

KIIT UNIVERSITY
MID SEMESTER EXAMINATION – 2016
First Semester, B. Tech and Dual Degree
Physics (PH-1003)

Full marks – 25

Time – 2hrs

Answer any **FIVE** questions including question **No. 1** which is **compulsory**.

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

All parts of a question should be answered at one place only.

1. [1x5]
 - a) If 100N force is experienced by the body moving in a resistive medium having coefficient of resistance $10^6 \text{ dyn cm}^{-1} \text{ sec}$, then what is the velocity of the body at that instant.
 - b) Under what condition the damped oscillation becomes under damped. Show it graphically.
 - c) The fringes in Newton's rings experiment are circular in nature, explain why?
 - d) Why the central fringe appears dark in Newton's rings when viewed in reflected light?
 - e) In case of two beam interference the intensity in maxima and minima regions are varied by 10% of the average intensity. Calculate the ratio of amplitudes of two interfering waves.
2.
 - a) Derive an expression for instantaneous displacement of a body under damped vibration. Under what condition the motion is over damped. Explain it graphically. [4]
 - b) Write the differential equation for a body under forced vibration and explain each term. [1]
3.
 - a) What is interference of light? Explain analytically how the intensity of light gets modified due to two beam interference and draw the intensity distribution curve. [4]
 - b) Two waves which will interfere are of equal amplitude each of 6 units, if they interfere at any point having a phase difference of 60° , then calculate the intensity (I) and maximum intensity (I_{max}). [1]
4.
 - a) What is amplitude resonance? Under what condition amplitude resonance occurs? What is sharpness of amplitude resonance? Draw the resonance curves for a body under forced vibration. [4]
 - b) Show that energy conservation principle remains true in the process interference. [1]
5.
 - a) Classify the waves with examples. Establish the general differential equation for wave motion. [4]
 - b) Why do we prefer lens of large radius of curvature for producing Newton's rings? [1]
6.
 - a) Explain the theory of formation of Newton's rings. Derive expression for the diameters of bright and dark rings in terms of wavelength and radius of curvature. [4]
 - b) In Newton's rings experiment the diameter of 2nd and 10th order dark rings are 0.12cm and 0.43cm respectively. If the radius of curvature of plano-convex lens is 110cm, then calculate the wavelength of light used. [1]
7.
 - a) Explain in detail how Newton's rings are used to determine (i) wavelength of light and (ii) refractive index of a liquid. [4]
 - b) When a liquid is introduced between the plano-convex lens and the glass plate, the diameter of 15th dark ring changes from 1.45 to 1.40cm. Find the refractive index of the liquid used. [1]