



# SHRI ANGALAMMAN COLLEGE OF ENGINEERING AND TECHNOLOGY

(An ISO 9001:2008 Certified Institution)  
SIRUGANOOR, TIRUCHIRAPPALLI – 621 105



## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

### EE1205 - ELECTRICAL DRIVES AND CONTROL

#### UNIT – I INTRODUCTION

##### **PART – A**

1. State the factors that can influence the choice of a motor to drive the load.
2. What is thermal overloading?
3. What are the advantages of electrical drive?
4. What are the factors governing the size and rating of the motor?
5. Draw the block diagram of an electric drive system.
6. What is meant by group drive? Give an example.
7. Define heating time constant.
8. Define cooling time constant.
9. What is an electric drive?
10. What are the applications of electric drive?
11. Give the formulae for computing power requirement for a linear movement.
12. Mention the functions of Power modulators.

##### **PART – B**

1. Explain the factors governing the selection of motors. (16)
2. Discuss in detail the determination of power rating of motors. (10)

3. Write a brief note on classes of duty for an electric motor. (10)
4. Draw the typical temperature rise-time curve and derive the equation for temperature rise in an electric drive. (16)
5. Explain in detail about the various types of electric drives. (8)
6. Compare the D.C and A.C drives. (8)
7. Explain the different types of loading of drives. (8)
8. Explain the choice of selection of the motor for different loads. (8)
9. Draw the block diagram and explain the basic elements of an electric drive system. (16)
10. Explain the four quadrant operation of motor applicable for hoist. (16)

## **UNIT –II MOTOR CHARACTERISTICS**

### **PART –A**

1. Draw the speed – torque characteristics of D.C series motor.
2. What is dynamic braking?
3. What are the stable conditions for the stable operations of motors?
4. Draw the slip – torque characteristics of a single phase induction motor.
5. Define plugging of 3 phase induction motor.
6. Why DC series motors should never be started on no-load?
7. Give the types of braking used for 3 phase induction motor.
8. Define regenerative braking of 3 phase induction motor.
9. Draw the output characteristics of DC shunt motor.
10. What are the possible solutions to improve the starting torque of 3 phase induction motor?
11. Draw the circuit for capacitor start and run 1 phase induction motor.
12. Define torque.
13. Classify the drive motors based on their speed – torque characteristics.
14. List the types of rotors in induction motor.
15. Draw the speed torque characteristics of a DC shunt motor.
16. Draw the slip torque characteristics of a 3 $\Phi$  induction motor
17. Draw the speed torque characteristics of a 3 $\Phi$  induction motor

## **PART – B**

1. Explain the Speed-Torque characteristics of three phase induction motor with neat diagrams. (16)
2. Explain about the speed-torque characteristics of a DC Shunt Motor with

Suitable graphs and diagrams. (16)

3. Explain the various methods of braking of induction motors. (16)
4. Draw and explain various load characteristics of DC Shunt Motor.(16)
5. Explain various methods of braking of DC Shunt Motors with neat diagrams.(16)
6. Explain various methods of braking of DC Series Motors with neat diagrams. (16)

## **UNIT – III STARTING METHODS**

### **PART -A**

1. What are the functions of starters?
2. What are the factors influencing the selection of starters?
3. Why starter is necessary for starting a DC Motor?
4. What are the starters used for starting DC Motors?
5. Why is starting current high in a DC Motor?
6. What are the protective devices used in DC Motor Starters?
7. How does the four point starter differ from three point starter?
8. Explain the function of NVR coil in DC Motor Starters?
9. Explain the function of OLR coil in DC Motor Starters?
10. What are the different methods of starting three phase induction motors?
11. How many terminals are provided on the terminal box of a squirrel cage induction motor to be started by a star-delta starter?
12. Mention the reasons for most of the three phase induction motors provided with delta

connected stator winding?

13. Write the applications of three phase induction motors?
14. Mention the merits of DOL starter.
15. Mention the demerits of DOL starter
16. Why stator resistance starter is rarely used?
17. What are the effects of increasing rotor resistance on starting current and starting torque?
18. How reduced voltage starting of induction motor is achieved?
19. How automatic starters are working in DC Motors?
20. How we start the wound-rotor (slip-ring) motors?
21. Why single phase induction motor is not self-starting?

## **PART – B**

1. Draw a neat schematic diagram of a three point starter and explain its working. (16)
2. Draw a neat schematic diagram of a four point starter and explain its working. (16)
3. Explain with neat circuit diagram, the star-delta starter method of starting squirrel cage induction motor.(16)
4. Explain the typical control circuits for DC Series and Shunt motors. (16)
5. Explain with neat diagram the starting of three phase slip ring induction motor. (16)
6. Draw and explain the push-button operated direct-on line starter for three phase induction motor.(16)
7. Draw and explain the manual auto-transformer starter for three phase induction motor. (16)

## UNIT – IV CONVENTIONAL AND SOLID STATE SPEED CONTROL OF DC DRIVES

### PART - A

1. Enumerate the factors on which the speed of a DC Motor depends.
2. By what methods can the speed of a DC Shunt Motor be controlled?
3. Why the field control is considered superior to armature resistance control for DC Shunt Motors?
4. What is the effect of inserting resistance in the field circuit of a DC Shunt Motor on its speed and torque?
5. What is meant by speed control?
6. Mention the different methods of speed control employed for DC Series Motor.
7. What is meant by armature control?
8. What will be the effect of change in supply voltage on the speed of DC Shunt Motor?
9. What are the advantages and disadvantages of armature resistance control of DC Shunt Motor?
10. What are the advantages and disadvantages of Field control (or) Flux control method?
11. What is meant by flux control (or) field control method?
12. In which type of control the field current and armature current kept constant?
13. How we select the shunt and series motor based on the torque and speed in particular application?
14. Write down the applications of Ward-Leonard system of speed control.
15. What are the advantages and disadvantages of Ward-Leonard method of speed control?
16. Write down the disadvantages and applications of armature diverted method of speed control of DC Series Motor.
17. What is meant by solid state speed control?
18. What are the advantages and disadvantage of solid state drive methods?
19. What is meant by DC Chopper?
20. What is meant by duty cycle?

21. What are the different types of Chopper?
22. What is the function of freewheeling diode?
23. Write the output equations for single phase half and full converters.
24. What are the two main methods for speed control of DC Shunt Motor?
25. What are the advantages of thyristor control on speed control of DC Motor?
26. Why Chopper based D.C drives give better performance than rectifier controlled drives?
27. Name the solid state controllers used for the speed control of D.C Shunt and Series Motor.
28. What is free-wheeling?

### **PART –B**

1. Discuss the Ward-Leonard speed control system with a neat circuit diagram. Also mention its advantages and disadvantages. (16)
2. Explain how the speed of a DC Shunt Motor can be varied both above and below the rated speed at which it runs with full field current.(16)
3. Explain the speed control schemes of DC Series Motor. (16)
4. Explain the single phase half wave converter drive speed control for DC drive with waveforms.(16)
5. Explain with neat sketch the chopper control method of speed control of DC motors.
6. Explain with neat sketches about the DC Shunt Motor speed control by using single phase fully controlled bridge converter.(16)
7. A 500V series motor having armature resistance and field resistance of  $0.2 \Omega$  and  $0.3 \Omega$  respectively runs at 500 rpm when taking 70A. Assuming unsaturated field, find out its speed when field diverter of  $0.684 \Omega$  is used constant load torque.(16)
8. A 250V DC Series Motor takes 40A of current when developing a full load torque at 1500 rpm. Its resistance is  $0.5 \Omega$ . If the load torque varies as the square of the speed determine the resistance to be connected in series with the armature to reduce the speed to 122 rpm. Assume the flux is proportional to field current. (16)

## UNIT – V CONVENTIONAL AND SOLID STATE SPEED CONTROL OF AC DRIVES

### PART - A

1. List the different methods of speed control of three phase induction motor.
2. Write short notes about cascaded method of speed control?
3. Define Slip.
4. What is slip-power recovery system?
5. What are the advantages of Slip-power recovery system?
6. What is meant by Voltage control in induction motor? And where it is applicable?
7. What is meant by Voltage / Frequency control?
8. What are the main features of V/f control?
9. What is meant by Stator frequency control?
10. What is meant by AC Voltage controller?
11. Mention the advantages and disadvantages of Stator voltage control.
12. What are the possible methods of speed control available by using inverter?
13. Why we go for PWM inverter control?
14. Write the classifications of PWM techniques.
15. What is meant by Cyclo converter?
16. Write the types of cyclo converter.
17. Write the applications of Cyclo converter.
18. Write down the limitation of cyclo converter method of speed control.
19. Compare the Static Kramer and Scherbius System.
20. What are the advantages and disadvantages of Static Scherbius scheme of speed control?
21. Write the speed equation of an induction motor.
22. What is VVVF control?

## **PART – B**

1. Explain the V/f control method of AC drive with neat sketches.(16)
2. Explain the speed control schemes of phase wound induction motors. (16)
3. Explain in detail about Slip power recovery scheme. (16)
4. Explain the concatenation operation of three phase induction motors. Hence derive the speed experienced in cascaded set. (16)
5. Explain the different methods of speed control used in three phase induction motors. (16)
6. Explain the Kramer system and Scherbius system. (16)
7. Draw the power circuit arrangement of three phase variable frequency inverter for the speed control of three phase induction motor and explain its working. (16)
8. Discuss the speed control of AC motors by using three phase AC Voltage regulators. (16)
9. Explain the static Kramer method and static scherbius method of speed control of three phase induction motor.(16)
10. Explain in detail about the various methods of solid state speed control techniques by using inverters.(16)

SACET MECH