Course Code: 1940415 **Roll No:** MLRS- R19

MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section2(f) & 12(B)of the UGC act,1956

II B.Tech II Sem Regular End Examination, July 2021

ELECTROMAGNETIC FIELDS AND WAVES

(ECE)

Time: 3 Hours. Max. Marks: 70

Note: 1. Answer any FIVEquestions.
2. Each question carries 14 marks and may have a, b as sub questions.

1	a)	A point charge of 100pC is located at (4,1,-3) while the x-axis carries charge 2nC/m. if the plane z=3 also carries charge 5nC/m^2 find the E at (1,1,1)	7M	CO1	BL3
	b)	Derive an expression for electric field intensity of an infinite sheet of charge in XY – plane with uniform charge density .	7M	CO1	BL4
2	a)	Derive the expression for the capacitance of capacitor for two parallel plates separated by certain distance 'd'?	7M	CO1	BL4
	b)	Explain Gauss law and also derive Maxwell's first equation.	7M	CO1	BL2
3	a)	Given a magnetic vector potential A= -ρ2/4 Wb/m calculate the total magnetic flux crossing the surface ϕ=π/2 ,1<ρ<2m and 0<z<5m	7M	CO2	BL3
	b)	Write Maxwell's Equations in Different Forms , integral form and Word Statements.	7M	CO3	BL2
4	a)	Obtain an expression for differential magnetic field strength *dH* due to differential current element *Idl* at the origin in the positive Z-direction.	7M	CO2	BL4
	b)	Explain about Amperes' law of forces.	7M	CO2	BL2
5	a)	What is inconsistency in Ampere's circuit law and how to overcome it?	7M	CO3	BL4
	b)	Prove that E_{tan} is continuous and D_{norm} is discontinuous at boundary between dielectric – dielectric mediums?	7M	CO3	BL3
6	a)	A uniform plane wave propagating in a medium has E = $2e^{-\alpha z}\sin(10^8t-\beta z)a_y$ V/m if the medium is characterized by $\varepsilon_r=1$ and $\mu_r=20$ $\sigma=3$ S/m find β, α, H	7M	CO4	BL3
	b)	Derive the expression for attenuation constant and phase constant in a lossy dielectric medium.	7M	CO4	BL3
7	a)	Prove that the intrinsic impedance of the Uniform plane wave in free space is 377Ω	7M	CO4	BL3
	b)	Explain about dominant mode and Degenerate mode	7M	CO5	BL4
8	a)	In a rectangular wave guide for which a=1.5 cms, b=0.8cms $\sigma=0$, $\mu=\mu_0$, $\varepsilon=4\varepsilon_0$ $H_x=2\sin(\pi x/a)\cos(3\pi y/b)\sin((\pi \times 10^{11}t-\beta z)$ A/m find the mode of operation , the cutoff frequency and phase constant , propagation constant	7M	CO5	BL3
	b)	Derive the equation for power transmission for TM waves?	7M	CO5	BL3

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