RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

SECOND YEAR

B.A./B.SC. THIRD SEMESTER (July – December) 2014

Mid-Semester Examination, September 2014

Date : 18/09/2014 **PHYSICS (General)**

Time : 12 noon – 1 pm Paper : III Full Marks : 25

[Use a separate answer book for each group]

[*Answer **five questions** taking at least **one** from each group*]

Group – A

1. a) What do you mean by central force? [1]
   b) State and prove the Gauss's law on gravitation. [1+3]

2. Calculate the components of velocity and acceleration in plane polar coordinate system (r, θ). [5]

3. Find the equation of motion of a rocket which continuously loses part of its mass, as it moves upward, in the form of ejected burnt fuel. [5]

4. a) What is the position vector of centre of mass of a system of particles?
   b) Find the velocity, acceleration, linear momentum and equation of motion of a system of two particles. [5]

Group – B

5. a) Write down the conditions for sustained interference. [1]
   b) What is Stokes method? Show that ray changes phase due to reflection according to stokes method. [2]
   c) In Young's double slit experiment, the distance between the slits are 0·02 cm. If a ray of wavelength 6000Å use for this experiment then interference pattern forms at a distance of 80cm from the slit, then calculate the distance of 5^{th} bright fringe. [2]

6. a) State the Basic principal of formation of Newton's Ring. [1]
   b) Explain how can you calculate the wavelength of a monochromatic light using Newton's ring method. [4]

7. What is zone plate? Make a comparison between zone plate and convex lens. [2+3]

8. a) Make a comparison between grating spectrum and prism spectrum. [2]
   b) What is dispersive power of a grating? Find its expression. [3]

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