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**Question Paper Code : 51463**

**B.E./ B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016**

**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. Write the importance of radiation resistance of an antenna.
2. What is the significance of aperture of the antenna ?
3. A uniform linear array contains 50 isotropic radiation with an inter element spacing of  $\lambda/2$ . Find the directivity of broadside forms of arrays.
4. What is pattern multiplication and draw the pattern of 2 point sources separated by  $\lambda/2$ .
5. State Huygen's principle.
6. What are the merits and applications of offset feed reflector antenna ?
7. Calculate the radio horizon of a TV antenna placed at a height of 166 m. If the receiver is at a distance of 66 km, what should be the height of the receiving antenna ?
8. Write any four salient features of micro strip antenna.
9. Find the maximum distance that can be covered by a space wave, when the antenna heights are 60 m and 120 m.
10. What is Fading and how it is compensated ?

**PART – B (5 × 16 = 80 Marks)**

11. (a) Derive the Electric and magnetic field components of a Hertzian dipole. **(16)**

**OR**

- (b) (i) Two spacecrafts are separated by 3 km. Each has an antenna with directivity  $D= 200$  operating at 2 GHz. If craft A's receives 20 db power, what is the transmitted power by craft B ? **(7)**
- (ii) Explain the following terms with respect to antenna :
- (1) Polarization
  - (2) Effective aperture
  - (3) Directivity **(9)**

12. (a) (i) What is binomial array ? **(2)**
- (ii) Draw the pattern of 10 element binomial array with spacing between the elements of  $3\lambda/4$  and  $\lambda/2$ . **(14)**

**OR**

- (b) Derive the expressions for field pattern of broad side array of n point sources. **(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 impedance of driven and image dipoles. Assume perfectly conducting sheet reflectors of infinite extent.

14. (a) (i) Differentiate V antenna from Rhombic antenna. Explain their construction and principles in detail. **(8)**
- (ii) Explain the design details of log periodic dipole antenna. **(8)**

**OR**

- (b) (i) Draw a neat block diagram for antenna radiation pattern measurement. Explain the procedure in detail. **(10)**
- (ii) Give an account on " Helical Antenna". **(6)**

15. (a) (i) Describe the Troposcatter propagation. **(8)**
- (ii) Explain the effect of Earth's magnetic field on ground wave propagation. **(8)**

**OR**

- (b) Describe the theory of propagation of Electromagnetic wave through the ionosphere in the presence of external magnetic field and show that the medium acts as doubly refracting crystal. **(16)**