

**B-220****61N0606**

Roll No. \_\_\_\_\_

Total No. of Pages.:02

**61N0606****B.Tech VI Sem Main/Back (New Scheme) Examination 2025-26****Electrical Engineering****(6EE5-11) - Electromagnetic Field Theory****Time :3 Hours****Maximum Marks: 70**  
**Min. Passing Marks:**Instructions to Candidates:

Part-A: Short answer questions (up to 25 words) 10x2 marks = 20 marks. All ten questions are compulsory.

Part- B: Analytical/Problem Solving questions 5x4 marks = 20 marks. Candidates have to answer 5 questions out of 7.

Part - C: Descriptive/Analytical/Problem Solving questions 3x10 marks = 30 marks. Candidates have to answer 3 questions out of 5.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

1 \_\_\_\_\_

2 \_\_\_\_\_

**Part-A**

- Q.1. Explain Physical interperation of gradient?
- Q.2. State Green's Stoke's theorem?
- Q.3. What are the different charges configuration of Electrical field?
- Q.4. Define flux density?
- Q.5. Explain Magnetic field vector?
- Q.6. Define Ampere's Law?
- Q.7. What is Faraday's Law?
- Q.8. What is Skin effect?
- Q.9. Define standing wave Ratio?
- Q.10. What do you mean by polarization in electrical field?

**PART-B**

Q.1. A particular scalar field  $\alpha$  is given by

(a)  $\alpha = 20e^{-x} \sin\left(\frac{\pi y}{6}\right)$

(b)  $\alpha = 25r \sin \phi$

Find its gradient at P(0, 1, 1) for cartesian and  $P(\sqrt{2}, \frac{\pi}{2}, 5)$  for cylindrical?

- Q.2. State and prove Helmholtz theorem?
- Q.3. Explain Electrical Potential and displacement vector?

P.T.O.

**B-220**

- Q.4. Derive Poisson's & Laplace equation?  
 Describe analogy between electric and magnetic fields.  
 Explain Poynting vector in detail?  
 Derive Biot-Savart's law?

### PART-C

[3x10=30]

- Q.1 For positive  $x, y, z$   $S_v = 40xyz \text{ C/m}^3$ . Find the total charge within the region defined by  $x=0, y=0, 0 \leq 2x+3y \leq 10$  and  $0 \leq z \leq 2$ .
- Q.2. Drive Uniqueness Theorem?
- Q.3. Explain Field determination by method of images?
- Q.4. Two regions are separated by a surface  $3x-2y+5z=0$ . Region 1 has permeability  $\mu_1 = 2\mu_0$  and region 2 has  $\mu_2 = 5\mu_0$ . The point  $P(2, 2, 2)$  lies in region 2 for a field  $\vec{H}_1 = 4\vec{a}_x + 6\vec{a}_y - 3\vec{a}_z \text{ A/M}$ . Find field  $\vec{H}_2$  &  $\vec{B}_2$ ?
- Q.5. Write short notes on  
 (a) Dielectrics  
 (b) Conductor

\*\*\*\*\*