

Code: 9A04503

**R09**

B.Tech III Year I Semester (R09) Supplementary Examinations June 2016

**ANTENNAS & WAVE PROPAGATION**  
(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions  
All questions carry equal marks

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- 1 (a) Define antenna radiation pattern. Draw and explain its parameters.  
(b) Calculate the radiation efficiency of an antenna if the input power is 4 kW, maximum directivity is 20 dB and the radiated power density at a distance of 1 km in the direction of maximum directivity is  $0.2 \text{ mW/m}^2$ .
- 2 (a) Derive the expression for radiation resistance of short dipole antenna. What is its directivity?  
(b) Calculate power gain of a half wave dipole when ohmic losses & directive gain are 7 ohms & 1.64 respectively.
- 3 (a) Calculate directivity in dB for: (i) Broad-side array. (ii) End-fire array. Assume that both arrays have 8 isotropic elements separated by  $\lambda/4$  distance.  
(b) Illustrate merits and demerits of binomial array.
- 4 (a) Explore various modes of operation of helical antennas with examples.  
(b) Give the design equations for optimum pyramidal horn antenna. Considering these equations, obtain the dimensions for the antenna if it is designed at X-band. Assume necessary data.
- 5 (a) Explain how to derive radiation pattern of a rectangular microstrip antenna of  $\lambda/2 \times \lambda/2$  using array theory.  
(b) Explore various feed methods of parabolic antenna.
- 6 (a) Discuss about different types of Lens antennas.  
(b) Establish far field criteria by derivation. Also find at a point where far and near fields are equal.
- 7 Write short notes on:  
(a) M – Curves.  
(b) Plane earth reflection.  
(c) Path loss.
- 8 (a) Establish relation between MUF and cut off (critical) frequency.  
(b) Distinguish between skip distance and virtual height. Give suitable sketches.

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