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Odd Semester Examination 2024
Backlog

Paper Name: Electromagnetic waves **Paper Code: BTECE 501**
Time: 3 Hours **Maximum Marks: 75**

Section A
Attempt ALL questions

Q.N.	Questions	Marks	CO	BL
1	Write the differential and integral form of Maxwell's equations. Also state their physical significance.	5	CO4	L1
2	(a) Define skin depth. (b) How does skin depth changes for a good conductor • if conductivity increases. • if frequency decreases. (c) Find the skin depth for attenuation constant of 0.5 units?	5	CO1	L3
3	What is a uniform plane wave? Give its properties.	5	CO5	L4
4	(a) Compute $\nabla \cdot \vec{F}$ and $\nabla \times \vec{F}$ for the vector field $\vec{F} = x^2yz\hat{i} - (z^3 - 3xy)\hat{j} + 4y^2\hat{k}$ (b) Write the physical significance of curl and divergence of the vector field?	5	CO2	L3
5	Show the impedance transformation on Loss-less and Low loss Transmission line.	5	CO1	L2
6	How waves propagate in a parallel plane waveguide? Show using example.	5	CO4	L4
7	What are the different types of channel impairment losses and attenuation in a waveguide? Explain using examples.	5	CO5	L3

Section B
Attempt any FOUR questions

Q.N.	Questions	Marks	CO	BL
1	Derive the boundary conditions on displacement vector, $\vec{D}$ and electric field vector $\vec{E}$ of an EM wave at media interface.	10	CO3	L1
2	Derive transmission line equations and give expressions for voltage wave.	10	CO4	L3
3	(a) Describe various types of polarized waves. (b) Identify the kind of polarized wave obtained after the superposition of following waves: • $\vec{E_1} = E_0\cos(\omega t + kz)\hat{x}$; $\vec{E_2} = E_0\sin(\omega t + kz)\hat{y}$ • $\vec{E_1} = E_0\cos(\omega t + kz + \frac{\pi}{2})\hat{x}$; $\vec{E_2} = E_0\sin(\omega t + kz)\hat{y}$ Justify your answer.	10	CO5	L4
4	Obtain an expression for reflection and transmission coefficients of a uniform plane wave, reflected from a conducting surface under normal incidence.	10	CO3	L2
5	Prove laws of reflection for an EM wave, reflected from a dielectric interface.	10	CO2	L2
6	Prove the conditions for total internal reflection for an EM wave using Fresnel's equations.	10	CO1	L2

BL: Bloom's Taxonomy level (1-Remenbering; 2-Understanding; 3-Applying; 4-Analysing; 5-Evaluating; 6-Creating)