

R16

Code No: 136AF

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, March/April - 2021

ANTENNAS AND WAVE PROPAGATION
(Common to ECE, ETM)

Max. Marks: 75

Time: 3 hours

Answer any five questions
All questions carry equal marks

1. a) Explain the terms: i) Radiation resistance ii) Effective length iii) Radiation intensity.
b) Calculate $D(\theta, \phi)$, the directivity for the unidirectional antenna with the power pattern $\phi = \phi_m \sin\theta \sin^2\phi$. [9+6]
2. Derive the field components and radiation resistance of a quarter wave monopole starting from Maxwell's equations. [15]
3. a) Sketch and explain the construction, operation and design considerations for a Yagi-Uda antenna.
b) Distinguish between sectoral, pyramidal and conical horns. Explain their utility. [9+6]
4. a) Draw the constructional features of microstrip antenna.
b) Explain the importance of focal length to diameter ratio of a parabolic reflector.
c) Calculate the directivity of a 20 turn helical antenna having $\alpha=12^\circ$, circumference equal to one wavelength. [6+4+5]
5. a) Demonstrate the constructional features of Cassigrain feed.
b) Differentiate end-fire and broad side arrays.
c) Calculate the directivity of a 10 element uniform linear end-fire array with improved directivity with a spacing of $\lambda/4$ between the elements. [7+4+4]
6. a) Explain the absolute method for measuring the gain of an antenna.
b) What are the features of Binomial array? Explain its feeding concepts. [8+7]
7. a) What is Wave tilt? How does it affect the field strength at a distance from the transmitter?
b) At what frequency a wave must propagate for the D-region to have an index of refraction 0.5? Assume that the Ionic density of D-layer is 400 electrons/cubic cm. [9+6]
8. a) Write short notes on
(i) Skip distance (ii) Day and night frequency.
b) Find the range of LOS system when the receiver and transmitter antenna heights are 10m and 100m respectively. Take effective earth's radius into consideration. [10+5]