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KAMALA INSTITUTE OF TECHNOLOGY & SCIENCE, SINGAPUR

23EE28PC501

III.B. Tech. I. Semester Regular Examinations, November- 2025

POWER ELECTRONICS

(EEE)

Time: 3 Hours

Max. Marks: 60

Note: Question paper consists of Part-A & Part-B.

i) **Part-A** for 10M, ii) **Part-B** for 50marks

- Part A** is compulsory, consists of 10 sub questions from all units carrying equal marks.
- Part-B** consists of **10 questions** (numbered from 2 to 11) carrying **10marks** each. From each unit there are 2 questions and the students should answer one of them. Hence the student should answer **5 questions** from **Part-B**.

PART-A				(10Marks)	
Q. No	Questions	Marks	BTL		
1.a)	List out the operating regions of a power BJT?	1	1		
1.b)	Define latching current and holding current of an SCR	1	1		
1.c)	Define extinction angle in converter operation.	1	1		
1.d)	What is the function of a firing angle in a converter circuit?	1	1		
1.e)	Mention the advantages of using SMPS over linear power supplies?	1	1		
1.f)	Give the function of the freewheeling diode in a buck converter?	1	1		
1.g)	What causes harmonic distortion in inverter output?	1	1		
1.h)	Define performance parameters of inverters.	1	1		
1.i)	What type of load is commonly used for testing AC voltage controllers?	1	1		
1.j)	State the principle of operation of a single-phase AC voltage controller.	1	1		
PART-B				(50Marks)	

Q.No.	Questions	Marks	BTL
2. a)	Examine the various methods of SCR commutation with neat circuit diagrams	7M	3
b)	Discuss the applications of power electronics in industrial and renewable energy systems.	3M	2
OR			
3. a)	Explain the working principle of a Power MOSFET and also draw its characteristics.	5M	2
b)	Illustrate the turn-on and turn-off characteristics of SCR with relevant waveforms.	5M	2
OR			
4. a)	Explain operation of a single-phase fully controlled converter with RL load.	6M	2
b)	A 3 phase, three pulse converter is operated from a 3 phase star connected 208V, 60Hz supply and the load resistance is equal to 10ohm. If it is required to obtain an average output of 50% of maximum possible output voltage, calculate i. Delay angle α ii. the average output current and iii. Input power factor	4M	4
OR			
5. a)	Explain the circuit diagram and operation of a three-phase fully controlled converter with RLE load.	5M	2
b)	Discuss the effect of load and source inductance on the shape and phase of converter output current and voltage waveforms.	5M	2
OR			
6. a)	Derive the expressions for average inductor voltage and average capacitor current in a steady-state DC–DC converter.	7M	4
b)	State the difference between continuous conduction mode (CCM) and discontinuous conduction mode (DCM).	3M	2
OR			

7. a)	Enumerate the energy conversion process in a buck–boost converter in detail.	7M	3
b)	Explain the principle and operation of a Switched-Mode Power Supply.	3M	2
8. a)	Illustrate the Multiple Pulse Width Modulation technique. Describe the method of generating gating pulses.	5M	2
b)	Discuss the different voltage control techniques used in single-phase inverters.	5M	2
OR			
9. a)	Explain the working of a three-phase bridge inverter operating in 180° conduction mode.	7M	3
b)	Discuss the Sinusoidal Pulse Width Modulation technique for inverter voltage control.	3M	2
10.a)	Describe the working of a mid-point type single-phase cycloconverter with neat diagram and waveforms.	5M	2
b)	Explain the principle of operation of a single-phase AC voltage controller with resistive R load.	5M	2
OR			
11.a)	Explain the principle of phase control in AC voltage regulators. Discuss how output voltage is controlled by varying the firing angle.	6M	2
b)	Discuss the applications of cycloconverters in industrial drives	4M	2

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