Qn. Set Code-1

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 × 10]

1. Answer the following questions.

(a) Define the term (a) Active Network (b) Passive Network.

(b) Discuss the purpose of using MCB in an electrical installation.

(c) State and Explain the faraday's laws of electromagnetic induction.

(d) List the applications of a 1 phase Induction motor.

(e) Draw the B-H curve of magnetic material.

(f) Define the terms "Form Factor and Peak Factor" in a.c circuits.

(g) A current of 5 sin $(314t - \pi/4)$ A is drawn from a supply voltage of 230 sin $(314t + \pi/4)$ V. Calculate the active power supplied from the source.

(h) Describe the advantages of 3 phase system over single phase system.

(i) Define ohm's law with an example and writes its limitations.

(j) Explain the purpose of using fuse in an electrical installation.

SECTION-B

2. (a) State and Explain the Superposition Theorem with suitable example? [4]

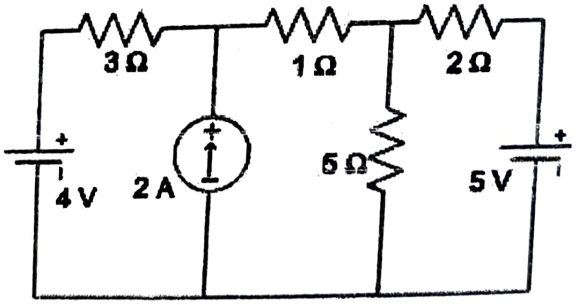
(b) Explain the principle of operation of a three phase induction motor. [4]

3. (a) List out the analogy of various quantities between the electric circuit and magnetic circuit. [4]

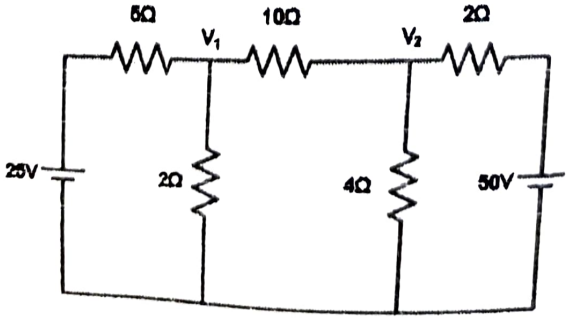
(b) Define a Transformer. Explain the principle of operation of a single phase transformer. [4]

SECTION-C

4. (a) Solve and find the current in 2 Ω resistor using superposition principle. [4]



(b) Solve and Find the current flowing through 10 Ω resistance using nodal analysis. [4]



5. (a) Derive an expression for the average power consumed in a pure resistive circuit and a pure inductive circuit. [4]

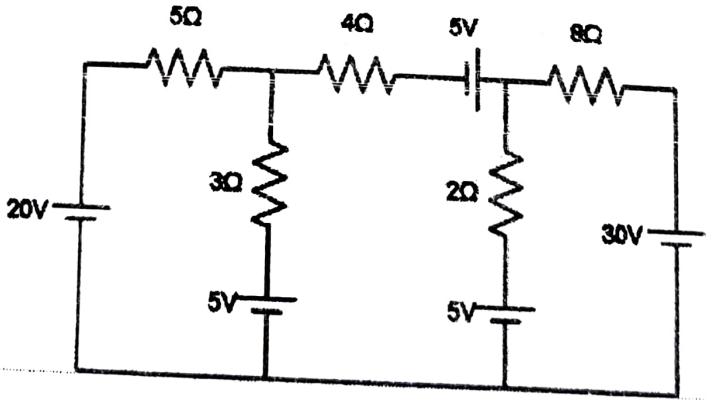
(b) Explain with phasor diagram the instantaneous current equation of series R-L circuit. Define power factor. [4]

6. (a) A circuit consists of a pure resistance and a coil in series. The power dissipated in the resistance is 500 W and the drop across it is 100 V. The power dissipated in the coil is 100 W and the drop across it is 50 V. Find the reactance and resistance of the coil and the supply voltage. [4]

(b) A resistance of 20 Ω, an inductance of 0.2 H and capacitance of 100 μF are connected in series across a single phase, 220 V, 50 Hz mains. Determine the following (i) Total Impedance (ii) current flowing (iii) voltage drop across R, L & C (iv) power consumed in watt. [4]

SECTION-D

7. (a) Find the current flowing through 8 Ω resistances using the Mesh Analysis. [4]



(b) An iron ring has a cross section of 3 cm^2 and a mean diameter of 25 cm. An air-gap of 0.4 mm has been cut across the section of the ring. The ring is wound with a coil of 200 turns through which a current of 2 A is passed. If the total magnetic flux is 0.24 mWb. Find the relative permeability of iron, assuming no magnetic leakage. [4]

8. (a) The resistor and a capacitor are connected in series with a variable inductor. When a circuit is connected to a 240 V, 50 Hz supply, the maximum current by varying the inductor is 0.5 A. At this current the voltage across the capacitor is 250 V. Calculate R, L and C. [4]

(b) A 400 V, 3 Phase supply is connected to a balanced network of three impedances each consisting of a 20 Ω resistance and a 15 Ω inductive reactance. Determine (i) the line current (ii) power factor (iii) Total power in KW, when the three impedances are (a) star connected (b) delta connected. [4]

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