'I' Scheme

Question Paper Profile

Program Name : **Electrical Engineering Program Group**

Program Code : **EE/EP/EU**

Semester : **Third**

22324

Course Title : **Electrical Circuits**

Max. Marks : **70** **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 Five of the following. **10 Marks**

a) Draw impedance triangle for R-C series circuit. Write nature of power factor of this circuit.
b) Define impedance and reactance related to single phase AC series circuit. Give the units of both.
c) Define admittance with unit.
d) Draw the sinusoidal waveform of 3-phase emf and also indicate the phase sequence.
e) Give four steps to solve mesh analysis.
f) State Superposition Theorem.
g) State the maximum power transfer theorem for DC circuit.

Q.2 Attempt any Three of the following. **12 Marks**

a) Find active, reactive and apparent power and power factor of the A.C. Series circuit consisting of R=1 ohm, L=0.001 Henry and C= 1 microfarad supplied with 100 volt, 50 Hz power supply.
b) A voltage of 200 ∠ 53° is applied across two impedances in parallel. The values of impedances are (12 + j16) and (10 – j20). Determine the kVA, kVAR and kW in each branch and power factor of the whole circuit.
c) A delta connected induction motor is supplied by 3-phase, 400V, 50Hz supply the line current is 43.3A and the total power taken from the supply is 24 kW. Find the resistance and reactance per phase of motor winding
d) Using mesh analysis find values of V_R as shown in Figure No. 1

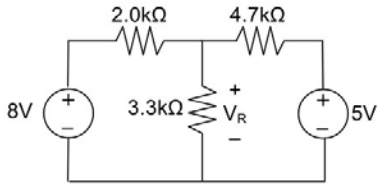


Fig. 1.

Q.3) Attempt any Three of the following. **12 Marks**

a) A coil of resistance 50 Ω and inductance of 0.1 H is connected in series with 100 mF capacitor. The combination is supplied with 230 V, 50 Hz A.C. supply. Calculate voltage across each, current through the circuit, power factor and draw complete vector diagram.

b) Two impedances (12 + j16) and (10-j20) Ω are connected in parallel across a supply of $200\angle 60^0$ using admittance method calculate branch currents, total current and power factor of whole circuit.
c) Give four advantages of polyphase circuits over 1-phase circuits.
d) Give the expression for star to delta and delta to star transformation.
e) Using Norton's theorem, find current through 1ohm resistances in Figure No. 2.

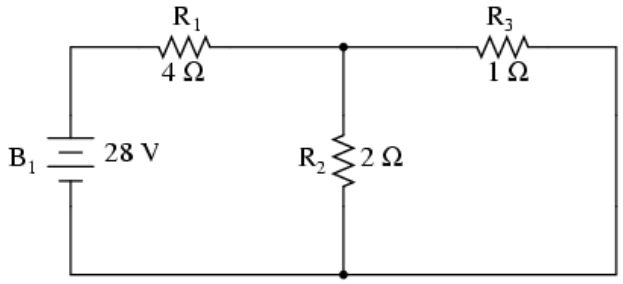


Fig.2

Q.4) Attempt any Three of the following. 12 Marks

a) An inductive coil (10 + j40) Ω impedance is connected in series with a capacitor of 100 μF across 230 V, 50 Hz, 1-Phase supply mains find :
(1) Current through the circuit
(2) P.F. of the circuit
(3) Power dissipated in the circuit
(4) Draw phasor diagram

b) A coil having resistance of 5 Ω and inductance of 0.2H is arranged in parallel with another coil having resistance of 1 Ω and inductance of 0.08 H. Calculate the current through the combination and power absorbed when a voltages of 100 V, 50 Hz is applied. Use impedance method.

c) Each phase of a delta-connected load comprises a resistor of 50 Ω and capacitor of 50 μF in series. Calculate the line and phase currents when the load is connected to a 440 V, 3 phase 50 Hz supply.

d) Define duality of electric circuits and write duality of electrical elements.

Q.5) Attempt any Two of the following. 12 Marks

a) A 100 Ω resistor, 0.02 H inductor and 1.2 μF capacitor are connected in parallel with a circuit made up of resistor of 110 Ω and a capacitor of 2.4 μF. a supply of 230V, 50 Hz is connected across the circuit. Calculate the current taken from the supply & phase angle of it.

b) Using source transformation, find the voltage across 12 Ω (v_x), as shown in figure 3.

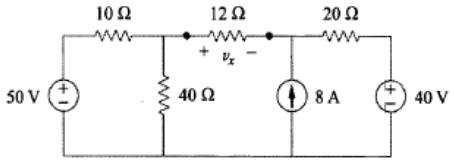


Fig.3

c) Apply Thevenin's theorem to calculate current flowing through $R_5 = 250\ \Omega$ resistor as shown in figure.4

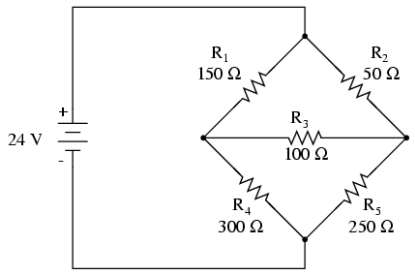


Fig.4

Q.6) Attempt any Two of the following. 12 Marks

a) An a.c. series circuit has a resistance of 10 Ω, an inductance of 0.2 H and a capacitance of 60 μF. Calculate: (a) resonant frequency (b) current (c) power at resonance. Applied voltage is 200 V.

b) State relationship between line voltage and phase voltage, line current & phase current in a balanced star connection. Draw complete phasor diagram of voltages & current.

c) Apply Superposition theorem to calculate current flowing through $R_4 = 10\ \Omega$ resistor as shown in figure.5

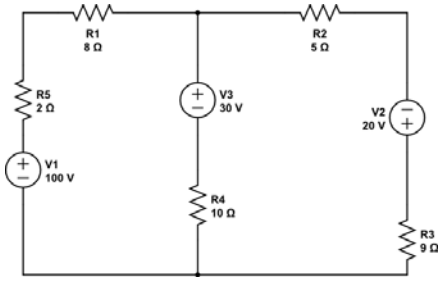


Fig.5

'I' Scheme

Question Paper Profile

Program Name : **Electrical Engineering Program Group**

Program Code : **EE/EP/EU**

Semester : **Third**

22324

Course Title : **Electrical Circuits**

Max. Marks : **20** **Time: 1 Hour**

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 FOUR. **08 Marks**

a. Draw voltage triangles for R-L and R-C single phase AC series circuits.
b. Define quality factor of series A.C. circuit.
c. Convert $Z = 6 + j8\ \Omega$ in polar form.
d. Define admittance and conductance in relation with parallel circuits. Give formulas for the same.
e. Write properties of Parallel resonance.
f. Define Quality Factor for parallel resonance. Give equation of it.

Q.2 Attempt any THREE. **12 Marks**

a. A resistance 60 Ω and inductance of 0.5 H is connected in series. The combination is supplied with 230 V, 50 Hz A.C. supply. Calculate voltage across each, current through the circuit, power factor and draw complete vector diagram.
b. A RC series circuit consisting of R = 10 Ω and C = 100 mF is connected across 200V, 50Hz AC supply. Find the value of current and power factor. What will be the value of current and power factor if the value of resistance is doubled?
c. Derive an expression for resonant frequency of a series RLC circuit.
d. Impedances Z1 = (10 + j5) Ω and Z2 = (8 + j6) Ω are connected in parallel across V = (200 + j0). Using the admittance method, calculate circuit current and the branch currents.
e. A coil having resistance of 5 Ω and inductance of 0.2H is arranged in parallel with capacitor of 50 μF. Calculate the current through the combination and power absorbed when a voltages of 100 V, 50 Hz is applied. Use impedance method.

'I' Scheme

Question Paper Profile

Program Name : **Electrical Engineering Program Group**

Program Code : **EE/EP/EU**

Semester : **Third**

22324

Course Title : **Electrical Circuits**

Max. Marks : **70** **Time: 3 Hrs.**

Instructions:

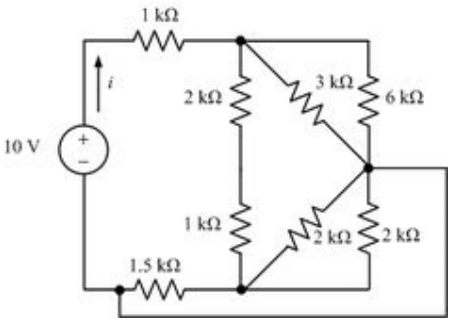
(1) All questions are compulsory.
(2) Illustrate your answers with neat sketches wherever necessary.
(3) Figures to the right indicate full marks.
(4) Assume suitable data if necessary.
(5) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR. **08 Marks**

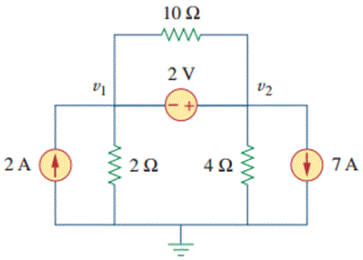
a) Define line voltage and phase voltage
b) What do you mean by balanced load and balanced supply in relation with polyphase AC circuits?
c) Give four steps to solve nodal analysis.
d) How current source can be converted into equivalent voltage source?
e) State Reciprocity Theorem.
f) State Norton's theorem.

Q.2 Attempt any THREE. **12 Marks**

a. Three coils each with a resistance of 10 Ω and inductance of 0.35mH are connected in star to a 3-phase, 440 V, 50 Hz supply. Calculate the line current and total power taken per phase.
b. Derive relation between line and phase voltages of star connection of 3ph load.
c. Find current in 1k Ω by using star delta transformation.



d. Find the current in 10 Ω by using superposition theorem.



e. Find maximum power in R_1= 4 Ω by using maximum power transfer theorem.