2E3209

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B. Tech. II - Sem. (Main / Back) Exam., - 2024
2FY3-08 Basic Electrical Engineering

Time: 3 Hours   **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A. All five questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (As mentioned in form No. 205)

1. NIL _____   2. NIL _____

PART – A   [10×2=20]

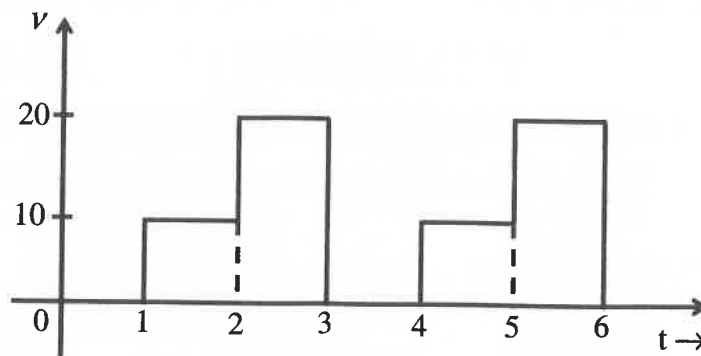### (Answer should be given up to 25 words only)

All questions are compulsory

Q.1   State and Explain Kirchhoff s' laws.

Q.2   State and Explain Norton s' theorem.

Q.3   If the length of a wire of resistance R is uniformly stretched to 'n' times its

original value, then what is the value of its new resistance?

Q.4   Find the RMS & Average value of the waveform shown in the Figure below:

Q.5   Derive the condition for resonance in a series circuit.

Q.6   State the relationship between phase and line quantities (voltage, current & power) in the circuit of a 3-phase delta-connected system.

Q.7.   Explain the working principle of a Transformer.

Q.8   Define voltage regulation and write its expression for a transformer.

Q.9   Explain how BJT works as an amplifier.
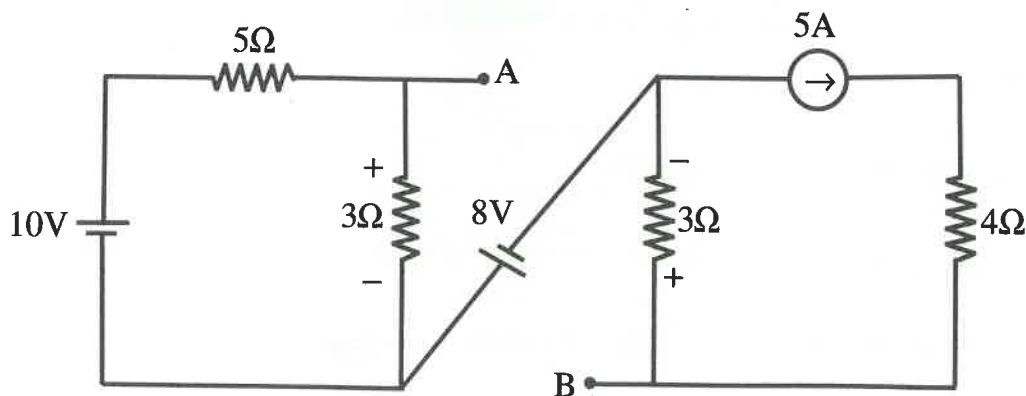
Q.10   What is the function of a commutator?

PART – B   [5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions
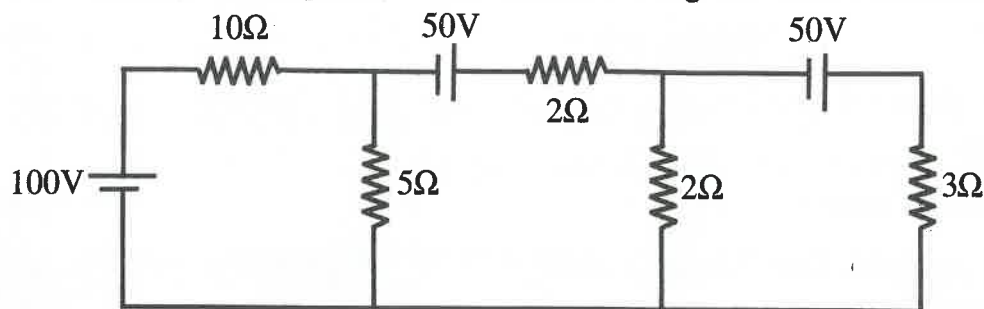
Q.1   Find the voltage of point A w.r.t point B.

Q.2 Find the current through the 5 ohm resistance using Thevenin's theorem.

Q.3 Show that current through pure inductance lags behind the applied voltage by 90 degrees. Also, prove that pure inductance does not consume any power. Draw voltage, current, and power waveforms.

Q.4 Explain and draw the phasor diagram for a single-phase transformer for the lagging power factor.

Q.5 The load of the household consists of 8 lamps of 20W each, 4 fans of 75W each, 1 T.V of 40W, 1 refrigerator of 150W, 1 A.C of 1500W, 1 electric heater of 1800W, and 1 washing machine of 900W. If the supply is 230V and fixed monthly meter charge is ₹ 150/- then for average loading of 50% throughout a day, what will be the electric bill for 1 month? Assume the cost per unit for 1st 800 units be ₹ 4/- for next 500 units be ₹ 5/- and after that ₹ 6/- .
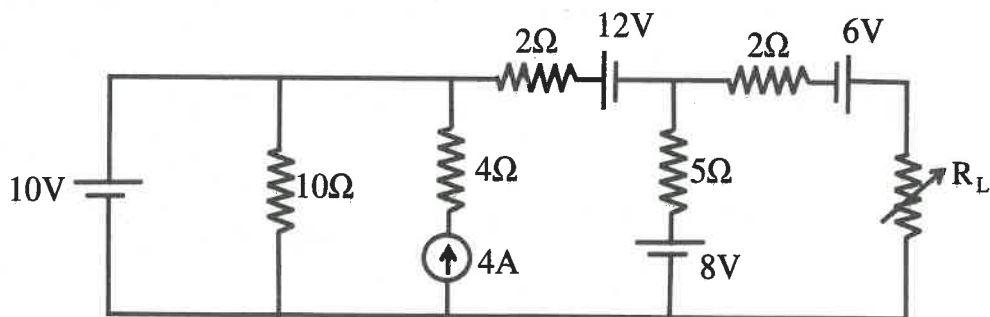
PART – C   [3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1 For the circuit shown, find the value of the resistance RL for maximum power and calculate maximum power.

Q.2 Write short notes on :

(a) SFU

(b) MCCB

(c) ELCB

(d) Types of Earthing

Q.3 Explain Insulated Gate Bipolar Transistor (IGBT) construction, working and its characteristics in detail.

Q.4 A 100 ohm resistance is connected in series with a choke coil. When a 400V, 50Hz supply is applied to this combination, the voltage across the resistance and the choke coil are 200V and 300V respectively. Find the power consumed by the choke coil. Also, calculate the power factor of the choke coil and the power factor of the circuit.

Q.5 Explain the construction and working principle of three Phase Synchronous Motor.