations of dimensional analysis.
- 1.10 Apply dimensional formulae to check the correctness of physical equations and to convert a unit from one system to another system (density, force and energy).
- 1.11 Define accuracy and precision of instruments, random and systematic errors.
- 1.12 List the rules for representing significant figures.
- 1.13 Solve simple numerical problems.

### **VECTORS**

- 2.1 Define Scalar and Vector quantities with examples.

- 2.2 Represent a vector graphically and label vector characteristics.
- 2.3 Classify Vectors - Proper vector, Equal vector, Unit vector, Negative vector, Null vector and Position vector.
- 2.4 Resolve a Vector into two orthogonal components.
- 2.5 Explain Lami's theorem.
- 2.6 Explain Parallelogram law of vectors and develop expressions for magnitude and direction of resultant vector.
- 2.7 Illustrate parallelogram law of vectors (working of sling and flying bird).
- 2.8 Represent a vector in terms of unit vectors ( $\hat{i}, \hat{j}, \hat{k}$ ).
- 2.9 Explain Scalar product of vectors.
- 2.10 Apply scalar product to work done by force and power.
- 2.11 List the properties of scalar product.
- 2.12 Explain vector product of vectors.
- 2.13 Explain right hand thumb rule and right hand screw rule.
- 2.14 Apply vector product to explain torque.
- 2.15 List the properties of vector product.
- 2.16 Extend vector product to area of parallelogram and area of triangle.
- 2.17 Solve related numerical problems.

## MECHANICS

- 3.1 Explain concept of friction.
- 3.2 Explain Normal reaction and Angle of friction.
- 3.3 Derive expression for acceleration of a body on a rough horizontal surface.
- 3.4 Derive expressions for displacement and time taken to come to rest by a body over a rough horizontal surface.
- 3.5 Explain and label the forces acting on a body moving over smooth and rough inclined planes.
- 3.6 Define angle of repose.
- 3.7 Apply friction in brake system of moving vehicles such as bicycle.
- 3.8 Explain and classify Projectile motion with examples.
- 3.9 Derive expression for path of a projectile in oblique projection.
- 3.10 Develop formulae for Maximum height, Time of ascent, Time of descent, Time of flight, Horizontal range and maximum horizontal range of a projectile in oblique projection.
- 3.11 Explain circular motion and define angular displacement, angular velocity, angular acceleration, frequency and time period.
- 3.12 Develop a relation between linear velocity and angular velocity.
- 3.13 Explain Central force with examples and outline expressions for Centripetal and Centrifugal forces.
- 3.14 Apply centripetal and centrifugal forces to banking of roads, bending of cyclist and centrifuge.

3.15 Solve related numerical problems.

## **PROPERTIES OF MATTER**

- 4.1 Define Elasticity and elastic bodies with examples.
- 4.2 Define Stress and Strain with their expressions.
- 4.3 Explain types of stress and strain.
- 4.4 Define Elastic limit.
- 4.5 Explain Hooke's law.
- 4.6 Outline the significance of stress and strain curve.
- 4.7 Develop a formula for Young's modulus of a wire having circular cross-sectional area.
- 4.8 Compare Cohesive and Adhesive forces.
- 4.9 Explain Surface tension and illustrate Surface tension with examples.
- 4.10 Define capillarity and angle of contact.
- 4.11 Outline the formula for Surface tension based on capillarity ( $T = \frac{1}{2} h d \rho g$ ).
- 4.12 Effect of temperature and impurity on surface tension of a liquid.
- 4.13 Explain Viscosity.
- 4.14 Develop Newton's formula for viscous force and explain coefficient of viscosity.
- 4.15 Outline Poiseuille's equation for coefficient of viscosity.
- 4.16 Explain the effect of temperature on viscosity of liquids and gases.
- 4.17 Identify the importance of viscosity in blood flow through arteries, liquid soap, paint, lubricants and braking oil.
- 4.18 Explain Streamline flow and Turbulent flow.
- 4.19 Define Reynold's number and explain its significance.
- 4.20 Outline the Equation of Continuity and explain the terms with diagram.
- 4.21 Explain Bernoulli's theorem.
- 4.22 Apply Bernoulli's theorem to dynamic lift (aero foil lift, swing of a ball, blowing of roofs, atomizer, Bunsen burner).
- 4.23 Solve related numerical problems.

## **CONSERVATION LAWS AND ENERGY SOURCES**

- 5.1 Explain concept of Work, Power and Energy.
- 5.2 Explain Potential energy and Kinetic energy with examples.
- 5.3 Develop expressions for Potential energy and Kinetic energy.
- 5.4 State Work-Energy theorem and prove the relation.
- 5.5 State law of conservation of energy with examples.
- 5.6 Prove law of conservation of energy in the case of a freely falling body.
- 5.7 Illustrate law of conservation of energy in the case of simple pendulum.
- 5.8 Explain Non-renewable and Renewable energy sources and list the examples.
- 5.9 Explain Solar cooker, Wind mill and Biogas plant with neat diagrams.
- 5.10 Explain Green House effect.
- 5.11 List domestic and industrial energy conservation methods.

5.12 Solve related numerical problems.

## HEAT

- 6.1 Explain thermal expansion of solids and three coefficients of expansion of solids.
- 6.2 Outline Centigrade and Fahrenheit scales of temperature and relate them.
- 6.3 Explain principle of Bimetallic strip.
- 6.4 Apply principle of bimetallic strip to electric water heater thermostat, circuit breaker and iron box.
- 6.5 Explain Boyle's law in gases and its limitations.
- 6.6 Explain concept of Absolute Zero using the relations  $P_t = P_0[1 + \frac{t}{273}]$  and  $V_t = V_0[1 + \frac{t}{273}]$ .
- 6.7 Explain Absolute scale of temperature.
- 6.8 Explain Charles' laws in gases in terms of absolute temperature.
- 6.9 Develop Ideal gas equation and calculate the value of Universal gas constant.
- 6.10 Translate gas equation in terms of density.
- 6.11 Explain Isothermal and Adiabatic processes and distinguish between them.
- 6.12 Explain the terms internal energy and external work done.
- 6.13 Derive the expression for work done by the gas  $[W=P(V_2-V_1)]$ .
- 6.14 Explain first law of thermodynamics and list applications of it.
- 6.15 Apply first law of thermodynamics to isothermal and adiabatic processes.
- 6.16 Explain second law of thermodynamics and list applications of it.
- 6.17 Define specific heats and molar specific heats of a gas.
- 6.18 Solve related numerical problems.

## References:

1. Principles of Physics by N. Subrahmanyam and Brijlal, S. Chand & Co, New Delhi, edition, 1982
2. Engineering. Physics by R.K. Gaur, S.L. Gupta, Dhanpatrai Publications, New Delhi.
3. ISC Physics, Book I&II, P. Vivekanandan, DK Banerjee, S Chand, New Delhi.
4. Intermediate Physics, Vol. I&II, Telugu Academy, TS, Hyderabad.
5. Fundamentals of Physics by Halliday and Resnick.

## E-learning resources:

1. Hyper Physics website: <http://hyperphysics.phy-astr.gsu.edu/>

**MID SEM-I EXAM**

S.No	Unit Name	R	U	A	Remarks
1	Unit-I	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-II	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	
<b>MID SEM –II EXAM</b>					
S.No	Unit Name	R	U	A	Remarks
1	Unit-III	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-IV	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

**Semester End Examination**

Sl No	Unit No.	Questions to be set for SEE			Remarks		
		R	U	A			
1	I	4	1	9(a)	13(a)		
2	II			10(a)	14(a)		
3	III		3	5, 6	9(b)	13(b)	
4	IV				11(a)	15(a)	
5	V				11(b)	15(b)	
6	VI		7,8	10(b)	14(b)		
		12(a)		16(a)			
Total Questions		8	8	8			

Legend:	Remembering (R)	1 Mark
	Understanding (U)	3 Marks
	Application (A)	5 Marks

**BOARD DIPLOMA EXAMINATION (C-21)**  
**MID SEM-I**  
**FIRST SEMESTER EXAMINATION**  
**SC-103 - BASIC PHYSICS**

**Time: 1 Hour**

**Total Marks: 20**

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**PART-A**

Instructions: 1. Answer **ALL** questions.  
2. Each question carries **ONE** mark. 4X1 =4

1. Define fundamental physical quantity.
2. Write dimensional formula for work.
3. Define vector quantity.
4. Define unit vector.

**PART-B**

Instructions: 1. Answer **ALL** questions.  
2. Each question carries **THREE** marks. 2X3 =6

5. (a). Outline three applications of dimensional analysis.  
(OR)  
(b). Outline any three rules for representing significant figures.
6. (a). Explain Lami's theorem.  
(OR)  
(b). Explain right hand screw rule of vector product.

**PART-C**

Instructions: 1. Answer **ALL** questions.  
2. Each question carries **FIVE** marks. 2X5 =10

7. (a). By applying the dimensional analysis convert CGS unit of energy into SI units of energy.  
(OR)  
(b). Check the correctness of the following equations by applying Principle of homogeneity?  
1)  $s = ut + \frac{1}{2} at^2$       2)  $v^2 - u^2 = 2 as$
8. (a). Derive expression for magnitude and direction of resultant vector by applying parallelogram law of vectors.  
(OR)  
(b). Two vectors are  $\vec{A} = 3\vec{i} - 3\vec{j} + \vec{k}$  and  $\vec{B} = 4\vec{i} + 9\vec{j} + 2\vec{k}$ . Solve  $\vec{A} \times \vec{B}$

**BOARD DIPLOMA EXAMINATION (C-21)**  
**MID SEM –II**  
**FIRST SEMESTER EXAMINATION**  
**SC-103 - BASIC PHYSICS**

**Time: 1 Hour**

**Total Marks: 20**

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**PART-A**

- Instructions: 1. Answer **ALL** questions.  
2. Each question carries **ONE** mark.

4X1 =4

1. Define angle of friction.
2. Define central force.
3. Define stress.
4. Define Reynold's number.

**PART-B**

- Instructions: 1. Answer **ALL** questions.  
2. Each question carries **THREE** marks.

2X3 =6

5. (a). Explain the forces acting on the body moving up on a rough inclined plane.  
(OR)  
(b). Derive the relation between linear velocity and angular velocity.
6. (a). Explain the effect of temperature on viscosity of liquids and gases.  
(OR)  
(b). Explain Bernoulli's theorem.

**PART-C**

- Instructions: 1. Answer **ALL** questions.  
2. Each question carries **FIVE** marks.

2X5 =10

7. (a). Develop expressions for maximum height and horizontal range of a projectile in oblique motion.  
(OR)  
(b). Develop the expression for angle of banking of roads.
8. (a). Develop formula for young's modulus of a wire having circular cross-sectional area.  
(OR)  
(b). Apply Bernoulli's theorem to dynamic aero foil lift.

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**BOARD DIPLOMA EXAMINATION, (C-21)**  
**FIRST SEMESTER EXAMINATION**  
**SC-103 - BASIC PHYSICS**

Time: 2 Hours]

[Total Marks: 40

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**PART – A**

- Instructions: 1. Answer **ALL** questions.  
2. Each question carries **ONE** mark.

08X01=08

1. Define unit.
2. Define capillarity.
3. What is SI unit of power?
4. Define Hooke's law.
5. Name any one example of conservation of energy.
6. Define energy.
7. Define specific heat of a gas.
8. Define internal energy.

**PART – B**

- Instructions: 1. Answer **ALL** questions.  
2. Each question carries **THREE** marks.

04X03=12

9(a). Explain Lami's theorem.

(OR)

9(b). Explain renewable and non-renewable energy sources with example.

10(a). Explain projectile motion with example.

(OR)

10(b). Explain Boyle's law and its limitations.

11(a). Show that  $PE = mgh$

(OR)

11(b). Explain law of conservation of energy in the case of simple pendulum.

12(a). Explain first law of thermodynamics and list applications of it.

(OR)

12(b). Explain Boyle's law and its limitations.

## PART – C

- Instructions: 1. Answer **ALL** questions.  
2. Each question carries **FIVE** marks.

04X05 = 20

13(a). Develop expressions for magnitude and direction of resultant of two vectors using parallelogram law of vectors.

(OR)

13(b). Develop expression for kinetic energy of a body of mass 'm' moving with a velocity 'v'.

14(a). Develop a relation between linear velocity and angular velocity.

(OR)

14(b). apply first law of thermodynamics to isothermal and adiabatic processes.

15(a). Apply law of conservation of energy in the case of freely falling body.

(OR)

15(b). Explain Work-Energy theorem and develop the relation.

16(a). develop ideal gas equation

(OR)

16(b). Explain principle of bimetallic strip and apply it to electric water heater thermostat

## SC-104 - GENERAL ENGINEERING CHEMISTRY

Course Title	General Engineering Chemistry	Course Code	SC-104
Semester	I	Course Group	Foundation
Teaching Scheme in Periods (L:T:P)	4:1:0	Credits	3
Methodology	Lecture +Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

**Prerequisite:** Basic knowledge of chemistry in secondary education.

**Course Objectives:** After studying this course, the student will be able to understand and appreciate the role of Chemistry and environmental studies in different spheres of industries.

**Course Outcome:** On successful completion of the course, the students will have ability to attain below Course Outcomes (CO):

CO1	Understand and explain the concept of atomic structure, chemical bonding, oxidation, reduction and oxidation number and apply the knowledge to solve engineering problems.
CO2	Understand and explain concept of mole, molarity, normality and colloids and apply the knowledge in various engineering areas.
CO3	Understand and explain the different theories of acids and bases, concept of pH, buffer action and apply the knowledge to solve engineering problems.
CO4	Understand the concept of Ecosystem, Biodiversity, Green Chemistry and Management of e-waste and take measures to support sustainable development.
CO5	Understand the concept of hardness and degree of hardness of water and apply the relevant water treatment methods to solve domestic and industrial problems.
CO6	Understand the concept of electrolysis, applications of electrolysis, Faraday's Laws of Electrolysis and apply the knowledge in extraction and purification of metals used for domestic and industrial purpose.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	-	-	-	-	2
CO2	3	1	-	-	1	-	2
CO3	3	1	-	-	-	-	2
CO4	3	-	-	-	3	-	3
CO5	3	1	-	-	1	-	2
CO6	3	1	-	-	-	-	2

## COURSE CONTENTS

### **UNIT-I: Fundamentals of Chemistry**

**13 Periods**

**Atomic Structure:** Introduction – Atomic number – Mass number- Isotopes and Isobars - Bohr's Atomic Theory - Orbitals - Shapes of s, p and d orbitals – Aufbau principle - Hund's rule - Pauli's exclusion principle - Electronic configuration of elements

**Chemical Bonding:** Introduction – Electronic theory of valency - Types of chemical bonds - Ionic, Covalent, Co-ordinate covalent, Metallic and Hydrogen bonds with examples - Properties of Ionic and Covalent compounds - Types of Hydrogen bonds – Effect of hydrogen bonding on physical properties.

**Oxidation-Reduction:** Electronic concept of Oxidation, Reduction, Oxidation Number - Calculations.

### **UNIT-II: Solutions and Colloids**

**12 Periods**

Introduction - Solution – Solubility - Classification of solutions based on physical state- Atomic weight - Molecular weight ,Equivalent weight - Mole concept – Molarity – Normality - Numerical problems on mole, molarity and normality – Colloids - Types of colloids- Lyophilic and Lyophobic colloids - Protective Colloids - Gold number - Properties of Colloids - Industrial applications of colloids.

### **UNIT-III: Acids and Bases**

**13 Periods**

Introduction - Theories of acids and bases and limitations - Arrhenius theory - Bronsted - Lowry theory - Lewis acid base theory - Ionic product of water - pH and related numerical problems - Buffer solutions- buffer action - Applications of buffer solution - Ostwald's theory of indicators.

### **UNIT-IV: Environmental Science**

**12Periods**

Introduction - Environment -Scope and importance of environmental studies- Important terms -Concept of ecosystem - Producers, consumers and decomposers - Food chain - Food web - Carbon and nitrogen cycles - Biodiversity, definition and threats to Biodiversity- Forest resources- Deforestation – Green Chemistry – e-waste – Management of e-waste.

## **UNIT-V: Water Technology**

**13 Periods**

Introduction -Soft and hard water - Causes of hardness – Types of hardness - Disadvantages of hard water using in industries - Degree of hardness - Softening methods - Permutit process - Ion exchange process - Drinking water - Municipal treatment of water for drinking purpose – Osmosis - Reverse Osmosis - Advantages of Reverse osmosis – Desalination by Electro dialysis – Defluoridation – Nalgonda Technique.

## **UNIT-VI: Electrochemistry:**

**12 Periods**

Conductors, insulators, electrolytes – Types of electrolytes - Arrhenius theory of electrolytic dissociation - Electrolysis – Electrolysis of fused NaCl and aqueous NaCl – Applications of electrolysis - Faraday's laws of electrolysis- Numerical problems.

### **Reference Books:**

1. Engineering chemistry – Jain & Jain – Dhanpat Rai Publishing Company.
2. A Text book of Engineering Chemistry – S.S.Dara – S.Chand Publications.
3. Environmental Studies – A.K.De.
4. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press
5. Intermediate Chemistry I and II – Telugu Academy TS
6. Engineering chemistry – Prasanta Rath, B. Ramadevi, Ch. Venkataramana Reddy& Subhendu Chakroborty – CENGAGE

### **E - learning links:**

1. <https://iupac.org/>
2. <https://www.khanacademy.org/>
3. [www.nptel.ac.in](http://www.nptel.ac.in)
4. [www.chemguide.co.uk](http://www.chemguide.co.uk)
5. [www.visionlearning.com](http://www.visionlearning.com)

### **Specific Learning Outcomes**

**Upon completion of the course, the student will have ability to**

## **UNIT- I: FUNDAMENTALS OF CHEMISTRY**

- 1.1 Explain the concept of atomic number, mass number, isotopes and isobars
- 1.2 State the postulates of Bohr's atomic theory and its limitations
- 1.3 Define Orbital.
- 1.4 Draw and explain the shapes of s, p and d orbitals.

- 1.5 Distinguish between Orbit and Orbital
- 1.6 Make use of 1. Aufbau principle, 2. Hund's rule and 3. Pauli's exclusion principle in writing electronic configuration of elements.
- 1.7 Write the electronic configuration of elements up to atomic number 30
- 1.8 Define chemical bond.
- 1.9 Write the Postulates of Electronic theory of valency.
- 1.10 List the types of chemical bonds viz., Ionic, Covalent, Co-ordinate covalent, Metallic and Hydrogen bond.
- 1.11 Define ionic bond and explain the Ionic bond formation in NaCl, MgO, CaCl<sub>2</sub>, Na<sub>2</sub>O, K<sub>2</sub>O.
- 1.12 List and explain the properties of ionic compounds.
- 1.13 Explain covalent bond formation in Hydrogen, Oxygen, Nitrogen, Ammonia, Methane, Ethylene, and Acetylene molecules using Lewis Dot Method.
- 1.14 List and explain the properties of covalent compounds.
- 1.15 Compare the properties of ionic compounds and covalent compounds.
- 1.16 Define metallic bond and explain with free electron theory/ electron sea model.
- 1.17 Define hydrogen bond
- 1.18 Explain inter molecular hydrogen bonding in HF, H<sub>2</sub>O, NH<sub>3</sub>
- 1.19 Explain inter and intra molecular hydrogen bonding in Salicylaldehyde and Nitrophenol.
- 1.20 Explain the effect of hydrogen bonding on the boiling point.
- 1.21 Explain the effect of hydrogen bonding on solubility of alcohols
- 1.22 Understand the electronic concept of oxidation, reduction and redox reaction.
- 1.23 Define oxidation number
- 1.24 List the rules for calculation of oxidation number.
- 1.25 Apply the rules to calculate the oxidation number.

## **UNIT-II: SOLUTIONS AND COLLOIDS**

- 2.1 Define the terms 1.Solution, 2.Solute and 3.Solvent.
- 2.2 Define solubility.
- 2.3 Explain the factors effecting solubility.
- 2.4 Define aqueous solution and alcoholic solution.
- 2.5 Compare unsaturated, saturated and super saturated solutions.

- 2.6 Classify the solutions based on the physical state of solute and solvent.
- 2.7 Define atomic weight, molecular weight and equivalent weight.
- 2.8 Calculate the molecular weight and the equivalent weights of acids, bases and salts.
- 2.9 Define mole.
- 2.10 Explain mole concept and solve the numerical problems.
- 2.11 Define and explain molarity and normality.
- 2.12 Derive the relationship between molarity to normality.
- 2.13 Solve numerical problems on molarity and normality of a solution and mixture of solutions.
- 2.14 Define and explain colloids, dispersed phase and dispersion medium with examples.
- 2.15 List the types of colloids with examples.
- 2.16 Distinguish between Lyophilic Colloid and Lyophobic Colloid.
- 2.17 Understand the Protective Colloids and Gold number. (Elementary level)
- 2.18 Explain the properties of colloids: Tyndall effect, Brownian movement and Coagulation.
- 2.19 State and explain the industrial applications of colloids.

### **UNIT-III: ACIDS AND BASES**

- 3.1 Explain Arrhenius theory of acids and bases.
- 3.2 State the limitations of Arrhenius theory of acids and bases
- 3.3 Explain Bronsted - Lowry theory of acids and bases.
- 3.4 State the limitations of Bronsted - Lowry theory of acids and bases.
- 3.5 Explain Lewis theory of acids and bases.
- 3.6 List out the types of Lewis acids and bases.
- 3.7 State the limitations of Lewis theory of acids and bases.
- 3.8 Explain the ionic product of water and solve the problems.
- 3.9 Define pH and explain Sorenson's pH scale.
- 3.10 Solve the numerical problems on pH (Strong acids and bases).
- 3.11 Define buffer solutions and give examples of acidic and basic buffers.
- 3.12 State the applications of buffer solutions.
- 3.13 Explain the buffer action of acidic (acetate buffer) and basic (ammonium buffer) buffers.
- 3.14 Explain the Ostwald's theory of indicators with phenolphthalein and methyl orange indicators as an example.

## **UNIT-IV: ENVIRONMENTAL SCIENCE**

4.1 Define the term environment

4.2 Explain the importance of the following

1) Lithosphere, 2) Hydrosphere, 3) Atmosphere, 4) Biosphere,

4.3 Define and understand the following terms

i) Pollutant, ii) Contaminant iii) Pollution, iv) Receptor, v) Sink,  
vi) Particulates, vii) Threshold limit value (TLV), viii) Dissolved oxygen  
(DO), ix) BOD and x) COD

4.4 Define Ecosystem. Understand the biotic and the abiotic components of ecosystem.

4.5 Define and explain the following biotic components with examples

1) Producers, 2) Consumers and 3) Decomposers

4.6 Explain the food chain of land, aquatic and forest.

4.7 Explain the Food web.

4.8 Understand the Carbon and Nitrogen cycles.

4.9 Define and explain biodiversity

4.10 Explain the threats to biodiversity.

4.11 Explain conservation of biodiversity.

4.12 Describe the forest and list the uses of forests.

4.13 Define the deforestation and explain the causes, effects and control of deforestation.

4.14 Understand the concept of Green Chemistry – Its principles and benefits.

4.15 Define e-waste

4.16 Explain the effect of e-waste on environment.

4.17 State the effects of chemicals released from e-waste on human beings.

4.18 Explain the management of e-waste.

4.19 Understand and explain the advantage of recycling of e-waste.

## **UNIT V: WATER TECHNOLOGY**

5.1 State the various sources of water.

5.2 Define the terms soft water and hard water with examples

5.3 Define hardness of water.

5.4 Explain temporary and permanent hardness of water.

5.5 List the usual chemical compounds causing hardness (with Formulae)

5.6 Explain the disadvantages of using hard water in industries.

- 5.7 Define Degree of hardness, units of hardness in ppm , mg/L and numerical problems related to hardness.
- 5.8 Explain the methods of softening of hard water:
- a) Removal of temporary hardness by i) Boiling ii) Clark's Method
  - b) Removal of total hardness by i) Permutit process ii) Ion-Exchange process.
- 5.9 List the essential qualities of drinking water.
- 5.10 Explain Municipal treatment of water for drinking purpose.
- 5.11 Define Osmosis and Reverse Osmosis (RO).
- 5.12 List the applications and advantages of RO.
- 5.13 Explain the process of desalination of sea water by Electro dialysis.
- 5.14 Explain the process of defluoridation by using Nalgonda Technique.

## **UNIT VI: ELECTROCHEMISTRY**

- 6.1 Define the terms 1. Conductor, 2. Insulator, 3. Electrolyte and 4. Non-electrolyte
- 6.2 Types of electrolytes - strong and weak electrolytes with examples.
- 6.3 Distinguish between metallic conductors and Electrolytic conductors.
- 6.4 Explain the Arrhenius theory of electrolytic dissociation
- 6.5 Define electrolysis.
- 6.6 Explain the electrolysis of fused NaCl and aqueous NaCl (Nelson Cell).
- 6.7 Explain the applications of Electrolysis - Electrolytic refining of metal (Copper)  
- Electroplating.
- 6.8 Explain Faraday's laws of electrolysis
- 6.9 Define chemical equivalent, electrochemical equivalent.
- 6.10 Know the relationship between chemical equivalent and electrochemical equivalent
- 6.11 Solve the numerical problems based on Faraday's laws of electrolysis

## Blue Print

### MID SEM-I EXAM

S.No	Unit Name	R	U	A	Remarks
1	Unit-I	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-II	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	
<b>MID SEM –II EXAM</b>					
S.No	Unit Name	R	U	A	Remarks
1	Unit-III	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-IV	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

### Semester End Examination

Sl No	Unit No.	Questions to be set for SEE			Remarks		
		R	U	A			
1	I	4	1	9(a)	13(a)		
2	II			10(a)	14(a)		
3	III		3	5, 6	9(b)	13(b)	
4	IV				11(a)	15(a)	
5	V				11(b)	15(b)	
					7,8	10(b)	14(b)
6	VI	12(a)	16(a)				
		12(b)	16(b)				
Total Questions		8	8	8			

Legend:	Remembering (R)	1 Mark
	Understanding (U)	3 Marks
	Application (A)	5 Marks

**BOARD DIPLOMA EXAMINATIONS (C21)**  
**I SEMESTER, MIDSEM – I**  
**SC-104 - GENERAL ENGINEERING CHEMISTRY**

**Time: 1 Hour**

**Max. Marks: 20**

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**PART – A**

Instructions: Answer **all** questions. Each question carries **one** mark.  
marks

4 X 1 = 4

1. State Hund's rule.
2. Write the electronic configuration of Cr.
3. Define mole.
4. What are colloids?

**PART – B**

Instructions: Answer **the following** questions. Each question carries **three** marks

2 x 3 = 6 Marks

5. a. Draw the shapes of s and d orbitals.  
(OR)  
b. Explain the covalent bond formation in Nitrogen molecule by Lewis dot method.
6. a. Classify solutions based on their physical state.  
(OR)  
b. Compare any three properties of lyophilic and lyophobic colloids.

**PART – C**

Instructions: Answer **the following** questions. Each question carries **five** marks

2 x 5 = 10 Marks

7. a. Explain the effect of hydrogen bonding on boiling point with examples.  
(OR)  
b. What is oxidation number? Find the oxidation number of 'S' in H<sub>2</sub>SO<sub>4</sub> and 'Mn' in KMnO<sub>4</sub>.
8. a. Define molarity. Find the weight of H<sub>2</sub>SO<sub>4</sub> required to prepare 400 ml of 0.5M solution.  
(OR)  
b. Define normality. Calculate the normality of 500 ml solution containing 0.53 grams of Na<sub>2</sub>CO<sub>3</sub>.

**BOARD DIPLOMA EXAMINATIONS (C21)**  
**I SEMESTER, MIDSEM – II**  
**SC-104 - GENERAL ENGINEERING CHEMISTRY**

**Time: 1 Hour**

**Max. Marks: 20**

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**PART – A**

Instructions: i. Answer **all** questions. Each question carries **one** mark.

4 X 1 = 4 marks

1. What is conjugate acid base pair?
2. Define ionic product of water.
3. Define an ecosystem.
4. What is threshold limit value?

**PART – B**

Instructions: Answer **the following** questions. Each question carries **three** marks

2 x 3 = 6 Marks

5. a. What are the limitations of Arrhenius theory of acids and bases?  
(OR)  
b. Explain the neutralization according to Lewis theory of acids and bases with an example.
6. a. Explain the terms producers, consumers and decomposers with example.  
(OR)  
b. Explain the aquatic food chain.

**PART – C**

Instructions: Answer **the following** questions. Each question carries **five** marks

2 x 5 = 10 Marks

7. a. Define pH. Find the pH of 0.5M NaOH solution.  
(OR)  
b. What are buffer solutions? State the applications of buffer solutions.
8. a. What is Biodiversity and how to conserve the Biodiversity.  
(OR)  
b. What is deforestation? What are its consequences?

**BOARD DIPLOMA EXAMINATIONS (C21)**  
**I SEMESTER END EXAMINATION**  
**SC-104 - GENERAL ENGINEERING CHEMISTRY**

**Time: 2 Hours**

**Max. Marks: 40**

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**PART-A**

Instructions: Answer **all** questions. Each question carries **one** mark.

8 X 1 = 8 marks

1. Define atomic mass number.
2. What is biodiversity?
3. Define degree of hardness of water.
4. What are buffer solutions?
5. Define soft water and hard water.
6. Name the salts responsible for temporary hardness of water.
7. Define the terms conductor and insulator.
8. What is an electrolyte?

**PART – B**

Instructions: Answer **the following** questions. Each question carries **three** marks

4 x 3 = 12 Marks

9. a. State and explain Hund' rule.  
or  
b. Write any six essential qualities of drinking water.
10. a. Explain the terms producers, consumers and decomposers with example.  
or  
b. What are strong and weak electrolytes? Give examples.
11. a. Define reverse osmosis and state its advantages.  
or  
b. Compare temporary and permanent hardness of water.
12. a. Distinguish between metallic and electrolytic conductors.  
Or  
b. State Faraday's Laws of electrolysis.

PART – C

Instructions: Answer **the following** questions. Each question carries **five** marks 4 x 5 =20  
Marks

13. a. Find the molarity and normality of the two litres of solution containing 10.6 grams of  $\text{Na}_2\text{CO}_3$ .

or

b. Calculate the temporary and permanent hardness of water containing the following salts per litre

i.  $\text{Ca}(\text{HCO}_3)_2 = 32.4$  mg, ii.  $\text{Mg}(\text{HCO}_3)_2 = 29.2$  mg, iii.  $\text{CaSO}_4 = 13.6$  mg, iv.  $\text{MgCl}_2 = 19$  mg

14. a. Explain Lewis theory of acids and bases.

or

b. Explain the process of electrolysis of fused  $\text{NaCl}$ .

15. a. Explain the permutit process of softening of hard water with a neat diagram.

or

b. What are the disadvantages of using hard water in industries?

16. a. Explain the process of electrolytic refining of copper.

Or

b. Calculate the weight of  $\text{Al}$  deposited on the cathode if 0.5 amperes of electric current is passed through  $\text{AlCl}_3$  solution for 1 hour.

## MN-105 BASICS OF MINING ENGINEERING

Course Title	Basics of Mining Engineering	Course Code	MN-105
Semester	I	Course Group	Core
Teaching Scheme in Periods (L: T: P)	4:1:0	Credits	3
Type of course	Lecture + Assignment	Total Contact Periods	75
CIE	60	SEE	40

### Pre-requisites

This course requires the basic knowledge of Basic Physics, Mathematics and social studies at Secondary school level

### Course Objectives

To impart the knowledge of mineral deposits and to make the student learn and understand the to introduce the students to the basic concepts of Mining, System of Mining and classification

To impart knowledge on various methods of approach to mineral deposits, explosives, drilling technology, shaft sinking and mine gases

### Course Content

#### UNIT-1 Introduction to Mining

**Duration: 9 Periods (L :6 - T:3)**

State the History of mining, Contribution of mining to human civilization and national economy Indian mineral resources and world status -Various definitions of Mining- Mining operations. Modes of entry into the deposit-application, limitations. Various methods of extraction of deposits in coal, Non-coal, steps involved in extraction.

#### UNIT-2 Concepts of Mining Methods

**Duration: 10 Periods (L: 6 – T: 4)**

Definitions used in Mining methods -Out crop, Cover, over-burden, back, vein, lode, ore shoot, coal measures, pit top, pit-bank, pit-bottom, shaft-station, reserve station, rest station, mineral reserves, tunnel, cross cut, level, drive, staple pit, inset, gallery, heading, blind heading, face, dip, closures, slice, split, stook, barrier, sump, shaft, auxiliary shaft. Classification of coal seams based on the thickness depth, inclination, gassiness.

Classification of methods of working coal in respect of underground and open cast mining. Definition of terms with suitable sketches Horizon Mining; Placer Mining-Hydraulic Mining Dredging, leaching.

### **UNIT-3 Drilling Methods**

**Duration: 13Periods (L: 9 –T: 4)**

Classification of drilling methods-Principle of working, method of selection, application, limitations -Various drill tools, drill bits and their field application - flushing methods- feed mechanism. Methods of core recovery - single tube, double tube and wire-line tube barrels with sketch reasons for deviation of bore holes, bore hole survey.

### **UNIT -4 Explosives**

**Duration 17 Periods ( L:12 – T: 5)**

Uses of explosives in mining industry, classification based on strength, speed and application. Low and high explosives, their composition, properties - explosives used in underground in opencast workings, their composition. Permitted explosives, their classification- various accessories used to perform blasting operation. Procedure to carryout blasting operation in Underground mines, precautions to be taken. Methods of dealing misfire and blown out shots.

### **UNIT -5 Shaft sinking**

**Duration 13 Periods (L: 9 – T: 4)**

Purpose of Shaft Sinking, Uses, factors for selection of site, different stages of sinking through subsoil, temporary, permanent supporting, Drilling, Blasting patterns used during shaft sinking, Ventilation and lighting system while sinking shaft, special methods of shaft sinking-widening of shaft .

### **UNIT -6 Mine Gases**

**Duration 13 Periods (L: 9 – T: 4)**

Atmospheric and mine air – composition, changes, reasons Classification of mine – poisonous, inflammable and noxious, their physical and chemical properties physiological effects, occurrence.

Testing for the presence of mine gases, flames safety lamp-Principle constructional details, transfer of heat in the lamp, Accumulation and percentage tests- Listing of detectors.

### **Reference Books :**

- 1) Elements of Mining Technology- Vol-I ,D.J.Deshmukh, Denett publication
- 2) Elements of Mining Technology Vol-II , D.J.Deshmukh, Denett publication
- 3) Coal mining practice – I.C.F Statham Vol-I The Caxton Publishing Company Limited, London.

### **Suggested students activities :-**

1. Students should visit the mine and observe how the strata is being controlled under various conditions of the mine
2. Students should visit the laboratory and familiarize various methods of testing Physico mechanical properties of rock sample
3. Students should refer mining magazine in the Library and learn various new methods of controlling the strata
4. Quiz
5. Group discussion
6. Surprise test

### **e- learning Resources**

1. <http://www.miningmagazine.com/>
2. <http://www.mining-journal.com/country/india>
3. <https://www.cmpdi.co.in/publication.php>
4. [www.nptel.ac.in](http://www.nptel.ac.in)

### **Specific Learning Outcomes**

#### **1.0 Various elements of Mining and stages/phases in Mining**

- 1.1 State the History of mining.
- 1.2 Understand the contribution of Mining Activity in the cause of human civilization
- 1.3 State Contribution of mining to civilisation and national economy Indian mineral resources and world status.
- 1.4 State the role of mining engineers in industry.
- 1.5 List the various Mining Industries in the state and in the country.
- 1.6 Define the terms mine, mining, mining engineering, Ore, Ore deposits, Waste / gangue, mineral, mineral deposits.
- 1.7 List the various stages of Mining operations – Pre-mining, Mining and Post-mining.
- 1.8 Introduction to opencast and underground coal & metalliferous mining – selection criteria.

- 1.9 List the various pre-mining Operations-Exploration, land acquisition, prospecting licence.
- 1.10 State the de-vegetation, and initial ground treatment for future (Next stage) of Mining operations – Forming approach Roads.
- 1.11 List the various mining operation (Entry to deposit, development, exploitation, stopping / depillaring.)
- 1.12 List the various ancillary mining operations – (Strata control, transportation, ventilation, drainage, lighting, reclamation, or soil or back filling.)
- 1.13 List the various post mining operations (beneficiation of mineral concentration techniques, assaying metallurgical operations.)
- 1.14 List different types of mode of entry to mineral deposits
- 1.15 Define the mode of entries with sketches
- 1.16 List the applicability and limitations of mode of entries.
- 1.17 State the comparison of various Modes of entry into deposits for underground mining – shafts, inclines, adits, etc.

## **2.0 Concepts of Mining Methods.**

- 2.1 Define the following terms with sketches Out crop, Cover, over-burden, back, vein, lode, ore shoot, coal measures, pit top, pit-bank, pit-bottom, shaft-station, reserve station, rest station, mineral reserves, tunnel, cross cut, level , drive, staple pit , inset, gallery, heading, blind heading, face, dip, closures, slice, split, stook, barrier, sump, shaft, auxiliary shaft.
- 2.2 Give the classification of coal seams based on the thickness
- 2.3 Give the classification of coal seams based on the depth.
- 2.4 Give the classification of coal seams based on the inclination.
- 2.5 Give the classification of coal seams based on the gassiness.
- 2.6 Give the classification of coal seams based on the wateriness.
- 2.7 Give the classification of methods of working coal in respect of underground and open cast mining.
- 2.8 Compare Underground mining Vs opencast mining.
- 2.9 Define the following terms with suitable sketches. Horizon Mining; Placer mining - Hydraulic mining, Dredging, Solution Mining-Borehole Extraction, Leaching.

### **3.0 Drilling methods.**

- 3.1 State the Principles of drilling
- 3.2 List the methods of Drilling.
- 3.3 List the uses of boreholes.
- 3.4 Give the classification of drilling methods.
- 3.5 List the selection of Drilling methods
- 3.6 List the applications of Drilling methods
- 3.7 List the limitations of Drilling methods.
- 3.8 State the applicability of percussive and rotary drilling methods.
- 3.9 List the various drill bits.
- 3.10 State the flushing methods.
- 3.11 List the drilling tools and accessories used in rotary drilling.
- 3.12 State the purposes of tools used rotary drilling methods
- 3.13 Explain rotary methods of drilling with sketch
- 3.14 List the fields of application of Drilling
- 3.15 State the exploration and production drilling.
- 3.16 List type of drilling in underground workings,
- 3.17 List the variables affecting the performance of drilling
- 3.18 State the novel methods of drilling
- 3.19 Describe the Screw Feed feed mechanism –and Hydraulic feed with sketches.
- 3.20 Describe the Hydraulic feed mechanism with sketch.
- 3.21 Define the term mud flushing.
- 3.22 Define the terms sludge and core.
- 3.23 State the purpose of core recovery
- 3.24 List the different methods of core recovery.
- 3.25 Explain single tube, double tube and wire-line tube barrels with sketch.
- 3.26 State the reasons for deviation of bore holes.

### **4.0.Explosives**

- 4.1. Define the term explosive.
- 4.2. State the uses of explosives for mining industry.
- 4.3. List the characteristics of explosives
- 4.4. Explain the characteristics of explosives.
- 4.5. Classifies the explosives based on strength, density
- 4.6. Define 'high explosive'.

- 4.7. State the composition of high explosives used in underground and in opencast mines (coal and non-coal mines)
- 4.8. List the properties of high explosives.
- 4.9. Define the terms boosters and primers.
- 4.10. State their composition and list their properties.
- 4.11. State their field application.
- 4.12. Define the term 'Permitted explosive'.
- 4.13. Classifies the Permitted explosives and their applicability
- 4.14. List the test that a permitted explosive should pass through.
- 4.15. Mention the field application of safety fuse and cordtex
- 4.16. Define the term 'detonator'
- 4.17. Classify the detonators.
- 4.18. State the composition of different detonators.
- 4.19. Describe the construction of a) delay b) Nonel detonators.
- 4.20. Mentions the field of application of each kind of detonators.
- 4.21. Define the terms misfire, blown out shot, cut-off
- 4.22. Explain the procedure to perform blasting operation in underground mines along with precaution's to be taken
- 4.23. Explain the procedure for dealing misfire, blown-out shot

## 5.0 **Shaft sinking.**

- 5.1 List the factors to be considered for the selection of a shaft as a mode of entry.
- 5.2 State the factors consider for selection of a site for shaft sinking.
- 5.3 List the necessary equipment required for sinking a shaft.
- 5.4 List the different stages of shaft sinking.
- 5.5 Explain the different stages of sinking through normal strata.
- 5.6 Explain the permanent supporting of the shaft sides by brick walling concrete, Curbing Monolithic concrete lining.
- 5.7 Classify the special methods of shaft sinking and their applicability's.
- 5.8 Explain the specials methods of shaft sinking a) Pilling Methods b) Caisson Methods c) Freezing Method d) Cementation Methods.
- 5.9 List the modern techniques used in shaft sinking
- 5.10 Explain shaft widening and deepening of the shaft.

## 6.0 Mine Gases.

- 6.1 State the composition of surface air and mine air.
- 6.2 Compares the composition of surface air and mine air.
- 6.3 List the reasons for changes in the composition of air while passing through mine workings.
- 6.4 Give the classification of mine gases
- 6.5 List the poisonous gases.
- 6.6 List the noxious gases.
- 6.7 List the inflammable gases.
- 6.8 State the occurrence and mention the chemical, physical and physiological effects of poisonous gases.
- 6.9 State the occurrence and mention the chemical, physical and physiological effects of noxious gases.
- 6.10 State the occurrence and mention the chemical, physical and physiological effects of inflammable gases.
- 6.11 Explain the purpose of flame safety lamp.
- 6.12 Explain the principle of safety lamp-wire gauge principle.
- 6.13 Describe the constructional details of flame safety lamp bottom and top feed-types.
- 6.14 Explain the method of transfer of heat in the flame safety lamp.
- 6.15 Explain the accumulation and percentage tests conducted with flame safety lamp.
- 6.16 List different detectors used for detecting poisonous, noxious and inflammable gases.

Course Outcome		CL	Linked PO	Teaching periods
CO1	Understand the scope of Mining activity, various steps involved in the process	R/U/A	1,2	09
CO2	Interpret the terminology used in Mining	R/U	1,2,3,4,	10
CO3	Analyze different methods of drilling	R/U/A	3,4,5,7	13
CO4	Identification of different types of explosives used in mines	R/U/A	3,4,6	17
CO5	Understand the methods of shaft sinking	R/U/A	3,4,5	13
CO6	Understand the atmospheric changes in underground mines due to Mining activity, composition of various gasses and their detection	U/A	3,4,	13
<b>Total</b>				<b>75</b>

### MID SEM-I EXAM

S.No	Unit Name	R	U	A	Remarks
1	Unit-I	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-II	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	
<b>MID SEM –II EXAM</b>					
S.No	Unit Name	R	U	A	Remarks
1	Unit-III	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-IV	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

### Semester End Examination

Sl No	Unit No.	Questions to be set for SEE			Remarks		
		R	U	A			
1	I	4	1	9(a)	13(a)		
2	II		2	10(a)	14(a)		
3	III		3	5, 6	9(b)	13(b)	
4	IV				11(a)	15(a)	
5	V	11(b)			15(b)		
6	VI	3	7,8	10(b)	14(b)		
Total Questions				8	8	8	

Legend:	Remembering (R)	1 Mark
	Understanding (U)	3 Marks
	Application (A)	5 Marks

**BOARD DIPLOMA EXAMINATION (C-21)**  
**MID SEM-I**  
**DMN-THIRD SEMESTER EXAMINATION**  
**BASICS OF MINING ENGINEERING**

TIME: 1Hour

TOTAL MARKS: 20

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**Important Note:** Wherever any question has choice, marks will be allotted only to first attempted question. **No marks will be allotted for extra questions answered**

**PART - A****(4x1 = 4M)**

*Note: Answer ALL the questions. Each question carries 1 mark.*

*The length of the answer shall not exceed 1/4 of page*

1. Define the term mine
2. State any four mining industries in Telangana
3. Define the term sump.
4. Define the term face

**PART- B****(2 x 3 = 6M)**

*Note: Answer the following questions. Each question carries 3 marks.*

*The length of the answer shall not exceed 1 page*

5. a. List any two mining operations and explain it  
OR  
b. List any two ancillary mining operations and explain it
6. a. Define the terms cover and rest station  
OR  
b. Define the terms stook and barrier

**PART-C****(2x5=10M)**

*Note: Answer the following questions. Each question carries 5 marks*

*The length of the answer shall not exceed 2 pages*

7. a. State the contribution of mining to human civilization  
OR  
b. Define mode of entries with sketch and give their applicability
8. a. Compare underground mining Vs Opencast mining  
OR  
b. Give classification of coal seams based on thickness, depth, inclination and gassiness.

**BOARD DIPLOMA EXAMINATION, (C-21)  
MID SEM-II  
DMN-FIRST SEMESTER EXAMINATION  
BASICS OF MINING ENGINEERING**

TIME: 1Hour

TOTAL MARKS: 20

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**PART - A**

**(4x1 = 4M)**

*Note: Answer ALL the questions. Each question carries 1 mark.*

*The length of the answer shall not exceed 1/4 of page*

1. Give the classification of drilling methods
2. Define the term core.
3. Define the term explosive
4. List the types of initiations of explosives.

**PART- B**

**(2 x 3 = 6M)**

*Note: Answer the following questions. Each question carries 3 marks.*

*The length of the answer shall not exceed 1 page*

5. a. List the uses of bore holes

OR

- b. State the reasons for deviation of bore holes

6. a. Explain the characteristics of explosives

OR

- b. Describe the safety fuse.

**PART-C (2x5=10M)**

*Note: Answer the following questions. Each question carries 5 marks*

*The length of the answer shall not exceed 2 pages*

7. a. Explain rotary method of drilling with sketch.

OR

- b. Describe the screw feed mechanism with sketch

8. a. Describe the constructional details of delay detonator with sketch.

OR

- b. Explain the procedure for dealing with misfire



12. (a) List the reasons for changes in the composition of air while passing through mine workings  
(or)  
12. (b) Explain the principle of safety lamp-wire gauge principle.

**PART-C**

04X05=20

- Instructions** :
1. Answer any **FOUR** questions.
  2. Each question carries **FIVE** marks.

13. (a) List various mining operations and explain it.  
(or)  
13. (b) Explain the different stages of sinking through normal strata.
14. (a) List the uses of bore holes.  
(or)  
14. (b) Describe the constructional details of flame safety lamp top feed-types.
15. (a) Explain the different stages of sinking through normal strata.  
(or)  
15. (b) Explain the permanent supporting of the shaft sides by brick walling concrete.
16. (a) State the occurrence and mention the physiological effects of white damp.  
(or)  
16.(a) Explain the principle of flame safety lamp

## ME-106 BASIC ENGINEERING DRAWING

(This Course is Common to all programs of Diploma in Engineering offered by the State Board of Technical Education, Hyderabad, Telangana State)

Course Title :	Basic Engineering Drawing	Course Code	ME-106
Semester	I	Course Group	Core
Teaching Scheme in Pds (L :P)	1:0:2	Credits	1.5
Methodology	Lecture + Practice	Total Contact Pds:	45
CIE	60 Marks	SEE	40 Marks

**Prerequisites:** No prerequisites are required to learn this course.

### Course Objectives

The Course is aimed at developing basic drawing skills so as to enable them to use these skills in the preparation of engineering drawings, their reading and interpretation.

### Course Outcomes

*Upon completion of the subject the student shall be able to*

<b>CO1</b>	Recognize the importance of Engineering Drawing and usage of the drawing instruments.
<b>CO2</b>	Practice free hand lettering & numbering in different styles.
<b>CO3</b>	Recognize the importance of Dimensioning and Acquiring the knowledge of different methods of dimensioning systems.
<b>CO4</b>	Appreciate the usage of engineering curves such as tangent lines, tangent arcs, parabola, hyperbola, ellipse, involute, cycloid and helix in various engineering applications and draw the above said curves
<b>CO5</b>	Realize the concept of projection and attain visualization projection of points, Lines and Planes. The student will also be able to draw the views related to projection of Points, Lines and Planes.
<b>CO6</b>	Analyze the concept of orthographic projections and student will be able to draw orthographic views of an object from its pictorial drawing.

### Blueprint for Marks in SEE

Unit No	Name of the Unit	Periods	Questions to be set for SEE		
			R	U	A
			PART-A (2M Questions)		PART-B (6M Questions)
1, 2 & 3	Importance of Engineering Drawing and Instruments, Free hand lettering and Numbering and Dimensioning Practice	09	Q1	Q9(a)	
4a.	Geometric constructions up to construction of polygons	06	Q2	Q9(b)	
4b.	Geometric constructions contd., Conical curves and Special curves	06	Q3	Q10(a)	
5	Projection of points, Lines, and Planes	09	Q4	Q10(b)	
6	Orthographic projections	15	Q5, Q6, Q7, Q8	Q11(a), Q11(b), Q12(a), Q12(b)	
Total Periods / Total Questions		45	8	4	
<p>[ R: Remembering; U: Understanding – 2 Marks; A: Application – 6 Marks]</p> <p><u>Note: Question Paper consists PART – A and PART-B</u>            PART – A consists of 8 questions) and student has to answer ALL questions, each question carries 2 marks. (8x2 = 16)            PART – B consists of 4 questions and student has to attempt ALL questions, each question carries 6 marks (4x6=24)</p>					

### CIE Question Paper Pattern and Syllabus

Unit No	Name of the Unit	Periods	Questions to be set for CIE		
			R	U	A
			PART-A (2M Questions)		PART-B (6M Questions)
<b>Mid Sem – I Exam</b>					
1, 2 & 3	Importance of Engineering Drawing and Instruments, Free hand lettering and Numbering and Dimensioning Practice	09	Q1, Q2	Q5(a), Q5(b)	
4a.	Geometric constructions up to construction of polygons	06	Q3, Q4	Q6(a), Q6(b)	
Total			4	2	
<b>Mid Sem – II Exam</b>					
4b.	Geometric constructions contd., Conical curves and Special curves	06	Q1, Q2	Q5(a), Q5(b)	
5	Projection of points, Lines, and Planes	09	Q3, Q4	Q6(a), Q6(b)	
Total			4	2	
<p>[ R: Remembering; U: Understanding – 2 Marks; A: Application – 6 Marks]</p> <p><u>Note: Question Paper consists PART – A and PART-B</u>            PART – A consists of 4 questions and student has to answer ALL questions, each question carries 2 marks. (4x2 = 8)            PART – B consists of 2 questions and student has to attempt ALL questions, each question carries 6 marks (2x6=12)</p>					

## Course Contents

### NOTE:

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

### **1.0 The importance of Engineering Drawing and Engineering Instruments**

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.

#### **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, Drawing plate:

Lay out of sheet – as per SP-46-1988 to a suitable scale.

### **2.0 Free hand lettering & numbering**

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

### **3.0 Dimensioning practice**

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

### **4.0 Geometric Construction**

Division of a line: to divide a straight line into given number of equal parts internally examples in engineering application. Construction of tangent lines: to draw tangent lines touching circles internally and externally.

Construction of tangent arcs

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

Construction of polygon: construction of any regular polygon of given side length using general method.

Conical Curves: Explanation of Ellipse, Parabola, Hyperbola, as sections of a double cone and a loci of a moving point, Eccentricity of above curves – Their Engg. application viz. Projectiles, reflectors, P-V Diagram of a hyperbolic process.

**Conical Curves:** Construction of any conic section of given eccentricity by general method.

Construction of ellipse by concentric circles method.

Construction of parabola by rectangle method.

Construction of rectangular hyperbola.

**Special 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

## 5.0 Projection of points, lines and planes

Projecting a point on two planes of projection -Projecting a point on three planes of projection -Projection 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.

Projection of regular planes.

- a) Plane perpendicular to HP and parallel to VP and vice versa.
- b) Plane perpendicular to HP and inclined to VP and vice versa.

## 6.0 Orthographic Projections

Meaning of orthographic projection -Using a viewing box and a model – Number of views obtained on the six faces of the box - Legible sketches of 3 views for describing object -Concept of front view, top view, and side view for sketching these views of engineering 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 full object.

## Reference Books

1. Engineering Drawing by N.D. Bhatt (Charotar Publishing House Pvt. Ltd.)
2. Engineering Drawing by Kapil dev – (Asian Publisher)

3. Engineering Drawing by Basant Agarwal & C. M. Agarwal - ( McGraw-hill)
4. A Textbook on Engineering Drawing by P. Kannaiah, K. L. Narayana, K. Venkata Reddy

### Online Resources

1. [1.https://nptel.ac.in/courses](https://nptel.ac.in/courses)
2. [2. www.slideshare.net/shameem.mist/engineering-drawing](http://www.slideshare.net/shameem.mist/engineering-drawing)
3. [3.https://www.powershow.com/viewfl/76303a-](https://www.powershow.com/viewfl/76303a-)
4. OWI5M/Engineering\_Drawing\_powerpoint\_ppt\_presentation
5. [4.https://www.powershow.com/view0/91a2bf-](https://www.powershow.com/view0/91a2bf-)
6. N2Q2N/Basic\_engineering\_drawing\_solved\_question\_powerpoint\_ppt\_presentation

### Suggested Learning Outcomes

Upon completion of the subject, the student shall be able to

#### 1.0 Understand the basic concepts of engineering drawing

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

#### Use of Engineering Drawing Instruments

- 1.4 select the correct instruments and draw lines of different orientation.
- 1.5 Select the correct instruments and draw small and large Circles.
- 1.6 Select the correct instruments for measuring distances on the drawing.
- 1.7 Use correct grade of pencil for different types of lines, thickness and given function.
- 1.8 Select and use appropriate scales for a given application.
- 1.9 Identify different drawing sheet sizes as per I.S. and Standard Lay- outs.
- 1.10 Prepare Title block as per B.I.S. Specifications.

#### 2.0 Write Free Hand Lettering and Numbers

- 2.1 Write titles using sloping lettering and numerals of 7mm, 10mm and 14mm height
- 2.2 Write titles using vertical lettering and numerals of 7mm, 10mm and 14mm height
- 2.3 Select suitable sizes of lettering for different layouts and applications
- 2.4 Practice the use of lettering stencils.

#### 3.0 Understand Dimensioning Practice

- 3.1 Define “Dimensioning.
- 3.2 State the need of dimensioning of drawing according to accepted standard.
- 3.3 Identify notations of Dimensioning used in dimensioned drawing.

- 3.4 Identify the system of placement of dimensions in the given dimensioned drawing.
- 3.5 Dimension a given drawing using standard notations and desired system of dimensioning.
- 3.6 Dimensioning standard features applying necessary rules.
- 3.7 Arrange dimensions in a desired method given in a drawing.
- 3.8 Identify the departures if any made in the given dimensioned drawing with reference to SP-46-1988, and dimension the same correctly.

#### **4.0 Apply Principles of Geometric Constructions**

- 4.1 Divide a given line into desired number of equal parts internally.
- 4.2 Draw tangent lines and arcs.
- 4.3 Use General method to construct any polygon.
- 4.4 Explain the importance of conics.
- 4.5 Construct conics (ellipse, parabola and hyperbola) by general method.
- 4.6 Construct ellipse by concentric circles method.
- 4.7 Construct parabola by rectangle method.
- 4.8 Construct rectangular hyperbola from the given data.
- 4.9 Construct involute from the given data.
- 4.10 Construct cycloid and helix from the given data.
- 4.11 State the applications of the above constructions in engineering practice.

#### **5.0 Apply Principles of Projection of points, lines and planes (06 Hours)**

- 5.1 Visualize the objects
- 5.2 Explain the I-angle and III-angle projections
- 5.3 Practice the I-angle projections
- 5.4 Draw the projection of a point with respect to reference planes (HP&VP)
- 5.5 Draw the projections of straight lines with respect to two reference Planes (up to lines parallel to one plane and inclined to other plane)
- 5.6 Draw the projections of planes (up to planes perpendicular to one plane and inclined to other plane)

#### **6.0 Apply principles of orthographic projection**

- 6.1 Explain the principles of orthographic projection with simple sketches.
- 6.2 Draw the orthographic view of an object from its pictorial drawing.
- 6.3 Draw the minimum number of views needed to represent complete engineering component.

## Course Outcomes (CO)

Upon successful completion of the course, the students will be able to

Course Outcome		Cognizant Level	Linked Program Objectives (PO)
CO1	Acquiring the knowledge about the importance of Engineering drawing and Drawing instruments usage.	R	1, 4, 7
CO2	Practicing free hand Lettering & Numbering in different styles.	R/U	1, 3, 4, 7
CO3	Acquiring the knowledge about different methods of dimensioning systems.	R/U	1,3, 4, 7
CO4	Appreciate the usage of engineering curves for tracing the paths and surface profile of the machine components such as gear profile from involute and cycloid., cooling towers from hyperbola, automobile headlights from ellipse and dish antenna from parabola etc.	R/U/A	1, 2, 3, 4, 7
CO5	Realize the concept of projection and attain visualization projection of points, Lines and Planes. The student will also be able to draw the views related to projection of Points, Lines and Planes.	R/U/A	1, 2, 3, 4,6, 7
CO6	Realize the concept of orthographic projections and student will be able to draw orthographic views of an object from its pictorial drawing.	R/U/A	1, 2, 3, 4, 7

## CO-PO MATRIX:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	-	-	3	-	-	3
CO2	3	-	1	2	-	-	3
CO3	3	-	1	2	-	-	2
CO4	3	1	2	2	-	-	2
CO5	3	3	2	2	-	1	1
CO6	3	1	3	3	-	-	2

**BOARD DIPLOMA EXAMINATION, (C-21)**  
**DME – I SEMESTER**  
**ME-106, MID SEMESTER - I EXAMINATION**  
**BASIC ENGINEERING DRAWING**

**Time: 1 Hour]**

**[Total Marks: 20**

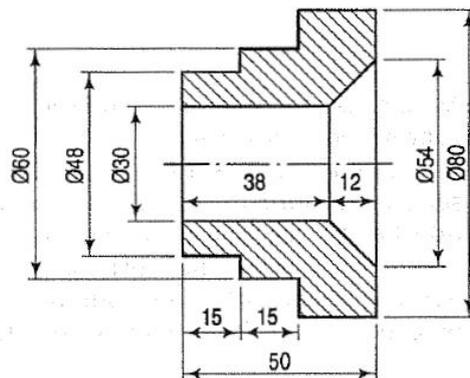
**PART-A**

04x02=08

**Instructions :**

1. Answer **ALL** questions.
2. Each question carries **TWO** marks.

1. Write freehand the following, using single stroke vertical capital letters of height 12 mm.  
'NECESSITY IS THE MOTHER OF INVENTION'
2. Redraw the following figure in Uni-Directional system of dimensioning.



3. To divide a straight line of 70mm into 6 equal parts.
4. Bisect a given line AB of length 75mm.

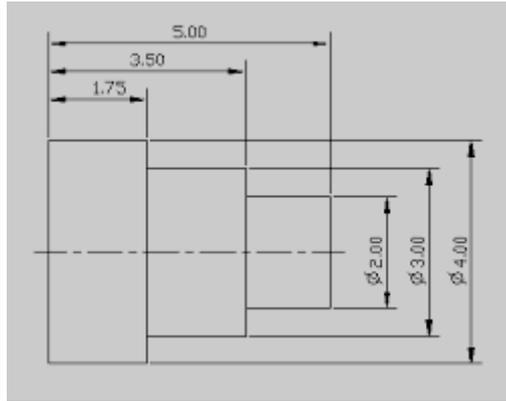
**PART-B**

02x06=12

**Instructions :**

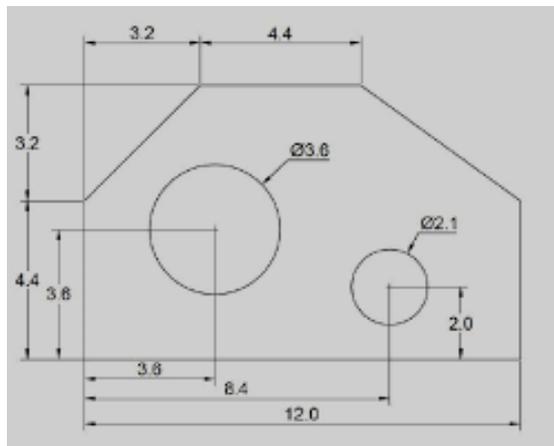
1. Answer **ALL** questions.
2. Each question carries **SIX** marks.

5. (a) Redraw the following figure with chain dimensioning.



(Or)

5. (b) Redraw the following figure in aligned system of dimensioning.



6. (a) Construct a regular pentagon of base side 30 mm in general method.

(Or)

6. (b) Draw an arc of radius 30 mm touching the given straight line AB of length 70 mm and passing through a point 'P' which is 55 mm above the line AB.

**BOARD DIPLOMA EXAMINATION, (C-21)**  
**DME – I SEMESTER**  
**ME-106 MID SEMESTER - II EXAMINATION**  
**BASIC ENGINEERING DRAWING**

**Time: 1 Hour]**

**[Total Marks: 20**

---

**PART-A**

04x02=08

- Instructions :**
1. Answer **ALL** questions.
  2. Each question carries **TWO** marks.
1. Draw an arc of radius 30 mm touching the two given straight lines AB and AC making an angle  $45^{\circ}$  with each other.
  2. Draw an internal common tangent for the two given circles of equal radius of 30 mm if the centre distance is 75 mm.
  3. Draw the projections of a point A lying on both the planes.
  4. A line AB of length 70 mm is parallel to V.P. and inclined an angle of  $30^{\circ}$  to H.P. Draw its projections when its end A is on the H.P. and 20 mm in front of V.P.

**PART-B**

02x06=12

- Instructions :**
1. Answer **ALL** questions.
  2. Each question carries **SIX** marks.
5. (a) Construct an ellipse if the distance between focus and the directrix is 50 mm by eccentricity method. Also draw the normal and tangent at any point on the curve.  

(Or)
  5. (b) Construct the locus of a point 'P' which is on the circumference of circle of radius 25 mm when it is rolling on a straight line for one complete revolution without slipping. Also name the curve.
  6. (a) Draw the projections of a line AB of length 75 mm parallel to HP and inclined at an angle of  $30^{\circ}$  to VP. The end A is 30 mm from both the reference planes.  

(Or)
  6. (b) A square of base side 40 mm is perpendicular to both the reference planes. Draw its projections.

**MODEL PAPER SEE**  
**ME-106 BOARD DIPLOMA EXAMINATION, (C-21)**  
**DME – I SEMESTER EXAMINATION**  
**BASIC ENGINEERING DRAWING**

**Time: 2hours]**

**[Total Marks: 40**

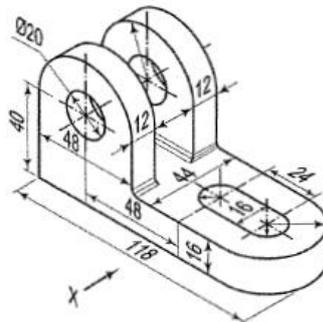
**Important Note:** Wherever any question has choice, marks will be allotted only to first attempted question. No marks will be allotted for extra questions answered.

**PART-A**

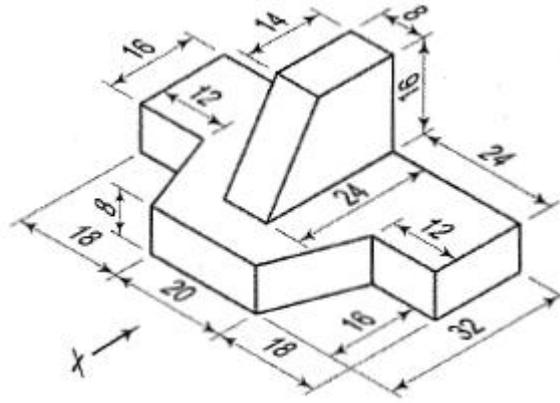
08x02=16

**Instructions :**

1. Answer **ALL** questions.
2. Each question carries **TWO** marks.
3. All the dimensions are in mm.
1. Write the following, using single stroke vertical capital letters of size 10 mm:  
'DEVELOP AN ATTITUDE OF GRATITUDE'
2. Bisect the given angle of  $55^{\circ}$ .
3. Inscribe a pentagon in a given circle of radius 35 mm.
4. Draw the projections of a point 'P' lying on HP and 30 mm behind VP.
5. Draw the top view of a circular plane of diameter 50mm when its plane is perpendicular to HP.
6. Draw the projections of a cube of base side 30 mm when it is resting on one of its base on HP with one of its vertical face is parallel to VP.
7. Draw the front view of the block shown in figure



8. Draw the front view of the block shown in figure

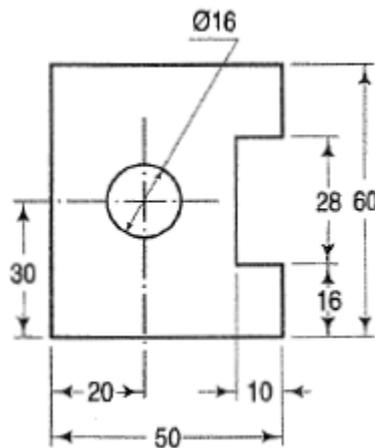


**PART-B**

04x06=24

- Instructions :**
1. Answer ALL questions.
  2. Each question carries **SIX** marks.
  3. All the dimensions are in mm.

9. (a) Redraw the following figure with aligned system of dimensioning.



(Or)

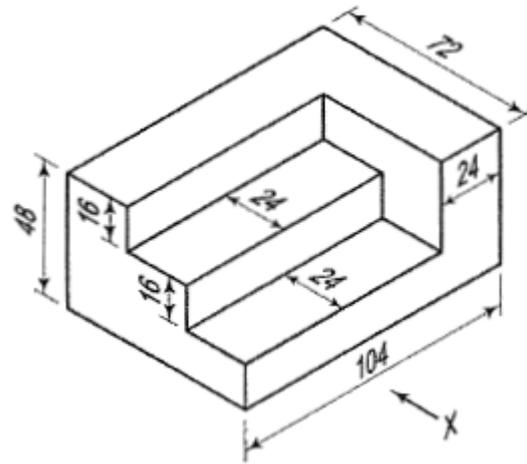
9. (b) Inscribe a hexagon in a given circle of radius 30mm by keeping one of its side horizontal.

10. (a) Draw a parabola with the distance of the focus from the directrix at 50 mm using eccentricity method and draw a normal and tangent through a point 40 mm from the directrix.

(Or)

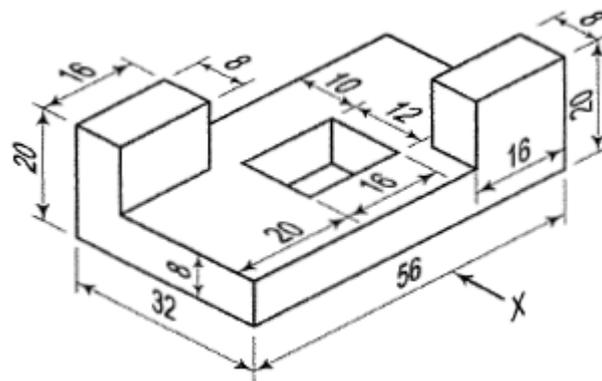
10. (b) A line AB 75 mm long is parallel to H.P. and inclined at  $30^\circ$  to V.P. The end A is 25 mm above H.P and 30 mm in front of V.P. Draw its projections.

11. (a) Draw the front view of the component shown in figure

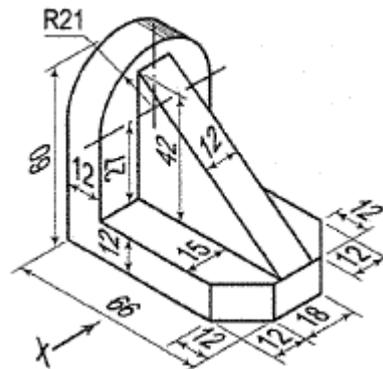


(Or)

11. (b) Draw the top view from the component as shown in figure.

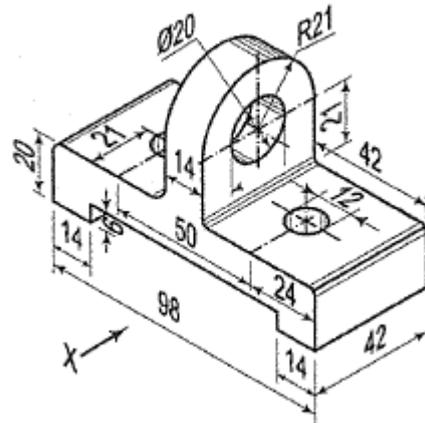


12. (a) Draw the frontview of component shown in figure



(Or)

12 (b) Draw the top view and front view of the component as shown in figure



## ME-107 - BASIC AUTOCAD LAB

Course Title :	Basic AutoCAD Lab	Course Code	ME-107
Semester	I	Course Group	Core
Teaching Scheme in periods (L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture + Practice	Total Contact periods	45 Periods
CIE	60 Marks	SEE	40 Marks

### Pre requisites:

This course requires the Basic Computer Skills and Practice concepts of engineering drawing

### Course Outcomes

<b>CO1</b>	Importance and advantages of CAD. Set drawing area and draw geometric shapes and modify as per requirement
<b>CO2</b>	Creating new objects by using draw commands
<b>CO3</b>	Modifying the existing drawing using modify commands
<b>CO4</b>	Add dimensions and text with required font and size.
<b>CO5</b>	Generate isometric model and draw circle on three iso planes
<b>CO6</b>	Create 2D drawings with front, side view with all above features

### Course Content

#### UNIT -1

**Duration: 15 periods (T:5 + P:10)**

##### 1.1 The Computer Aided Drafting and its software

Definition of Computer Aided Drafting, the Advantages and importance of CAD software LIKE Auto CAD, Intelli Cad, ProG CAD etc., the features of Graphic Work station, CAD Environment: Screen, Various tool bars and menus.

##### 1.2 Selection of commands

Commands using toolbars, menus, command bar. Repeating a command, Nesting a command and modifying a command. Use of prompt history window and scripts, mouse shortcuts. Creating the drawing. Opening existing and, saving of drawing, setting up a drawing. Setting and changing the grid and snapping alignment, and the Entity snaps.

##### 1.3 Use of viewing tools of CAD & Use of coordinate systems of the drawing

Use of mouse, Scroll bar to move around within drawing, changing of magnification of drawing. Displaying of multiple views, the use of controlling visual elements like Line weight and line types.

Two dimensional coordinates such as Absolute, Cartesian, Relative Cartesian and Polar coordinates and direct method of drawing line.

#### **1.4 Creating simple and complex entities**

Drawing of lines, circles, arcs, ellipses, elliptical arcs, rays and infinite lines, rectangles, polygons,

#### **1.5 Use the simple Modifying tools to modify the properties of entities**

Entity selection and de selection methods, the Deletion of entities. Copying of entities within a drawing, between drawings, parallel copies,

### **UNIT -2**

**Duration: 15 periods (T:5 + 10P)**

#### **2.1 Use the Modifying tools to modify the properties of entities**

Mirroring entities and arraying entities. The Rearranging of entities by Moving, Rotating and Reordering. The Resizing of entities by Stretching, Scaling, Extending, Trimming, and editing the length. The Braking and joining of entities. Chamfering and Filleting of entities

#### **2.2 Creating complex entities**

Drawing of shapes like rectangle, Polygon, polylines, Splines, donuts, and adding of hatch pattern

#### **2.3 Use the drawing information retrieving tools Measure, Divide, Calculate and Display**

Creating and editing of point entities. Dividing the entities in to segments. Calculation of areas of defined by points, closed entities, and combined entities, calculate the distance and angle between the entities. Displaying the information about the entities and drawing status.

#### **2.4 Use the Text tool to create and formatting the various types of text Fonts and its styles**

The creating, naming and modifying the text fonts, the Creation of line text, paragraph text, setting of line text style and its alignment. The Setting of Paragraph text style and its alignment, and modifying the text. Rectangular and polar array

#### **2.5 Use Dimensioning concepts to create, Edit ,Control dimension styles & variables and Adding geometric tolerances**

The creating of linear, Angular, Diametral, Radial, Ordinate dimensions. The creating leaders and annotations, making dimensions oblique, Editing the dimension text, controlling of dimension arrows and format. The Controlling of line settings and dimension text, the Controlling of dimension units, and dimension tolerance.

## 2.6 Isometric Views

Setting of isometric grid – change of iso planes, drawing straight line and circle  
Create Isometric views of simple objects

## .UNIT -3

**Duration: 15 periods (T:3 + P:10)**

**Practise of 2D Drawings consisting** of different line types, line weights, hatch, dimensioning and Text

Using appropriate commands creation of 2D drawings of standard components

### Specific Learning Outcomes

## UNIT-1

**Duration: 15 periods (T:3 + P:10)**

**Upon completion of the course the student shall be able to Understand about the**

### 1. Computer Aided Drafting and its software

- 1.1 Define Computer Aided Drafting
- 1.2 List the Advantages of CAD and also various CAD software's
- 1.3 Explain the importance of CAD software
- 1.4 Explain the features of Graphic Work station
- 1.5 Explain CAD Screen, Various tool bars and menus
- 1.6 Explain the benefits of Templates
- 1.7 Identify various CAD software's and their features

### Use appropriate selection commands

- 1.8 Practice commands using toolbars, menus, command bar
- 1.9 Practice repeating a command, Nesting a command and modifying a command
- 1.10 Use prompt history window and scripts
- 1.11 Know the use of mouse for zooming and pan
- 1.12 Practice the Creating the drawing, saving the drawing with .drawing extension and Opening Existing drawing
- 1.13 Practice the setting up a drawing with drawing limits and drawing units.
- 1.14 Practice the setting and changing the ortho, grid and snapping alignment
- 1.15 Practice the Entity snaps

### Use viewing tools of CAD & Use coordinate systems of the drawing

- 1.16 Practice the use of Scroll bar, pan command and rotating view to move around within drawing
- 1.17 Practice the changing of magnification of drawing

- 1.18 Practice how the coordinate system work and it is displayed
- 1.19 Practice the Two dimensional coordinates such as Absolute Cartesian, Relative Cartesian, Polar coordinates and direct method to draw a line.
- 1.20 Explain importance and use of Osnap/ Esnap points.
- 1.21 Practice to draw with other drawing commands like circle, polygon and other.

### **Create the simple and complex entities**

- 1.22 Draw the lines, circles, arcs, ellipses, elliptical arcs, rays and infinite lines.

## **UNIT -2**

**Duration: 15 periods (T:3 + P:10)**

### **2. Use the modifying tools to modify the properties of entities**

- 2.1 Practice the various methods of entity selection like window, cross window, fence, last and previous methods and deselect ion method
- 2.2 Draw shapes like Rectangles, Polygons, Polylines, Splines, donuts
- 2.3 Practice the adding of hatch with required pattern and adjusting line angle and line space.
- 2.4 Practice the Deletion, breaking and trimming of entities
- 2.5 Practice the Copying of entities within a drawing, between drawings
- 2.6 Practice the Chamfering and Filleting of entities
- 2.7 Practice the making of parallel copies, Mirroring entities and Arraying entities
- 2.8 Practice the Rearranging of entities by Moving, Rotating and Reordering
- 2.9 Practice the Resizing of entities by Stretching, Scaling, and Extending.
- 2.10 Practice the Editing of polylines: Opening, Closing, Curving, Decurving, Joining, Changing width and editing vertices
- 2.11 Practice the Exploding of entities

### **Use the drawing information retrieving tools Measure, Divide, Calculate, Display, and Track**

- 2.12 Divide the entities in to required number of segments
- 2.13 Calculate the areas defined by points, of closed entities, and combined entities
- 2.14 Calculate the distance between the entities
- 2.15 Calculate the angle between the entities
- 2.16 Display the information about the entities and drawing status
- 2.17 Track time spent working on a drawing

### **Use the Text tool to create and formatting the various types of text fonts and its styles**

- 2.18 Practice the creating, naming and modifying the text fonts
- 2.19 Practice the Creation of line text, paragraph text
- 2.20 Practice the Setting of line text style and its alignment
- 2.21 Practice the Setting of Paragraph text style and its alignment

- 2.22 Practice the Changing of line text and Paragraph text
- 2.23 Practice the use of alternate text editor

**Use Dimensioning concepts to create dimensions, Edit dimensions, Control dimension styles & variables and Adding geometric tolerances**

- 2.24 Practice the creating of linear, Angular, Diametral, Radial, Ordinate dimensions
- 2.25 Practice the creating leaders and annotations
- 2.26 Practice the making dimensions oblique,
- 2.27 Edit the dimension text
- 2.28 Practice the Controlling of dimension properties like arrow types, size, dim line adjustment, dim offset, text size: primary and secondary units and format
- 2.29 Practice the Controlling of dimension units, and dimension tolerance

**UNIT-3**

**Duration: 15 periods (T:3 + P:10)**

**3. Create 2D Drawings**

- 3.1 Create 2D drawings of standard mechanical components with dimensions and text

**Recommended Books**

1. AutoCAD by George Omura
2. 4MCAD User Guide- IntelliCAD Technology Consortium

**Key competence to be achieved by students / Suggested Learning Outcomes**

S.No	Experiment Title	Key components
1	Introduction to CAD	<ul style="list-style-type: none"> <li>• Open / close AutoCAD program</li> <li>• Understands AutoCAD Graphic User Interface(GUI) and various toolbars</li> </ul>
2	Selecting commands & Working withdrawing	<ul style="list-style-type: none"> <li>• Use prompt history window and scripts</li> <li>• Practice the setting up a drawing</li> <li>• Practice the Entity</li> </ul>
3	a) Viewing drawing	<ul style="list-style-type: none"> <li>• Use Scroll bar, pan command, and rotating view to move around within drawing</li> <li>• Control visual elements like Fill, Text, Blips and</li> <li>• Line weight</li> </ul>
	b) Working with coordinates	<ul style="list-style-type: none"> <li>• Use Two dimensional coordinates and Three dimensional coordinates</li> <li>• Use right-hand rule</li> <li>• Use filters in two and three dimensions</li> <li>• Define user coordinate system</li> </ul>
4	Creating simple and complex	<ul style="list-style-type: none"> <li>• Draw the simple shapes like lines, circles, arcs</li> </ul>

	entities	<ul style="list-style-type: none"> <li>and complex shapes like polygons, planes etc.,</li> <li>Practice adding of hatch pattern</li> </ul>
5	Getting Drawing information	<ul style="list-style-type: none"> <li>Measure the intervals and distance between Entities.</li> <li>Divide the entities in to segments</li> <li>Calculate the areas defined by points, of closed entities, and Combined entities</li> </ul>
6	Use the Text tool to create various types of text fonts and its styles	<ul style="list-style-type: none"> <li>Calculate the areas defined by points, of closed entities, and Combined entities</li> <li>Use filters in two and three dimensions</li> <li>Draw the simple shapes like lines, circles, arcs and complex shapes like polygons, planes etc.,</li> <li>Practice the adding of hatch pattern</li> </ul>
7	Dimensioning drawing	<ul style="list-style-type: none"> <li>Practice the Controlling of dimension properties like arrow types, size, dim line adjustment, dim offset, text size , primary and secondary units and format</li> <li>Practice the Controlling of dimension units, and dimension tolerance</li> </ul>
8	Isometric Views	<ul style="list-style-type: none"> <li>Use Iso snap command to create Isometric views</li> </ul>
9	2D Drawings	<ul style="list-style-type: none"> <li>Use proper 2D commands to create 2D drawings</li> </ul>

Course Outcomes		CL	Linked PO	Teaching Hours
CO1	Importance and advantages of CAD. Set drawing area and draw geometric shapes and modify as per requirement	U/A	1,2,3,4,7	3
CO2	Creating new objects by using draw commands	U/A	1,2,3,4	12
CO3	Modifying the existing drawing using modify commands	U/A	1,2,3,7	6
CO4	Add dimensions and text with required font and size.	A	1,2,3,4	6
CO5	Generate isometric model and draw circle on three iso planes	U/A	1,2,3,4,7	3
CO6	Create 2D drawings with front, side view with all above features	A	1,2,3,4,7	15

**MID SEM-I EXAM**

<b>S.No</b>	<b>Unit Name</b>	<b>R</b>	<b>A</b>	<b>Remarks</b>
1	Unit-I	1, 2,3,4	5,6	
<b>Total Questions</b>		<b>4</b>	<b>2</b>	

**MID SEM –II EXAM**

<b>S.No</b>	<b>Unit Name</b>	<b>R</b>	<b>A</b>	<b>Remarks</b>
1	Unit-II	1, 2,3,4	5,6	
<b>Total Questions</b>		<b>4</b>	<b>2</b>	

### SEMESTER END EXAM

S N	Unit name	Questions to be set for SEE		Remarks
		R, U	A	
1	Unit-1	1,2		
2	Unit-2	3,4		
3	Unit-3		5, 6	

### CO-PO MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	1	3	-	-	3
CO2	3	1	1	2	-	-	3
CO3	3	1	1	2	-	-	2
CO4	3	-	-	2	-	-	2
CO5	3	1	1	2	1	-	1
CO6	3	2	3	3	-	1	2

**ME-107 - Basic AutoCAD Lab**  
**MODEL PAPER FOR MID -1 (CIE)**

**TIME: 1hr**

**Marks: 20M**

.....

**PART-A**

NOTE: Answer all questions  
8marks

4 X 2 =

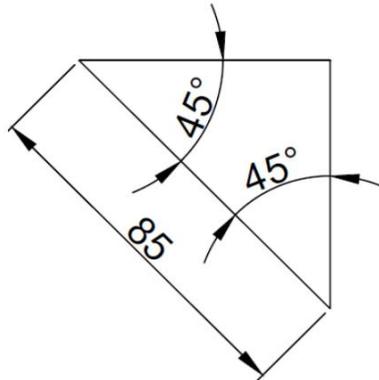
1. Draw a square of 50x50mm by using any CAD software.
2. Draw an equilateral triangle of 50mm side by using any CAD software.
3. Draw an ellipse with major axis 80mm and minor axis 30mm by using any CAD software.
4. Draw a line of 50mm and draw five parallel lines at 10mm distance by using offset command

**PART-B**

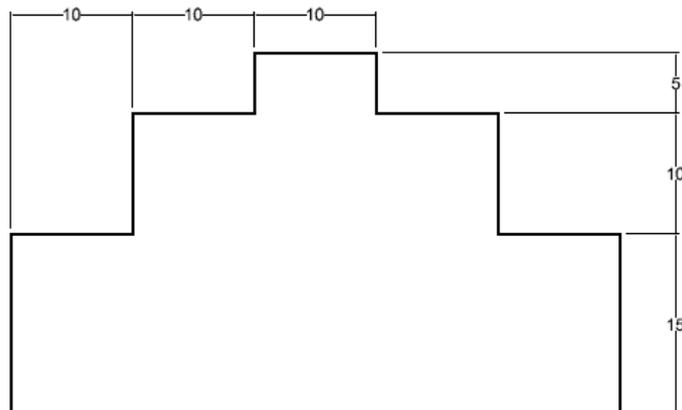
NOTE: Answer any one questions  
12marks

1 X 12 =

5. Draw the following using any CAD software without dimensioning.



6. Draw the following using any CAD software without dimensioning.



**ME-107 - Basic AutoCAD Lab**  
**MODEL PAPER FOR MID -2 (CIE)**

**TIME: 1hr**

**Marks: 20M**

**PART-A**

NOTE: Answer all questions  
8marks

4 X 2 =

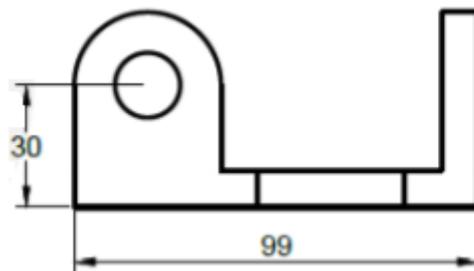
1. Write text "CAD Lab" with Calibri font style and font size 10 by using any CAD software.
2. Draw a line of 10mm and divide it into four equal parts by modifying the point style to x shape.
3. Add continuous dimensions to divided line drawn in Q no. 2.
4. Draw a pentagon of side 60mm and calculate its area by using any CAD software.

**PART-B**

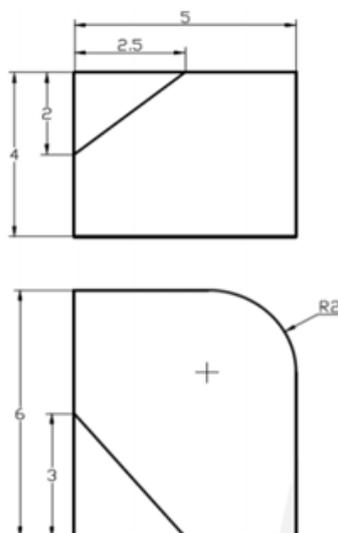
NOTE: Answer any one questions  
12marks

1 X 2 =

5. Draw the following using any CAD software and add dimensioning.



6. Draw the following using any CAD software and add dimensioning.



**ME-107 - Basic AutoCAD Lab**  
**MODEL PAPER FOR SEE**

**TIME: 2hr**

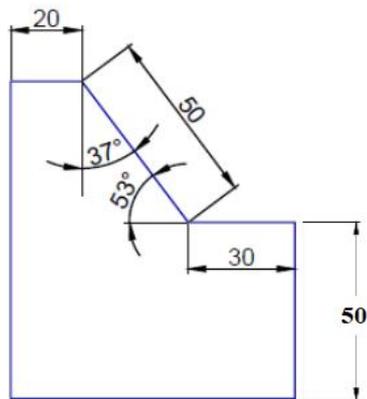
**Marks: 40M**

**PART-A**

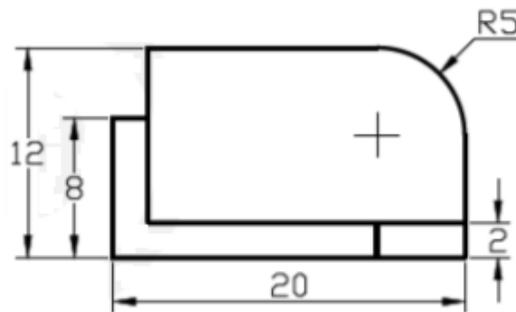
NOTE: Answer all questions  
16marks

4 X 4 =

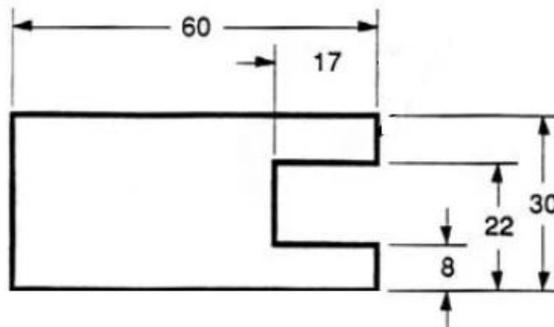
1. Draw the following fig by using any CAD software, change the line type and add dimensions. Also list the commands used in sequence.



2. Draw the following arrow mark by using any CAD software, and add complete dimensions. Also list the commands used in sequence.



3. Redraw the following figure and add dimensions as shown in figure.



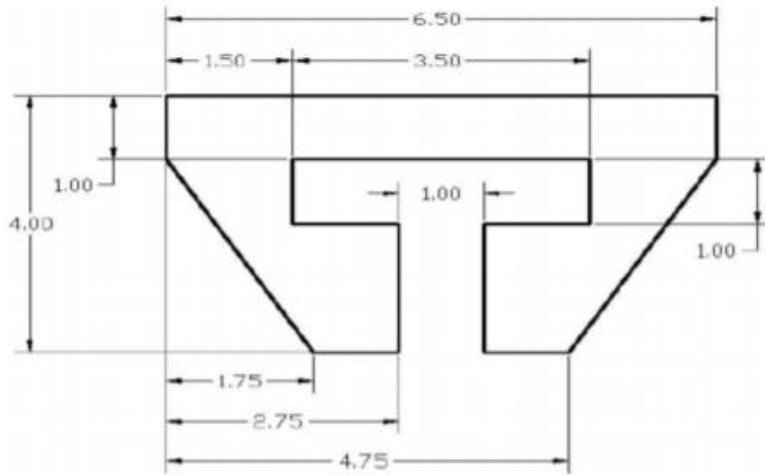
4. Draw isometric view of a cube of 100mm side by using any CAD software.

**PART-B**

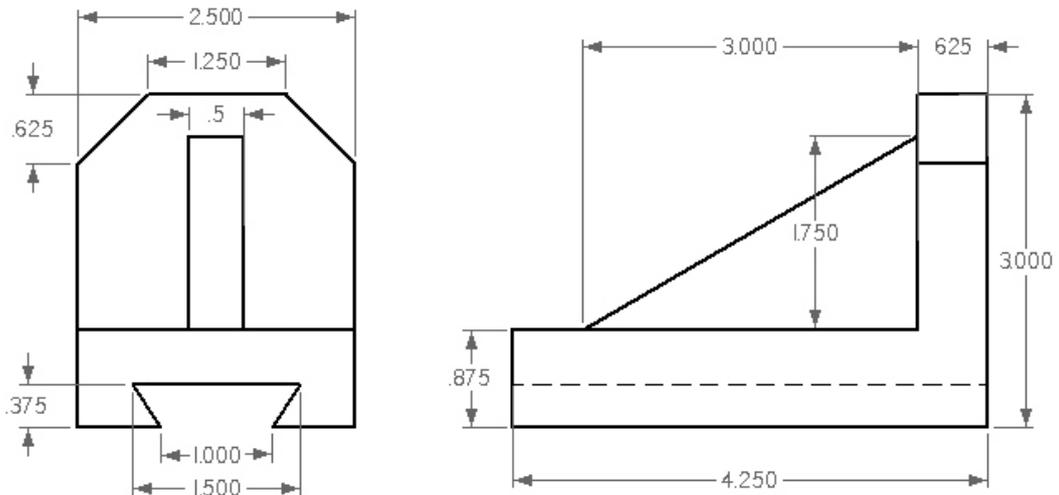
NOTE: Answer any one questions

1 X 24 = 24marks

5. (a) Draw the following using any CAD software and add dimensioning. 15+5+4 marks  
(b) List the commands in sequence and also write the procedure  
(c) Add title box containing Student PIN, name and college name



6. (a) Draw the following using any CAD software and add dimensioning. 15+5+4 marks  
(b) List the commands in sequence and also write the procedure  
(c) Add title box containing Student PIN, name and college name



## MN-108-BASIC MINING WORKSHOP LAB

Course Title	Basic Mining Workshop Lab	Course Code	MN-108
Semester	I	Course Group	Core
Teaching Scheme in Hrs (L: T: P)	1:0:2	Credits	1.5
Methodology	Lecture + Practice	Total Contact Hours :	45
CIE	60 Marks	SEE	40 Marks

### Pre requisites

This course requires the basic skills of Handling Domestic tools, this course also requires the basic knowledge of basic mathematics at secondary school level.

### Course Outcomes:

On completion of course the student should be able to

CO1	Identify and use the tools and equipment in Fitting Shop
CO2	Acquire skill in basic fitting operations
CO3	Identify and use the tools to perform Carpentry operations
CO4	Identify and use the tools to perform Welding operations
CO5	Identify and use the tools to perform operations in Machine Shop
CO6	Identify and use the tools to perform Electrical workshop

### COURSE CONTENTS

#### FITTING SHOP

1. Marking and chipping on Mild – steel flat 12 mm thick.
2. Cutting with hack saw, M.S. Flats of 6 mm thick.
3. Marking, cutting, drilling, Chamfering and tapping on a M.S. Flat 12 mm thick.
4. Assembling of two pieces, Matching by filing (6 mm thick M.S. Plate)

#### CARPENTRY SHOP

1. Cutting of wood with hand saw.
2. Planning of wood.
3. Planning and chiseling of wood.
4. Orientation of wood grain.
5. Preparation of dovetail joint.
6. Mortise and tenon joint.
7. Wood turning on a lathe.
8. Preparation of one household article.

## **WELDING SHOP**

1. Beading Practice
2. Prepare a job and make a Lap Joint and finish it using grinder
3. Prepare a job and make a butt joint and finish it using grinder
4. Prepare the job and make T-joint

## **MACHINE SHOP**

- 1 Turn the given rod to get three different diameters using Lathe
- 2 Thread cutting on Lathe
- 3 Thread cutting on GI pipe on Lathe
- 4 Prepare a centre punch and knurl it's head
- 5 Make a square plate using power grinder, mark triangular and drill three holes of different diameters at the vertices

## **ELECTRICAL WORKSHOP**

1. Wiring tools and accessories
2. Electrical wiring joints
3. Simple lamp circuits
4. Soldering practice
5. Earthing

## **REFERENCE BOOKS**

1. Manufacturing Technology (Voll ) by P N Rao (McGraw Hill)
2. Principles of Foundry Technology by P L Jain (McGraw Hill)

Title of the Job	Competencies	Key Competencies
<p><b>Fitting shop</b></p> <p>1. Marking and Chipping on Mild steel flat of 100x50x12 mm</p>	<ul style="list-style-type: none"> <li>- Identify appropriate measuring tool</li> <li>- Handle appropriate marking tool</li> <li>- Handle appropriate chipping tool</li> <li>- Mark the dimensions</li> <li>- Remove the material by chipping from MS flats</li> </ul>	<ul style="list-style-type: none"> <li>• Mark the dimensions</li> <li>• Remove the material by chipping from MS flats</li> </ul>
<p>2. Cutting with hack saw of MS flats of 70x50x6 mm</p>	<ul style="list-style-type: none"> <li>- Check the raw material for size</li> <li>- Fix the work piece in vice</li> <li>- Mark the work as per given dimensions</li> <li>- Perform dot punching</li> <li>- Load and unload hack saw blade from its frame</li> <li>- Use the hack saw to perform cutting operation</li> </ul>	<ul style="list-style-type: none"> <li>• Load and unload hack saw blade from its frame</li> <li>• cut the work as per marked dimensions using Hack saw</li> </ul>
<p>3. Drilling, chamfering and on a MS flat of 50x50x12 mm</p>	<ul style="list-style-type: none"> <li>- Check the raw material for size</li> <li>- Apply the chalk on the surface and on all sides of the flat</li> <li>- Layout the dimensions and mark the lines using dot punch</li> <li>- Chamfer the edges through filing</li> <li>- Locate the hole centres using odd leg callipers and centre punching</li> <li>- Identify appropriate drill bit</li> <li>- Load and unload drill bit from the machine</li> </ul>	<ul style="list-style-type: none"> <li>• Load and unload drill bit from the machine</li> <li>• Identify appropriate taps</li> <li>• Tap the hole</li> </ul>
<p>4. Tapping MS flat 50x50x12 mm</p> <p>Dieing M.S Round 12 mm or G.I pipe ½”</p>	<ul style="list-style-type: none"> <li>- Check the raw material for size</li> <li>- Identify appropriate tap and die</li> <li>- Secure the tap in the wrench</li> <li>- Tap the hole</li> <li>- Hold the bar in bench vice</li> <li>- Fix the die in die stock</li> <li>- Cut external threads using a Die</li> <li>- Check the fit for accuracy</li> </ul>	<ul style="list-style-type: none"> <li>• Secure the tap in the wrench</li> <li>• Tap the hole 10.2mm dia</li> <li>• Fix the die in die stock</li> <li>• Cut external threads using a Die M 12</li> </ul>

<p>5.Assembling of two pieces, matching by filing (06)</p> <p>M.S flat 50 x 50 x 6 mm</p>	<ul style="list-style-type: none"> <li>- Cut the pieces to size using hack saw</li> <li>- File surface of flat for trueness</li> <li>- Mark the surfaces as per dimensions</li> <li>- Dot punch the marked lines</li> <li>- Cut with hack saw as per marked lines</li> <li>- Smoot the surfaces with file</li> <li>- Assemble the two pieces</li> </ul>	<ul style="list-style-type: none"> <li>• Identify appropriate file</li> <li>• File the specimen</li> <li>• Assemble two pieces</li> </ul>
<p><b>Carpentry Shop</b></p> <p>6.Cutting of wood with hand saw (06)</p> <p>1' x 2" x 2 "</p>	<ul style="list-style-type: none"> <li>- Identify the orientation of grains</li> <li>- Select appropriate saw for cutting in each of the directions viz. across and along the grains</li> <li>- Select appropriate work holding device</li> <li>- Handle appropriate measuring and marking tools(Steel rule, Try square, Marking gauge)</li> <li>- Mark dimensions on work using Marking gauge</li> <li>- Fix the work in the vice</li> <li>- Perform cutting along the grains using Rip saw</li> <li>- Change the position of work in the vice</li> <li>- Perform cutting perpendicular the grains using cross cut saw</li> </ul>	<ul style="list-style-type: none"> <li>• Identify the orientation of grains</li> <li>• Mark dimensions on work using marking gauge</li> <li>• Perform cutting along and perpendicular the grains using appropriate saw</li> </ul>
<p>7.Planning of wood(06)</p> <p>1' x 2" x 1 "</p>	<ul style="list-style-type: none"> <li>- Identify the direction for planning wood stock</li> <li>- Select appropriate jack plane</li> <li>- Prepare the jack plane for planning (Load and unload the blade of a jack plane)</li> <li>- Select appropriate work holding device</li> <li>- Perform marking on work using appropriate tool</li> <li>- Fix the work in the vice</li> <li>- Plane the surfaces on all four sides using jack plane</li> </ul>	<ul style="list-style-type: none"> <li>• Identify the direction for planning wood stock</li> <li>• Prepare the jack plane for planning</li> <li>• Plane the surfaces on all four sides using jack plane</li> </ul>

<p>8.Chiselling of wood (06)</p> <p>1' x 2" x 1 "</p>	<ul style="list-style-type: none"> <li>- Select appropriate chisels and saw</li> <li>- Select appropriate work holding device</li> <li>- Select appropriate measuring and marking tools</li> <li>- Fix the work in the vice</li> <li>- Mark the position of grooves on work using marking gauge</li> <li>- Cut sides of grooves by hand saw</li> <li>- Chip the material using firmer chisel by applying pressure with mallet</li> <li>- Finish the grooves with rasp file</li> </ul>	<ul style="list-style-type: none"> <li>• Select appropriate chisels and saw</li> <li>• Mark the position of grooves on work using marking gauge</li> <li>• Cut sides of grooves by hand saw</li> <li>• Chip the material using firmer chisel by applying pressure with mallet</li> </ul>
<p>9.Preparation of a Dove tail joint (09)</p> <p>1' x 2" x 1 "</p>	<ul style="list-style-type: none"> <li>- Select the appropriate cutting tools and work holding devices</li> <li>- Plane the wooden pieces on all sides</li> <li>- Mark at an angle of 75<sup>0</sup> with bevel square</li> <li>- Trim the dovetail by chisel to exact size</li> <li>- Cutt the dovetail groove on second piece</li> <li>- Finish the groove</li> <li>- Assemble the two pieces to prepare dovetail halving joint by using mallet</li> </ul>	<ul style="list-style-type: none"> <li>• Trim the dovetail by chisel to exact size</li> <li>• Mark at an angle of 75<sup>0</sup> with bevel square</li> <li>• Cutt the dovetail groove on second piece</li> <li>• Assemble the two pieces to prepare dovetail halving joint by using mallet</li> </ul>
<p>10.Preparation of Mortise and Tenon joint (09)</p> <p>1' x 2" x 1 "</p>	<ul style="list-style-type: none"> <li>- Select the appropriate cutting tools and work holding devices</li> <li>- Plane the two pieces to the required size using jack plane</li> <li>- Mark the dimensions to make Tenon using mortise gauge</li> <li>- Cut tenon with tenon saw along the marked lines</li> </ul>	<ul style="list-style-type: none"> <li>• Mark the dimensions to make Tenon and mortise on two pieces using mortise gauge</li> <li>• Cut tenon with tenon saw along the marked lines</li> </ul>

<p>11.Preparation of Mortise and Tenon joint</p> <p>1' x 2" x 1 "</p>	<ul style="list-style-type: none"> <li>- Use firmer chisel to remove the excess material to set finished tenon</li> <li>- Mark the dimension to make mortise on the second piece with mortise gauge</li> <li>- Use mortise chisel to provide recess in the second piece to accommodate tenon</li> <li>- Assemble the two pieces by fitting the tenon into mortise</li> </ul>	<ul style="list-style-type: none"> <li>• Use mortise chisel to provide recess in the second piece to accommodate tenon</li> <li>• Assemble the two pieces by fitting the tenon into mortise</li> </ul>
<p>12.Wood turning on lathe (06) 1' x 2" x 2 "</p>	<ul style="list-style-type: none"> <li>- Select appropriate tools</li> <li>- Plane the four corners of the work piece using jack plane</li> <li>- Mark the centres of the work on either side</li> <li>- Mount the work between head stock &amp; tailstock centres</li> <li>- Fix the tool in the tool post &amp; Position it in appropriate height</li> <li>- Start the lathe to make the work piece to revolve at desired speed</li> <li>- Feed the bevel gauge against the rotating work to get the required size and shape</li> <li>- Use outside callipers to check the diameter of the pin</li> <li>- Use parting off tool to reduce the diameter on either ends of the pin</li> <li>- Remove the rolling pin between centres and cut off excess material on either sides</li> </ul>	<ul style="list-style-type: none"> <li>• Mark the centres of the work on either side</li> <li>• Fix the tool in the tool post &amp; Position it in appropriate height</li> <li>• Start the lathe to make the work piece to revolve at desired speed</li> <li>• Feed the bevel gauge against the rotating work to get the required size and shape</li> </ul>
<p>13.Preparation of any household article (ex: stool)</p>	<ul style="list-style-type: none"> <li>- Prepare the drawings of a stool required for a particular drawing table</li> <li>- State the specifications of the wood stock required</li> <li>- Identify the type of joints to be made</li> <li>- Identify the operations to be made and their sequence</li> <li>- Perform operations to produce pieces of joint</li> <li>- Assemble all joints as per the drawing</li> </ul>	<ul style="list-style-type: none"> <li>• Prepare the drawings of a stool required for a particular drawing table</li> <li>• Identify the operations to be made and their sequence</li> <li>• Perform operations to produce pieces of joint</li> <li>• Assemble all joints as per the drawing</li> </ul>

<p><b>Welding Shop.</b></p> <p>14. Performing various joints such as T-Joint, Butt Joint ,Lap Joint</p>	<p>-Identify various tools required to perform Welding Operation</p> <p>-Prepare various joint</p> <p>-Smoothing of joint by grinding</p>	<ul style="list-style-type: none"> <li>• Perform welding operation</li> <li>• Finishing of the job by grinding operation</li> </ul>
<p><b>Machine Shop</b></p> <p>15. Turn the given rod to get three different diameters using Lathe</p>	<ul style="list-style-type: none"> <li>- Choose the rod whose diameter is to be reduced</li> <li>- Mark the centres of the work on either side</li> <li>- Mount the work between head stock &amp; tailstock centres</li> <li>- Fix the tool in the tool post &amp; Position it in appropriate height</li> <li>- Start the lathe to make the work piece to revolve at desired speed</li> <li>- Feed the bevel gauge against the rotating work to get the required size and shape</li> <li>- Use outside callipers to check the diameter of the pin</li> <li>- Use parting off tool to reduce the diameter on either ends of the pin</li> <li>- Remove the rolling pin between centres and cut off excess material on either sides</li> </ul>	<ul style="list-style-type: none"> <li>- Performing various operations using Lathe and its operation</li> <li>- Placing the job between the heads of the Lathe</li> <li>- Measuring the diameter of the rod using Vernier caliper before and after cutting using Lathe</li> </ul>
<p><b>16.Thread cutting using Lathe</b></p>	<ul style="list-style-type: none"> <li>- Identify the tools required to perform thread cutting</li> <li>- Draw the diagram of external threading</li> <li>- Fix the thread cutting tool to the lathe machine</li> <li>- Perform the external threading using tool</li> </ul>	<ul style="list-style-type: none"> <li>- Performing thread cutting operation</li> </ul>
<p><b>17. Center punch</b></p>	<ul style="list-style-type: none"> <li>- Draw the diagram of square plate on which the center punch to be made</li> <li>- Identify the tools required</li> <li>- Mark the location of center punch.</li> <li>- Performing Center punch of required diameter</li> </ul>	<ul style="list-style-type: none"> <li>- Prepare the square plate of required size and flatten its surface using power grinding machine.</li> <li>- Mark the location of center punch</li> <li>- Perform the center punch of required diameter</li> </ul>

<p><b>18</b> Make a square plate using power grinder, mark triangular and drill three holes of different diameters at the vertices</p>	<ul style="list-style-type: none"> <li>- Draw the diagram of required square plate along with its dimensions</li> <li>- Identify the tools required</li> <li>- Mark the triangle of given side along with its vertices</li> <li>- Perform drilling of holes of required diameter at its vertices</li> </ul>	<ul style="list-style-type: none"> <li>- Prepare square plate of required dimensions.</li> <li>- Mark the triangle of given side along with its vertices</li> <li>- Perform drilling of holes of required diameter at its vertices</li> </ul>
<p><b>Electrical Shop</b></p> <p><b>19.</b>Identify tools and accessories</p>	<p>Handle the different wiring</p> <p>a) tools and accessories</p> <p>b) select switches, and MCB's</p> <p>c) Identify wires and cables as per the requirements of the load.</p>	<ul style="list-style-type: none"> <li>• Identify the size and specifications of various tools used for electrical wiring.</li> <li>• Understand the usage of the standard wire gauge.</li> <li>• Identify the type, size and specifications of DP mains,</li> </ul>
<p>20. Prepare a straight Joint / Married Joint</p>	<p>To prepare a Straight joint/Married joint using a 7/20 Al. Cable</p>	<ul style="list-style-type: none"> <li>• Identify the size of the cable</li> <li>• Perform splicing of Insulation properly.</li> <li>• Perform Straight joint/Married joint</li> </ul>
<p>21.Prepare T Joint</p>	<p>To prepare a T joint using a 7/20 Al. Cable</p>	<ul style="list-style-type: none"> <li>• Insert the leads of the wires properly as per the sketches.</li> <li>• Twist the wires properly.</li> </ul>
<p>22.Prepare union joint</p>	<p>To prepare a Western union joint using a single strand Al. Cable</p>	<ul style="list-style-type: none"> <li>• Overlap the two wires properly</li> <li>• Twist the binding wires properly</li> </ul>

23. Prepare a Pig Tail Joint	To prepare a pig tail joint using a single strand Copper Cable	<ul style="list-style-type: none"> <li>• Place the wires in V-shape.</li> <li>• Twist the wires in clock wise direction.</li> </ul>
24. One way Lamp connection	To control one lamp by one 1-way switch with PVC surface conduit wiring system	<ul style="list-style-type: none"> <li>• Draw wiring diagram</li> <li>• Identify the size of cable, PVC pipe, type of 1-way switch and lamp holder.</li> <li>• Make Connections as per Wiring Diagram</li> </ul>
25. Controlling two lamps by Two 1-way switch	To control two lamps by two 1-way switches with PVC surface conduit wiring system	<ul style="list-style-type: none"> <li>• Draw wiring diagram</li> <li>• Handle the screw driver, electrician Knife, line tester to fix the PVC pipe using saddles and junction boxes.</li> <li>• Select colour and length of wire for phase and neutral</li> <li>• Switch on the supply after making of the connections</li> <li>• Disconnect the circuit after testing.</li> </ul>
26, Control one lamp, 2/3 pin socket by two 1-way switch	To control one lamp and 2/3 pin socket by two 1-way switches with PVC surface conduit wiring system	<ul style="list-style-type: none"> <li>• Connect 2/3 pin socket properly with respect to phase, neutral and earth.</li> <li>• Connect phase wire through switches.</li> </ul>
27. Electric bell	To control Electrical Bell	<ul style="list-style-type: none"> <li>• Connect the bell through ceiling rose properly.</li> <li>• Make ceiling rose connections properly</li> </ul>
28.Soldering Practice of simple electrical circuit	Soldering Practice Of Simple Electronic Circuit	<ul style="list-style-type: none"> <li>• Proper use of Lead and Flux</li> <li>• Maintain proper temperature of soldering iron.</li> </ul>

Course Outcome (CO)		Cognizant Level	Linked Program Outcomes (PO)	Teaching periods
CO1	Identify and use the tools and equipment in Fitting Shop	R/U/A	1,2,3,4,9,1	5
CO2	Acquire skill in basic fitting operations	R/U/A	1,2,3,4,9,10	6
CO3	Identify and use the Welding shop	R/U/A	1,2,3,4,9,10	11
CO4	Identify and use the tools to perform Carpentry operations	R/U/A	1,2,3,4,9,10	12
CO5	Identify and use the tools to perform operations in electrical workshop	R/U/A	1,2,3,4,9,10	11
R: Remembering, U: Understanding, A: Applying				

### MID EXAMINATION -I and II

One questions to be chosen from the list of experiments 1 to 10 for Mid examination -I and from 11 to 16 for mid examination -II. Student can select one question by lottery method.

Sl. No	Description	Marks
1	Writing procedure	5
2	Sketch / Drawings	5
3	Experiment	5
4	Viva voice	5
Total		20

### INTERNAL EVALUATION

The internal evaluation of a student in the laboratory will be carried out based on the following objectives

Sl. No	Description	Marks
1	Assignment	10
2	Seminar /Model preparation	10
Total		20

## END EXAMINATION

One questions to be chosen from the list of experiments1 T to 22. Student can select one question by lottery method.

Sl. No	Description	Marks
1	Writing procedure	10
2	Sketch / Drawing	05
3	Experiment	15
4	Viva voice	10
Total		40

## SC-109 - BASIC SCIENCE LAB

Course Title	Basic Science Lab	Course Code	SC-109
Semester	I	Course Group	Practical
Teaching Scheme in Pds/Hrs(L:T:P)	1:0:2	Credits	1.5
Type of course	Tutorial & Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

### Physics Lab

**Pre requisites:** Knowledge of basic concepts of basic High school science and basic mathematics

**Course objectives:** To provide practical knowledge about the basics of Physics instrumentation and calculations/measurements.

Course Outcomes	
CO1	Understand Vernier caliper principle and calculate accurate measurement of lengths and volumes of various objects
CO2	Understand Screw Gauge principle and calculate accurate measurement of thickness of various thin objects
CO3	Understand vectors and resultant of vectors and verify Parallelogram law of forces and Triangle law of forces
CO4	Understand the concept of viscosity and calculate Coefficient of viscosity of a liquid by capillary method
CO5	Verify Boyle's law employing Quill tube.

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

**Learning outcomes**

On successful completion of the course, the student will have ability to:

1. Determine the volumes of objects like cylinder, sphere and piece of pipe.
2. Determine thickness /diameter of small objects like glass plate and wire.
3. Verify the parallelogram law and triangle law of forces.
4. Determine the viscosity of liquid using capillary method
5. Verify Boyle's law employing Quill tube.

**Course Delivery:**

The course will be delivered through lectures, class room interaction, group discussions, graded exercises, demonstration and practice.

**Tutorial: 1Periodd /Experiment:**

1. Introduction to Physics practical and its importance, safety precautions in maintenance of equipment in the laboratory.
2. Maintenance of apparatus and equipment.
3. Follow of Do's and Don'ts.
4. Maintenance of data in manual and record book.
5. Write the procedure of the experiment before the commencement of each experiment.
6. Strictly following of instructions given from time to time by the lecturer-in-charge.
7. Demonstration of each experiment by the lecturer in charge.

**Conduction of experiments: 2 periods/Experiment.**

Student must perform experiment individually under the supervision of the lecturer-in charge.

<b>EXAMINATION &amp; EXPERIMENTS</b>		
<b>S.NO</b>	<b>EXAMINATION</b>	<b>EXPERIMENTS</b>
1	MIDSEM-I	EXPERIMENT NO 1 & 2
2	MIDSEM-II	EXPERIMENT NO 3 & 4
3	SEMESTER END EXAMINATION	EXPERIMENT NO 1,2,3,4 and 5

<b>Scheme of Valuation of SEE</b>		
<b>S.No</b>	<b>Particulars</b>	<b>Marks</b>
1.	Objective/Aim	01
2.	Apparatus/Equipment	02
3.	Observations	02
4.	Principle including formula	02
5.	Experiment (Tabular form, readings, etc)	05
6.	Calculation and Result	05
7.	Viva Voce	03
	<b>Total</b>	<b>20</b>

References:

1. Basic Applied Physics – R.K. Gaur
2. Laboratory manual for class XI and XII – NCERT

## Chemistry Lab

**Prerequisite:**

Knowledge of basic concepts of chemistry of secondary education.

**Course Objectives:**

To provide practical knowledge about the basics of preparation of chemical solutions and volumetric analysis of chemical compounds.

**Course Outcomes:**

On successful completion of the course, the student will have ability to attain CO:

Course Outcome	
<b>CO1</b>	Prepare the standard solution.
<b>CO2</b>	Estimate the amount of the HCl in the given sample of solutions
<b>CO3</b>	Estimate the amount of the NaOH in the given sample of solutions.
<b>CO4</b>	Estimate the amount of the H <sub>2</sub> SO <sub>4</sub> in the given sample of solutions.
<b>CO5</b>	Determine the hardness of water in the given sample.

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

**Course Delivery:**

The course will be delivered through lectures, classroom interaction, group discussion, demonstration and practicals.

## **Conduction of experiments: Lecture 1 period + Experiment 2 periods.**

Student must conduct experiment individually under the supervision of the staff-in-charge.

### **Lecture and Demonstration: 1 Period**

1. Introduction of chemistry practical and its importance, safety precautions in maintenance of cleanliness and orderliness of chemicals in the laboratory.
2. Maintenance of apparatus and equipment.
3. Follow of Do's and Don'ts.
4. Maintenance of data in record book.
5. Write the procedure of the experiment before the commencement of each experiment.
6. Strict following of instructions given from time to time by the staff-in-charge.
7. Demonstration of each experiment by the staff in charge.

### **Course Content**

#### **Volumetric Analysis: (22.5 Periods)**

#### **Volumetric Analysis by Titrimetric Method:-**

Volumetric Analysis -Titration – Standard Solutions - Concentration of solutions - Indicators - Acid base indicators - Selection of indicators - Endpoint of titration- Neutralization.

#### **List of experiments:**

1. Preparation of 0.05M sodium carbonate solution.
2. Estimation of hydrochloric acid present in 250 ml of solution by using standard sodium carbonate solution.
3. Estimation of sodium hydroxide present in 250ml of solution by using standard hydrochloric acid solution.
4. Estimation of sulphuric acid present in 250ml of solution by using standard sodium hydroxide solution.
5. Determination of total hardness of water sample by 0.02N EDTA solution.

#### **Specific Learning Outcomes**

#### **Upon completion of the course, the student will have ability to**

1. Prepare standard sodium carbonate solution and dilute to desired concentration.
2. Estimate hydrochloric acid present given volume of solution by using standard sodium carbonate solution.
3. Estimate sodium hydroxide present in the given volume of solution by using standard hydrochloric acid solution.
4. Estimate sulphuric acid present in the given volume of solution by using standard sodium hydroxide solution.
5. Determine the total hardness of water sample by using 0.02N EDTA solution.

**Reference Books:**

1. Vogel's Inorganic Qualitative and Quantitative Analysis.
2. Practical chemistry by O.P.Pande & others.
3. Qualitative and quantitative analysis by Alex.

<b>EXAMINATION &amp; EXPERIMENTS</b>		
<b>S.NO</b>	<b>EXAMINATION</b>	<b>EXPERIMENTS</b>
1	MIDSEM-I	Experiment No. 1 & 2
2	MIDSEM-II	Experiment No. 3 & 4
3	SEMESTER END EXAMINATION	Experiment No. 1,2,3,4 and 5

<b>Scheme of Valuation for MID I &amp; II and SEE</b>		
<b>Sl. No.</b>	<b>Particulars</b>	<b>Marks</b>
<b>1</b>	Identification of apparatus/equipment/chemical compounds/tools/etc.	2
<b>2</b>	Writing Principle and Procedure	5
<b>3</b>	Experiment and Observations	6
<b>4</b>	Calculation and Results	4
<b>5</b>	Viva-voice	3
<b>Total</b>		<b>20</b>

**BOARD DIPLOMA EXAMINATION, (C-21)**  
**MIDSEM – I**  
**FIRST SEMESTER EXAMINATION**  
**SC-109 - BASIC SCIENCE LAB**

**TIME: 1 Hour**

**TOTAL MARKS: 20**

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- Instructions:** (1) Answer both PART-A AND PART-B on separate answer sheets.
- (2) Each question carries **TEN** marks.

**PART-A (PHYSICS LAB)**

*Perform ONE experiment allotted by the examiner.*

1 x 10 = 10

1. Find the volume of given sphere using Vernier caliper.
2. Find the volume of given cylinder using Vernier caliper.
3. Find the volume of given piece of pipe using Vernier caliper
4. Determine the thickness of given glass plate using Screw gauge.
5. Find the cross sectional area of given wire using Screw gauge.

**PART-B (CHEMISTRY LAB)**

*Perform ONE experiment allotted by the examiner.*

1 x 10 = 10

1. Prepare 250 ml of 0.05M sodium carbonate solution.
2. Estimate the amount of hydrochloric acid present in 500 ml of the given solution using 0.02M sodium carbonate solution.
3. Estimate the amount of hydrochloric acid present in 250 ml of the given solution using 0.05M sodium carbonate solution.

**BOARD DIPLOMA EXAMINATION, (C-21)**  
**MIDSEM – II**  
**FIRST SEMESTER EXAMINATION**  
**SC-109 - BASIC SCIENCE LAB**

**TIME: 1 Hour**

**TOTAL MARKS: 20**

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**Instructions:** (1) Answer both PART-A AND PART-B on separate answer sheets.

(2) Each question carries **TEN** marks.

**PART-A (PHYSICS LAB)**

*Perform ONE experiment allotted by the examiner.*

1 x 10 = 10

1. Verify parallelogram law of forces.
2. Verify triangle law of forces
3. Determine coefficient of viscosity of water using capillary method.

**PART-B (CHEMISTRY LAB)**

*Perform ONE experiment allotted by the examiner.*

1 x 10 = 10

1. Estimate the amount of NaOH present in 500 ml solution using 0.02M HCl solution
2. Find the Molarity and estimate the amount of Sulphuric acid present in 250 ml solution using 0.01M NaOH solution.

**BOARD DIPLOMA EXAMINATION, (C-21)**  
**SEMESTER END EXAMINATION**  
**FIRST SEMESTER EXAMINATION**  
**SC-109 - BASIC SCIENCE LAB**

Time: 2 Hours]

[Total Marks: 40

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**Instructions:** (1) Answer both PART-A AND PART-B on separate answer sheets.  
(2) Each question carries **TWENTY** marks.

**PART-A (PHYSICS LAB)**

*Perform ONE experiment allotted by the examiner.*

1 x 20 = 20

1. Find the volume of given sphere using Vernier caliper.
2. Find the volume of given cylinder using Vernier caliper.
3. Find the volume of given piece of pipe using Vernier caliper
4. Determine the thickness of given glass plate using Screw gauge.
5. Find the cross sectional area of given wire using Screw gauge.
6. Verify parallelogram law of forces
7. Verify triangle law of forces.
8. Determine coefficient of viscosity of water using capillary method.
9. Verify Boyle's law using Quill tube.

**PART-B (CHEMISTRY LAB)**

*Perform ONE experiment allotted by the examiner.*

1 x 20 = 20

10. Prepare 250 ml of 0.05M sodium carbonate solution.
11. Estimate the amount of hydrochloric acid present in 500 ml of the given solution using 0.02M sodium carbonate solution.
12. Estimate the amount of hydrochloric acid present in 250 ml of the given solution using 0.05M sodium carbonate solution.
13. Find the Molarity and estimate the amount of NaOH present in 100 ml of the given solution using 0.01M HCl solution.
14. Estimate the amount of Sulphuric acid present in a litre of solution using 0.01M NaOH solution.
15. Determine the total hardness of the given water sample using 0.02N EDTA solution

## CS-110 - Basic Computer Science Lab

Course Title	Basic Computer Science Lab	Course Code	CS-110
Semester	I	Course Group	Practical
Teaching Scheme in Periods (L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture +Tutorial	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

**Pre-requisite:** The students should have basic knowledge of and basic knowledge of using computer

### COURSE OUTCOME

CO1	Creating and saving a document, Formatting of text in MS-WORD
CO2	Spell checking, Mail merging and Printing of Documents in MS-WORD
CO3	Creating and Saving a presentation, inserting text and pictures & Formatting the text and pictures, Slide transition and Animation effects in MS-POWER POINT
CO4	Building Worksheet & Charts In Ms-Excel and Printing Of Worksheet
CO5	Creating Database, Tables, Forms, Queries, Reports In Ms-Access

### Course Contents

#### 1. Unit-I: Creating, Saving a document, Formatting of text in MS-WORD

**Duration: 5 hrs**

- MS\_WORD - Creating and saving a document, Formatting of text

#### 2. Unit-II: Spell checking, Mail merging and Printing of Documents in MS-WORD MS Word

**Duration: 10 hrs**

- MS-WORD - Spell Checking - Mail merging - Printing of Documents

#### 3. Unit-III: Creating and Saving a presentation in MS Powerpoint and Slide transition and Animation effects

**Duration: 10 hrs**

- MS-POWER POINT - Creating and saving a presentation - Inserting text and pictures - Formatting the text and pictures- MS-POWER POINT - Effects of slide transition - Animation effects - Slide show & views of slides

#### **4. Unit-IV Building & Charts in MS-Excel and Printing Of Worksheet**

**Duration: 10 hrs**

- Building Worksheets – Building Charts, Printing EXCEL Worksheet

#### **5. Unit-V Creating Database, Tables, Queries, Forms ,Reports & Printing**

**Duration: 10 hrs**

- Creating Table, Viewing(ACCESS) – Creating Forms – Creating Queries and Viewing Database
- Creating of ACCESS Reports – Printing of ACCESS Tables, Forms, Reports

### **Specific Learning Outcomes:**

#### **1.0 Practice Operation of MS-Word.**

- 1.1 Demonstrate starting MS word.
- 1.2 Identify the word screen elements.
- 1.3 Identify the tool bars on the screen.
- 1.4 Demonstrate loading different tool bars for their functionality.
- 1.5 Identify the drop down menus of the main menu and their functionality.
- 1.6 Demonstrate creating a sample text.
- 1.7 Demonstrate text formatting.
- 1.8 Demonstrate page formatting.
- 1.9 Demonstrate selecting, deselecting the text from menu and Copying.
- 1.10 Demonstrate importing text from other packages.

#### **2.0 Spell checking, Mail merging and Printing of Documents in MS-WORD**

- 2.1 Demonstrate search and replace of text.
- 2.2 Demonstrate spell checking.
- 2.3 Demonstrate creating tables.
- 2.4 Demonstrate mail merging of documents.
- 2.5 Demonstrate printing documents, merge printing of documents.
- 2.6 Demonstrate word procedure for importing figures, charts from other installed software.

#### **3.0 Practice operation of MS-Power Point and Slide transition and Animation effects.**

- 3.1 Demonstrate starting MS Power Point.

- 3.2 Identify the opening screen elements.
- 3.3 Identify the tool bars in the opening screen.
- 3.4 Demonstrate the selection of the methods of creating a new presentation.
- 3.5 Identify the different Auto Layouts of a slide.
- 3.6 Demonstrate creating a new slide
- 3.7 Demonstrate inserting a new slide.
- 3.8 Demonstrate slide transition effects.
- 3.9 Demonstrate a slide show.
- 3.10 Demonstrate animation effects.
- 3.11 Demonstrate creating an organization chart.
- 3.12 Identify the different slide views.

#### **4.0 Building Worksheets & Charts in MS-Excel**

- 4.1 Start EXCEL from the start
- 4.2 Identify the various parts of the window.
- 4.3 Identify the tabs and groups in ribbon layout
- 4.4 Identify and customizing the quick access toolbar
- 4.5 Identify the office button and commands of the drop down menu.
- 4.6 Practice loading of the existing worksheet or create a new worksheet.
- 4.7 Practice entering into the worksheet.
- 4.8 Practice formatting the cells.
- 4.9 Practice formatting the texts in the cells.
- 4.10 Practice changing the height and width of the cells.
- 4.11 Practice freezing the rows, columns.
- 4.12 Practice splitting the screens.
- 4.13 Enter formulas into the cells.
- 4.14 Enter formulas with built in functions.
- 4.15 Create a range name for the cells for group operations.
- 4.16 Create graph for the data in the worksheet.

#### **5.0 Creating Database, Tables, Queries and Forms**

- 5.1 Practice loading Ms Access from the start menu.
- 5.2 Create a database table using Database Wizard.
- 5.3 Enter data into the table.
- 5.4 Edit data in the table.

- 5.5 View data from the database.
- 5.6 Design a query.
- 5.7 View data using the query.
- 5.8 Demonstrate creating Forms.
- 5.9 View the database through Forms.
- 5.10 Practice navigating through the database through Forms.
- 5.11 Practice creating Custom Form using Forms Wizard.
- 5.12 Practice creating Reports using the Report Wizard.
- 5.13 Practice printing the tables, forms and reports.

## **EXERCISES**

1. Create and save a document using MS WORD.
2. Format the Text document.
3. Change the page set-up and Insert Header/Footer.
4. Spell checking in the document.
5. Print the document.
6. Create main document and data file for mail merging.
7. Print the document with mail merging.
8. Create a table in the document.
9. Add row, column to a table.
10. Create and save a new presentation using MS Power Point.
11. Choose Auto Layout for a new slide.
12. Inserting text and pictures into a blank slide.
13. Inserting new slides into the presentation.
14. Applying slide transition effects.
15. Demonstrate a slide show.
16. Set animation to text and pictures in a slide.
17. Set the sounds, order and timing for animation.
18. Create and save a new work book in Excel
19. Operating Mouse to selecting tabs, groups, cells, group of cells
20. Entering Data into Worksheet
21. Editing of Worksheet
22. Formatting the text in the cells
23. Formatting the numbers in the cells.

24. Changing the height and width of cells.
25. Freezing Titles, splitting screen
26. Enter formulae for calculation in the cells.
27. Copying the formula over a range of cells.
28. Inserting built-in functions in to the cells.
29. Create graphs for the data using Chart Wizard.
30. Practice Data Forms in Excel.
31. Printing of worksheet
32. Creating Tables using wizard in Access
33. Creating Tables using Design View in Access.
34. Entering Data into tables
35. Viewing the data in table.
36. Creating a new query using wizard.
37. Creating a new query using design view.
38. Viewing the data using a Select Query.
39. Updating the data in table using Update Query.
40. Linking two Tables on Relational Aspect.
41. Create forms using Form Wizard.
42. Create reports using Report Wizard.
43. Printing the tables, forms and reports

### **Suggested Student Activities**

1. Student visits Library to refer to Manual for the specifications
2. Student inspects the available equipment in the Lab to identify the components
3. Visit nearby Industry to familiarize with fabrication techniques
4. Analyze the connections in the UPS available in the Institution facility
5. Quiz , Group discussion, Surprise test

### **RECOMMENDED BOOKS:**

1. Teach yourself Office 2007 for Windows – Coray Sandler, Tom Badgett, Jan Weingarten, BPB Publications.
2. The ABC s of MS Office 2007– Guy Hard-Davis, BPB Publications.
3. Working in MS Office - Ran Mansfield, Tata McGraw Hill Publications.

### Student E-Learning reference

1. <https://www.tutorialspoint.com/word/index.htm>
2. <https://www.tutorialspoint.com/powerpoint/index.htm>

### CO / PO MAPPING MATRIX

	<b>COURSE OUTCOME</b>	<b>CL</b>	<b>Linked PO</b>	<b>Teaching Hrs</b>
CO1	Creating and saving a document, Formatting of text in MS-WORD	R/U/A	1,2,3,4,7	5
CO2	Spell checking, Mail merging and Printing of Documents in MS-WORD	R/U/A	1,2,3,4,7	10
CO3	Creating and Saving a presentation, inserting text and pictures & Formatting the text and pictures and Slide transition and Animation effects in MS-POWER POINT	R/U	1,2,3,4,7	10
C04	Building Worksheet & Charts In Ms-Excel and Printing Of Worksheet	R/U/A	1,2,3,4,7	10
C05	Creating Database, Tables, Forms, Queries, Reports In Ms-Access	R/U/A	1,2,3,4,7	10

MODEL PAPER OF **MID SEM- I** EXAM

TIME: 1 hr

MARKS: 20

ANSWER ANY ONE QUESTION. EACH QUESTION CARRIES TWENTY MARKS.

20 x 1 = 20

1. Demonstrate Starting MS word and identify the word screen elements.
2. Draw and explain the groups and commands in Home tab under ribbon in Ms word.
3. Demonstrate text formatting in Ms word.
4. Demonstrate procedure for checking of spelling and grammar using dictionaries.
5. Demonstrate paragraph formatting in Ms word.
6. Draw and explain the groups and commands in page layout tab under ribbon in Ms word.
7. Demonstrate page formatting in Ms word.
8. Demonstrate procedure for creating Mail merging process in Ms word.
9. Demonstrate creating of table and adding rows and columns to the existing table in Ms word.
10. Demonstrate finding and replacing of text & searching for a bookmark.
11. Demonstrate starting of MS Power Point and identify the opening screen elements.
12. Draw and explain the groups and commands in Home tab under ribbon in MS Power Point.
13. Demonstrate different Auto Layouts of a Slide in MS Power Point.
14. Demonstrate Slide Transition effects in Ms Power Point.
15. Demonstrate different Animation effects in Ms Power Point.
16. Draw and explain the groups and commands in Animations tab under ribbon in MS Power Point.
17. Demonstrate different Slide views in MS Power Point.
18. Draw and explain the groups and commands in Review tab under ribbon in MS Power Point.
19. Demonstrate inserting and formatting of text and pictures in MS Power Point.

MODEL PAPER OF **MID SEM- II EXAM**

TIME: 1 hr

MARKS: 20

ANSWER ANY ONE QUESTION. EACH QUESTION CARRIES TWENTY MARKS. 20  
x 1 = 20

1. Write procedure to open Excel window and Draw and label the parts in Excel window.
2. Draw and Write about groups and commands under Formulas tab under the ribbon in MS-Excel.
3. Write procedure to format the text in the cells.
4. Write procedure to enter formulas with built in functions.
5. Write procedure for creating chart in MS-excel.
6. Write Procedure for formatting numbers in MS-Excel.
7. Write procedure for writing criteria and extract the data.
8. Write procedure for printing of a worksheet.
9. Write procedure for formatting of chart in Ms-excel.
10. Write procedure to jump to different workbooks & import worksheet from different workbook.
11. Write procedure to create a database.
12. Write procedure to create a table using design view.
13. Write procedure to create form using forms wizard.
14. Write procedure for creating reports using report wizard.
15. Write procedure for creating a Custom Form.
16. Write the procedure to create custom reports.
17. Write the procedure to print active sheet.
18. Write the procedure for Printing of reports.
19. Draw and explain the groups and commands in create tab under ribbon in Ms access.
20. Write the procedure for creating Filter by form.

## MODEL PAPER OF END SEMESTER EXAM

TIME: 2hr

MARKS : 40

ANSWER ANY ONE QUESTION. EACH QUESTION CARRIES TWENTY MARKS.

20 x 1 = 20

1. Write procedure for Creating and saving a document and draw and label the different parts of opening screen elements in Ms word.
2. Draw and explain the groups and commands in Home tab under ribbon in MS Power Point.
3. Write procedure for applying sounds, order, timing and effects of animation in a presentation.
4. Write procedure for character formatting in Ms word.
5. Draw and explain the groups and commands in Home tab under ribbon in Ms word.
6. Write procedure for creating main document and data file for mail merging.
7. Write procedure for page formatting in Ms word.
8. Write procedure for checking spelling and grammar using dictionary in Ms word.
9. Write procedure for printing of document in Ms word.
10. Draw and explain the groups and commands in Animations tab under ribbon in MS Power Point.
11. Write procedure to open Excel window and Draw and label the parts in Excel window.
12. Draw and Write about groups and commands under Formulas tab under the ribbon in MS-Excel.
13. Write procedure to format the text in the cells.
14. Write procedure to enter formulas with built in functions.
15. Write procedure for creating chart in MS-excel.
16. Write Procedure for formatting numbers in MS-Excel.
17. Write procedure for writing criteria and extract the data.
18. Write procedure for printing of a worksheet.
19. Write procedure for formatting of chart in Ms-excel.

20. Write procedure to jump to different workbooks & import worksheet from different workbook.
21. Write procedure to create a database.
22. Write procedure to create a table using design view.
23. Write procedure to create form using forms wizard.
24. Write procedure for creating reports using report wizard.
25. Write procedure for creating a Custom Form.
26. Write the procedure to create custom reports.
27. Write the procedure to print active sheet.
28. Write the procedure for Printing of reports.
29. Draw and explain the groups and commands in create tab under ribbon in Ms access.
30. Write the procedure for creating Filter by form.

Record book :- 10 marks

Viva-voce:- 10 marks

## MN-111-SKILL UPGRADATION

Course Title	Skill Upgradation	Course Code	MN-111
Semester	I	Course Group	Practical
Teaching Scheme in Periods (L:T:P)	0:0:8	Credits	2.5
Methodology	Lecture +Tutorial	Total Contact Periods	120

### Basic English – Skills Upgradation

#### TASK:

**LEVEL 1:** Collection of material for learning skills

**LEVEL2:** Analysis of the material

**LEVEL 3:** Practice the activities

**LEVEL 4:** Assessment of the skills acquired

#### Activity before the activities:

*Collect the material useful for learning Listening, Speaking, Reading, Writing (LSRW skills), Grammar and Vocabulary.*

- 1. Collect newspaper clippings, books, puzzles, pictures, audio and video programmes in English.*
- 2. Talk to your classmates, seniors, alumni, teachers, successful people in job interviews and celebrities.*
- 3. Visit libraries to gather information.*
- 4. Visit useful websites for acquiring language learning skills.*

#### Activities:

1. Collect / Go through the different kinds of dictionaries and find out the differences.
  - a) List out the English words which are originated from Telugu, Hindi, Sanskrit and other Indian languages.
  - b) Prepare a list of technical words related to your branch.
  - c) Prepare the list of Homonyms, Homophones. Heteronyms, Heterophones and Capitonyms.
2. Collect the vocabulary building games and activities. Practice them individually, in pairs and groups.
3. Learn different kinds of reading a text. Practice various kinds of reading material.

4. Find out the differences between reading aloud and silent reading. Identify the advantages and disadvantages of speed reading.
5. Conduct a survey on the need for English. Talk to your classmates or seniors and find out the difficulties while learning English.
6. Practice dialogues on
  - a) Feelings
  - b) Likes & dislikes
  - c) Requests
  - d) Obligations(Dramatize the dialogues)
7. Introduce yourself through a line up activity or inner and outer circle activity.
8. Introduce tenses:
  - a) Write the diary using present tense.
  - b) Write an anecdote in past tense.
  - c) Prepare the weather forecast for the next week in future tense.
9. Observe the picture / photo and describe the persons, places and things using the describing words and prepositions.
10. Role play: Interview a celebrity using 'wh' and 'yes/no' questions.
11. Identify what is there in the bag using 'yes/no' questions.
12. Arrange the jumbled sentences in an order to make a meaningful paragraph.
13. Write a paragraph on your goals.
14. Write a letter to God / a celebrity.
15. Collect the letters written by great leaders, celebrities and officers.

Note: The above activities are indicative. The teacher may assign any other activity relevant to the skills introduced in the semester.

### COURSE OUTCOMES

<b>No.</b>	At the end of the course, the students will have the ability to:
<b>101.1</b>	Use a dictionary and acquire vocabulary for social interaction.
<b>101.2</b>	Comprehend, identify main ideas, make inferences, visualize, and answer questions. Analyze and evaluate the written material.
<b>101.3</b>	Speak and write grammatically correct sentences, communicate effectively, express their likes, dislikes, feelings, make requests, express obligations and introduce themselves.
<b>101.4</b>	Use verbs in the different tenses according to the situations. Use Voice to express an action clearly
<b>101.5</b>	Describe people and objects, ask questions, use prepositions and write grammatically correct sentences.
<b>101.6</b>	Convey ideas in the form of paragraphs and letters

### CO-PO Matrix

<b>CO</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>Mapping POs</b>
<b>101.1</b>	-	-	-	-	3		3	5,7
<b>101.2</b>	-	-	-	-	3	2	3	5,6,7
<b>101.3</b>	-	-	-	-	3	3	3	5,6,7
<b>101.4</b>	-	-	-	-	2	2	3	5,6,7
<b>101.5</b>	-	-	-	-	2	2	3	5,6,7
<b>101.6</b>		-	--	--	2		3	5,7



## I SEMESTER

### SKILL UPGRADATION IN - BASIC ENGINEERING MATHEMATICS

#### ACTIVITY ASSESSMENT Steps

1. Mathematical concepts
2. Procedure
3. Explanation
4. Working with others
5. Mathematical errors

#### ACTIVITIES

1. Prepare a presentation to explain Logarithms.
2. Prepare a list of articles purchased from a super market and arrange in a matrix form to Compute the total amount using matrix multiplication.
3. Prepare a presentation to resolve a Partial fraction into simpler fractions.
4. Prepare a presentation stating the applications of Trigonometry.
5. List the methods to solve system of equations using Matrices and Determinants. Describe their features.
6. Visit the library, refer books on Mathematics and collect the details related to 2 Mathematicians.
7. Prepare a presentation to solve a triangle ABC in different cases.

#### CO / PO - MAPPING OF ACTIVITIES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	1			1	2	2	3
CO2	3	2	2	1	1		1	2	2	3
CO3	3	2	2	1			1	2	2	3
CO4	3	2	2	1			1	2	2	3
CO5	3	2	2	1			1	2	2	3
CO6	3	2	2	1			1	2	2	3
CO7	3	2	2	1			1	2	2	3



## SEMESTER – I

### SKILL UPGRADATION – C21 BASIC PHYSICS

#### TASK

**LEVEL 1: Concept, Ethical Data, Materials, Source (Library/internet/others)**

**LEVEL 2: Methodology/procedure**

**LEVEL 3: Analysis/experiment**

**LEVEL 4: Interpretation/inference/evaluation.**

***Bridge activity: - Visiting your college Library:***

*(A) Prepare a list of available reference books in Physics with details such as author, publisher, edition etc.*

*(B) Prepare a list of Physics/Science journals, magazines, monographs with details.*

*(C) Prepare a log book of your visits to college library with brief description.*

***Activities:-***

1. Discover some physical equations and apply principle of homogeneity.
2. Visit your College Physics laboratory. Collect equal amounts (mass in gm) of water and mercury. Calculate the density of each in CGS units. Express them in SI system of units using dimensional analysis. Infer the result.
3. Identify the bodies which have rolling objects like wheels, ball bearings. Prepare a chart with drawings and explain the importance of rolling friction.
4. Identify the objects where you apply various methods of reducing friction. Make each method as a module to one individual. Integrate all modules and generate a chart with brief explanation by the use of drawings.
5. Take two vectors with varying angles of inclination. Find the resultant using triangle law of vector addition by drawing the vectors in each case on a graph paper. Draw the conclusions. Correlate the result using parallelogram law of vector addition.
6. Three forces  $F_1$ ,  $F_2$  and  $F_3$  are acting on a body with angles  $\theta_1$ ,  $\theta_2$ , and  $\theta_3$  with the horizontal respectively. Calculate the resultant force acting on that body. Draw the diagram.
7. Survey the places where curved paths are banked. Take photographs and reconstruct on the chart. Prepare a report.
8. Verify Hooke's Law by performing experiment using weights, spring and ruler.
9. Explore the internet. Prepare a power point report on surface tension and wetting, viscosity.
10. Debate on Green house effect and global warming. Justify the advantage of green house effect. Prepare a video clip and power point report with diagrams.

11. Design a mini wind mill/solar cooker/biomass plant as an application of conversion of energy.
12. Construct a model thermometer having centigrade scale, Fahrenheit and absolute scale with the help of available simple objects. Formulate the method of development.

*NOTE: The above activities are indicative. The teacher may assign any other activity relevant to the course based on resources available.*

Course Outcomes (CO)		Linked Pos	Activity Hours
CO1	Apply principle of homogeneity	PO1, PO2	3
CO2	Convert unit from one system to other system using dimensions	PO1, PO2, PO3	3
CO3	Prepare a chart with drawings explaining the importance of friction	PO1, PO2, PO7	3
CO4	Prepare a chart on reducing friction	PO1, PO2, PO4, PO5, PO7	3
CO5	Triangle law of vector addition - graphical analysis – correlation with parallelogram law of vector addition	PO1, PO4,	3
CO6	Calculate resultant force by component method	PO1, PO2, PO4	3
CO7	Banking of roads – practical observations	PO1, PO2, PO5	3
CO8	Verify Hooke's law with simple materials	PO1, PO2, PO3, PO4	3
CO9	Power point report on surface tension and wetting, viscosity by exploring internet	PO1, PO2, PO7	3
CO10	Debate on Green house effect and global warming. Advantage of green house effect - justification. Prepare a video clip and power point report with diagrams.	PO5, PO6, PO7	3
CO11	Design a mini wind mill/solar cooker/biomass plant as an application of conversion of energy-working models.	PO5, PO6, PO7	3
CO12	Construct a model thermometer having centigrade scale and absolute scale. Formulate the development.	PO1, PO2, PO4	3



## **SC-104 - GENERAL ENGINEERING CHEMISTRY**

### **Suggested Skill Upgradation Activities**

#### **Activity Assessment Steps:**

**Level-1: Concept, Data collection and summarization, Material etc**

**Level-2: Prepare Chart, explain the process, perform the experiment etc, and prepare a report etc**

**Level-3: Oral or power point presentation of the activity.**

**Level-4: Submission of report.**

#### **Activity – 1**

Prepare a chart or model of different types of orbitals and electronic configuration.

#### **Activity – 2**

Prepare the models/ charts on ionic and covalent bonding.

#### **Activity – 3**

Prepare and study the physical properties of True Solution, Colloidal Solution, and Suspension.

#### **Activity – 4**

Study of the acidic, basic or neutral nature of water sample collected from various sources.

#### **Activity – 5**

Compare the renewable and non-renewable energy sources.

#### **Activity – 6**

Study and analysis of ecosystem (lake, pond etc) existing in your surroundings.

#### **Activity – 7**

Study of bio diversity in your surroundings.

#### **Activity – 8**

Study and report the importance of forest resources.

#### **Activity – 9**

Study and report the importance of osmosis and reverse osmosis.

#### **Activity – 10**

Explain the method of purification of drinking water adopted at your residence.

#### **Activity – 11**

Preparation of the models/ charts on the softening of water by different methods and comparison.

#### **Activity – 12**

Study of electrolytes and non-electrolytes

**Note: Any other skill upgradation activity related to the course may be taken up.**

### Mapping of POs to Skill Upgradation Activities

S.No	Name of the activity	Linked POs
1	Prepare a chart or model of different types of orbitals and electronic configuration.	1, 6,7
2	Prepare the models/ charts on ionic and covalent bonding.	1, 6,7
3	Prepare and study of physical properties of True Solution, Colloidal Solution, and Suspension.	1,4, 6,7
4	Study of the acidic, basic or neutral nature of water sample collected from various sources.	1,4, 6,7
5	Compare the renewable and non renewable energy sources.	1, 5, 6,7
6	Study and analyze the ecosystem (lake, pond etc) existing in your surroundings	1, 5, 6,7
7	Study of bio diversity in your surroundings	1, 5, 6,7
8	Study and report the importance of forests resources.	1,5, 6,7
9	Study and report the importance of osmosis and reverse osmosis.	1, 6,7
10	Explain the method of purification of drinking water adopted at your residence.	1, 6,7
11	Preparation of the models/ charts on the softening of water by different methods and comparison.	1, 6,7
12	Study of electrolytes and non-electrolytes	1, 6,7

**Method of evaluation of the student activities ( Rubrics)**

**Model Rubrics**

S. No	Sub activity	Performance Level (Score)			
		Excellent (4)	Good (3)	Satisfactory (2)	Need improvement (1)
1	Level-1 (Data and Material collection)	All materials and data required for the activity were accurately prepared based on the data collected independently	Almost all materials and data required for the activity were accurately prepared based on the data collected independently	The materials and data required for the activity were accurately prepared based on the data collected with the help of teacher.	The materials and data required for the activity were inaccurately prepared .
2	Level-2 (Chart, Model, Experiment or Study)	Procedures were outlined in a step-by-step fashion that could be followed by anyone & performed the activity effectively.	Procedures were outlined in a step-by-step fashion, require explanation & performed the activity effectively.	Procedures that outlined were complete with 1 or 2 gaps and require explanation & performed the activity normally	Procedures that outlined were not sequential, & performed the activity in a poor way
3	Level-3 ( Oral or Power point presentation)	Presented/ explained the information about the activity in logical, interesting sequence with attractive visuals or diagrams.	Presented/ explained the information about the activity in logical sequence with visuals or diagrams.	Presented/ explained the information about the activity in logical sequence with less visuals or diagrams.	Presented/ explained the information about the activity without sequence and visuals or diagrams.
4	Level-4 (Submission of Report)	Provided a detailed conclusion/ summary clearly based on the data and activity	Provided a conclusion / summary clearly based on the data and activity	Provided a conclusion/ summary less effectively	Conclusions /summary was not relevant.

**Note: The above rubrics are indicative. Separate rubrics may be prepared according to the activity. Minimum passing score is 2.5.**

### **Suggested Course Outcomes**

#### **CO.1 Address the identified needs of the community collaboratively to facilitate positive social change.**

- a. Prepare a chart related to the topics covered in the present semester.
- b. Listen to expert talk, guest lecture, YouTube video and write a summary.
- c. Participate in Haritha Haram and submit a small report about the activities.
- d. Prepare a report / PPT / poster on waste water recycling or any eco-friendly practices.
- e. Seminar on problems with possible solutions in the campus or nearby places
- f. Group discussions or enacting a play on topics creating awareness about socio-economic problems
- g. Take up a case study on identification of latest technologies to tackle day to day problems such as pollution control or traffic management and submit a report / PPT/ poster
- h. Participate in NCC

**(PO 5, 6 )**

#### **CO.2 Listen attentively to others and respond appropriately**

- a. Listen to expert talk, guest lecture, YouTube video and write a summary.
- b. Participating in Group discussions or enacting a play on topics creating awareness about socio-economic problems that can be mitigated by technologies.
- c. Participate in quiz on technical aspects or current affairs
- d. Participate in Mock Interview

**(PO 5)**

#### **CO.3 Adapt your style to the occasion, task, and audience**

- a. Group discussions or enacting a play on topics creating awareness about socio-economic problems that can be mitigated by technologies.
- b. Seminar on problems with possible solutions in the campus or nearby places
- c. Participate in Mock Interview

**(PO5, 6, 7)**

#### **CO.4 Articulate ideas in various formats including oral, written, nonverbal, visual, and electronic devices.**

- a. Prepare a chart related to the topics covered in the present semester.
- b. Refer to an e-journal and submit a summary report on upcoming technologies.
- c. Visit factory / industry and submit a report/PPT on the observations made.
- d. Prepare a mini project and submit report.

- e. Prepare a report / PPT / poster on waste water recycling or any eco-friendly practices.
- f. Take up a case study on identification of latest technologies to tackle day to day problems such as pollution control or traffic management and submit a report / PPT/ poster
- g. Seminar on problems with possible solutions in the campus or nearby places
- h. Participate in Mock Interview

(PO5, 6, 7)

**CO.5 Demonstrate ability to recognize and effectively manage ambiguous ideas, experiences and situations**

- a. Take up a case study on identification of latest technologies to tackle day to day problems such as pollution control or traffic management and submit a report / PPT/ poster
- b. Seminar on problems with possible solutions in the campus or nearby places

(PO5, 6, 7)

**CO.6 Analyze the interconnections between individuals and society as well as how individual actions have an impact on others.**

- a. Participate in Haritha Haram and submit a small report about the activities.
- b. Participate in Swatch Bharath and write an essay on the importance of the program
- c. Participate in NCC

(PO5, 6, 7)

(PO5, 6, 7) CO	Outcome	CO/PO Mapping
CO1	Address the identified needs of the community collaboratively to facilitate positive social change.	5, 6, 7
CO2	Listen attentively to others and respond appropriately	5, 6, 7
CO3	Adapt your style to the occasion, task, and audience	5, 6, 7, 8, 9, 10
CO4	Articulate ideas in various formats including oral, written, nonverbal, visual, and electronic devices.	5, 6, 7, 8, 9, 10
CO5	Demonstrate ability to recognize and effectively manage ambiguous ideas, experiences and situations	5, 6, 7, 8, 9, 10
CO6	Analyze the interconnections between individuals and society as well as how individual actions have an impact on others.	5, 6, 7, 8, 9, 10

<b>(PO5, 6, 7) CO</b>	<b>Outcome</b>	<b>CO/PO Mapping</b>
CO1	Address the identified needs of the community collaboratively to facilitate positive social change.	5, 6, 7
CO2	Listen attentively to others and respond appropriately	5, 6, 7
CO3	Adapt your style to the occasion, task, and audience	5, 6, 7
CO4	Articulate ideas in various formats including oral, written, nonverbal, visual, and electronic devices.	5, 6, 7
CO5	Demonstrate ability to recognize and effectively manage ambiguous ideas, experiences and situations	5, 6, 7
CO6	Analyze the interconnections between individuals and society as well as how individual actions have an impact on others.	5, 6, 7

**Note:** The above COs may map to other POs from 1 to 4 apart from PO's 5 to 7 depending on the topic

### **Suggested Student Activities**

1. Prepare a chart related to the topics covered in the present semester.
2. Refer to an e-journal and submit a summary report on upcoming technologies.
3. Visit nearby Mines / Processing plants and submit a report/PPT on the observations made.
4. Prepare a mini project and submit report.
5. Listen to expert talk, guest lecture, YouTube video and write a summary.
6. Participate in Haritha Haram and submit a small report about the activities.
7. Prepare a report / PPT / poster on waste water recycling or any eco-friendly practices.
8. Take up a case study on identification of latest technologies to tackle day to day problems such as pollution control or traffic management and submit a report / PPT/ poster
9. Participate in Swatch Bharath and write an essay on the importance of the program
10. Group discussions or enacting a play on topics creating awareness about socio-economic problems
11. Physical activities such as sports, games, yoga, meditation and other relaxation techniques
12. Participate in quiz on technical aspects or current affairs
13. Seminar on problems with possible solutions in the campus or nearby places
14. Participate in NCC
15. Participate in Mock interviews

**Note:** The above student activities will be assessed using rubrics. A sample rubrics template is given below. The subject teacher can assess students using rubrics with at least four relevant aspects.

<b>RUBRICS MODEL (For assessing Presentation skills) Aspects</b>	Needs improvement	Satisfactory	Good	Exemplary
Collection of data	Collects very limited information	Collect much Information with very limited relevance to the topic	Collects some basic information with little bit of irrelevance	Collects a great deal of information with relevance
Presentation of data	Clumsy presentation of data	Presents data well; but presentation needs to be more meaningful	Presents data well but need to improve clarity	Presents data in an understandable eye concise manner
Fulfill team's roles & duties	Performs very little duties but Unreliable.	Performs very little duties and is inactive	Performs nearly all duties	Performs all duties of assigned team roles
Shares work equally	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Normally does the assigned work	Always does the assigned work without having to be reminded
Interaction with other team mates	Usually does most of the talking; rarely allows others to speak	Talks good; but never show interest in listening to others	Listens, but sometimes talks too much	Listens and speaks a fair amount
Audibility and clarity in speech	Hardly audible and unclear	Very little audibility and clarity	Audible most of the time with clarity	Audible and clear
Understanding content	Lacks content understanding and is clearly a work in progress	Little depth of content understanding	Some depth of content understanding is evident but needs improvement	Insight and depth of content understanding are evident
Content Presentation	Content is inaccurate and information is not presented in a logical order making it difficult to follow	Content is accurate and information is not presented in a logical order making it difficult to follow	Content is accurate but some information is not presented in a logical order but is still generally easy to follow	Content is accurate and information is presented in a logical order

**Suggested additional aspects for assessing Leadership Qualities:**

1. Carrying self
2. Punctuality
3. Team work abilities
4. Moral values
5. Communication skills
6. Ensures the work is done in time

Suggested additional aspects for assessing “Participation in social task”

1. Interested to know the current situation of society.
2. Shows interest to participate in given social task.
3. Reliable
4. Helping nature
5. Inter personal skills
6. Ensures task is completed

Suggested additional aspects for assessing “Participation in Technical task”

1. Updated to new technologies
2. Identifies problems in society that can be solved using technology
3. Interested to participate in finding possible technical solutions to identified project
4. Reliable
5. Interpersonal skills

Suggested additional aspects for Carrying Self:

1. Stand or sit straight.
2. Keep your head level
3. Relax your shoulders.
4. Spread your weight evenly on both legs.
5. If sitting, keep your elbows on the arms of your chair, rather than tightly against your sides.
6. Make appropriate eye contact while communicating. Lower the pitch of your voice
7. Speak more clearly