

SUBJECT : POWER ELECTRONICS

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Time: Three Hours

Full Marks: 100

Question No.	PART – I 50 Marks for each part	Marks
	Answer any THREE questions. Two marks are reserved for neat and well organized answer.	
1.(i)	Classify power diodes according to their reverse recovery time.	5
(ii)	Explain how steady state power loss of power diode is calculated from it's V-I characteristics. What is soft recovery (SRD) and hard recovery (HRD) diode ?	7 4
(iii)	What is Schottky diode?	
2.(i)	Sketch the structure of a power MOSFET and explain its working principle .	6
(ii)	State the important characteristics of power MOSFET .	4
(iii)	Explain why power BJT is operated in the Quasi-saturation region.	6
3.(i)	Sketch the circuit and explain the operation of a Boost type DC-DC converter feeding a resistive load using relevant waveforms and derive the expression of output voltage in terms of its input voltage.	8
(ii)	Why is Pulse Width Modulation (PWM) technique is preferred over Frequency Modulation (FM) technique to obtain variable duty cycle?	2
(iii)	A step up DC-DC chopper is fed from an input DC voltage of 100 volts. What is the required Duty cycle to obtain 15A load current at its output having a purely resistive load of 10 ohms ? If the switching frequency of the chopper is 250KHz, what is the OFF-time of the chopper?	6
4.(i)	Sketch the circuit and explain, using suitable waveforms, the operation of a Full-Bridge Inverter with fixed input DC voltage. What is the main disadvantage of this type of inverter specially in case of an inductive load?	10
(ii)	Explain how dv/dt and di/dt protection is achieved in an SCR?	6
5.	Write the short notes on any TWO of the followings:	8x2
(i)	SCR.	
(ii)	Buck type chopper.	
(iii)	Desirable properties of an ON-OFF type controller for controlling electrical power flow.	

**BACHELOR OF ENGINEERING IN
ELECTRICAL ENGINEERING (EVENING) EXAMINATION, 2018**

(4th Year, 1st Semester)

POWER ELECTRONICS

Time: Three Hours

Full Marks: 100

(50 marks for each part)

Use a separate Answer-script for each Part

PART-II

Answer *any three* questions

Two marks are reserved for neatness and well organized answer script

1. a) Explain the operation of a three phase half wave rectifier circuit with a schematic. 8
 - b) A three phase half wave rectifier operates from a line voltage supply of 400V, 50 Hz. A resistive load of 10Ω is connected at the output of the rectifier. Calculate the average and RMS current through the load. 8
2. a) Explain the operation of a single phase half wave converter feeding a RL load. Give necessary circuit diagram and waveforms. Also explain the operation of above converter in the presence of a freewheeling diode across the load. 12
 - b) Draw the output voltage and current waveform of single phase half-wave diode rectifier circuit with inductive load L. 4
3. a) Explain the operation of a Single Phase Full Wave Bridge Converters with R-L Load. Draw the output voltage and current waveforms. 6
 - b) A single phase transformer with secondary voltage of 230 V, 50 Hz, delivers power to load of 10Ω through a half controlled rectifier circuit. For a firing angle of 60 degree, determine rectification efficiency, form factor, voltage ripple factor, transformer utilization factor and PIV of thyristor. 10
4. Explain the operation of a three phase full wave rectifier circuit with resistive load R and obtain the following:
Average output voltage, RMS output voltage, form factor, voltage ripple factor, transformer utilization factor and PIV. 16
5. Write short notes on the following 8×2
 - a) Three phase full-wave converter
 - b) Single phase, mid-point type step down cycloconverter

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