

Hall Ticket Number :

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R-20

Code: 20AC22T

I B.Tech. II Semester Regular & Supplementary Examinations September 2022

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)

1. Answer **ALL** the following short answer questions (5 X 2 = 10M)

- | | CO | Blooms Level |
|---|----|--------------|
| a) Distinguish between Fresnel and Fraunhofer diffractions. | 1 | L1 |
| b) Write any two applications of dielectrics. | 2 | L1 |
| c) State Stoke's theorem for curl. | 3 | L1 |
| d) What is indirect band gap semiconductor? Give one example. | 4 | L1 |
| e) Write any two applications of nanomaterials. | 5 | L1 |

PART-B

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

- | | Marks | CO | Blooms Level |
|--|-------|-----|--------------|
| 2. a) State the basic conditions required for the phenomenon of interference of light. | 4M | CO1 | L1 |
| b) Derive an expression for wavelength of light in Newton's rings experiment. | 8M | CO1 | L3 |

OR

- | | | | |
|--|----|-----|----|
| 3. a) Give the differences between interference and diffraction. | 4M | CO1 | L1 |
| b) Discuss the Fraunhofer diffraction at single slit. Obtain the conditions for principal maximum and minimum. | 8M | CO1 | L3 |

UNIT-II

- | | | | |
|--|----|-----|----|
| 4. a) What are different types of polarization in dielectrics? | 4M | CO2 | L1 |
| b) Explain ionic polarizability and derive an expression for ionic polarizability. | 8M | CO2 | L2 |

OR

- | | | | |
|---|----|-----|----|
| 5. a) Derive the relation between magnetic susceptibility and permeability. | 4M | CO2 | L3 |
| b) Explain ferromagnetic hysteresis on the basis of domains. | 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 $\text{curl } \vec{F}$ 3M CO3 L3
- b) State Poynting theorem. Explain how the Poynting vector explains the energy flow. 9M CO3 L2

OR

7. a) Mention few applications of optical fibre. 4M CO3 L1
- b) Define acceptance angle and acceptance cone. Derive an expression for acceptance angle in terms of refractive indices of the core and the cladding. 8M CO3 L3

UNIT-IV

8. a) How does the Fermi level change with temperature in p-type and n-type semiconductors? 4M CO4 L2
- b) Derive an expression for density of electrons in intrinsic semiconductors. 8M CO4 L3

OR

9. a) Distinguish between p-type and n-type semiconductors. 4M CO4 L1
- b) Explain Hall effect and its importance. Derive the relation between Hall coefficient and Hall voltage. 8M CO4 L2

UNIT-V

10. a) Explain A.C Josephson effect. 4M CO5 L2
- b) What is super conductivity? Explain Meissner effect. Describe type- I and type –II superconductors. 8M CO5 L2

OR

11. a) Write some mechanical and optical properties of nanomaterials. 4M CO5 L1
- b) Explain chemical vapor deposition method of synthesis of nanomaterials with diagram. 8M CO5 L2

*** End ***

Hall Ticket Number :										
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R-20

Code: 20A223T

I B.Tech. II Semester Regular & Supplementary Examinations September 2022

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 Fleming's left hand rule?	1	1
b) Write the applications of DC generators?	2	1
c) Does the transformer draw any current when its secondary is open circuited?	3	1
d) Write the symbol of PNP transistor.	4	2
e) What is the importance of earthing?	5	2

PART-B

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

	Marks	CO	Blooms Level
UNIT-I			
2. a) What is Fleming's right hand rule and how it used to determine the direction of force in DC Generator.	6M	1	3
b) State Kirchhoff's laws and explain with an example?	6M	1	1

OR

3. 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	1	3
b) Discuss Faraday's laws of electromagnetic induction?	8M	1	2

UNIT-II

4. a) Draw and explain the different types of generators?	8M	2	2
b) Explain the principle of operation of DC generator?	4M	2	2

OR

5. a) Derive the Torque equation of DC motor?	6M	2	2
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- b) A DC generator supplies a load of 9kW at 220V. Calculate the induced e.m.f if the armature resistance is 0.8 ohms and the field resistance is 70 ohms? 6M 2 3

UNIT-III

6. a) Derive the EMF equation of transformer? 8M 3 2
 b) Explain the principle of operation of Alternator? 4M 3 2

OR

7. Explain the OC and SC test of transformer with necessary diagrams? 12M 3 2

UNIT-IV

8. a) Draw and explain V-I characteristics of diode? 6M 4 2
 b) Explain the operation of diode half-wave rectifier? 6M 4 2

OR

9. Explain the input and output characteristics of PN junction diode in Common Emitter configuration 12M 4 2

UNIT-V

10. a) Discuss the types of wires and cables? 6M 5 2
 b) Draw and explain the block diagram of CRO? 6M 5 2

OR

11. a) Discuss the operation of MCB? 6M 5 2
 b) Explain the operation of function generator? 6M 5 2

*** End ***

Hall Ticket Number :									
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R-20

Code: 20AC21T

I B.Tech. II Semester Regular & Supplementary Examinations September 2022

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)

- | | | |
|--|-----|----|
| a) Solve $\frac{d^4x}{dt^4} + 4x = 0$ | CO1 | L3 |
| b) Write the second order Legendre's Linear equation form. | CO2 | L3 |
| c) Form the differential equation by eliminating a and b from $\log(az - 1) = x + ay + b$. | CO3 | L2 |
| d) Find the greatest value of the directional derivative of the function $f = x^2yz^3$ at $(2, 1, -1)$. | 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	Blooms Level
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UNIT-I

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

3. Solve the differential equation $(D^2 + 4)y = \sec 2x$ by the method of variation of parameters.	12M	CO1	L3
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UNIT-II

4. A condenser of capacity C discharged through an inductance L and resistance R in series and the charge q at time t satisfies the equation $L \frac{d^2q}{dt^2} + R \frac{dq}{dt} + \frac{q}{C} = 0$. Given that L= 0.25 henries, R = 250 ohms, C=2×10 ⁻⁶ farads, and that when t = 0, charge q is 0.002 coulombs and the current dq/dt = 0, obtain the value of q in terms of t.	12M	CO2	L3
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OR

5. Solve $x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + y = \log x \cdot \sin(\log x)$ 12M CO2 L1

UNIT-III

6. a) Form a partial differential equation by eliminating the arbitrary functions $f(x)$ and $g(y)$ from $z = yf(x) + xg(y)$. 6M CO3 L2
- b) Solve $x^2(y-z)p + y^2(z-x)q = z^2(x-y)$. 6M CO3 L3

OR

7. Solve by the method of separation of variables
 $3u_x + 2u_y = 0$ where $u(x,0) = 4e^{-x}$. 12M CO3 L3

UNIT-IV

8. a) Find the directional derivative of $\phi = x^2yz + 4xz^2$
 at $(1, -2, -1)$ in the direction of the vector $2\bar{i} - \bar{j} - 2\bar{k}$. 6M CO4 L2
- b) Show that $\nabla^2(r^n) = n(n+1)r^{n-2}$. 6M CO4 L3

OR

9. a) Find the angle between the surfaces $x^2 + y^2 + z^2 = 9$ and
 $z = x^2 + y^2 - 3$ at the point $(2, -1, 2)$. 6M CO4 L2
- b) Find whether the function
 $\bar{F} = (x^2 - y^3)\bar{i} + (y^2 - 3x)\bar{j} + (z^2 - xy)\bar{k}$
 is irrotational and hence find scalar potential function
 corresponding to it. 6M CO4 L2

UNIT-V

10. a) Find the work done in moving a particle in the force field
 $\bar{F} = 3x^2\bar{i} + (2xz - y)\bar{j} + z\bar{k}$ along the straight line from
 $(0,0,0)$ to $(2,1,3)$ 6M CO5 L2
- b) Apply Divergence theorem to evaluate
 $\iiint_s (x+z)dydz + (y+z)dzdx + (x+y)dx dy$
 where s is the surface of the sphere $x^2 + y^2 + z^2 = 4$. 6M CO5 L3

OR

11. Verify Green's theorem in the plane for
 $\int_c (x^2 - xy^3) dx + (y^2 - 2xy) dy$ where c is a square with
 vertices $(0, 0), (2, 0), (2, 2), (0, 2)$. 12M CO5 L5

*** End ***

Hall Ticket Number :									
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R-20

Code: 20A521T

I B.Tech. II Semester Regular & Supplementary Examinations September 2022

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 | Blooms Level |
|---|-----|--------------|
| a) Write a Python program to find the sum of all items in the dictionary. | CO1 | L1 |
| b) How memory management is done in Python? | CO2 | L3 |
| c) What is Encapsulation in Python? Give Example. | CO3 | L3 |
| d) List out the differences between Set and Dictionary? | CO4 | L1 |
| e) List out different Kinds of Tree Traversals for a Binary Search Tree. | CO5 | L5 |

PART-B

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

- | | Marks | CO | Blooms Level |
|---|-------|-----|--------------|
| UNIT-I | | | |
| 2. a) Given the marks of ten students 10, 20, 25, 34, 11, 33, 44, 67, 79, 81. Write a python program to identify the odd and even numbers and place it in separate lists. | 8M | CO1 | L1 |
| b) Write a Python program to find transpose matrix of a given matrix of size n x n. | 4M | CO1 | L4 |
| OR | | | |
| 3. a) Explain about operations on Sets in Python. | 6M | CO1 | L4 |
| b) Explain about operations on Dictionary in Python. | 6M | CO1 | L5 |
| UNIT-II | | | |
| 4. a) Discuss various string handling methods in Python. | 6M | CO2 | L1 |
| b) Write a Python function that prints all prime numbers from 1 to 100. | 6M | CO2 | L5 |
| OR | | | |
| 5. a) Discuss about fundamental features of Object oriented programming. | 6M | CO2 | L6 |
| b) Explain the procedure of calling a class method from another class method in python with an example. | 6M | CO2 | L1 |

UNIT-III

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

OR

7. a) Write a Python program to create a user-defined exception that will check whether the person is eligible or not.

Note:- The person eligibility for voting is 21 years. 8M CO3 L2

b) Discuss various built-in exceptions in Python with an example. 4M CO3 L5

UNIT-IV

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

OR

9. Describe the procedure of how to traverse, search and remove a node in a single linked list. 12M CO4 L6

UNIT-V

10. Describe the priority queues and its operations in Python. 12M CO5 L3

OR

11. a) Briefly explain about iterators in Trees. 4M CO5 L6

b) Write a program to calculate the height of a binary tree in python. 8M CO5 L3

*** End ***

Hall Ticket Number :

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R-20

Code: 20A324T-A

I B.Tech. II Semester Regular & Supplementary Examinations September 2022

Engineering Drawing

(Artificial Intelligence & Machine Learning)

Max. Marks: 70

Time: 3 Hours

Marks CO Blooms Level

UNIT-I

1. Construct a hyperbola when the distance between the focus and the directrix is 40mm and the eccentricity is $\frac{4}{3}$. Draw a tangent and normal at any point on the hyperbola. 14M C1 L1

OR

2. A coin of 40mm diameter rolls over horizontal table without slipping. A point on the circumference of the coin is in contact with the table surface in the beginning and after one complete revolution. Draw and name the curve. Draw a tangent and normal at any point on the curve. 14M C1 L1

UNIT-II

3. a) A point P is 15mm above the H.P. and 20mm in front of the V.P. Another point Q is 25mm behind the V.P. and 40mm below the H.P. Draw projections of P and Q keeping the distance between their projectors equal to 90mm. Draw straight lines joining
i. their top views and ii. their front views. 7M C2 L2
- b) A point 30mm above XY line is the plan view of two points P and Q. the elevation of P is 45mm above the H.P. while that of the point Q is 35mm below the H.P. Draw the projections of the points and state their position with reference to the principal planes and the quadrant in which they lie. 7M C2 L2

OR

4. The midpoint of a straight line AB is 60mm above H.P. and 50mm in front of V.P. The line measures 80mm long and inclined at 30° to H.P. and 45° to V.P. Draw its projections. 14M C2 L2

UNIT-III

5. A semicircular plate of 80mm diameter has its straight edge in the VP and inclined at 60° to the HP, the surface of the plate makes an angle of 30° with the VP. Draw its projections. 14M C3 L3

OR

6. An equilateral triangular plane ABC of side 40mm has its plane parallel to V.P. and 20mm away from it. Draw the projections of the plane when one of its sides is:
- (a) Perpendicular to H.P. (b) Parallel to H.P. and
(c) Inclined to H.P. at an angle of 45°

14M C3 L3

UNIT-IV

7. A pentagonal pyramid, base 25mm side and axis 75mm long has one of its triangular faces in the V.P. and the edge of the base contained by that face makes an angle of 30° with the H.P., Draw its projections.

14M C4 L3

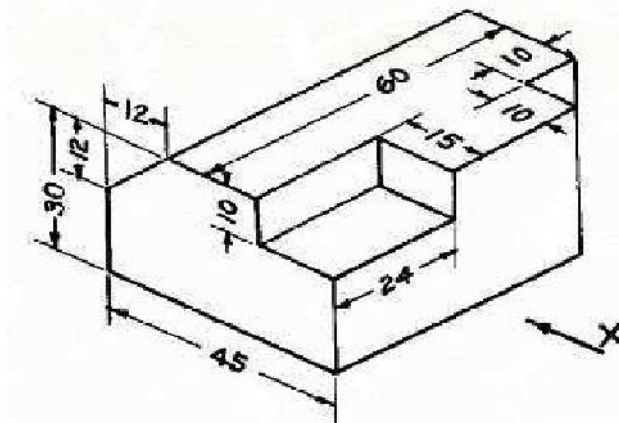
OR

8. A regular square prism lies its axis inclined at 60° to the HP and 30° to the VP. The prism is 60mm long and has a face width of 25mm. The nearest corner is 10mm away from the VP and the farthest shorter edge is 100mm from the HP. Draw the projections of the solid.

14M C4 L4

UNIT-V

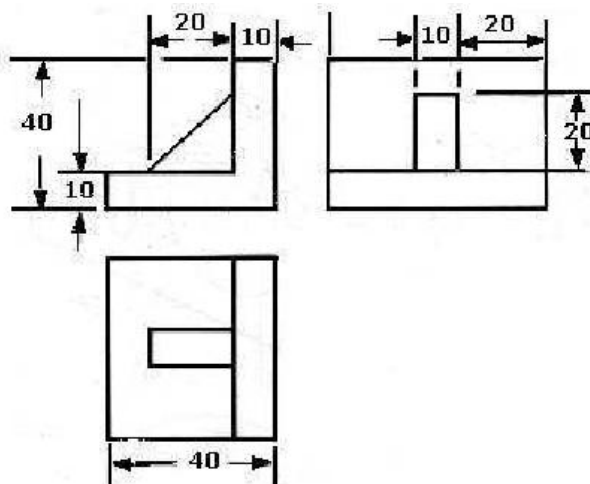
9. Draw the front view, top view and left side view of the object shown in figure. (All dimensions are in mm)



14M C5 L3

OR

10. Draw the isometric view of the ribbed angle plate, shown in figure. All dimensions are in mm



14M C5 L3

*** End ***

Hall Ticket Number :										
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R-20

Code: 20A324T-C

I B.Tech. II Semester Regular & Supplementary Examinations September 2022

Engineering Drawing
(Common to CSE and AI&DS)

Max. Marks: 70

Time: 3 Hours

Answer five questions by choosing one question from each unit (5 x 14 = 70 Marks)

	Marks	CO	Blooms Level
UNIT-I			
1. a) Construct an ellipse by concentric circle method whose major axis is 90 mm and minor axis is 55 mm.	7M	C1	L1
b) Construct an ellipse whose major and minor axes are 100 mm and 60mm respectively by oblong method.	7M	C1	L1
OR			
2. A circle of 40 mm diameter rolls along a straight line without slipping. Draw the curve traced out by a point 'P' on the circumference for one revolution of the circle. Draw a tangent and normal at a point on it 35 mm from the line.	14M	C1	L2
UNIT-II			
3. a) A line AB 50 mm long makes an angle 45° to the V.P. The end A is 15 mm in front of V.P and 12 mm above the H.P. Draw the front view and top view of the line AB.	7M	C2	L2
b) A line MN 50 mm long is parallel to V.P and inclined at 30° to H.P. The end M is 20 mm above H.P and 10 mm in front of V.P. Draw the projections of the line.	7M	C2	L2
OR			
4. A line CD 80 mm long is inclined at an angle of 30° to H.P and 45° to V.P. the point C is 20 mm above H.P and 30 mm in front of V.P. Draw the projections of the straight line.	14M	C2	L2
UNIT-III			
5. a) A hexagonal lamina of 40 mm side is resting on one of its corner on H.P. Its plane is inclined at an angle of 30° to H.P and perpendicular to V.P. Draw its projections.	7M	C3	L3
b) Draw the projections of a circular lamina of 50 mm diameter, whose center is 30 mm above the H.P and 20 mm in front of V.P. The circular lamina is inclined at an angle of 30° to V.P and perpendicular to H.P.	7M	C3	L3
OR			
6. Draw the projection of a circular lamina of 80 mm diameter having one end A of the diameter on H.P and the other end B is in the V.P. The surface of the circle is inclined at 30° to H.P and 60° to V.P.	14M	C3	L3

UNIT-IV

7. A pentagonal pyramid side of base 25 mm and axis 50 mm long is resting on an edge of its base on the H.P with its axis inclined at 30° to the HP and parallel to V.P. Draw its projections.

14M C4 L3

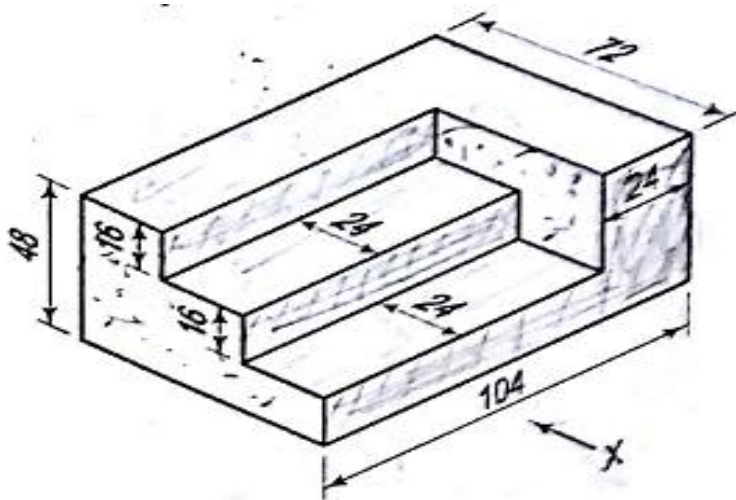
OR

8. Draw the projections of a cylinder of base 30 mm diameter and axis 40 mm long, resting with a point of its base circle on H.P such that the axis is making an angle of 30° with the H.P.

14M C4 L3

UNIT-V

9. Draw the (i) Front view (ii) Top View (iii) Side view of the Following Isometric Drawings

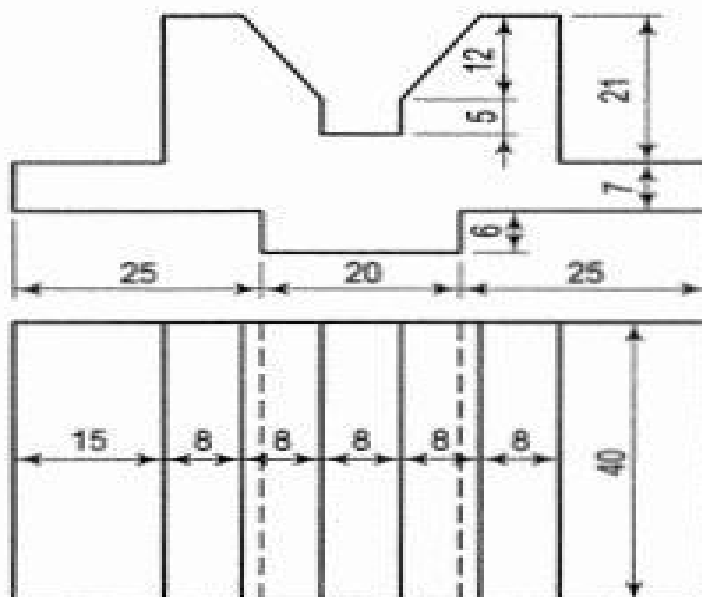


All dimensions are in 'mm'

14M C5 L3

OR

10. Draw the isometric view of an object, whose orthographic projections are shown below.



All dimensions are in 'mm'

14M C5 L3

*** End ***