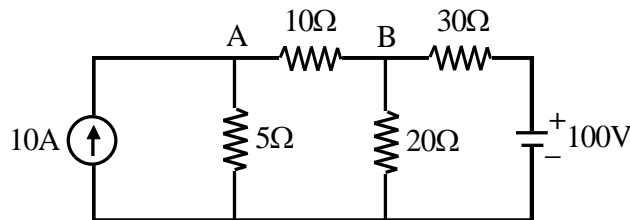




- Notes :
1. All questions carry equal marks.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.
 4. Illustrate your answers wherever necessary with the help of neat sketches.
 5. Use of slide rule, Logarithmic tables, Steam tables, Mollier's chart, Drawing instruments, Thermodynamic tables for moist air, Psychrometric charts and Refrigeration charts is permitted.

1. a) State and explain ideal and practical voltage and current source. Draw the V-I Characteristics of ideal and practical voltage and current source. **8**
- b) State superposition theorem. Find the current through branch AB using super position theorem. **8**

**OR**

2. a) Draw & Explain the impedance triangle for series 'R-L-C' circuit with $X_L < X_C$. Also explain its resonance. **8**
- b) A series RLC series consists of $R = 10\Omega$, $L = 0.318H$, $C = 63.6\mu F$ and emf source $e(t) = 100\sin 314t$, calculate (i) Expression for $i(t)$ (ii) Phase angle between voltage and current (iii) power factor (iv) power factor (v) active power consumed. **8**
3. a) What is B-H curve. Compare Magnetic and Electrical Circuit. **8**
- b) Two bars of same material with relative permeability is 800 having equal mean lengths of 10 cm. but area of cross sections 2 cm^2 and 1 cm^2 are bent in the form of semicircle and joined to form a close ring. Calculate AT required to produce 1 wb/m^2 flux density in the smaller ring. Neglect air gap leakage and fringing effect. **8**

OR

4. a) Derive & explain the condition for maximum efficiency & regulation of a transformer. **8**
- b) The following test data is obtained on 5 kVA, 220/440 volt single phase transformer:
O.C. Test : 220V, 2 Amp, 100W L.V. side
S.C. Test : 40 V, 11.4 Amp, 200W,H.V. side
Find all the parameters of equivalent circuit of transformer refer to primary side. Also draw the equivalent circuit. **8**

5. a) Discuss the various characteristics of DC shunt and series motors with electrical connection diagrams. Hence suggest the applications for different works. 8
- b) Derive the torque equation of DC motor. Also prove that the torque of series motor is proportional to square of the armature current. 8

OR

6. a) Why starters are necessary for starting induction motors? Explain in short different starting methods for 3 phase induction motors. 8
- b) In a 8 pole, 3ϕ , 50 Hz induction motor the shaft speed is 735 rpm. 8
Calculate the following:
i) Synchronous speed
ii) Percentage slip
iii) Frequency of rotor current.
7. a) State various types of instrument. Explain the construction and working principle of PMMC. 8
- b) Differentiate between earth wire and neutral wire. How these wires generated from electrical systems. Explain with suitable electrical connection diagrams. 8

OR

8. a) Explain the necessity of fuse in electrical circuit. Also explain HRC fuse. 8
- b) Explain the single phase dynamometer type of wattmeter. 8
9. a) Explain the operation of a Zener diode under forward and reverse biased conditions. 8
- b) Explain the following safety devices in short. 8
i) SFU ii) MCB
iii) ELCB iv) MCCB

OR

10. a) Explain NAND and NOR gate as universal gate. 8
- b) Explain operation of capacitor start single phase induction motor. 8
Minimise the four variable logic function using k-map.
 $f(A, B, C, D) = \pi M(0, 3, 4, 7, 8, 10, 12, 14) + d(2, 6)$.
