4E4175

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B. Tech. IV-Sem. (Back) Exam., Oct.-Nov. - 2020
Electrical Engineering
4EE5A Electrical Machines – II
EE, EX

Time: 2 Hours **Maximum Marks: 48**
Min. Passing Marks: 16

Instructions to Candidates:

*Attempt **three questions,** selecting **one question each** from any three **unit.** All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

1. NIL 2. NIL

UNIT- I

Q.1 (a) Explain how the rotating magnetic field is developed in AC machines? [6]

(b) What are the essential conditions for development of torque in AC machines? [4]

(c) Explain how the electromechanical energy conversion takes place in AC machines? [6]

OR

Q.1 (a) Explain the concept of rotating magnetic field? [8]

(b) Derive the basic emf equation for an induced emf per phase for full pitch, concentrated type of winding. [8]

UNIT- II

Q.2 (a) Explain the construction of a three phase induction motor with neat sketches o different parts. [8

(b) A 15-hp, 4 pole, 50Hz, 3-phase induction motor runs at 1500rpm on full load. The stator copper loss is 231 Watts and the rotational loss is 345 Watt. Determine – [8]

(i) Shaft torque

(ii) Mechanical power developed

(iii) Air gap power

(iv) Rotor copper loss and

(v) Motor efficiency

OR

Q.2 (a) Explain the problems of cogging and crawling in induction motors. How these can be removed? [8]

(b) Explain the equivalent circuit of induction motor and draw basic equivalent circuit and approximate equivalent circuit. [8]

UNIT- III

Q.3 (a) Explain the concept of double field revolving theory in induction motor with neat sketches. [8]

(b) Explain the Torque-slip characteristic of an induction machine with neat sketches. [8]

OR

Q.3 (a) Describe the working of stepper motor with neat diagram. [8]

(b) Explain the construction and working of universal motor with the help of neat sketches. [8]

UNIT- IV

Q.4 (a) Explain the parallel operation of two alternators. Describe any one method by which two alternators could be put in parallel. [8]

(b) Explain power angle characteristics of cylindrical rotor synchronous motor. [8]

OR

Q.4 (a) Why almost all large size synchronous machines are constructed with rotating field system type? Why synchronous generator rating are in kVA and not in kW? [8]

(b) Give the advantage for providing armature winding on stator circuit rather than rotor circuit and explain the working principle of two pole synchronous generator. [8]

UNIT- V

Q.5 (a) Describe in brief with neat sketches the functional operation of synchronous motor. Draw the performance characteristics curve when operating at unity p.f and at 0.8 p.f leading. [8]

(b) Explain the hunting of synchronous machine. What are the remedies used to avoid hunting? [8]

OR

Q.5 (a) Explain the principle of operation of 3-phase synchronous motor. Why Synchronou motor is not self-starting? [8]

(b) Show that a synchronous motor has no net starting torque. Describe the methods of starting synchronous motor. [8]