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VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

B.E. (ECE: CBCS) VI-Semester Advanced Supplementary Examinations, July-2019

Transmission Lines & Antennas

Time: **3** hours Max. Marks: **70**

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

1. The physical length of a transmission line is λ/4 meters. Find its electrical length.
2. What is meant by loading of cable? Classify types of loading?
3. Write the characteristics of $\frac{\lambda}{2}$ and $\frac{\lambda}{4}$ length of transmission lines?
4. The characteristic impedance and phase shift constants of a transmission line are 49Ω and 1.54 rad/s respectively. Find the length of a short circuit stub that will have an impedance of j 25 Ω.
5. A dipole antenna of λ/8 length has an equivalent total loss resistance of 1.5 Ω. Find the efficiency of the antenna.
6. An antenna has a field pattern given by $E(\theta) = \cos^2\theta$ for $0 \leq \theta \leq 90^\circ$. Find directivity and HPBW.
7. Write the excitation coefficients for 7 element binomial array?
8. Define pattern multiplication and give its importance.
9. List out the different modes of helical antenna?
10. List the advantages and disadvantages of Microstrip antennas.

Part-B (5 × 10 = 50 Marks)

(All sub-questions carry equal marks)

11. a) Draw the characteristics of m derived T section for high pass filter.

    b) Design T and π section low pass filter which has series inductance 80 MHz and shunt capacitance 0.022 μF. Find the cutoff frequency and design impedance.

12. a) A distortion less transmission line has an attenuation constant of 20 mNp/m. The Characteristic impedance of the line is 50Ω. Assume that the phase velocity on the line is 0.6 times the velocity of light. Find primary constants and delay in the Transmission line?

    b) At a frequency of 80 MHz, a lossless transmission line has a characteristic impedance of 300 Ω and a wavelength of 2.5m. Find series inductance and shunt capacitance of the line.

13. a) Explain the quarter wave monopole antenna and draw its radiation patterns of E and H fields.

    b) Derive an expression for Friis transmission equation of an antenna.

14. a) Consider an array of two identical infinitesimal dipoles separated by a distance λ/4 with same magnitude excitation difference β between the elements. Find the nulls of the total field for β=0 and β=π/2 and also illustrate the same.

    b) With the aid of appropriate sketches, explain the operation of Yagi-Uda array. List its applications. Why it is called a super gain antenna.

Contd…2

15. a) Give the comparison of different modes in which a helical antenna can radiate the signal.

    b) Explain the working principle of lens antenna with neat diagrams.

16. a) Derive conditions to avoid various distortions in the transmission line?

    b) How circuit elements L,C can be realized using lossless transmission line?

17. Write short notes of any ***two*** of the following:

    a) A magnetic field strength of 5μA/m is required at a point on $\theta = \pi/2$, 2 Km from an antenna in air. Neglecting ohmic loss, how much power must the antenna transmit if it is a Loop antenna of radius $\lambda/25$.

    b) Explain the principle and working of Rhombic antenna with suitable sketches.

    c) List out the differences between the active and passive corner reflectors. What are retroreflectors?

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