Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SIXTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019

Course Code: EE302

Course Name: ELECTROMAGNETICS

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks. Marks

1		Find the divergence of $\bar{A}$ where $\bar{A} = \rho z \sin\phi \bar{a}_\rho + 3\rho z^2 \cos\phi \bar{a}_\phi$	(5)
2		Define equipotential surface?	(5)
3		Explain Biot-Savart Law.	(5)
4		Derive Maxwell's equations in differential and integral form from Faraday's Law	(5)
5		What is displacement current?	(5)
6		Apply Poynting theorem to derive an expression for power flowing through a co-axial cable	(5)
7		Compute the phase constant and attenuation constant for a uniform plane wave having frequency 10GHz in a lossy dielectric material for which $\mu = \mu_0$, $\varepsilon_r = 2.3$ and $\sigma = 2.56\times10^{-4}$ ℧/m.	(5)
8		What is electromagnetic interference? What are its causes?	(5)

PART B

Answer any two full questions, each carries 10 marks.

9	a)	State and Prove Stoke's Theorem	(5)
	b)	What is Curl of a vector field? Explain its physical significance.	(5)
10	a)	State and Prove Gauss's law.	(5)
	b)	Apply Gauss's law to find the expression for Electric field Intensity and Electric flux density due an infinite line charge distribution.	(5)
11	a)	Explain the concept of electric potential and potential gradient.	(5)
	b)	Explain spherical co-ordinate system.	(5)

PART C

Answer any two full questions, each carries 10 marks.

12	a)	Apply Biot-Savart law and determine an expression for magnetic field intensity at a point due to an infinitely long straight conductor carrying current I.	(7)
	b)	Explain continuity equation for current.	(3)
13	a)	State Ampere's circuital law and explain any one application of Ampere's circuital law	(5)
	b)	Derive the boundary conditions with respect to the electric field at the interface of a dielectric – dielectric boundary	(5)
14	a)	Derive an expression for energy stored in an electrostatic field in terms of electric flux density.	(7)
	b)	What is electric polarisation? Explain.	(3)

PART D

Answer any two full questions, each carries 10 marks.

15		State and explain Poynting theorem and Poynting vector. Also derive an expression for average power density.	(10)
16	a)	A uniform plane wave is travelling at a velocity of 2.5×10^5 m/s having wavelength $\lambda = 0.25$mm in a non magnetic good conductor. Calculate the frequency of wave and the conductivity of a medium.	(5)
	b)	What are electromagnetic waves? Explain the concept of uniform plane waves.	(5)
17		Derive the wave equations for a transmission line.	(10)

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