Date 5/3/2010

H. S. C. PHYSICS - PAPER II

(LIGHT, ELECTRICITY AND MAGNETISM, MODERN PHYSICS)

Time : 2 Hrs.) **Question Paper : March 2010** (Max. Marks : 40

Note : *Please See to Question Paper March 2008.*

Q. I. Select and write the most appropriate answer from the given alternatives for each sub-question. **(8)**

(i) A parallel beam of light travelling in glass is incident obliquely on water surface. After refraction, its width.

(a) decreases (b) increases (c) remains same (d) becomes zero

(ii) The resistance of galvanometer is G. If S is the resistance used to convert the galvanometer into an ammeter, then the effective resistance of the ammeter is ....

(a) G + S (b) G - S (c) $\frac{G+S}{G.S}$ (d) $\frac{G.S}{G+S}$

(iii) S. I unit of magnetic potential is ....

(a) J / A m^2 (b) J / A m (c) Wb / m^2 (d) Wb / A m

(iv) For destructive interference, the phase difference between two waves should be ....

(a) 0, $\frac{\pi}{2}$, π,... (b) 0, 2π, 4π, ... (c) π, 3π, 5π, ... (d) $\frac{\pi}{4}$, $\frac{\pi}{2}$, $\frac{3\pi}{4}$, ...

(v) Which logic gate corresponds to the logical equation, $Y = \overline{A + B}$?

(a) NAND (b) NOR (c) AND (d) OR

(vi) The reflected waves from the ionosphere are .....

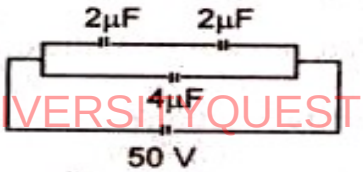
(a) ground waves (b) sky waves

(c) space waves (d) very high frequency waves

(vii) The radius of first Bohr orbit is 0.53 A. U. and radius of n^{th} Bohr orbit is 212 A. U. The value of 'n' is ....

(a) 2 (b)12 (c) 20 (d) 400

(viii) In the following figure, charge on 4μF capacitor is ....



(a) 40μC (b) 100μC (c) 200μC (d) 250μC

Q. 2. (A) Attempt any ONE : (8)

(i) A ray of light is incident on a water surface of refractive index $\frac{4}{3}$, making an angle of 40° with the surface. Find the angle of refraction.

(ii) A condenser of capacity 100μF is charged to potential of 1 kV. Calculate the energy stored in the condenser.

(B) Attempt any TWO :

(i) State the principle on which a transformer works. With neat diagram, explain the construction of a step-up transformer.

(ii) Explain the principle of working of a moving coil galvanometer (Suspended coil type).

(iii) Derive an expression for the magnitude of magnetic induction at any point due to a short magnetic dipole.

Q. 3. (A) Attempt of ONE : (8)

(i) State Kirchhoff's laws in electricity.

(ii) Prove that the accuracy of a tangent galvanometer is maximum at a deflection of 45°.

(B) Attempt any TWO :

(i) Derive an expression for the mechanical force per unit area of a charged conductor.

(ii) State Bohr's third postulate for hydrogen atom and hence derive Bohr's formula for wave number.

(iii) With a neat diagram explain the construction of coaxial cables. What are its advantages over two wire transmission lines?

Q. 4. (A) Attempt any TWO : (8)

(i) Draw a neat labelled ray diagram showing polarisation through a Nicol prism.

(ii) Draw a neat labelled ray diagram of biprism experiment showing the positions of two virtual sources and the region of interference.

(iii) Draw a neat labelled diagram of Divission and Germer experiment.

(B) Attempt any ONE :

(i) Describe construction and working of light emitting diode (L.E.D.) State its 'any two' uses.

(ii) With the help of a neat diagram describe Thomson's experiment to determine

(a) the velocity, and (b) the charge to mass ratio of electrons.

Q. 5. Attempt any TWO : (8)

(i) In Young's experiment, two slits separated by 4 mm are illuminated by a light of wavelength 6400 A. U. Interference fringes are obtained at a distance of 60 cm. from the slits. Find the changes in the fringe width, if the separation between the slits is -

(a) increased by 1 mm, and (b) decreased by 1 mm.

(ii) The potentiometer wire has length 10 m and resistance 10Ω. If the current flowing through it is 0.4 A, what are the balancing lengths when two cells of e. m. f. s 1.3 V and 1.1 V are connected so as to (a) assist and (b) oppose each other?

(iii) An A. C. Voltage of r. m. s. value 1 V is applied to a parallel combination of inductor L = 10 m H and capacitor C - 4μF. Calculate the resonant frequency and corrent through each branch at resonance.