

Uva Wellassa University, Sri Lanka
End Semester Examination – March 2012
SCT 252-2 Physics II



Duration: Two (02) hours

Total four (04) Questions

Answer all questions

25 marks for each question

- 01). a. Find an expression for fringe width in case of Young's double slit experiment.
b. What is the effect on the interference fringes when the screen is moved backward perpendicular to the plane of the slits?
c. A beam of light consisting of two wavelengths 6500 Å and 5200 Å, is used to obtain interference fringes in a Young's double slit experiment. The distance between the slits is 2 mm and the distance between the plane of the slits and the screen is 120 cm.
i. Find the distance of the third bright fringe on the screen from the central maximum for the wavelength 6500 Å.
ii. What is the least distance from the central maximum where the bright fringes due to both the wavelengths coincide?
- 02). a. Explain the term diffraction.
b. Discuss the Fraunhofer diffraction at a single slit and explain the formation of the diffraction pattern.
c. Obtain the condition for getting diffraction maxima and minima.
- 03). A tray of mass m is supported by a two identical springs as shown in figure 01. When the tray is pressed down slightly and released, it executes simple harmonic motion (SHM) with a period of T .
a. Show that the force constant of each spring, k is
$$k = \frac{2\pi^2 m}{T^2}$$

b. Find the value of k if the mass of the tray is 12kg and the period of the SHM is 1.5 s.
c. When a block of mass M is placed on the tray, the period of SHM changes to 3.0 s. What is the mass of the block? (assume the mass of the tray is 12 kg)

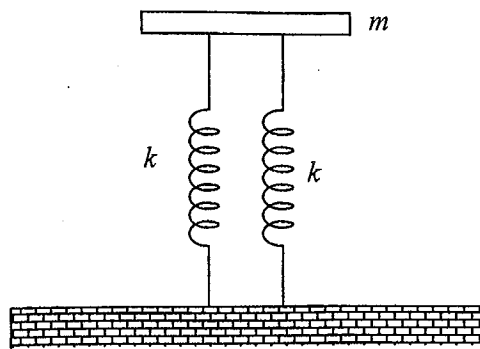


Figure 01

- 4).
- a. Describe the phenomenon of superposition of waves.
 - b. Two vibrations along the same line are described by the equations $y_1 = A \cos(10\pi t)$ and $y_2 = A \cos(12\pi t)$. Draw a careful sketch of the resultant disturbance over one beat period and find the beat period.
 - c. Obtain expressions for the displacement of a mass executing forced oscillations as a function of frequency of the applied force under the linear damping and the restoring force, assuming steady state condition has been reached. Explain the amplitude resonance