ROLL NO. _____

Code: DE57 Subject: NETWORKS AND TRANSMISSION LINES

DipIETE – ET

Time: 3 Hours **DECEMBER 2013** **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. The characteristic impedance Z_o of transmission line is

(A) Arithmetic mean of Z_{oc} and Z_{sc}
(B) Geometric mean of Z_{oc} and Z_{sc}
(C) Harmonic mean of Z_{sc} and Z_{oc}
(D) Always equal to Z_{sc} and Z_{oc}

b. A transmission line becomes distortion less if

(A) G = 1/R **(B)** LG = CR
(C) It operate in AF range **(D)** It is properly matched

c. Norton's equivalent circuit consists of

(A) voltage source in parallel with impedance
(B) voltage source in series with impedance
(C) current source in series with impedance
(D) current source in parallel with impedance

d. The convolution of $f(t)*g(t)$ is

(A) $\int_0^{\infty} f(t)g(t-\tau)d\tau$ **(B)** $\int_0^{t} f(t)g(t-\tau)d\tau$

(C) $\int_0^{t} f(t-\tau)g(t)dt$ **(D)** $\int_0^{t} f(t)g(t-\tau)dt$

e. If Z parameter of a two port network are $Z_{11}=5\Omega$, $Z_{22}=7\Omega$; $Z_{12}= Z_{21}=3\Omega$ then the A,B,C,D parameters are respectively given by

(A) $\frac{5}{3};\frac{26}{3};\frac{1}{3};\frac{7}{3}$ **(B)** $\frac{10}{3};\frac{52}{3};\frac{2}{3};\frac{14}{3}$

(C) $\frac{15}{3};\frac{78}{3};\frac{3}{3};\frac{21}{3}$ **(D)** $\frac{3}{5};\frac{3}{26};\frac{3}{1};\frac{3}{7}$

f. An ideal filter should have

(A) Zero attenuation in the pass band
(B) Infinite attenuation in the pass band
(C) Zero attenuation in the attenuation band
(D) Infinite attenuation in the attenuation band

g. A transmission line VSWR is a

(A) vector quantity **(B)** scalar quantity
(C) dimension quantity **(D)** exponential term

h. Time constant of series RL circuit is

(A) $\frac{R}{L}$ **(B)** $\frac{L}{R}$
(C) RL **(D)** None of these

i. In a circuit containing R, L and C, power loss can take place in

(A) L only **(B)** R only
(C) C only **(D)** All of these

j. Propagation constant parameter is used in

(A) Symmetrical networks **(B)** Asymmetrical networks
(C) Both type of networks **(D)** Inverse networks

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

Q.2 a. Determine the current in a circuit as shown in Fig.1, when the switch 's' is closed at t=0 . Assume there is no initial charge on the capacitor or current in the inductor **(8)**

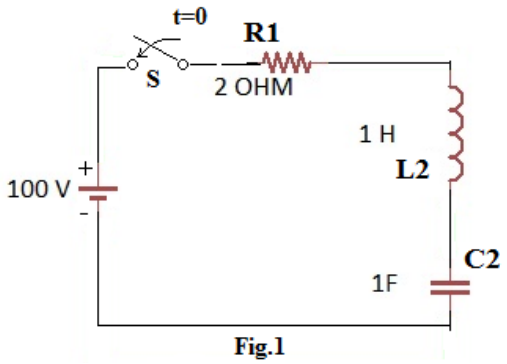

Fig.1

b. For the network shown in Fig.2 determine the voltage across inductor. **(8)**

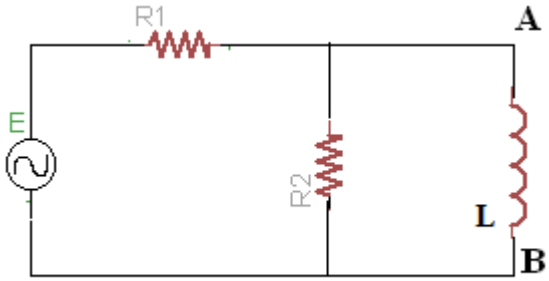

Fig.2

Q.3 a. Find the Laplace transform of any function that repeats itself. **(8)**

b. Write short note on- **(8)**
(i) Initial and final value theorem
(ii) Convolutional Integrals

Q.4 a. State Reciprocity theorem and check whether the circuit shown in fig.3 obeys reciprocity theorem **(8)**

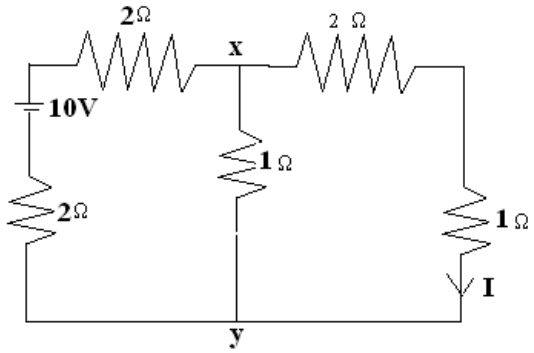

Fig.3

b. State and prove the substitution theorem. **(8)**

Q.5 a. The z-parameter for a 2-port network are Z_{11}=30Ω, Z_{22} = 40Ω, Z_{21} = 20Ω. Find the equivalent T network. **(8)**

b. For the given 2 port network calculate ABCD. Parameters and image impedances. **(8)**

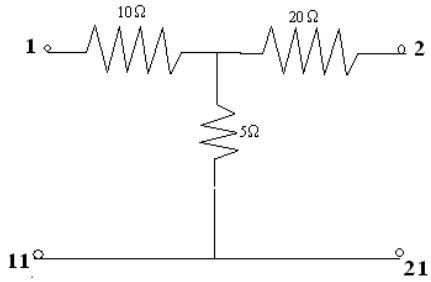

Fig.4

Q.6 a. Draw and explain a series resonant circuit with the help of phasor diagram. **(8)**

b. What is quality factor? Explain its effect on bandwidth. Determine Q factor of a coil for the series circuit having resonance frequency f_r = 7.12 Hz and BW = 3.178 Hz **(8)**

Q.7 a. Explain the following
(i) Reflection coefficient (ii) Secondary line constants
(iii) Distortion less Transmission Line **(9)**

b. A transmission line connects a transmitter of 1.2 MHz to the aerial located 100m away from it. If Z_0 of the lines be equal to 500Ω. What is the input impedance of this line if antenna end is a) open circuited b) short circuited. **(7)**

Q.8 a. What is stub? Explain the different type of stub matching used in transmission lines. **(10)**

b. Derive the relation between VSWR ('S') and Reflection coefficient ('K'). **(6)**

Q.9 a. A Π section filter network consists of a series arm inductance of 10mH and two shunt arm capacitances of 0.16 μF each. Calculate the cut-off frequency and attenuation and phase shift at 12 KHz. What is the value of nominal impedance in the pass band? **(8)**

b. Design k- type band pass filter having a design impedance of 500 Ω and cut-off frequencies 1 KHz and 10 KHz. **(8)**