

**PRAGATI ENGINEERING COLLEGE: SURAMPALEM(AUTONOMOUS)**  
**II B.Tech I Semester Supplementary Examinations June-2024**

**ELECTRO MAGNETIC FIELDS**

(EEE)

Time: 3 hours

Max. Marks: 70

**Answer ONE Question from each UnitAll**  
**Questions Carry Equal Marks**

Q. No.	Questions	BTL	CO	Marks
<b>UNIT – I</b>				
1.	a) Derive the concept of Electric field intensity from Coulombs law	K2	CO1	7M
	b) Two-point charges $Q_1 = 300\mu\text{C}$ and $Q_2 = 350\mu\text{C}$ are located at (5,0,0) m and (0,0, -5) m respectively. Determine the force on $Q_1$ .	K3	CO1	7M
<b>OR</b>				
2.	a) Derive the expression for a potential inside a solid sphere having uniformly charge density.	K2	CO1	7M
	b) A spherical volume $R=2\text{m}$ has a uniform charge density $\rho = 2 \text{ C/m}^3$ . Calculate the potential $V$ at $r = 100\text{cm}$ .	K3	CO1	7M
<b>UNIT – II</b>				
3.	a) Explain the behavior of conductor in an electric field.	K2	CO2	7M
	b) Find the potential due to an electric dipole consisting of $+Q$ at $(a/2, 0,0)$ and $-Q$ at $(-a/2,0,0)$ at a distance point $(r, \theta, \phi)$ in spherical coordinates.	K3	CO2	7M
<b>OR</b>				
4.	a) Derive the expression for equation of continuity.	K2	CO2	7M
	b) The capacitance of a capacitor formed by two parallel metal plates each $200 \text{ cm}^2$ in area separated by a dielectric 4 mm thick is $4 \times 10^{-4}\mu\text{F}$ . A P.D. of 20 KV is applied. Determine (i) the potential gradient (ii) Total charge on the plates (iii) Electric flux density and (iv) relative permittivity of dielectric.	K3	CO2	7M
<b>UNIT – III</b>				
5.	a) Explain the Biot Savarts Law.	K2	CO3	7M
	b) A steady current element $10^{-3} \text{ A m}$ is located at the origin in free space. (i) What is the magnetic field $B$ due to this element at the point $(1,0,0)\text{m}$ ? (ii) What is the magnetic field at the point $(0,0,1)\text{m}$ ?	K3	CO3	7M
<b>OR</b>				
6.	a) Derive an expression for magnetic field at the center of circular coil.	K2	CO3	7M
	b) Obtain the expression for Lorentz force equation.	K2	CO3	7M
<b>UNIT – IV</b>				
7.	a) Define self-inductance and obtain the expression for inductance of a toroid.	K1	CO4	7M
	b) The current in a coil is increased from zero to 15 A at a uniform rate in 6 sec. It is found that this coil develops self-induced emf of 150V, whereas emf of 25 V is produced in a neighboring coil. Compute the self-inductance of the first coil and the mutual inductance between the two coils.	K3	CO4	7M
<b>OR</b>				

8.	a)	Derive the expression for coefficient of coupling between two coils.	K2	CO4	7M
	b)	Calculate the Inductance of a solenoid 8 cm in length, 2cm in radius having $\mu_r=100$ and carrying 800 turns of wire	K3	CO4	7M
UNIT – V					
9.	a)	Explain about Dynamically induced EMFs.	K2	CO5	7M
	b)	Explain about Faraday's laws of electromagnetic induction	K2	CO5	7M
OR					
10.	a)	State and explain poynting theorem	K2	CO5	7M
	b)	Find the displacement current density within a parallel plate capacitor having a dielectric with $\epsilon_r = 10$ , area of plates $S = 0.01 \text{ m}^2$ , distance of separation, $d = 0.05\text{mm}$ , applied voltage is $V = 200 \sin 200t$ .	K3	CO5	7M