Code: DE107   **Subject: NETWORKS AND TRANSMISSION LINES**

DiplETE – ET (NEW SCHEME)

Time: 3 Hours   **DECEMBER 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. If the current enters the dotted terminal of the coil, the reference potential of the voltage induced in the other coil is _____.

   (A) positive   **(B)** negative
   (C) additive   **(D)** none of these

b. In terms of ABCD parameters, the image parameter Z_{12} of a two port network is
   (A) $\sqrt{BD/AC}$ **(B)** $\sqrt{AB/CD}$
   (C) AB/CD **(D)** BD/AC

c. h_{21}, in terms of Z parameters can be expressed as

   (A) $\Delta Z/Z_{22}$ **(B)** $\Delta Z/Z_{12}$
   (C) $Z_{12}/\Delta Z$ **(D)** $- Z_{21}/Z_{22}$

d. $1/s + a$ is Laplace transform of
   (A) e^{at} **(B)** e^{-at}
   (C) $1/e^{-at}$ **(D)** none of these

e. Reciprocity theorem applies to only one of the following networks

   (A) Linear as well as non linear   **(B)** Linear bilateral
   (C) Linear active   **(D)** all type of networks

f. Higher the Q of a series circuit,

   (A) sharper its resonance   **(B)** greater its bandwidth
   (C) broader its resonance curve   **(D)** narrower its pass band

g. Stub matching is more effective if

   (A) O.C. stub is used   **(B)** done as near source as possible
   **(C)** done as near load as possible   **(D)** done at any voltage maxima on line

h. In open circuit line, voltage maxima is at

(A) load
(B) source
(C) any point on the line
(D) midpoint between source and load

i. Neper is equal to

(A) 115.1 x attenuation in dB   **(B)** 11.51 x attenuation in dB
(C) 1.151 x attenuation in dB   **(D)** 0.1151 x attenuation in dB

j. An m-derived filter has

(A) High attenuation in the entire attenuation band
(B) low attenuation in the entire attenuation band
(C) High attenuation in entire passband
(D) High attenuation at f = f∞

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

Q.2 a. Illustrate the condition of reciprocity and symmetry in Z-parameter representation.   **(8)**

b. Explain with the help of diagram the phenomenon of standing waves in open and short circuit lines.   **(8)**

Q.3 a. At t = 0, a pulse of width a is applied to the RL network of Fig 3. Determine the expression for the current i(t) using Laplace transformation.   **(8)**
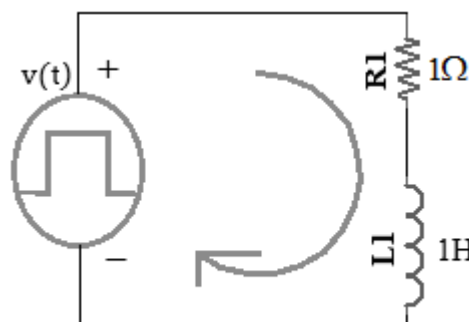
Fig. 3

b. Find the Laplace transform of   **(8)**
(i) Unit Step Function
(ii) Exponential Function

Q.4 a. State Thevenin theorem and find the current in the resistance of 5ohm as shown in circuit in Fig.4.   **(8)**
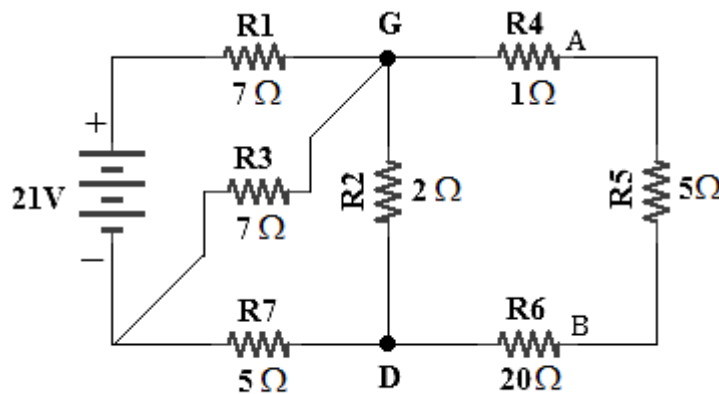

Fig. 4

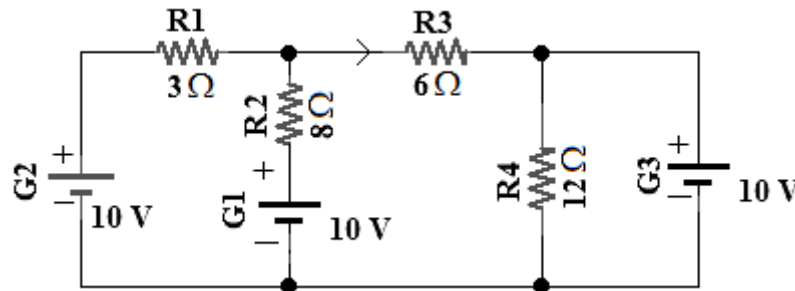b. State superposition theorem and determine the current through each resistor.**(8)**

Fig.5

Q.5 a. Explain the effect of resistance on the frequency response for RLC circuit. **(5)**

b. Explain how impedance of a parallel resonant circuit varies with frequency?**(5)**

c. Show that the frequency of resonance in a parallel RLC circuit differ from that of a series RLC circuit.   **(6)**

Q.6 a. Derive an expression of characteristics impedance Z_o of symmetrical T section.   **(8)**

b. Derive an expression for the open and short circuit impedance of a symmetrical T network in terms of arm impedance.   **(8)**

Q.7 a. The Z parameters of a two port network are $Z_{11} = 10$ ohms, $Z_{22} = 20$ ohms, $Z_{12} = Z_{21} = 5$ ohms.
(i) Find the ABCD parameters
(ii) Also find the equivalent T-network   **(8)**

b. What is Reflection Coefficient? Derive the relation between VSWR and Reflection Coefficient.   **(8)**

Q.8 a. Draw the balance and unbalance circuit for T and π network.   **(4)**

   b. Design a 'T' type symmetrical attenuator which offers 40dB attenuation with a load of 400Ω.   **(6)**

   c. Design a constant K low pass filter having f_c = 2kHz and design impedance R_O = 600 Ω. Obtain the value of attenuation at 4 kHz   **(6)**

Q.9 Write Short note on the following: **(8×2)**
   (i) Losses in transmission Line
   (ii) Smith Chart and its Application