

Hall Ticket Number :									
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R-20

Code: 20AC21T

I B.Tech. II Semester Supplementary Examinations February 2023

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

PART-A

(Compulsory question)

- | | | |
|---|-----|----|
| 1. Answer ALL the following short answer questions (5 X 2 = 10M) | CO | BL |
| a) Find the P.I of $(D^2 - 2D + 4)y = e^x \cos x$ | CO1 | L2 |
| b) Solve $x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + y = \log x$ | CO2 | L3 |
| c) Find the partial differential equation of all planes passing through the origin. | CO3 | L2 |
| d) Find $\nabla \left(\nabla \cdot \frac{\vec{r}}{r} \right)$ | CO4 | L2 |
| e) State Stokes theorem. | CO5 | L3 |

PART-B

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

	Marks	CO	BL
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UNIT-I

- | | | | |
|--|-----|-----|----|
| 2. Solve $(D^2 - 4D + 4)y = 8x^2 e^{2x} \sin 2x$. | 12M | CO1 | L3 |
|--|-----|-----|----|

OR

- | | | | |
|--|-----|-----|----|
| 3. Solve, by the method of Variation of Parameters, $y'' - 2y' + y = e^x \log x$ | 12M | CO1 | L3 |
|--|-----|-----|----|

UNIT-II

- | | | | |
|---|-----|-----|----|
| 4. In an L-C-R circuit, the charge q on a plate of a condenser is given by $L \frac{d^2q}{dt^2} + R \frac{dq}{dt} + \frac{q}{C} = E \sin pt$. The circuit is tuned to resonance so that $p^2 = 1/LC$. If initially the current i and the charge q be zero, show that, for small values of R/L, the current in the circuit at time t is given by $(Et/2L) \sin pt$. | 12M | CO2 | L3 |
|---|-----|-----|----|

OR

5. Solve $(2x-1)^2 \frac{d^2y}{dx^2} + (2x-1) \frac{dy}{dx} - 2y = 8x^2 - 2x + 3$ 12M CO2 L1

UNIT-III

6. a) Form the partial differential equation by eliminating the arbitrary function from $\phi\left(\frac{y}{x}, x^2 + y^2 + z^2\right) = 0$. 6M CO3 L2
- b) Solve the partial differential equation $\frac{p}{x^2} + \frac{q}{y^2} = z$. 6M CO3 L3

OR

7. Use Separation of Variables to solve $4u_x + u_y = 3u$ with $u(0, y) = 3e^{-y} - e^{-5y}$. 12M CO3 L3

UNIT-IV

8. a) Find the values of a and b so that the surfaces $ax^2 - byz = (a+2)x$ and $4x^2y + z^3 = 4$ may intersect orthogonally at the point $(1, -1, 2)$. 6M CO4 L2
- b) Show that $\frac{\bar{r}}{r^3}$ is solenoidal. 6M CO4 L3

OR

9. a) Find constants a, b, c so that the vector $\bar{A} = (x+2y+az)\bar{i} + (bx-3y-z)\bar{j} + (4x+cy+2z)\bar{k}$ is irrotational. Also find ϕ such that $\bar{A} = \nabla\phi$ 6M CO4 L2
- b) Prove that $\text{div curl } \bar{f} = 0$. 6M CO4 L3

UNIT-V

10. Evaluate $\iint_S \bar{F} \cdot \bar{n} \, ds$ where $\bar{F} = 12x^2y\bar{i} - 3yz\bar{j} + 2z\bar{k}$ and S is the portion of the plane $x + y + z = 1$ included in the first octant. 12M CO5 L5

OR

11. Verify Green's theorem for $\int_c [(3x^2 - 8y^2)dx + (4y - 6xy)dy]$ where c is the region bounded by $x=0$, $y=0$ and $x+y=1$. 12M CO5 L5

*** End ***

Hall Ticket Number :									
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R-20

Code: 20A521T

I B.Tech. II Semester Supplementary Examinations February 2023

Data Structures through Python

(Common to CSE, AI&DS 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 mark**.
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

- | | | |
|---|-----|----|
| 1. Answer ALL the following short answer questions (5 X 2 = 10M) | CO | BL |
| a) Write a for loop in python that prints even numbers from 0 to 100, using range function. | CO1 | L1 |
| b) List out the differences between an array and a list in Python. | CO2 | L3 |
| c) What is slicing in Python? Give Illustrations. | CO3 | L1 |
| d) List out basic operations on list that can be performed in Python. | CO4 | L3 |
| e) Write the operations of Queues. | CO5 | L5 |

PART-B

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

Marks CO BL

UNIT-I

- | | | | |
|---|----|-----|----|
| 2. a) Write a Python program to input n numbers and to reverse the set of numbers without using List structure. | 6M | CO1 | L1 |
| b) Write a Python program to find maximum element and minimum element from the given List | 6M | CO1 | L4 |

OR

- | | | | |
|---|----|-----|----|
| 3. a) Explain about operations on Dictionaries in Python. | 6M | CO1 | L4 |
| b) Write about different loop control statements available in python? Explain with suitable examples. | 6M | CO1 | L5 |

UNIT-II

- | | | | |
|---|----|-----|----|
| 4. a) What type of parameter passing is used in Python? Justify your answer with sample programs. | 6M | CO2 | L1 |
| b) Write a Python function that prints all factors of a given number. | 6M | CO2 | L5 |

OR

- | | | | |
|--|----|-----|----|
| 5. a) What are global and local variables in Python? | 6M | CO2 | L1 |
| b) Explain about garbage collection in Python. | 6M | CO2 | L5 |

UNIT-III

6. Explain inheritance in Python with an example. 12M CO3 L2

OR

7. a) Write a Python program that overloads + operator, to add two objects of a class. 6M CO3 L5

b) How to create, raise and handle user defined exceptions in Python 6M CO3 L5

UNIT-IV

8. Describe the concept of stack and its implementation using linked list in Python. 12M CO4 L2

OR

9. Describe the operations performed in Single linked list. 12M CO4 L6

UNIT-V

10. a) Construct an AVL tree with the following values:
{ 50 , 20 , 60 , 10, 8 , 15 , 32 , 46 , 11 , 48 } 6M CO5 L3

b) Construct a Binary search tree with following key elements: 15, 10, 20, 8, 12, 16, 25 6M CO5 L6

OR

11. a) Explain Binary tree with an example. 4M CO5 L3

b) Construct a max heap for the following :
{11, 9, 10, 8, 5, 2, 4} 8M CO5 L6

*** End ***

Hall Ticket Number :

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R-20

Code: 20A324T

I B.Tech. II Semester Supplementary Examinations February 2023

Engineering Drawing

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

Max. Marks: 70

Time: 3 Hours

Marks	CO	Blooms Level
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UNIT-I

1. A fixed point is 75mm from a fixed straight line. Draw the locus of a point P moving such a way that its distance from the fixed straight line is equal to its distance from the fixed point. Name the curve.

14M	C1	L1
-----	----	----

OR

2. Draw a cycloid given the diameter of a rolling circle as $d=30\text{mm}$. Draw a normal and tangent at any point on the curve.

14M	C1	L1
-----	----	----

UNIT-II

3. a) The point A is on H.P. and 40mm in front of V.P. Another point B is on V.P. and below H.P. The line joining their front views makes an angle of 45° with XY, while the line joining their top views makes an angle of 30° . Find the distance of the point B from H.P.

7M	C2	L2
----	----	----

- b) Draw the projections of the following points in third quadrant when the

- i. Point A lies in the H.P. and 22mm away from the V.P.
- ii. Point B lies in the V.P. and 32mm away from the H.P.
- iii. Point C lies 32mm from the H.P. and 22mm from the V.P.

7M	C2	L2
----	----	----

OR

4. The top view of a 75mm long line AB measures 65mm, while the length of its front view is 50mm. It's one end A is in the H.P. and 12mm in front of the V.P. Draw the projections of AB and determine its inclinations with the H.P. and the V.P.

14M	C2	L2
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UNIT-III

5. A regular hexagonal plane of 30mm side has a corner at 20mm from V.P. and 50mm from H.P. Its surface is inclined at 45° to V.P. and perpendicular to H.P. Draw the projections of the plane.

14M	C3	L3
-----	----	----

OR

6. A regular pentagon of 30mm side is resting on one of its edges on H.P. which is inclined at 45° to V.P. Its surface is inclined at 30° to H.P. Draw its projections

14M C3 L3

UNIT-IV

7. A triangular prism of base side 45mm and length of axis 75mm has a corner in the H.P. the face opposite to that corner makes 50° to the H.P. while the axis of the solid makes 30° to the V.P. obtain the two views of the solid.

14M C4 L4

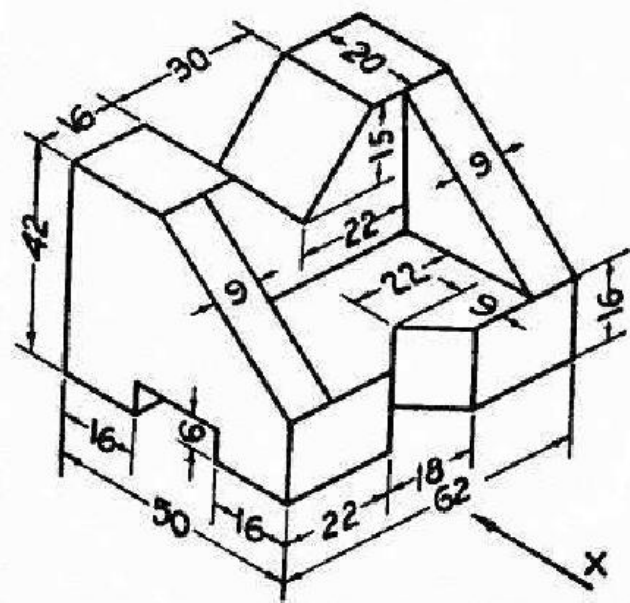
OR

8. A hexagonal pyramid, base 25mm side and axis 55mm long, has one of its slant edges on the ground. A plane containing that edge and the axis is perpendicular to the H.P. and inclined at 45° to the V.P. Draw its projections, when the apex is nearer the V.P. than the base.

14M C4 L2

UNIT-V

9. Draw the front view, top view and left side view of the object shown in figure. (All dimensions are in mm).



14M C5 L3

OR

10. Draw the isometric view of a hexagonal prism TWO possible positions, with side of base 25mm and axis 60mm long, The prism is resting on its base on H.P. with an edge of the base parallel to V.P. Use the box method.

14M C5 L1

*** End ***

Hall Ticket Number :

R-20

Code: 20AC22T

I B.Tech. II Semester Supplementary Examinations February 2023

Applied Physics

(Common to CSE 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 mark**.

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

PART-A

(Compulsory question)

- | | CO | BL |
|--|----|----|
| 1. Answer ALL the following short answer questions (5 X 2 = 10M) | | |
| a) What are the necessary conditions to get clear and distinct interference fringes? | 1 | L1 |
| b) What is dielectric polarization? | 2 | L1 |
| c) Define total internal reflection. | 3 | L1 |
| d) Write any two applications of semiconductors. | 4 | L1 |
| e) State Meissner's effect. | 5 | 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) Define interference. What do you mean by coherent sources? | 4M | CO1 | L1 |
| b) Obtain conditions for maxima and minima due to interference of reflected light in thin films. | 8M | CO1 | L2 |

OR

- | | | | |
|---|----|-----|----|
| 3. a) What are (i) quarter wave plate and (ii) half wave plate? | 4M | CO1 | L1 |
| b) Describe Nicol Prism and explain how it acts as an analyzer. | 8M | CO1 | L3 |

UNIT-II

- | | | | |
|---|----|-----|----|
| 4. a) Derive the relation between dielectric susceptibility and polarizability. | 4M | CO2 | L3 |
| b) What is electronic polarizability. Derive an expression for electronic polarizability. | 8M | CO2 | L2 |

OR

5. a) Define magnetic flux density B, magnetic field strength H and magnetization M. How are they related with each other? 4M CO2 L3
- b) Explain how substances are classified according to their magnetic behavior. 8M CO2 L2

UNIT-III

6. a) If $\vec{F} = (3x^2 - 3yz) \mathbf{i} + (3y^2 - 3zx) \mathbf{j} + (3z^2 - 3xy) \mathbf{k}$ then find $\text{div } \vec{F}$. 4M CO3 L3
- b) Write Maxwell's equations in differential form and explain their physical significance. 8M CO3 L2

OR

7. a) Classify the fibres on the basis of refractive index profile and on the basis of modes. 4M CO3 L2
- b) Define numerical aperture of a fibre and derive an expression for it. How numerical aperture is useful on optical fibres. 8M CO3 L3

UNIT-IV

8. a) Distinguish between intrinsic and extrinsic semiconductors. 4M CO4 L2
- b) Explain classification of solids based on band theory. 8M CO4 L2

OR

9. a) Write short note on Drift and Diffusion currents. 4M CO4 L1
- b) Derive an expression for density of holes in intrinsic semiconductors. 8M CO4 L3

UNIT-V

10. a) Write some applications of superconductors in various fields. 4M CO5 L1
- b) Explain the BCS theory with key note of Cooper Pairs. Differentiate between type-I and Type-II superconductors. 8M CO5 L2

OR

11. a) Write any four applications of nanomaterials. 4M CO5 L1
- b) With a neat diagram, explain mechanical ball milling process of synthesis of nanomaterials. Write advantages and disadvantages also. 8M CO5 L2

*** End ***

Hall Ticket Number :										
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R-20

Code: 20A223T

I B.Tech. II Semester Supplementary Examinations February 2023

Basic Electrical and Electronics Engineering

(Common to CE, CSE 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 mark**.
 3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

1. Answer ALL the following short answer questions (5 X 2 = 10M)	CO	Blooms Level
a) State cork screw rule?	1	1
b) Draw the connection diagram of Swinburne's test?	2	2
c) How the copper loss varies with power factor in a transformer?	3	1
d) How P-N junction is formed in a diode?	4	1
e) Write the classification of instruments?	5	1

PART-B

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

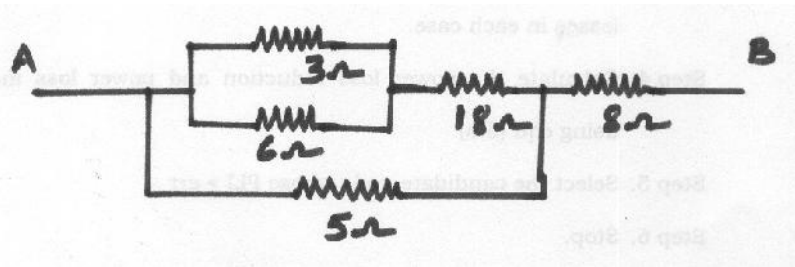
Marks CO BL

UNIT-I

- | | | | |
|---|----|---|---|
| 2. a) Three resistors R1, R2 and R3 are connected in series across a constant voltage V. The voltage across R1 is 20V. The power consumed by R2 is 25 W, R3=2ohms. Find the voltage V if the current is 5A? | 6M | 1 | 3 |
| b) Discuss about static and dynamic induced EMF? | 6M | 1 | 2 |

OR

3. Calculate the effective resistance of the following combination of resistances and the voltage drops across each resistance, when a voltage of 60V is applied between points A and B as shown in fig.



12M 1 3

UNIT-II

- | | | | |
|---|-----|---|---|
| 4. a) Derive the EMF equation of DC Generator? | 6M | 2 | 2 |
| b) Explain the Brake test of DC motor? | 6M | 2 | 2 |
| OR | | | |
| 5. Explain the speed control methods of DC motor? | 12M | 2 | 2 |

UNIT-III

- | | | | |
|--|----|---|---|
| 6. a) Explain the Brake test on three-phase induction motor? | 6M | 3 | 2 |
| b) Discuss the principle of operation of three-phase transformer? | 6M | 3 | 2 |
| OR | | | |
| 7. a) Explain the calculation of regulation with synchronous impedance method? | 6M | 3 | 2 |
| b) Explain the calculation of efficiency and regulation of transformer? | 6M | 3 | 2 |

UNIT-IV

- | | | | |
|---|----|---|---|
| 8. a) Explain the operation of diode half-wave rectifier? | 6M | 4 | 2 |
| b) Describe the diffusion process that takes place at the p-n junction, and explain the presence of depletion region? | 6M | 4 | 2 |
| OR | | | |
| 9. a) Define | | | |
| i) active ii) saturation and cut-off region in a transistor? | 6M | 4 | 2 |
| b) Sketch characteristics of transistor CE configuration? | 6M | 4 | 2 |

UNIT-V

- | | | | |
|--|----|---|---|
| 10. a) Explain the principle of cathode ray tube? | 6M | 5 | 2 |
| b) Explain about different types of Fuses? | 6M | 5 | 2 |
| OR | | | |
| 11. a) In a house there are 5 lamps 25 watts used 14 hours per day, a 200 W refrigerator used 24 hours per day, and a 125 watt water pump used 8 hours per day. How much electrical energy used for a month (30 days)? | 9M | 5 | 3 |
| b) Discuss the applications of CRO? | 3M | 5 | 2 |

*** End ***