GUJARAT TECHNOLOGICAL UNIVERSITY ME- SEMESTER II– EXAMINATION – SUMMER 2015

Subject Code: 2720503 Subject Name: Antenna Engineering Design Time: 2:30 PM – 5:00 PM Instructions:			Date: 30/05/2015 Total Marks: 70
Q.1	(a)	Define the following: (i)Radiation intensity (ii)Beam width (iii)Directivity (iv)Radiation power density (v)Effective Aperture (vi)Beam Efficiency (vii)Gain	07
	(b)	What are the different types of antennas? Discuss briefly.	07
Q.2	(a)	Explain the linear, circular and elliptical polarizations along with the suitable examples.	07
	(b)	An antenna with a radiation resistance of 48 ohms, a loss resistance of 2 ohms, and a reactance of 50 ohms is connected to a generator with open circuit voltage of 10 V and internal impedance of 50 ohms via a /4-long transmission line with characteristic impedance of 100 ohms. (i)Draw the equivalent circuit (ii)Determine the power supplied by the generator (iii)Determine the power radiated by the antenna OR	07
	(h)	The radiation intensity of the major lobe of antenna is represented	07
		by: $U = B_0 \cos B_0$ is the maximum radiation intensity. The radiation intensity exists only in the upper hemisphere(0 Ö Ö /2, 0 Ö Ø Ö 2). Find the (i) beam solid angle, exact and approximate (ii) maximum directivity	
Q.3	(a)	Derive the expression of the Array Factor of N-element linear	07
	(b)	Five isotropic sources are placed symmetrically along the z-axis, each separated from its neighbor by an electrical distance kd = 5 /4.For a binomial array, find the (i)excitation coefficients (ii)array factor (iii)normalized power pattern (iv)angles where the nulls(if any) occur OR	07
Q.3	(a)	Write a short note on Dolph-Tschebyscheff Antenna Array.	07
<u>ر</u>	(b)	Draw the geometry of planar antenna array. Obtain the expression of Array Factor.	07
Q.4	(a)	Draw the geometry of Rectangular micro strip Antenna. Enlist its advantages and disadvantages. Derive the expression of resonant frequency of the rectangular cavity.	07

(b) Design a rectangular microstrip antenna using a substrate 07 (RT/duroid 5880) with dielectric constant of 2.2 , h= 0.1588 cm so as to resonate at 10 GHz.

OR

- Q.4 (a) Discuss the factors affecting the aperture efficiency of the 07 parabolic reflector antenna. How does the Cassegrain reflector improve the performance of a parabolic reflector antenna?
 - (b) Design a pyramidal horn antenna with optimum gain at a 07 frequency of 10 GHz. The overall length of the antenna from the imaginary vertex of the horn to the center of the aperture is 10 and is nearly the same in both planes. Determine the

 (i)Aperture dimensions of the horn
 (ii)Gain of the antenna

(iii)Aperture efficiency of the antenna in %.Assume the reflection, conduction and dielectric losses of the antenna are negligible.

- Q.5 (a) Write a short note on Finite Difference Time Domain 07 Method (FDTD).
 - (b) Discuss Feed Networks in Phased Arrays. 07

OR

- Q.5 (a) Explain Beam forming in antenna array .Explain the 07 different methods of Adaptive Digital Beam forming.
 - (b) Explain the smart antenna system alongwith its features and 07 benefits.
