Roll No .....

EC - 505

B.E. V Semester

Examination, June 2016

Communication Network and Transmission Lines

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.
ii) All parts of each question are to be attempted at one place.
iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.
iv) Except numericals, Derivation, Design and Drawing etc.

1. a) What is meant by insertion loss?
   b) A symmetric T section has an impedance of j 100Ω in each series arm and an impedance of j 400 Ω in each shunt arm. Find the characteristic impedance.
   c) 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.
   d) Design a symmetrical 600Ω bridged - T resistance attenuator to have an attenuation of 20dB.

   OR

   Determine the image impedance, iterative impedance and characteristic impedance of symmetrical two port network.

2. a) What is the function of the m-derived section in a composite filter?
   b) What are the properties of band elimination filter?
   c) Write the differences between Butterworth and Chebyshev Approximation.
   d) Transform a low-pass filter to high pass filter using frequency transformation method.

   OR

   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 10.65KHz.

3. a) What are the conditions of positive real function?
   b) Write the properties of L-C impedance functions.
   c) Test whether the polynomial F(s) is Hurwitz, $F(s) = s^4+s^3+s^2+3s+4$.
   d) Synthesize the following functions in a Foster form. $(s^2+1)(s^2+8)/ s(s^2+4)$.

   OR

   Synthesize the following functions in Cauer form. $(s^3+2s^2+s+1)/(s^3+s^2+ s)$.

4. a) What is meant by reflection loss and insertion loss in a transmission line?
   b) Calculate the characteristic impedance of a transmission line if the following measurement have been made on the line $Z_{oc} = 550 \angle -60°\Omega$ and $Z_{sc} = 500 \angle 30°\Omega$.
   c) List the parameters of coaxial cable line at high frequencies.
   d) Derive the conditions required for a distortionless line.

   OR

   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.

5. a) State the reasons, which necessitate the use of stub matching in practice.
   b) Define standing wave ratio.
   c) What are the applications of the quarter wave and half wave line?
   d) 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).

   OR

   What are the special considerations of radio frequency lines? A radio frequency line with Z_0 = 70 Ohm is terminated by Z_L = 115 – j80 Ohm at λ = 2.5m. Find the VSWR and the maximum and minimum line impedances.

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