Hall Ticket Number :										

R-20

Code: 20AC22T

I B.Tech. II Semester Supplementary Examinations December 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)	Write any four applications of diffraction.	CO1	L1
	b)	Define dielectric polarizability.	CO2	L1
	c)	What are integral forms of Maxwell's equations?	CO3	L1
	d)	Define Hall effect.	CO4	L1
	e)	Explain the mechanical properties of nano materials.	CO5	L2

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 formation of Newton's rings and derive the expression for diameter of the dark ring in the reflected system.	10M	CO1	L2
	b)	In Newton's Ring Experiment, the diameters of the 4^{th} and 12^{th} dark rings are 0.35 cm and 0.60 cm respectively. Find the diameter of the 20^{th} dark ring?	2M	CO1	L3
		OR			
3.	a)	Describe the construction of Nicol prism and show how it can be used as a polarizer or analyzer.	10M	CO1	L2
	b)	Find the thickness of a quarter wave plate when the wavelength of light is equal to 5890 Å, μ_O=1.55, and μ_E=1.54.	2M	CO1	L3
		UNIT–II			
4.	a)	What is meant by local field in a dielectric and how it is calculated for a cubic structure?	8M	CO2	L1
	b)	Obtain Clausius–Mosotti equation.	4M	CO2	L2
		OR			
5.	a)	Define magnetic susceptibility and permeability.	4M	CO2	L1
	b)	Classify magnetic materials and explain their properties.	8M	CO2	L4

UNIT–III

6.	a)	State and prove the Stoke's theorem for curl.	6M	CO3	L1
	b)	Prepare the electromagnetic wave equation for non-conducting medium.	6M	CO3	L3
		OR			
7.	a)	Distinguish between light propagation in step index optical fiber and graded index optical fiber.	8M	CO3	L4
	b)	Explain about signal attenuation in optical fibers?	4M	CO3	L2

UNIT–IV

8.	a)	Differentiate conductors, semiconductors and insulators on the basis of energy band structure.	8M	CO4	L4
	b)	Explain the variation of Fermi level in N-type semiconductor with respect to temperature.	4M	CO4	L2
		OR			
9.	a)	Distinguish between direct and indirect band gap semiconductors.	8M	CO4	L4
	b)	Write any four important applications of semiconductors.	4M	CO4	L1

UNIT–V

10.	a)	What is Josephson's effect? Discuss the AC and DC Josephson's effects.	8M	CO5	L2
	b)	Write any four applications of superconductors.	4M	CO5	L1
		OR			
11.	a)	Explain the synthesis of nano materials by Chemical vapor deposition.	8M	CO5	L2
	b)	Write any four applications of Nano materials.	4M	CO5	L1

*** End ***

Hall Ticket Number :										

R-20

Code: 20A223T

I B.Tech. II Semester Supplementary Examinations December 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 Kirchhoff's Current Law.	1	1
b)	What is the significance of back emf?	2	2
c)	Define regulation and efficiency of a transformer.	3	1
d)	What is a PN Junction diode and how this is to be operated.	4	2
e)	What are the essential components of indicating instrument?	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 batteries A and B with the internal resistances R_A and R_B are connected in parallel to supply current of 155A to a load resistance R_L. Given E_A=122V, R_A=0.15 ohms and R_B=0.1ohms and I_B = 60A. Calculate E_B and power drawn by the load?	6M	1	3
b)	A 35V 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 600 ohms and shows a reading of 5V. Calculate the value of resistance R.	6M	1	3
	OR			
3. a)	Define the following terms with an example: (i) Unilateral elements (ii) Distributed elements (iii) Linear elements (iv) active elements	6M	1	1
b)	A circuit consists of three resistances of 12, 18 and 36 ohms respectively by joined in parallel and the combination is connected in series with a resistance of 12 ohms. The whole circuit is connected to 60V supply. Calculate current in each branch, total current drawn and power dissipated in each resistor.	6M	1	3
	UNIT–II			
4. a)	Explain in detail about the classification of DC generators based on the type of excitation? Give the connection diagrams.	6M	2	2

	b)	A 4 pole 220V wave connected shunt motor gives 11.19 kW when running at 1000 r.p.m and drawing armature and field current of 50A and 1A respectively. It has 540 conductors. Its resistance is 0.1 ohms. The brush drop is 1V per brush. Calculate total torque, useful torque, flux per pole, rotational losses and efficiency?	6M	2	3
		OR			
5.	a)	What is the operating principle of a DC motor? Explain in detail	6M	2	2
	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	2	3
		UNIT–III			
6.	a)	Explain the transformer on no-load with phasor diagram.	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/m2 .Calculate the number of turns per limb on H.V. side and L.V side for a 3400V/240V ratio.	6M	3	3
		OR			
7.	a)	Draw and explain the torque-slip characteristics of three-phase induction motor	6M	3	4
	b)	A 3-phase star connected alternator has 8-poles and runs at 750rpm. It has 24 slots/phase and 10 conductors per slot, the flux being 0.055 Wb/pole. Calculate the line voltage. Assume winding factor to be 0.96.	6M	3	3
		UNIT–IV			
8.	a)	Explain about the operation of a transistor as amplifier with a neat of circuit diagram?	6M	4	3
	b)	Draw and explain the circuit diagram of a common emitter amplifier and draw its charcteristics?	6M	4	2
		OR			
9.	a)	For a transistor connected in common-emitter configuration, sketch the output characteristics relating collector current and the collector emitter voltage, for various values of base current. Explain the shape of the characteristics.	6M	4	3
	b)	Justify the answer the transistor acts as an amplifier?	6M	4	4
		UNIT–V			
10.		Explain How frequency is measured by using CRO.	12M	5	2
		OR			
11.		Classify the cables and explain in details any of two of them.	12M	5	2

*** End ***

Hall Ticket Number :										

R-20

Code: 20AC21T

I B.Tech. II Semester Supplementary Examinations December 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)

		CO	BL
1.	Answer ALL the following short answer questions (5 X 2 = 10M)		
a)	Find the particular integral of $(D^2 - 2D + 1)y = e^{3x}$	1	2
b)	Write the second order Legendre's Linear Equation form	2	3
c)	Solve p-q=1	3	2
d)	Find curl F at the point (1,2,3) given F= $(x^2yz\bar{i} + xy^2z\bar{j} + xyz^2\bar{k})$	4	3
e)	State Gauss Divergence Theorem	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 $(D-2)^2y = e^{2x}[\sin 2x + x^2]$	12M	1	3
	OR			
3.	Solve $(D^2+3D+2)y = e^{-x} + x^2 + \cos x$	12M	1	3
	UNIT–II			
4.	Solve $x^2\frac{d^2y}{dx^2} + 2x\frac{dy}{dx} - 4y = x^2 + 2\log x$	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 $\frac{EC}{2}\left\{\sin\frac{t}{\sqrt{LC}} - \frac{t}{\sqrt{LC}}\cos\frac{t}{\sqrt{LC}}\right\}$	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)	Identify the appropriate form and solve $p^2 + q^2 = x + y$	6M	3	3

OR

7. Using the method of separation of variables solve $3\frac{\partial u}{\partial x} + 2\frac{\partial u}{\partial y} = 0, u(x,0) = 4e^{-x}$ — 12M | 3 | 3

UNIT–IV

8. a) Find the directional derivative of $f = x^2 - y^2 + 2z^2$ at the point p(1,2,3)in the direction of the line PQ. Where Q is the point $(5,0,4)$ — 6M | 4 | 3

   b) Find div F and Curl F where F= grad $(x^3 + y^3 + z^3 - 3xyz)$ — 6M | 4 | 3

OR

9. ( ) $(x^2 - yz)\bar{i} + (y^2 - zx)\bar{j} + (z^2 - xy)\bar{k}$ Identify whether the above vector is irrotational or not. If so, find its scalar potential — 12M | 4 | 3

UNIT–V

10. Using Green's theorem evaluate $\int_C (y - \sin x)dx + \cos y\,dy$ where C is the plane triangle enclosed by the lines $y = 0, x = \frac{\pi}{2}$ and $y = \frac{2x}{\pi}$ — 12M | 5 | 3

OR

11. Apply stokes theorem to evaluate $\int_C y\,dx + z\,dy + x\,dz$ where C is the curve of intersection of $x^2 + y^2 + z^2 = a^2$ and $x + z = a$ — 12M | 5 | 3

*** End ***

Hall Ticket Number :										

R-20

Code: 20A521T

I B.Tech. II Semester Supplementary Examinations December 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 static and dynamic data types in programming languages	CO1	L2
b)	What are the advantages of Modular Programming?	CO2	L1
c)	Differentiate built-in and user-defined exceptions.	CO3	L1
d)	How data abstraction differs from procedural abstraction?	CO4	L3
e)	What is a full binary tree?	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)	Define Literals. Write different types of literals with examples.	5M	CO1	L1
b)	Explain the type conversion of operands. How will you write a program to convert a temperature in degrees Fahrenheit into an equivalent temperature in degrees Celsius?	7M	CO1	L2
	OR			
3. a)	Compare sequential, selection, and iterative control.	6M	CO1	L2
b)	Show the effect of operator precedence in Boolean operators.	6M	CO1	L1
	UNIT–II			
4. a)	With a neat diagram, state the use of function routine in a programming language.	6M	CO2	L3
b)	Identify the difference between Value-Returning and non-Value-Returning functions with suitable examples.	6M	CO2	L3
	OR			
5. a)	State the importance of Module in Python. Explain, how can you use Modules in your program explain with an example Program	8M	CO2	L1
b)	How will you check the contents of a string using a Python program code?	4M	CO2	L2

UNIT–III

6.	a)	Discuss the usage of abstract classes and interfaces in Python.	6M	CO3	L3
	b)	Explain Python Built-in Exceptions.	6M	CO3	L1

OR

7.		Analyze the concepts of inheritance and polymorphism. State the difference between these two techniques and write the code implementations.	12M	CO3	L2

UNIT–IV

8.	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

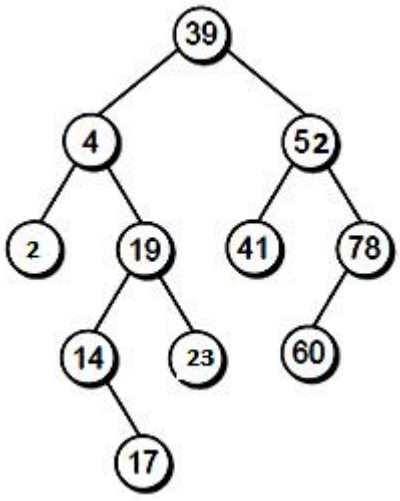
OR

9.		Prove that “A queue is also known as a first-in, first-out (FIFO) list”, with an example and write appropriate functions.	12M	CO4	L5

UNIT–V

10.	a)	Build an AVL tree with the following values: {15, 20, 24, 10, 13, 7, 30, 36, 25, 42, 29}.	6M	CO5	L6
	b)	Differentiate binary tree and binary search tree with example trees.	6M	CO5	L1

OR

11.	a)	Consider the binary search tree below and show the resulting tree after deleting each of the following keys: 14, 52, and 39. 	8M	CO5	L3
	b)	Explain the balancing factor of AVL tree.	4M	CO5	L1

*** End ***

Hall Ticket Number :										

R-20

Code: 20A324T

I B.Tech. II Semester Supplementary Examinations December 2023

Engineering Drawing

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

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	CO	BL
	UNIT–I			
1. a)	Construct a regular pentagon and hexagon by general method.	10M	CO1	L1
b)	Bisect a straight line AB of length 75mm.	4M	CO1	L1
	OR			
2.	A fixed point 70mm from fixed straight line. When the distance between point from F and the distance between point from directrix is 3/4. Name the curve and draw the curve at least 9 plots and also draw tangent and normal at a point 60mm from F.	14M	CO1	L1
	UNIT–II			
3.	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 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	CO2	L1
	OR			
4.	Two points A and B are in the HP. The point A is 30 mm in front of the VP, while B is behind the VP. The distance between their projectors is 75 mm and the line joining their top views makes an angle of 45^0 with reference line. Find the distance of point B from the VP.	14M	CO2	L1
	UNIT–III			
5.	Draw the projections of a circle of 50mm diameter, having its plane vertical and inclined at 30^0 to the VP. Its centre is 30mm above the HP and 20mm in front of the VP.	14M	CO3	L1
	OR			
6.	A circular plate of negligible thickness and 50 mm diameter appears as an ellipse in the front view, having its major axis 50 mm long and minor axis 30 mm long. Draw its top view when the major axis of the ellipse is horizontal.	14M	CO3	L2

UNIT–IV

7. A hexagonal prism is resting on one of the corners of its base on the HP. The longer edge containing that corner is inclined at 45^0 to the base. The axis of the prism makes an angle of 30^0 to the V.P. Draw the projections of the solid. 14M CO4 L2

OR

8. A hexagonal prism of base side 30 mm and axis height of 60 mm rests on one of its corners on HP. The axis is inclined at 40^0 HP and its base edge is inclined at 30^0 to VP. Draw its projections. 14M CO4 L2

UNIT–V

9. Draw the isometric view of a square prism with the side of the base 40mm and length of the axis 70mm. when its axis is i) vertical ii) horizontal. 14M CO5 L1

OR

10. Draw the front view, top view and side view for the solid shown in the figure 1.

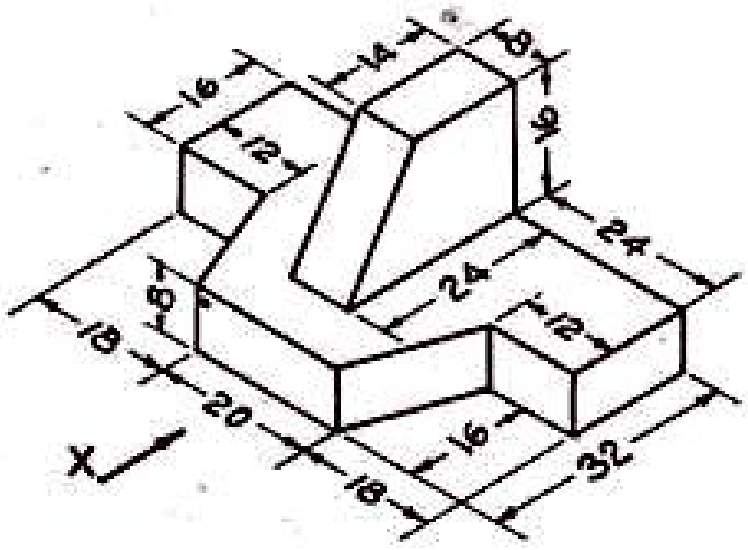

Figure 1. 14M CO5 L1

*** End ***