

B.E. DEGREE EXAMINATIONS: NOVEMBER 2009

Third Semester

MECHANICAL ENGINEERING

U07EE301: Electrical Drives and Controls

Time: Three hours

Maximum Marks: 100

Answer ALL the Questions:-

PART A (10 x 1 = 10 Marks)

1. If B is the flux density, l the length of conductor and v be the velocity of conductor, then induced emf is given by
 - a) Blv
 - b) Blv^2
 - c) Bl^2
 - d) Bl
2. Which of the starter is suitable for DC series motor
 - a) Three point starter
 - b) Four point starter
 - c) Two point starter
 - d) star delta starter
3. What type of starter is used for slip ring Induction Motor?
 - a) Star delta starter
 - b) DOC starter
 - c) Rotor resistance starter
 - d) three point starter
4. State one advantage of direct online starting of an Induction motor.
 - a) Low cost
 - b) protection of motor
 - c) Very low starting torque
 - d) high power factor
5. List one drawback of CSI fed Induction motor.
 - a) High dynamic response
 - b) not suitable for multi motor drives
 - c) High range of speed control
 - d) size of inverter capacitors is very small.
6. Starter voltage control is possible because
 - a) Torque is proportional to square of voltage
 - b) torque is inversely proportional to voltage
 - c) Torque is proportional to voltage
 - d) torque is proportional to square root of voltage.
7. What is soft start?
 - a) Starting using star delta starter
 - b) starting using three point starter
 - c) Starting using AC voltage controller
 - d) starting using DOC starter.

8. When rotor frequency is Hz for a 1400 rpm Induction motor. Find its speed
 a) 1400 b) 1350 c) 1330 d) 1320
9. The major disadvantageous of induction motor compare to synchronous motor.
 a) Efficiency is low b) power factor is poor
 c) Speed is high d) cost is high.
10. The third quadrant in four quadrant operation of a drives is
 a) forward motoring b) reverse motoring
 c) Forward braking d) Reverse braking

PART B (10 x 2 = 20 Marks)

11. What are the disadvantages of a group drive?
 12. How the motor ratings are selected for shunt time duty?
 13. Draw the mechanical characteristics of DC series motor.
 14. Define degenerative braking of induction motors.
 15. What is the function of starters in DC motors?
 16. Draw neat sketch of DOC starter used for 3 phase insulation motors.
 17. State the disadvantages of rheostatic control.
 18. How can speed be controlled in a DC shunt motor?
 19. What are the applications of chopper?
 20. How three phase drives are classified?

PART C (5 x 14 = 70 Marks)

21. (a) (i) Compare AC and DC drives.. (7)
 (ii) What are the factors influencing the selection of electrical drives? (7)
 (OR)
 (b) (i) Explain different types of electrical drives and its applications to industry? (7)
 (ii) What are the different classes of motor duty and explain in detail? (7)
22. (a) (i) Draw and explain counter current and dynamic braking of a induction motor. (7)
 (ii) A 3 phase, 50HZ, 8 pole induction motor have a full load slip of 4%. The r resistance is 0.001Ω / phase and the standstill resistance is 0.005Ω / phase. Find ratio of maximum to full load torque and the speed at which the maximum torque occurs. (7)

need
) 1320
motor.

(OR)

- (b) (i) Explain the various methods of electric braking for (1) DC shunt motors.
(2) DC series motor.

23 (a) Describe the principle of starting of DC shunt motor using power and control circuit with neat circuit diagram.

(OR)

- (b) A three phase, 400V, 50HZ insulation motor has a rotor resistance of 0.1Ω and standstill reactance 0.9ohms/phase . The full load slip is 5%, calculate
(i) Full load torque as a percentage of maximum torque and
(ii) Value of extra resistance to be added in the rotor circuit to have 75% of maximum torque at start.

24 (a) Explain the different types of speed control applicable for DC series motor?

(OR)

- (b) A 250V, 10HP, DC shunt motor with $R_a = 0.4\Omega$ and $R_{fb} = 100\Omega$ runs at 1000rpm on full load. Efficiency on full load is 85%. If speed is to be raised to 1400rpm keeping load constant, determine extra resistance to be added in the field circuit. Assume $1\text{ hp} = 735.5\text{ watts}$.

25 (a) Draw and explain some of the commonly used controlled rectifier circuits for DC drive.

(OR)

- (7) (b) A 220V, 1500 rpm, 10A separately excitable DC motor has an armature resistance of
(7) 1Ω . It is fed from single phase fully controlled bridge converter with an AC source
voltage, 230V, 50HZ. Assuming continuous load current calculate.
(7) (i) Motor speed at the firing angle of 30° and torque of 5 N.m.
(7) (ii) Developed torque at the firing angle 45° and speed of 1000rpm.

industry? (7)
n motor. (7)
4%. The ro
phase. Find
maximum torq
(7)
