

CBCS SCHEME



USN

--	--	--	--	--	--	--	--	--	--

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 meter 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)

