DU – 081

III Semester B.E. (E and E) Degree Examination, Dec. 2017/Jan. 2018
(2K11 Scheme)
EE 302 : ELECTRIC CIRCUITS

Time : 3 Hours Max. Marks : 100

***Instruction**: Answer **any five full** questions by selecting atleast **two** questions from **each** Part.*

PART – A

1. a) Distinguish the following with suitable examples :
   i) Unilateral and bilateral ckts.
   ii) Passive and active elements. **4**

   b) For the network shown in fig. 1(b), find mesh currents I_1, I_2 and I_3.

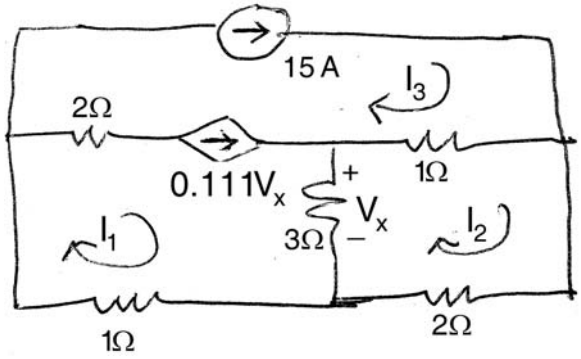

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fig. 1 (b)

   c) Find the voltage at nodes 1 and 2 for the network shown in fig. 1(c)

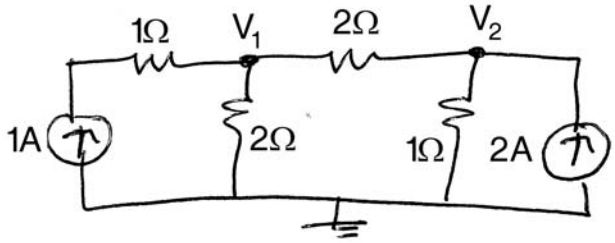

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fig. 1(c)

2. a) Replace the circuit between A and B in fig. 2 (a) with a voltage source in series with a single resistor using source transformation technique.

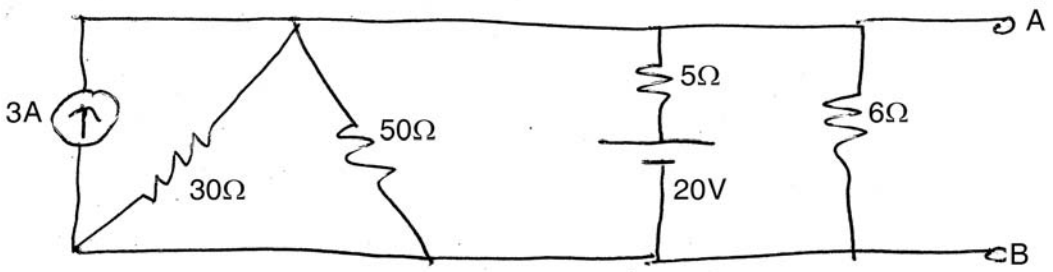


fig. 2(a) **5**

b) Find the current supplied by the battery in the network of fig. 2(b).

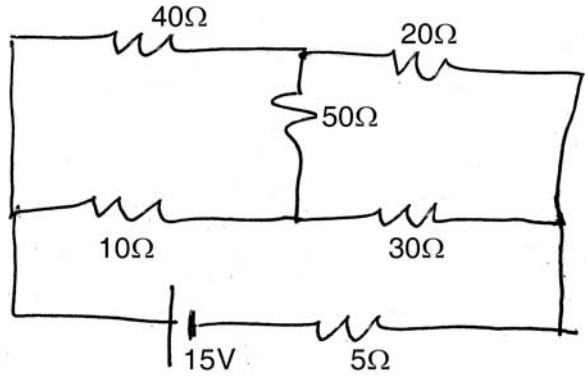


fig. 2(b) **5**

c) Find the power supplied by 10 V source in the network shown in fig. 2 (c).

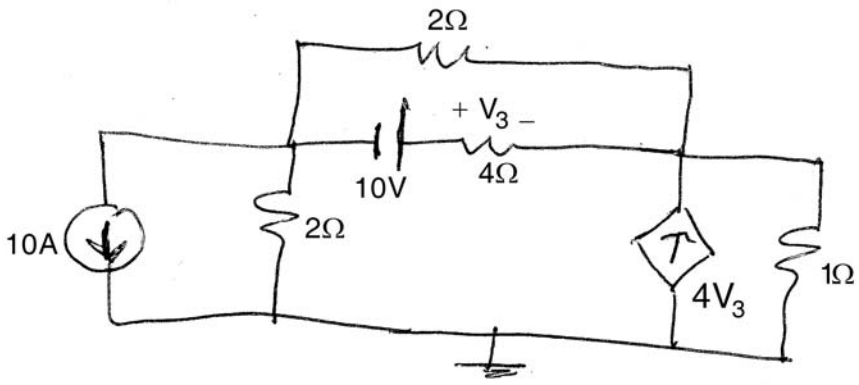
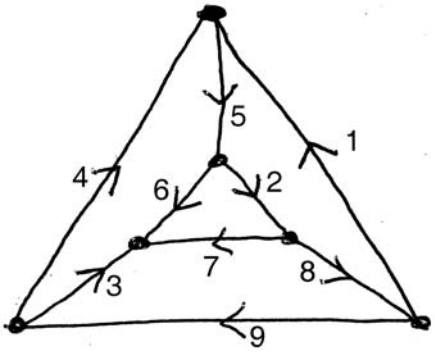


fig. 2(c) **10**

3. a) For the oriented graph shown in fig. 3(a) and for the tree indicated obtain the fundamental loops and fundamental cutsets.



Tree {5, 6, 7, 8, 9} **10**

fig. 3(a)

b) Find the current through the 4Ω resistor in fig. 3(b) using the principle of superposition.

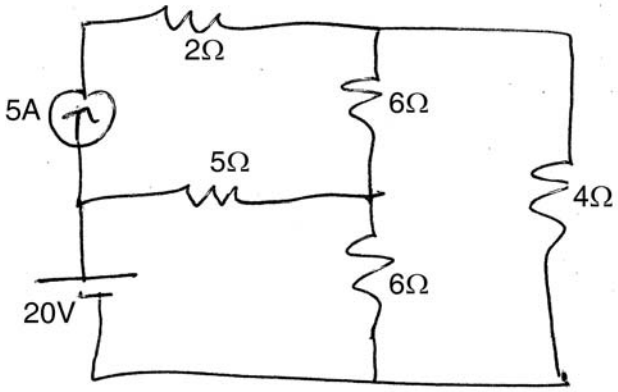


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fig. 3(b)

4. a) Find Thevenin's equivalent network for fig. 4(a). **10**

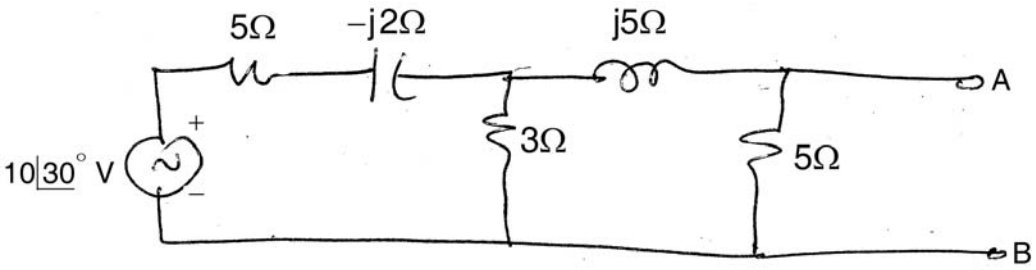

fig. 4(a)

b) Determine the source voltage V_s so that the current through 2Ω resistor is zero in the network of fig. 4(b).

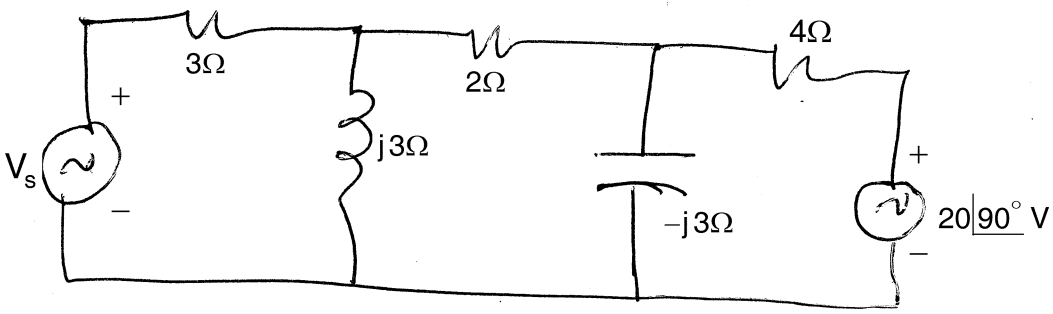

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fig. 4 (b)

PART – B

5. a) Compare series and parallel resonant circuits. **6**

b) Obtain the current locus for the circuit shown in fig. 5(b) and find the value of R_c which results in a angle of 45° between V and I_t.

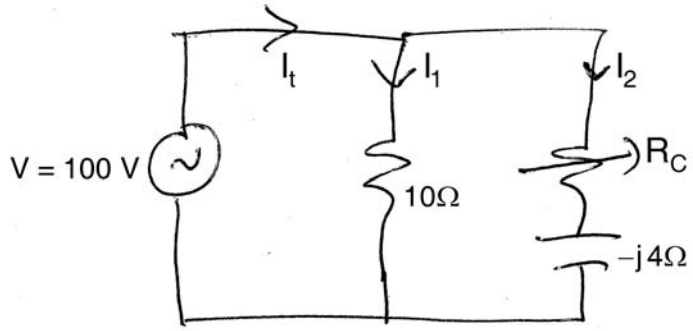

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fig. 5 (b)

c) Find the equivalent inductance of the network shown in fig. 5(c).

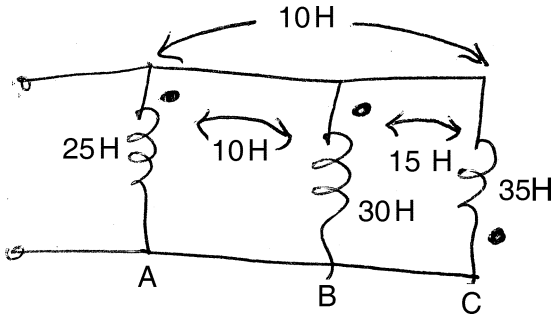

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fig. 5(c)

6. a) Show that 3ϕ power can be measured using two wattmeters. **6**

   b) Two wattmeters connected to measure 3ϕ power for V connected load reads 3 kW and 1 kW. The line current is 10 A. Calculate i) line and phase voltage ii) resistance and reactance/ ph. **6**

   c) A 400 V, 50 Hz, 3ϕ supply of phase sequence ABC is supplied to a delta connected load consisting of a 100Ω resistor between lines A and B, a 378 mH inductor between lines B and C and a 37.8 μF capacitor between lines C and A. Determine phase and line currents. **8**

7. a) In the network shown in fig. 7(a), the switch is closed. Assuming all initial conditions as zero, find i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$.

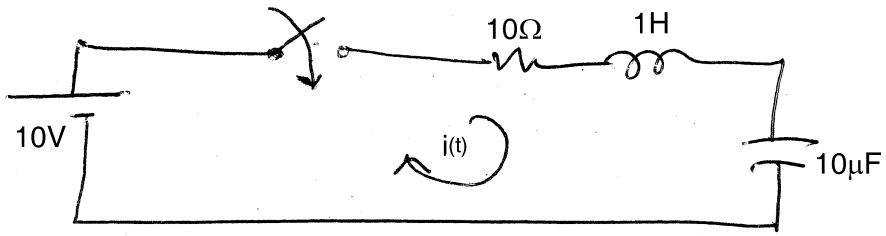

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fig. 7(a)

   b) In the network of fig. 7(b), a steady state is reached with the switch K open. At t = 0 , the switch is closed. Find the current i(t) for t > 0.

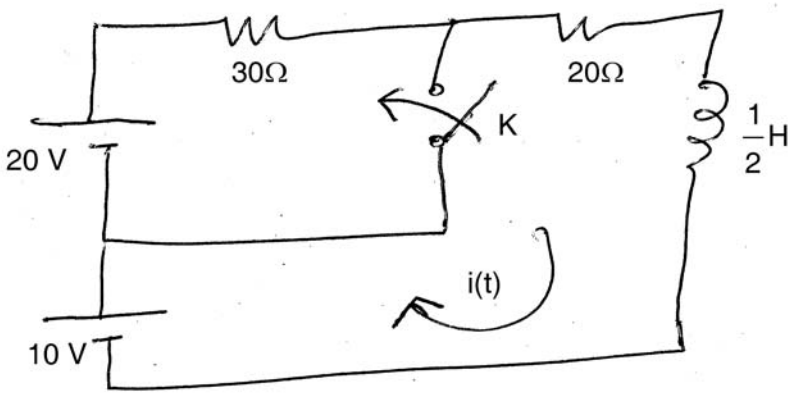

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fig. 7(b)

   c) Explain the behaviour of resistor inductor and capacitor elements under transient conditions. **6**

8. a) Find the open-circuit impedance parameters for the network shown in fig. 8(a) Determine whether the network is symmetrical and reciprocal.

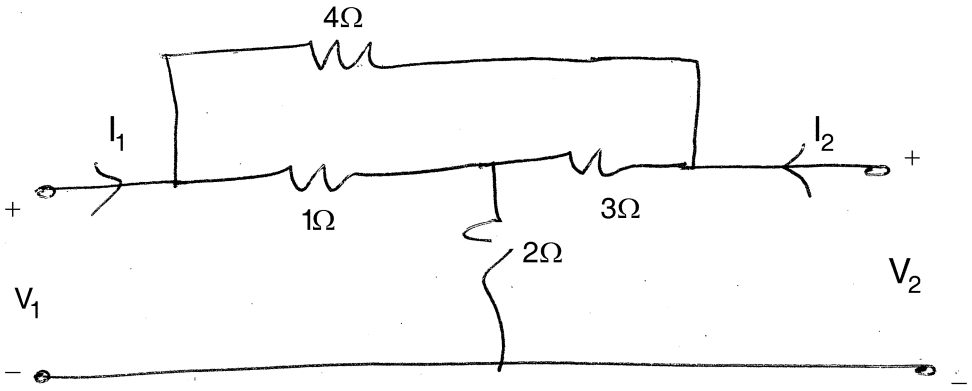

fig. 8(a) **8**

b) Derive the short-circuit admittance parameters of a two port network. **6**

c) Obtain the admittance function Y(s) for which the pole-zero diagram is shown in fig. 8 (c).

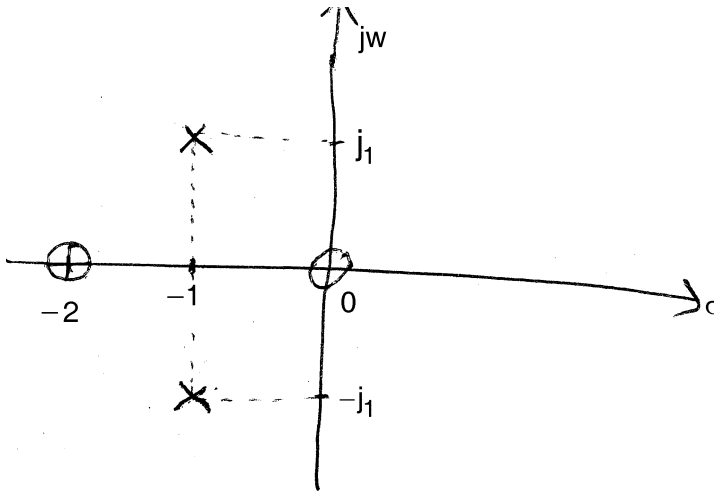

fig. 8(c) **6**
