

**Ref No.Ex/EE/5 /T/413/2017(S)**  
**B.E.E (EVENING) 4<sup>TH</sup> YEAR 1<sup>ST</sup> SEMESTER SUPPLE EXAM.2017**

**SUBJECT : POWER ELECTRONICS**

Time: Three Hours

Full Marks: 100

Question No.	PART – I 50 Marks for each part	Marks
	<b>Answer any THREE questions. Two marks are reserved for neat and well organized answer.</b>	
1.(i)	With the help of two-transistor model, show how regenerative action takes place in an SCR .	7
(ii)	What are the advantages and disadvantages of SCR over other power electronic devices ?	3
(iii)	Explain how SCR is protected from high $dV/dt$ and high $di/dt$ .	6
2(i)	Sketch the structure of a power MOSFET and explain its working principle .	6
(ii)	State the important characteristics of a power MOSFET.	4
(iii)	How steady state power loss of a power diode is calculated from its V-I characteristics and equivalent circuit.	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 down DC-DC chopper is fed from an input DC voltage of 160 volts. What is the required Duty cycle to obtain 12A load current at its output having a purely resistive load of 5 ohms ? If the switching frequency of the chopper is 150KHz, what is the OFF-time of the chopper?	6
4.(i)	Sketch the circuit and explain, using suitable waveforms, the operation of a Push- Pull 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)	What are the advantages and disadvantages of Linear Power Supply?	6
5.	Write the short notes on any TWO of the followings:	8x2
i)	IGBT.	
(ii)	Full Bridge Inverter.	
(iii)	Power losses in a semiconductor devices.	

**BACHELOR OF ENGINEERING IN  
ELECTRICAL ENGINEERING (EVENING) EXAMINATION, 2017**

(4th Year, 1st Semester, Supplementary)

**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 resistive load R and obtain the following:  
Average output voltage, RMS output voltage, form factor, voltage ripple factor, transformer utilization factor and PIV. 14
- b) Why are three phase rectifiers preferred over single - phase rectifiers ? 2
  
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 principle of operation of a single phase, mid-point type cycloconverter. Give circuit diagram and input-output waveforms. 8
- b) Briefly explain the operation of three phase full wave converter with resistive load with necessary circuit diagrams and operation. 8
  
4. a) Explain the operation of single phase full - wave bridge converter feeding a RLE load. Give necessary circuit diagram and waveforms. Also find out the average and RMS output voltage across the load. 10
- b) A single phase half-wave converter is operated from a 230 V, 50 Hz source with load resistance is  $R=12\Omega$ . For a firing angle of  $30^\circ$ , determine the rectification efficiency, form factor and transformer utilization factor. 6

5. Write short notes on the following

8×2

a) Three phase half-wave converter

b) Single phase semi converter with RLE load  
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