

University of Mumbai
Examination First Half 2022

Examinations Commencing from 17th May 2022 to 30th May 2022

Program: Electrical

Curriculum Scheme: Rev 2019

Examination: SE Semester IV

Course Code: EEC404 Paper code: 40624 Course Name: Power Electronics Devices & Circuits

Time: 2 hour 30 minutes

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1	The average output voltage of converter circuit, with increase in firing angle
Option A:	increases
Option B:	decreases
Option C:	remains constant
Option D:	becomes zero
2	Comparing triac and SCR
Option A:	Both are unidirectional device
Option B:	Triac require more current to turn on at particular voltage
Option C:	Both are bi directional device
Option D:	Triac requires less time to turn off
3.	Constant ripple free output current can be achieved in
Option A:	converters with R load
Option B:	Converters with RL load
Option C:	Inverters with R load
Option D:	Inverters with RL load
4	What is the duty cycle of a chopper ?
Option A:	Ton/Toff
Option B:	Ton/T
Option C:	T/Toñ
Option D:	Toff x Ton
5.	A four quadrant operation requires
Option A:	Two full converters in series
Option B:	Two full converters connected back to back
Option C:	Two full converters connected in parallel
Option D:	Two semiconverters connected back to back
6.	In a VSI (Voltage source inverter)
Option A:	the internal impedance of the DC source is negligible
Option B:	the internal impedance of the DC source is very very high
Option C:	the internal impedance of the AC source is negligible
Option D:	the IGBTs are fired at 0 degrees.
7.	To turn OFF an SCR, the anode current must be brought below -----

	current and a reverse voltage must be applied for a time larger than ----- - time of the device.
Option A:	holding, turn off
Option B:	holding, turn on
Option C:	latching, turn off
Option D:	latching, turn on
8	di/dt protection is provided to the SCR by
Option A:	connecting an inductor in parallel with SCR
Option B:	connecting an inductor in series with SCR
Option C:	connecting a capacitor in series with SCR
Option D:	connecting a capacitor in parallel with SCR
9	What is the formula for output voltage for Buck converter?
Option A:	$8D \times V_{in}$
Option B:	$5D \times V_{in}$
Option C:	$3D \times V_{in}$
Option D:	$D \times V_{in}$
10	Choose the wrong statement for an LED driver circuit.
Option A:	Regulates the current flowing through LED
Option B:	LED light output is proportional to its current
Option C:	Has an inbuilt rectifier if input is AC
Option D:	Decreases the lamp life of the LED

Q2. (20 Marks)	Solve any Four out of Six	5 marks each
A	Write a short note on protection of SCR.	
B	Discuss Sinusoidal Pulse Width Modulation technique	
C	A boost regulator has input voltage of 5volts. The average output voltage is 15volts. Load current is constant and equal to 0.5 Amp. The switching frequency is 25kHz. If L is 150 μ H and C= 220 μ F, find out:- Duty cycle and ΔI_L	
D	What is a bootstrap driver circuit? Why it is needed?	
E	What do you mean by two transistor analogy of SCR? Derive relation and condition of anode current.	
F	Compare power MOSFET & IGBT (any five points).	

Q3. (20 Marks)	Solve any Two Questions out of Three	10 marks each
A	Explain gate triggering techniques for SCR.	
B	Explain Buck-boost regulator with circuit diagram and derive the relation for output voltage.	
C	Describe the working of dual converter with circuit diagram and waveforms	

Q4 (20 Marks)	Solve any Two Questions out of Three	10 marks each
A	Explain the working of single phase full bridge converter with R-L load with circuit diagram and draw the supply and load voltage waveform for firing angle 90° .	
B	Describe the working of three phase bridge Inverter for 180° conduction mode and draw the gating signals and phase voltages.	
C	What is forced commutation? Explain any two commutation techniques with circuit diagram.	