RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

FIRST YEAR B.A./B.SC. SECOND SEMESTER (January – June) 2014 Mid-Semester Examination, March 2014

Date : 26/03/2014

PHYSICS (General)

Time : 11 am – 12 noon

Paper : II

Full Marks : 25

[2]

[2]

(Answer *five questions* taking at least <u>one</u> from each group)

<u>Group – A</u>

- a) State Gauss's divergence theorem in vector calculus. 1.
 - A force acting along the vector $\vec{i} + 2\vec{j} + 2\vec{k}$. Find the work done by the force of magnitude 15 b) units in displacing a particle (mass 100 gm.) from a point (1,1,1) to a point (2,1,3). [3]
- a) Define Curl of a vector field. 2.
 - b) If $\vec{V} = \vec{\omega} \times \vec{r}$ then prove that $\vec{\nabla} \times \vec{V} = 2 \vec{\omega}$. The symbols have their usual meanings. [3]

<u>Group – B</u>

3.	a)	Write down the fundamental assumptions of kinetic theory of gases.	[3]
	b)	Deduce Avogadro's hypothesis from kinetic theory of gases.	[2]
4.	a)	Explain Maxwell's law of velocity distribution.	[2]
	b)	Explain most probable velocity, r.m.s. velocity and average velocity. Indicate these three velocities in velocity distribution graph.	[3]

Group - C

5.	a)	Explain how a current carrying loop can have a magnetic dipole moment. Write down the expression of the moment.	+1]
	b)	Current flowing through a circular wire of a circuit is 10A and the area of cross-section of wire is $7.5 \times 10^{-4} \text{ m}^2$. Find out the magnetic dipole moment of the wire.	[2]
6.	a) b)	What is electromagnetic induction ? Mention the SI unit of mutual inductance.[1-Find out the expression of self inductance of a current carrying solenoid.[1-	+1] [3]
7.	a) b)	State Gauss's theorem and derive its differential form. [1- The electric field of a region is $\vec{E} = 2x \vec{i} + 2y\vec{j} + z\vec{k}$. Calculate the volume charge density of that	+2]
		region. Given : $\epsilon_0 = 8.85 \times 10^{-12} e^2 N^{-1} m^{-2}$.	[2]

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