



KEEPING MOBILE PHONE/SMART WATCH, EVEN IN 'OFF' POSITION, IS TREATED AS EXAM MALPRACTICE

Answer any TEN Questions

(10 X 10 = 100 Marks)

- Apply node voltage analysis on the circuit shown in Figure 1 and find v_x . Also, verify this voltage v_x using Thevenin's theorem.

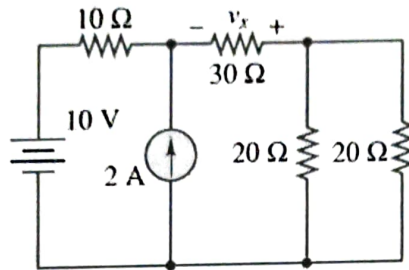


Figure 1

- Find the mesh currents and all branch currents of the circuit in Figure 2.

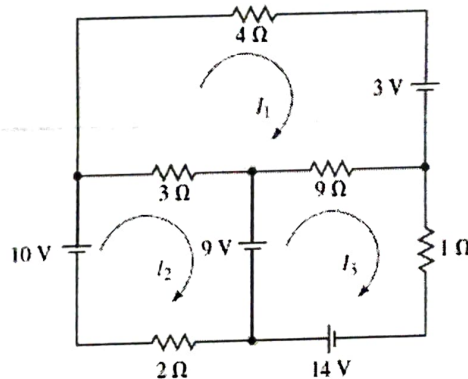


Figure 2

- A three phase star connected supply system delivering power to three phase star connected load. The voltage in star connected supply system between lines is 415 V, 50 Hz ac supply. The load is balanced load and its load impedance per phase is $(8+j20) \Omega$. For the given load, calculate (i) Line and phase currents (ii) active power (iii) Reactive power (iv) power factor (v) Apparent power.
- A coil consists of a resistance of 100Ω and an inductance of 200 mH. If an alternating voltage, v , given by $v = 200\sin 500t$ volts is applied across the coil, calculate (a) the circuit impedance, (b) the circuit current (c) the voltage across the resistance, (d) the voltage across the inductance and (e) the phase angle between voltage and current.
- A toroidal core composed of three sections. The mean arc lengths are $l_1 = 30$ cm, $l_2 = 20$ cm and $l_3 = 10$ cm. The cross-sectional areas are $a_1=1$ cm², $a_2=3$ cm² and $a_3=2$ cm². Relative permeability for sections 1, 2, 3 is 2000, 5000, and 8,000 respectively. Flux in the core is 0.8 mWb, find: (1) Reluctances of each section, (2) Total Magnetomotive Force, and Exciting current if the coil has 100 turns

6. Two coils with a coefficient of coupling of 0.5 between them are connected in series so as to magnetise (a) in the same direction (b) in the opposite direction. The corresponding values of total inductances for (a) 1.9H and for (b) 0.7H. Find the self inductances of the two coils and the mutual inductance between them.
7. Write the principle of operation, and applications of the following electrical machines:
a) BLDC motor, b) Stepper Motor
8. Describe the working principle of conventional DC motor with the aid of suitable diagram. List its various types with characteristics
9. Design basic combinational circuits that perform the three bit binary addition.
10. Design a logic circuit with a four-bit input representing the binary number ABCD. If the min-terms are $m_0, m_2, m_4, m_3, m_6, m_7, m_8, m_{10}, m_{12}, m_{14}$.
 - a) Draw the Karnaugh map and truth table for the function.
 - b) Determine the minimum expression for the function.
 - c) Draw the logic circuit, using only AND, OR, and NOT logic gates.
11. Explain the operation of a single phase diode bridge rectifier constructed using PN junction diode. Also draw the input and output voltage waveforms
12. Explain the construction and working of BJT with the help of neat schematic and draw its output characteristics in CE configuration.

