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Question Paper Code : 27221

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Fifth Semester

Electrical and Electronics Engineering

EE 6504 — ELECTRICAL MACHINES – II

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is meant by armature reaction in alternator?

2. Define Voltage regulation of an alternator.

3. When is synchronous motor is said to receive 100% excitation?

4. What are the causes of hunting?

5. State the condition for maximum torque of an induction motor under running condition.

6. Why the rotor slots are slightly skewed in squirrel cage induction motor?

7. What is the effect of change in supply voltage on starting torque of induction motor?

8. List out the methods of speed control of cage type 3 phase induction motor.

9. Why single phase induction motor is not self starting? Mention any one method of starting.

10. How can the direction of a capacitor run motor be reversed?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Define armature reaction and explain the effect of armature reaction on different power factor loads of synchronous generators. (8)

(ii) Derive the emf equation of an alternator. (8)

Or

(b) A 3 phase, Y-connected, 1000 KVA, 2000 V, 50 Hz alternator gave the following open-circuit and short circuit test readings:

Field current (A)	10	20	25	30	40	50
O.C. Voltage (V)	800	1500	1760	2000	2350	2600
S.C. armature current (A)	–	200	250	300	–	–

The armature effective resistance per phase is 0.2Ω Draw the characteristic curves and determine the full load percentage regulation at (i) 0.8 p.f lagging, (ii) 0.8 p.f leading by MMF method. (16)

12. (a) (i) Draw and explain the phasor diagram of a synchronous motor operating at lagging and leading power factor. (8)

(ii) Explain V and inverted V curves applied to synchronous motor. (8)

Or

(b) (i) A 1000 KVA, 11000 V, 3—phase star-connected synchronous motor has an armature resistance and reactance per phase of 3.5Ω and 40Ω respectively. Determine the induced emf and angular retardation of the rotor when fully loaded at 0.8 p.f. lagging and 0.8 p.f. leading. (8)

(ii) Derive the expression for power delivered by a synchronous motor in terms of load angle (α). (8)

13. (a) Sketch and explain the torque slip characteristics of the 3 phase cage and slip-ring induction motors. Show the stable region in the graph. (16)

Or

(b) (i) A 3 phase induction motor has a starting torque of 100% and a maximum torque of 200% of the full load torque. Determine:

(1) Slip at which maximum torque occurs;

(2) Full load slip;

(3) Rotor current at starting in per unit of full-load rotor current. (8)

(ii) Explain the working principle of 3 phase induction motor. (8)

14. (a) (i) Explain the method of starting of slip ring induction motor. (8)

(ii) Explain the speed control of a 3 phase induction motor using voltage control and frequency control. (8)

Or

(b) Explain the speed control of 3 phase induction motor with slip power recovery scheme. (16)

15. (a) (i) Explain the operating principle of hysteresis motor with neat diagram. (8)

(ii) Explain the operating principle of Linear Induction motor with neat diagram. (8)

Or

(b) Using double field revolving theory, explain why a single phase induction motor is not self starting. Also obtain the equivalent circuit of single phase induction motor with necessary equations. (16)

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