

University of Mumbai

Examination 2020

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: Electronics Engineering

Curriculum Scheme: Rev 2016

Examination: BE Semester VII

Course Code: ELX702

Time: 2 hour

Course Name: Power Electronics

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	The DIAC can be represented by
Option A:	two SCRs in anti-parallel
Option B:	two SCRs in parallel
Option C:	two diodes in anti-parallel
Option D:	two diodes in parallel
2.	The TRIAC can be represented by
Option A:	two SCRs in anti-parallel
Option B:	two SCRs in parallel
Option C:	two diodes in anti-parallel
Option D:	two diodes in parallel
3.	The TRIAC's terminals are
Option A:	gate, anode, cathode
Option B:	MT1, MT2, gate
Option C:	gate1, gate2, anode, cathode
Option D:	MT1, MT2, gate1, gate2
4.	A power transistor is a
Option A:	three layer, three junction device
Option B:	three layer, two junction device
Option C:	two layer, one junction device
Option D:	four layer, three junction device
5.	Choose the correct statement
Option A:	MOSFET is a uncontrolled device
Option B:	MOSFET is a voltage controlled device
Option C:	MOSFET is a current controlled device
Option D:	MOSFET is a temperature controlled device
6.	A thyristor (SCR) is a
Option A:	P-N-P device
Option B:	N-P-N device
Option C:	P-N-P-N device

Option D:	P-N device
7.	In the SCR structure the gate terminal is located
Option A:	near the anode terminal
Option B:	near the cathode terminal
Option C:	in between the anode & cathode terminal
Option D:	none of the mentioned
8.	A thyristor can be brought from the forward conduction mode to forward blocking mode by
Option A:	the dv/dt triggering method
Option B:	applying a negative gate signal
Option C:	applying a positive gate signal
Option D:	applying a reverse voltage across anode-cathode terminals
9.	For the SCR to remain in the ON (conducting) state
Option A:	gate signal is continuously required
Option B:	no continuous gate signal is required
Option C:	no forward anode-cathode voltage is required
Option D:	negative gate signal is continuously required
10.	The average output voltage of single phase half-wave is maximum when SCR is triggered at $\omega t =$
Option A:	π
Option B:	0
Option C:	$\pi/2$
Option D:	$\pi/4$
11.	For a single phase half-wave, thyristor circuit with R load, the input power factor is given by
Option A:	rms source voltage/total rms line current
Option B:	rms input power/power delivered to the load
Option C:	$\cos \alpha$
Option D:	power delivered to load/input VA
12.	In a semi-converter with RLE load during the freewheeling period, the energy is
Option A:	fed back to the source
Option B:	fed to the inductor(L) and absorbed by E
Option C:	absorbed by the L & E and dissipated at R
Option D:	fed to the L & E and dissipated at R
13.	A single-phase semi-converter is connected to a 230 V source and is feeding a load $R = 10 \Omega$ in series with a large inductance that makes the load current ripple free. Find the average output current for $\alpha = 45^\circ$.
Option A:	14 A
Option B:	17 A
Option C:	10 A
Option D:	0 A
14.	Inverters converts

Option A:	dc power to dc power
Option B:	dc power to ac power
Option C:	ac power to ac power
Option D:	ac power to dc power
15.	_____ based inverters do not require self-commutation.
Option A:	IGBT
Option B:	GTO
Option C:	PMOSFET
Option D:	SCR
16.	The output current wave of a single-phase full bridge inverter on RL load is
Option A:	a sine wave
Option B:	a square wave
Option C:	a triangular wave
Option D:	constant dc
17.	Several equidistant pulses per half cycle are used in _____ type of modulation technique.
Option A:	single-pulse
Option B:	multiple-pulse
Option C:	sine-pulse
Option D:	equidistant-pulse
18.	A chopper may be thought as a
Option A:	Inverter with DC input
Option B:	Diode rectifier
Option C:	DC equivalent of an AC transformer
Option D:	DC equivalent of an induction motor
19.	The load voltage of a chopper can be controlled by varying the
Option A:	duty cycle
Option B:	firing angle
Option C:	reactor position
Option D:	extinction angle
20.	Find the expression for output voltage for a step-up chopper, assume linear variation of load current and α as the duty cycle.
Option A:	V_s
Option B:	V_s/α
Option C:	$V_s/(1-\alpha)$
Option D:	$V_s/\sqrt{2}$

Q2	Solve any Four out of Six	5 marks each
A	Describe different modes of operation of SCR with the help its static V-I characteristics and explain what is holding current and latching current.	
B	Explain single phase full-bridge inverter with R load.	
C	Explain with the help of neat circuit diagram and waveforms what the effect of freewheeling diode is on the performance of single phase half wave controlled rectifier with RL load.	
D	What are turn on methods of SCR? What are the basic requirements for successful turn on of SCR? Which is the best method of SCR triggering explain why?	
E	Describe the principle of on-off control and phase control.	
F	Write a short note on Single phase cyclo-converter	

Q3.	Solve any Two Questions out of Three	10 marks each
A	Draw the schematic of step-up and step-down choppers and derive an expression for output voltage in terms of duty cycle for a step-up and stepdown chopper.	
B	Discuss the effect of source inductance on the performance of single phase fully controlled converter, indicating clearly the conduction of various thyristors during one cycle.	
C	Draw and explain the basic series inverter circuit employing class A type commutation. Draw and discuss the important waveforms. State the limitations of this series inverter.	