

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

<b>R-20</b>
-------------

**Code: 20AC21T**

I B.Tech. II Semester Supplementary Examinations June 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 <b>all</b> the following short answer questions ( 5 X 2 = 10M )                           | CO  | BL |
| a) Solve $(D^2 + 5D + 6)y = 0$  | CO1 | L3 |
| b) Solve $(x^2D^2 + 4xD + 3)y = 0$  | CO2 | L3 |
| c) Form the partial differential equation by eliminating the arbitrary constants from $z = ax + by$ | CO3 | L2 |
| d) Find $\text{curl } \bar{f}$ for $\bar{f} = z\bar{i} + x\bar{j} + y\bar{k}$                       | CO4 | L1 |
| e) State Green's theorem.   | CO5 | L2 |

**PART-B**

Answer **five** questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

Marks    CO    BL

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

- |   |    |     |    |
|---|----|-----|----|
| 2. a) Solve $(D^2 + 6D + 9)y = e^{-2x}$ | 6M | CO1 | L3 |
| b) Solve $(D^2 + 1)y = x$               | 6M | CO1 | L3 |

**OR**

- |  |     |     |    |
|--|-----|-----|----|
| 3. Solve $\frac{d^2 y}{dx^2} + 4y = \tan 2x$ by using method of variation of parameters. | 12M | CO1 | L3 |
|--|-----|-----|----|

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

- |   |     |     |    |
|---|-----|-----|----|
| 4. Solve $(1+x)^2 \frac{d^2 y}{dx^2} + (1+x) \frac{dy}{dx} + y = 2 \sin[\log(1+x)]$ | 12M | CO2 | L3 |
|---|-----|-----|----|

**OR**

- |  |     |     |    |
|--|-----|-----|----|
| 5. Solve $(x^2D^2 - 3xD + 4)y = (1+x)^2$ | 12M | CO2 | L3 |
|--|-----|-----|----|

**UNIT-III**

6. Form the partial differential equation by eliminating the arbitrary constants  $a, b$  from  $(x-a)^2 + (y-b)^2 = z^2 \cot^2 r$  12M CO3 L2
- OR**
7. Solve  $x^2(y-z)p + y^2(z-x)q = z^2(x-y)$  12M CO3 L3

**UNIT-IV**

8. Find the directional derivative of  $W = x^2 - 2y^2 + 4z^2$  at  $(1, 1, -1)$  in the direction of  $2\bar{i} + \bar{j} - \bar{k}$ . 12M CO4 L2
- OR**
9. Find  $\text{curl } \bar{f}$  where  $\bar{f} = \text{grad}(x^3 + y^3 + z^3 - 3xyz)$  12M CO4 L2

**UNIT-V**

10. 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  $y = \pm 1$ . 12M CO5 L2
- OR**
11. Verify Stoke's theorem for the function  $\bar{F} = x^2\bar{i} + xy\bar{j}$  integrated round the square in the plane  $z=0$  whose sides are along the lines  $x=0, y=0, x=a, y=a$ . 12M CO5 L2

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

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

<b>R-20</b>
-------------

**Code: 20A521T**

I B.Tech. II Semester Supplementary Examinations June 2024

**Data Structures through Python**

(Common to CSE, AI&DS, CSE(DS), CSE(AI) and AI&ML)

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 ( 5 X 2 = 10M ) | CO  | BL |
| a) Compare static and dynamic data types in programming languages         | CO1 | L2 |
| b) What are actual parameters?  | CO2 | L1 |
| c) What are multiple except blocks  | CO3 | L1 |
| d) Define a stack   | CO4 | L1 |
| e) Define Binary Search Tree.   | CO5 | L1 |

**PART-B**

Answer **five** questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

- |   | Marks | CO  | BL |
|---|-------|-----|----|
| <b>UNIT-I</b>   |       |     |    |
| 2. a) Compare sequential, selection, and iterative control.                                     | 6M    | CO1 | L2 |
| b) Define Literals. Write different types of literals with examples                             | 6M    | CO1 | L1 |
| <b>OR</b>   |       |     |    |
| 3. Illustrate, the various ways to iterating over a List  | 12M   | CO1 | L3 |
| <b>UNIT-II</b>  |       |     |    |
| 4. Discuss various string handling methods in Python  | 12M   | CO2 | L2 |
| <b>OR</b>   |       |     |    |
| 5. a) Write a Python function that prints all prime numbers from 1 to 100.                      | 6M    | CO2 | L1 |
| b) Discuss three fundamental features of object-oriented programming.                           | 6M    | CO2 | L2 |
| <b>UNIT-III</b>   |       |     |    |
| 6. What is inheritance? Illustrate types of inheritance with python code                        | 12M   | CO3 | L1 |
| <b>OR</b>   |       |     |    |
| 7. a) Write a Python Program to Demonstrate multiple exceptions in a single block               | 6M    | CO3 | L1 |
| b) Difference between built-in exceptions and handling exception                                | 6M    | CO3 | L2 |
| <b>UNIT-IV</b>  |       |     |    |
| 8. Explain implementation of Queue ADT using Python List with examples.                         | 12M   | CO4 | L2 |
| <b>OR</b>   |       |     |    |
| 9. a) List out the advantages and disadvantages of using a linked list                          | 6M    | CO4 | L1 |
| b) List the applications of stack.  | 6M    | CO4 | L1 |
| <b>UNIT-V</b>   |       |     |    |
| 10. Describe the priority queues and its operations in Python.                                  | 12M   | CO5 | L2 |
| <b>OR</b>   |       |     |    |
| 11. a) Construct a Binary search tree with following key elements:<br>15, 10, 20, 8, 12, 16, 25 | 6M    | CO5 | L6 |
| b) Differentiate binary tree and binary search tree.  | 6M    | CO5 | L2 |

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

Hall Ticket Number : 

--	--	--	--	--	--	--	--	--

**R-20**

**Code: 20A324T**

I B.Tech. II Semester Supplementary Examinations June 2024

**Engineering Drawing**

(Common to CSE, AI&DS, CSE(AI), CSE(DS) and AI&ML)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

\*\*\*\*\*

Important Note: 1. On completing your answers. Compulsorily draw diagonal cross line on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 32+8=40, will be treated as malpractice.

**UNIT-I**

Marks      CO      BL

- |    |   |    |     |    |
|----|---|----|-----|----|
| 1. | a) Divide a straight-line AB of length 50 mm, into 7 equal parts.                       | 7M | CO1 | L2 |
|    | b) Construct a regular Hexagon by General Method, given the length of its side is 40mm. | 7M | CO1 | L2 |

**OR**

- |    |   |     |     |    |
|----|---|-----|-----|----|
| 2. | The major and minor axes of an ellipse are 120mm and 80mm. Draw an ellipse by Concentric Circles method | 14M | CO1 | L2 |
|----|---|-----|-----|----|

**UNIT-II**

- |    |   |     |     |    |
|----|---|-----|-----|----|
| 3. | A point is 50mm from both the reference planes. Draw its projections in all possible positions. | 14M | CO2 | L3 |
|----|---|-----|-----|----|

**OR**

- |    |   |     |     |    |
|----|---|-----|-----|----|
| 4. | A line AB, 50mm long, has its ends A in both the H.P and the V.P. It is inclined at 30° to the H.P and at 45° to the V.P. Draw the projections. | 14M | CO2 | L3 |
|----|---|-----|-----|----|

**UNIT-III**

- |    |  |     |     |    |
|----|--|-----|-----|----|
| 5. | A square ABCD of 40mm side has a corner on the HP and 20mm in front of the VP. All the sides of the squares are equally inclined to the HP and parallel to the VP. Draw its projections. | 14M | CO3 | L3 |
|----|--|-----|-----|----|

**OR**

- |    |  |     |     |    |
|----|--|-----|-----|----|
| 6. | A regular pentagon of 25 mm side has one side on the ground and inclined at 30° to V.P. Its plane is inclined at 45° to the H.P. Draw its projections. | 14M | CO3 | L3 |
|----|--|-----|-----|----|

**UNIT-IV**

- |    |   |     |     |    |
|----|---|-----|-----|----|
| 7. | Draw the projections of a hexagonal prism of base 25mm side and axis 60mm long, when it is resting on one of its corners of the base on HP. The axis of the solid is inclined at 45° to the HP. | 14M | CO4 | L3 |
|----|---|-----|-----|----|

**OR**

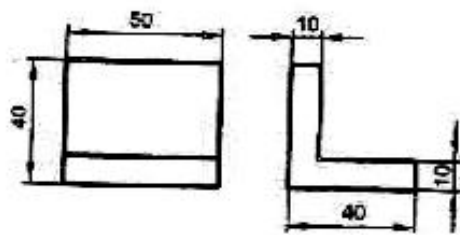
- |    |   |     |     |    |
|----|---|-----|-----|----|
| 8. | A square prism, base 40mm side and height 65mm has its axis inclined at 45° to the HP and has an edge of its base, on the HP and inclined at 30° to the VP. Draw its Projections. | 14M | CO4 | L3 |
|----|---|-----|-----|----|

**UNIT-V**

- |    |   |     |     |    |
|----|---|-----|-----|----|
| 9. | Draw the isometric projection of (i) a cylinder (ii) a cone of base diameter 30mm and axis 45mm long. | 14M | CO5 | L3 |
|----|---|-----|-----|----|

**OR**

- |     |   |  |  |  |
|-----|---|--|--|--|
| 10. | Draw the isometric view to the following orthographic views |  |  |  |
|-----|---|--|--|--|



14M      CO5      L3

\*\*\*

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

<b>R-20</b>
-------------

**Code: 20AC22T**

I B.Tech. II Semester Supplementary Examinations June 2024

**Applied Physics**

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

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 ( 5 X 2 = 10M ) | CO  | BL |
| a) State principle of superposition of light waves                        | CO1 | L1 |
| b) Write any two applications of dielectric materials.                    | CO2 | L1 |
| c) Define the total internal reflection                                   | CO3 | L1 |
| d) What is P-type semiconductor   | CO4 | L1 |
| e) What is critical temperature of superconductors                        | CO5 | L1 |

**PART-B**

Answer **five** questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

Marks CO BL

**UNIT-I**

- |  |     |     |    |
|--|-----|-----|----|
| 2. Explain the interference in parallel thin film and derive the conditions for bright and dark bands. | 12M | CO1 | L3 |
|--|-----|-----|----|

**OR**

- |   |     |     |    |
|---|-----|-----|----|
| 3. Derive the conditions for maxima and minima intensities formed by Fraunhofer diffraction due to double slit. | 12M | CO1 | L3 |
|---|-----|-----|----|

**UNIT-II**

- |  |    |     |    |
|--|----|-----|----|
| 4. a) Define ionic polarization and derive Ionic polarizability. | 8M | CO2 | L3 |
| b) Write the applications of dielectrics.                        | 4M | CO2 | L1 |

**OR**

- |  |    |     |    |
|--|----|-----|----|
| 5. a) Distinguish soft and hard magnetic materials.  | 8M | CO2 | L4 |
| b) Define magnetization and magnetic susceptibility. | 4M | CO2 | L1 |

**UNIT-III**

- |  |     |     |    |
|--|-----|-----|----|
| 6. Derive Maxwell's equations for electromagnetics | 12M | CO3 | L3 |
|--|-----|-----|----|

**OR**

- |  |    |     |    |
|--|----|-----|----|
| 7. a) Define total internal reflection and derive the expression for critical angle. | 6M | CO3 | L3 |
| b) Distinguish step index and graded index optical fiber                             | 6M | CO3 | L4 |

**UNIT-IV**

- |  |    |     |    |
|--|----|-----|----|
| 8. a) Write the applications of semiconductors.              | 6M | CO4 | L1 |
| b) Explain the N-type semiconductor with energy band diagram | 6M | CO4 | L2 |

**OR**

- |  |     |     |    |
|--|-----|-----|----|
| 9. Classify the solids based on energy bands | 12M | CO4 | L4 |
|--|-----|-----|----|

**UNIT-V**

- |  |     |     |    |
|--|-----|-----|----|
| 10. Distinguish Type-I and Type-II superconductors | 12M | CO5 | L4 |
|--|-----|-----|----|

**OR**

- |   |    |     |    |
|---|----|-----|----|
| 11. a) Explain the mechanical and thermal properties of nanomaterials | 6M | CO5 | L2 |
| b) Write the applications of nanomaterials                            | 6M | CO5 | L1 |

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

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

<b>R-20</b>
-------------

**Code: 20A223T**

I B.Tech. II Semester Supplementary Examinations June 2024

**Basic Electrical and Electronics Engineering**

(Common to CE, CSE, CSE(AI), CSE(DS) and AI&DS)

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 ( 5 X 2 = 10M ) | CO  | BL |
| a) State and explain Kirchhoff's Current Law.                             | CO1 | L1 |
| b) What is the expression of back emf?                                    | CO2 | L2 |
| c) Define regulation and efficiency of a transformer.                     | CO3 | L1 |
| d) What is a PN Junction diode and how this is to be operated.            | CO4 | L2 |
| e) What are the essential components of indicating instrument?            | CO5 | L1 |

**PART-B**

Answer **five** questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

Marks CO BL

**UNIT-I**

- |  |    |     |    |
|--|----|-----|----|
| 2. a) A color TV has a current of 1.99 A when connected to a 230V household circuit. What is the resistance in ohms of the TV set? | 4M | CO1 | L3 |
| b) Discuss Faraday's laws of electromagnetic induction?  | 8M | CO1 | L2 |

**OR**

- |   |    |     |    |
|---|----|-----|----|
| 3. a) Define the following terms with an example:<br>(i) Unilateral elements                      (ii) Distributed elements<br>(iii) Linear elements                          (iv) active elements  | 6M | CO1 | L1 |
| b) A circuit consists of three resistances of 12, 18 and 36ohms respectively by joined in parallel and the combination is connected in series with a resistance of 12ohms. The whole circuit is connected to 60V supply. Calculate current in each branch, total current drawn and power dissipated in each resistor. | 6M | CO1 | L3 |

**UNIT-II**

- |  |    |     |    |
|--|----|-----|----|
| 4. a) What is the operating principle of a DC motor? Explain in detail   | 6M | CO2 | L2 |
| b) A long shunt compound generator delivers a load current of 30A at 400V and has armature, series field and shunt field resistances of 0.04 ohms, 0.02 ohms and 180 ohms respectively. Calculate the generated voltage and the armature current. Allow 1V per brush for contact drop. | 6M | CO2 | L3 |

**OR**

5. a) Draw and explain the different types of generators? 8M CO2 L2  
 b) Explain the principle of operation of DC generator? 4M CO2 L2

**UNIT-III**

6. a) Explain the transformer on no-load with phasor diagram. 6M CO3 L4  
 6M 3 4  
 b) A single phase core type 50Hz transformer has a square having 25cm side, the maximum flux density in the core 1.2 wb/m<sup>2</sup>. Calculate the number of turns per limb on H.V. side and L.V side for a 3400V/240V ratio. 6M CO3 L3

**OR**

7. Explain the OC and SC test of transformer with necessary diagrams? 12M CO3 L2

**UNIT-IV**

8. Draw and explain the circuit diagram of a common emitter amplifier and draw its characteristics? 12M CO4 L2

**OR**

9. a) Explain the operation of diode half-wave rectifier? 6M CO4 L2  
 b) Describe the diffusion process that takes place at the p-n junction, and explain the presence of depletion region? 6M CO4 L2

**UNIT-V**

10. Explain How frequency is measured by using CRO. 12M CO5 L2

**OR**

11. a) Explain the principle of cathode ray tube? 6M CO5 L2  
 b) Explain about different types of Fuses? 6M CO5 L2

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