Reg. No.																

Question Paper Code	14727

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2026

Third Semester

Electrical and Electronics Engineering

20EEPC303 - ELECTROMAGNETIC THEORY

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART – A (i) (MCQ)
(16 × 1 = 16 Marks)
Answer ALL Questions

		Marks	K – Level	CO
1.	Frequency range of 300Hz to 100kHz for EM fields are called as a) Radio Frequency b) Low Frequency c) Very Low Frequency d) None of the above	1	K3	CO1
2.	For a Non linear time variant field a) Divergence vanish if curl exist b) Curl vanish if divergence exist c) Both may or may not exist d) Both will vanish	1	K2	CO1
3.	Gradient of a scalar yields a) Scalar b) Constant c) Vector d) Zero	1	K1	CO1
4.	The field present in a capacitor is a) Magneto static b) Electrodynamic c) Electrosatic d) Zero	1	K1	CO2
5.	Selection of insulator for any real time circuit involves the measurement of a) Current b) Power c) Voltage d) Frequency	1	K2	CO2
6.	Use of higher frequency in electronic circuits a) Reduces the noise level b) Reduce the size of components c) Reduce Electro Magnetic Interference d) Reduce the cost	1	K3	CO2
7.	Ampere's law relates a) Gradient of magnetic field intensity b) Curl of magnetic field intensity c) Divergence of magnetic field intensity d) Curl of Magnetic flux density	1	K1	CO3
8.	A current of 2A is flowing through a inductor of 100mH. The energy stored is a) 2 J b) 20J c) 0.2J d) 0.02J	1	K2	CO3
9.	Poisson's equation in magnetostatics relates a) Magnetic potential and magnetic field intensity b) Magnetic potential and current density c) Magnetic potential and current d) Magnetic potential and magnetic flux density	1	K3	CO3
10.	For free space Curl of the Magnetic field intensity for static field a) Infinity b) Zero c) Constant d) None of the above	1	Kx	CO4

11.	Divergence of current density is		1	K1	CO4
	a) Time rate of change of charge density	b) Time rate of change of field density			
	c) Time rate of change of field density	d) Time rate of change of conduction			
12.	Modified Ampere's law includes		1	K2	CO4
	a) Diffusion current	b) Electron current			
	c) Conduction current	d) Displacement current			
13.	Velocity of a plane wave is determined by		1	K3	CO5
	a) Magnetic field intensity	b) Magnetic flux density			
	c) Electric field intensity	d) Electric Flux density			
14.	Velocity of envelope of a wave with which it propagates into space is		1	K1	CO5
	a) Phase velocity	b) Wave velocity			
	c) Velocity	d) Group velocity			
15.	EMI stands for		1	K2	CO5
	a) Electromagnetic Image	b) Electromagnetic Interference			
	c) Electromagnetic Impression	d) None of the above			
16.	Skindepthdependson		1	K3	CO5
	a) Phase constant	b) Attenuation constant			
	c) Propagation constant	d) Wave velocity			

PART – A (ii) (Short Answer Questions)
(8 × 3 = 24 Marks)
Answer ALL Questions

17.	Solve the distance from A(1,2,3) to B(2,0,-1) in rectangular coordinates. Also find the unit vector extending from the origin towards the point P(3,-1,-2).	3	K3	CO1
18.	Apply the conditions for a vector A to be (a) solenoidal Use the del operator in curl, gradient and divergence.	3	K4	CO1
19.	Apply the boundary conditions for Electrostatics.	3	K4	CO2
20.	Determine the expression for capacitance and energy density.	3	K3	CO2
21.	Prove the existence of scalar magnetic potential in permanent magnets.	3	K4	CO3
22.	Prove the current flowing through a capacitor is due to displacement of ions and not due to conduction.	3	K3	CO4
23.	Evaluate the maximum torque on a 100 turn rectangular coil of 0.2 x 0.3m carrying a current of 2A in the field of flux density 5 Wb/sq.m.	3	K4	CO4
24.	Prove the electromagnetic wave travels with the velocity of light in free space.	3	K4	CO5

PART - B (Descriptive Answer Questions)
(5 × 12 = 60 Marks)
Answer ALL Questions

25.	a)	Derive the electric field intensity at a given point due to a line charge of finite length.	12	K3	CO1
		OR			
	b)	Analyze gradient, divergence, curl and Stokes theorem.	12	K3	CO1
26.	a)	Apply Gauss's Law to derive Poisson's equation and Laplace's equation.	12	K3	CO2
		OR			
	b)	Derive an expression for energy stored and energy density in an electrostatic field.	12	K3	CO2

27.	a).	Derive the expressions for magnetic flux density and field intensity due to a finite long current-carrying conductor using Biot-Savart's law.	*12*	*K3*	*CO3*
		OR			
	b)	Derive the expressions for boundary conditions in magnetostatics fields.	*12*	*K3*	*CO3*
28.	a)	Analyze Maxwell's equations for free space in integral and point forms with relation to Ampere's circuital law and Faraday's law.	*12*	*K4*	*CO4*
		OR			
	b)	Analyze the relationship between circuit theory and field theory in a series RLC circuit.	*12*	*K4*	*CO4*
29.	a)	Derive the electromagnetic wave equation for free space in terms of electric field.	*12*	*K4*	*CO5*
		OR			
	b)	Analyze the Poynting theorem. Derive the expression for poynting vector.	*12*	*K4*	*CO5*