Premier University
Department of Computer Science and Engineering
CSE 2nd Semester Final Examination, June 2016
Course Title : Engineering Physics - II
Course No. : PHY-103

Time : 3 Hours **Marks : 50**

Answer any Five (5) questions from the followings

Q1. a) State Ampere's law. 2

b) Explain expression of a magnetic field for a solenoid by using Ampere's law. 5

c) A distribution line extended in east west carries current of 60 A. Calculate the magnetic field at a point 3m directly below the line. 3

Q2. a) State Lenz's law. Show that Lenz's law follow the conservation principle of energy. 1+2

b) Define self inductance. Derive an expression for coefficient of self inductance L. 1+3

c) Calculate the inductance of a solenoid of 1000 wound uniformly over a length of 50 cm and a cylindrical upper lobe 4 cm in diameter. The medium is air. 3

Q3. Deduce the following Maxwell's electromagnetic equations. 1+2+1+1

(i) Curl $\vec{E} = -\frac{\partial \vec{B}}{\partial t}$ (ii) Div $\vec{E} = \frac{1}{\varepsilon_0}\rho$

(iii) Div $\vec{B} = 0$ (iv) $\vec{\nabla} \times \vec{B} = \mu_0 \varepsilon_0 \frac{\partial \vec{E}}{\partial t} + \mu_0 \vec{J}$

Q4. a) What is the relation between the path difference and the phase difference? 1

b) From the theory of interference of light show that the distance between any two consecutive bright or dark fringes are $\beta = \frac{\lambda D}{d}$ where the symbols are have their usual meaning. 6

c) Two straight and narrow parallel slits 1mm apart are illuminated by monochromatic light. Fringes formed on the screen held at a distance of 100 cm from the slit are 0.50 mm apart. What is the wavelength of light? 3

Q5. a) Describe Newton's ring experiment and hence derive the expression for the n^{th} bright and dark rings by reflected light. 7

(a) In a Newton's ring experiment the diameter of the 7th ring was 0.493 cm and the diameter of 17th ring was 0.623 cm. Find the radius of the Plano-convex lens if the wavelength of light used is 5890 A°. 3

(b) Write the basic postulates of special theory of relativity. 2

(c) According to special theory of relativity, show that $t = \frac{t_0}{\sqrt{1-\frac{v^2}{c^2}}}$, where the symbols have their usual meaning. 5

(d) At what speed should a clock be move so that it may appear to lose one minute in each hour? 3

Q7. a) What is Photoelectron? 1

b) From photoelectric effect, Show that $hv = T_{max} + hv_0$ where the symbols have their usual meaning. 5

c) The work function of potassium is 3.0 eV. When ultraviolet light of wavelength 4000A° falls on a potassium surface, what is the maximum energy in electron volts of the photoelectrons. 4

Premier University
Department of Computer Science and Engineering
2nd Semester Final Examination, November 2013
Course Code: PHY-103
Course Title: Engineering Physics-II
Marks: 50
Time: 3 Hours

Answer any five (5) from the following questions

a) Obtain the expression for the magnetic field B inside a solenoid. 05
b) Show that if a infinitely long straight wire carries a current i, then at a distance R from the wire the magnetic field of induction, $B = \frac{\mu_0 I}{2\pi R}$. 05
[Here, μ_0 has its usual meaning]

a) Explain Faraday's law of electromagnetic induction and hence show that for N-number of turns the law can be written as : 06

$$E = -N\frac{d}{dt}\int B.ds$$

b) State and explain Len's law. 04

a) What do you understand by self-inductance? Deduce the expression for the self-inductance L. Define the practical unit of self-inductance. 05
b) Define mutual inductance, M. If we have two coil 1 and 2 having number of turns N_1 and N_2 and currents in the two coils i_1 and i_2 respectively then show that 05

$$M_{21} = \frac{N_2\Phi_{21}}{i_1}$$

and

$$M_{12} = \frac{N_1\Phi_{12}}{i_2}$$

a) Write down the Maxwell's four electromagnetic equations. 0
b) Deduce the equation: 0

$$\oint B.dl = \mu\varepsilon_0\int\frac{dE}{dt}.dS + \mu_0\int J.dS$$

a) Explain the principle of superposition of waves.
b) What do you understand by the coherent source of light?
c) Obtain an expression for the intensity I of light at a point when two light waves having the same frequency ω and amplitude a interfere with each other.

a) Describe Newton's ring experiment for the determination of the wavelength of light.
b) In a Newton's ring experiment the diameter of the 16^{th} ring was found to be 0.60 cm and that of the 6^{th} ring was 0.30 cm. If the radius of the plano convex lens is 98 cm, calculate the wavelength of light used.

a) What are the postulates of special theory of relativity?
b) Deduce the Lorentz transformation equations.

Premier University
Department of Computer Science & Engineering
2nd Semester Final Examination, May 2017
Course Title: Engineering Physics –II
Course No. : PHY-103

Time: 3 Hours **Marks: 50**

Answer any five (5) from following seven (7) questions.

Q1. a) Explain magnetic field vector? 3
b) State Ampere's law and hence derive an expression of the magnetic field vector *B* for a long solenoid. 7

Q2. a) What is mutual inductance? Find an expression for coefficient of mutual induction? 5
b) Discuss how the Lenz's law allows us to find the direction of the induced current. 2
c) Calculate the inductance of a solenoid of 1600 turns wound uniformly over a length of 52 cm on a cylindrical tube 4 cm in diameter. The medium is air. 3

Q3. a) Deduce the following Maxwell's electromagnetic equation: 10

$$\nabla \times B = \mu_o \varepsilon_o \frac{\partial E}{\partial t} + \mu_o j$$

Q4. a) Prove that, the distance between any two consecutive dark or bright fringes formed in Young's experiment is given by, $\beta = \frac{\lambda D}{d}$ where the symbols have their usual meanings. 6
b) In Young's double slit experiment the separation of the slits is 1.9 mm and the fringe spacing is 0.31 mm at a distance of 1 m from the slits. Calculate the wave length of light. 4

Q5. a) Explain the formation of Newton's ring experiment by reflected light and hence obtain the conditions for bright and dark rings. 8
b) In a Newton's ring experiment the diameter of the 17th ring was found to be 0.750 cm and that of the 7th ring was 0.360 cm. If the radius of curvature of the Plano-convex lens is 100 cm, calculate the wavelength of light used. 2

Q6. a) Write down the postulates of special theory of relativity. 2
b) Deduce the Lorentz transformation equations that relates the coordinates (x,y ,z, t) in S-frame with the coordinates (x, y, z ,t) in S'frame. Where, S'-frame is moving with a velocity v with respect to S-frame. 8

Q7. a) Deduce the $E = mc^2$ relation. 6
b) A body having rest mass 1.5kg is moving with a velocity 0.7c in the space, where c is the velocity of light. Find the total energy of the body. 4