

**BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLOGY & SCIENCE
(AUTONOMOUS)**

II - B. Tech I-Semester Supplementary Examinations (BR23), March - 2026

Electromagnetic Field Theory (EEE)

Time: 3 hours

Max. Marks: 70

*Question Paper consists of Part-A and Part-B
Answer ALL the question in Part-A and Part-B*

PART-A (10X2 = 20M)

	Marks	CO	BL
1. a) Define coulombs law?	(2M)	CO1	BL1
b) Write about potential gradient?	(2M)	CO1	BL1
c) Define conduction current density?	(2M)	CO2	BL1
d) Write formula for parallel plate capacitance?	(2M)	CO2	BL1
e) State the Biotsawart's circuital law	(2M)	CO3	BL1
f) Define Magnetic dipole?	(2M)	CO3	BL1
g) Define Self Inductance?	(2M)	CO4	BL1
h) Write formula for Self-Inductance of Solenoid?	(2M)	CO4	BL1
i) Write statement of Faraday's Laws of Electromagnetic Induction?	(2M)	CO5	BL1
j) What are the Maxwell's equations for time varying fields?	(2M)	CO5	BL1

PART-B (5X10 = 50M)

2a. Explain about Position and distance vectors and Components of a vector?	5(M)	CO1	BL2
b. Derive the expression for electric field intensity due to sheet of charge?	5(M)	CO1	BL3
(OR)			
3a. Derive point charge proof of gauss law?	5(M)	CO1	BL3
b. Explain about Poisson's equation and Laplace equation?	5(M)	CO1	BL2
(OR)			
4a. Discuss about behavior of conductors in an electric field?	5(M)	CO2	BL2
b. An electric dipole of $100a_z pC\cdot m$ is located at the origin. Find V and E at point (0,0,10)?	5(M)	CO2	BL3
(OR)			
5a. State and prove the boundary conditions at the boundary between two dielectrics?	5(M)	CO2	BL2
b. If a dielectric material of $\epsilon_r = 4.0$ is kept in an electric field $E = 3.0a_x + 2.0a_y + a_z$, V/m, find the polarization?	5(M)	CO2	BL3
(OR)			
6a. State and explain biot-savart's law?	5(M)	CO3	BL2
b. Obtain the expression for torque on a current loop placed in a magnetic field?	5(M)	CO3	BL3
(OR)			
7a. Derive the H-field equation due to infinitely long current element?	5(M)	CO3	BL2
b. Determine the magnetic field intensity, H at the center of a square current Element. The length of each side is 2 m and the current, $I = 1.0$ Amp.	5(M)	CO3	BL3

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| 8a. | Explain the concept self and mutual inductances? | 5(M) | CO4 | BL2 |
| b. | Find the mutual inductance between two toroidal windings which are closely wound on iron core of relative permeability 900. The mean radius of the core is 5 cm and radius of its cross-section is 5cm. Each winding has also 800 turns. | 5(M) | CO4 | BL3 |
| (OR) | | | | |
| 9a. | Derive the expressions for the Self-Inductances of a solenoid? | 5(M) | CO4 | BL2 |
| b. | A very long solenoid with 2 X 2 cm cross section has an iron core ($\mu_r = 1000$) and 4000 turns/meter. If it carries a current of 500 mA, find (i) Its Self-inductance per meter (ii) The energy per meter stored in its field. | 5(M) | CO4 | BL3 |
| (OR) | | | | |
| 10a | State and explain faraday's laws of electromagnetic induction? | 5(M) | CO5 | BL2 |
| b. | Discuss about Statically Induced EMF and Dynamically Induced EMF? | 5(M) | CO5 | BL2 |
| (OR) | | | | |
| 11a | Derive the Maxwell's four equations for time varying fields? | 5(M) | CO5 | BL2 |
| b | State and explain Poynting Theorem? | 5(M) | CO5 | BL2 |
