B 2183

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2007.

Second Semester

Civil Engineering

EE 151 — ELECTRICAL ENGINEERING

(Common to Mechanical Engineering/Mechatronics Engineering/ Chemical Engineering/Leather Technology/Polymer Technology/Textile Chemistry/ Textile Technology/ Fashion Technology/Industrial Bio Technology/Metallurgical Engineering)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State Kirchoff's Voltage Law.

2. Define the term 'Power factor".

3. What are the two types of induced emfs?

4. Define the term "Voltage regulation" of a dc generator.

5. List the methods for starting induction motors.

6. Define "transformation ratio" of a single phase transformer.

7. What are the different torques act upon the moving system of the instruments for good operation?

8. Mention the two types of moving iron instruments.

9. List out the different losses occurred in a transformer.

10. What is the basic working principle of Alternator?

PART B — (5 × 16 = 80 marks)

11. (a) (i) When a resistor is placed across a 230 volt supply, the current is 12 A. What is the value of the resistor that must be placed in parallel to increase the load current to 16 A. (6)

(ii) Using node voltage analysis, Obtain the currents flowing in all the resistors of the circuit shown in Fig. Q. 11. (10)

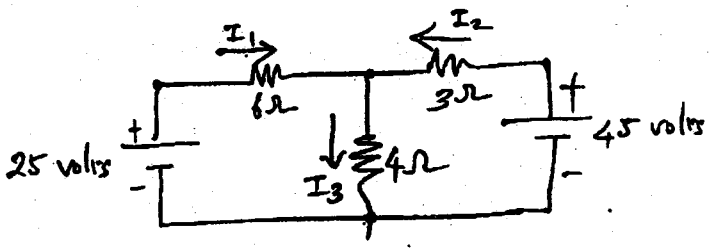

Fig. Q. 11

Or

(b) A coil of resistance 10 ohms and inductance 0.1 Henry is connected in series with a 150 μ_F capacitor across 200 V, 50 Hz supply. Calculate

(i) Inductive reactance, capacitive reactance, impedance, current and power factor and

(ii) The voltage across the coil and capacitor respectively. (16)

12. (a) Explain the construction and working principle of a d.c motor. (16)

Or

(b) Describe the construction and working principle of a three phase induction motor. (16)

13. (a) Explain the operating principle of an electro dynamometer type of watt meter with suitable diagram. (16)

Or

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

14. (a) (i) A pure inductance, L = 0.01 H takes a current of 10 cos 1500 t. Calculate the inductive reactance, the equation for the voltage across it and at what frequency will the inductive reactance be equal to 40 ohms. (10)

(ii) Define the terms "Form factor" and "Peak factor" of an ac signal. (6)

Or

(b) The power input to a 2000 V, 50 Hz, 3 phase motor running on full load at an efficiency of 90% is measured by two – Wattmeters, Which indicate 300 kW and 100 kW respectively. Calculate :

(i) Input power

(ii) Power factor

(iii) Line current and

(iv) H.P. output. (16)

15. (a) Explain the principle of operation of a single phase transformer with necessary diagram. (16)

Or

(b) Name the instrument used for measuring the electrical power consumed during a specific period. Discuss, how the instrument operates. (16)
