Roll No. | | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 18

B.Tech. (Mechanical Engg.) (2018 & Onwards) (Sem.–1,2)
B.Tech.(Automobile Engg.)/(CE)/(CSE)/
(Electrical & Electronics Engg.)/(ME)

ELECTROMAGNETISM

Subject Code : BTPH-103-18
M.Code : 75357

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION - B & C. have FOUR questions each.**
3. **Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.**
4. **Select atleast TWO questions from SECTION - B & C.**

SECTION-A

Write briefly :

1. What is the significance of negative sign in the equation $E = -\nabla V$? If a potential V is known at a point, can we find the electric field by using $E = -\nabla V$?
2. Show that electric potential function $x^2 - y^2 + z$ satisfies Laplace's equation.
3. What is uniqueness theorem? Explain.
4. Discuss the physical meaning of the Maxwell's equation $\nabla . B = 0$.
5. What is physical significance of magnetic susceptibility?
6. Define skin depth of a conductor. What is the value of skin depth for a perfect conductor?
7. What is a plane wave?
8. State Faraday's law of electromagnetic induction. Is Lenz's law contained in it?
9. Light is mostly characterised by electric field vector even though it has magnetic field vector also. Why?
10. What is the justification of choosing the earth as the zero of potential in practice?

SECTION-B

11. The distance between H^+ and Cl^- ions in HCL molecule is 1.28Å. Find the potential due to this dipole at a distance 12Å on a line making an angle of 60° with the axis of dipole.

12. Why electric field inside a dielectric decreases due to polarization? Show that $D = \varepsilon_0 E + P$, where the symbols has their usual meanings.

13. Explain the term vector potential. Using the concept of vector potential, deduce Biot-Savart law.

14. Distinguish between diamagnetic, paramagnetic and ferromagnetic substances. Give their important properties.

SECTION-C

15. Show that Faraday's law of electromagnetic induction can be expressed in the differential form $\nabla \times E = -\frac{\partial B}{\partial t}$. Discuss the physical meaning of this equation.

16. State and prove Poynting theorem. Explain physical meaning of each term involved in expression.

17. Prove by mathematical analysis that electromagnetic waves are transverse in nature.

18. A plane electromagnetic wave is incident normally at the boundary of two media of impedance Z_1 and Z_2. Discuss the phenomenon of reflection and transmission.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.