ROLL NO. _____

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

DipIETE – ET (Current Scheme)

Time: 3 Hours **December 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 current of 3A flows through a resistor of 20ohms then the power absorbed in the resistor is
(A) 200 watts **(B)** 100 watts
(C) 150 watts **(D)** 180 watts

b. The Laplace Transform of an Impulse function is
(A) 0 **(B)** 1
(C) -1 **(D)** 1/S

c. Norton's equivalent circuit consists of
(A) voltage source in parallel with resistance
(B) voltage source in series with resistance
(C) current source in parallel with resistance
(D) current source in series with resistance

d. At resonance, the current in a series RLC circuit is
(A) minimum **(B)** maximum
(C) zero **(D)** infinity

e. Transmission will be distortionless if
(A) LC = GR **(B)** LG = 1/CR
(C) LG = CR **(D)** LR = GC

f. Loading is used in cable in order to
(A) increase load resistance **(B)** increase shunt capacitance
(C) reduce distortion **(D)** increase power handling capacity

g. For a given transmission line , if a short circuit is placed at the load end (Z_R=0) then the reflection coefficient K is
(A) 0 **(B)** 1
(C) infinite **(D)** -1

h. When $Z_R = 800\Omega$ and $Z_0 = 400\ \Omega$, then the value of K is
(A) 1/3 **(B)** 3
(C) 2 **(D)** ½

i. A transmission line is said to be perfectly matched to the load when it is terminated by its
(A) characteristic impedance **(B)** open circuit impedance
(C) short circuit impedance **(D)** zero

j. In symmetrical π- attenuator, if $R_0 = 600\ \Omega$ and $N = 2$ then the value of R_2 is
(A) 200 Ω **(B)** 300 Ω
(C) 100 Ω **(D)** 150 Ω

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

Q.2 a. A series RLC circuit consists of resistance R=25 Ω, inductance L=0.01H and Capacitance C=0.04 μF. Calculate **(2+4+4)**
(i) The frequency of resonance
(ii) If a 10V voltage of frequency equal to the frequency of resonance is applied to this circuit, calculate the values of V_L and V_C across L and C.
(iii) Find the frequencies at which these voltages V_L and V_C are maximum

b. Derive the expression for Impedance of a Parallel Tuned circuit. **(6)**

Q.3 a. Find the Laplace transform of the following functions **(3+5)**
(i) $x(t) = e^{at} u(t)$
(ii) $x(t) = t^2 u(t)$

b. State and prove Initial value theorem. **(2+6)**

Q.4 a. Applying Thevenin's theorem find the current flowing through the load resistor 22Ω in the circuit shown in Fig. 1 **(8)**

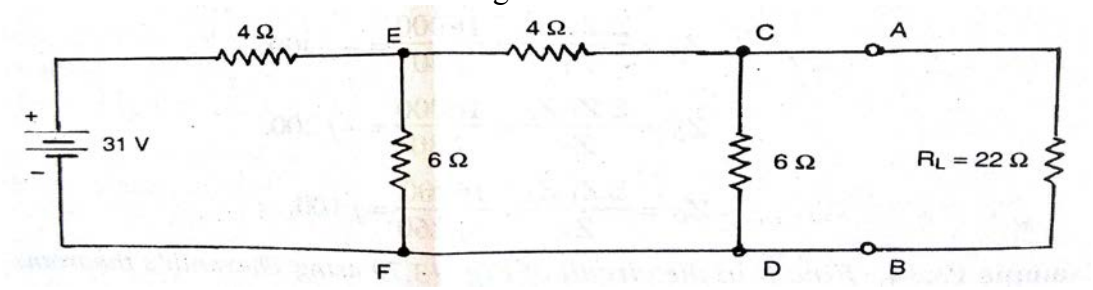

Fig. 1

b. By applying principle of superposition theorem, find the current through 1 Ω resistor in the circuit shown in Fig. 2 **(8)**

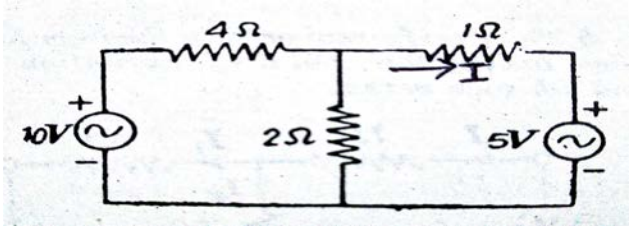

Fig. 2

Q.5 a. Find out ABCD parameters for the resistive pi – network shown in Fig. 3 **(8)**

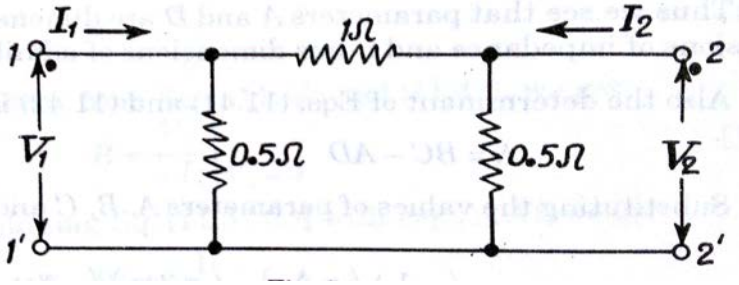

Fig. 3

b. Explain π -section representation of a Two-port Network expressed in terms of ABCD and Y-parameters **(8)**

Q.6 a. Define Quality factor of a coil. Derive the expression for Q-factor in terms ω , L and R. **(2+6)**

b. The circuit shown in Fig. 4 represents a parallel RLC circuit where R_L is the ohmic resistance of the inductor L connected in parallel with capacitor. Find the resonant frequency of the parallel circuit. **(8)**

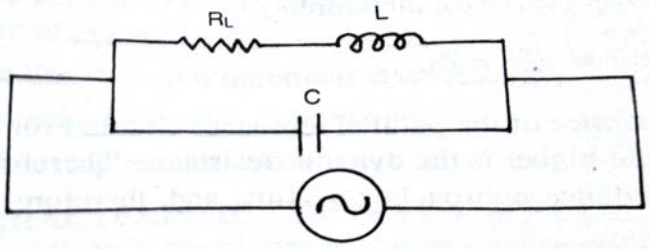

Fig. 4

Q.7 a. An underground cable has the following constants per loop kilometer : R=53Ω, L=0.6mH, C=0.04 μF, and G=1 μS. The frequency of operation is 1000Hz. Calculate Z_o, α , β, γ , λ and V_p for the cable. **(2+2+1+1+1+1)**

b. Define Frequency and Delay distortions in a transmission line. Explain the methods to minimize the distortions in a transmission line. **(3+5)**

Q.8 a. Explain, how Quarter Wave Transformer acts as an impedance matching device? **(8)**

b. Define Stub matching. Explain the operation of a single stub matching. **(2+6)**

Q.9 a. Draw the circuit of Symmetrical Bridged T-Attenuator and derive the design equations for a symmetrical bridged T- attenuator. **(8)**

b. An attenuator is composed of symmetrical T section having series arms each of 175 Ω and shunt arm of 350 Ω. Derive an expression for it and calculate the characteristics of this network and attenuation per section. **(8)**