B.E. / B.Tech. Instrumentation Engineering (Model Curriculum) Semester-V

IN503M / Industrial - Industrial Drives and Control

P. Pages : 2 **GUG/S/25/14023**

Time : Three Hours * 2 3 6 3 * Max. Marks : 80

Notes : 1. All questions carry equal marks.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) Describe various triggering methods of series connected SCR. **8**

b) What is power electronics? State Applications of power electronics. **8**

OR

2. a) A train of pulses of frequency 5kHz having a duty ratio of 20% triggers a thyristor. Determine the pulse width. If the average gate power dissipation is 0.5W, determine the maximum allowable gate power drive. **8**

b) Examine the Two Transistor model of SCR and derive an expression for anode current. **8**

3. a) Examine the operation of step-up chopper. Derive an expression for the average output voltage in terms of input dc voltage and duty cycle. **8**

b) What is meant by phase controlled rectifier? State applications of controlled rectifier. **8**

OR

4. a) Discuss with neat circuit diagram the operation of half bridge inverter. **8**

b) Define inverter. Classify the inverters & describe the basic operation of inverter. **8**

5. a) Elaborate working principle of Position Servo Motor. **8**

b) Describe the construction & operation of Permanent Magnet DC motor. **8**

OR

6. a) Discuss the single phase induction motor in details. **8**

b) 25V dc series motor takes 25A and runs at 800rpm, Its armature resistance is 0.5Ω, and series field resistance is 0.3Ω, If iron and friction losses amount to 750W and find- **8**

1) The armature torque
2) The shaft torque
3) The overall efficiency

7. a) Elaborate Hall effect sensor based brushless d.c. Motor drive. **8**

b) Mention the different methods of speed control employed for DC Series Motor. **8**

OR

8. a) An 80kW, 440V, 800rpm DC motor is operating at 600rpm and developing 75% rated torque is controlled by $3-\Phi$, dix pulse thyristor converter. If the back emf at rated speed is 410V, determine the triggering angle of the converter. The input to the converter is $3-\Phi$, 415V, 50Hz a.c. supply. **8**

b) What are the different driving modes of stepper motor? Elaborate it with neat diagrams. **8**

9. a) Discuss how Solid State Relays are used for control of AC Motor. **8**

b) Examine different techniques of Closed Loop Control of Induction motor. **8**

OR

10. a) A three phase, squirrel-cage induction motor is developing torque 1500 sync watts at 50Hz and 1440rpm (synchronous speed is 1500rpm). If the motor frequency is now increased to 75Hz using constant power mode, determine the new value of torque developed by motor at constant slip. **8**

b) Explain the operation of synchronous motor drive. **8**

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