Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 30573

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2024.

Fourth Semester

Electrical and Electronics Engineering

EE 8401 — ELECTRICAL MACHINES – II

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Why is the field system of an alternator made as a rotor?

2. Define voltage regulation.

3. Define hunting in a synchronous motor.

4. List the starting methods of synchronous motor.

5. A 3-phase induction motor is wound for 4 poles and is supplied from 50 Hz system. Calculate the speed at which the magnetic field of the stator is rotating.

6. What is cogging in an induction motor?

7. Illustrate the advantages and disadvantages of V/F speed control of an induction motor.

8. Compare Plugging, Dynamic braking and Regenerative braking.

9. How can the direction of a capacitor-start motor can be reversed?

10. State the principle of operation of a linear induction motor.

PART B — (5 × 13 = 65 marks)

11. (a) Describe how the direct and quadrature-axis reactances of a salient-pole synchronous machine can be estimated by means of slip test.

Or

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

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

Or

(b) A 6600V, 3 phase, star connected synchronous motor draws a full load current of 80 A at 0.8 pf leading. The armature resistance is 2.2 Ω and reactance of 22 Ω per phase. If the stray losses of the machine are 3200W. Find

(i) Emf induced (5)

(ii) Output power (4)

(iii) Efficiency of the machine. (4)

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

Or

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

14. (a) Summarize the different types of braking of three phase induction motor.

Or

(b) The rotor resistance per phase of a 3-phas, 60 kW induction motor is 0.020W. Design a starter for this induction motor having six notches, where the upper current limit has to be the full load current so that the slip is 2.5%.

15. (a) Using double field revolving theory, compose why a single phase induction motor is not self-starting. Also obtain the equivalent circuit of single phase induction motor with necessary equations.

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 3 phase 50 Hz, 12 pole, 200 kW slip-ring induction motor drives a fan whose torque is proportional to the square of speed. At full load, the motor slip is 0.045. The rotor resistance measured between any two slip-rings is 61 m Ω. Invent what resistance should be added in the rotor circuit to reduce the fan speed to 450 rpm?

Or

(b) A 220 V, single phase induction motor gave the following test results:

Blocked rotor test: 120 V, 9.6 A, 460 W; No-load test: 220 V, 4.6 A, 125 W.

The Stator winding resistance is 1.5 Ω and during the blocked rotor test, the starting winding is open. Prepare the Equivalent circuit parameters, core, friction and windage losses.

———————