Roll No. .....

3099

B. Tech. 4th Semester (EE) Examination – May, 2023

ELECTROMAGNETIC FIELDS

Paper : PCC-EE-216-G

Time : Three hours] *[Maximum Marks : 75*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting ***one*** question from each Section. Question No. 1 is ***compulsory***. All questions carry equal marks.

1. (a) Explain the difference between scalar magnetic potential and vector magnetic potential. 2.5 × 6

(b) State point form of Ohm's law and Gauss's law.

(c) Write the wave equation in a conducting medium.

(d) Explain the circular cylindrical coordinate system.

(e) What do you mean by equipotential surfaces ?

(f) Give the expression for energy stored in a static electric field.

SECTION – A

2. (a) Express $2x\hat{i} - 3y^2\hat{j} + xz\hat{k}$ is cylindrical coordinate. 7.5

(b) Describe the curl operator. 7.5

3. Given point $P(-2, 6, 3)$ and vector $A = yax + (x + z)\,ay$. Evaluate A and P is Cartesian, cylindrical and spherical systems. 15

SECTION – B

4. (a) Derive the electric field for each possible case due to an uniformly charged sphere of Radius R and volume charge density ρ. 7.5

(b) Derive the equation of continuity for time varying fields. 7.5

5. (a) Describe the analogies between electric and magnetic fields. 7.5

(b) Differentiate between electrostatic energy and electric density. 7.5

SECTION – C

6. Write notes on : 15

(a) Inductance and mutual inductances

(b) Motional electromotive forces

7. (a) State and prove Biot-Savart's law. 7.5

(b) Explain the concept of displacement current. How is this different from conduction current ? 7.5

SECTION – D

8. (a) State and prove Poynting theorem. 7.5

(b) State Maxwell's equation is phasor form. 7.5

9. Write notes on : 15

(a) Uniform plane waves

(b) Boundary conditions