Hall Ticket Number :										

R-20

Code: 20AC22T

I B.Tech. II Semester Regular Examinations October 2021

Applied Physics

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

PART-A
(Compulsory question)

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

a) Define diffraction grating**.**

b) If the susceptibility of a dielectric is 4, what is its dielectric constant?

c) What is critical angle?

d) What are direct bandgap semiconductors? Give example

e) Write any two applications of nanomaterials.

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)	Explain the formation of Newton's rings. How do you determine the wavelength of an unknown source by using Newton's rings?	8M		
	b)	In a Newton's rings experiment the diameter of the 15^{th} ring is found to be 0.59 cm and that of the 5^{th} ring is 0.336 cm. If the radius of curvature of the lens is 100 cm, find the wave length of the light.	4M		
		OR			
3.	a)	Write a short note on quarter and half-wave plates.	8M		
	b)	Calculate the thickness of quarter wave and half wave plates of wavelength 5890 A^0, μ_0=1.654 and μ_e=1.582.	4M		
		UNIT–II			
4.	a)	What is local field? Deduce an expression for it?	8M		
	b)	The relative permittivity of sulphur is 4.0, calculate its atomic polarizability (given that sulphur in cubic form has a density of 2.08 X 10^3 Kg/m^3 and its atomic weight is 32)	4M		
		OR			
5.	a)	Differentiate soft and hard magnetic materials. Write few applications of magnetic materials.	8M		
	b)	A magnetic material has a magnetization of 3000 amp/m and flux density of 0.005 weber/m^2. Calculate the magnetic force and the relative permeability of the material.	4M		

UNIT–III

6.	a)	State and prove Gauss divergence theorem	8M
	b)	State the four Maxwell's equations	4M

OR

7.	a)	Discuss in detail about the attenuation and various losses in optical fibers.	8M
	b)	In an optical fiber, the fractional refractive index change is 0.14 and refractive index of cladding is 1.3. Calculate refractive index of core.	4M

UNIT–IV

8.	a)	What is Hall effect? Derive an expression for Hall coefficient.	8M
	b)	Write any four applications of Hall effect.	4M

OR

9.	a)	Derive an expression for the carrier concentration in an n-type semiconductors	8M
	b)	The electron concentration in an n-type semiconductor is $5x10^{-17}$ m^{-3}. Calculate the conductivity of the material if the drift velocity of electron is 350 m/s in an electric field of 1000 v/m.	4M

UNIT–V

10.	a)	Explain BCS theory of superconductivity. How it explains zero resistivity	8M
	b)	Explain Meissner's effect in superconductors.	4M

OR

11.		With a neat sketch explain the principle, construction and working of scanning electron microscope.	12M

*** End ***

Hall Ticket Number :										

R-20

Code: 20A223T

I B.Tech. II Semester Regular Examinations October 2021

Basic Electrical and Electronics Engineering

(Common to CE, CSE and AI & DS)

Max. Marks: 70 Time: 3 Hours

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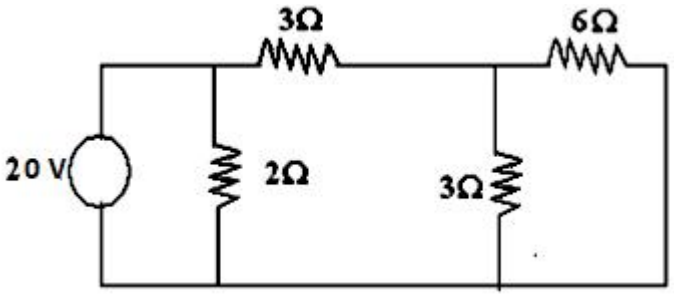
Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two mark.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A
(Compulsory question)

		CO	Blooms Level
1.	**Answer ALL the following short answer questions** (5 X 2 = 10M)		
a)	Explain the relationships of R, L and C elements?	CO1	L1
b)	What is the significance of back e.m.f?	CO2	L1
c)	What is meant by slip of an induction motor?	CO3	L1
d)	Draw the circuit symbol for a PNP and NPN transistors	CO4	L1
e)	What are the main components of a CRT?	CO5	L1

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)	Classify Network elements and give their volt-ampere relations.	6M	CO1	L1
	b)	A circuit consists of 2 Ω, 4 Ω, 10 Ω and 20 Ω resistors connected in parallel. A total current of 10 A flows into the circuit supplied voltage is 30V, determine total resistance and current in each resistor.	6M	CO1	L3
		OR			
3.	a)	State and explain Kirchhoff's current law with suitable examples.	6M	CO1	L1
	b)	Determine the current through 6Ω resistor and the power supplied by the for the circuit shown in figure			



			6M	CO1	L3
		UNIT–II			
4.	a)	Mention the applications of DC shunt and series motors?	6M	CO2	L1
	b)	A 6 pole wave wound dc generator is having 50 slots with 25 conductors per slot and rotating at 1500 rpm. The flux per pole is 0.015 wb, calculate the emf generated?	6M	CO2	L3
		OR			

5.	a)	Derive an expression for the torque of a dc motor.	6M	CO2	L2
	b)	A 230 V motor has an armature circuit resistance of 0.6 ohm. If the full-loaded armature current is 30A and no load armature current is 4A, find the change in back e.m.f. from no load to full load.	6M	CO2	L3

UNIT–III

6.	a)	Explain how to determine the regulation of alternator by synchronous impedance method	6M	CO3	L1
	b)	Explain the Principle operation of Transformer?	6M	CO3	L3

OR

7.	a)	Explain the principle of operation of 3-phase induction motor with neat sketch?	6M	CO3	L1
	b)	A 230/400 V single phase transformer has 800 turns on primary. The maximum flux density in the core is 1.5 Wb/m^2. Calculate the number of turns on secondary, area of cross section and maximum flux in the core.	6M	CO3	L3

UNIT–IV

8.	a)	Explain with a neat diagram working of bridge wave rectifier?	6M	CO4	L2
	b)	Explain the operation of PNP transistor and draw its characteristics.	6M	CO4	L1

OR

9.	a)	Explain the working of a P-N Diode in forward bias and reverse bias?	6M	CO4	L1
	b)	Draw the circuit diagram of full wave rectifier and explain its operation	6M	CO4	L1

UNIT–V

10.	a)	Explain the principle of operation of the Cathode ray tube?	6M	CO5	L1
	b)	Write the applications of the CRO?	6M	CO5	L1

OR

11.	a)	What is the earthing? What is the purpose of earthing?	6M	CO5	L1
	b)	Discuss about the types of wires?	6M	CO5	L1

*** End ***

Hall Ticket Number :										

R-20

Code: 20AC21T

I B.Tech. II Semester Regular Examinations October 2021

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

PART-A
(Compulsory question)

			CO	Blooms Level
1.	**Answer ALL the following short answer questions**	(5 X 2 = 10M)		
a)	Evaluate $\frac{1}{D^2-4D+4}xe^{2x}$.		CO1	L2
b)	Solve the Euler's equation $x^2\frac{d^2y}{dx^2}+3x\frac{dy}{dx}+y=0$.		CO2	L3
c)	Find the general solution of $p+q=pq$		CO3	L2
d)	Prove that $\nabla.\bar{r}=3$		CO4	L3
e)	State Green's theorem.		CO5	L3

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

		Marks	CO	Blooms Level
	UNIT–I			
2.	Solve $\left(D^2-4D\right)y=e^x+\sin 3x\cos 2x.$	12M	CO1	
	OR			
3.	Solve the following equation by the method of variation of parameters $\left(D^2+3D+2\right)y=e^x+x^2$	12M	CO1	
	UNIT–II			
4.	Solve $(1+2x)^2\frac{d^2y}{dx^2}-6(1+2x)\frac{dy}{dx}+16y=8(1+2x)^2$	12M	CO2	
	OR			
5.	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 $p^2=\frac{1}{LC}$. 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 $\frac{Et}{2L}\sin pt$	12M	CO2	

UNIT–III

6. a) Solve $p(1+q)=qz$ — 6M CO3

   b) Solve $x(z^2-y^2)p+y(x^2-z^2)q=z(y^2-x^2)$ — 6M CO3

OR

7. Solve by the method of separation of variables
   $u_x=2u_t+u$ where $u(x,0)=6e^{-3x}$ — 12M CO3

UNIT–IV

8. a) Fine the directional derivative of $\phi(x,y,z)=xy+yz+zx$ in the direction of $-2\vec{i}+\vec{j}+2\vec{k}$ at the point (1, 2, 0). — 6M CO4

   b) Find the angle between the surfaces
   $x^2+y^2+z^2=12$ and $x^2+y^2-z=12$ at $(2,2,2)$. — 6M CO4

OR

9. a) Find the constant a, b and c such that the vector field defined by $\vec{F}=(4xy+az^3)\vec{i}+\left(bx^2+3z\right)\vec{j}+(6xz^2+cy)\vec{k}$ is irrotational. With these values of a, b and c determine a scalar function ϕ such that $\vec{F}=\nabla\phi$. — 8M CO4

   b) Prove that $\nabla\left(\frac{\vec{r}}{r^3}\right)=0$ — 4M CO4

UNIT–V

10. Verify Gauss's divergence theorem for $\vec{F}=\left(x^2-yz\right)\vec{i}+(y^2-zx)\vec{j}+(z^2-xy)\vec{k}$ take over the rectangular parallelepiped $0\le x\le a, 0\le y\le b, 0\le z\le c$. — 12M CO5

OR

11. Verify Stokes' theorem for the vector field $\vec{F}=(2x-y)\vec{i}-yz^2\vec{j}-y^2z\vec{k}$ over the upper half surface of $x^2+y^2+z^2=1$ bounded by its projection on the *xy*-plane. — 12M CO5

*** End ***

Hall Ticket Number :										

R-20

Code: 20A521T

I B.Tech. II Semester Regular Examinations October 2021

Data Structures through Python

(Common to CSE and AI&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 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)	Define linear data structure.	CO1	L1
b)	Differentiate between global vs local variables.	CO2	L2
c)	Define Inheritance	CO3	L1
d)	What are the features of stacks?	CO4	L2
e)	List out the steps involved in deleting a node from a binary search tree.	CO4	L1

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

		Marks	CO	Blooms Level
	UNIT–I			
2.	Illustrate, the various ways to iterating over a List	12M	CO1	L3
	OR			
3.	Develop a python program to generate all possible spellings of the last four digits of any given phone number –use dictionaries.	12M	CO1	L4
	UNIT–II			
4.	Discuss about string processing in python	12M	CO2	L3
	OR			
5.	Write short notes on			
	a).Actual vs. Formal arguments	6M	CO1	L2
	b).Mutable vs. Immutable Arguments	6M	CO1	L2
	UNIT–III			
6. a)	Write Python Program to Demonstrate Multiple Inheritance with Method Overriding.	8M	CO3	L6
b)	Explain try and catch block with example	4M	CO3	L2
	OR			
7.	Write Python code to create a function named **move_rectangle()** that takes an object of **Rectangle** class and two numbers named **dx** and **dy**. It should change the location of the Rectangle by adding dx to the x coordinate of corner and adding **dy** to the y coordinate of corner.	12M	CO3	L6
	UNIT–IV			
8.	Explain Stack ADT and its operations	12M	CO4	L3
	OR			
9.	Explain how queues can be implemented using Linked List	12M	CO4	L3
	UNIT–V			
10.	Define Tree. Explain the tree traversals with algorithms and examples.	12M	CO4	L2
	OR			
11. a)	Construct a max heap for the following: {12, 15, 9, 8, 10, 18, 7, 20, 25}	6M	CO4	L6
b)	Build an AVL tree with the following values: {15, 20, 24, 10, 13, 7, 30, 36, 25, 42, 29}	6M	CO4	L6

*** End ***

Hall Ticket Number :										

R-20

Code: 20A324T-A

I B.Tech. II Semester Regular Examinations October 2021

Engineering Drawing

(Common to CSE-A,B and AI&DS)

Max. Marks: 70 Time: 3 Hours

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

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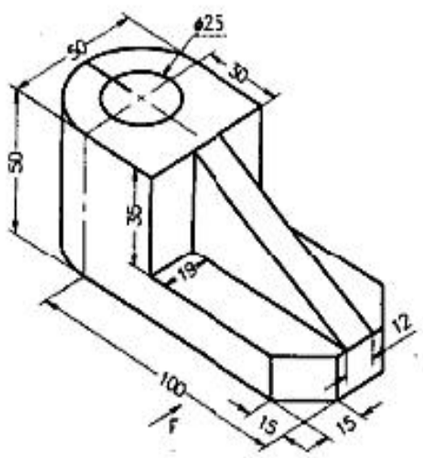
			Marks	CO	Blooms Level
		UNIT–I			
1.		Construct a conic when the distance of its focus from its directrix is equal to 50 mm and its eccentricity is 2/3.Name the curve, mark its major axis and minor axis. Draw a tangent at any point, P on the curve.	14M	C1	L1
		OR			
2.		Draw an epicycloid of rolling circle of diameter 40 mm which rolls outside another circle (base circle) of 120 mm diameter for one revolution. Draw a tangent and normal at any point on the curve.	14M	C1	L1
		UNIT–II			
3.	a)	Two points A and B are in the H.P. The point A is 30 mm in front of the V.P., while B is behind the V.P. The distance between their projectors is 75 mm and the line joining their top views make an angle of 45^0 with XY. Find the distance of the point B from the V.P.	7M	C2	L2
	b)	The top view of a 75 mm long line measures 55 mm. The line is in the V.P., its one end being 25 mm above the H.P .Draw its projections.	7M	C2	L2
		OR			
4.		One end A of a line AB, 75mm long is 20mm above the H.P. and 25mm in front of the V.P. The line is inclined at 30^0 to the H.P. and the top view makes 45^0 with the V.P. Draw the projections of the line and find the true inclinations with the vertical plane.	14M	C2	L2
		UNIT–III			
5.		A regular hexagon of 40 mm side has a corner in the H.P. Its surface is inclined at 45^0 to the H.P. and the top view of the diagonal through the corner which is in the H.P. makes an angle of 60^0 with the V.P. Draw its projections.	14M	C3	L3
		OR			
6.		An equilateral triangular plane ABC of 30mm side is parallel to V.P & perpendicular to H.P and 25mm away from V.P. Draw its projections when one of its sides is (i) Parallel to H.P (ii) Perpendicular to H.P (iii) inclined at 45^0 to the HP.	14M	C3	L2
		UNIT–IV			
7.		Draw the projections of a hexagonal pyramid, base 30 mm side and axis 60 mm long, having its base on the H.P. and one of the edges of the base inclined at 45^0 to the V.P.	14M	C4	L5
		OR			
8.		A square prism, base 40 mm side and height 65 mm, has its axis inclined at 45^0 to the H.P. and has an edge of its base, on the H.P. and inclined at 30^0 to the V.P. Draw its projections.	14M	C4	L1
		UNIT–V			
9.		Draw the Isometric projection of a hexagonal prism when it is resting on ground on a rectangular face with axis parallel to V.P. The side of base of the prism is 30 mm and axis length is 60 mm.	14M	C5	L3
		OR			
10.		An isometric view of a block is shown in Figure. Draw the Front view and Top view.			



14M C5 L3

*** End ***