Nepal College of Information Technology

Unit Test

Spring 2012

Program : BE CE/ELX Time : 2 hrs

Semester : (II) FM : 70

Subject : Physics PM : 35

* *Candidates are requested to give their answer as far as practicable in their own words.*
* *The figure in the margin indicates the full marks*
* *Attempt ALL question*

1. Write down the differential equation for linear simple harmonic motion. Derive the time period of oscillation of compound pendulum and show that the time period will be minimum when the radius of gyration(k) is equal to the length(l) of compound pendulum. (2+8)

2. A meter stick suspended from one end swings as a physical pendulum (i) What is the period of oscillation? (ii) What would be the length of the simple pendulum that would have the same period? (4+3)

3. Write down the plane progressive wave equation. Derive a relation that relates particle velocity with wave (phase) velocity. (2+6)

4. The equation of transverse wave traveling in a rope is given by y=10 Sin π(0.01x- 2.00t), where x and y are expressed in centimeters and t in seconds. (i) Find the amplitude, frequency, velocity and wavelength of the wave, (ii) Find the maximum transverse speed of a particle in the rope. (4+2)

5. A wave of frequency 500HZ has a phase velocity of 350m/s. (i) How far apart are two points 600 (π/3 rad) out of phase? (ii) What is the phase difference between two displacements at a certain point at times 10-3 sec apart? (3+4)

6. What is the reason behind the colored fringes in thin films? Give the mathematical (analytical) interpretation about how intensity is distributed in interference pattern. (2+7)

7. A soap film 5 × 10-5 cm thick is viewed at an angle of 350 to the normal. Find the wavelengths of light in the visible spectrum which will be absent from the reflected light if the refractive index of the soap film is 1.33. (7)

8. “Light bends round the corner of narrow edges”, how can you interpret it? Explain single slit diffraction and thus locate the positions for different diffraction minima. Sketch the intensity distribution in the above case. (2+5+2)

9. How many orders will be visible if the wavelength of the incident radiation is 5000A0 and the number of the lines on the grating is 2620 in one inch. (7)