ANNA UNIVERSITY :: CHENNAI – 600 025

MODEL QUESTION PAPER

V SEMESTER

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

EC335 – TRANSMISSION LINES AND NETWORKS

Time: 3hrs **Max Marks: 100**

Answer all Questions
(Smith chart to be provided)

PART – A (10 x 2 = 20 Marks)

1. Why frequency and phase distortion occur in transmission line? Write the condition of no distortion in terms of line parameters.
2. What is meant by reflection loss and insertion loss in a transmission line?
3. An air-filled coaxial transmission line has outer and inner conductor radii equal to 6 cm and 3cm, respectively. Calculate the values of a) inductance per unit length, b) capacitance per unit length and c) characteristic impedance of the line.
4. A loss less transmission line with Z_0 = 50 ohm is terminated in an impedance equal to 50+j50 ohm. What is the reflection coefficient and VSWR on the line.
5. A 100-ohm load is to be matched to a 50-ohm line. Determine the characteristic impedance of a quarter wavelength matching section
6. State the reasons, which necessitate the use of stub matching in practice.
7. What is the function of the m-derived section in a composite filter?
8. Sketch the variation of characteristic impedance of a low-pass constant K filter as a function of frequency.
9. What is the function of delay equalizer? Where it is used.
10. Show under what condition a symmetrical lattice network with series arm impedances Z_1 and diagonal impedances Z_2 will be a constant resistance network.

PART – B (5 x 16 = 80 Marks)

11. Derive the expressions for the voltage and current at any point on the transmission line in terms of propagation constant, length and characteristic impedance of the line. Hence deduce an expression for input impedance in terms of reflection coefficient.

12.a) What are the special considerations of radio frequency lines? A radio frequency line with Z_0 = 70 ohm is terminated by Z_L = 115 – j80ohm at λ = 2.5m. Find the VSWR & the maximum and minimum line impedances. Derive the formula used.

(OR)

12.b) A loss less line has a standing –wave ratio of 4. The R_o is 150 ohm and the maximum voltage measured on the line is 135 V. Find the power being delivered to the load. Derive the equation used.

13.a) A loss less line with Z_0 = 300 ohm in operated at 200 MHz. The line is terminated with a load Z_L to produce VSWR = 4.48, the first voltage minimum occurs at 6cm from the load end. Determine two stubbing positions nearest to the load and the corresponding lengths of short-circuited stubs having a characteristic impedance of 300 ohm for matching.

(OR)

13.b) A 50 ohm line feeds an inductive load Z = 35+j35 ohm. Design a double stub tuner to match this load to the line (make use of a Smith's chart).

14.a) Design a composite low-pass filter with a cutoff frequency of 10KHz for a load resistance of 500 ohm. It should have high attenuation at 10.65 KHz.

(OR)

14.b) Design a composite high-pass filter with a cutoff frequency of 10KHz for a load resistance of 500 ohm with high attenuation at 9.39 KHz.

15.a) Design a symmetrical 600Ω bridged – T resistance attenuator to have an attenuation of 20dB.

(OR)

15.b) A length of telephone cable is driven from a 600Ω resistance. The measured insertion loss in dB is tabulated:

$f(H_z)$ ⟶	30	100	500	1000	2000	4000	6000
loss(dB) ⟶	3.8	3.8	4.6	6.6	10.5	16.4	20.7

Design a lattice network to equalize the cable within 2dB from 30 to 4000 Hz. The overall insertion loss of the cable and equalizer must not exceed 20dB.
