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Question Paper Code: 41232

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2015.

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. For an ideal transformer,

   (a) both z and y parameters exist.

   (b) neither z nor y parameters exist.

   (c) z-parameters exist, but not the y-parameters.

   (d) y-parameters exist, but not the z- parameters.

3. A network function can be completely specified by

   (a) Real parts of zeros (b) Poles and zeros

   (c) Real parts of poles (d) Poles, zeros and a scale factor

4. Superposition theorem is applicable only to networks that are

   (a) linear (b) non-linear (c) time-invariant (d) passive

5. The rms value of the a-c voltage v(t) = 200 sin 314 t is

(a) 200 V (b) 314 V (c) 157.23 V (d) 141.42 V

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. A terminal where three or more branches meet is known as

(a) node (b) terminus (c) combination (d) anode

9. Which of the following is a bilateral element?

(a) constant current source (b) constant voltage source

(c) capacitance (d) none of the above

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

PART - B (5 x 2 = 10 Marks)

11. State reciprocity theorem.

12. Define the term 'Quality factor'.

13. Write the expression for the power measured by two wattmeters used in 3-phase balanced load, in terms of voltage, current and power factor.

14. Calculate the power factor if $V(t)= V_m \sin(\omega t-45°)$ and $I(t)= I_m \sin(\omega t-135°)$.

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.

PART - C (5 x 16 = 80 Marks)

16. (a) (i) Two batteries A and B are connected in parallel and a load of 10Ω is connected across their terminals. A has an emf of 12 V and internal resistance (I.R) of 2 Ω. B has an emf of 8 volts and I.R of 1Ω. Using Kirchoff's laws, determine the values and directions of currents in each of the batteries and in external resistance. Also determine the potential across the external load. (8)

(ii) Determine the current delivered by the source in the circuit shown in Fig.1. (8)

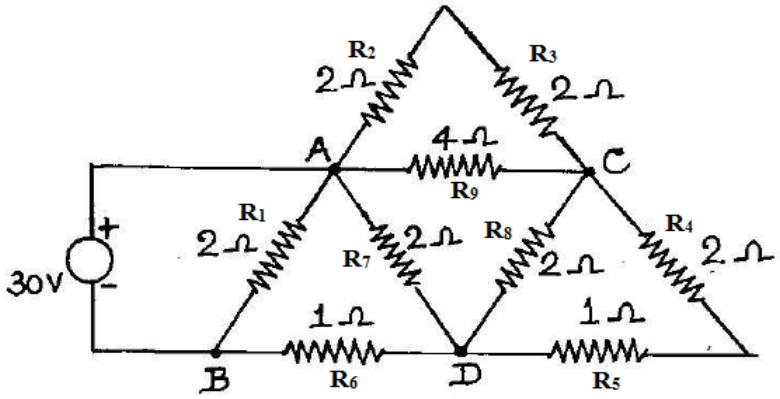

Fig.1

Or

(b) (i) Determine the power dissipation in the 4Ω resistor of the circuit shown in Fig.2 by using mesh analysis. (8)

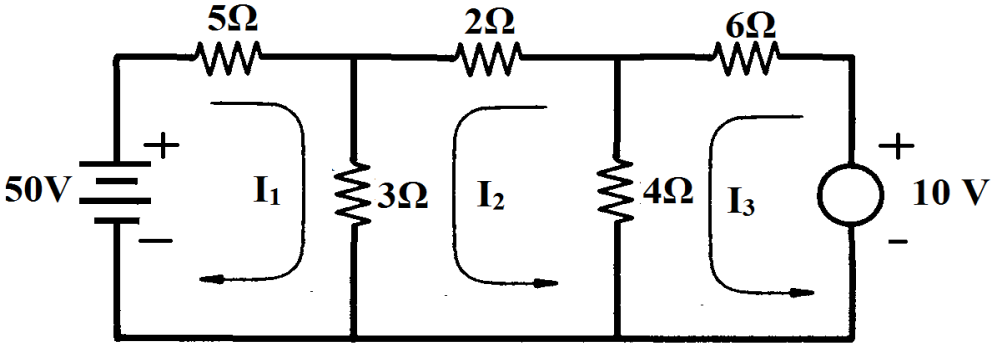

Fig.2

(ii) Find by the nodal method, the currents I_A and I_B for the circuit shown in Fig.3. (8)

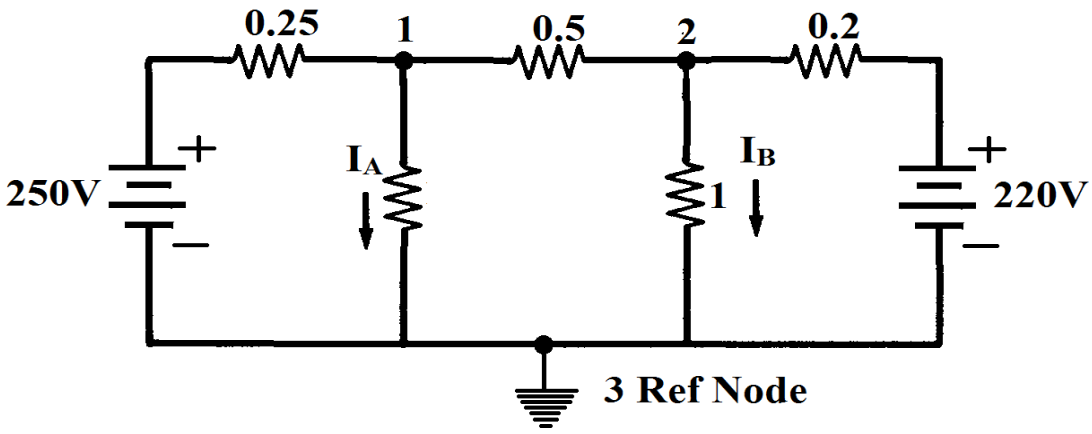

Fig.3

17. (a) In Fig.4 determine the equivalent resistance by using star-delta transformation. (16)

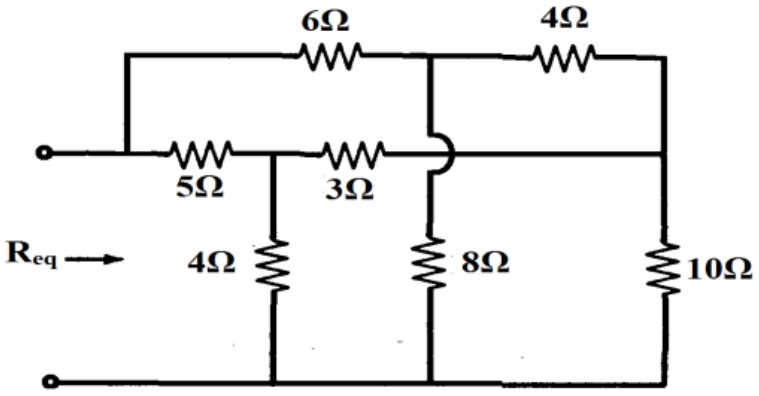

Fig.4

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 Fig. 5. (16)

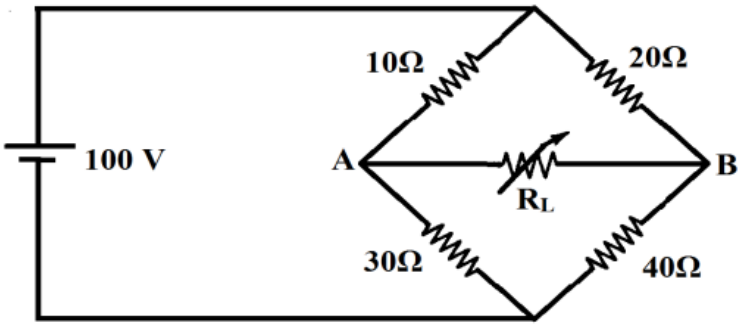

Fig.5

18. (a) 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)

Or

(b) In the coupled circuit shown in Fig. 6, find the voltage across the 5 ohm resistor. (16)

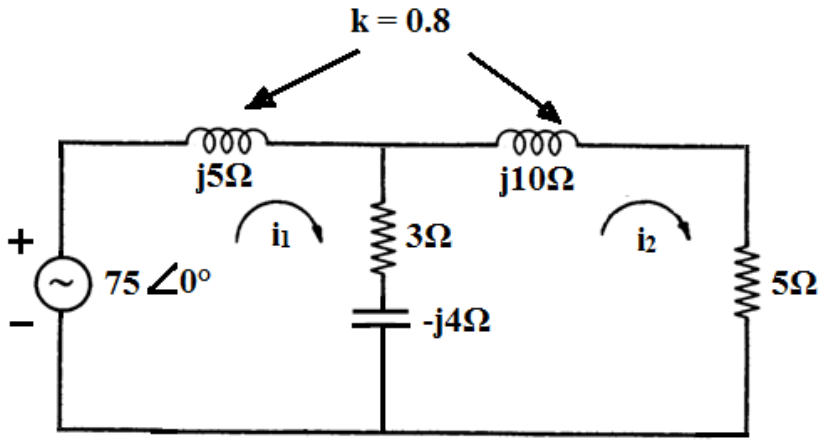

Fig.6

19. (a) In the series circuit shown in Fig.7, the switch is closed on position 1 at t=0. At t=1 milli-second, the switch moved to position 2.Obtain the equations for the current in both intervals and draw the transient current curve. (16)

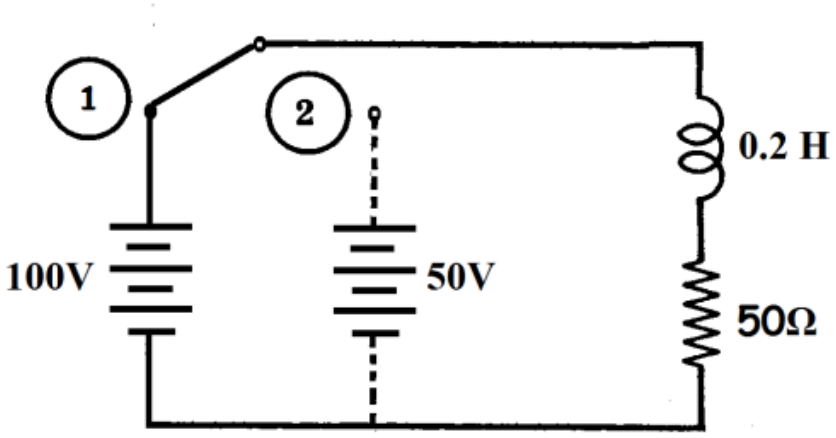

Fig.7

Or

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

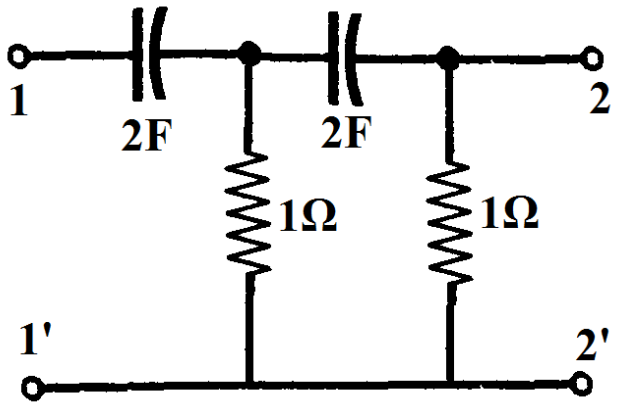

Fig.8

20. (a) A 400 *V*, 3-phase supply feeds an unbalanced three wire star-connected load. The branch impedances of the load are *ZR* = (4+j8)*Ω*; ZY = (3+j4)*Ω* and *ZB* = (15+j20)*Ω*. Find the line currents and voltage across each phase impedance. Assume *RYB*- Phase sequence. (16)

Or

(b) 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)

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