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Question Paper Code : 11234

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2014.

Fifth Semester

Electrical and Electronic Engineering

080280039 – ELECTRICAL MACHINES – II

(Regulation 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is armature reaction and What are its causes?
2. What are the parameters obtained from Potier triangle in ZPF method?
3. What are the starting methods of a Synchronous motor?
4. What is a Synchronous condenser?
5. Distinguish between Crawling and Cogging in Three Phase Induction motor.
6. How can an Induction motor be operated as an Induction Generator?
7. What is the necessity of starter for starting of a three phase Induction motor?
8. What are the different starting methods of three phase Induction motor?
9. What is the use of capacitor in a single phase induction motor?
10. How is 'step angle' calculated in a stepper motor?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain with a neat sketch, the constructional details and principle of operation of an Alternator. (8)

(ii) A three phase, 8 pole, 750 rpm, Star connected alternator has 72 slots on the armature. Each slot has 12 conductors and winding is short chorded by 2 slots. Find the Induced EMF between lines while given the flux per pole is 0.06 Wb. (8)

Or

(b) (i) A three phase, star connected, 1000 kVA, 11,000 V alternator has rated current of 52.5 A. The ac. resistance of the winding per phase is 0.45 Ω. The test results are given as

OC Test: Field current = 12.5A; Line Voltage = 422 V

SC Test: Field current = 12.5A ; Line current = 52.5 A

Determine the full load voltage regulation of alternator at 0.8 p.f. lagging. (8)

(ii) Describe the procedure to conduct slip test on a Salient pole alternator for determining the X_d and X_q. (8)

12. (a) (i) Describe with neat diagrams, the principle of working of a Synchronous motor. (8)

(ii) Describe the effect of excitation on armature current and power factor by drawing V and inverted V curves. (8)

Or

(b) (i) Describe the Phenomenon of hunting and its suppression in a Synchronous motor. (6)

(ii) Derive the expression for power developed by a Synchronous motor with relevant phasor diagram. And also derive the conditions for maximum power developed. (10)

13. (a) (i) Explain with a neat diagram the principle of operation of three phase induction motor. (8)

(ii) The power input to a 6 pole, three phase, 50 Hz induction motor is 42kW and the speed is 970 RPM. The stator losses are 1.2 kW and the friction and windage losses are 1.8 kW. Find slip, rotor output, the rotor cu loss and efficiency of the machine. (8)

Or

(b) Draw the Circle diagram from no load and blocked rotor test of a three phase, 14.92 kW, 400V, 6 pole induction motor from the following test results: (16)

No load test : 400 V, 11 A, p.f. = 0.2

Blocked rotor test : 100 V, 25 A, p.f. = 0.4

Rotor Copper loss at standstill is half the total Copper loss.

From the diagram find, line current, slip, efficiency and p.f. at full load.

14. (a) (i) Explain with neat diagrams the working auto transformer starter of a three phase induction motor. (8)

(ii) Determine a suitable auto transformation ratio for starting a three phase induction motor with line current not exceeding three times the full load current. The short circuit current is 5 times the full load current and full load slip is 5%. (8)

Or

(b) (i) Explain with neat diagrams the working star-delta starter of a three phase induction motor. (8)

(ii) Describe the variable frequency speed control of a three phase induction motor. (8)

15. (a) (i) Describe with necessary diagrams, the Double revolving field theory. (8)

(ii) Describe with a neat diagram, the principle of operation of a Shaded pole single phase induction motor. (8)

Or

(b) (i) Describe with a neat diagram the working of a Hysteresis motor. (8)

(ii) Describe with a neat diagram the working of a stepper motor. (8)
