ROLL NO. _____

Code: DE107 Subject: NETWORKS AND TRANSMISSION LINES

DipIETE – ET (NEW SCHEME)

Time: 3 Hours **JUNE 2016** **Max. Marks: 100**

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- **Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1 Choose the correct or the best alternative in the following: (2×10)

a. A parallel RLC circuit (R=1 ohm, L=1H, C=1F) is excited by a unit step current. The steady state current through L will be
(A) Zero **(B)** 1/3 unit
(C) 2/3 unit **(D)** 1 unit

b. The Laplace transform of the unit impulse is
(A) s. **(B)** 0.
(C) s e −s. **(D)** 1.

c. Norton's theorem results in
(A) Current source in parallel with an impedance
(B) A current and an impedance in series
(C) A voltage source only
(D) A current source only

d. The VSWR lies in the range of
(A) 0 to 1 **(B)** 1 to infinite
(C) 0 to infinite **(D)** –1 to +1

e. A Smith Chart is used for solving problems in
(A) Radio wave propagation **(B)** Transmission line
(C) Antenna system **(D)** Power transfer problems

f. The characteristics impedance of a distortion-less line is
(A) Real **(B)** inductive
(C) capacitive **(D)** complex

g. Thevenin's theorem is valid for a network containing only
(A) Non-linear network **(B)** linear elements
(C) resistances **(D)** reactive elements

h. A parallel resonant circuit can be used
(A) as a high impedance
(B) to reject a small band of frequencies
(C) Both **(A)** and **(B)**
(D) to amplify certain frequency

i. One neper is equal to

(A) 0.8686 db **(B)** 8.686 db
(C) 118.686 db **(D)** 86.86 db

j. When 3 equal resistances of 5 ohm are connected in delta, what is the resistance in one of the arms of the equivalent star circuit

(A) 5 ohm **(B)** 1.33 ohm
(C) 15 ohm **(D)** 10 ohm

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

Q.2 a. Explain common singularity functions. **(3)**

b. Find the inverse Laplace transform of the following function **(5)**

$F(s) = \frac{s+4}{2s^2+5s+3}$

c. State and prove Initial and Final value theorem. **(8)**

Q.3 a. State & prove π-T equivalent theorem. **(8)**

b. A network function has a zero at 3 mega radians/sec and poles at 2 and 4 mega-radians/sec. It is required to give a driving point impedance of +j 100 ohms at 1 mega-radians/sec. Determine the schematic diagram of a series type Foster network & the values of the elements. **(8)**

Q.4 a. Find the relationship between two-port Z, Y, h and ABCD parameters. **(8)**

b. Explain the application to the analysis of typical two-port networks. **(8)**

Q.5 a. Explain the characteristic curves of series RLC & parallel RLC resonance circuit. **(8)**

b. A 100mH inductor with 500 ohm self resistance is in parallel with a 5nF capacitor. Find the resonance frequency of the combination. Sketch the variation of impedance with frequency. **(4)**

c. Compare the series & parallel resonance circuit. **(4)**

Q.6 a. Derive transmission line equations & find its constants. **(8)**

b. A generator of 1 volt, 1000Hz, supplies power to 1000 km long open wire line terminated in Z_0 (Characteristic impedance) & having following parameters : R=10.4 ohms, L=0.0037 henry, G=0.8 micromhos, C=0.00835mfd. Calculate the phase velocity, Characteristic impedance, propagation constant & power delivered at the receiving end. **(8)**

Q.7 a. Define reflection and derive the relation for reflection coefficient. **(8)**

b. Derive expression for Input Impedance of open and short circuited lines. Also find secondary line constants in terms of Z_{OC} & Z_{SC}. **(4+4)**

Q.8 a. Explain the basis for construction of Smith chart. Illustrate as to how it can be used as an admittance chart. **(10)**

b. A lossless transmission line in air has a characteristic impedance of 300 ohms & is terminated by unknown impedance. When the frequency is 200 Mhz, the standing wave ratio is 4.48 and first voltage minima is situated at 6 cm from the load. Determine the complex reflection co-efficient and terminating impedance of the line. **(6)**

Q.9 a. Define Band pass filter and explain constant-k filter and m-derived filter. **(8)**

b. Draw and explain asymmetrical L and π attenuator. **(8)**