

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 $\alpha=180^\circ$. **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**
