

B. N. Bandodkar College of Science, Thane

Second Semester Examination, March 2012®

F. Y. B. Sc.

PHYSICS : USPH 201

Duration : 2 Hours]

[Marks : 60

- N.B. (1) All questions are compulsory.
(2) Figures to the right indicate full marks.
(3) Use of non programmable calculator is allowed.

1. (a) Attempt any **ONE** of the following: 8
- 1) Discuss the composition of two parallel simple harmonic motion of same period but different amplitudes and initial phases and show that the resultant motion is also simple harmonic in nature with the same period.
- 2) Derive the Newton's second law of motion for a rigid body.
- (b) Explain the concept of the centre of mass in a rigid body. 4
- (c) A particle performs SHM with an amplitude of 5cms and frequency of 5 Hz. What is the maximum velocity and maximum acceleration? 3
2. (a) Attempt any **ONE** of the following: 8
- 1) Derive an expression for the optical path difference in the case of reflection of a monochromatic beam of light from a thin film.
- 2) Derive an expression for the focal length of a thin lens.(lens makers formula)
- (b) Write a short note on spherical aberration. 4
- (c) Newton's rings are formed with a light of wavelength 6700AU.Find the radius of 40th dark ring and the radius of curvature of the lens, given that the radius of the 10th dark ring is 0.011m 3
3. (a) Attempt any **ONE** of the following: 8
- 1) Describe the construction and working of He-Ne laser.Draw the energy level diagram.
- 2) What is numerical aperture (NA) of an optical fibre? Derive the necessary expression for the numerical aperture (NA).
- (b) Explain the recording of a hologram. 4
- (c) Write a short note on graded-index optical fibre. 3

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4. (a) Attempt any **THREE** of the following: 12
- 1) What are Lissagous figures? On what factors do they depend upon?
 - 2) Derive an expression for the total kinetic energy of a rigid body in the centre of mass frame.
 - 3) Explain briefly the measurement of the angle of minimum deviation using a spectrometer.
 - 4) Explain the wedge shaped film briefly with the help of a diagram.(No derivation)
 - 5) Explain the process of population inversion.
- (b) Draw a neat labelled diagram of a point to point communication link using optical fibre. 3

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