Qn. Set Code-1

Semester: 1ˢᵗ
Programme:B.Tech
Branch: Scheme-B
(Engineering Elective-I)
(2ⁿᵈ Phase)

AUTUMN END SEMESTER EXAMINATION-2022
1ˢᵗ Semester B.Tech
BASIC ELECTRICAL ENGINEERING
EE10002
(For 2022 Admitted Batch)

Time: 3 Hours

Full Marks: 50

Answer any SIX questions.
Question paper consists of four SECTIONS i.e. A, B, C and D.
Section A is compulsory.
Attempt minimum one question each from Sections B, C, D.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable
*and all parts of a question should be answered at one place only.*

SECTION-A

1. Answer the following questions.   [1 × 10]

    (a) Differentiate between ideal voltage source and practical voltage source.

    (b) Define root mean square value of an alternating current.

    (c) Distinguish between phase and phase difference.

    (d) Define m.m.f and reluctance with their units in a magnetic circuit.

    (e) Write two applications of single-phase induction motor.

    (f) Write the power rating of the following electrical appliances

    (i) refrigerator and (ii) washing machine

    (g) Mention various methods to prevent electric shock.

    (h) State the necessity of a fuse.

(i) State Kirchoff's current and voltage law.

(j) State the importance of the earthing in any electrical installation.

SECTION-B

2. (a) State and explain Superposition Theorem with suitable diagrams. [4]

(b) Find the current in the 3kohm resistor using Nodal Analysis. [4]
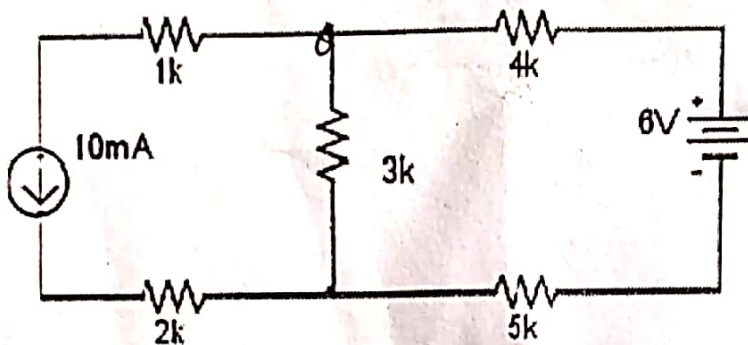
3. (a) Derive the expression of current in a pure inductive circuit if the supply voltage is given by $v = V_m \sin \omega t$ and also draw the phasor diagram and time diagram of v and i. [4]

(b) A series circuit consisting of a resistance, an inductance and a capacitance of 20 Ω, 0.2 H and 100 µF respectively. The series connection is connected across 220-V, 50-Hz AC mains. Determine the following (a) impedance (b) current (c) power in watts and VA (d) p.f. and angle of lag. [4]

SECTION-C

4. (a) Compare between the 3-phase star and delta connection with suitable diagrams. [4]

(b) Find all the branch currents in the circuit by using Mesh analysis method. [4]
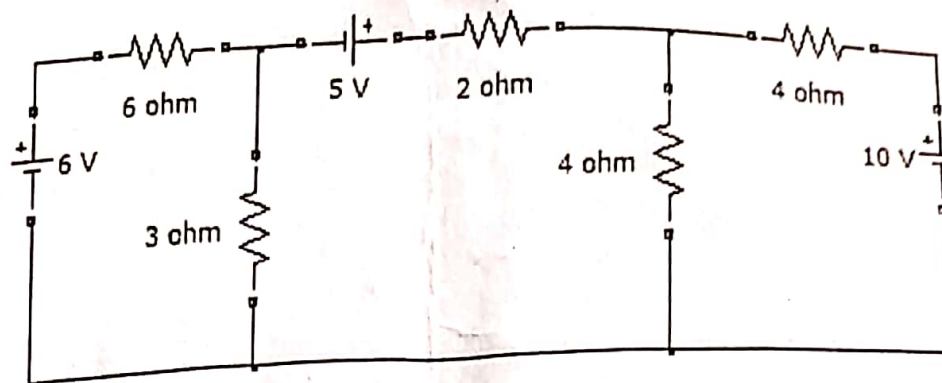
5. (a) Differentiate between single-phase and three-phase AC system. Also write the instantaneous phase voltage equations and draw phasor diagram for 3-phase AC system. [4]

(b) Given a balanced 3-φ, Y-connected load for which supply line voltage is 440 V and impedance of each phase is $(8 + j6)$ ohm. Find the line current and power absorbed by each phase. [4]

6. (a) Draw and explain magnetic B-H curve of magnetic material. Show the knee point and saturation. Why it is not a straight line. Give reason. [4]

(b) Calculate the electricity bill of a house which has 5 bulbs of 100 watt each, 3 fans of 80 watt each, 2 tube lights of 24 watt each, 1 cooler of 140 watt and 1 geyser of 850 watt. These appliances are used for 5 hours daily and the bill to be generated for the month of January. Take the cost of 1 unit of electricity is Rs. 3.20. [4]

SECTION-D

7. (a) State the similarities and dissimilarities between Electric Circuits and Magnetic Circuits. [4]

(b) A coil consisting of 200 turns is uniformly wound around a cast steel ring with a mean circumference of [4]

1000 mm, area of cross-section of 800 mm^2, and relative permeability of 800. If the current flowing into the coil is 5 A, Calculate (a) the magnetic field strength, (b) reluctance of the core and (c) total flux

8. (a) Discuss in details about on single-phase transformer with working principle. Also narrate the applications of transformer. [4]

(b) Describe briefly the energy scenario in India. [4]

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