

Total No. of Questions: 22

Total No. of Pages: 02

Roll No. _____

Paper Code
3E1220

B.Tech. III-Sem (Main & Back) January-2026
Electrical & Electronics Engg.
3EX4-08 Electromagnetic Fields
EE,EX
3E1220

Time : 3 Hours

Maximum Marks : 70

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. _____ 2. _____

Part-A

(Answer should be given up to 25 words only)

All questions are compulsory

10x2=20

- Q. 1 Difference between scalar and vector quantity. .
- Q. 2 Define ohms law in point form. .
- Q. 3 Applications of Gauss law. .
- Q. 4 Enlist any four properties of electromagnetic fields / wave. .
- Q. 5 Characteristics of Motional electromotive forces. .
- Q. 6 Definition of Boundary conditions and electric dipole. .
- Q. 7 Explain the surface and volume charge distributions. .
- Q. 8 Derive the poynting theorem. T-437
- Q. 9 Advantages and disadvantages of static magnetic field. .
- Q.10 State the Coulomb's law in electrostatics. .

Part B

(Analytical/Problem solving questions)

Attempt any Five questions. T-437

5x4=20

- Q. 1 Use Biot-Savart's law for any finite current carrying conductor to find magnetic field intensity.
- Q. 2 Point charge $Q = -0.2\mu\text{C}$ placed at origin in free space. find electric field intensity & electric potential at $(0,6,8)\text{m}$.
- Q. 3 Explain the concept of Magnetic scalar potential.
- Q. 4 For a vector field show that the divergence of the curl of any vector field is zero.
- Q. 5 Formulate wave equation for perfectly dielectric medium.
- Q. 6 Derive the Laplace equation.
- Q. 7 Compare electric and magnetic fields using any six points.

Part C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions.

3x10=30

- Q. 1 Formulate electromagnetic wave equation from Maxwell's equation for perfectly conducting and insulating media.
- Q. 2 Prove that $\vec{E} = -\Delta V$. Also derive the Poisson's and Laplace equation.
- Q. 3 Derive Gauss laws in the point form for an electric field and magnetic field. T-437
- Q. 4 Calculate the magnetic field intensity $\vec{H}$ due to infinite conductor carrying current I along z axis.
- Q. 5 Derive electric field intensity due to an infinite plane having density $\rho_s \left(\frac{\text{C}}{\text{m}^2} \right)$