AB-3117

B. Sc. (Sem. V) Examination

March / April – 2015

Physics : Paper - VII
(Electromagnetism & Optics)

Time : **2** Hours] [Total Marks : **50**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. Sc. (Sem. V)**

Name of the Subject :

☛ **Physics : Paper - VII (Electromagnetism & Optics)**

☛ Subject Code No. : **3 1 1 7** ☛ Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) Figures to the right indicate total marks carried by the question.

(3) Symbols used in the question paper have their usual meanings.

(4) Students can use non-programmable scientific calculator.

1 Answer the following in brief : **8**

(1) On which factors does the value of electric susceptibility of the substance depend ?

(2) State Faraday's law of electromagnetic induction.

(3) What is plasma ?

(4) When does the field of view in Michelson's interferometer become completely dark ?

(5) Haidinger's fringes are called the fringes of equal inclination, why ?

(6) For the glass-air interface $n_1 = 1.5$ and $n_2 = 1.0$ then calculate the critical angle.

(7) Define total internal reflection.

(8) Why the attenuation loss of light in a fiber occurs ?

2 (a) Attempt any one of the following : **10**

(1) Discuss behaviour of a dielectric in an external electric field and obtain the relation $\chi = k - 1$ between dielectric constant and electric susceptibility.

(2) Explain motional emf and discuss general case of a rod moving on a U-shaped conductor.

(b) Solve any one of the following : **4**

(1) The distance between two extreme points of two wings of an aeroplane is 50 meters. It is flying at a speed of 360 km/hour in horizontal direction. If the vertical component of earth's magnetic field at that place is $2 \times 10^{-4} Wb/m^2$ then find the induced emf of the wing.

(2) The rate of change of current in one coil of a system of two coils is $1.6\ A/\text{sec}$. If an induced emf of 2.56×10^{-2} volt is produced in the other coil, then calculate the mutual inductance of the system of two coils.

3 (a) Attempt any one of the following : **10**

(1) Describe the construction, working and different types of fringes obtained by Michelson's interferometer.

(2) (i) Discuss the numerical aperture in optical fibre. **5**

(ii) Why optical fibres are made of glass ? **5**

(b) Solve any one of the following : **4**

(1) In an experiment for determining the refractive index of gas using Michelson interferometer a shift of 140 fringes is observed. If the wavelength of light used is $5460\ \mathring{A}$ and the length of the tube is 20 cm, calculate the refractive index of gas.

(2) A signal of 100 mW is entered into a fiber. The outcoming signal from the other end is of 40 mW. What is the loss in dBs (decibel) ?

4 Write short notes on any two of the following : **14**

(1) Haidinger's fringes.

(2) Discuss attenuation loss in optical fibre.

(3) Self inductance and mutual inductance.

(4) Magnetic confinement - Pinch effect.