PVP 14

Code: EE2T5

I B.Tech - II Semester – Regular/Supplementary Examinations
April - 2018

ELECTRICAL CIRCUIT ANALYSIS - I
(ELECTRICAL & ELECTRONICS ENGINEERING)

Duration: 3 hours Max. Marks: 70

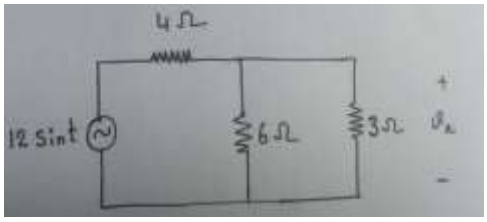
PART – A

Answer ***all*** the questions. All questions carry equal marks

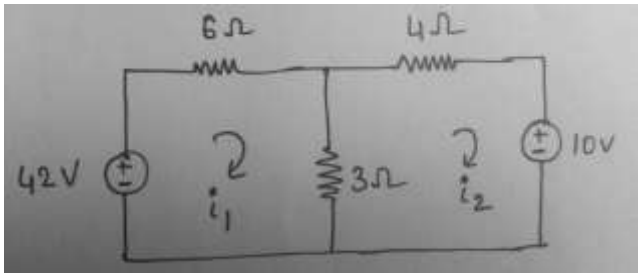
11 x 2 = 22 M

1. a) State Ohm's law and KVL.

   b) Determine v_x in the following circuit.



   c) Apply mesh analysis for the following circuit and write the KVL equation for loop 1 and 2.



   d) Write the steps to determine the node voltages with an example.

   e) Compare series and parallel resonant circuits with respect to
      i) impedance at resonance ii) Current at resonance
      iii) power factor at resonance and iv) Q-factor

   f) Define bandwidth of a series resonant circuit.

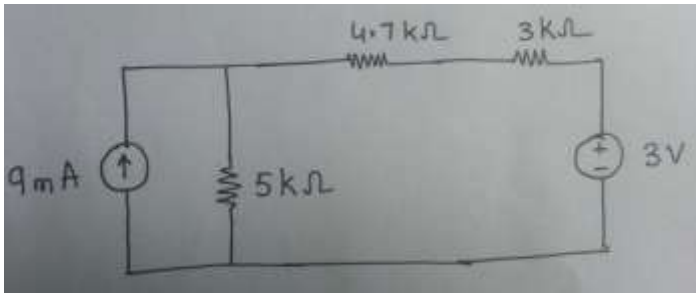
   g) Write any two applications of delta connection.

h) 3 coils, each having a resistance of 20 Ω and an inductive reactance of 15 Ω are connected in star to a 400 V, 3-phase, 50 Hz supply. Calculate the line current.

i) What is the Universal method of measuring power in a 3-phase circuit? Through a diagram show the connections.

j) The ratio of the reading of 2 watt meters connected to measure power in a 3-phase balanced load is 3:1. The load is known to be inductive with a lagging power factor. Calculate the power factor.

k) Convert the current source in the following circuit in to an equivalent voltage source.

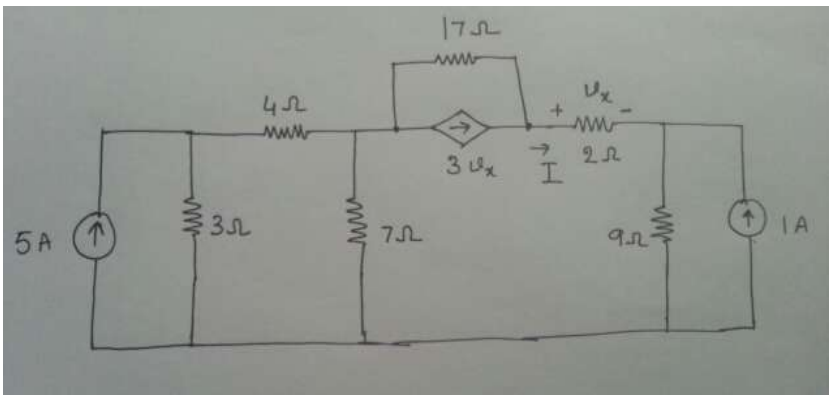


PART – B

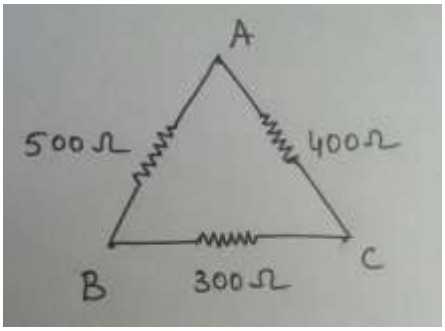
Answer any ***THREE*** questions. All questions carry equal marks.

3 x 16= 48

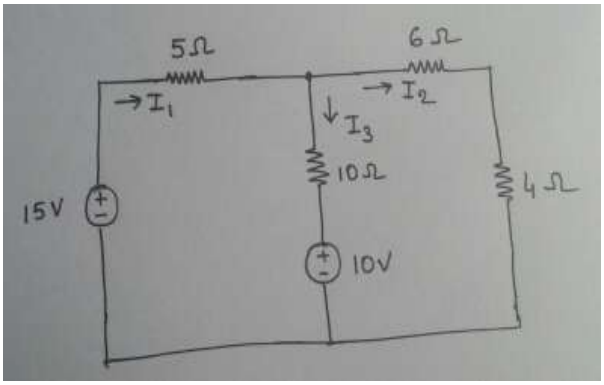
2. a) Calculate the current through the 2 Ω resistor by making use of source transformation. 8 M



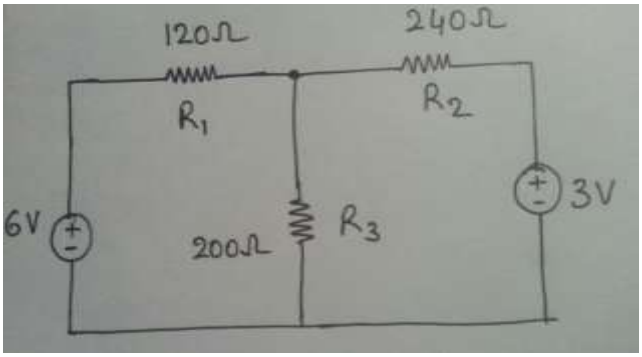
b) Convert the following Δ - network to an equivalent Y- network. 8 M



3. a) Find the branch currents I_1, I_2 & I_3 using mesh analysis. 8 M



b) Use the nodal analysis to determine the current through R_3 of the following circuit. 8 M



4. a) Draw the power triangle and show the relation between apparent power, true power and reactive power. 6 M

b) A coil having a resistance of 7 Ω and an inductance of 31.8 mH is connected to 230 V, 50 Hz supply. Calculate (i) the circuit current (ii) phase angle (iii) power factor and (iv) power consumed. 10 M

5. A balanced 3-phase load consists of three coils, each of the resistance 6 Ω, and inductive reactance of 8 Ω. Determine the line current and power absorbed when the coils are i) star-connected ii) delta-connected across 400V, 3-phase supply. 16 M

6. a) Each of the two wattmeters connected to measure the input to a 3-phase induction motor reads 10kW. If the power factor of the motor be changed to 0.866 lagging, determine the readings of the two wattmeters, the total input power remaining unchanged. 8 M

b) An unbalanced Y-load has balanced voltages of 100V and the acb sequence. Calculate the line currents and the neutral current. Assume $Z_A = 15$, $Z_B = 10 + j5$ Ω, $Z_C = 6-j8$ Ω. 8 M