B.E. DEGREE EXAMINATIONS: NOV/DEC 2010

Fourth Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U07EE401**:** Electrical Machines – II

Time: Three Hours   **Maximum Marks: 100**

Answer ALL Questions:-

PART A (10 x 1 = 10 Marks)

1. A 50 Hz Alternator will run at the greatest possible speed if it is wound for ….. poles

   (a) 8   (b) 6   (c) 4   (d) 2

2. For proper parallel operation ,a.c polyphase alternators must have the same

   (a) speed   (b) voltage rating   (c) KVA Rating   (d) excitation

3. In a synchronous motor , the rotor Cu losses are met by

   (a)Motor input   (b) armature input   (c) supply lines   (d) dc source

4. The direction of rotation of a synchronous motor an be reversed by reversing

   (a) current to the field winding   (b) supply phase sequence

   (c) polarity of rotor poles   (d) load on the motor

5. The effect of increasing the length of air gap in an induction motor will be to increase the

   (a) power factor   (b) speed   (c) magnetizing current   (d) air gap flux

6. In a 3phase induction motor , the relative speed of stator flux with respect to……. is zero.

   (a) Stator winding   (b) rotor   (c) rotor flux   (d) space

7. An Induction motor has a short circuit current 7 times the full load current and a full load slip of 4 percent. Its line starting torque is …………. times the full load torque.

   (a) 7   (b) 1.96   (c) 4   (d) 49

8. For the purpose of starting an induction motor a star –delta switch is equivalent to an auto starter of ratio ……… percent

   (a) 33.3   (b) 57.7   (c) 73.2   (d) 60

9. If the starting winding of a single phase induction motor is left in the circuit , it will

   (a) draw excessive current and over heat   (b) run slower

   (c) run faster   (d) spark at light loads

10. A repulsion motor is equipped with

   (a) a commutator   (b) slip rings   (c) a repeller   (d) neither (a) nor (b)

PART B (10 x2 =20 Marks)

11. Write down the equation for frequency of emf induced in an Alternator.

12. Why do cylindrical Alternators operate with steam turbines?

13. What is the effect on speed if the load is increased on a 3 phase synchronous motor?

14. Write the principle of operation of synchronous motor?

15. What is circle diagram of an I M?

16. How does the shaft torque differ from the torque developed in 3-phase Induction motor?

17. What is the need for starters?

18. Draw the schematic diagram of a slip power recovery scheme

19. What type of single phase induction motor would you use for the following applications? (i) Ceiling fan (ii) Wet grinder

20. Write the principal of operation of a reluctance motor.

PART C (5 x14 =70 Marks)

21. a) (i) State the requirements for paralleling of alternators. (5)

   (ii) A two pole, 50 Hz, 3-phase, turbo alternator is excited to generate the bus-bar voltage of 11 kV on no load. The machine is star connected and the short circuit current for this excitation is 1000A. Calculate the synchronizing power per degree of mechanical displacement of the rotor and the corresponding synchronizing torque. (9)

(OR)

   b) A 3300V, 3 phase star connected alternator has a full load current of 100A.On short circuit a field current of 5A was necessary to produce full-load current. The e m f on open circuit for the same excitation was 900V.The armature resistance was 0.8 ohm/phase. Determine the full load voltage regulation for (i) 0.8 pf lagging (ii) 0.8 p f leading.

22. a) Draw and explain V and Inverted V curves of Synchronous Motor.

(OR)

   b) Derive the expression for power developed in a Synchronous Motor.

23. a) A 100 Kw ,3300V,50Hz 3-phase,star connected induction motor has a synchronous speed of 500 rpm .The full load slip is 1.8% and full load poweer factor is 0.85. stator copper loss = 3500w, rotational loss = 1200w, calculate.
(i)Rotorcopperloss.
(ii)Linecurrent.
(iii)Full load efficiency.

(OR)

b) Derive the equation for torque developed by an Three Phase I M. Draw the typical torque-slip curve and deduce the condition for maximum torque.

24. a) Explain the various techniques of speed control of 3-phase I M.

(OR)

b) Explain any **two** methods of starting of Three Phase Squirrel cage Induction Motor.

25. a) Explain with the relevant diagrams the double field revolving theory of Single Phase Induction Motor.

(OR)

b) (i) Develop the Equivalent Circuit of Single Phase Induction Motor   (7)

   (ii) Explain the construction and operation of the Stepper Motor   (7)

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