Fifth Semester B-Tech Degree Examination

13.502   : ELECTRICAL TECHNOLOGY (U)

Time : 3 Hours   Max Mark : 100

Instructions: Answer all the questions from Part A (2 marks each)) and one full question from each module in Part B.

PART –A

1. Explain the function of Interpole windings in a DC machine.
2. Derive the EMF equation of a DC generator.
3. Explain the working principle of DC motor.
4. Explain the principle of operation of Autotransformer.
5. What are the factors on which the torque of an Induction motor depends?
6. Draw the vector diagram of a Single Phase Transformer at lagging power factor.
7. What do you mean by Synchronous Condenser?
8. How can the direction of rotation of Capacitor- Start motor be reversed?
9. Draw the functional schematic of AC electric locomotive.
10. Mention any two applications of DC shunt and series motor.

PART –B
MODULE - I

11.

   a)   Explain the various types of excitations for DC generators with figures.

(10 marks)

   b)   A DC motor has an armature current of 110 A at 480 V. The resistance of the armature is 0.3 ohms. The generator is lap wound with a total of 864 conductors. The number of poles is 6 and the flux per pole is 0.06 Wb. Find the speed and total torque developed by the armature.

(10 marks)

12.

a) A DC shunt generator supplies 96A at a terminal voltage of 200 V. the armature and shunt field resistance are 0.1Ω and 50Ω respectively. The iron and mechanical losses are 2500 W. Find

        1) The EMF generated.

        2) Copper losses.

        3) Mechanical efficiency.

        4) Overall efficiency.   (10 marks)

a) Explain the armature reaction in DC machine. What are its effects?

        (10 marks)

MODULE – II

13.

a) Derive the EMF equation of a Single Phase transformer.   (8 marks)

b) A 220 / 440 V Single Phase transformer has the following test results.

| OC test : | 220 V | 1 A | 70 W | On LV side |
| SC test : | 20 V | 12 A | 100 W | On HV side |

  i) Draw the equivalent circuit referred to LV sides.

  ii) Calculate the full load efficiency at upf and full load regulation at 0.8 pf lag.

        (12 marks)

14.

a) With neat diagrams, explain any four starting methods of three- phase Induction motor.

        (12 marks)

b) Discuss the principle of operation of a three- phase Induction motor.

        (8 marks)

MODULE – III

15.

a) Develop the EMF method of determining the Voltage regulation of an alternator.

        (10 marks)

b) Explain the working of an Universal motor.   (10 marks)

16.

   a) Write a short note on Stepper motor. Mention its application.   (10 marks)

   b) Explain why the Single Phase Induction motor is not self- starting. What are the various starting methods employed?

                                                          (10 marks)

MODULE - IV

17.

   a) Explain the methods of braking of DC motors.

                                                          (10 marks)

   b) Why synchronous motor is not self – starting. Briefly discuss the methods used for starting synchronous motors.   (10 marks)

18.

   a) Discuss the system of electric power supply employed for traction purpose.

                                                          (10 marks)

   b) Explain the speed control methods used in electric traction.   (10 marks)