Question Paper Code	12635

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024
Fourth Semester
Electrical and Electronics Engineering
20EEPC401 - SYNCHRONOUS AND INDUCTION MACHINES
Regulations - 2020
(Use of *Graphs* is permitted)

Duration: 3 Hours   Max. Marks: 100

PART - A (10 × 2 = 20 Marks)
Answer ALL Questions

		Marks	K-Level	CO
1.	Define a synchronous machine.	2	K1	CO1
2.	Recall the principle of an alternator.	2	K1	CO1
3.	Infer pull-out torque in a synchronous motor.	2	K2	CO2
4.	List out the applications of synchronous motors.	2	K2	CO2
5.	A 12-pole, 3-phase alternator driven at a speed of 500 rpm, supplies power to an 8-pole, 3-phase induction motor. If the slip of the motor, at full load, is 3%, calculate the full-load speed of the motor**.**	2	K2	CO3
6.	State the difference between the slip ring rotor and cage rotor of an induction motor.	2	K2	CO3
7.	Define regenerative braking.	2	K1	CO4
8.	Outline the need for starting in motors.	2	K2	CO4
9.	Summarize the applications of a shaded pole induction motor.	2	K2	CO5
10.	Demonstrate the usage of centrifugal switches provided in many single phase induction motors.	2	K2	CO5

PART - B (5 × 13 = 65 Marks)
Answer ALL Questions

11. a)	Illustrate the constructional details and working principle of a synchronous generator.	13	K2	CO1

OR

11. b)	A three-phase star-connected alternator supplies a load of 10 MW at 0.85 power factor lagging & 11 KV (terminal voltage). Its resistance is 0.1 Ω / phase & synchronous reactance is 0.66 Ω/ phase. Calculate the value of E.M.F generated and regulation.	13	K2	CO1

12. a)	Explain the various excitation modes using V and inverted V curves of a synchronous motor with the necessary diagram.	13	K2	CO2

OR

12. b)	Discuss about the methods of starting of 3-phase synchronous motor.	13	K2	CO2

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **12635**

13. a) Derive the torque equation of a three-phase induction motor and find the condition for maximum starting and running torque.   *13 K2 CO3*

OR

    b) Classify the types of rotors of induction motor. Compare and Contrast the features of both.   *13 K2 CO3*

14. a) Discuss the following starting methods of three-phase induction motors.   *13 K2 CO4*
      (i) Direct On-line starter
      (ii) Star- delta starters

OR

    b) Explain the various techniques of speed control of induction motor from rotor side control.   *13 K2 CO4*

15. a) Demonstrate why single phase induction motor is not self-starting with the help of double field revolving theory**.** Also describe the constructional features of single phase induction motor.   *13 K2 CO5*

OR

    b) Summarize the classification of single-phase motors. Explain any two types of single-phase induction.   *13 K2 CO5*

PART - C (1 × 15 = 15 Marks)

16. a) Develop in detail about the slip power recovery scheme of a three phase induction motor.   *15 K3 CO4*

OR

    b) Construct the braking method of three phase induction motor with neat schematic and also mention it's limitations.   *15 K3 CO4*