B.E. First Semester (Fire Engineering) (C.B.S.)
Basic Electrical Engineering (BEE)
Paper – IV

P. Pages : 2

TKN/KS/16/7287

Time : Two Hours

0855

Max. Marks : 40

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Notes :   1.   All questions carry marks as indicated.
2.   Solve Question 1 OR Questions No. 2.
3.   Solve Question 3 OR Questions No. 4.
4.   Solve Question 5 OR Questions No. 6.
5.   Solve Question 7 OR Questions No. 8.

1.   a)   Explain practical voltage source, current source and Ideal voltage source, current source.   **5**

b)   Find the total current 'I' for below shown circuit using Star-Delta conversion. All the resistors are in ohms.   **5**
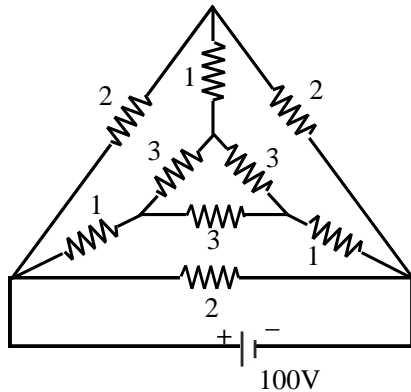
2.   a)   Calculate the voltage between terminal A-B for shown network.   **5**
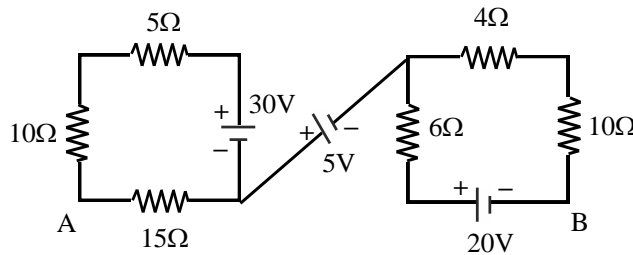
b)   Find the current flowing in branch AB for network shown in fig. by superposition theorem.   **5**
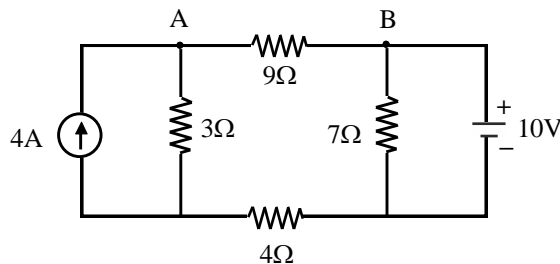
3.   a)   Explain the similarities and Dissimilarities between Electric circuit and Magnetic circuit. (four points each)   **4**

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b) An Iron magnetic circuit has uniform cross sectional area of 5cm² and a length of 25cm. A coil of 120 turns is wound uniformly over the magnetic circuit. Calculate **6**

    i) The magnetising force (H)

    ii) The relative permeability of the iron (μ_r) for each value of current and total flux :-

        a) When the current is 5A, the total flux is 0.6mwb

        b) When the current in coil is 1.5A, the total flux is 0.3mwb.

4. a) An Iron ring with cross sectional area of 6cm² carries a flux of 0.1mwb. It is wound with a wire of 100 turns and has a saw cut of 2mm. If the mean length of magnetic path is 30cm, relative permeability of Iron is 500, then calculate; **6**

    i) Flux density   ii) Ampere turns for iron.

    iii) Ampere turns for air   iv) Magnetising current.

    v) Magnetic field strength of Iron ring.

b) Define the following term in magnetic circuit. **4**

    i) Magnetic fringing effect.   ii) Co-ercive force.

    iii) Retentivity.   iv) Magnetic flux Density.

5. a) A coil of 10 Ω resistance and 0.1H inductance, is in series with a 150 μf capacitor across 200v, 50Hz AC supply. **5**

Calculate

    i) X_L and X_C ii) Z

    iii) I   iv) Cos ϕ and its nature.

    v) V_C and V_{coil}

b) Define the following terms. **5**

    i) Frequency   ii) R. M. S. value

    iii) Average value   iv) Power Factor

    v) Form Factor

6. a) Derive the relationship between line voltage and phase voltage in case of star connection. **5**

b) Three Identical coils of (9+j12) Ω are connected in delta to a 400v, 50Hz, 3-phase supply. Calculate for this load **5**

    i) Line Current.   ii) Voltage across each Impedance.

    iii) Power factor   iv) Total Kilovolt Ampere

    v) Total Kilowatt.

7. a) A 400v/100v, 1 ϕ transformer takes a no load current of 5A at 0.2 lagging P.F. secondary winding supplies a load of 100A at a P.F. of 0.8 lagging. Find the primary input current. **6**

b) Derive EMF equation of transformer. **4**

8. a) Derive the condition for Maximum efficiency for transformer. **4**

b) A 5 KVA, 230V/400V single phase transformer takes 0.7A and 60w on an open circuit when the low voltage winding is short circuited and 20V is applied to the high voltage terminal's, the current and power are 10A and 90w respectively. Calculate: **6**

    i) The full load efficiency at unity P.F.

    ii) Full load regulation at 0.8 P.F. lagging.

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