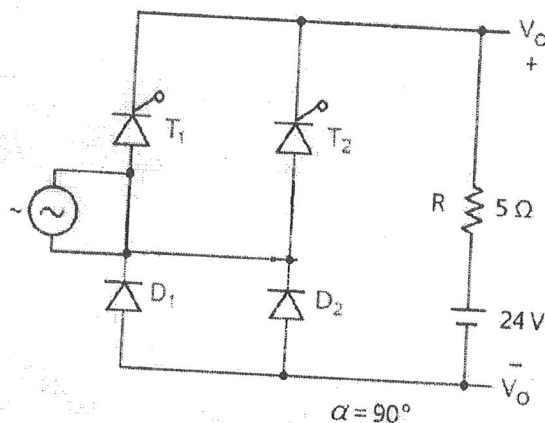


Exam.	Regular (New Course)		
Level	BE	Full Marks	60
Programme	BEL	Pass Marks	24
Year / Part	III / I	Time	3 hrs.

Subject: - Power Electronics (ENEE 302)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ All questions carry equal marks.
- ✓ Assume suitable data if necessary.

1. a) Explain the working of thyristor with the help of V-I curve and explain the meaning of latching current and holding current.
- b) The reverse recovery time of a diode is $3.9 \mu\text{s}$ and the rate of fall of the diode current decay is $50 \text{ A}/\mu\text{s}$. For a softness factor of 0.3, determine storage charge and peak reverse current.
2. a) With the help of suitable circuit diagram and waveforms, explain the operation of single phase full wave bridge rectifier with resistive load. Derive the expression for average value and rms value of the output voltage.
- b) The rectifier shown in the figure below is used to charge the battery. Find the conduction angle, average value of charging current, power supplied to the battery, power supplied by the source and efficiency of the system, where supply voltage is 48 V AC, firing angle $\alpha = 90^\circ$ and battery voltage = 24V.



3. a) Explain the operation of three phase single way controlled rectifier with purely resistive load. Derive the expression for average value of output voltage. Draw the waveforms of output voltage for firing angle = 60° and calculate average value of output voltage.
- b) Explain the operating principle of isolated bi-directional DC-DC converter. Also explain the application of this converter in EV vehicles.
4. a) Explain the operation of a three phase inverter in 180° conduction mode. Illustrate with a suitable circuit diagram and the related waveforms of phase and line voltage of output voltage.
- b) Explain the operation of single-phase AC voltage controller with R-L load.
5. a) Explain the operation of single-phase step down cycloconverter with necessary circuit diagram and waveform.
- b) A single-phase square wave inverter has a resistive load of 50Ω . The DC input voltage is $(72 \text{ V}) - 0 - (-72)$ with mid-point grounded. Find (i) rms value of output voltage (ii) Peak value of fundamental component of output voltage (iii) output power.