

Roll No.

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UG (CBCS) Annual IInd Year Examination

1503

B.Sc. PHYSICS

(Waves and Optics)

(DSC-1D)/Core

Paper : PHYS 202 TH

Time : 3 Hours]

[Maximum Marks : 50

Note :- Attempt *five* questions in all. The question paper consists of five Sections. Section-A is compulsory. Sections-B, C, D and E consist of two questions each. Select *one* question from each Section.

Section-A

(Compulsory Question)

1. Attempt any seven sub-questions :
 - (i) The amplitude of an S.H.M. is doubled; find the corresponding change in time period.
 - (ii) At what distance from the mean position in S.H.M., the potential and kinetic energies becomes equal ?

CP-103

(1)

Turn Over

- (iii) Write the dimensional formula of damping constant.
- (iv) In simple harmonic motion, the displacement is maximum when
- (a) Velocity is zero
 - (b) Acceleration is zero
 - (c) Velocity is maximum
 - (d) Kinetic energy is maximum
- (v) If the distance between the two slits is doubled, the fringe width
- (a) Doubles
 - (b) Halves
 - (c) Four-times
 - (d) Remains same
- (vi) What are stationary waves ? How are they formed ?
- (vii) What are the two methods of producing interference ?
Give example of each case.
- (viii) Write down the conditions for observing a sustained interference pattern.
- (ix) What is dichroism ?

[2×7=14]

Section-B

2. (i) Show that the total energy of a body executing S.H.M. is directly proportional to the square of the amplitude. Also find the displacement at which the energy becomes half kinetic and half potential. [7]
- (ii) Write the main characteristics of simple harmonic motion. [2]
3. (i) Write the equation of motion of one-dimensional damped harmonic mechanical oscillator. Find its solution and examine the case when the system is lightly damped. [7]
- (ii) Write short note on the Q-factor and relaxation time. [2]

Section-C

4. (i) Explain the behavior of magnitude and phase of the displacement versus driving force frequency in case of forced oscillator. [7]
- (ii) What do you mean by normal coordinates and normal modes of vibration ? [2]
5. (i) Explain the stationary wave formation on stretched string. Also discuss different modes of vibration explaining particularly the fundamental mode. [7]
- (ii) What do you understand by phase velocity and group velocity ? [2]

Section-D

6. (i) Discuss the formation of Newton's rings by reflected light. Describe the experimental setup and state why the Newton's rings are circular ? [7]
- (ii) What is the reason of multiple colours produced in a soap film ? [2]
7. (i) Briefly explain the construction, principal, working and applications of Michelson's interferometer. [7]
- (ii) What do you mean by Haidinger's fringes ? [2]

Section-E

8. (i) Discuss the intensity distribution of the Fraunhofer diffraction obtained with a single slit, illuminated by a parallel beam of monochromatic light. [7]
- (ii) What is zone plate ? How is it constructed ? [2]
9. (i) Write short notes on the following :
- (a) Wire grid polarizer
- (b) Malus law
- (c) Double refraction [6]
- (ii) What do you mean by positive and negative crystals ? Explain with example. [3]