17EE44

USN

Fourth Semester B.E. Degree Examination, June/July 2019
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. What is back emf? Explain its significance. **(06 Marks)**
    b. Why a shunt motor should not be put on with field winding open? **(04 Marks)**
    c. A 440V, dc shunt motor has a no load speed of 2000rpm. It is running at 1000 rpm at full load torque, reduced armature voltage and full load. If the load torque is reduced to 50% of rated value, with the armature voltage and field voltage held constant at previous voltages. **(10 Marks)**

OR

2   a. Briefly explain the various losses that occur in D.C. machine. Derive the condition for maximum efficiency of D.C. Motor. **(10 Marks)**
    b. With a neat sketch, describe the working of three point starter. What are its limitations, what is the necessity of starter? **(10 Marks)**

Module-2

3   a. Explain back to back test as two identical D.C. machines and calculate the efficiency of machines as generator and motor. **(10 Marks)**
    b. A 500V, D.C. shunt motor, when running on no load takes 5A. Armature resistance is 0.5Ω and shunt field resistance is 250Ω, find the output in kW and efficiency of motor, when running on full load and taking a current of 50A. **(10 Marks)**

OR

4   a. Discuss the torque – slip characteristics of a three phase induction motor including motoring generating and breaking regions. **(10 Marks)**
    b. A 440V, 3ϕ, 50Hz, 4 pole star connected induction motor has full load speed of 1425 rpm. The rotor has an impedance of $(0.4 + j4)\Omega$ per phase and rotor/stator turns ratio of 0.8. Calculate: i) full load torque   ii) full load copper loss   iii) maximum torque and speed at which it occurs   iv) starting current. **(10 Marks)**

Module-3

5   a. Starting from the fundamentals develop the equivalent circuit of a polyphase induction motor and explain hoe mechanical power developed is taken care of in equivalent circuit. **(10 Marks)**
    b. Explain no load test and blocked rotor test in a 3ϕ induction motor. How are the parameters of equivalent circuit determined from test results? **(10 Marks)**

OR

6 a. What is the purpose of using deep bar rotor? Explain the construction and working of deep bar rotor induction motor. (10 Marks)

b. A 415V, 29.84kW, 50Hz delta connected motor gave the following test data.
No load test: 415V, 21A, 1250W
Blocked rotor test: 100V, 45A, 2730W
Construct the circle diagram and determine:
i)   Line current and power factor for rated output
ii) The maximum torque. Assume stator and rotor copper losses are equal at stand still. (10 Marks)

Module-4

7 a. Explain in detail auto-transformer method of starting a squirrel cage induction motor. (10 Marks)

b. Mention the different methods of speed control of 3ϕ induction motor, describe any two methods. (10 Marks)

OR

8 a. Explain double field revolving theory as applied to single phase induction motor and prove that it cannot produce any starting torque. (10 Marks)

b. Explain why single phase induction motor is not self starting. (05 Marks)

c. Briefly explain torque-speed characteristics of capacitor split phase motor. Mention the applications of capacitor split phase motors. (05 Marks)

Module-5

9 a. What are V and inverted V curves? Sketch them and explain their significance. (10 Marks)

b. Explain the operation of synchronous motor at constant load variable excitation. (10 Marks)

OR

10 a. State the methods of starting synchronous motor. Explain any one in details. (05 Marks)

b. Explain the importance of damper winding in synchronous motor. (05 Marks)

c. Explain the principle of operation of linear induction motor. List the some applications of it brief the working of linear induction motor. (10 Marks)

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