CBCS SCHEME

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15EE44

Fourth Semester B.E. Degree Examination, June/July 2018
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. Derive torque equation of a D.C. Motor. **(04 Marks)**

b. Explain why a D.C. series motor should never run unloaded. **(04 Marks)**

c. A 220V D.C. series motor is running at a speed of 800 rpm and draws 100A. Calculate at what speed the motor will run when developing half the torque. Total resistance of the armature and field is 0.1Ω. Assume that the magnetic circuit is unsaturated. **(08 Marks)**

OR

2 a. Describe the working of three point starter with neat sketch. What are its limitations? **(10 Marks)**

b. What are the losses that occur in DC machines? Derive the condition for maximum efficiency of a D.C. motor. **(06 Marks)**

Module-2

3 a. Explain briefly Field's test for determination of efficiency of DC series machines. **(08 Marks)**

b. The Hopkinson's test on two shunt machines gave the following results for full load :
Line voltage = 230 V.
Armature currents of motor and generator are 37A and 30A respectively.
Field currents of motor and generator are 0.85A and 0.8A respectively.
Calculate the efficiency of the motor and generator. Assume resistance of each machine for the armature as 0.33Ω. **(08 Marks)**

OR

4 a. Discuss the torque – slip characteristics of a three phase induction motor including motoring generating and braking regions. **(12 Marks)**

b. A 8 – pole , 50Hz induction motor has an emf in the rotor of frequency 1.5Hz. Determine the slip and speed of the motor. **(04 Marks)**

Module-3

5 a. Starting from the first principles develop the equivalent circuit of a 3 – phase induction motor. **(08 Marks)**

b. Explain Cogging and Crawling in 3 – phase induction motor. **(08 Marks)**

OR

6 a. Describe the construction and working of a Double – Cage induction motor. **(08 Marks)**

b. Explain the principle of operation of an Induction Generator. What are its limitations? **(08 Marks)**

Module-4

7 a. Explain the method of speed control of 3 – ϕ Induction motor by varying the rotor resistance. **(06 Marks)**

b. Explain the construction and working of Star – delta starter with derivation. **(10 Marks)**

OR

8 a. Explain Double Revolving Field theory of Single – Phase Induction motor with a neat sketch. **(08 Marks)**

b. Explain construction and working principle of a Shaded – Pole Motors. **(08 Marks)**

Module-5

9 a. Explain the operation of synchronous motor at constant load variable excitation with phasor diagram. **(08 Marks)**

b. A synchronous motor developing 20KW is connected in parallel with a factory load of 200KW at a p.f of 0.8 lag. If the total load connected to the supply has a p.f of 0.92 lag, what is the value of reactive power taken by the motor and at what p.f is it operating? **(08 Marks)**

OR

10 a. Explain the construction and working principle of a Universal Motor. **(08 Marks)**

b. Write short note on Linear Induction Motor. **(04 Marks)**

c. Write short note on Stepper Motor. **(04 Marks)**

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