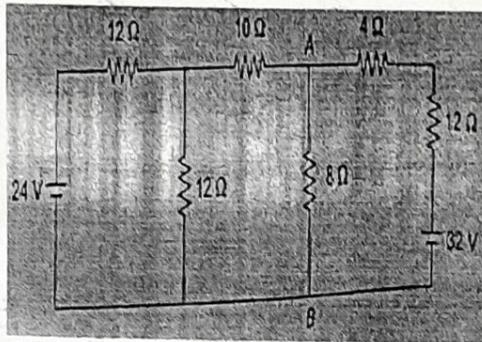


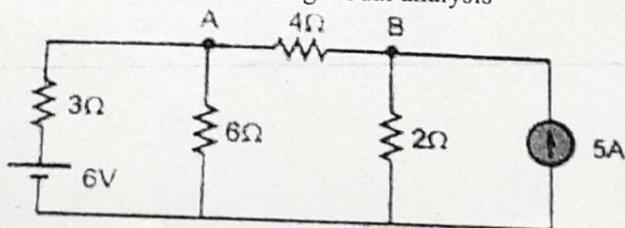
Time: 2 Hours

Marks: 60

- N.B.:
- (1) Question No.1 is compulsory.
 - (2) Attempt any **THREE** questions from remaining **FIVE** questions.
 - (3) Assume suitable data if necessary and mention the same clearly.
 - (4) Figures on the right indicate the marks.
- Q.1
- a. State the condition of maximum power transfer in a circuit and write the expression for maximum power. 3
 - b. Find RMS value of current flowing through a $314\mu\text{F}$ capacitor when connected to 230V, 50Hz, single phase AC supply. Write the equation of instantaneous voltage and current. 3
 - c. How an actual (practical) transformer differs from an ideal transformer? 3
 - d. Compare single-phase and three-phase induction motors. 3
 - e. Explain working of a LED. 3
- Q.2
- a. Find the current through 8Ω resistance using Thevenin's Theorem. 10

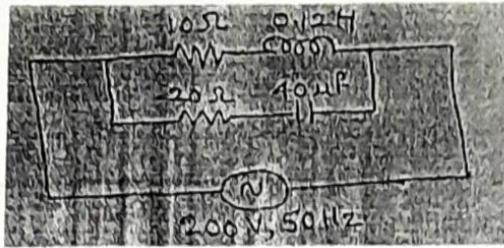


- b. Explain the construction and working principle of a BLDC motor. 5
- Q.3
- a. A voltage $e(t) = 100 \sin 314 t$ is applied to a series circuit consisting of 10Ω resistance, 0.0318H inductance and a capacitor of $63.6\mu\text{F}$. Calculate (i) impedance of a series circuit, (ii) expression for $i(t)$, (iii) power factor (iv) active power, reactive power, and apparent power of a series circuit. 10
 - b. Draw the characteristics of Zener diode and Explain application of a Zener diode as a voltage regulator 5
- Q.4
- a. Find Current through 4Ω resistance using Nodal analysis 5

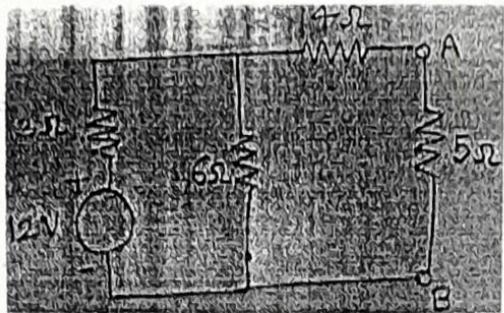


- b. Explain CE configuration of BJT with the input and output characteristics. 5
- c. Three identical coils each $[4.2 + j5.6]\Omega$ are connected in star across 415 V, three-phase, 50 Hz, AC supply. Determine (a) the line current (b) the power factor and (c) the total power. 5

- Q.5
- a. Explain the construction and working principle of a single-phase transformer with a neat labelled diagram. 6
 - b. Draw the construction of a DC Motor and label its parts. What are the types of DC Motor? 4
 - c. Find supply current, current in each branch and total power factor. 5



- Q.6
- a. Determine Norton's equivalent circuit which may be used to represent the given network at the terminals AB and hence find current through 5 Ω resistance. 6



- b. Define the following terms in the series RLC resonance circuit 5
 - (i) Resonance Frequency, (ii) Resonance curve, (iii) Half-power frequencies or Cut-off frequencies, (iv) Bandwidth, (v) Quality factor
- c. Compare BJT and FET 4
