Exam.Code:0929
Sub. Code: 6911

1078

B.E. (Electronics and Communication Engineering)
Fifth Semester
EC-503: Antennas and Wave Propagation

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) Define radiation and induction field.	1
	b) What is significance of front to back ratio.	1
	c) Define polarization of EM waves.	1
	d) What is effective area of an antenna?	1
	e) State multiplication of pattern.	1
	f) What is line of sight?	1
	g) Define virtual height.	1
	h) What are resonant and non resonant antennas?	1
	i) Define BALUNs.	1
	j) What is stub matching?	1
	Section-B (Do any two questions)	
2	a) Derive an expression for power density and radiation resistance of a half wave dipole antenna.	5
	b) X and y components of a circularly polarized plane electromagnetic wave in free space are $E_x = 2\sin(\omega t - \beta z)$; $E_y = 2\cos(\omega t - \beta z)$ Find the expression for the displacement current density and draw a neat sketch showing the field and current density.	5
3	a) Derive an expression for the gain of a half wavelength antenna.	4
	b) Explain why it is necessary to match the impedance of an antenna to that of the feeder and prove that such matching can be obtained with a quarter wave line.	6
4	a) Find the excitation coefficient of a three elements broad side Chebychev array which produces a radiation pattern with SLR= 20 dB. The spacing of elements is λ.	5
	b) Draw the directional pattern of a half wavelength dipole. Discuss in brief how improved directional patterns are achieved with broad side array using $\lambda/2$ dipole as basic driven elements.	5
	Section-C (Do any two questions)	
5	a) Design a Rhombic antenna to operate at 10 MHZ when the angle of elevation is 10 degree.	5
	b) Bring out the important differences between ground wave propagation, space wave propagation and ionospheric propagation of radio waves; highlight the application area of each of them.	5
6	a) Write short note on top loading and tuning of antenna.	5
	b) Explain clearly meaning of terms skip distance, MUF, critical frequency and virtual height of an ionosphere layer. Which of these will determine directly the maximum electron concentration in an ionospheric layer? Show how it does so?	5
7	a) Derive the field strength at the receiving antenna for tropospheric wave propagation.	5
	b) Determine the change in the electron density of E layer when critical frequency changes from 4 MHz to 1 MHz between mid-day and sun set	5

x-x-x