QP Code: RD21BTECH259 | Reg. No | | | | | | | | | | | AY 21

GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Fifth Semester Regular) Examinations, December – 2023

21BELPC35001 – Power Electronics

(EE & EEE)

Time: 3 hrs | Maximum: 70 Marks

Answer all questions

(The figures in the right hand margin indicate marks)

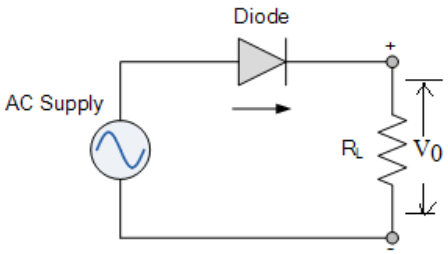
PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. Power MOSFET is a voltage-controlled device. Why?	CO1	K3
b. What losses occur in a thyristor during working conditions?	CO1	K2
c. Find the average value of output current for a 1-phase HW diode rectifier with R load, having RMS output current = 100A.	CO3	K3
d. Can you provide examples of how a DC chopper can be used in motor speed control applications?	CO4	K4
e. A step up chopper has input voltage 110 V and output voltage 150 V. The value of duty cycle is ?	CO5	K3

PART – B **(15 x 4 = 60 Marks)**

Answer ***ALL*** questions	Marks	CO #	Blooms Level
2. a. A single phase 230V, 1Kw heater is connected across 1 phase 230V, 50Hz supply through an SCR. For firing angle delay of 450 and 900, Calculate the power absorbed in the heater element.	7	CO1	K3
b. Explain the constructions and switches charactertics of power MOSFETs.	8	CO1	K2
(OR)			
c. Illustrate the working of cosine firing circuit with neat block diagram.	7	CO2	K3
d. Calculate the required parameters for snubber circuit to provide dv/dt protection to SCR used in single phase bridge converter. The SCR has maximum dv/dt capability of 60V/µsec. The input line-line voltage has a peak value of 425 volts and the source inductance is 0.2mH.	8	CO2	K3
3.a. Explain the operation of full wave-wave uncontrolled rectifier supplying R-load with neat waveforms. Derive an expression for the average output voltage.	7	CO3	K3
b. For the shown half-wave rectifier, the source is a sinusoid of 120V rms at a frequency of 60 Hz. The load resistor is 5 Ω. Determine (a) the average load	8	CO3	K3

current, (b) the dc and ac power absorbed by the load and (c) the power factor of the circuit.



(OR)

c.	Discuss the operation of single-phase half-wave diode rectifier with RL-load. Derive the average output voltage equation.	7	CO3	K2
d.	Explain the operation of 3-phase diode bridge rectifier with resistive load. Draw the output voltage and current waveforms.	8	CO3	K2
4.a.	A step-down dc chopper has input voltage of 230v with 10-ohm load, voltage drop across chopper is 2v, when it is on. For a duty cycle of 0. Calculate (i) average and rms value of output voltage (ii) power delivered to the load	7	CO4	K3
b.	Is there any difference between the term's "boost" and "buck" converter?	8	CO4	K3

(OR)

c.	Discuss the operation of single-phase full wave rectifier with DC Motor-load. Derive the average and RMS output voltage equation.	7	CO4	K3
d.	Discuss the principle of operation of DC-DC step down chopper with suitable waveforms. Derive the expression for its average dc voltage.	8	CO4	3
5.a.	The single-phase full bridge inverter has resistive load of R=4 ohm and dc Input voltage is 48v. Determine rms output voltage at the fundamental Frequency, output power.	7	CO5	K4
b.	Write the principle of operation of Cyclo-converter connected to R-Load.	8	CO6	K3

(OR)

c.	How does a UPS (Uninterruptible Power Supply) work?	7	CO6	K3
d.	The single-phase half bridge inverter has resistive load of R=10 ohm and dc input voltage is 220v. Determine rms output voltage, average value, RMS current and output power.	8	CO5	K4

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