



CBCS SCHEME

15EE44

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

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. What is back emf? Explain its significance. (05 Marks)
b. Derive an expression for the torque of a DC motor. (05 Marks)
c. A 250 V DC shunt motor runs at 1000 rpm on No Load and takes 5A. The architecture and shunt field resistance are 0.2 Ω and 250 Ω respectively. Calculate the speed when loaded and taking a current of 50 A. due to armature reaction the field weakness by 3%. (06 Marks)

OR

- 2 a. Explain the different methods of controlling speed of DC shunt motor. (06 Marks)
b. Enumerate the various losses in a DC machine. Explain briefly. (05 Marks)
c. Draw and explain the characteristics of a DC series motor. (05 Marks)

Module-2

- 3 a. With a neat sketch, explain the important and procedure of conducting swin burne test on DC shunt motor. List the advantages of this test. (08 Marks)
b. Describe the Hopkinson's test for two identical shunt motors indicating how the η of each machine on full load is obtained. (08 Marks)

OR

- 4 a. Derive torque equation for a 3 ϕ induction motor and derive condition for maximum torque. (08 Marks)
b. Discuss the complete torque-slip characteristics of a 3 ϕ induction motor including motoring, generating and braking regions. (08 Marks)

Module-3

- 5 a. Starting from the fundamentals develop the equivalent circuit of a polyphase induction motor and explain how the mechanical power developed is taken care of in the equivalent circuit. (06 Marks)
b. Draw the circle diagram from No load and SC test of a 3 ϕ , 14.92 KW, 400 V, 6 pole induction motor from the following test results (line values).

No load test	400 V	11 A	pf = 0.2 lag
SC test	100 V	25 A	pf = 0.4 lag

Rotor copper loss at stand still is half of the total copper loss. From the circle diagram. Find:
(i) Line currents (ii) Slip (iii) η (iv) pf at Full load (10 Marks)

OR

- 6 a. Explain the phenomenon of cogging and crawling in a 3 ϕ induction motor. (06 Marks)
b. Explain how the variation in rotor resistance can be achieved in 3 ϕ squirrel cage induction motor by deep bar and double cage rotor construction. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-4

- 7 a. What is induction generator? Discuss the principle of operation with the help of a phasor diagram. (10 Marks)
b. Explain the importance of induction generator in grid connected application. (06 Marks)

OR

- 8 a. Enumerate the methods of starting 3 ϕ induction motor. Explain Y- Δ starter of 3 ϕ squirrel cage induction motor with a suitable diagram. (08 Marks)
b. Mention the different speed control methods of a 3 ϕ induction motor. Explain any one method from each side. (08 Marks)

Module-5

- 9 a. With neat sketches, explain the construction, working and applications of split phase induction motor. (08 Marks)
b. Describe any one method of starting the single phase induction motor with phasor diagram. (08 Marks)

OR

- 10 a. Why synchronous motors are not self starting? Explain briefly. (08 Marks)
b. State the methods of starting synchronous motor. Explain any one in detail. (08 Marks)
