ROLL NO. _____

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

DiplETE – ET (Current Scheme)

Time: 3 Hours **June 2019** **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 $A^2 - BC = 1$, the circuit is
(A) Balanced **(B)** Reciprocal
(C) symmetrical and reciprocal **(D)** Reciprocal and Bilateral

b. 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)** $-z_{21}/z_{22}$

c. In RLC circuit R = 45Ω L=0.06H and C=0.6μF, the power factor will be
(A) Unity **(B)** Zero
(C) Lagging **(D)** Leading

d. In a series resonant circuit, the impedance of the circuit will be
(A) Minimum **(B)** Maximum
(C) Infinite **(D)** Zero

e. $\frac{1}{s+a}$ is the Laplace transform of
(A) e^{at} **(B)** e^{-at}
(C) $\frac{1}{e^{-at}}$ **(D)** None of these

f. A BPF may be obtained by using a high pass filter followed by a
(A) LPF **(B)** HPF
(C) RC filter **(D)** None of these

g. Distortion-less condition of a transmission line is given by
(A) $Z_0 = \sqrt{L/C}$ **(B)** R/G = L/C
(C) $R \cdot G = L \cdot C$ **(D)** $Y = \sqrt{\frac{1}{LC}}$

h. A Smith chart is used in solving problems in
(A) Radiowave propagation **(B)** Transmission lines
(C) Aerial system **(D)** any where in the line

i. The characteristic impedance of a transmission line is
(A) Real **(B)** Inductive
(C) Capacitive **(D)** Complex

j. Propagation constant parameter is used in
(A) symmetrical network **(B)** asymmetrical networks
(C) Both types as in **(A)** and **(B)** **(D)** Inverse networks

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

Q.2 a. Explain π-T Equivalent theorem with the help of suitable example. **(8)**

b. Find the current following through 12Ω resistor as shown in Fig.1 using Thevenin's Theorem. **(8)**

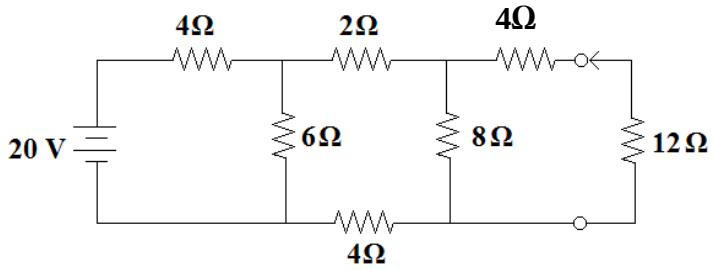

Figure 1

Q.3 a. Derive the Laplace transform of unit impulse function. **(8)**

b. Voltage $V(s) = \frac{1+2e^{-s}-e^{-2s}}{s^2}$ is applied as input to a series RL circuit with R=3Ω and L=3H. Calculate i(t) using Laplace transform through the circuit. [Assume $i(0^+)=0$] **(8)**

Q.4 a. Explain the characteristic curve of a parallel R-L-C circuit. **(8)**

b. A series RLC circuit has R=2Ω and X_C=5Ω and inductance is impure having its resistance 3Ω and inductive reactance of 1Ω. Find the input impedance and circuit current. Also calculate the frequency of resonance. Supply is 100V, 50 Hz. **(8)**

Q.5 a. Explain the term characteristic impedance and propagation constant of a transmission line. **(8)**

b. A lossless transmission line has a shunt capacitance of 100 pF/m and a series inductance of 4μH /m. What is its characteristic impedance? **(8)**

Q.6 a. Explain significance of Poles and Zeros in network functions. **(8)**

b. The Z-parametrs of a two port are: **(8)**
$Z_{11} = 10\Omega$, $Z_{22} = 20\Omega$, $Z_{12} = Z_{21} = 5\Omega$
Find the ABCD parameters.

Q.7 a. Determine the input impedance of a lossless short circuited line. **(8)**

b. Explain the term Quarter wave transformer in transmission lines. **(8)**

Q.8 a. Draw T & π sections of a constant K high pass filter. Derive an expression for cut-off frequency. **(4+4)**

b. Design a symmetrical bridge T-attenuator with attenuation of 40 dB and design impedance of 600 Ω. **(8)**

Q.9 a. Define: **(2×4)**
(i) Bilateral and unilateral elements
(ii) Linear and nonlinear elements
(iii) Resistance parameter
(iv) Ideal voltage source

b. What is Mutual Induction? Explain working principle of two mutually coupled Inductor. **(8)**