



B.Tech III Semester Regular/Supplementary Examinations, December 2025

ELECTRO MAGNETIC FIELDS

(EEE)

Maximum Marks: 60

Date:24.12.2025

Duration: 3 hours

- Note:**
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	BTL
1.a)	What is the Del operator?	1M	1	1
b)	State the expression for the gradient of a scalar field.	1M	1	1
c)	State Gauss's law	1M	2	1
d)	Define electric flux and give the relation between electric field intensity and electric flux density?	1M	2	1
e)	What are dielectrics? What is the difference between dielectric and insulators?	1M	3	1
f)	State Biot-savart's law.	1M	3	1
g)	Define Self-inductance.	1M	4	1
h)	Give the expressions relating B and H with the current density J.	1M	4	1
i)	State Faraday's law?	1M	5	1
j)	What is transformer EMF?	1M	5	1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	Explain vector algebra operation, addition, subtraction, scalar product, vector product, scalar triple and vector triple product with suitable examples.	10M	1	2,3
OR				
3	Derive the integral theorems of vector calculus a) Divergence theorem b) Stokes theorem	5M 5M	1	3
4	Obtain an expression for potential of a electric dipole in electric field.	10M	2	3
OR				
5	Determine the electric field intensity due to infinite line charge, at a point perpendicular to its plane and at a given distance from the line charge from first principles.	10M	2	3

6	a) Derive Laplace and Poisson equation. b) Define Magnetic flux, Magnetic flux line and Magnetic flux density and state the relation between Magnetic flux and Magnetic flux density.	5M 5M	3 3	4 2
OR				
7	a) State Ampere's circuital law and explain any two applications of Ampere's Circuital law. b) Explain Scalar and Vector Magnetic potential and their limitations.	5M 5M	3 3	3 4
8	Derive the Expressions for the Boundary conditions between two perfect dielectrics	10M	4	4,5
OR				
9	Determine the force per meter length between two long parallel wires A & B separated by 6 cm in air carrying currents of 42 Amps. (i) In same direction. (ii) In the opposite direction.	10M	4	3
10	Derive the Maxwell's equations both in integral form and differential form for Time varying fields.	10M	5	5
OR				
11	a) Define poynting vector and derive the expression for poynting theorem. b) Briefly explain the propagation in good conductors.	5M 5M	5 5	5 3,4