

M.E. Second Semester (Electrical & Elect.) (New-CGS)  
**13291 : Elective-I : Power Electronics Controlled Drives**  
**2 EEEME 4**

P. Pages : 2

Time : Three Hours



**AW - 3573**

Max. Marks : 80

- Notes :
1. Due credit will be given to neatness and adequate dimensions.
  2. Assume suitable data wherever necessary.
  3. Use of pen Blue/Black ink/refill only for writing the answer book.

**SECTION - A**

1. a) A 220V, 10.5 Amp, 2000 RPM shunt motor has the armature and field resistance of  $0.5 \Omega$  and  $400 \Omega$  respectively. It drives a load whose torque is constant at rated motor torque. Calculate motor speed if the source voltage drop 175 volts. 7  
b) Explain in detail four quadrant operation of a dc motor drive. 7

**OR**

2. a) Explain with necessary diagram the converter configuration for a four quadrant DC motor drive. 7  
b) Derive the expression for average load voltage and load current for single phase full converter fed separately excited DC motor. Draw the output voltage and current waveforms for  $\alpha = 60^\circ$ . Assume continuous condition. 7
3. a) Explain the operation of two quadrant DC chopper fed separately excited DC motor exhibiting forward motoring and forward regeneration modes along with speed torque characteristics. 7  
b) Draw a neat block diagram for a closed loop operation of a chopper fed dc separately excited motor and explain each block mention few advantages. 6

**OR**

4. a) Describe the steady state performance of chopper controlled DC motor drive with average values by neglecting harmonics. 7  
b) A step up chopper is used to deliver load voltage of 500 V from 220 V DC source. If the blocking period of the thyristor is  $80 \mu s$ . Compute the required pulse width. 6
5. a) Develop a flow chart for the computation of triggering angle versus conduction angle as a function of power factor angle. 7  
b) Explain why the drive based on slip energy recovery principle are more efficient than the drive based on the rotor resistance control technique. 6

**OR**

6. a) Explain in detail with neat diagram torque speed characteristic with phase control induction motor drives. 7
- b) Explain stator voltage control method of controlling the speed of three phase induction motor drive. 6

**SECTION - B**

7. a) Explain with neat diagram working of voltage source inverter. 6
- b) Discuss how the speed of a three phase induction motor can be controlled by varying the frequency of applied voltage. 7

**OR**

8. a) For a frequency controlled induction motor explain the terms in details, the constant slip speed control and constant air gap flux control. 6
- b) Explain with block diagram, the operation of DC link voltage source inverter for speed control of three phase induction motor drive. 7
9. a) Describe current source indirect vector controller in detail. 6
- b) In what way control for AC motors differ from that of DC motor ? Explain in brief vector control. 7

**OR**

10. a) Discuss the advantages of variable frequency induction motor drive. 6
- b) Explain key performance characteristics and applications of vector controlled induction motor. 7
11. a) Discuss in detail with suitable example phase advancing. 7
- b) Write a short note on design of current controllers for PMBDCM drive. 7

**OR**

12. a) Explain how the sensor less control of PMBDCM drive works ? 7
- b) What are the different topologies for half wave operation of the PMBDCM drives. Explain any one. 7

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