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Question Paper Code	12194
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**B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2023**

Sixth Semester

**Electronics and Communication Engineering**

**20ECPC601 - TRANSMISSION LINES AND ANTENNAS**

(Smith chart needs to be provided)

(Regulations 2020)

Duration: 3 Hours

Max. Marks: 100

**PART - A (10 × 2 = 20 Marks)**

Answer ALL Questions

- |   | <i>Marks,<br/>K-Level, CO</i> |
|---|-------------------------------|
| 1. Write the condition for distortion less line.                            | 2,K1,CO1                      |
| 2. Why do standing waves exist on transmission lines?                       | 2,K2,CO1                      |
| 3. Relate the Gain and Directivity of an antenna through proper expression. | 2,K1,CO3                      |
| 4. Find the length of half wave dipole at 30MHz.                            | 2,K1,CO3                      |
| 5. Interpret the meaning of array factor.                                   | 2,K1,CO4                      |
| 6. Write about pattern multiplication and its advantages.                   | 2,K1,CO4                      |
| 7. What are the features of Pyramidal horn antenna?                         | 2,K1,CO5                      |
| 8. What is aperture blockage?   | 2,K1,CO5                      |
| 9. Draw the various layers of atmospheric structure.                        | 2,K1,CO6                      |
| 10. Define virtual height.  | 2,K1,CO6                      |

**PART - B (5 × 13 = 65 Marks)**

Answer ALL Questions

11. a) Derive the general transmission line equations for voltage and current at any point on a line. 13,K2,CO1
- OR**
- b) Discuss in detail the inductance loading of telephone cables and discuss the attenuation constant, phase constant and velocity of signal transmission for the uniformly loaded cable. 13,K2,CO1
12. a) Define and mention the significance of the following antenna parameters with relevant formulas: 13,K2,CO3
- (i) Antenna Gain.
  - (ii) Antenna Efficiency.
  - (iii) Effective Area.
  - (iv) Radiation Pattern.

**OR**

- b) Derive Friis transmission formula. Explain its significance. *13,K2,CO3*

13. a) Derive the field equations for array of two point sources with spacing  $\lambda/2$  with equal amplitude and phase. Also derive the array factor, direction of maximum, minimum and half power point directions. Draw the radiation pattern. *13,K2,CO4*

**OR**

- b) Explain in detail the Binomial array and derive an expression for the array factor. Also obtain the excitation coefficients of a seven element binomial array. *13,K2,CO4*

14. a) Discuss the working principle of parabolic reflector. Explain the various feed techniques their relative merits and demerits. *13,K2,CO5*

**OR**

- b) With necessary illustrations explain the radiation characteristics of Microstrip antenna and mention its possible application. *13,K2,CO5*

15. a) Write short note on (i) reconfigurable antenna (ii) Active antenna. *13,K2,CO6*

**OR**

- b) Explain about sky wave propagation and drive the expression for critical frequency. *13,K2,CO6*

**PART - C (1 × 15 = 15 Marks)**

16. a) Discuss in detail the distribution for voltage and current on a lossless line at ultra high frequencies. *15,K2,CO2*

**OR**

- b) (i) Discuss the principle of double stub matching with neat diagram. *7,K2,CO2*  
(ii) A single stub is to match a  $400 \Omega$  line to a load  $200 - j100 \Omega$ . The wavelength is 3 m. Determine the position and length of the short-circuited stub using relevant formula. *8,K2,CO2*