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Question Paper Code : 90199

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Fourth Semester

Electrical and Electronics Engineering

EE8401 – ELECTRICAL MACHINES – II

(Regulations 2017)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. Define voltage regulation in Alternator.
2. Compare salient pole and cylindrical pole rotors.
3. How hunting can be prevented ?
4. List the merits of three phase synchronous motor over three phase induction motor.
5. A three phase, 6 pole, 50 Hz induction motor has a slip of 1% at no-load. Find synchronous speed and frequency of rotor currents at standstill.
6. Why one of the wattmeter shows negative reading while measuring power of the induction motor at no-load condition using two wattmeter method ?
7. Why V/f ratio should be maintained constant ?
8. Name the different types of starters suitable for three phase induction motor.
9. Mention the advantages of stepper motors.
10. Why single phase induction motor is not self-starting ?

PART – B (5×13=65 Marks)

11. a) A three star connected alternator is rated at 1500 kVA, 12000 V. The armature effective resistance and synchronous reactance are 2 ohms and 35 ohms respectively. Calculate the percentage regulation for a load of 1200 kW at 0.8 lagging and leading power factors. Draw the phasor diagram for the same. (4+4+5)

(OR)

b) Explain the effect of armature reaction in synchronous generator for zero power factor lagging as well as leading and at unity power factor. Draw necessary diagram and phasor diagrams.

12. a) The synchronous reactance per phase of a three phase star connected 6600 V synchronous motor is 20 ohms. For a certain load input, the input is 915 kW at normal voltage and the induced line emf is 8942 V. Neglecting resistance, determine line current and power factor. (7+6)

(OR)

b) Explain V and inverted V curves of a synchronous motor with necessary diagram and vector diagrams.

13. a) The starting and maximum torques of a three phase induction motor are 1.5 times and 2.5 times its full-load torque. Determine the change in rotor circuit resistance to obtain a full load slip of 0.03. Neglect stator impedance. (13)

(OR)

b) A 6 pole, 50 Hz, three phase induction motor running on full load with 3% slip develops a torque of 160 N-m at its pulley rim. The friction and windage losses are 210 W and the stator copper and iron losses equal to 1640 W. Calculate rotor output, rotor copper loss and efficiency at full load. (13)

14. a) A 400 V, 50 Hz, induction motor, when started directly from the mains takes 4 times the full load current and the torque produced is twice the full load torque. Determine :

i) The motor current, the line current and the starting torque when started by means of an auto-transformer of ratio 2.5 : 1. (3+3+3)

ii) The voltage to be applied and the motor current if the full load torque is to be obtained at starting. (4)

(OR)

b) The full load speed of a 8 pole, 50 Hz slip ring motor is 730 rpm. The rotor resistance per phase is 0.2 ohms. Calculate the external resistance per phase that must be added to lower the speed to 620 rpm. Given that the torque is same in the two cases.

15. a) Explain the working principle of shaded pole induction motor and linear induction motor. **(13)**

(OR)

b) The resistance and inductive reactance of each winding of a 50 Hz split phase induction motor are 75 ohms and 230 ohms respectively. Additional resistance R and condenser C are in series with one winding. Calculate their values to give the same current in each winding with a phase difference of 90 degrees. **(13)**

PART – C

(1×15=15 Marks)

16. a) A three phase, 400 V induction motor gave the following test readings :

No load test : 400 V, 1250 W, 9 A

Short circuit test : 150 V, 4 kW, 38 A.

Draw the circle diagram. If the normal rating is 14.91 kW, find the full load values of current, power factor and slip from the circle diagram. **(5+5+5)**

(OR)

b) A 1500 kVA, 6600 V, three phase star connected alternator with a resistance of 0.4 ohm and resistance of 6 ohms per phase, delivers full load current at power factor 0.8 lagging and normal rated voltage. Estimate the terminal voltage for the same excitation and load current at 0.8 power factor leading.

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