

Power Devices & Machines

P. Pages : 2

Time : Three Hours



NKT/KS/17/7269/7274

Max. Marks : 80

- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Questions No. 2.
 3. Solve Question 3 OR Questions No. 4.
 4. Solve Question 5 OR Questions No. 6.
 5. Solve Question 7 OR Questions No. 8.
 6. Solve Question 9 OR Questions No. 10.
 7. Solve Question 11 OR Questions No. 12.
 8. Due credit will be given to neatness and adequate dimensions.
 9. Assume suitable data whenever necessary.

1. a) Explain the operation of SCR using two transistor analogy and derive the expression for anode current. **7**

b) Draw & explain Dynamic characteristic of SCR. Define Turn ON time. **6**

OR

2. a) Explain four mode of operation of Triac. **7**

b) Write short notes on application of Traic as phase control circuit. **6**

3. a) Give constructional details of IGBT, Explain how IGBT works. Draw V-I characteristic. **7**

b) Give comparison between the SCR, power MOSFET & IGBT. **7**

OR

4. a) Explain basic structure, symbol & operation of power MOSFET? Explain formation of depletion region & creation of Inversion layer & show V-I characteristic. **8**

b) Write short notes on GTO. **6**

5. a) Explain the operation of single phase fully controlled full wave converter with resistive load. **6**

b) With the help of a neat circuit diagram & waveform explain single phase fully controlled half wave controlled rectifier with R-L load & freewheeling diode. **7**

OR

6. a) Describe the operation of 3 phase half wave controlled rectifier (HWCR) with resistive load. **7**

- b) Draw & explain midpoint single phase cycloconverter with Resistive load. Give advantage & application of cycloconverter. **6**
7. a) Classify choppers based on quadrant of operation & output voltage. Explain class C chopper. **7**
- b) What are the different control techniques used in chopper. Explain in short. **6**

OR

8. a) Explain operation of simple series inverter. Draw all relevant waveform. **6**
- b) Explain the operation of 3 phase bridge Inverter in 120° mode. Draw waveform. **7**
9. a) What is an open-delta (V-V) connection? What are the applications of this system. **7**
- b) What are the distinguishing features of Y-Y, Y- Δ , Δ -Y & Δ - Δ connections. Give advantages. **6**

OR

10. a) Why starters are necessary for starting of Induction motor? Explain Star-Delta starter. **7**
- b) Discuss the various methods of speed control of 3 phase I.M. Explain any one method. **6**
11. a) Explain speed control of DC shunt motor. **7**
- i) Flux control method.
- ii) Voltage control method.
- b) A 250 volt dc shunt motor has armature resistance of 0.25Ω , on load it takes an armature current of 50A and runs at 750 rpm. If the flux of motor is reduced by 10% without changing the load torque. Find the new speed of the motor. **7**

OR

12. a) Write short notes on speed control of DC series motor. **8**
- 1) Flux control.
- 2) Rheostatic control.
- b) Explain with neat diagram construction & principle of operation of universal motor. **6**
