Roll No. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

S. No. of Question Paper : 1564

Unique Paper Code   : 222465   C

Name of the Paper   : Ph.-II : WAVES AND OPTICS (PHPT-303)

Name of the Course   : B.Sc. (Prog.)

Semester   : IV

Duration : 3 Hours   Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt any *five* questions.

All questions carry equal marks.

1. (a) Discuss the motion of compound pendulum and show that it is simple harmonic. Also find out the expression for time period of oscillations. 10

   (b) A particle executes simple harmonic motion of period 31.4 sec and amplitude 5 cm. Calculate its maximum velocity and maximum acceleration. 5

2. (a) What are standing waves ? Give necessary conditions for t
formation.

(b) Derive an expression for normal modes of vibrations on a strin
length 'l' fixed rigidly at both ends. Also find expressions upt
overtones.

3. (a) Obtain differential equation for damped harmonic oscillator and de
its solution. Also discuss different cases.

(b) Show that average energy of a weakly damped harmonic oscill
decays exponentially with time.

4. (a) A system executing damped harmonic motion is subjected to
external periodic force. Investigate the forced vibrations and ob
the condition of resonance.

(b) What are half power points of the power resonance curve fo
driven oscillator ?

5. (a) What are coherent and incoherent sources ? Discuss the conditio

for sustained interference.   ‹

(b) Two straight narrow parallel slits 2.0 mm apart are illuminated w:

monochromatic light of wavelength 5896 Å. Fringes are observed

a distance of 60 cm from the slits. Find the width of fringes.

(c) Plot intensity distribution curve for interference pattern obtain

from two coherent point sources.

6. (a) What is a diffraction grating ? Give the construction and theory

a plane diffraction grating of transmission type, and explain t

formation of spectra by it.

(b) A parallel beam of sodium light incidents normally on a pla

transmission grating having 4250 lines per cm and a second ord

spectral line is observed at an angle of 30°. Calculate t

wavelength of light.

7. (a) What is 'polarization of light' ? Distinguish polarized light fro

   ordinary (unpolarized) light.

   (b) Describe the construction of a Nicol prism. Explain how it can

   used as a polarizer and as an analyser. What are its limitatio.

   and uses ?

8. (a) What is a zone plate ? Give its theory. Show that a zone plate h.

   multiple foci.

   (b) Compare the zone plate with a convex lens. What is meant l

   'phase reversal zone plate' ?