ROLL NO. _____

Code: DE57 **Subject: NETWORKS AND TRANSMISSION LINES**

DipIETE – ET

Time: 3 Hours **JUNE 2014** **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. An inductor stores the energy in the form of _____

(A) electric field **(B)** magnetic field
(C) electric charge **(D)** E.M.F.

b. Laplace transform of a unit impulse function is _____

(A) 1/S **(B)** $1/S^2$
(C) S **(D)** 1

c. In a network, to neglect a voltage source, the terminals across the source are _____

(A) open circuited **(B)** short circuited
(C) replaced by capacitor **(D)** replaced by very high resistance

d. Z_{11} in terms of transmission parameters is equal to _____

(A) A/C (**B)** 1/C
(C) D/C **(D)** C/A

e. In a series R-L-C circuit, at resonant frequency the overall impedance of circuit is equal to _____

(A) R **(B)** L
(C) infinite **(D)** zero

f. The loop inductance of a transmission line having distributed line constants is measured in _____

(A) Henrys **(B)** Ohms
(C) Henrys/km **(D)** Ohm/km

g. Input impedance of ¼ wave length long short circuited lossless transmission line is _____

(A) zero **(B)** low
(C) high **(D)** infinite

h. When condition is changed from transmission to attenuation, the frequency is called as _____ frequency.

(A) resonant **(B)** line
(C) cut off **(D)** bandwidth

i. A circuit has Thevenin's voltage of 10V, Thevenin's resistance of 2Ω and load resistance of 3Ω, then its load voltage is _____

(A) 3V **(B)** 5V
(C) 6V **(D)** 10V

j. A filter is a _____ selective network.

(A) amplitude **(B)** phase
(C) time **(D)** frequency

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

Q.2 a. A capacitor of 4μF capacitance is charged to a potential difference of 400V and then connected in parallel with an uncharged capacitor of 2 μF capacitance. Calculate potential difference across the parallel capacitors. **(8)**

b. Differentiate between current source and voltage source. Draw and explain the characteristics of ideal and practical sources. **(8)**

Q.3 a. Determine the laplace transform of the pulse shown in Fig.1. **(8)**

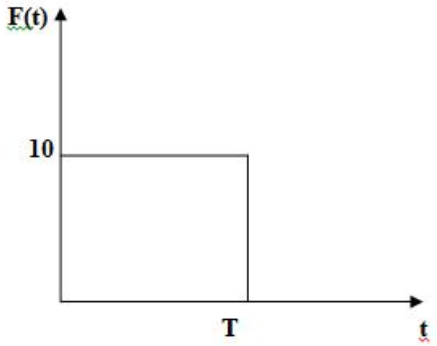

Fig.1

b. Derive an expression for the current i(t) in a series R-C circuit when it is excited by an impulse input with zero initial conditions. **(8)**

Q.4 a. State and prove maximum power transfer theorem. **(8)**

b. Using Thevenin's theorem, find out current in the resistance connected across the terminals AB shown in Fig.2 **(8)**

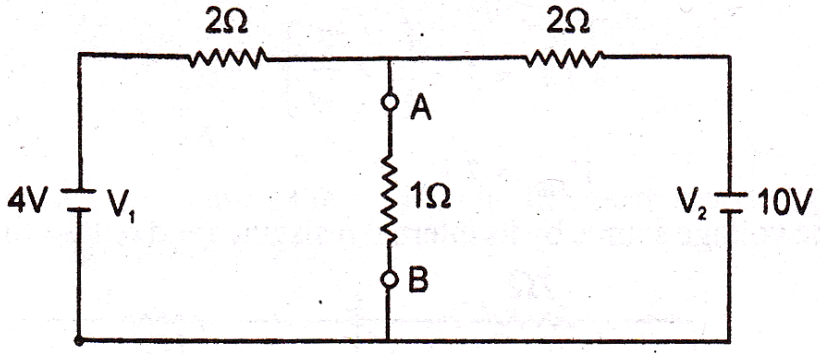

Fig.2

Q.5 a. Derive an expression for the transmission parameters of a two port network.**(8)**

b. Find Z parameters for the circuit shown in Fig.3. Also draw equivalent circuit of the network using Z parameters. **(8)**

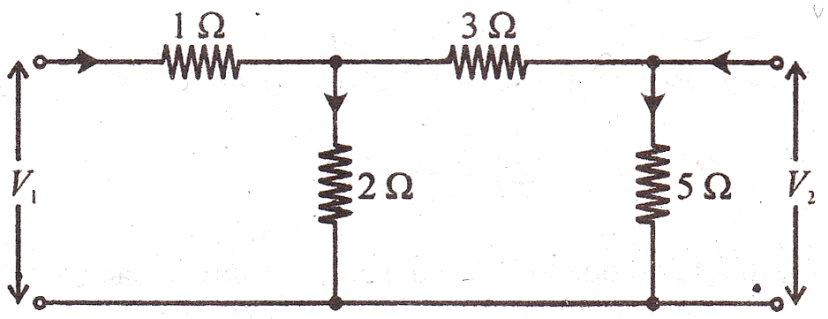

Fig.3

Q.6 a. Determine the parameters of an RLC series circuit that will resonate at 1000 Hz, has a bandwidth of 100 Hz and draws 16 W power from a 200 V generator operating at the resonant frequency of the circuit. **(8)**

b. What is series resonance? Derive an expression for
(i) resonant frequency
(ii) circuit impedance
(iii) power factor
(iv) circuit current at resonance **(8)**

Q.7 a. Explain the factors causing distortion in a transmission line and methods to minimise distortion. **(10)**

b. Explain primary constants of a transmission line and draw the equivalent circuit of transmission line using these constants. **(6)**

Q.8 a. A high frequency transmission line consists of a pair of open wires having a distributed capacitance of 0.01 μF/km and distributed inductance of 4 mH/km. Calculate its characteristic impedance and propagation constant at a frequency of 10 MHz. **(4)**

b. Derive an expression for characteristics impedance and propagation constant of a transmission line at radio frequencies. **(4)**

c. Explain the concept of single and double stub impedance matching of lines. **(8)**

Q.9 a. Design T and π sections of a constant K high pass filter having cut off frequency of 12 kHz and design impedance R_0 = 500 Ω. Also find attenuation at a frequency of 4 kHz. **(8)**

b. Design a T type symmetrical attenuator, which offers 40dB attenuation with a load of 400 Ω. **(8)**