Reg. No.															

B.Tech. DEGREE EXAMINATION, NOVEMBER 2023

Sixth Semester

18EIC305T – POWER ELECTRONICS AND DRIVES

(For the candidates admitted from the academic year 2020-2021 to 2021-2022)

Note:

(i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

(ii) **Part - B & Part - C** should be answered in answer booklet.

Time: 3 hours | Max. Marks: 100

	Marks	BL	CO	PO

PART – A (20 × 1 = 20 Marks)

Answer **ALL** Questions

1. Identify the reverse recovery time for general purpose diode (A) 20 μs (B) 25 μs (C) 30 μs (D) 5 μs	1	1	1	1
2. MOSFET is said to be _____switch. (A) Uncontrolled (B) Semi controlled (C) Fully controlled (D) Semi uncontrolled	1	1	1	1
3. Thyristor is considered to be semi controlled switch because (A) It can be turned off but not on with a gate pulse (B) It conducts only during one-half cycle of an alternating current wave (C) It can be turned on but not off with a gate pulse (D) It can be turned on only during one half cycle of an alternating voltage wave	1	1	1	1
4. The controlling parameter in IGBT is the (A) I_G (B) V_{GE} (C) I_C (D) V_{CE}	1	1	1	1
5. Identify the other name of class A commutation (A) Self commutation (B) Resonant commutation (C) Natural commutation (D) Impulse commutation	1	1	2	2
6. The thyristor turn-off requires that the anode current (A) Falls below the holding current (B) Falls below the latching current (C) Rises above the holding current (D) Rises above the latching current	1	1	2	2
7. Triggering the circuit is called as (A) Turn-off method (B) Turn-on method (C) Commutation circuits (D) Natural commutation circuit	1	1	2	2

8. The pulse gating is not suitable of 1 1 2 2
   (A) R loads
   (B) RC loads
   (C) RL loads
   (D) It is suitable of every type of load

9. AC-DC conversion is called as _____ 1 1 3 1
   (A) Chopper
   (B) Inverter
   (C) Rectifier
   (D) Cyclo converter

10. The frequency of ripple in the output voltage of a three phase controlled bridge rectifier depends on 1 1 3 1
   (A) Firing angle
   (B) Load inductance
   (C) Load resistance
   (D) Supply frequency

11. A dual converters has 1 1 3 2
   (A) Two full converters in series
   (B) Two half converters in series
   (C) Two full converter in anti-parallel
   (D) Two half converters in anti-parallel

12. Cyclo converters concerts _____ 1 1 3 2
   (A) DC-DC
   (B) DC-AC
   (C) AC-AC
   (D) AC-DC

13. In DC choppers, the waveforms for input and output voltages are represented as 1 1 4 1
   (A) Discontinuous, continuous
   (B) Both continuous
   (C) Both discontinuous
   (D) Continuous, discontinuous

14. A step-up chopper has V_s as the source voltage and α as the duty cycle. express the output voltage for this chopper is given by 1 1 4 1
   (A) $V_s(1+\alpha)$
   (B) $V_s/(1-\alpha)$
   (C) $V_s(1-\alpha)$
   (D) $V_s/(1+\alpha)$

15. VSI will have better performance if its 1 1 4 2
   (A) Load inductance is small and source inductance is large
   (B) Both load inductance and source inductance are small
   (C) Both load inductance and source inductance are large
   (D) Load inductance is large and source inductance is small

16. In case of the 120° mode of operation, _____devices conduct at a time. 1 1 4 2
   (A) 2
   (B) 3
   (C) 4
   (D) 6

17. SMPS are based on the _____principle. 1 1 5 3
   (A) Phase control
   (B) Integral control
   (C) Chopper
   (D) MOSFET

18. Static UPS requires _____ 1 1 5 3
   (A) Only rectifier
   (B) Only inverter
   (C) Both inverter and rectifier
   (D) None of the mentioned

19.	An offline UPS requires _____ (A) Resistor (B) Capacitor (C) Battery (D) Inductor	1	1	5	3
20.	_____component makes an online UPS different from offline UPS (A) Charge controller (B) Battery (C) Static switch (D) AC/DC converter	1	1	5	3

PART – B (5 × 4 = 20 Marks)

Answer **ANY FIVE** Questions

		Marks	BL	CO	PO
21.	Summarize MOSFET and BJT switch.	4	2	1	1
22.	Define the term commutation and list its classification.	4	1	2	2
23.	Define controlled rectifier with its classification.	4	1	3	2
24.	Summarize the operation of PWM inverter.	4	2	4	2
25.	Show the block diagram for open loop and close loop control of drives.	4	1	5	3
26.	Describe the snubber circuit with its diagram.	4	2	1	1
27.	Define sinusoidal pulse modulation with its waveform.	4	1	4	1

PART – C (5 × 12 = 60 Marks)

Answer **ALL** Questions

		Marks	BL	CO	PO
28. a.	Explain different modes of thyristor operation with its V-I characteristics and derive its two-transistors analogy.	12	2	1	1
	(OR)				
b.	Discuss any one fully controlled switch with the operation and its switching characteristics.	12	2	1	1
29. a.	Demonstrate the class C commutation with its circuits and waveform.	12	3	2	2
	(OR)				
b.	Examine the class D commutation with its circuits and waveform.	12	3	2	2
30. a.	Illustrate the operation of single phase fully controlled RL load with its waveform.	12	4	3	1
	(OR)				
b.	Analyze the operation of single-phase step up and step down cyclo converter for RL load with the waveform.	12	4	3	2
31. a.	Examine the 180 degree mode VSI circuit with its necessary circuits and the waveform.	12	3	4	1
	(OR)				
b.	Illustrate the boost converter circuit and derive the output voltage.	12	3	4	2

32. a. Analyze the operation of battery-operated vehicle and the design of charging and discharging of battery. 12 4 5 3

(OR)

b. Illustrate the uninterruptible power supply with its different mode of operation. 12 4 5 3

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