



Reg. No. :

Name :

VI Semester B.Sc. Degree (CCSS-Reg./Supple./Imp.)

Examination, May 2016

Core Course in Physics

6B 11PHY : ELECTRODYNAMICS – II

(2011 & Earlier Adm.)

Time : 3 Hours

Total Weightage : 30

SECTION – A

(Choose the correct answer, **each** bunch carries a weightage of **one**)

1. i) At the centre of a current carrying single turn circular loop, magnetic field is
 a) $B = I/2\mu\pi R$ b) $B = \mu I/2R$ c) $B = \mu I/2\pi R$ d) $B = \mu I/2\pi R^2$
- ii) Magnetization is related to B by
 a) $M = \chi_m H$ b) $M = \chi_m B$ c) $M = \chi_m / H$ d) $M = \chi_m / B$
- iii) Torque acting on a dipole is maximum by a magnetic field when
 a) $\theta = 0$ b) $\theta = 90$ c) $\theta = 45$ d) $\theta = 30$
- iv) The mutual inductance of two coils is maximum when the coils are
 a) inclined at an angle of 45° b) at right angles to each other
 c) facing each other d) touching each other
2. i) The trajectory of the charged particle in an electric field outside the parallel plates is
 a) parabola b) hyperbola c) circle d) straight line
- ii) The instrument used to sort out and identify positive ions and arrange them according to their masses is
 a) magnetic separator b) quadrant electrometer
 c) mass spectrometer d) cyclotron
- iii) If the deflection sensitivity of a CRO is 2mm/V , calculate the deflection of the spot when a voltage of 15 V is applied
 a) 1.5 cm b) 6 cm c) 3 cm d) none of these
- iv) $\sqrt{(\mu/\epsilon)}$ has the dimensions of
 a) inductance b) impedance c) capacitance d) electric field

(2×1= 2)

P.T.O.



SECTION – B

(Answer **any six** questions, **each** question carries a weightage of **one**)

3. Give the physical interpretation of bound currents.
4. What is the effect of magnetic field on atomic orbits ?
5. What is motional e.m.f. ?
6. Give the continuity equation in electrodynamics.
7. What is magnetic vector potential ?
8. Explain polarization in electromagnetic waves.
9. Explain the working of ink-jet printer.
10. What is magnetic separator ? (6×1= 6)

SECTION – C

(Answer **any nine** questions, **each** question carries a weightage of **two**)

11. Derive the integral form of Amperes's law in magnetized materials.
12. Distinguish between Coulomb Gauge and Lorentz gauge.
13. Explain a hysteresis loop.
14. Obtain the boundary conditions for E and B.
15. Show that the energy stored in a magnetic field of a coil of 1000 turns, length 100 cm, area of cross-section 7 sq.cm. and wound over a core of magnetic permeability 1000 is nearly 0.44 J when 1 A current is passed through it.
16. The magnetic susceptibility of a medium is 940×10^{-4} . Calculate its absolute and relative permeability.
17. Calculate the value of Poynting vector on the surface of the sun if the power radiated by it is 3.8×10^{26} W (Radius of sun = 7×10^8 m). If the average distance between the sun and the earth is 1.5×10^{11} m, show that the value of solar constant is 1.34×10^3 W/m²s.



18. Prove that light is an electromagnetic wave.
19. An incident wave of specified shape $g_i(z - v_1t)$, is moving down a string. It gives rise to a reflected wave, $h_R(z+v_1t)$ and a transmitted wave, $g_T(z - v_2t)$. By imposing the boundary conditions find the value of h_R and g_T .
20. Find the frequency of the oscillator that is to be connected between the dees of a cyclotron with a magnetic field 1.5 W/m² for accelerating deuteron.
21. With the help of a labeled diagram explain the construction of cathode ray oscilloscope.
22. Explain how sorting of minerals is done. (9×2= 18)

SECTION – D

(Answer **any one** question; **each** question carries a weightage of **four**)

23. a) What is Hall Effect ?
b) Derive an expression for Hall voltage.
c) What are the conclusions drawn from it ?
24. Derive the reflection and transmission coefficients of electromagnetic waves in matter. (1×4 = 4)