310605

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B. Tech. III Sem. (Main) Exam., Dec. - 2019

Common for EE/EEE

3EE4-05 Electrical Circuit Analysis

Time: 3 Hours **Maximum Marks: 120**

Instructions to Candidates:

Part – A: *Short answer questions (up to 25 words) 10 × 2 marks = 20 marks. All ten questions are compulsory.*

Part – B: *Analytical/Problem Solving questions 5 × 8 marks = 40 marks. Candidates have to answer five questions out of seven.*

Part – C: *Descriptive/Analytical/Problem Solving questions 4 × 15 marks = 60 marks. Candidates have to answer four questions out of five.*

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART - A

Q.1 State and explain Superposition theorem. [2]

Q.2 Draw the equivalent circuit of the two – port network in terms of Z parameters. [2]

Q.3 Write down the necessary condition for driving point impedance of admittance function. [2]

Q.4 Write short note on transformed network with initial conditions. [2]

Q.5 Explain resonance in series RLC circuit. [2]

Q.6 Explain active power, Reactive power and apparent power and find the relation between them. [2]

Q.7 Derive an interrelation between Y – parameters in terms of h – parameters. [2]

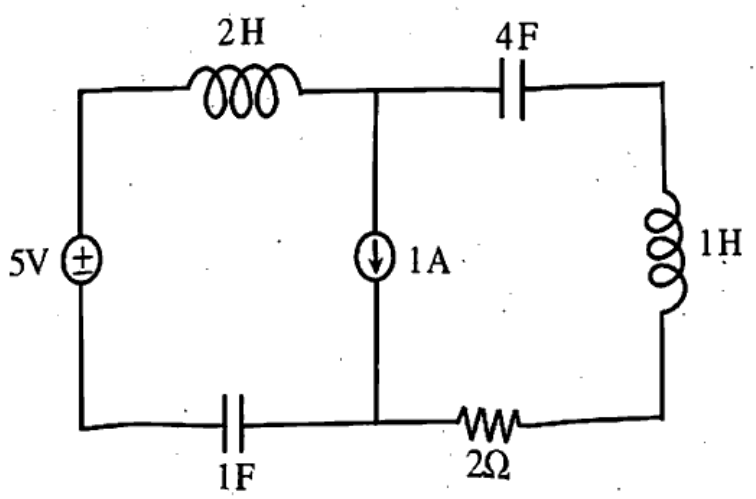
Q.8 Explain steady state and transient state response. [2]

Q.9 Explain reciprocity theorem in a network. [2]

Q.10 A series RL circuit with R = 50Ω and L = 10 H has constant voltage V = 100V applied at t = 0 by the closing of a switch. Calculate the current at time t = 0.5 sec. [2]

PART – B

Q.1 Draw the dual of given network of Fig (1) [8]



Fig(1)

Q.2 In the network of given Fig. (2) the switch is closed at t = 0 find values of i, di/dt, d^2i/dt^2 at t = 0+. [8]

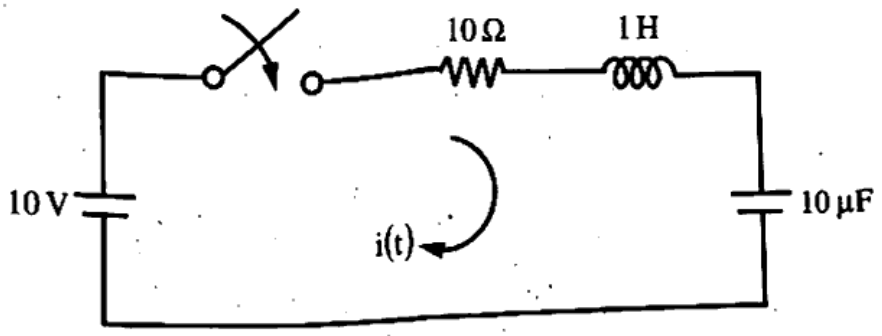


Fig (2)

Q.3 In the network shown in Fig (3), find the voltage V1 and V2. [8]

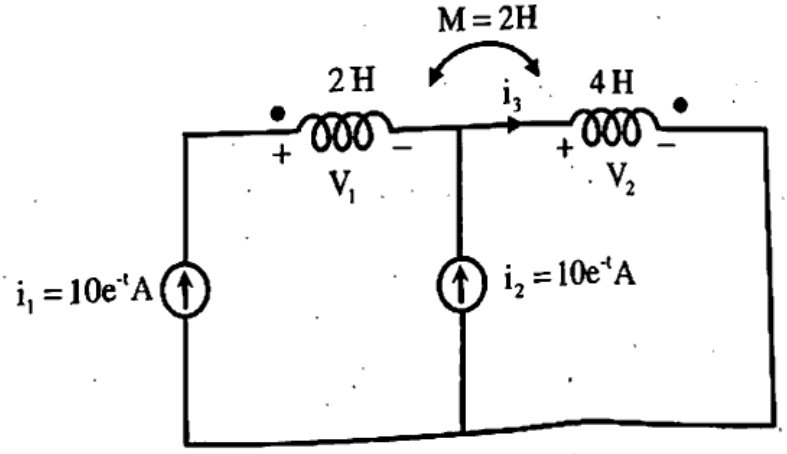


Fig (3)

Q.4 The three equal impedances of each of $10\angle 60\Omega$ are connected in star across a three – phase, 400V and 50 Hz supply. Calculate- [8]

(a) Line voltage and phase voltage

(b) Power factor and active power consumed

(c) If the three impedances are connected in delta to the same source of supply, what is the active power consumed

Q.5 State and prove initial and final value theorem. [8]

Q.6 Find the transfer function $V_2(s) / V_1(s)$ for the given network in Fig (4) [8]

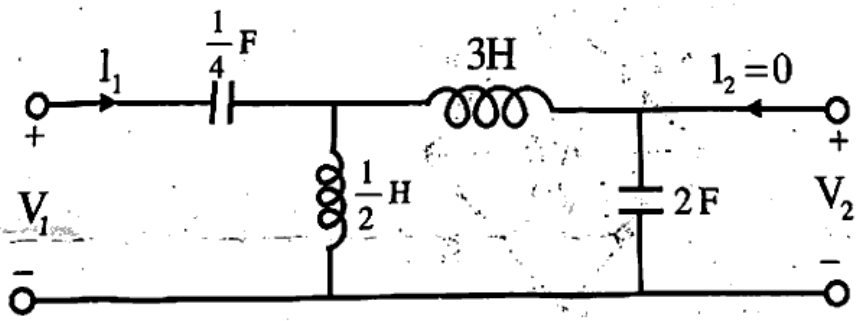


Fig (4)

Q.7 For the network shown in Fig (5), find the Z parameters. [8]

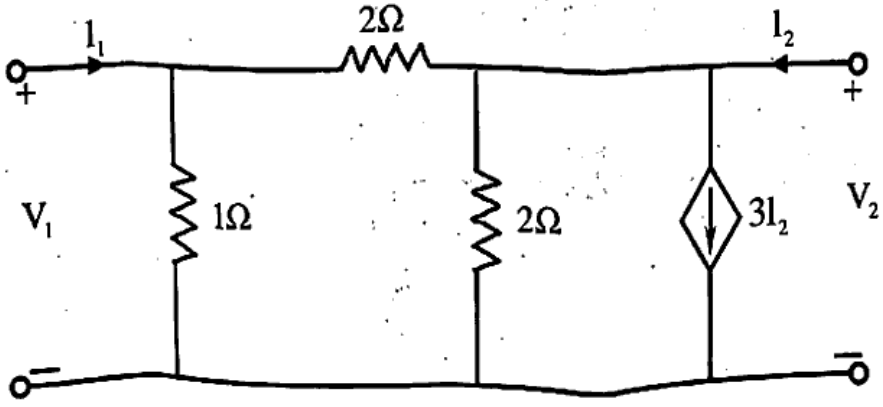
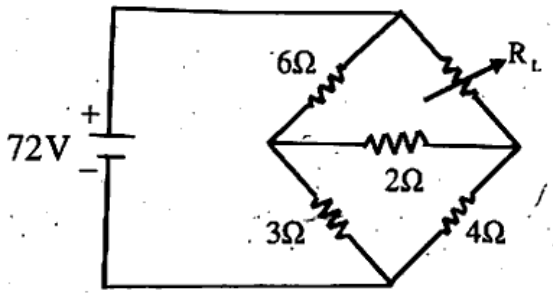


Fig (5)

PART – C

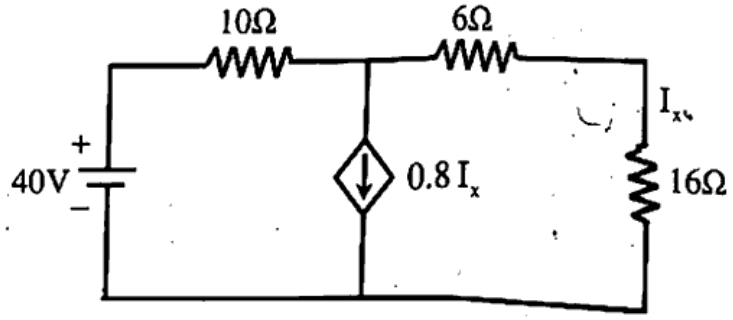
Q.1 Derive the equation of the transient current and steady state current in series RL circuit having sinusoidal excitation. A 50 Hz, 400 V (peak value) sinusoidal voltage is applied at t = 0 to a series RL circuit having resistance 5 Ω and inductance 0.2 H. Obtain an expression of current at any instant of time t. Calculate the value of transient current at 0.01 second after switching ON. [15]

Q.2 (a) Find the value of resistance R_L in fig (6) for maximum power transfer and calculate the maximum power transfer. [8]



Fig(6)

(b) Determine the current in the 16 Ω resistor in Fig. (7) By the Thevenin's theorem. [7]



Fig(7)

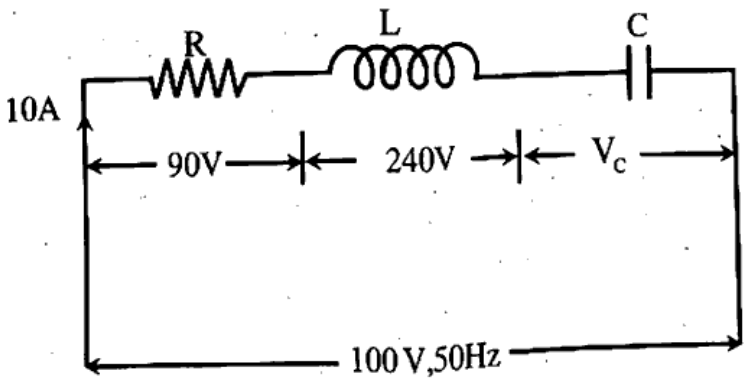
Q.3 (a) Write a short note on dot convention in coupled circuit. [7]

(b) A circuit consists of a pure resistor, a pure inductor and a pure capacitor connected in series as shown in Fig (8). When the circuit is supplied with 100V, 50 Hz supply the voltages across inductor and resistor are 240 V and 90 V respectively. If the circuit takes a 10A leading current, calculate- [8]

(i) Value of resistance, inductance and capacitance

(ii) Power factor of the circuit

(iii) Voltage across the capacitor



Fig(8)

Q.4 (a) Find the expression of current for step response of parallel RL circuit. [7]

(b) For the network shown in fig (9) the switch is closed at time t = 0. Determine the current i(t) assuming zero initial conditions in the network elements. [8]

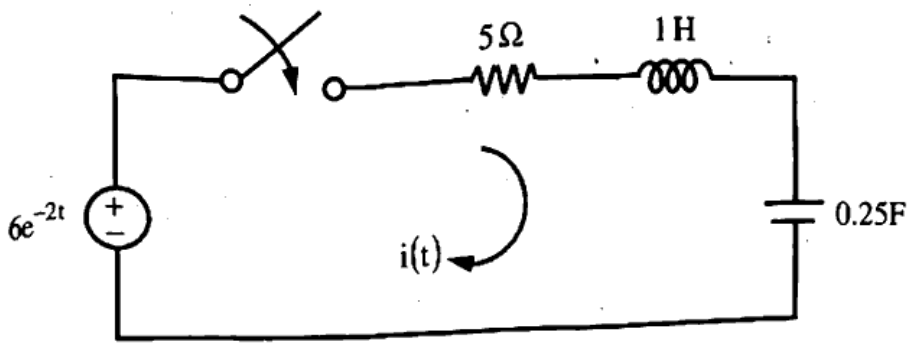


Fig (9)

Q5 (a) Derive the expression when two port networks are connected in cascade. [7]

(b) Find the inverse Laplace transform of given function- [8]

(i) $F_1(s) = \frac{(s+2)}{s(s+1)(s+3)}$

(ii) $F_2(s) = \frac{s}{(s^2+1)(s^2+4)}$
