Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SIXTH SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018

Course Code: EE 302

Course Name: ELECTROMAGNETICS (EE)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks. Marks

1	Obtain gradient of the functions: a) $F = 5\rho^4 z^3 \sin\varphi$ b) $V = 10r^4 \sin\theta \cos\varphi$.	(5)
2	Obtain the expression of electric filed due to different charge bodies.	(5)
3	Find the magnetic flux crossing the portion of the conductor in the plane $\emptyset = \pi/4$ defined by $0.01 \leq \emptyset \leq 0.05\ m$ and $0 \leq Z \leq 2\ m$ for a current of 2 A	(5)
4	Explain about energy densities in electric and magnetic fields.	(5)
5	Explain about Poynting theorem.	(5)
6	Derive and Explain Uniform plane wave equation.	(5)
7	Define a) intrinsic impedance b) characteristic impedance.	(5)
8	Write down the expression of transmission line parameters.	(5)

PART B

Answer any two full questions, each carries10 marks.

9	a)	Explain about the cylindrical coordinate system.	(3)
	b)	Find the gradient of scalar function V=ρ^2 sin 2$\emptyset$ in cylindrical coordinates and the directional derivative of the function in the direction of the vector $\vec{A}=\overrightarrow{a_\rho}+\overrightarrow{a_\emptyset}$ at the point (2, π/4, 0).	(7)
10	a)	Explain about the physical significance of divergence of vector quantity.	(4)
	b)	Derive the expression of electric field intensity due to sheet charge having surface charge density σ_s C/m^2	(6)
11	a)	Explain about the conservative field.	(2)
	b)	Determine the divergence of vector field $1) P = x^2 yz\overrightarrow{a_x} + xy\overrightarrow{a_z}$ $2) Q = 1/r^2 \cos\theta\, \overrightarrow{a_r} + r\cos\theta \sin\theta\, \overrightarrow{a_\theta}$	(8)

PART C

Answer any two full questions, each carries10 marks.

12 a) State and explain Ampere's circuit law. (3)

b) A current filament carries a current of 10 A in the a_z direction on the z axis. Find $\vec{H}$ in rectangular system at point P(1,2,3) due to this filament if it extends from a)z = -∞ to +∞ b) 5 to ∞. (7)

13 a) Derive the expression of inductance of solenoid having N turns. (6)

b) Explain the electric boundary conditions of two dielectric media. (4)

14 a) Formulate the Maxwell's equation in differential form and point form in phasor form. (7)

b) Explain the continuity equation. (3)

PART D

Answer any two full questions, each carries 10 marks.

15 a) What is skin depth? (3)

b) Show that the power flow along a concentric cable is the product of voltage and current using Poynting Theorem. (7)

16 a) Explain group velocity and phase velocity. (5)

b) Derive the attenuation constant and phase shift constant for a perfect conductor. (5)

17 a) Explain about electromagnetic interference. (4)

b) A 9375 MHz uniform plane wave is propagating in polystyrene. If the amplitude of the electric field intensity is 20 V/m and the material is assumed to be loss less find α, β, λ, intrinsic impedance, propagation constant and amplitude of H. (6)

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