

Code No: 126AJ**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B. Tech III Year II Semester Examinations, October/November - 2016****STATIC DRIVES****(Electrical and Electronics Engineering)****Time: 3 hours****Max. Marks: 75****Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART – A**(25 Marks)**

- 1.a) What are the advantages of electrical drives? [2]
- b) Write the basic performance equations of a separately excited D.C motor. [3]
- c) What are the advantages of electrical braking over mechanical braking? [2]
- d) Explain dynamic braking. [3]
- e) Define duty cycle of a chopper. [2]
- f) What are the advantages in operating choppers at high frequency? [3]
- g) What is PWM control? [2]
- h) State separately the speed control methods of induction motor from stator side and rotor side. [3]
- i) What are the speed control methods of synchronous machines? [2]
- j) List out some applications of cyclo converter fed synchronous motor drive. [3]

PART – B**(50 Marks)**

- 2.a) Explain in detail the principles of working of 3- ϕ fully controlled converters connected to d.c. series motor.
- b) What is the purpose of freewheeling diode in converters when fed to d.c motors?[6+4]

OR

- 3.a) Explain Armature voltage control and Field control method of D.C. motors.
- b) Explain the speed-torque characteristics of a dc series motor connected to a single phase fully controlled converter. [5+5]

- 4.a) Explain the concept of regenerative braking applied to D.C. motors.
- b) With neat block diagram explain the closed loop operation of dc motor. [5+5]

OR

- 5.a) Describe the single phase four quadrant operation of dc drive using dual converter.
- b) A 400V, 750rpm, 70A dc shunt motor has an armature resistance of 0.3Ω when running under rated condition, the motor is to be braked by plugging with armature current limited to 90A. what external resistance should be connected in series with the motor. [5+5]

- 6.a) Explain in detail operation of separately excited dc motor in motoring control with chopper.
- b) A separately excited dc motor with armature resistance of 0.01Ω with dc supply 220V, 100A, 1000rpm is fed with chopper control for its motoring operation. Calculate the duty ratio of chopper at rated torque with speed of 500rpm for its braking operation. [6+4]

OR

- 7.a) Explain the importance of a closed loop system that is used when chopper control dc drive system is connected.
- b) A 230V separately excited dc motor takes 50A at a speed of 800rpm. It has armature resistance of 0.4Ω . This motor is controlled by a chopper with an input voltage of 230V and frequency of 50Hz. Calculate the speed of regenerative braking operation at duty ratio of 0.6. [6+4]
- 8.a) Explain the principle behind the variation of speed of three phase induction motor by V/F method. Discuss this for operation above rated frequency.
- b) Compare VSI and CSI fed drives. [6+4]

OR

- 9.a) Discuss in detail the role of cyclo converter in speed control of induction motor.
- b) In which way is static Kramer control is different from static Scherbius drive. [6+4]
- 10.a) Describe load commutated current source inverter fed synchronous motor drive in detail.
- b) Draw the block diagram of a closed loop synchronous motor drive fed from VSI. [5+5]

OR

11. Describe the:
- a) Separate controlled mode of operation of synchronous motor by CSI cycloconverters.
- b) Self-controlled mode of operation of synchronous motor by VSI cycloconverters. [5+5]

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