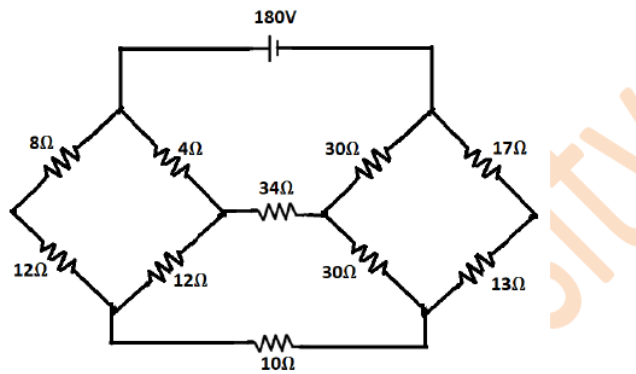
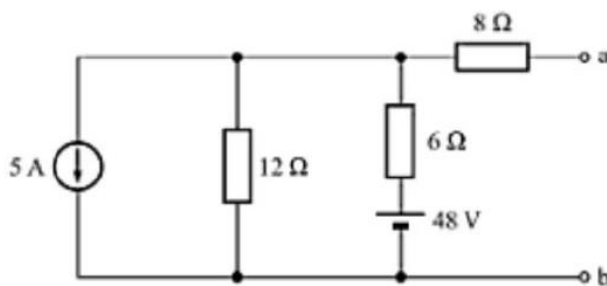


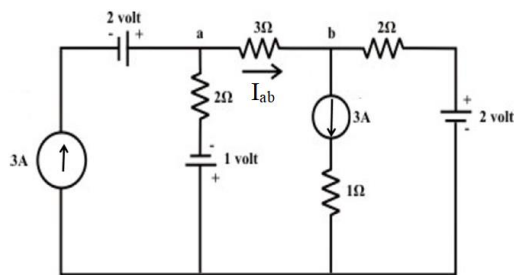
1A) Use Star Delta Transformations to find the current through 10Ω resistor in the network below.



1B) Draw Thevenins equivalent circuit across the terminals a-b for the network shown below :



1C) Using Superposition Theorem determine the current through 3 resistor in the direction shown in the network below :



2A) The voltage drops across 3 elements connected in series can be represented by $e_1 = 20\sin\omega t$, $e_2 = 40\sin(\omega t + 90^\circ)$, $e_3 = 30\sin(\omega t - 30^\circ)$ respectively.

- Find the resultant EMF in instantaneous form.
- Also find the value of resultant EMF at $t = 0$ sec
- Draw the phasor diagram

2B) A 1.25Ω resistor is connected in series with an Inductor of value 133mH and a 100F capacitor. Entire series network is connected across 200V , 50Hz supply. Determine :

- Impedance of the circuit.
- Active, Reactive, Apparent Powers
- Value of Inductor in order to get the circuit into resonance.

2C) An AC circuit has two branches A & B connected in parallel across 230V , 50Hz supply. Branch A consists of coil with inductance of 100mH and resistance of 10 ohms. Branch B takes a leading current from the supply. If the total power drawn from the supply is 1KW and overall power factor of 0.6 lag , Determine the capacitance and resistance of Branch B.

3A) With help of neat circuit diagram and phasor diagram , Prove that 2 wattmeters are sufficient to measure total 3 phase active power.

Also derive the expression for power factor of circuit in terms of wattmeter readings..

3B) A 3 phase Balanced Delta connected load has an impedance of $(20+j30)$ ohms. The load draws lagging current from the supply of 240V , 50Hz.

(i) Current in each phase of the load.

(ii) Reactive power

(iii) Wattmeters readings W1 and W2, if wattmeters are connected to measure total 3 phase power.

3C) Two wattmeters connected to measure 50Hz 3 phase power , for a balanced star connected 3 phase load measure 10KW and 5KW respectively. If Line current is 20A at lagging power factor , Determine

(i) Phase Voltage

(ii) Line Voltage

(iii) Resistance per phase

(iv) Inductance per phase

4A) With proper nomenclature , Derive the expression of Electromagnetic Torque developed in DC motor.

4B) A three phase induction motor with 4 poles , is supplied from an alternator having 6 poles and running at 1000rpm. Find

(i) Synchronous Speed

(ii) Full load speed of the motor if full load slip is 2%

(iii) Frequency of Rotor currents when running at 1350 rpm.

(iv) Slip when the motor is standstill.

4C) A 10KW , 500V shunt machine has the armature resistance and shunt field resistance of 0.5 ohms and 250 ohms respectively .The iron and frictional losses equal to 600 and 400 Watts respectively.

(i) Find emf generated.

(ii) Constant losses.

(iii) Efficiency of the generator supplying output power of 10KW

(iv) Efficiency of the motor drawing input power of 10KW

5A) Write a note on :

(i) Classification of cables based on Voltage Rating

(ii) Fuses

5b) The maximum flux density in the core of a 1100/220V,50Hz,100KVA transformer is 3.5T. If the EMF per turn is 5.5V. Calculate

- (i) The area of cross section of the core
- (ii) The number of turns of the primary and secondary windings
- (iii) Rated Primary and Secondary Currents at Full Load
- (iv) Rated Primary and Secondary Currents at 25% Load

5C) The list of loads and average consumption hours per day of a typical household is given below:

S.No.	Name of the Appliance	Wattage	Average consumption hours per day
1.	Six Bulbs	25W each	12 hours
2.	Three Ceiling fans	85W each	10 hours
3.	2 Geysers	1KW	1 hour
4.	Refrigerator	150W	24 hours
5.	Television	50W	8 hours
6.	Mixer Grinder	850W	20 minutes
7.	Water Pump	800W	45 minutes

Considering a 31 day month, Determine

- i) Total number of units consumed in a month
- ii) Monthly bill for the above consumption units considering a domestic connection of 6KW sanctioned load with the tariff details given below:

S.No	Type of Charges	Tariff Details
1.	Fixed Charges for the sanctioned load	Rs. 60 /- for first KW Rs. 75/- for every additional KW
2.	Energy consumption Charges	0 to 50 units @ Rs. 4.5 per unit 51 to 100 units @ Rs. 5.95 per unit 101 to 200 units @ Rs. 7.5 per unit 201 to 300 units @ Rs. 8.55 per unit 301 to 400 units @ Rs. 8.6 per unit Above 400 units @ Rs. 9.0 per unit
3.	Fuel Adjustment Charges	@ 20 paise per unit consumed
4.	Tax on Energy consumption charges only	9.5 %