Scheme – G

Sample Question Paper

Course Name : Electrical Engineering Group

Course Code : EE/EP **17323**

Semester : Third

Subject Title : Electrical Circuit and Network

Marks : 100 **Time: 3 hrs**

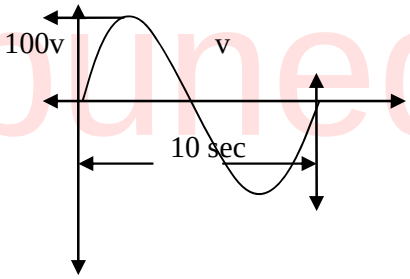
Instructions:

1. All questions are compulsory
2. Illustrate your answers with neat sketches wherever necessary
3. Figures to the right indicate full marks
4. Assume suitable data if necessary
5. Preferably, write the answers in sequential order

Q.1: Attempt any TEN of the following: **20 Marks**

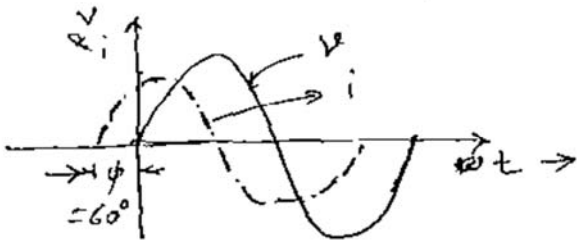
a. Define crest factor and form factor related to sinusoidal AC waveform.

b. Find frequency and RMS value of the following voltage waveform



c. Define power factor and quality factor in RLC series circuit

d. State the equation of voltage and current for the waveform shown below



e. Define conductance and susceptance related to parallel circuit. Also write the mathematical equation.

f. Draw graphical representation of Impedance and current with respect to frequency in parallel resonance circuit

g. Draw neat circuit of balanced connected load connected to 3 Ph. Star connected generator.

h. Draw the sinusoidal waveform of 3 ph emf and also indicate the phase sequence.

i. Write the procedure of converting a given current source into voltage source.

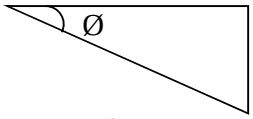
j. State superposition theorem applied to DC circuits.
k. State Norton's theorem applied to DC circuit
l. State the behavior of following elements at the time of switching i.e. transient period
i. pure L ii. Pure C

Q2 : Attempt any FOUR of the following: 16 Marks

a. The voltage and current in a circuit with 50Hz supply are represented as follows.
v = 280 Sin ωt i = 14.14 Sin (ωt – π/6)
Find i. RMS value of current ii. Average value of voltage iii. Power consumed in the circuit iv. Draw the phasor diagram of current and voltage.

b. Derive the expression for current in pure capacitive circuit when connected to sinusoidal AC voltage. Draw the phasor diagram

c. For the given impedance triangle

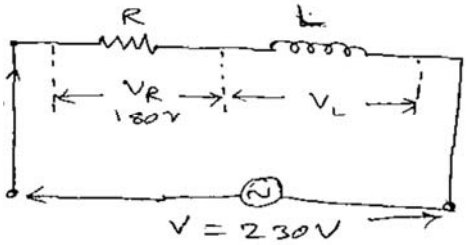


i. Identify the type of circuit
ii. Mark parameters of all sides of the triangle
iii. State the nature of power factor
iv. Draw the sinusoidal waveform s voltage and current

d. Define following quantities
i. Phase ii. Active power iii. Reactive power iv. Apparent power

e. For the given circuit shown below

I = 2A



50Hz

Find the following i. Voltage across inductance
ii. Values of R and L
iii. Power factor
iv. Active power

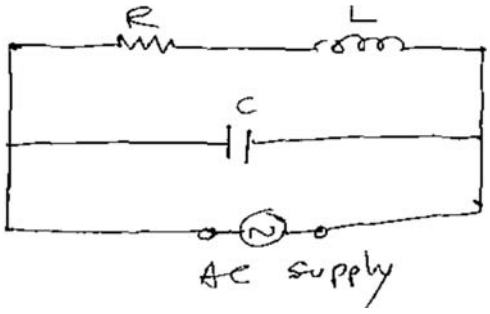
f. A RLC series circuit with a resistance of 10Ω. Inductance of 0.2H and capacitance of 50μF is supplied with 200V variable frequency AC supply. Find
i. Frequency at which the circuit will behave as purely resistive circuit
ii. Current at this condition
iii. Quality factor
iv. Power factor

Q.3 : Attempt any FOUR of the following: 16 Marks

a. Compare between series and parallel resonance circuit on the basis of following points

i. Resonant frequency ii. Impedance iii. Current iv Magnification

b. Derive the expression for resonant frequency for the circuit shown below



c. If A = 10 + j8 , B= -7 + j2 C= 6 - j3,
Find i. AB/C ii. (A + B)/(B - C)

d. A coil having resistance of 5Ω and inductance of 0.02H is arranged in parallel with another coil having resistance of 1 Ω and inductance of 0.08H. Calculate the current through the combination and power absorbed when a voltage of 100V, 50Kz is applied. Use impedance method.

e. Define the following terms
i. Leading Quantity ii. Lagging Quantity

Also identify the leading quantity in fig A and lagging quantity in Figure B

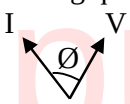


Fig A

Fig B

f. A RC series circuit consisting of R = 10Ω and C= 100μ F is connected across 200v, 50Hz AC supply. Find the value of current ad power factor. What will be the value of current and power factor if the value of resistance is doubled

Q.4: Attempt any FOUR of the following: 16 Marks

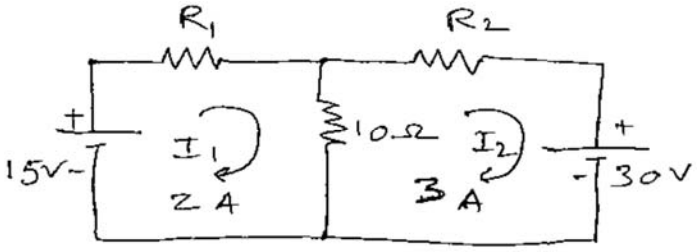
g. State any four advantages of polyphase circuit over single phase circuit

h. Three impedances each of 8 – j10 Ω are connected in delta across 400V, 50Hz 3 Phase AC supply. Calculate I . Phase current ii. Line currentiii. Phase voltage iv. Power drawn.

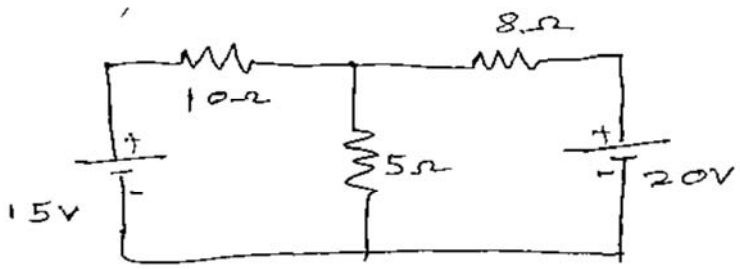
i. A star connected balanced load consumes 2000W power when connected to 3 phase 400 v 50Hz supply. Is the power factor of the load Is $1/\sqrt{2}$ lagging, calculate value s of resistance and inductance of each phase.

j. Derive the formulae for Delta to Star transformation.

k. Using Mesh analysis find value of R1 and R2 shown in figure



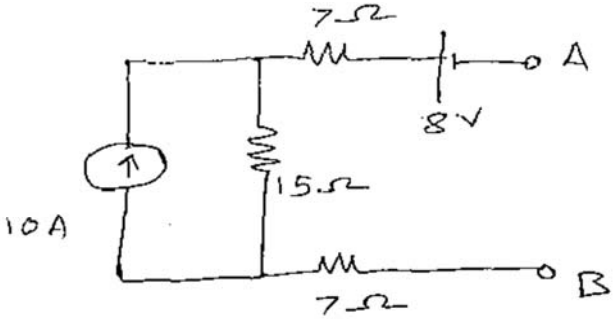
l. For the circuit shown below calculate current through 10Ω resistance using nodal analysis



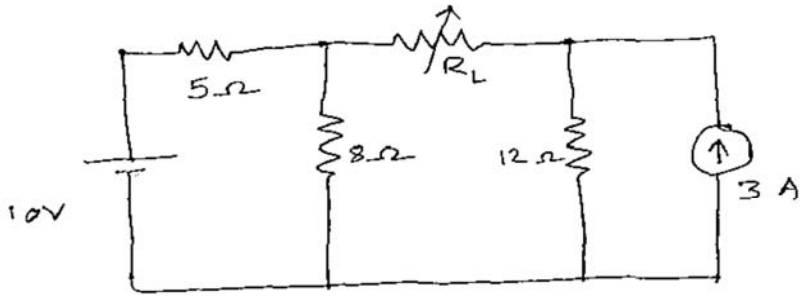
Q.5: Attempt any TWO of the following: 16 Marks

a. With the help of necessary phasor diagram, derive the relationship between line and phase current in balanced Delta connected load, connected to 3 phase AC supply.

b. i. State Thevenin's theorem and write its procedural steps to find current in a branch(Assume a simple circuit)
ii. develop Thevenin's equivalent across A and B in the network shown below

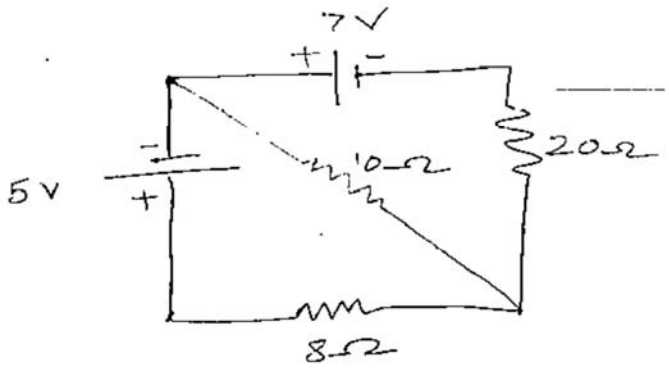


c. State maximum power transfer theorem. In the following network find the value of resistance R_L So that maximum power will transfer through it and also calculate this power.

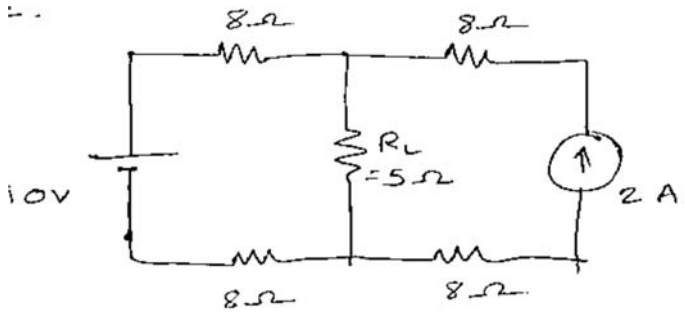


Q.6: Attempt any FOUR of the following: 16 Marks

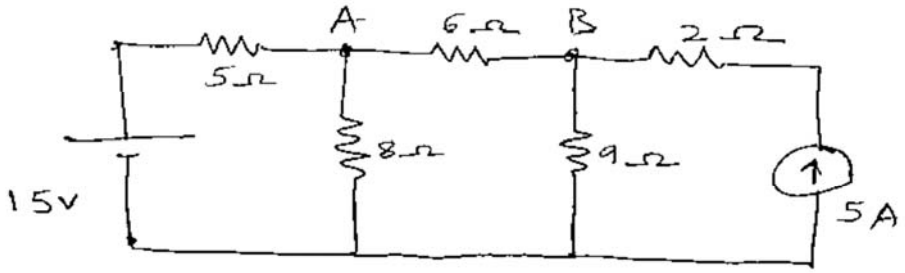
a. Calculate current through 10Ω resistance in the network shown in figure using superposition theorem



b. Using Norton's theorem find current through 5Ω resistance



c. Find the voltages at nodes A and B in the network shown below



d. Draw the curves for following parameters during series resonance condition with respect to frequency

i. X_L ii. X_C iii. I iv. Z

e. Explain the concept of initial and final conditions in switching circuits for the elements R, L. and C.

f. Explain how sinusoidal AC emf is generated by using simple one loop AC generator.