

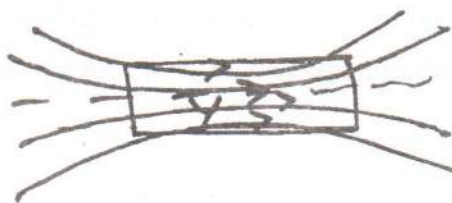
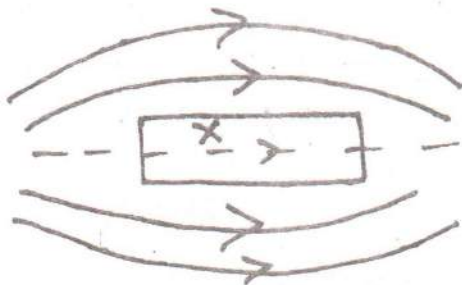
# Half Yearly Examination-2014-15

Class - XII Sci.  
Subject - Physics

Time : 3 to 3½ hrs.

M. M. : 70

- Q.1. An electron is moving along the +ve X-axis in the presence of uniform magnetic field along +ve Y-axis. What is the direction of the force acting on it? (1)
- Q.2. What is the value of horizontal component of earth's magnetic field at the magnetic poles? (1)
- Q.3. What is the nature of magnetic field in a MCG? (1)
- Q.4. What is the value of bond width for speech signals? (1)
- Q.5. What should be the length of a dipole antenna for a carrier wave having frequency  $3 \times 10^8$  Hz? (1)
- Q.6. Draw the block diagram of a communication system. (2)
- Q.7. A Galvanometer coil has a resistance of  $12 \Omega$  and the meter show full scale deflection for a current of  $3nA$ . How will you convert the meter into a voltmeter of range 0 to 18 V? (2)
- Q.8. Write the function of the following in communication system - (a) Transducer (b) Repeater. (2)
- Q.9. Write the expression for the magnitude of the magnetic field at the center of a circular loop of radius  $r$  carrying a steady current  $I$ . Draw the field lines due to the current loop. (2)
- Q.10. A uniform magnetic field gets modified as shown below, when two specimens X and Y are placed in it. (2)

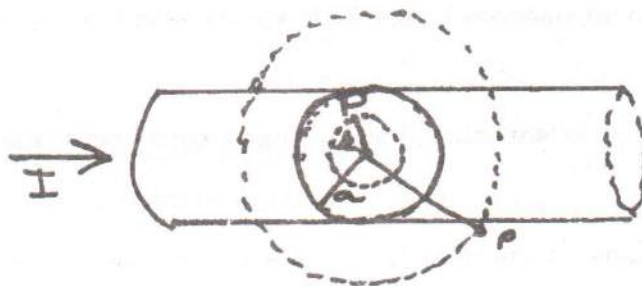


- (i) Identify the two specimens X and Y.  
 (ii) State the reason for the behaviour of the field lines in X and Y.

**Q.11.** A message signal of frequency 10 KHz and peak voltage of 10 volts is used to modulate a carrier of frequency 1 MHz and peak voltage of 20 volts. Determine (a) modulation index (b) the side band produced. (3)

**Q.12.** Use Ampere's Law to obtain the magnetic field (i) inside the toroid (ii) at the surface (iii) outside the toroid. (3)

**Q.13.** Figure shows a long straight wire of a circular cross section of radius  $a$  carrying steady current  $I$ . The current  $I$  is uniformly distributed across this cross-section. Derive the expression for the magnetic field in the region  
 $r < a$  and  $r > a$ . (3)



**Q.14.** Name the type of waves which are used for LOS communication. (3)  
 A transmitting antenna has a height of 20 m and the height of receiving antenna is 45 m. Calculate the maximum distance between them. (radius of earth =  $6.4 \times 10^6$  km)

**Q.15.** Write two factors justifying the need of modulating a signal. (3)  
 A carrier wave of peak voltage 24V is used to transmit a message signal. What would be the peak voltage of modulating signal to order to have a modulation index of 50% ?

**Q.16.** A student records the following data for the magnetic field ( $B$ ) at axial points at different distance  $x$  from the centre of a circular coil of radius ' $a$ ' carrying current  $I$ , verify (any two) that these observations are in good agreement with the expected theoretical variation of  $B$  with  $x$ .

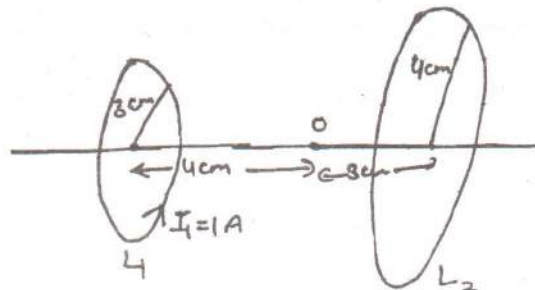
$x$	$x = 0$	$x = a$	$x = 2a$	$x = 3a$
$B$	$B_0$	$0.25\sqrt{2} B_0$	$0.039\sqrt{5} B_0$	$0.25\sqrt{10} B_0$

**Q.17.** Explain how will you convert a galvanometer into a ammeter of a given range ? (3)

**Q.18.** Define the following term :- (3)  
 (a) Attenuation (b) Noise (c) Noise

**Q.19.** Explain the process of Amplitude Modulation. (3)

- Q.20.** Two coaxial circular loops  $L_1$  and  $L_2$  of radii 3 cm and 4 cm are placed as shown. What should be the magnitude and direction of the current in the loop  $L_2$  so that the net magnetic field at the point O be zero ?



- Q.21.** Name the elements of earth magnetic field at a place. Explain their meaning. (3)
- Q.22.** Explain the difference between Diamagnetic and paramagnetic substance. (3)
- Q.23.** Raj was talking on his mobile to his friend for a long time. After his conversation was over, his sister Deepa advised him that if his conversation was of such a long duration, it would be better to talk through land line.  
Answer the following :-
- (a) Why is it considered harmful to use a mobile phone for a long duration ? (4)
- (b) Which values are reflected in the advice of her sister Deepa ?
- Q.24.** Derive an expression for the magnetic moment of an electron revolving around the nucleus in term of its angular momentum. What is the direction of the magnetic moment of the electron with respect to its angular momentum ? (5)

or

With the help of labelled diagram. Explain the principle and working of MCG.

- Q.25.** Explain with the help of a labelled diagram, the principle and working of a cyclotron. Deduce the expression for the cyclotron frequency and show that it does not depend on speed of the charged particle. (5)
- Q.26. (a)** Derive the expression for the force between two long parallel current carrying conductors. (5)
- (b)** Use this expression to define SI unit of current.

or

Deduce an expression for the torque acting on a rectangular current carrying loop placed in a uniform magnetic field. Show that the torque  $\tau$  can be expressed as-

$$\tau = n \times B$$