Exam.Code:0927
Sub. Code: 6897

1078

B.E. (Electronics and Communication Engineering)
Third Semester
EC-301: Electromagnetic Theory

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 (Section- A) which is compulsory and selecting two questions each from Section B-C.

x-x-x

	Section A (All questions are compulsory)	
1	a) How is the inconsistency in Ampere's law overcome?	1
	b) How can you determine if two vectors are independent or dependant?	1
	c) What are the different types of charge configuration and name their units?	1
	d) Define electromagnetic wave polarization.	1
	e) Where the concepts of scalar magnetic potential can't be defined?	1
	f) Write dominant mode in circular waveguide.	1
	g) Define skin depth and surface resistance.	1
	h) Define the term 'Brewster angle'.	1
	i) When a transmission line behaves an infinite transmission line?	1
	j) Why impedance matching is required?	1
	Section B (Attempt any two questions)	
2	a) Derive Maxwell's field equation in differential and integration form, also write their physical interpretation.	5
	b) State and prove stroke's and Gauss's divergence theorem.	5
3	a) A uniform plane wave in a medium having $\sigma=10^{-3}$s/m, $\varepsilon = 80\ \varepsilon_0$ and $\mu=\mu_0$ is having a frequency of 10 kHz. Calculate the different parameters of wave.	4
	b) Prove that for parallel polarization that $\frac{E_r}{E_i} = \frac{\tan(\theta_i-\theta_t)}{\tan(\theta_i+\theta_t)}$ and for perpendicular polarization that $\frac{E_r}{E_i} = \frac{\sin(\theta_t-\theta_i)}{\sin(\theta_t+\theta_i)}$	6
4	a) A travelling electromagnetic wave has a maximum value of E=15 V/m. The medium is a perfect dielectric with $\mu_r=1$ and $\varepsilon_r = 5$ find a)average and peak Poynting vector b) impedance of medium c) peak value of magnetic field.	5
	b) Define intrinsic impedance. Derive an expression for intrinsic impedance when wave is propagating in good conductor.	5
	Section C (Attempt any two questions)	
5	a) Calculate the ratio of circular waveguide cross sectional area to the rectangular waveguide cross section (TE and TM mode). Assume that both these waveguides have similar or equal cut-off frequencies or wavelengths. Assume suitable data.	6
	b) Write the basic equation for transmission line find out input impedance of transmission line terminated with any load impedance (Z_R).	4
6	a) Define infinite transmission line. Derive expression for current and voltage at any point of the infinite line.	4
	b) Derive the quality factor of a circular waveguide	6
7	a) A 12 km line is terminated in its characteristics impedance. At a certain frequency the voltage at 1 km from the sending end is 10% below that at the sending end. Find the voltage across the load impedance in terms of percentage of the sending end voltage.	5
	b) Derive the field components when wave is propagating with TE mode in parallel conducting panes.	5

x-x-x