Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–V • EXAMINATION – WINTER • 2014

Subject Code: X 51101 **Date: 29-11-2014**

Subject Name: Antenna and Wave Propagation

Time: 10:30 am - 01:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Define i) Broadside array, ii) End fire array, iii) Far field, iv) Near field, v) Directivity, vi) HPBW, vii) Efficiency of Antenna	**07**
	(b)	What is antenna array? Obtain the expression for the resultant field due to two isotropic point sources placed at a distance 'd' and fed with the same amplitude of currents but with a phase of 'α'.Sketch the radiation pattern for the spacing of $d=\lambda/2$ and phase $\alpha=180^0$.	**07**
Q.2	**(a)**	Derive the expression of radiation resistance in half wave dipole antenna.	**07**
	(b)	Explain principle of pattern multiplication for array of point sources .Give two examples of short dipole.	**07**
		OR	
	(b)	Derive the far field components and the radiation resistance of a small circular loop with a radius 'a' and with a uniform phase current.	**07**
Q.3	**(a)**	Derive Friss Transmission formula for a radio link.	**07**
	(b)	Explain the working of an artificial dielectric lens antenna and derive the relation for effective index of refraction of such a lens formed by conducting sphere.	**07**
		OR	
Q.3	**(a)**	Explain the construction features and operation of i) Yagi-antenna and ii) Folded dipole antenna with a suitable diagram.	**07**
	(b)	Explain Schelkunoff Theorem and show its usefulness	**07**
Q.4	**(a)**	Explain the properties of parabola and obtain the expression of the field intensity ratio in the aperture plane of a cylindrical parabolic reflector.	**07**
	(b)	What is slot antenna? State Babinet's principle. Explain its application to slot antenna and complementary antenna.	**07**
		OR	
Q.4	**(a)**	Draw cross section of cylindrical parabolic reflector and a reflector with paraboloid of revolution. Derive the field intensity ratio in the aperture plane for both. Calculate gain in db and beam width of a paraboloidal reflector of a 5m diameter at 10 GHz. The reflector has an overall efficiency of 65%.	**07**
	(b)	Explain frequency scanning Arrays and mention its advantages.	**07**
Q.5	**(a)**	Write short notes on: i) MUF, ii) Critical frequency, iii) Skip distance.	**07**
	(b)	Explain the experimental set up for the measurement of radiation pattern of an antenna.	**07**
		OR	
Q.5	**(a)**	Explain different modes of propagation with its practical significance.	**07**
	(b)	Explain i) microstrip antenna, ii) Rhombic antenna.	**07**

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