R-20

Code: 20AC22T

I B.Tech. II Semester Regular & Supplementary Examinations July 2023

Applied Physics

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

Max. Marks: 70   Time: 3 Hours

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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)

		CO	BL
1. Answer ALL the following short answer questions (5 X 2 = 10M)			
a) List any four engineering applications of polarization.		CO1	L1
b) Define Magnetic susceptibility.		CO2	L1
c) What is critical angle of propagation in optical fibers?		CO3	L1
d) Write the Einstein's relation in semiconductor.		CO4	L1
e) Write any two important properties 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. a)	Explain the phenomenon of interference of light due to thin parallel film and find the conditions for maxima and minima.	10M	CO1	L2
b)	A parallel beam of light of wavelength 6000Å is incident on a glass plate of refractive index 1.5 such that the angle of refraction into the plate is 30^0. Calculate the smallest thickness of the plate, which will make it appear dark by reflection.	2M	CO1	L3

OR

3.	Obtain the conditions for maxima and minima in Fraunhoffer diffraction due to single slit.	12M	CO1	L4

UNIT–II

4. a)	What is meant by polarization in dielectrics?	2M	CO2	L1
b)	Explain electronic polarizability in atoms and obtain an expression for electronic polarizability in terms of radius of the atoms.	10M	CO2	L2

OR

5. a)	Explain hysteresis loop in detail.	8M	CO2	L2

b) Classify the magnetic materials based on their hysteresis curve as soft and hard magnetic materials and mentioned their distinct characteristic features. 4M CO2 L4

UNIT–III

6. a) State and prove the Gauss's theorem for divergence. 6M CO3 L3

   b) Derive the electromagnetic wave energy using Poynting's theorem. 6M CO3 L3

OR

7. a) Derive an expression for acceptance angle and numerical aperture. 10M CO3 L3

   b) Calculate the acceptance angle of a given optical fiber, if the refractive indices of core and cladding are 1.562 and 1.497 respectively. 2M CO3 L3

UNIT–IV

8. a) Explain classification of solids into conductors, semiconductors and insulators 6M CO4 L2

   b) Derive the drift and diffusion current in semiconductors. 6M CO4 L2

OR

9. a) State Hall effect and derive the value of Hall coefficient. 10M CO4 L3

   b) Mention the applications of Hall effect. 2M CO4 L1

UNIT–V

10. a) What do you understand by Meissner's effect in super conductors? 4M CO5 L1

    b) Discuss the electron–phonon interaction and the formation of Cooper pairs in superconductors on the basis of the BCS theory. 8M CO5 L3

OR

11. a) Explain the physical and chemical properties of nano materials. 4M CO5 L2

    b) Explain the synthesis of nano materials by ball milling. 8M CO5 L2

*** End ***

R-20

Code: 20A223T

I B.Tech. II Semester Regular & Supplementary Examinations July 2023

Basic Electrical and Electronics Engineering

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

Max. Marks: 70   Time: 3 Hours

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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)

		CO	BL
1. **Answer ALL the following short answer questions** (5 X 2 = 10M)			
a) State and explain Kirchoff's Voltage Law.		1	2
b) Write the necessity of commutator for operation of a D.C machine?		2	3
c) Write the principle of operation of transformer?		3	2
d) Draw the circuit diagram symbols for p-n-p and n-p-n transistors		4	1
e) How are moving coil instruments classified?		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) Two resistances when they are in series have an equivalent resistance of 9ohms and when connected in parallel have an equivalent resistance of 2ohms. Find the two resistances?   6M   1   2

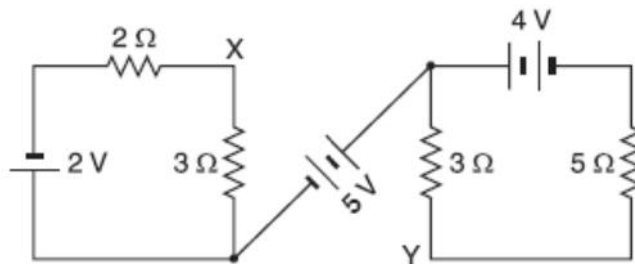b) What is the potential difference between X and Y in the network shown in Fig.1.

Fig.1   6M   1   3

OR

3. a) Two resistors 4 ohms and 6 ohms are connected in parallel. If the current supplied by source is 30 A. Find the equivalent resistance and current through each branch.   6M   1   2

b) A 35 V d.c supply is connected across a resistance of 600ohms in series with an unknown resistance R. A voltmeter having a resistance 1200 ohms is connected across 600ohms and shows a reading of 5V. Calculate the value of resistance R.   6M   1   3

UNIT–II

4. a) Derive the torque equation of a DC motor? 6M 2 3

   b) A 1500 kW, 550V, 10 pole generator runs at 150 r.p.m. There are 2500 lap connected conductors and the full load copper losses are 25KW. The air gap flux density has a uniform value of 0.9wb/m2. Calculate the no load terminal voltage and the area of the pole shoe? 6M 2 3

OR

5. a) Draw the circuit diagram of DC series generator and write the relations between voltages and currents? Write its applications. 6M 2 2

   b) Explain the Swinburne's test to determine the efficiency of a DC machine. 6M 2 1

UNIT–III

6. a) Explain principle of operation of a 1 phase transformer? 6M 3 2

   b) Derive the expression for the regulation of a 1 phase transformer and discuss whether its value should be low or high to get the better efficiency? 6M 3 4

OR

7. a) Explain in detail about the constructional features and operation of an alternator? 6M 3 1

   b) Draw and explain about the torque slip characteristics of an induction motor? 6M 3 2

UNIT–IV

8. a) Explain about the principle of operation of a full wave rectifier with the help of circuit diagram? 6M 4 2

   b) Explain in detail about the differences between PNP and NPN transistors? 6M 4 3

OR

9. a) Discuss about the differences between half wave rectifier and full wave rectifier by using the output waveforms? 6M 4 4

   b) Draw and explain the input and output characteristics for transistor CE configuration? 6M 4 3

UNIT–V

10. Draw the block diagram of a general purpose CRO and explain the functions of various blocks 12M 5 1

OR

11. Explain the working of MCB with neat diagram. 12M 5 3

*** End ***

Code: 20AC21T

I B.Tech. II Semester Regular & Supplementary Examinations July 2023

Differential Equations and Vector Calculus

(Common to all Branches)

Max. Marks: 70   Time: 3 Hours

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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   (5 X 2 = 10M)   CO BL

  a) Find the particular integral of $(D^2 - 2D + 1)y = e^{2x}$ 1   2

  b) Write the second order Legendre's Linear Equation form   2   3

  c) Find the partial differential equations of Z=ax+by   3   2

  d) Find div F if F= $(x^3 + y^3 + z^3 - 3xyz)$ 4   3

  e) State Stoke's Thorem   5   3

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

                                         Marks CO BL

UNIT–I

2. Solve $(D - 2)^2 y = 8[e^{2x} + sin2x + x^2]$ 12M   1   3

OR

3. Using variation of parameter to solve $\frac{d^2y}{dx^2} + a^2y = secax$ 12M   1   3

UNIT–II

4. Solve $(1 + x)^2 \frac{d^2y}{dx^2} + (1 + x)^2 \frac{dy}{dx} + y = 2 sin [\log(1 + x)]$ 12M   2   3

OR

5. An uncharged condenser of capacity C is charged by applying an e. m.f $\frac{E\sin t}{\sqrt{LC}}$, through leads of self-inductance L and negligible resistance, prove that at any time t, the charge on one of the plates is $\frac{EC}{2}\{sin\frac{t}{\sqrt{LC}} - \frac{t}{\sqrt{LC}}cos\frac{t}{\sqrt{LC}}\}$ 12M   2   3

UNIT–III

6. a) Form the partial differential equation by eliminating arbitrary functions f and g from $z = f(x+at) + g(x-at)$ 6M   3   3

  b) Solve $x^2(y-z)p + y^2(z-x)q = z^2(x-y)$ 6M   3   3

OR

7. Using the method of separation of variables, solve $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$ where $u(x, 0) = 6e^{-3x}$ 12M   3   3

UNIT–IV

8. a) Find the directional derivative of $f(x, y, z) = xy^2 + yz^3$ at the point (2,-1,1) in the direction of vector $\bar{i} + \bar{j} + \bar{k}$.   6M   4   3

   b) 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   4   3

OR

9. Find constants a,b,c so that the vector $A = (x + 2y + az)\bar{i} + (bx - 3y - z)\bar{j} + (4x + cy + 2z)\bar{k}$ is irrotational. Also find $\emptyset$ such that $\bar{A} = \nabla \emptyset$ 12M   4   3

UNIT–V

10. Verify Green's theorem for $\int_c [(xy + y^2)dx + x^2 dy]$ where C is bounded by y=x and $y = x^2$ 12M   5   3

OR

11. Verify Stoke's theorem for $F = (x^2 + y^2)\bar{i} - 2xy\bar{j}$ taken around the rectangle bounded by the lines $x = \pm a, y = 0, y = b$ 12M   5   3

*** End ***

Hall Ticket Number : | | | | | | | | | |

Code: 20A521T

I B.Tech. II Semester Regular & Supplementary Examinations July 2023

Data Structures through Python

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

Max. Marks: 70   Time: 3 Hours

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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)

		CO	BL
1. Answer ALL the following short answer questions (5 X 2 = 10M)			
a)	Compare type conversion methods in Python.	CO1	L2
b)	What are formal parameters?	CO2	L1
c)	Can a Python function return multiple values? If yes, how it works?	CO3	L1
d)	How will you define a Date ADT?	CO4	L2
e)	Write short notes on expression trees.	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.	Define an Expression. Illustrate different operators in an expression in Python, in the order of their precedence with examples.	12M	CO1	L2

OR

3.	a)	What is a list? Summarize common list operations with suitable examples.	8M	CO1	L1
	b)	Outline the list comprehensions in Python used to generate sequences.	4M	CO1	L2

UNIT–II

4.	a)	Interpret parameter passing to a function in Python.	10M	CO1	L2
	b)	Define keyword arguments.	2M	CO1	L1

OR

5.	a)	Discuss three fundamental features of object-oriented programming.	4M	CO2	L3
	b)	Design a Python code to call a class method from another class method	8M	CO2	L3

UNIT–III

6. a) Evaluate operator overloading and method overloading with suitable programs. — 7M CO3 L2

   b) What are abstract classes? Give examples. — 5M CO3 L1

OR

7. Analyze the importance of error and exception-handling techniques in Python. Justify your answer. — 12M CO3 L4

UNIT–IV

8. Construct a linked list with a neat diagram (choose any random elements) and explain the following operations with appropriate functions.
   i) Traversing the list
   ii) Creation of a new node
   iii) Removing a node
   iv) Searching for a node — 12M CO4 L3

OR

9. a) With a neat diagram, show the implementation of the stack ADT for the following values. 7 13 45 19 28 -1 — 10M CO4 L3

   b) List the applications of stack. — 2M CO4 L1

UNIT–V

10. a) What is a binary tree? Explain binary tree traversals with appropriate examples and program code. — 8M CO5 L5

    b) Differentiate binary tree and binary search tree. — 4M CO5 L1

OR

11. a) Define a Heap. Construct a max heap for the following: {12, 15, 9, 8, 10, 18, 7, 20, 25} — 9M CO5 L1, L3

    b) How will you remove an interior node with two children in a binary search tree? — 3M CO5 L1

*** End ***

Code: 20A324T-D

I B.Tech. II Semester Regular & Supplementary Examinations July 2023
Engineering Drawing
(Common to CSE, AI&DS and AI&ML)

Max. Marks: 70   Time: 3 Hours

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

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Marks

UNIT–I

1. Construct a parabola when the distance between the focus and directrix is 50mm. Also draw the tangent and normal to any point on the curve.   14M

OR

2. Construct an epicycloid of a circle 60 mm diameter which rolls outside of another circle of 120 mm diameter for one revolution. Draw tangent and normal to any point on the curve.   14M

UNIT–II

3. A line NS, 80mm long has its end N, 10mm above the HP and 15mm in front of the VP. The other end S is 65mm above the HP and 50mm in front of the VP. Draw the projections of the line and find its true inclinations with the HP and VP.   14M

OR

4. Draw the projections of the following points on the same ground line, keeping the projections 30mm apart.
    i.   A, in the H.P & 30mm, behind the V.P
    ii. B, 30mm above the H.P & 15mm in front of the V.P.
    iii. C, in the V.P & 50mm above the H.P.
    iv. D, 30mm below the H.P & 35mm behind the V.P.
    v.   E, 25mm above the H.P & 65mm behind the V.P.
    vi. F, 45mm below the H.P & 35mm in front of the V.P.
    vii. G, in both the H.P & the V.P.   14M

UNIT–III

5. A regular pentagon of 25mm side has one side on the ground. Its plane is inclined at 45^0 to the HP and perpendicular to the VP. Draw its projections   14M

OR

6. A semi-circular lamina of 64mm diameter has its straight edge in VP and inclined at an angle of 45^0 to HP. The surface of the lamina makes an angle of 30^0 with VP. Draw the projections   14M

UNIT–IV

7. A hexagonal pyramid, base 25mm side and axis 50mm long, has an edge of its base on the ground. Its axis inclined 30° to the ground and parallel to the V.P. Draw its projections   14M

OR

8. Draw the projections of a pentagonal prism, base 25mm side and axis 50mm long, resting on one of its rectangular faces on the H.P with the axis inclined 45° to the V.P.   14M

UNIT–V

9. Draw the top view, front view and left side view for the object shown below.

    14M
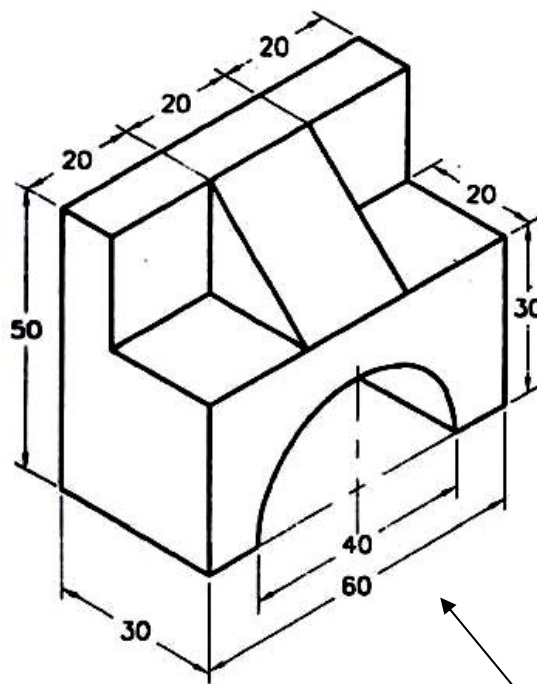
OR

10. Draw the isometric view of hexagonal prism, with side of base 25mm and axis 60mm long. The prism is resting on its base on HP, with an edge of the base parallel to VP.   14M

*** End ***