

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
Sixth semester B.Tech degree examinations (S), September 2020

Course Code: EC306

Course Name: Antenna & Wave Propagation

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks

Marks

- 1 a) With a neat diagram of the experimental setup, explain how radiation pattern measurement of an antenna is carried out. (10)
- b) Explain antenna field zones (5)
- 2 a) Derive expressions for the Far Field components and Radiation Resistance of a short dipole antenna. (12)
- b) Calculate the effective aperture of a short dipole antenna operating at 100 MHz. (3)
- 3 a) State and Prove Reciprocity Theorem. (7)
- b) The radiation intensity of the major lobe of an antenna is represented by (8)
- $$U = A_0 \cos\theta, \quad 0 < \theta < \frac{\pi}{2}, \quad 0 < \Phi < 2\pi$$
- Find the maximum directivity?

PART B

Answer any two full questions, each carries 15 marks

- 4 a) Explain the working of a rhombic antenna and its applications. (8)
- b) Explain the working of V antenna. (7)
- 5 a) Design a Dolph –Tschebyscheff array of 10 elements with spacing of $d = \lambda/2$ between the elements and major to minor lobe ratio is 26 dB. (15)
- 6 a) Derive expression for directions of pattern maxima, pattern minima and HPBW for a endfire array of 'n' elements. (10)
- b) With neat diagrams explain the principle of operation of a Horn antenna. (5)

PART C

Answer any two full questions, each carries 20 marks

- 7 a) With detailed diagrams explain the structure and modes of operation of helical antenna. (12)
- b) Explain duct propagation. (8)
- 8 a) Define Critical frequency and Maximum usable frequency. (5)

- b) With the help of neat diagrams explain the principle of operation of Log Periodic Antenna. (10)
- c) Explain Tropospheric scatter propagation. (5)
- 9 a) Design a rectangular microstrip antenna using a dielectric substrate with dielectric constant of 2.2, $h = 0.1588$ cm so as to resonate at 10 GHz. (15)
- b) What is fading. Explain the diversity techniques adopted in wave propagation. (5)

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