



CBCS SCHEME

17EE44

Fourth Semester B.E. Degree Examination, Jan./Feb. 2021 Electric Motors

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Derive the torque equation of a DC motor. (07 Marks)
- b. What are the applications of DC shunt motor, Series motor and Compound motor? (06 Marks)
- c. A 250V Shunt motor runs at 1000 rpm, while taking current of 25A. The resistance of the armature is 0.2Ω and resistance of the shunt field circuit is 250Ω . Calculate speed when loaded to take a current of 50A. If armature reaction weakens the field by 3% the voltage drop per brush is 1V, determine torque in both cases. (07 Marks)

OR

- 2 a. Describe the working of three point starter, with neat sketch. What are its limitations? (10 Marks)
- b. Describe the characteristics of a DC shunt motor. (05 Marks)
- c. With a neat sketch, explain the Ward Leonard method of speed control of DC motor. (05 Marks)

Module-2

- 3 a. Explain briefly Field's test for determination of efficiency of DC series machines. (07 Marks)
- b. Explain back to back test as two identical DC machines and calculate the efficiency of the machine as Motor and generator. (06 Marks)
- c. A Field's test on two Mechanically coupled similar motors with their Field's connected in series and with one machine running as motor and other as generator, gave following data :
Motor : Armature current 40A , Armature voltage 200V , the drop across its field winding 15V.
Generator : Armature current 32A , Armature voltage 160V , the drop across its field winding 15V.
The resistance of each armature is 0.4Ω . Calculate the efficiency of each machine at this load. (07 Marks)

OR

- 4 a. Derive the torque equation for a three phase induction motor. (06 Marks)
- b. Draw and explain the torque slip characteristics covering motoring , generating and breaking regions of operation. (07 Marks)
- c. What is Slip? Derive the maximum running torque equations of a Induction Motor. (07 Marks)

Module-3

- 5 a. Derive the approximate equivalent circuit referred to stator of an Induction Motor. (06 Marks)
- b. Explain with neat diagram, the blocked rotor test on an Induction Motor. (06 Marks)
- c. Explain Cogging and Crawling in 3 – phase Induction Motor. (08 Marks)

OR

- 6 a. Explain the principle of Operation of an Induction Generator. What are its limitations? (07 Marks)
b. Write the procedure of drawing the circle diagram. What information can be obtained from the circle diagram? (07 Marks)
c. With neat diagram, explain the construction of rotor of a double cage Induction Motor. (06 Marks)

Module-4

- 7 a. Why starter is necessary for an Induction Motor? With neat diagram, explain the operation of a Star Delta Starter. (07 Marks)
b. Explain the method of Speed , Control of 3 – ϕ Induction Motor by varying the rotor. (07 Marks)
c. A squirrel cage Induction motor in a short circuit current equal to 4 times the full load current. Determine starting torque as a percentage of full load torque if full load slip is 2.5%. (06 Marks)

OR

- 8 a. Explain Construction and working principle of a shaded pole motors. (08 Marks)
b. Explain Double Field Revolving theory as applied to a Single Phase Induction motor. (06 Marks)
c. Explain with neat diagram, the working principle of capacitor start single phase Induction Motor. (06 Marks)

Module-5

- 9 a. Explain the operation of synchronous motor at constant load variable excitation with phasor diagram. (08 Marks)
b. Explain the concept of hunting in synchronous motors. What are the methods to overcome this? (06 Marks)
c. Write a note on V curves and inverted V curves of a synchronous motor. (06 Marks)

OR

- 10 a. What is Linear Induction Motor? Explain its principle of operation and draw torque speed characteristic. (07 Marks)
b. Explain the working , characteristic and application of AC servo motor, with neat diagram. (07 Marks)
c. Write note on Stepper motor and list types of it. (06 Marks)

* * * * *