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Question Paper Code : 70555

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

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. Write down the significance of V and inverted V curves.
4. Synchronous motor can be used as synchronous condenser. Justify.
5. What measure can be taken for minimizing the effect of crawling in a 3-phase induction motor?
6. List the applications of 3-phase induction motor.
7. Mention the need of starter for induction motor?
8. Generalize how super-synchronous speed is achieved, while controlling the speed of an induction motor.
9. Define : Synchronous velocity.
10. What is the necessity of having laminated yoke in an ac series motor?

PART B — (5 × 13 = 65 marks)

11. (a) (i) Define armature reaction and explain the effect of armature reaction on different power factor loads of synchronous generators. (7)

(ii) Derive the EMF equation of a 3-phase synchronous machine. (6)

Or

(b) Summarize the discussion on capability curve with its boundaries of synchronous machine.

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

Or

(b) Explain any three starting methods of 3-phase synchronous motor.

13. (a) Describe the construction and working principle of 3 phase induction motor.

Or

(b) Derive the expression for torque, slip and draw speed torque characteristics of three phase induction motor.

14. (a) Explain the following methods of speed control scheme.

(i) Cascaded connection. (7)

(ii) V/f control. (6)

Or

(b) With neat diagrams explain the working of any two types of starters used for squirrel cage type 3 phase induction motor.

15. (a) Describe the no-load test and blocked rotor test for obtaining the equivalent circuit parameters of a single phase induction motor.

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

Blocked rotor test: 120V, 9.6 A, 460 W;

No-load test: 220V, 4.6 A, 125 W.

The Stator winding resistance is 1.5Ω . and during the blocked rotor test, the starting winding is open.

Prepare the Equivalent circuit parameters, core, friction and windage losses.