Roll No.

Total No. of Questions : 9] [Total No. of Printed Pages : 4 (2034)

**UG (CBCS) IInd Year Annual Examination** 

# 2805

## **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, selecting *one* question each from Sections-B, C, D and E. Q. No. 1 (Section-A) is compulsory. Use of Non-programmable calculator is allowed.

## Section-A

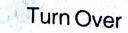
## (Compulsory Question)

1. (i) What is meant by phase of oscillating particle ?
(ii) What is the effect of damping on the natural frequency of an oscillator ?

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- (iii) Can a forced oscillator store energy ? Explain .
- (iv) Define degrees of freedom.
- (v) Why two wide slits cannot produce interference?
- (vi) The zone plate behaves like a :
  - (a) Convex lens
  - (b) Plane refracting surface
  - (c) Concave lens
  - (d) All of these
- (vii) What changes on polarization of light ?
  - (a) Phase
  - (b) Intensity
  - (c) Wavelength
  - (d) Frequency

#### $2 \times 7 = 14$

#### Section-B

- 2. (a) Derive an expression for kinetic energy and potential energy of a simple harmonic oscillator.
  - (b) A SHM is characterised by  $x = a \sin \omega t$ . Calculate the displacement at which kinetic energy is equal to its potential energy.

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3. Derive the equation of motion of damped simple harmonic oscillator and find its solution. Discuss light and critical damping.

# Section-C

- 4. (a) Discuss the behaviour of displacement of a forced oscillator with driving force frequency.
  - (b) Show that amplitude resonance occurs at a frequency which is slightly less than the natural frequency of the oscillator.
  - 5. (a) Show that total energy of a coupled oscillator remains constant.
    - (b) Show that there is no transmission of energy in a stationary wave.
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### Section-D

- 6. (a) Discuss Huygen's wave theory.
  - (b) Discuss in detail the Young's double slit
     experiment.
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- 7. Give the theory, experimental arrangement and method to determine wavelength of light by Newton's ring apparatus.

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**Turn Over** 

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# Section-E

- 8. (a) What is Zone plate ? Derive an expression for the area of the nth zone.
  - (b) What will be the minimum number of lines on a grating which will just resolve in the second order lines whose wavelenghts are 5890 Å and 5896 Å ?
- 6,3

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- 9. (a) Write short notes on the following :
  - (i) Brewster's law
  - (ii) Malus' law
  - (iii) Nicol prism
  - (b) Calculate the thickness of a half wave plate for light wavelength 6000 Å. Given  $\mu_0 = 1.55$  and  $\mu_c = 1.45$ .

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