

1E3108

Roll No. _____

Total No. of Pages: **4****1E3108****B. Tech. I - Sem. (Main / Back) Exam., - 2025****1FY3-08 Basic Electrical Engineering****Time: 3 Hours****Maximum Marks: 70*****Instructions to Candidates:***

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five 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.
(Mentioned in form No. 205)***

1. NIL2. NIL**PART – A****[10×2=20]****(Answer should be given up to 25 words only)****All questions are compulsory**

- Q.1 Define apparent power and power factor.
- Q.2 Write the EMF equation of a transformer and define each term.
- Q.3 If the length 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 Name and state the principle on which transformer works.
- Q.5 State the torque-slip characteristic of an Induction motor.

- Q.6 Write the full form of MCB. Where it is used?
- Q.7 What is the significance of reactive power?
- Q.8 What do you understand by lamination in a transformer?
- Q.9 Distinguish between a rectifier and an inverter.
- Q.10 What are the transformer losses?

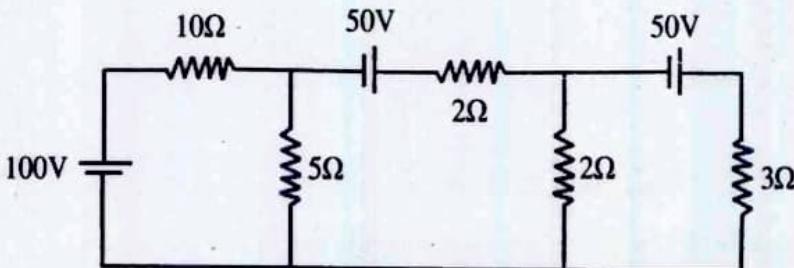
PART - B

[$5 \times 4 = 20$]

(Analytical/Problem solving questions)

Attempt any five questions

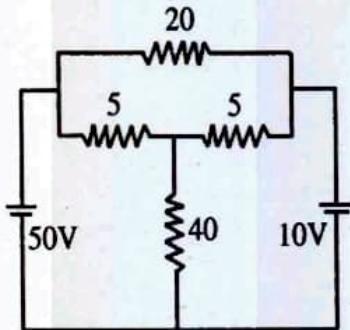
- Q.1 Determine the power factor of a RLC series circuit with $R = 5$ ohms, $X_L = 8$ ohms, and $X_C = 12$ ohms.
- Q.2 Find the current through 5 ohm resistance using Thevenin's theorem in following circuit:



- Q.3 With a neat circuit diagram explain the construction and operating principle of a DC machine.
- Q.4 Derive EMF equation of a single phase transformer. Discuss why transformer is known as constant flux device.
- Q.5 Explain the structure of NPN and PNP transistors in detail.
- Q.6 Write a short note on commutators.
- Q.7 Explain star to delta and delta to star transformation.

PART – C**[3x10=30]****(Descriptive/Analytical/Problem Solving/Design Questions)****Attempt any three questions**

- Q.1 Explain with sketches the constructional features and working of a synchronous generator.
- Q.2 A 100 ohms resistance is connected in series with a choke coil. On applying a 400 V, 50 Hz supply to this combination, the voltage across resistance and choke coil are 200 V and 300 V respectively. Find the power consumed by the choke coil. Also calculate the power of a choke coil and the power factor of circuit.
- Q.3 Use superposition theorem to find the current in 40 ohms resistance in the circuit shown below (assume all resistances in ohms) :



- Q.4 Explain why protective devices are used for overload and short circuit protection. Also explain why do we use an ELCB in electrical circuit installation?
- Q.5 The load of a household consists of 8 lamps of 20W each, 4 fans of 75W each, 1 T.V. of 40W, 1 refrigerator of 150W, 1 AC of 1.5 kW, 1 heater of 1.8 kW, and 1 washing machine of 900W. If the supply is 230 Volts and fixed monthly meter charges are ₹ 150. Then for average loading of 50% throughout a day, what will be the electricity bill? Assume the cost per unit for first 800 units be ₹ 4, next 500 units be ₹ 5 and after that ₹ 6 per unit.