

Hall Ticket Number :

**R-23**

**Code: 23AHS24T**

B.Tech. II Semester Regular Examinations July 2024

**Chemistry**

(Common to EEE, ECE, AI&DS and CSE(AI))

Max. Marks: 70

Time: 3 Hours

\*\*\*\*\*

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)

2. In Part-A, each question carries **Two marks**.

3. Answer **ALL** the questions in **Part-A** and **Part-B**

**PART-A**

( **Compulsory question** )

- |  |     |    |
|--|-----|----|
| 1. Answer <b>all</b> the following short answer questions ( 10 X 2 = 20M ) | CO  | BL |
| a) Calculate the bond order for Oxygen molecule.                           | CO1 | L3 |
| b) Define $\chi$ and $\chi^2$ .  | CO1 | L2 |
| c) Write two applications of super conductors.                             | CO2 | L1 |
| d) What are p-type and n-type semiconductors? Give examples.               | CO2 | L1 |
| e) Describe the components of a conductivity cell.                         | CO3 | L2 |
| f) Draw the construction of H <sub>2</sub> -O <sub>2</sub> fuel cell.      | CO3 | L4 |
| g) Differentiate between thermosets and thermoplastics                     | CO4 | L2 |
| h) How is Bakelite prepared?   | CO4 | L1 |
| i) What is the importance of IR spectroscopy?                              | CO5 | L1 |
| j) Describe the basic principle of chromatography.                         | CO5 | L2 |

**PART-B**

Answer *five* questions by choosing one question from each unit ( 5 x 10 = 50 Marks )

Marks CO BL

**UNIT-I**

2. Give a detailed account of Molecular Orbital theory. Draw molecular energy level diagrams of O<sub>2</sub> and CO molecules. 10M CO1 L4

**OR**

3. Derive Schrodinger wave equation and explain the significance of  $\chi$  and  $\chi^2$  10M CO1 L3

**UNIT-II**

4. Describe the properties of any two Nanomaterials in detail. List out their significant applications in various fields. 10M CO2 L2

**OR**

5. Explain the types and properties of supercapacitors. Discuss their practical applications in various fields of engineering. 10M CO2 L2

**UNIT-III**

6. Derive Nernst equation and explain its significance in calculating cell potentials. 10M CO3 L3

**OR**

7. a) Explain the principle and applications of Polymer Electrolyte Membrane Fuel cell (PEMFC). 5M CO3 L2  
 b) What are the potentiometric sensors? Explain their practical applications with suitable examples. 5M CO3 L1

**UNIT-IV**

8. a) Explain chain growth and step growth polymerization techniques with suitable examples. 5M CO4 L2  
 b) Give an account of the preparation and properties of elastomers. 5M CO4 L4

**OR**

9. Explain the mechanism of conduction in conducting polymers and discuss their practical applications. 10M CO4 L2

**UNIT-V**

10. Describe various electronic transitions induced by UV-Visible radiation and explain the significance of Beer-Lambert's law in UV-Vis spectroscopy 10M CO5 L2

**OR**

11. Draw the setup of HPLC chromatography and write a detailed account of its working mechanism. 10M CO5 L4

\*\*\* End \*\*\*

Hall Ticket Number :										
----------------------	--	--	--	--	--	--	--	--	--	--

<b>R-23</b>
-------------

**Code: 23AHS22T**

B.Tech. II Semester Regular Examinations July 2024

**Communicative English**

(Common to EEE, ECE, AI&DS and CSE(AI))

Max. Marks: 70

Time: 3 Hours

\*\*\*\*\*

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
2. In Part-A, each question carries **Two marks**.  
3. Answer **ALL** the questions in **Part-A** and **Part-B**

**PART-A**

**( Compulsory question )**

- |   |                  |     |    |
|---|------------------|-----|----|
| 1. Answer <b>all</b> the following short answer questions   | ( 10 X 2 = 20M ) | CO  | BL |
| a) What did Della do with her hair and why?   |                  | CO1 | L2 |
| b) What kind of landscape is described in the first three stanzas in the poem "The Book"?                   |                  | CO1 | L2 |
| c) Write the meanings of the following words:<br>i. coot    ii. evaluate    iii. deliberate    iv. squadron |                  | CO2 | L2 |
| d) Briefly describe two of business ventures of Elon Musk.  |                  | CO1 | L4 |
| e) Explain Note-making.   |                  | CO3 | L2 |
| f) What is a Chronological Resume?  |                  | CO3 | L2 |
| g) What announcement by the National Peace Council does Elizabeth show her brother?                         |                  | CO1 | L2 |
| h) List out types of Essays.  |                  | CO3 | L2 |
| i) What is self-esteem?   |                  | CO3 | L2 |
| j) Define technical jargon and provide any four examples.   |                  | CO2 | L1 |

**PART-B**

Answer **five** questions by choosing one question from each unit (5 x 10 = 50 Marks)

Marks    CO    BL

<b>UNIT-I</b>
---------------

- |  |    |     |    |
|--|----|-----|----|
| 2. a) How do Jim's and Della's actions symbolise the strength of their love for each other.                      | 5M | CO1 | L4 |
| b) Write a note on the different ways the financial situation of the couple in the story "The Gift of the Magi". | 5M | CO1 | L2 |

**OR**

- |   |    |     |    |
|---|----|-----|----|
| 3. a) Write a Formal Dialogue between two officials in an office "Introducing each Other".  | 5M | CO1 | L1 |
| b) Write the meaning and one example for the following Root Words: i.bio    ii.extra    iii. gram    iv. glot    v. neo    vi. mega | 5M | CO3 | L3 |

<b>UNIT-II</b>
----------------

- |   |    |     |    |
|---|----|-----|----|
| 4. a) Write an elaborate paragraph on "Superstitions".      | 5M | CO3 | L1 |
| b) <b>Fill in the blanks with suitable Prepositions:</b>    | 5M | CO3 | L3 |
| i. He lives _____ 19 Tower Road.                            |    |     |    |
| ii. I will arrive _____ eight o' clock.                     |    |     |    |
| iii. I have known her _____ last year.                      |    |     |    |
| iv. Missing the bus is no excuse _____ being late.          |    |     |    |
| v. People often make fun _____ what they do not understand. |    |     |    |
| vi. We will take a survey _____ the participants.           |    |     |    |

**OR**

5. How has the poet described landscape, flowers, plants and colours in the poem? How does it make you feel as a reader? Substantiate your answer with examples from the poem. 10M CO1 L3

**UNIT-III**

6. In what way has Musk proved to be a visionary leader of cutting-edge technology? Discuss with relevant examples. 10M CO1 L4

**OR**

7. a) **Fill in the blanks with suitable verb forms:** 5M CO3 L3
- Keep \_\_\_\_\_ (guess) the answers till you get them right.
  - Were you \_\_\_\_\_ (pay) attention to what was being said?
  - I have \_\_\_\_\_ (read) many books in the last one year.
  - How have you been \_\_\_\_\_?(do)
  - Asif \_\_\_\_\_ (teach) for six years at the computer institute by the time his father retires.
  - Raman \_\_\_\_\_ (live) in Chennai for 10 years.

- b) **Fill in the blanks with Collocation words:** 5M CO4 L4
- We couldn't take up another assignment as we were\_\_\_\_\_.
  - My work hours are flexible. I don't need to begin at a \_\_\_\_\_.
  - John asked his boss, 'I know you're busy, but can you \_\_\_\_\_ for me this week? I need to discuss something with you'.
  - Tsering was so eager to finish that he got done in\_\_\_\_\_.
  - We have \_\_\_\_\_ before the train arrives.
  - Vishnu has been through some\_\_\_\_\_.

**UNIT-IV**

8. a) Describe how the children found an exciting way to play with their new toys. 5M CO1 L4
- b) Write a letter to the Principal to organize a workshop on AI to resolve the AI future doubts. 5M CO4 L3

**OR**

9. a) Do you think Harvey and Elizabeth's experiment failed? Justify your answer. 5M CO1 L4
- b) Prepare a resume for applying a job as software developer in IT industry. 5M CO4 L3

**UNIT-V**

10. a) What are the different ways in which Interpersonal Communication helps improve everyday life? 5M CO3 L1
- b) Write six to eight presentation tips in making a presentation. 5M CO3 L2

**OR**

11. Write an Essay on the topic : " The impact of social media on youth". 10M CO3 L3

\*\*\* End \*\*\*

Hall Ticket Number :

R-23

Code: 23AHS21T

B.Tech. II Semester Regular Examinations July 2024  
**Differential Equations and Vector Calculus**  
(Common to All Branches)

Max. Marks: 70

Time: 3 Hours

\*\*\*\*\*

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
 2. In Part-A, each question carries **Two marks**.  
 3. Answer **ALL** the questions in **Part-A** and **Part-B**

**PART-A**

(Compulsory question)

1. Answer **all** the following short answer questions ( 10 X 2 = 20M)
- |   |     |    |
|---|-----|----|
| a) Solve $(2x^2 + y + 1)dx + (x + 2y + 1)dy = 0$ .  | CO1 | L3 |
| b) State Newton's Law of Cooling.   | CO1 | L1 |
| c) Solve $(D^2 + 4D + 4)y = 0$ .  | CO2 | L3 |
| d) Find PI of $(D^2 + 5D + 6)y = e^{3x}$ .  | CO2 | L3 |
| e) Find the partial differential equation by eliminating arbitrary constants $a, b$ from $z = ax + by + a^2 + b^2$ .                            | CO3 | L3 |
| f) Solve $\sqrt{x} + q\sqrt{y} = \sqrt{z}$ .  | CO3 | L3 |
| g) Find grad $f$ , where $f = x^2yz + xy^2z + xyz^2$ .  | CO4 | L1 |
| h) Show that $f = 3y^2z^2i + 3x^2z^2j + 3x^2y^2k$ is solenoidal, where $f = 3y^2z^2i + 3x^2z^2j + 3x^2y^2k$ .                                   | CO4 | L1 |
| i) Evaluate the line integral $\int_C (x^2 + xy)dx + (x^2 + y^2)dy$ , where $C$ is the square formed by the lines $x = \pm 1$ and $y = \pm 1$ . | CO5 | L3 |
| j) State Green's theorem  | CO5 | L1 |

**PART-B**

Answer **five** questions by choosing one question from each unit ( 5 x 10 = 50 Marks )

Marks CO BL

**UNIT-I**

2. a) Solve  $\frac{dy}{dx} + y \tan x = y^3 \sec x$ . 5M CO1 L3
- b) Solve  $(4xy + 3y^2 - x^2)dx + x(x + 2y)dy = 0$ . 5M CO1 L3

**OR**

3. a) Solve  $(4xy + 3y^2) \frac{dy}{dx} = 1$ . 5M CO1 L3
- b) If the temperature of the air is  $30^\circ C$  and the substance cools from  $100^\circ C$  to  $70^\circ C$  in 15 minutes. Find when the temperature will be  $40^\circ C$ . 5M CO1 L3

## UNIT-II

4. Solve  $(D - 2)^2 y = \{e^{2x} + \sin 2x + x\}$  10M CO2 L3

OR

5. Solve the simultaneous equations  $\frac{dx}{dt} + 2y + \sin t = 0$ ,  
 $\frac{dy}{dt} - 2x - \cos t = 0$ , given that  $x = 0$  and  $y = 1$  when  $t = 0$ . 10M CO2 L3

## UNIT-III

6. a) Form the partial differential equation by eliminating arbitrary constants  $a, b$  and  $c$  from  $(x - a)^2 + (y - b)^2 + z^2 = c^2$  5M CO3 L3

- b) Form the partial differential equation by eliminating arbitrary functions  $f$  and  $g$  from  $z = f(y + 2x) + g(y - 3x)$ . 5M CO3 L3

OR

7. Solve  $(x^2 - yz)p + (y^2 - zx)q = z^2 - xy$ . 10M CO3 L3

## UNIT-IV

8. a) If  $\vec{F} = \nabla(x^3 + y^3 + z^3 - 3xyz)$  find  $\text{curl}(\vec{F})$ . 5M CO4 L3

- b) Find the directional derivative of  $\phi = x^2yz + 4xz^2$  at  $(1, -2, -1)$  in the direction of the vector  $2i - j - 2k$ . 5M CO4 L3

OR

9. a) Find the angle between the surfaces  $x^2 + y^2 - z^2 = 6$  and  $x^2 + y^2 - z^2 = 13$  at  $(2, 1, 2)$ . 5M CO4 L3

- b) Find the values of  $a, b, c$  if  $\vec{F} = (x + y + az)\hat{i} + (bx + 2y - z)\hat{j} + (x + cy + 2z)\hat{k}$  is irrotational 5M CO4 L3

## UNIT-V

10. Find the work done by a force  $\vec{F} = 3x^2\hat{i} + (xz - y)\hat{j} + z\hat{k}$  along the straight line from  $(0, 0, 0)$  to  $(2, 1, 3)$ . 10M CO5 L3

OR

11. Verify Green's theorem for  $\int_C (xy + y^2)dx + x^2 dy$  where  $C$  is bounded by  $y = x$  and  $y = x^2$ . 10M CO5 L3

\*\*\* End \*\*\*

Code: 23A0421T

B.Tech. II Semester Regular Examinations July 2024

**Network Analysis**

(Electronics and Communication Engineering)

Max. Marks: 70

Time: 3 Hours

\*\*\*\*\*

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. In Part-A, each question carries **Two marks**.3. Answer **ALL** the questions in **Part-A** and **Part-B****PART-A****( Compulsory question )**1. Answer *all* the following short answer questions ( 10 X 2 = 20M )

CO BL

a) How many branches and nodes does the circuit in Fig. 1 have? Identify the elements that are in series and in parallel.

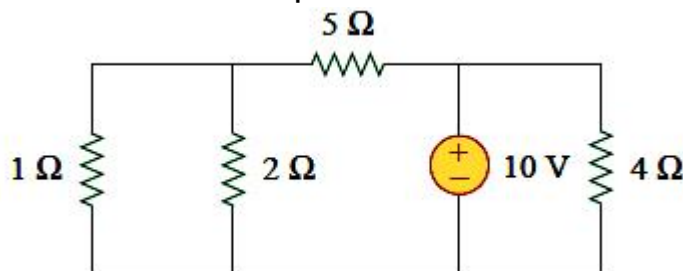


Fig. 1.

b) List out a few examples of dual elements.

1 L2

1 L1

c) Give the time constants of RC and RL circuits.

3 L1

d) How Inductor and Capacitor behave to steady state dc conditions?

3 L2

e) Draw the Phasor diagram of a pure Inductor circuit.

3 L1

f) Define Impedance and Admittance.

3 L1

g) Define Bandwidth.

3 L1

h) What is the significance of Quality-factor in Resonant circuits?

3 L2

i) Give h-parameter defining equations.

5 L1

j) Define insertion loss and why is insertion loss an important parameter in network design?

5 L1

**PART-B**Answer *five* questions by choosing one question from each unit ( 5 x 10 = 50 Marks )

Marks CO BL

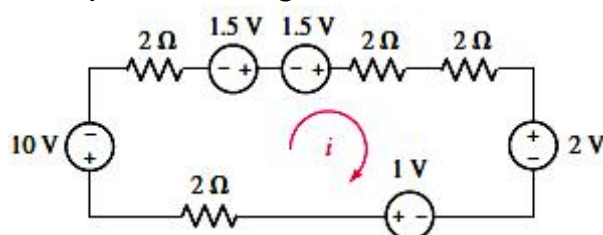
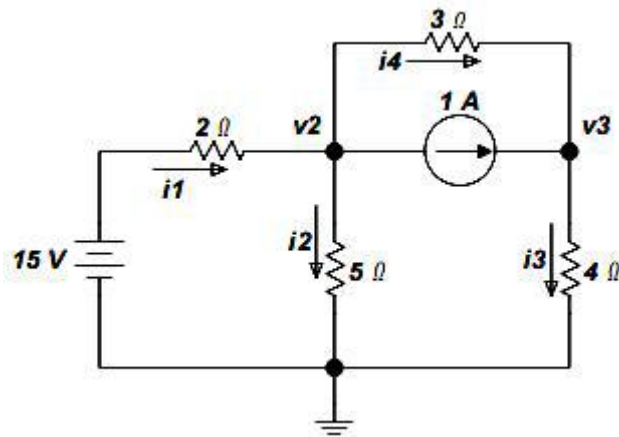
**UNIT-I**2. a) Use KVL to obtain a numerical value for the current labeled *i* in the circuit depicted in Fig. 2.

Fig. 2

5M 1 L2

- b) Obtain the current in various resistors of the circuit shown in figure using mesh analysis.



5M CO1 L3

OR

3. a) State and explain Compensation Theorem.  
b) Find  $i$  in the circuit shown in Fig. 4, using the superposition theorem.

4M 2 L2

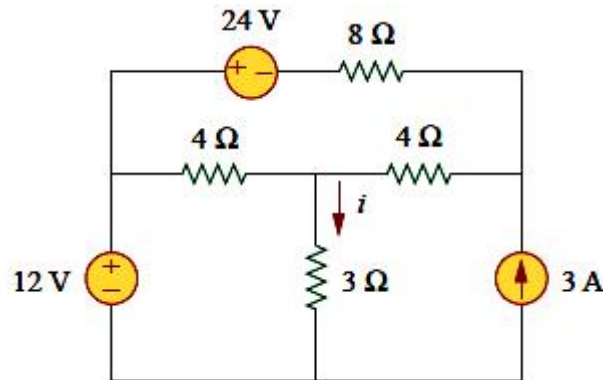


Fig. 4

6M 2 L3

UNIT-II

4. a) The differential equation that describes the voltage in an RLC network is  $\frac{d^2v}{dt^2} + 5\frac{dv}{dt} + 4v = 0$   
Given that  $v(t) = 0$ ,  $\frac{dv(0)}{dt} = 5 \text{ V/s}$ , Obtain  $v(t)$ .  
b) The switch in the circuit of Fig. 5 has been closed for a long time. At  $t=0$  the switch is opened. Calculate  $i(t)$  for  $t > 0$ .

5M 4 L3

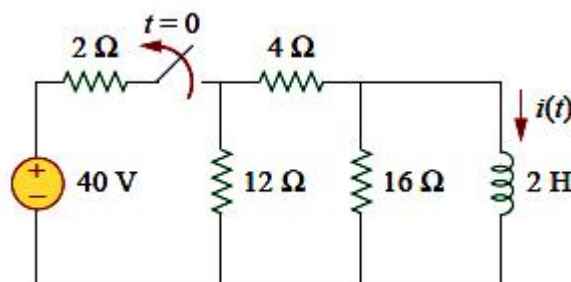


Fig. 5

5M 4 L3

Code: 23A0421T

OR



5. a) The switch in the circuit in Fig. 6 has been closed for a long time, and it is opened at  $t=0$ . Find  $v(t)$  for  $t \geq 0$ . Calculate the initial energy stored in the capacitor.

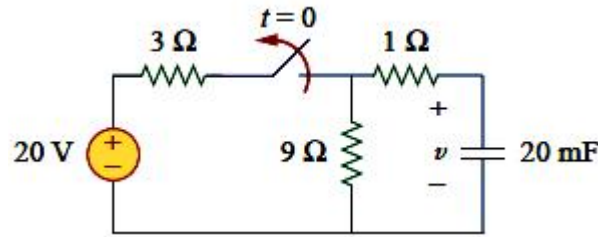


Fig. 6

5M 1 L3

- b) The current in an R-L-C circuit is described by

$$\frac{d^2 i}{dt^2} + 10 \frac{di}{dt} + 25i = 0$$

If  $i(0)=2$  A and  $\frac{di(0)}{dt} = 0$ , find  $i(t)$  for  $t \geq 0$ .

5M 4 L3

**UNIT-III**

6. a) Solve for the current in an R-L circuit with  $R=10 \Omega$  and  $L=1$  H connected to a step voltage  $V(t)=20u(t)$  using Laplace transforms.

5M 3 L3

- b) Express the impedance of a series R-C circuit using complex notation and solve for the voltage drop across each component, if  $R=20 \Omega$ ,  $C=50 \mu\text{F}$  and the supply voltage is  $V=100\text{V}$  at 60 Hz.

5M 3 L3

**OR**

7. a) For a series R-L-C circuit with  $R=10 \Omega$ ,  $L=0.5$  H, and  $C=50 \mu\text{F}$  connected to a 100 V, 60 Hz AC source, calculate the total impedance and current.

5M 3 L3

- b) Obtain expressions for the time-domain currents  $i_1$  and  $i_2$  in the circuit given as Fig. 7.

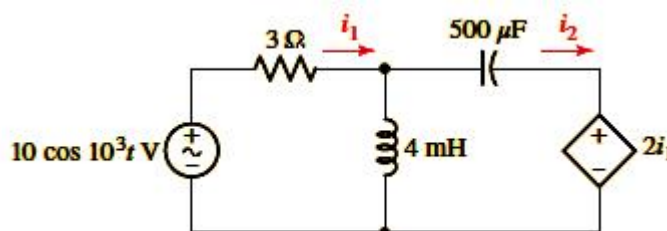


Fig. 7

5M 3 L3

**UNIT-IV**

8. A Series R-L-C circuit with  $R=100 \Omega$ ,  $L=0.5$  H and  $C=40 \mu\text{F}$  has an applied voltage of 50V with variable frequency. Calculate

- i. Resonance frequency      ii. Current at resonance  
 iii. Voltage across R, L and C      iv. Q-factor of the circuit  
 v. Upper and Lower half frequencies      vi. Band width

10M 3 L3

Code: 23A0421T

**OR**

9. a) Explain Self-Inductance and Mutual inductance. 5M CO4 L2  
b) Show that the relationship between the self-inductances, mutual inductances and co-efficient of coupling is

$$K = \frac{M}{\sqrt{L_1 L_2}}$$

5M CO4 L4

**UNIT-V**

10. a) Obtain the z parameters for the network in Fig. 8.

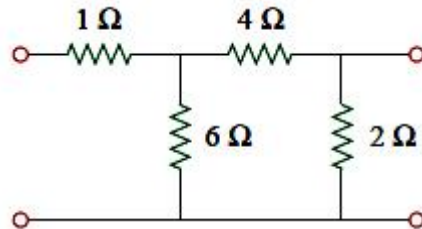


Fig. 8

5M 5 L3

- b) Find the transmission parameters for the two-port network in Fig. 9.

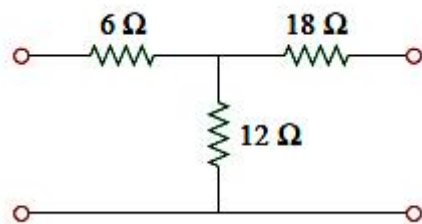


Fig. 9

5M 5 L3

**OR**

11. a) Define iterative impedance and give its significance in a network. 3M 5 L2  
b) Determine the hybrid parameters for the network in Fig. 10.

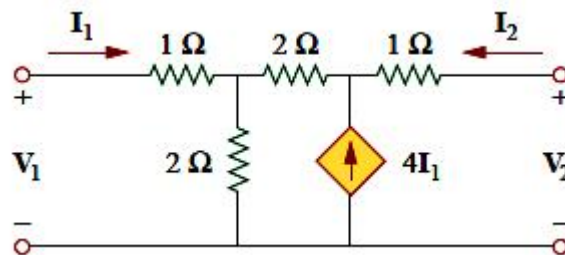


Fig. 10

7M 5 L3

\*\*\* End \*\*\*

Hall Ticket Number :									
----------------------	--	--	--	--	--	--	--	--	--

<b>R-23</b>
-------------

**Code: 23A0121T**

B.Tech. II Semester Regular Examinations July 2024

**Basic Civil & Mechanical Engineering**

(Common to EEE, ECE, AI&DS and CSE(AI))

Max. Marks: 70

Time: 3 Hours

\*\*\*\*\*

- Note: 1. Question Paper consists of two parts (**Part-1** and **Part-2**)  
2. Use separate Answer booklets for **Part-1** and **Part-2**  
3. Part-1 & Part-2 of question paper consists of Part-A & Part-B  
4. In Part-A, each question carries **One marks**.  
5. Answer **ALL** the questions in **Part-A** and **Part-B**

**PART-1**

**PART-A**

**(Compulsory question)**

- |  |     |    |
|--|-----|----|
| 1. Answer <b>all</b> the following short answer questions ( 5 X 1 = 5M ) | CO  | BL |
| a) Mention any four construction materials.                              | CO1 | L2 |
| b) Define- Porosity.   | CO1 | L2 |
| c) What is meant by estimation?  | CO2 | L2 |
| d) Write the use of levelling instruments.                               | CO2 | L2 |
| e) What is Rigid pavement?   | CO3 | L2 |

**PART-B**

Answer *five* questions by choosing one question from each unit ( 3 x 10 = 30 Marks )

Marks CO BL

**UNIT-I**

- |  |     |     |    |
|--|-----|-----|----|
| 2. What are the ingredients of cement concrete? Explain the process of making various types of concrete in detail. | 10M | CO1 | L3 |
|--|-----|-----|----|

**OR**

- |  |     |     |    |
|--|-----|-----|----|
| 3. Discuss the scope of Water resources Engineering and Environmental Engineering in detail. | 10M | CO1 | L2 |
|--|-----|-----|----|

**UNIT-II**

- |  |     |     |    |
|--|-----|-----|----|
| 4. Explain the following with suitable example.<br>(i) Angular measurements. (ii) Contour mapping. | 10M | CO2 | L3 |
|--|-----|-----|----|

**OR**

- |  |     |     |    |
|--|-----|-----|----|
| 5. Explain the following with respect to a room of dimensions 3metres x 3metres x 3metres.<br>(i) Detailed estimate. (ii) Abstract estimate. | 10M | CO2 | L3 |
|--|-----|-----|----|

**UNIT-III**

- |  |     |     |    |
|--|-----|-----|----|
| 6. Explain the applications of Rigid pavements and Flexible pavements with examples. | 10M | CO3 | L3 |
|--|-----|-----|----|

**OR**

- |   |     |     |    |
|---|-----|-----|----|
| 7. Explain the following with suitable example. (i) Rain water harvesting. (ii) Types of dams and Reservoirs. | 10M | CO3 | L2 |
|---|-----|-----|----|

PART-2PART-A

(Compulsory question)

- |  |    |    |
|--|----|----|
| 1. Answer <b>all</b> the following short answer questions ( 5 X 1 = 5M ) | CO | BL |
| a) Write industrial applications of non-ferrous metals.                  | 4  | 1  |
| b) What is the use of riser in a casting pattern?                        | 5  | 1  |
| c) Write the full form of CNC.   | 5  | 1  |
| d) Draw the $p$ - $V$ diagram of an Otto cycle.                          | 5  | 1  |
| e) Write any two applications of robotics?                               | 6  | 1  |

PART-BAnswer **five** questions by choosing one question from each unit (3 x 10 = 30 Marks )

- |   | Marks | CO | BL |
|---|-------|----|----|
| <b>UNIT-I</b>   |       |    |    |
| 2. a) Briefly explain the role of a mechanical engineer in the following sectors: (i) Automotive and (ii) Marine. | 6M    | 4  | 1  |
| b) What is the role of a mechanical engineering in aerospace industry?  | 4M    | 4  | 1  |

**OR**

- |  |    |   |   |
|--|----|---|---|
| 3. a) What are the advantages and limitations of using composite materials in aerospace industry compared to conventional materials? | 6M | 4 | 1 |
| b) Name any two smart materials and describe their applications.   | 4M | 4 | 1 |

**UNIT-II**

- |  |    |   |   |
|--|----|---|---|
| 4. a) Briefly explain the casting process. Why it is required? | 6M | 5 | 3 |
| b) Briefly explain steps/stages involve in 3D printing.        | 4M | 5 | 2 |

**OR**

- |  |    |   |   |
|--|----|---|---|
| 5. a) With a neat $T$ - $s$ diagram, explain the working principle of a vapour compression refrigeration cycle. Write the formula for its COP. | 5M | 5 | 2 |
| b) What are the differences between SI and CI engines?   | 5M | 5 | 2 |

**UNIT-III**

- |   |    |   |   |
|---|----|---|---|
| 6. a) With a neat sketch explain the working of a Diesel power plant. | 6M | 6 | 3 |
| b) What are the challenges in running hydro power plants?             | 4M | 6 | 2 |

**OR**

- |   |    |   |   |
|---|----|---|---|
| 7. a) What are the different power transmission devices? Explain working of belt drive transmission with a neat sketch. | 5M | 6 | 2 |
| b) What are the basic laws of robotics? Explain.  | 5M | 6 | 2 |

\*\*\* End \*\*\*