Reg. No. :

Question Paper Code: 42307

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

Second Semester

Electrical and Electronics Engineering

14UEE207- ELECTRIC CIRCUITS

(Regulation 2014)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 1 = 10 Marks)

1. In a double tuned circuit, consisting of two magnetically coupled, identical high-Q tuned circuits, at the resonance frequency of either circuit, the amplitude response has

    (a) a peak, always   (b) a dip, always
    (c) either a peak or a dip   (d) neither a peak nor a dip

2. A 100 Ω resistor is connected across the terminals of a 9 V battery. What is the power dissipation in the resistor?

    (a) 9 W (b) 0.9 W (c) 0.19 W (d) 0.81 W

3. Three equal resistances of 9 Ω are connected in delta. What is the resistance in one of the arms in an equivalent star circuit?

    (a) 3 Ω (b) 9 Ω (c) 1 Ω (d) 27 Ω

4. Maximum power is transferred to load, when the load resistance is

    (a) equal to half of the source resistance   (b) equal to source resistance
    (c) equal to zero   (d) equal to twice the source resistance

5. The maximum possible mutual inductance of two inductively coupled coils with self inductances $L1 = 25$ mH and $L2 = 100$ mH is given by

    (a) 125 mH (b) 75 mH (c) 50 mH (d) 100 mH

6. The admittance and impedance of the following kind of network have the same properties

   (a) LC   (b) RL   (c) RC   (d) RLC

7. In a series parallel circuit, any two resistances in the same current path must be in

    (a) series with each other   (b) parallel with each other
    (c) series with the voltage source   (d) parallel with the voltage source

8. An RL circuit has $R = 2\ \Omega$ and $L = 4\ H$. The time constant is

    (a) $4s$ (b) $0.5s$ (c) $8s$ (d) $2s$

9. A network which contains one or more than one source of e.m.f. is known as

    (a) linear network   (b) non-linear network

    (c) passive network   (d) active network

10. A network which contains one or more than one source of e.m.f. is known as

    (a) linear network   (b) non-linear network
    (c) passive network   (d) active network

<div align="center">PART - B (5 x 2 = 10 Marks)</div>

11. State reciprocity theorem.

12. Modify the voltage source of 120 V in series resistance of 10 Ω into a current source in parallel resistance.

13. Determine the quality factor for the series circuit consisting of $R = 10\ \Omega$, $L = 0.1\ H$

    and $C = 10\ \mu F$.

14. Distinguish between the steady state and transient state response of an electrical circuit.

15. Two inductively coupled coils have self inductances L1 = 50 mH and L2 = 200 mH. If the coefficient of coupling is 0.5, compute the value of mutual inductance between the coils.
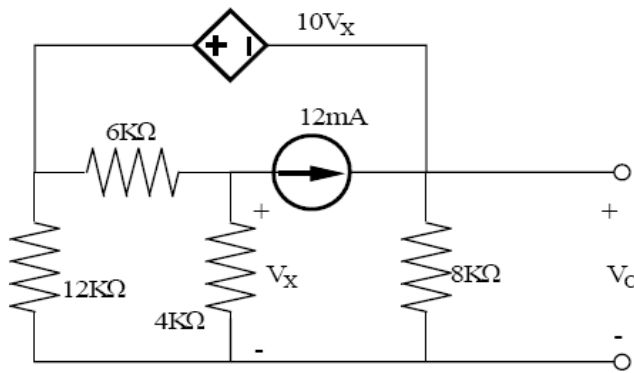
<div align="center">PART - C (5 x 16 = 80 Marks)</div>

16. (a) In the given circuit below calculate (i) the equivalent resistance across the terminals of the supply (ii) total current delivered by the source (iii) power delivered to 16 Ω resistor.   (16)
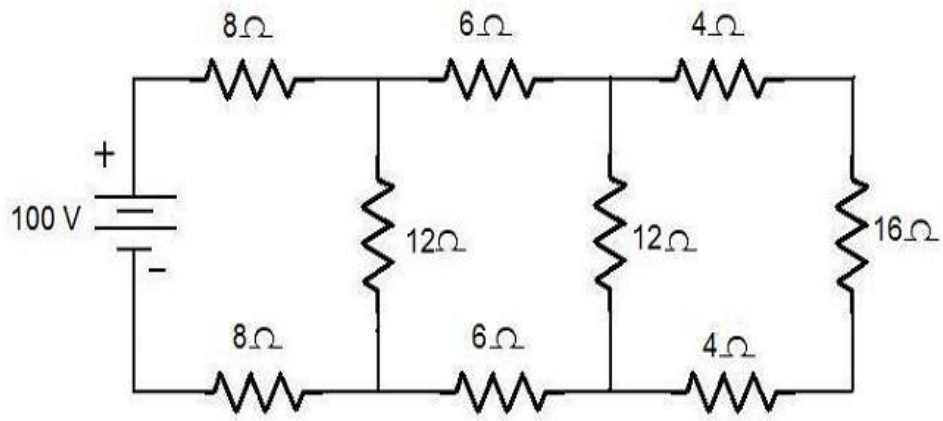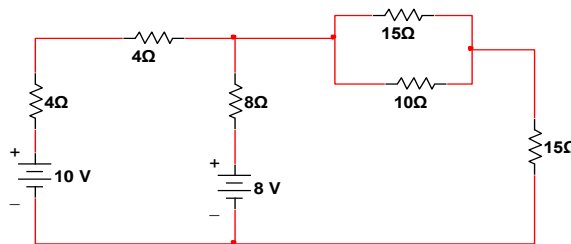
Or

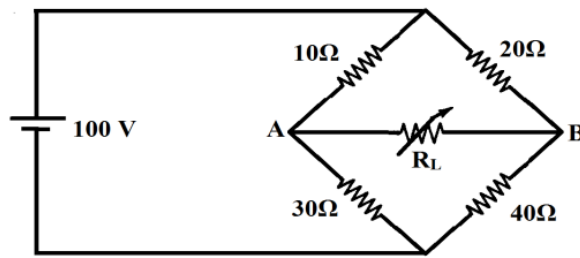(b) Calculate *Vo* from the following circuit shown below using mesh analysis. (16)

17. (a) Calculate the current in 10 Ω resistor of the network shown below using superposition theorem. (16)

Or

(b) Determine the load resistance to receive maximum power from the source; also find the maximum power delivered to the load in the circuit shown in below figure. (16)

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18. (a) State the condition for resonance in series RLC circuit and obtain the expression for resonant frequency. Derive the expression for bandwidth for a series RLC circuit as a function of resonant frequency. (16)

Or

(b) For a two-branch parallel circuit R_L = 15 Ω, R_C = 30 Ω, X_C = 30 Ω, E = 120 V and f = 60 Hz. For the condition of resonance, calculate (1) the two values of L and (2) the two values of total current. (16)

19. (a) Derive the expression for the current $i(t)$ in the series RC circuit: (a) with initial conditions (b) with relaxed initial conditions for a step input excitation, using Laplace transform technique. (16)

Or

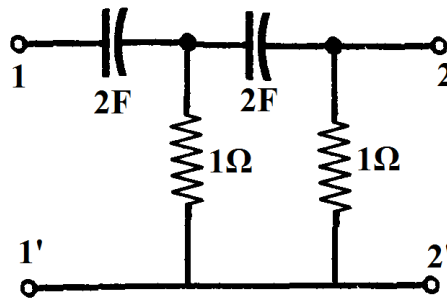(b) Find the Y parameters for the RC ladder network shown in Fig.8. (16)

Fig.8

20. (a) Calculate the total power input and readings of the two wattmeters connected to measure power in a three phase balanced load, if the reactive power input is15 $KVAR$, and the load power factor is 0.8. Also compute load KVA. (16)

Or

An unbalanced four wire star connected load has balanced supply voltage of 400 V. Load impedances are 4+$j8$ Ω, 3+$j4$ Ω and 15+$j10$ Ω for R phase, Y phase and B phase respectively. Estimate the line currents, neutral currents and total power. (16)

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