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Q 2222

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2007.

Second Semester

Civil Engineering

EE 151 — ELECTRICAL ENGINEERING

(Common to B.E. Mechanical Engineering/Metallurgical Engineering/
Chemical Engineering/Industrial Biotechnology/Leather Technology/Polymer
Technology/Textile Chemistry/Textile Technology/Fashion Technology
and Mechatronics Engineering)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State Kirchoff's Current Law.
2. Define RMS value of an a.c. signal.
3. Draw a power triangle indicating power components.
4. List the different types of d.c. machines.
5. Why transformer rating is given in KVA?
6. Mention the different methods of starting of induction motors.
7. What are the different types of damping provided in a measuring instrument?
8. Why electro-dynamometer types of instruments are used as transfer instruments?
9. Why moving coil instrument has an uniform scale?
10. Why a single phase motor is not a self starting machine?

PART B — (5 × 16 = 80 marks)

11. (a) A circuit consists of three resistors 3 ohms, 4 ohms and 6 ohms in parallel and a fourth resistor 4 ohms in series. A battery of emf 12 volts and internal resistance 6 ohms is connected across the circuit. Find the total current in the circuit and terminal voltages across the battery. (16)

Or

- (b) A series RLC circuit with $R = 10$ ohms, $L = 10$ mH and $C = 1 \mu\text{F}$ has an applied voltage of 200 V at resonant frequency. Calculate the resonant frequency, the current in the circuit and the voltages across the elements at resonance. Also determine the quality factor and bandwidth. (16)

12. (a) Describe the construction and operating principle of a d.c. motor with necessary diagrams. (16)

Or

- (b) Describe the construction and working of a single phase transformer with neat sketch. (16)

13. (a) Explain the characteristics of a d.c. generator with necessary diagrams. Also, discuss the method of determination of critical resistance (R_c). (16)

Or

- (b) (i) Explain the different methods of starting of synchronous motors. (8)
(ii) Describe the operating principle of an alternator. (8)

14. (a) Describe the working principle of a moving coil ammeter with a neat diagram. (16)

Or

- (b) Explain the operation of an instrument used to measure electrical power with necessary diagrams. (16)

15. (a) (i) Discuss the different types of connections made in the primary and secondary of a three phase transformer. (10)
- (ii) Explain the significance of back emf in a d.c. motor. (6)

Or

- (b) Three $40\ \Omega$ non-inductive resistances are connected (i) in star (ii) in delta across 200 V, 50 Hz, 3 phase lines. Calculate the power taken from the supply mains in each case. If one of the three resistors is disconnected, what would be the power taken from the supply mains in each case? (16)