

PART B — (5 × 16 = 80 marks)

11. (a) Derive and draw the m-derived T and Π section for low pass and high pass filter. (16)

Or

- (b) Derive characteristic impedance, inductance, capacitance and cut-off frequency for constant k low pass and constant k highpass filter, also draw their reactance curves. (16)

12. (a) (i) Obtain the general solution of transmission line. (10)

- (ii) A telephone cable 64 km long has a resistance of 13 Ω /km and a capacitance of 0.008 μ F/km. Calculate attenuation constant, velocity and wavelength of the line at 1000 Hz. (6)

Or

- (b) (i) Explain about different type of transmission line. (8)

- (ii) Discuss the following : reflection loss and return loss. (8)

13. (a) (i) Derive the expression for the input impedance of the dissipationless line and thus obtain the expression for the input impedance of the quarter wave line. Also discuss the applications of the quarter wave line. (10)

- (ii) Design a single stub match for a load of 150 + j 225 ohms for a 75 ohms line a 500 MHz using smith chart. (6)

Or

- (b) Explain double stub matching on a transmission line and derive the expression and the length of the stub used for matching on a line. (16)

14. (a) Discuss the characteristics of TE and TM waves and also derive the cut off frequency and phase velocity from the propagation constant. (16)

Or

- (b) (i) Derive field component of the wave propagation between parallel plates. (8)

- (ii) Derive the expression of wave impedance of TE, TM and TEM wave between a pair of perfectly conducting planes. (8)

15. (a) (i) Explain about excitation modes in rectangular wave-guide. (10)

- (ii) Calculate resonant frequency of an air filled rectangular resonator of dimensions $a = 3$ cm, $b = 2$ cm and $d = 4$ cm operating in TE_{101} mode. (6)

Or

- (b) Explain the propagation of electromagnetic waves in a cylindrical waveguide with suitable expressions. (16)