Uva Wellassa University, Sri Lanka
End Semester Examination – June/July 2010
SCT 252-2 Physics II
(Repeat Examination)

Time: Two (02) hours

Total **four (04)** Questions
Answer **all** questions

---

01) Explain clearly the followings given below.

i. Coherent and incoherent light sources
ii. Huygens' principle
iii. The phenomenon of interference
iv. Fraunhofer diffraction
v. Fresnel diffraction

(05×5 = 25 marks)

02) A weight of mass 0.1 kg is attached to the lower end of a helical spring. The upper end is fixed to a rigid support. The period of small vertical oscillations of the weight is found to be 1 s.

i. Calculate the stiffness of the spring. (i.e. the force required to extend the spring by one unit.)
ii. Calculate the magnitude of the damping resistance which would be necessary to cause the amplitude of the oscillations to fall by 10% per complete cycle. Derive any expressions used.

(25 marks)

03) i. Two vibrations along the same line are described by the equations $y_1 = A \cos(10\ \pi t)$ and $y_2 = A \cos(12\ \pi t)$. Find the beat period, and draw a careful sketch of the resultant disturbance over one beat period.

(11 marks)

ii. Construct the Lissagous figures of the combined motion.

(a) $x = \text{Cos}(2\ \omega t)$ and $y = \text{Sin}(2\ \omega t)$
(b) $x = \text{Cos}(2\ \omega t)$ and $y = \text{Cos}(2\ \omega t - 45^0)$

(07×2=14 marks)

04). i. What do you mean by the phase and the optical path of a light wave. Give an expression to show the relationship between the phase difference and optical path difference.

(04 marks)

ii. What are the conditions required to satisfy for the observation of a clear interference pattern.

(06 marks)

iii. Show that the fringe width of the interference pattern observed in Young's double slit experiment, is given by the following formula.

$$\text{Fringe width} = \frac{\lambda D}{d}$$

Here;

D = the distance between the screen and the double slit

d = the slit separation

(09 marks)

iv. In a Young's double slit experiment two narrow slits were 0.5 mm apart and the fringes were observed on a screen, 100 cm from the slits. It was found that the distance from the first to the eleventh bright fringe was 9.72 mm. Calculate the wavelength of the light used.

(06 marks)