

**Faculty of Engineering & Technology**  
**Fourth Semester B.E. (Electronics)/ET/EC (C.B.S.)**  
**Examination**  
**POWER DEVICES & MACHINES**

Time—Three Hours]

[Maximum Marks—80

**INSTRUCTIONS TO CANDIDATES**

- (1) All questions are compulsory.
  - (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) What is an on state condition of thyristors ? Draw and explain  $V_T \cdot I_T$  characteristic of SCR. 7
  - (b) Explain two transistor analogy of SCR. 7
- OR**
2. (a) With neat circuit, explain how a triac can be used as an AC regulator. Derive output voltage equation. 7
  - (b) Draw a TRIAC phase control circuit and explain its principle of operation. 7
3. (a) Explain IGBT with the help of characteristic and symbol and also explain performance parameter of IGBT. 7
  - (b) Give the comparison of IGBT with SCR. 6

OR

4. (a) Explain GTO with the help of characteristic and symbol. 6
- (b) Draw symbolic representation of n channel depletion type power MOSFET with characteristic. 7
5. (a) Explain single phase, halfwave controlled Rectifier with R-L load and sketch Load voltage waveform. 7
- (b) A single phase half wave converter in following figure 5 (b) is operated from a 120 V, 60 Hz supply and the resistive load is  $R = 10 \Omega$ . If average output voltage is 25% of maximum possible average output voltage calculate (i) delay angle (ii) the rms and average output currents.

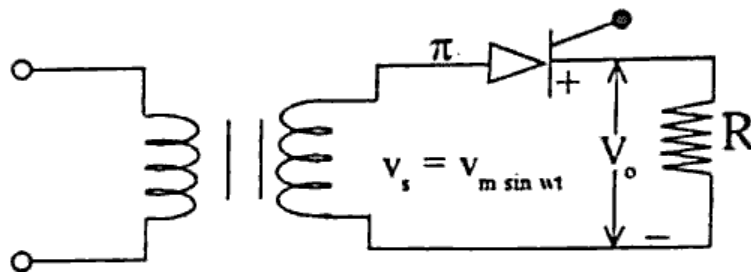


Fig 5 (b)

OR

6. (a) A single-phase AC voltage controller is supplied with 230 V ac voltage. If resistive load of 1 kW rating at 230 V rated voltage is connected to AC voltage controller calculate the firing angle if the load consume 50% power of its rated power at rated voltage.

6

- (b) Explain with waveform three phase half wave controlled rectifier with resistive load. 7
7. (a) Explain the operation of step down chopper with circuit diagram and waveform. 6
- (b) Draw and explain operation of two quadrant chopper. 7

**OR**

8. (a) Explain the operation of single Half bridge Inverter with wave form. (For resistive load) 6
- (b) Explain the operation of 3 phase bridge Inverter in  $180^\circ$  conduction mode. Draw output and line voltage waveforms. 7
9. (a) What is open delta system ? What are the applications of this system ? 7
- (b) A 500 kVA, 8 phase, 50 Hz transformer has a voltage ratio (line voltage) of 33/11/LV and is delta/star connected. The resistance per phase are : high voltage  $35\Omega$ , low voltage  $0.876\ \Omega$  and the iron losses is 3050 watt calculate the value of efficiency at full load and one half of full load (a) at unity p.f. (b) 0.8 pf. 7

**OR**

10. ✓ (a) Discuss various methods of speed control of 3 phase Induction motor. Explain any one method from stator side. 6

- (b) Describe with construction diagram the working of :
- (i) Star-Delta starter 8
  - (ii) Autotransformer starter. 8
11. (a) Explain working principle of operation of DC motor. 4
- (b) Write short notes on Ward-Leonard system of speed control. 5
- (c) Explain Flux control method of DC series motor. 4

**OR**

12. (a) A 240 V dc shunt motor takes 32 amp of line current. It the armature and field resistance are  $1.2 \Omega$  and  $240 \Omega$  respectively. If the load torque remains constant. Find the resistance inserted in series with the armature to halve the speed. 6
- (b) Explain with neat diagram construction and principle of operation of universal motor. State the application of universal motor. 7

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