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Question Paper Code:46301

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

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)

- Which of the following is preferred for automatic drives?
 - Synchronous motors
 - Squirrel cage induction motor
 - Ward Leonard controlled dc motors
 - Slip ring induction motor
- In case of centrifugal pumps the starting torque is generally
 - double the running torque
 - slightly more than running torque
 - same as running torque
 - less than running torque
- In single phase full wave controlled rectifier, maximum output voltage is obtained at conduction angle and minimum at conduction angle
 - $0^\circ, 180^\circ$
 - $180^\circ, 0^\circ$
 - $0^\circ, 0^\circ$
 - $180^\circ, 180^\circ$
- In dc choppers, if T_{on} is on-period and f is the chopping frequency, then output voltage in terms of the input voltage V_s is given by
 - $V_s \cdot T_{on} / f$
 - $V_s \cdot f / T_{on}$
 - $V_s / f \cdot T_{on}$
 - $V_s \cdot f \cdot T_{on}$
- Stator voltage control for speed control of induction motors is suitable for
 - fan and pump drives
 - drive of a crane
 - running it as generator
 - 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 concept of V/f control of inverters driving induction motors results in

(a) constant torque operation	(b) speed reversal
(c) reduced magnetic loss	(d) harmonic elimination

8. 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

9. Which speed control method preferred for constant torque drive?

(a) Armature voltage control	(b) Mechanical loading system
(c) Rotor Resistance control	(d) Field Control

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. State the condition for steady state stability of motor load system.
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. What is meant by margin angle of commutation?
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) Derive the equations of motor-load dynamics of load with translational motion and rotational motion. (16)

17. (a) Explain the operation of a three phase fully controlled rectifier control of dc separately excited motor. (16)

Or

- (b) Explain with a circuit diagram and waveform the operation of three phase fully controlled converter fed separately excited DC motor and obtain the expression of motor speed and torque for continuous conduction mode. (16)

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

Or

- (b) Draw and explain the block diagram of feedback vector control with rotor flux orientation. (16)

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 expression for transfer function of armature controlled DC servomotor. (16)

Or

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