

CIRCUIT and NETWORK THEORY

(Question Bank)

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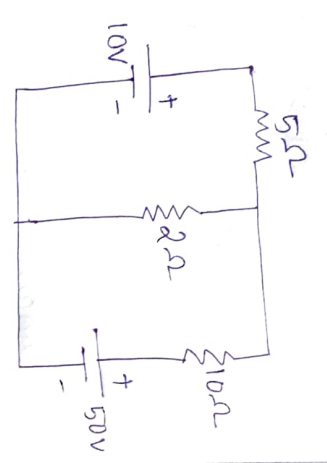
Electrical Dept.

(b2) Magnetic Circuits & Coupled Circuits :-

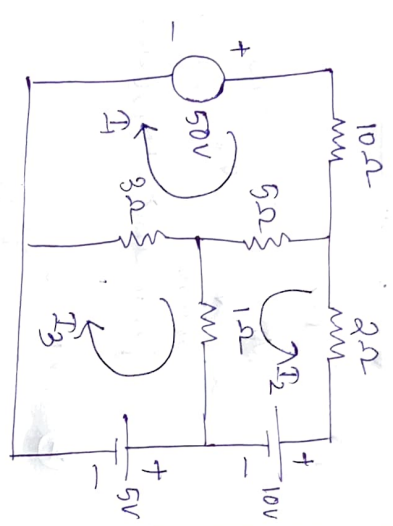
- ① Define ;
Magnetising force, intensity of magnetisation, MMF, magnetic flux, permeability, reluctance, permeance, hysteresis
- ② Analogy between electric ckt & magnetic ckt. Explain.
- ③ B-H Curve. Explain with hysteresis loss.
- ④ what is self inductance, its symbol and unit.
- ⑤ what is mutual inductance, its symbol and unit.
- ⑥ Define Faraday's laws of electromagnetic induction.
- ⑦ what is Lenz's law.
- ⑧ what is co-efficient of coupling.

(3) CIRCUIT ELEMENTS and ANALYSIS :-

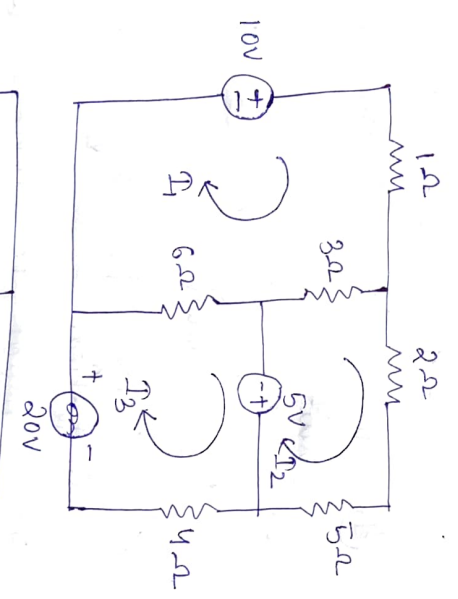
① Write the mesh currents equations in the circuit shown in the figure and determine the currents.



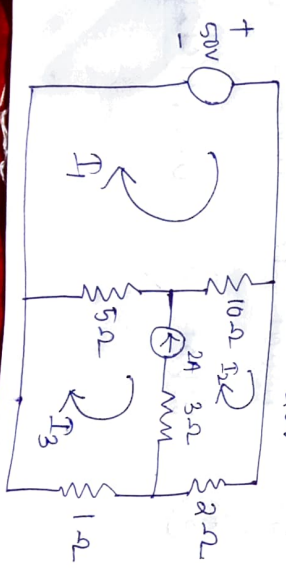
② Determine the mesh currents I_1 in the circuit shown.



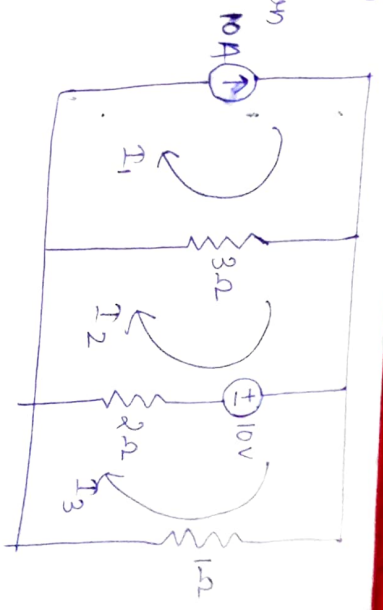
③ Write the mesh equations for the circuit.



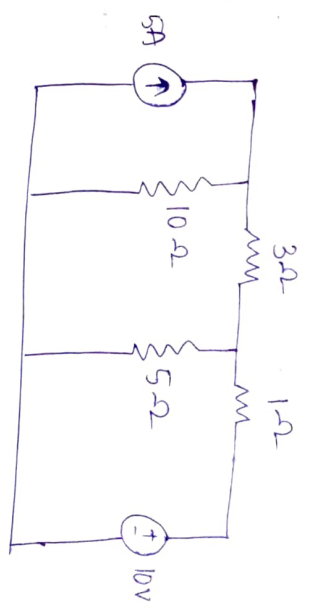
④ Determine the current in the 5Ω resistor in the network given in figure.



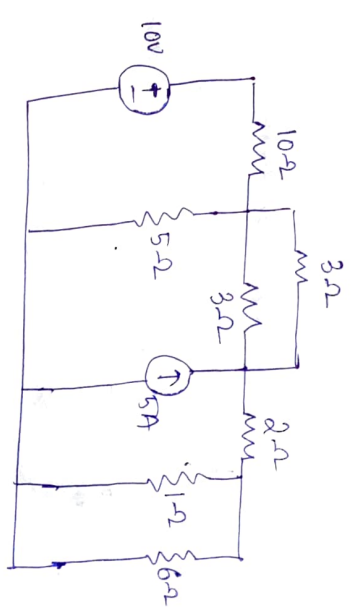
⑤ Write the mesh equations for the circuit shown in the figure.



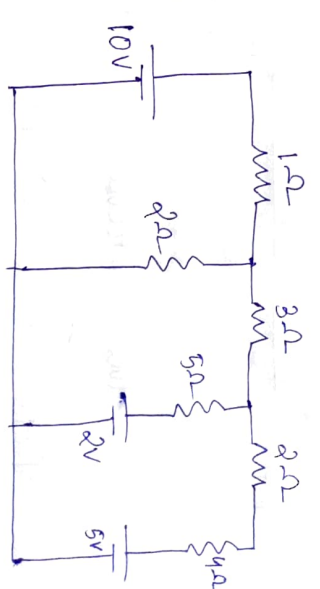
⑥ Write the node voltage equations and determine the current in each branch.



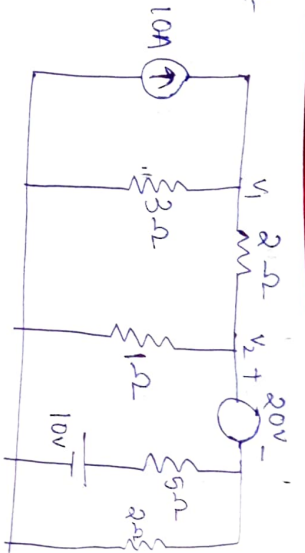
⑦ Determine the voltages at each node for the circuit shown in the figure.



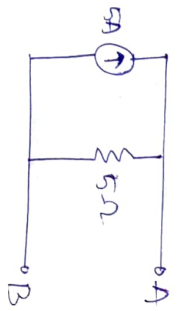
⑧ For the circuit shown, write the node equations by the inspection method.



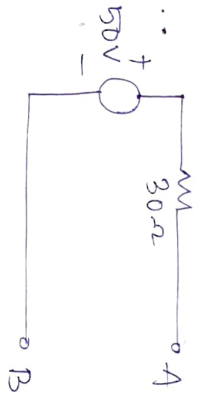
9) Determine the current in the 5Ω resistor for the circuit shown.



10) Determine equivalent voltage source;

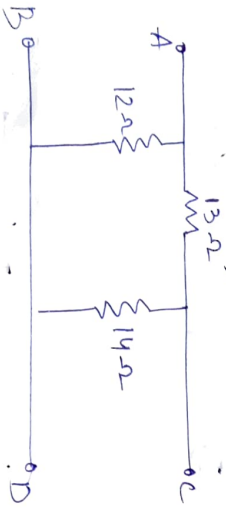


11) Determine equivalent current source;

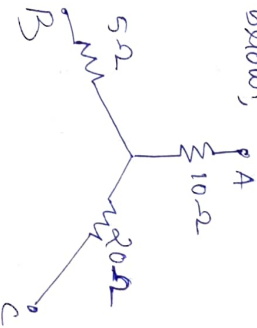


(4) NETWORK THEOREMS :-

1) Obtain star connected for the Delta connected ckt below;



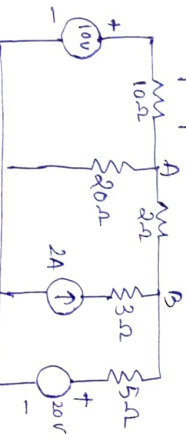
2) Determine the delta-connected equivalent for the star-connected ckt below;



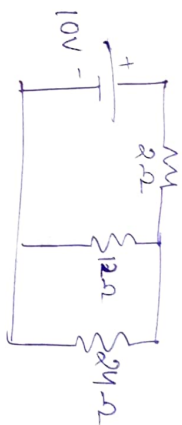
3) Find the current across 3Ω using superposition theorem;



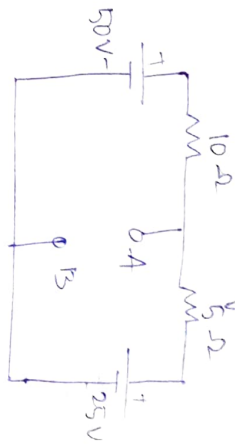
4) Find voltage across 2Ω resistor using superposition theorem;



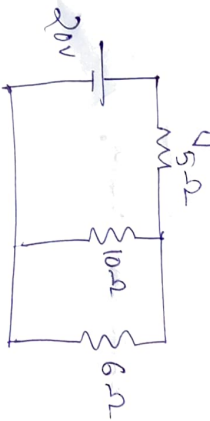
5) Find current & voltage across 24Ω resistor using thevenin's theorem.



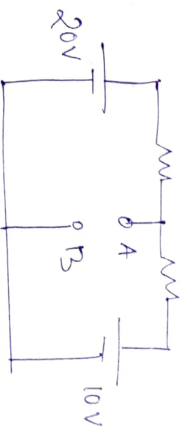
6) Determine the thevenin equivalent circuit across 'AB' for the given circuit shown in figure.



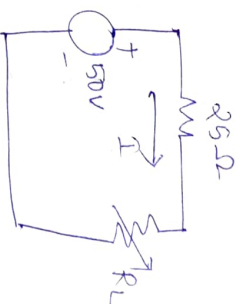
7) Find current & voltage across 6Ω using Norton's theorem.



8) Determine the Norton's equivalent ckt at the terminals AB.

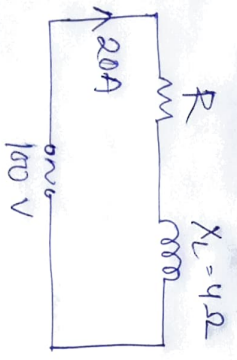
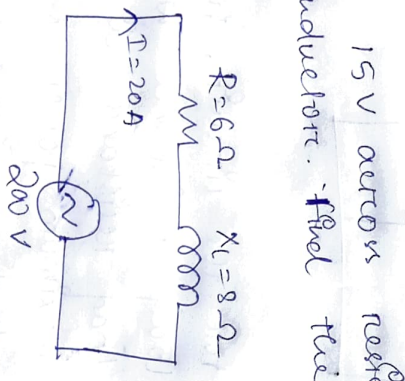


9) For the circuit, find the load resistance when the load resistance draws maximum power. and also find maximum power.



(5) AC CIRCUIT and RESONANCE :-

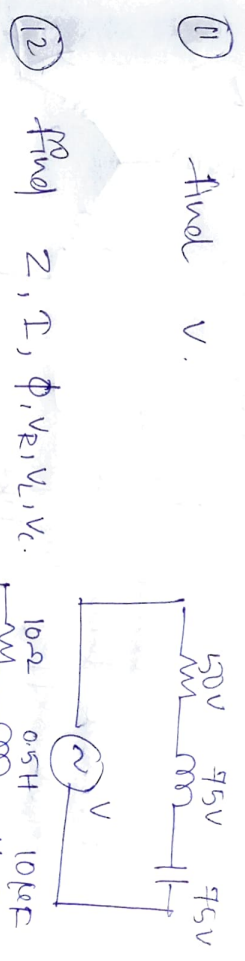
- ① An AC voltage R_s given by $v_s = 20 \sin 157t$. Find the frequency.
- ② $i = 10 \sin 314t$, Find the time taken to generate two cycles of current.
- ③ $v_s = 30 \sin 314t$. Find the time taken to by the voltage to reach $-30V$.
- ④ A AC current has a magnitude of $3A$ at 120° . Its max. value _____.
- ⑤ In R-L series ckt, $R = 10\Omega$, $X_L = 10\Omega$, find the phase angle between voltage & current.
- ⑥ In R-L series ckt, $15V$ across resistor and $20V$ across inductor. Find the supply voltage.
- ⑦ In the figure;
 - Find (i) Pt
 - (ii) power consumed
 - (iii) Reactive power
 - (iv) Active power
- ⑧ In the figure;
 - Find (i) R
 - (ii) power consumed
 - (iii) PF
 - (iv) wattful component of current.



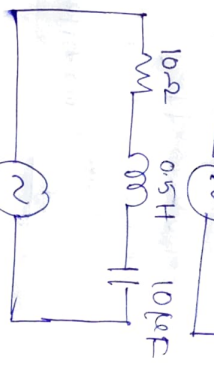
⑨ The active and reactive powers of an inductive circuits are $60W$ & $80VAR$ respectively. The PF ?

⑩ In An A.C series circuit $R = 6\Omega$, $X_L = 20\Omega$ and $X_C = 12\Omega$. The power factor will be ?

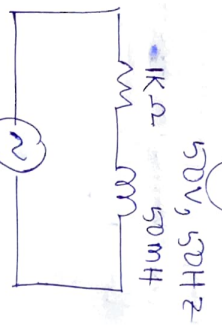
⑪ Find V .



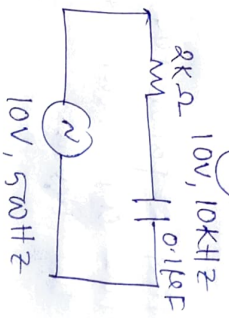
⑫ Find $Z, I, \phi, V_R, V_L, V_C$.



⑬ Find Z, I, ϕ, V_R, V_L .

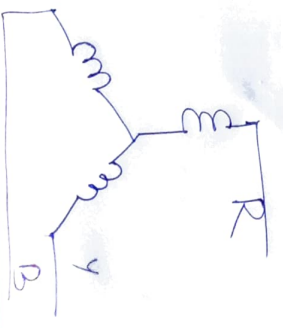


⑭ Find Z, I, ϕ, V_C, V_R .

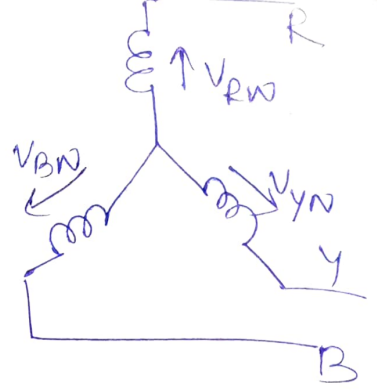


(6) POLYPHASE CIRCUIT :-

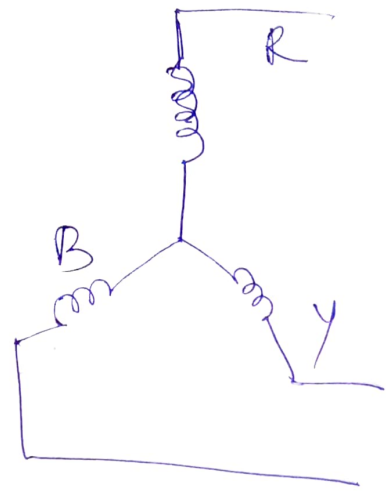
① In the figure shown, the value of the current in phase R is $I_R = 10 \angle 20^\circ A$. calculate the value of 3 line current. assume R, Y, B phase sequence.



- (2) A symmetrical star connected system is shown in the fig. Calculate the 3 line voltages given $V_{RN} = 230 \angle 0^\circ$. The phase sequence RYB



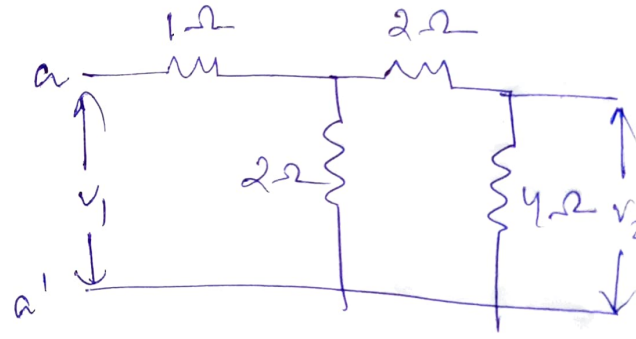
- (3) A balanced star connected load of $(4+3j) \Omega$ per phase is connected to a balanced three phase 400V supply. The phase current is 12A. find



- (i) total Active power (ii) Reactive power (iii) Apparent power

(7) TWO-PORT

- (1) find Y-parameter for the network shown in the figure.



- (2) find Z-parameter for the ckt shown in the figure.

