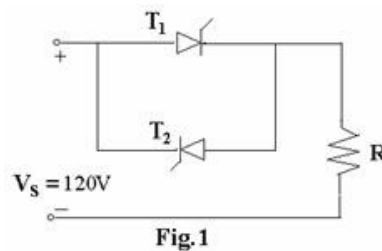


- j. A full converter operates in four quadrants
 (A) True (B) False

**Answer any FIVE Questions out of EIGHT Questions.
 Each question carries 16 marks.**

- Q.2** a. What is thyristor? Enumerate the various mechanisms by which thyristor can be triggered into conduction. What are the necessary conditions for turning on of an SCR? Discuss. (10)
- b. It is required to operate 250A SCR in parallel with 350A SCR with their respective on state voltage drops of 1.6V and 1.2V. Calculate the value of resistance to be inserted in series with each SCR so that they share the total load of 600A in proportion to their current ratings. (6)
- Q.3** a. Explain inverting mode of converters with suitable diagrams. (10)
- b. A 230V, 1kW resistance load is connected across a fully controlled single phase bridge converter. If the load is to be delivered a power of 800W, find
 (i) output voltage, (ii) firing angle and
 (iii) load current (rms value). (6)
- Q.4** a. Explain various steps to be carried out while designing chopper circuit. (7)
- b. A dc chopper has an input of 200V and average output voltage of 150V. Load resistance is 10Ω. Find
 (i) duty cycle,
 (ii) average and rms load currents and
 (iii) effective input resistance. (9)
- Q.5** a. What is meant by commutation of SCR? How are commutation methods classified? (8)
- b. What is unijunction transistor? Explain its configuration and characteristics. (8)
- Q.6** a. Draw circuit diagram and wave shapes of input voltage, output voltage and load current in a single phase full wave ac regulator feeding purely resistive load? (10)
- b. The single phase full wave controller shown in Fig.1 supplies a resistive load of $R=10\Omega$. The input rms voltage V_s is 120V, 60Hz. The delay angles of thyristors are equal: $\alpha_1 = \alpha_2 = \pi/2$. Determine
 (i) the rms output voltage,
 (ii) the input power factor
 (iii) the average current of thyristor (6)



- Q.7** a. Explain the principle of cycloconverter using simple diagram. (8)
- b. Explain circulating current mode of cycloconverter. (8)
- Q.8** a. Draw the diagram of a three phase bridge inverter circuit and explain its working. What are the two modes of operations? How these two modes are obtained? (10)

- b. A single phase full bridge inverter has purely resistive load and its voltage is controlled by multiple pulse width modulation technique. The width of each pulse is 30° and each half cycle has 5 pulses. If input voltage is 200V find (i) rms value of output voltage,
(ii) pulse width to maintain the output power constant if input voltage is increased by 10%,
(iii) maximum possible input voltage if maximum possible pulse width is 33° . **(6)**

- Q.9** a. Draw and explain block diagram for microprocessor based speed control of (i) dc motor and (ii) induction motor. **(8)**
- b. A 3-phase half controlled thyristor bridge with 400V, 3 phase 50 Hz supply is feeding a separately excited dc motor. The motor parameters are: rated current 50A, resistance 0.1Ω , back emf constant 0.3V/rpm .
(i) calculate no load speed if no load current is 5A and firing angle is 30° , (ii) also find firing angle to obtain a speed of 1600 rpm at rated current. **(8)**