B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Fourth Semester

Electrical and Electronics Engineering

EE 3405 – ELECTRICAL MACHINES – II

(Regulations 2021)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Explain the role of damper winding in synchronous generator.

2. List the various methods to determine the voltage regulation.

3. List the main parts of synchronous motor.

4. Name the starting methods of synchronous motor.

5. Classify the two types of 3-phase induction motor.

6. Describe cogging in an induction motor.

7. What is the need of starter for induction motor?

8. Compare Dynamic braking and Regenerative braking.

9. Explain how the direction of a capacitor-start motor can be reversed.

10. State the limitations of shaded pole motors.

PART B — (5 × 13 = 65 marks)

11. (a) Describe the parallel operation of three phase alternators with help of a neat diagram.   (13)

Or

(b) Explain the principle and construction of synchronous generator with neat diagram. Derive its emf equation.   (13)

12. (a) Explain briefly the constructional features and principle of operation of three-phase synchronous motor. (13)

Or

(b) What is the need for starters? Explain various methods used for starting a synchronous motor. (13)

13. (a) Sketch and Explain the torque slip characteristics of 3 phase cage and slip-ring induction motors. Show the stable region in the graph. (13)

Or

(b) (i) Discuss the different power stages of an induction motor with losses. (5)

(ii) Explain the working of synchronous induction motor with a schematic diagram. (8)

14. (a) Discuss the various starting methods of induction motors. (13)

Or

(b) Discuss the cascade operation of induction motors to obtain variable speed. (13)

15. (a) List out the classification of single phase motors. Explain any two types of single phase induction motors. (13)

Or

(b) Discuss the construction, operation and characteristics of the following:

(i) Repulsion motor. (7)

(ii) Servo motor. (6)

PART C — (1 × 15 = 15 marks)

16. (a) A 50 HP, 6-Pole, 50 Hz, slip ring IM runs at 960 rpm on full load with a rotor current of 40 A. Allow 300 W for copper loss in S.C. and 1200 W for mechanical losses, find R_2 per phase of the 3-phase rotor. (15)

Or

(b) A 100kW, 330V, 50Hz, 3 phase, star connected induction motor has a synchronous speed of 500 rpm. The full load slip is 1.8% and full load power factor 0.85. Stator copper loss is 2440 W, iron loss is 3500W, and rotational loss is 1200W. Calculate (i) rotor copper loss, (ii) the line current and (iii) the full load efficiency. (15)

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