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Question Paper Code: 46301

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2022

Sixth Semester

Electrical and Electronics Engineering

14UEE601 - ELECTRIC DRIVES AND CONTROL

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Which of the following is preferred for automatic drives?

   (a) Synchronous motors (b) Squirrel cage induction motor
   (c) Ward Leonard controlled dc motors (d) Slip ring induction motor

2. Which of the following motor is preferred for blowers?

   (a) Wound rotor induction motor (b) Squirrel cage induction motor
   (c) DC shunt motor (d) DC series motor

3. A four quadrant operation requires

   (a) Two full converters in series
   (b) Two full converters connected in parallel
   (c) Two full converters connected in back to back
   (d) Two semi converters connected in back to back

4. In single phase full wave controlled rectifier, maximum output voltage is obtained at conduction angle and minimum at conduction angle

   (a) 0°, 180° (b) 180°, 0° (c) 0°, 0° (d) 180°, 180°

5. Stator voltage control for speed control of induction motors is suitable for

   (a) fan and pump drives (b) drive of a crane
   (c) running it as generator (d) Constant load drive

6. In motor circuit static frequency changers are used for

(a) power factor improvement (b) improved cooling
(c) reversal of direction (d) speed regulation

7. The advantage of self control mode of a synchronous motor is

(a) High hunting Oscillations
(b) Requires Damper Winding in the synchronous motor
(c) Eliminate Stability Problem
(d) All the above

8. The torque angle is the

(a) Angle between load and Line current
(b) Angle between load current and supply voltage
(c) both (b) and (d)
(d) Angle between excitation emf and supply voltage

9. The Phase controlled rectifier always consumes

(a) Reactive Power (b) Real Power
(c) Apparent Power (d) Complex speed

10. The armature voltage control is only applicable for

(a) Above Base Speed (b) Below Base Speed
(c) both (a) and (b) (d) Critical speed

PART - B (5 x 2 = 10 Marks)

11. Which factors are considered in choosing an electrical drives?

12. What are the three intervals present in discontinuous conduction mode of single phase half and fully controlled rectifier?

13. Enumerate the advantages of AC drives with PWM inverters.

14. Mention the different types of permanent magnet synchronous motor.

15. What are the roles of inner current control and outer speed control loops?

PART - C (5 x 16 = 80 Marks)

16. (a) Explain the multi-quadrant operation of an electric motor driving a hoist load. (16)

Or

(b) Explain different types of electric braking in detail (16)

17. (a) Explain four quadrant operation of chopper in detail. (16)

Or

(b) Explain the operation of a Type-A chopper fed drive and a Type-B chopper fed drive. (16)

18. (a) Describe the open loop and closed loop speed control of voltage source inverter control for induction motor. (16)

Or

(b) (i) A 3-phase 60 KW,4000 rpm,460 V, 60 Hz, 2 pole star connected induction motor has the following parameter : R_s=0, R_r=0.28 Ω, X_s=0.23 Ω and X_m=11 Ω The motor is controlled by varying the supply frequency. If the breakdown torque requirement is 70 Nm. Calculate (a) the supply frequency and (b) the speed ω_m at the maximum torque. (8)

(ii) Explain the block diagram of vector control of induction motor drive. (8)

19. (a) Explain the open loop V/f control of synchronous motors drive and V/f speed control characteristics in torque speed plane. (16)

Or

(b) Explain self-control technique of synchronous motor with constant margin angle control. (16)

20. (a) Derive the transfer function of a separately excited dc motor - load converter system. (16)

Or

(b) Explain the armature voltage control with field weakening mode operation of separately excited dc motor drive. (16)

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