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Question Paper Code : 30154

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 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.   Define Winding Factor in synchronous generator.

2.   Give the applications of salient pole and non-salient pole alternators.

3.   Define "Pull in Torque" in synchronous Motor.

4.   What is the use of damper winding in synchronous motor?

5.   Define "slip" in Induction motor.

6.   Why rotor of a squirrel cage Induction motor is skewed?

7.   What is meant by V/f control in induction motor?

8.   What is the meant by Plugging in IM?

9.   Why the single phase IM is not self starting?

10. Define the principle of magnetic Levitation.

PART B — (5 × 13 = 65 marks)

11. (a)   Derive the generated EMF expression for an alternator. What will be the rms value of emf induced per phase in 3-phase, 6-pole, star-connected alternator having a stator with 90 slots and 8 conductors per slot? The flux per pole is 0.4mWb and it runs at a speed of 1000 rpm. Assume full-pitched coils and sinusoidal flux distribution.

Or

(b) How the regulation of an alternator is found using EMF method? A single-phase, 500 V, 50 Hz alternator produces a short-circuit current of 170 A and an open circuit emf of 425 V when a field current of 15A passes through its field winding. If its armature has an effective resistance of 0.2 ohm, determine its full-load regulation at unity pf and at 0.8 pf lagging using EMF method.

12. (a) Discuss the starting methods of synchronous motor.

Or

(b) Describe the method of finding out the "V and inverted V" curve with neat sketch.

13. (a) Explain the construction, working principle and parts of three phase induction motor.

Or

(b) Discuss how the circle diagram is constructed through the No load and blocked rotor tests in three phase Induction motor.

14. (a) Explain the Rotor resistance starter in 3 phase Induction motor with neat sketch.

Or

(b) Briefly discuss the operation of Static Kramer's and Static Scherbius drives with neat sketch.

15. (a) Discuss the concept of Double field revolving theory with neat sketch.

Or

(b) Discuss the operation of Linear induction motor with neat sketch.

PART C — (1 × 15 = 15 marks)

16. (a) The rotor resistance and stand-still reactance per phase of a 3-phase, 4-pole, 50 Hz induction motor is 0.2 ohm and 2 ohm respectively. The rotor is connected in star and emf induced between the slip rings at start is 80 V. If at full-load, motor is running at a speed of 1440 rpm, calculate (i) the slip (ii) rotor induced emf per phase (iii) the rotor current and power factor under running condition and (iv) rotor current and p.f. at standstill when the slip rings are short circuited.

Or

(b) The impedance of the rotor circuit at standstill of a 1000 HP, 3-phase, 16-pole induction motor is $(0.02 + j0.15)$ ohm. It develops full-load torque at 360 rpm. What will be.

(i) The ratio of maximum to full load torque

(ii) The speed at maximum torque

(iii) The rotor resistance to be added to get maximum starting torque.