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Question Paper Code : 51441

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

Fifth Semester

Electrical and Electronics Engineering

EE 2302/EE 52/EE 1301/10133 EE 505 — ELECTRICAL MACHINES — II

(Regulation 2008/2010)

(Common to PTEE 2302 Electrical Machines II for B.E. (Part–Time) Fourth Semester Electrical and Electronics Engineering – Regulation 2009)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. How will you distinguish between the two types of large synchronous generator from their appearance?

2. What is meant by alternator on infinite bus- bars?

3. Name any two important characteristic of a 3 phase synchronous motor not found in 3 phase induction motor.

4. Give any two methods of starting a synchronous motor.

5. How do change in supply voltage and frequency affect the performance of a 3 phase induction motor?

6. The starting torque of a squirrel cage induction motor cannot be altered when the applied voltage is constant. Why?

7. Which is the cheapest method of starting a three phase induction motor?

8. What is meant by plugging?

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

10. Name the motor being used in ceiling fans.

PART B — (5 × 16 = 80 marks)

11. (a) A 3–phase, star –connected, 1000KVA, 11,000V alternator has rated current if 52.5A. The ac resistance of the winding per phase is 0.45 Ω. The test results are given below:

OC Test: field current = 12.5 A, voltage between lines = 422 V.

SC Test: field current = 12.5A, line current = 52.5 A

Determine the full load voltage regulation of the alternator

(i) 0.8 pf lagging and

(ii) 0.8 pf leading.

Or

(b) Describe a method of determining direct and quadrature axis reactance of salient pole alternator.

12. (a) Describe briefly the effect of varying excitation upon the armature current and power factor of a three phase synchronous motor when input power to the motor is maintained constant.

Or

(b) A 75 KW, 400 V, 4–pole, 3-phase, star-connected synchronous motor has a resistance and synchronous reactance per phase of 0.04 Ω and 0.4 Ω respectively. Compute for full load 0.8 pf lead the open–circuit emf per phase and gross mechanical power developed. Assume an efficiency of 92.5%

13. (a) (i) A 746 KW, 3-phase, 50 Hz, 16-pole induction motor has a rotor impedance of $(0.02 + j0.15)\,\Omega$ at standstill. Full load torque is obtained at 360 rpm. Calculate

(1) The ratio of maximum to full–load torque

(2) The speed at maximum torque and

(3) The rotor resistance to be added to get maximum starting torque. (12)

(ii) Sketch the torque slip characteristic of an induction motor working at rated voltage and frequency. (4)

Or

(b) A 15 KW, 400V, 50Hz, 3 phase star connected induction motor gave the following test results:

No load test: 400V, 9A, 1310W

Blocked rotor test: 200V, 50A, 7100W

Stator and rotor ohmic losses at standstill are assumed equal.

Draw the induction motor circle diagram and calculate

(i) Line current,

(ii) Power factor,

(iii) Slip

(iv) Torque and efficiency at full load.

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

(ii) A three phase induction motor takes a starting current which is 5 times full-load current at normal voltage. Its full–load slip is 4 per cent. What auto–transformer ratio would enable the motor to be started with not more than twice the full load current drawn from the supply? What would be the starting torque under this condition? (8)

Or

(b) Explain speed control of 3 phase induction motor by slip power recovery scheme with neat sketches.

15. (a) 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.

Or

(b) Explain the construction and working of AC series motor and hysteresis motor in detail.

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