Nepal college of information technology

(Unit test)

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| Level: Bachelor | Semester- Fall- 2014 | Full Marks: 70 |
| Programme: BE (IT morning, &.Day/SE) | | Pass Mark: 35 |
| Course: Physics | | Time : 2hrs. |

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| *Candidates are required to give their answers in their own words as far as practicable.* |
| *The figures in the margin indicate full marks.* |
| Attempt all the questions. |

1. a) Under what condition, the motion of bar pendulum becomes simple harmonic? Derive an expression for the time period of it in terms of l and k. Hence, prove k=(l1l2)1/2 8

b) A small body of mass 0.10kg is undergoing SHM with amplitude 1m and period 0.2sec.

i) What is the maximum force acting on it?

ii) If the oscillation are produced by a spring, what is the force constant of the spring? 5

2. a) What are the properties of a wave? Write down an equation of a wave propagating in the positive direction of x-axis. Derive the relation between the particle acceleration and curvature of displacement curve. In addition, calculate the intensity of a wave propagating in a medium of density ƍ. 8

b) A stretched string has a linear density µ = 525 g/m and is under tension = 45 N. If you send a sinusoidal wave with frequency f= 120 Hz and amplitude ym= 8.5 mm along the string from one end. At what average rate does the wave transport energy? 5

3. a) What is the difference between interference and diffraction? Analyze interference mathematically. How is interference in thin film analyzed? Discuss mathematically taking the case of transmission. 8

b) A parallel beam of light of wavelength 5890 A0 is incident on a thin glass plate of refractive index 1.5 such that the angle of refraction in the plate is 600. Calculate the smallest thickness of the glass plate which will appear dark by reflection. 5

4. a) What is a Nicol Prism? How can you produce a linearly, circularly and elliptically polarized light. Discuss with mathematical details. 8

b) Find the thickness of a quarter wave plate when the wavelength of light is 5890 A0. (use µE=1.553 and µ0=1.544). 5

5. a) Compare and contrast Coulomb’s Law and Gauss’s Law. Derive the expression of electric field due to a charged circular disc. 8

b) Determine the expression of capacitance of a cylindrical capacitor of radii a and b (a<b). Explain why induced charge is always less than the magnitude of free charge. 5

6. Write short notes on: (any two) (2.5\*2=5)

a. Stationary Waves

b. Newton’s Rings

c. Energy stored in Capacitor