SARASWATHI VELU COLLEGE OF ENGINEERING - SHOLINGHUR

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Two Marks Questions and Answers
Solid State Drives (EE2352) S6 EEE

1. What is meant by electrical drives?

   Systems employed for motion control are called drives and they employ any of the prime movers such as diesel or petrol engines, gas or steam turbines, hydraulic motors and electric motors for supplying mathematical energy for motion control. Drives employing electric motion are called electric drives.

2. Mention the different types of drives.
   1)Group drive
   2)Individual drive
   3)Multimotor drive

3. List the different types of electrical drives.
   1)dc drives
   2)ac drives

4. What are the advantages of electric drives?
   1) They have flexible control characteristics. the steady state and dynamic characteristics of electrical drives can be shaped to satisfy load requirements.
   2) Drives can be provided with automatic fault detection systems, programmable logic controllers and computers can be employed to automatically ctrl the drive operations in a desired sequence.
   3) They are available in which range of torque, speed and power.
   4) It can operate in all the four quadrants of speed-torque plane. Electric braking gives smooth deceleration and increases life of the equipment compared to other forms of braking.
   5) Control gear required for speed control, starting and braking is usually simple and easy to operate.

5. Mention the different factors for the selection of electric drives?
   1) Steady state operation requirements.
   2) Transient operation requirements.
   3) Requirements related to the source.
   4) Capital and running cost, maintenance needs, life.
   5) Space and weight restriction.
   6) Environment and location.
   7) Reliability.

6. Mention the parts of electrical drives.
   1) Electrical motors and load.
   2) Power modulator
   3) Sources
   4) Control unit
   5) Sensing unit

7. Mention the applications of electrical drives
   Paper mills
   Electric traction
   Cement mills
   Steel mills

8. Mention the types of enclosures

Screen projected type
Drip proof type
Totally enclosed type
Flame proof type

9. Mention the different types of classes of duty
   Continuous duty
   Discontinuous duty
   Short time duty
   Intermittent duty

10. Define equivalent current method
    The motor selected should have a current rating more than or equal to the current. It is also necessary to check the overload of the motor. This method of determining the power rating of the motor is known as equivalent current method.

11. Define cooling time constant
    It is defined as the ratio between C and A. Coolng time constant is denoted as Tau
    Tau = C/A
    Where C=amount of heat required to raise the temp of the motor body by 1 degree Celsius
    A=amount of heat dissipated by the motor per unit time per degree Celsius.

12. What are the methods of operation of electric drives?
    Steady state
    acceleration including starting
    deceleration including starting

13. Define four quadrant operation.
    The motor operates in two mode: motoring and braking. In motoring, it converts electrical energy into mechanical energy which supports its motion. In braking, it works as a generator, converting mathematical energy into electrical energy and thus opposes the motion. Motor can provide motoring and braking operations for both forward and reverse directions.

14. What is meant by mechanical chars?
    The curve is drawn between speed and torque. This characteristic is called mechanical characteristics.

15. Mention the types of braking
    Regenerative braking
    Dynamic braking
    Plugging

16. Define and mention different types of braking in a dc motor?
    In braking the motor works as a generator developing a negative torque which opposes the motion. Types are regenerative braking, dynamic or rheostat braking and plugging or reverse voltage braking.

17. List the drawbacks of armature resistance control?
    In armature resistance control speed is varied by wasting power in external resistors that are connected in series with the armature. since it is an inefficient method of speed control it was used in intermittent load applications where the duration of low speed operations forms only a small proportion of total running time.

18. What is static Ward-Leonard drive?

    Controlled rectifiers are used to get variable d.c. voltage from an a.c. source of fixed voltage controlled rectifier fed dc drives are also known as static Ward-Leonard drive.

19. What is a line commutated inverter?

    Full converter with firing angle delay greater than 90 deg. is called line commutated inverter. such an operation is used in regenerative braking mode of a dc motor in which case a back emf is greater than applied voltage.

20. Mention the methods of armature voltage controlled dc motor?

    When the supplied voltage is ac,

    - Ward-Leonard schemes
    - Transformer with taps and un controlled rectifier bridge
    - Static Ward-Leonard scheme or controlled rectifiers

    When the supply is dc:

    - Chopper control

21. Write the expression for average o/p voltage of full converter fed dc drives?

    Vm=(2Vm/pi)cospi.....continuous conduction

    Vm=[Vm(cos alpha-cos beta)+(pi+alpha+beta)]/pi].....discontinuous conduction

22. What are the disadvantages of conventional Ward-Leonard schemes?

    - Higher initial cost due to use of two additional m\cs.
    - Heavy weight and size.
    - Needs more floor space and proper foundation.
    - Required frequent maintenance.
    - Higher noise and higher loss.

23. Mention the drawbacks of rectifier fed dc drives?

    - Distortion of supply.
    - Low power factor.
    - Ripple in motor current

24. What are the advantages in operating choppers at high frequency?

    The operation at a high frequency improves motor performance by reducing current ripple and eliminating discontinuous conduction.

25. Why self commutated devices are preferred over thyristors for chopper circuits?

    self commutated devices such as power MOSFETs power transistors, IGBTs, GTOs and IGCTs are preferred over thyristors for building choppers because they can be commutated by a low power control signal and don't need commutation circuit.

26. State the advantages of dc chopper drives?

    Dc chopper device has the advantages of high efficiency, flexibility in control, light weight, small size, quick response and regeneration down to very low speed.

27. What are the advantages of closed loop c of dc drives?

    Closed loop control system has the adv. of improved accuracy, fast dynamic response and reduced effects of disturbance and system non-linearities.

28. What are the types of control strategies in dc chopper?

    - Time ratio control.
    - Current limit control.

29. What are the adv. of using PI controller in closed loop ctrl. of dc drive?
    Stabilize the drive
    Adjust the damping ratio at the desired value
    Makes the steady state speed error close to zero by integral action and filters out noise again due to the integral action.

30. What are the different methods of braking applied to the induction motor?
    Regenerative braking
    Plugging
    Dynamic braking.

31. What are the different methods of speed control of IM?
    Stator voltage control
    Supply freq. control
    Rotor resistance control
    Slip power recovery control.

32. What is meant by stator voltage control.?
    The speed of the IM can be changed by changing the stator voltage. Because the torque is proportional to the square of the voltage.

33. Mention the application of stator voltage control.
    This method is suitable for applications where torque demand reduced with speed, which points towards its suitability for fan and pump drives.

34. Mention the applications of ac drives.
    AC drives are used in a no. of applications such as fans, blowers, mill run-out tables, cranes, conveyors, traction etc.

35. What are the three regions in the speed-torque characteristics in the IM?
    Motoring region (0<=s<=1)
    Generating region(s<0)
    Plugging region (1<=s<=2) where s is the slip.

36. What are the adv. of stator voltage control method?
    The ctrl circuitry is simple
    Compact size
    Quick response time
    There is considerable savings in energy and thus it is economical method as compared to other methods of speed ctrl.

37. What is meant by soft start?
    The ac voltage controllers show a stepless control of supply voltage from zero to rated volt. they are used for soft start for motors.

38. List the adv of squirrel cage IM?
    Cheaper
    light in weight
    Rugged in construction
    More efficient
    Require less maintenance
    It can be operated in dirty and explosive environment

39. Define slip

The difference between the synchronous speed (Ns)and actual speed(N)of the rotor is known as slip speed. the % of slip is gn by,

%slip s=[(Ns-N)/Ns]x 100

40. Define base speed.

The synchronous speed corresponding to the rated freq is called the base speed.

41. What is meant by freq ctrl of IM?

The speed of IM can be controlled by changing the supply freq because the speed is directly proportional to supply frequency. This method of speed ctrl is called freq control.

42. What is meant by V/F ctrl?

When the freq is reduced the i/p voltage must be reduced proportionally so as to maintain constant flux otherwise the core will get saturated resulting in excessive iron loss and magnetizing current. This type of IM behavior is similar to the working of dc series motor.

43. What are the adv of V/F ctrl?

Smooth speed ctrl

Small i/p current and improved power factor at low freq. start

Higher starting torque for low case resistance

44. What is meant by stator current ctrl?

The 3 phase IM speed can be controlled by stator current control. The stator current can be varied by using current source inverter.

45. What are the 3 modes of region in the adjustable-freq IM drives char.?

Constant torque region

Constant power region

High speed series motoring region

46. what is meant by regenerative braking?

Regenerative braking occurs when the motor speed exceeds the synchronous speed. In this case the IM runs as the induction m\c is converting the mechanical power into electrical power which is delivered back to the electrical system. This method of braking is known as regenerative braking.

47. What is meant by dynamic braking?

Dynamic braking of electric motors occurs when the energy stored in the rotating mass is dissipated in an electrical resistance. This requires a motor to operate as a gen. to convert the stored energy into electrical.

48. What is meant by plugging?

It is one method of braking of IM. When phase sequence of supply of the motor running at the speed is reversed by interchanging connections of any two phases of stator with respect to supply terminals, operation shifts from motoring to plugging region.

49. What is critical speed?

It is the speed that separates continuous conduction from discontinuous conduction mode.

50. Which braking is suitable for reversing the motor?

Plugging is suitable for reversing the motor.