

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

FIRST YEAR

B.A./B.Sc. SECOND SEMESTER (January – June) 2015

Mid-Semester Examination, March 2015

Date : 20/03/2015

PHYSICS (General)

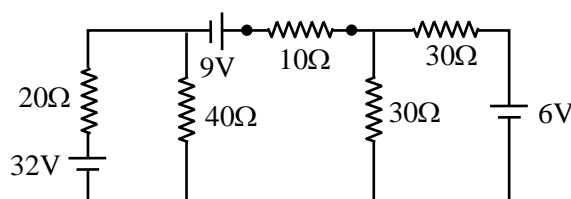
Time : 12 noon – 1 pm

Paper : II

Full Marks : 25

Answer any five questions :

1. a) Define a conservative field. [1]
b) Find the value of a,b,c so that the vector $\vec{F} = \hat{i}(x + ay + 4z) + \hat{j}(2x - 3y + bz) + \hat{k}(cx - y + 2z)$ is conservative. [3]
c) Write mathematical expression of gauss's theorem. [1]
2. Calculate the power dissipated in the 10Ω resistance in the network shown in figure, using thevenin's theorem. [5]



3. a) What do you mean by a perfect or ideal gas? [1]
b) Write an expression for the pressure of such a gas with the mention of the terms used in the expression. [2]
c) Determine the root mean square velocity of Nitrogen gas at normal temperature and pressure (NTP). The density of the gas at NTP = 0.00125 gm/cc . [2]
4. a) Draw the curve showing Maxwell's distribution of molecular velocity of an ideal gas at a given temperature. Show the position of most probable (C_m) average (C_a) and root mean square velocities (C_{rms}) in the graphical representation. [2+1]
b) Find out the numerical value of the ratio among C_m , C_a and C_{rms} . [2]
5. a) Define with example the degrees of freedom of a system of particles in motion. [2]
b) State principle of equipartition of energy of a thermal system. [1]
c) Calculate the value of the ratio of two specific heats of a diatomic gas. [2]
6. a) Mention the two assumptions of kinetic theory of ideal gases which have been based and corrected for the derivation of Van der Waal's equation of real gases. [2]
b) Write Van der Waals equation for the real gas with the mention of the terms in the equation. [2]
c) Define critical volume (V_c) of a gas. [1]

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