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VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (E.C.E.) II Year II-Semester Advanced Supplementary Examinations, June/July-2017

Networks and Transmission Lines

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. Show that the product of characteristic impedance of π and T network is equivalent to the product of their series and shunt arm impedances provided total series and shunt arms of the two networks are same.
2. The impedance of a series and shunt arms of L network are j300 ohms and –j700 ohms respectively. Calculate image impedances of the network.
3. List out the merits and demerits of constant K filters.
4. At what frequency will a prototype T section low pass filter having a cut off frequency fc, have an attenuation of 10 db?
5. Classify the equalizers and mention it's any two applications.
6. Design a symmetrical π type attenuator with characteristic resistance 600Ω to produce an attenuation of 20dB.
7. Write Campbell's formula and its significance.
8. Distinguish between Heaviside and lumped loading of cables.
9. Draw the voltage and current wave forms pattern on lossless transmission line terminated by open circuit load.
10. A load of 100 + j150Ω is connected to a 75Ω lossless line. Find VSWR and transmission coefficient.

Part-B (5 × 10 = 50 Marks)

11. a) Explain the electrical characteristics of an asymmetrical network. [6]

    b) Design a symmetrical 'T' network for the following specifications Characteristic impedance $Z_o = 400\Omega$, propagation constant $\gamma = j\frac{\pi}{4}$ [4]

12. a) Explain about 'm' derived low pass filter and derive its design equations. [5]

    b) Design an 'm' derived T section high pass filter with a cut off frequency fc = 20 kHz, design impedance Rk = 600 ohms and m = 0.6. [5]

13. a) Synthesize the given driving point impedance function $Z_{RC}(s) = \frac{(S+2)(S+6)}{2(S+1)(S+3)}$ in cauer form I and II realizations. [5]

    b) Write the properties of Hurwitz polynomial and Test the given polynomial is Hurwitz or not: $P(s) = S^6 + 3S^5 + 8S^4 + 15S^3 + 17S^2 + 12S + 4 = 0$. [5]

14. a) Derive the conditions to avoid frequency and delay distortions on the transmission lines. [6]

    b) Explain telephone cables are not used at high frequencies. [4]

Contd... 2

15. A lossless transmission line with characteristic impedance of 100Ω is terminated by 100+j200 Ω load. Using Smith Chart determine [10]

    a) Reflection Coefficient and Transmission Coefficient at a distance of 0.2 λ from the load.

    b) R_{max} *and* R_{min} resistances on the transmission line.

    c) Identify the locations of V_{max} *and* V_{min} at a distance of 0.7 λ from the load.

    d) Impedance and admittance at a distance of 1.2 λ from the load.

16. a) Derive the expressions for characteristic impedance and propagation constant for symmetrical 'T' network. [5]

    b) Explain about composite filter with a neat block diagram. [5]

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

    a) Inverse network elements. [5]

    b) Lattice delay equalizer. [5]

    c) Characteristics of half wave length transmission line. [5]