Total number of printed pages: **Programme: D/Semester-II/DPH206**

2022

SUBJECT NAME: Applied Physics-II

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

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1.	a)	Distinguish between reflection and refraction of light.	2
	b)	What is refractive index? Does it depend of the wavelength of light?	2+2 = 4
	c)	Explain total internal reflection with the help of two examples.	6
	d)	A small candle, 2.5cm in size is placed at 27cm in front of a concave mirror of radius of curvature 36cm. At what distance from the mirror should a screen be placed in order to obtain a sharp image? Describe the nature and size of the image. Or An object of size 10cm is placed at a distance of 15cm from a convex lens of 10cm focal length. Find the position of image and size of the image.	4
	e)	Show that the refractive index of the material of a prism is given by $n = \frac{sin[(A+\delta m)/2]}{sin(A/2)}$ where n, A and δm represent refractive index, angle of prism and minimum deviation respectively.	4
2.	a)	State Coulomb's inverse square law in electrostatics and hence obtain the expression of the electrostatic force between two-point charges in C.G.S and S.I. units?	2+4=6
	b)	What are electric lines of force? Write few properties of the electric lines of force.	1+2 = 3
	c)	Define electric field strength and electric potential. Obtain the expression of the electric potential due to a point charge +Q at a point at a distance r from it.	2+4
	d)	Define capacity of a condenser? Write its S.I. unit and dimensional formula.	3
	e)	Find the equivalent capacity of the combination of three capacitors 400μF,	4

		3.3μF and 47μF are connected in (a) in series (b) in parallel.	
3	a)	Distinguish between Natural and Artificial Magnet with examples.	4
	b)	Write short notes on Modern Theory of Magnetism.	6
	c)	Define Magnetic field and magnetic field intensity. Obtain the expression of the magnetic field intensity at a point at a distance r from the centre of a bar magnet in the end on position or in the broad side on position.	2+4=6
	d)	A short bar magnet has length 0.05 metre and pole strength $64\pi^2 \times 10^{-3}$ weber. Calculate the magnetic field due to this magnet at a point (a) at a distance of 0.5 metres from the centre of magnet on the axial line (b) at a distance of 0.5 metres from the centre of magnet on the equatorial line.	4
4	a)	Define emf and internal resistance of a cell? Distinguish between primary and secondary cells. Write short notes on the two defects of Simple Voltaic Cell.	2+2+6=10
	b)	What is importance of grouping of cells? What is the condition for maximum current in the circuit containing mixed grouping of the cells.	1+3=4
	c)	In how many rows and column will you arrange 640 number of identical cells (20V, 1.5 ohm) in a mixed grouping circuit connected an external resistance of 15ohm.	6
5.	a)	Define resistivity and conductivity? Write their units in S. I.?	3
	b)	State Ohm's law. How would you verify Ohm's law experimentally?	2+3=5
	c)	State the Joule's law of heating effect.	2
	d)	If three resistors of 3Ω, 6Ω and 9Ω are connected in parallel in a closed electrical circuit and a battery of 18V is connected across them, find the equivalent resistance and also the total current in the circuit.	4
	e)	An electric lamp marked 50W is worked on 220 V mains. Find the resistance of the lamp and the current passing through it. How much electrical energy would be consumed in lighting this electric bulb for a duration of 24 hours.	2+2+2=6
6	a)	Discuss the nature of magnetic fields due to a straight conductor and a solenoid carrying current.	2+2=4
	b)	State and explain Faraday's law of electromagnetic induction. What is Lenz's law?	4+1=5
	c)	What is a triode valve? Explain the different components of a triode valve.	1+3=4
	d)	What is photoelectric effect? Write down Einstein's photoelectric equation and state the physical significances of the symbols used.	1+3+3=7
7.	a)	Define binding energy and mass defect. Express 1 a.m.u in MeV	1+1+4=6

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	b)	Write four properties of X-rays.	4
	c)	Explain intrinsic and extrinsic semiconductors. Define doping.	2+2+1=5
	d)	How a diode can be used as a rectifier?	5

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