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Question Paper Code : X 60460

B.E./B.Tech. DEGREE EXAMINATIONS, NOV./DEC. 2020

Sixth Semester

Electronics and Communication Engineering

EC 2353/EC 63/10144 EC 604 – ANTENNAS AND WAVE PROPAGATION

(Regulations 2008/2010)

(Common to PTEC 2353 – Antennas and Wave Propagation for B.E. (Part – Time)
Fifth Semester – Electronics and Communication Engineering – Regulations 2009)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

1. What is the significance of gain of an antenna ?
2. Define the brightness temperature of the antenna.
3. How a dipole antenna can be formed from a 2 wire open circuited transmission line ?
4. Mention the features of radiation pattern multiplication principle.
5. State Huygen's Principle.
6. What are the features of slot antenna ?
7. Mention the types of feeding structures used for microstrip patch antennas.
8. Design a 3 element Yagi – Uda antenna to operate at a frequency of 200 MHz.
9. Define optimum working frequency.
10. What is meant by Faraday rotation ?

PART – B

(5×16=80 Marks)

11. a) i) Derive the radiation resistance of an Oscillating Electric Dipole. **(8)**
ii) Define and explain the polarization and its significance in antenna analysis. **(8)**

(OR)



- b) i) State and prove Lorentz Reciprocity Theorem for Antennas. (8)
 ii) Define
 1) Gain
 2) Directivity
 3) Antenna Temperature
 4) Antenna Input impedance. (8)
12. a) Derive the near field and far field electric and magnetic component of a finite length dipole and obtain the radiation pattern for various values of the length. (16)
 (OR)
 b) For a 2 element linear antenna array separated by a distance $d = 3\lambda/4$, derive the field quantities and draw its radiation pattern for the phase difference of 45° . (16)
13. a) Discuss the construction of the rectangular Horn antenna and draw the measured E – and H – plane field patterns of rectangular horns as a function of flare angle and horn length. (16)
 (OR)
 b) A square-corner reflector has a driven $\lambda/2$ element $\lambda/2$ from the corner. (4×4=16)
 i) Calculate and plot the far-field pattern in both principal planes.
 ii) What are the HBPWs in the two principal planes ?
 iii) What is the terminal impedance of the driven element ?
 iv) Calculate the directivity from impedances of driven and image dipoles. Assume perfectly conducting sheet reflectors of infinite extent.
14. a) With neat diagram explain helical antenna and briefly describe its operation in the axial mode. How does it differ from other antennas ?
 (OR)
 b) With neat block diagram explain how Radiation pattern and Gain of an antenna can be measured.
15. a) i) Draw the structure of ionosphere and explain the mechanism of ionosphere propagation. (10)
 ii) Explain the effects of magnetic fields on EM wave propagation. (6)
 (OR)
 b) i) Explain the terms:
 1) MUF
 2) Virtual height
 3) Duct propagation
 4) Skip distance
 5) Fading. (10)
 ii) Explain the mechanism of tropospheric propagation. (6)