Reg. No. : .....

Name : .....

VI Semester B.Sc. Degree (CBCSS – Reg./Supple./Improv.) Examination, April 2021
(2014 – 2018 Admissions)
CORE COURSE IN PHYSICS
6B11PHY– Electrodynamics – II

Time : 3 Hours

Max. Marks : 40

Instructions :
1) *Write answers in **English only**.*
2) *Section **A** : Answer **all** questions (Very short answer type. **Each** question carries **1** mark).*
3) *Section **B** : Answer **any seven** questions (Short answer type. **Each** question carries **2** marks).*
4) *Section **C** : Answer **any four** questions (Short essay/ problem type. **Each** question carries **3** marks).*
5) *Section **D** : Answer **any two** questions (Long essay type. **Each** question carries **5** marks).*

SECTION – A

1. What is the value of magnetic susceptibility in vacuum ?
2. What is electromotive force ?
3. Write the three dimensional wave equation.
4. The ratio E_0/H_0 has the dimension of that of _____ **(4×1=4)**

SECTION – B

5. What are ferromagnets ? Give examples.
6. How momentum conservation is rescued in electrodynamics ?
7. State and explain Ohm's law. Obtain the relation between current density, J and electric field E.
8. What is Curie point ?
9. Explain Joule Heating Law.
10. Define magnetic susceptibility and permeability.
11. Differentiate self inductance and mutual inductance.

12. Discuss the importance of $\nabla.B = 0$.
13. What is drift velocity ? Give its relation with current density.
14. Describe the working principle of betatron.
15. Explain how hall effect can be used to measure magnetic flux density.
16. What is synchrocyclotron ?
17. Write the integral and differential form of Faraday's Law.
18. Give the principle of cyclotron. **(7×2=14)**

SECTION – C

19. Show that energy of the magnetic dipole in a magnetic field B is given by $U = - m.B$.
20. Derive wave equation for E and B.
21. Prove that for an ideal source, potential difference is equal to emf.
22. Obtain the relation connecting electric field with scalar and vector potentials.
23. Obtain the formula for cyclotron frequency.
24. Deduce the integral form of Ampere's law in magnetized materials.
25. Discuss Coulomb gauge and Lorentz guage transformations.
26. In free space the electric field is given as $E= 10 \sin(2x - 100t)\ j$. Determine D, B and H by using Maxwell's equations. **(4×3=12)**

SECTION – D

27. Deduce and explain energy in magnetic fields.
28. A plane electromagnetic wave is incident normally on a conducting surface (linear media). Calculate reflection and transmission coefficient of incident electromagnetic wave.
29. What are bound currents ? Give its physical interpretation.
30. With a neat block diagram, discuss the theory and working of Cathode Ray Oscilloscope.
31. State and prove Poynting's theorem for the conservation of energy in an electromagnetic field and discuss the physical meaning of each term in the equation.
32. Deduce Maxwell's equation in electrodynamics. How did Maxwell correct the Ampere's law ? **(2×5=10)**