5E 5023

B. Tech. V Semester (Main/Back) Examination, Dec., 2014

ELECTRONICS & COMMUNICATION ENGG. # 5EC3A

TELECOMMUNICATION ENGINEERING

Time : 3 Hours **Min. Passing Marks : 24** **Maximum Marks : 80**

Instruction to Candidates :

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)

Unit–'I'

1. (*a*) A telephone line has R = 30 Ω/Km, L = 100 mh/Km, G = 0 and C = 20 μf/Km at f = 1 kHz. Calculate the phase velocity. [8]

(*b*) Establish the differential equation for a transmission line and calculate the voltage and current on the line, and prove that $Z_0^2 = Z_{oc} \cdot Z_{sc}$ [8]

OR

1. (*a*) A lossless transmission line operating at a frequency of 1 MHz has Zo = Ro = 680 Ω, β = 20 rad/Km. The line is terminated in pure resistance of 400 Ω and the voltage across the load is 5 V. Find:

(i) Magnitude of phase of voltage and current at a distance of 500 m from the load.

(ii) The values of V max, V min, I max, I min. [10]

(*b*) Derive an expression for reflection coefficient and VSWR when line is:

(i) Short circuited

(ii) Open circuited

(iii) Perfectly matched. [6]

Unit–'II'

2. (*a*) Why matching of transmission line is needed? Briefly explain the impedance matching devices and derive an expression for calculating length of stub. [10]

(*b*) Write down the application of smith chart and define R – circles and X - circles. [3]

(*c*) A lossless line has a characteristic impedance of 100 Ω and inductance per unit length of 1 μ h/m. If the line is operated at 1 GHz, find propagation constant β. [3]

OR

2. (*a*) Draw the block diagram and explain the procedure for measurement of Insertion loss and VSWR. [10]

(*b*) A parallel wire line has Zo = 70Ω Z_R = (120 – j 80) Ω, S = 2.6. If the line is to transmit power of 60 watts, find the magnitude of voltage and current. Also find the magnitude of the receiving end voltage. [6]

Unit–'III'

3. (*a*) Find the values of attenuation per section and characteristic impedance of a symmetrical π-attenuators when the component value have given as

(i) Series arm R_1 = 20 Ω, shunt arm (each) R_2 = 400Ω

(ii) R_1 = 100 Ω, R_2 = 300 Ω [10]

(*b*) Draw a symmetrical bridged - T attenuator and writes the design equations. [6]

OR

3. (*a*) Sketch a section of m-derived Band pass filter and derive the value of each component. [10]

(*b*) Design an m-derived T Section (High Pass) filter with a cutoff frequency fc = 20 kHz. design impedance, R_D = 600 Ω and m = 0.6. [6]

Unit–'IV'

4. (*a*) During the busy hour 1500 calls were offered to a group of trunks and 10 calls were lost. The average call duration is 5 minutes. Find:

(i) The traffic offered

(ii) The traffic carried

(iii) Gos

(iv) Traffic lost

(v) Total duration of Period of Congestion. [8]

(*b*) What is multiplexing? Write the differences between FDM & TDM. [8]

OR

4. (*a*) What is echo in a telephone system? Define the concept of using echo cancellers and echo suppressors. [8]

(*b*) Explain cross talk. How many types of Cross talk exist in telecommunication circuits? [8]

Unit–'V'

5. Write the short notes on any two: [8×2 = 16]

(*i*) SPC Digital telephone exchange

(*ii*) STS and TST switches

(*iii*) Facsimile services

(*iv*) Concept of supervisory and AC signaling.