PAPER ID-410428

Subject Code: KEE603

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM VI) THEORY EXAMINATION 2023-24
POWER ELECTRONICS

TIME: 3 HRS **M.MARKS: 100**

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief.

Q no.	Question	Marks	CO
a.	Explain the terms latching and holding current in SCR.	2	CO1
b.	What are the applications of various power Electronics Devices?	2	CO1
c.	What are the different methods for turning on a SCR?	2	CO2
d.	What are di/dt and dv/dt ratings of SCRs?	2	CO2
e.	Give expression of the average voltage of single-phase semi-converters.	2	CO3
f.	Explain the effect of source inductance on the operation of a 1-phase full converter.	2	CO3
g.	Discuss the applications of AC voltage controllers.	2	CO4
h.	List any two merits & two demerits of a cycloconverter.	2	CO4
i.	Explain the function of feedback diodes used in antiparallel with transistors in inverters.	2	CO5
j.	What is meant by PWM control in inverters?	2	CO5

SECTION B

2. Attempt any *three* of the following:

a.	Draw the static characteristics of the power diode. Also, explain the reverse recovery characteristics of the power diode.	10	CO1
b.	Explain the working of the Buck-Boost converter with the help of neat diagrams.	10	CO2
c.	Explain the working of a single-phase half-wave controlled converter with RL load. Draw the output voltage & output current waveforms and derive an expression for the average output voltage.	10	CO3
d.	A single-phase voltage controller has an input of 230 V and a load of 10 Ω resistive. For 4 cycles on and 3 cycles off, determine the (a) RMS output voltage (b) input power factor and (c) average and RMS thyristor currents.	10	CO4
e.	Explain the operation of a 1-phase current source inverter. Also, describe the merits & demerits of this inverter.	10	CO5

SECTION C

3. Attempt any *one* part of the following:

a.	Explain in detail the switching characteristics of BJT with relevant waveforms.	10	CO1
b.	Explain the construction, working and V-I characteristics of SCR with suitable diagrams. Also, explain its advantages and applications.	10	CO1

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4. Attempt any *one* part of the following:

a.	Explain the working of the step-down chopper with the help of neat diagrams.	10	CO2
b.	A step-up chopper is used to feed a load at 400 V DC from a 250 V DC source. The inductor current is continuous. If the off time of the switch is 20 μs, then find the switching frequency of the chopper in kHz.	10	CO2

5. Attempt any *one* part of the following:

a.	Draw the waveforms for the Three-Phase half-wave (M-3) converter with R-load for firing angle **(α) < 30°.** Also, derive an expression for the average output voltage.	10	CO3
b.	Explain the Dual converter and derive the expression for the circulating current of a single-phase dual converter in the circulating current mode. Also, comments on how a circulating current-mode type dual converter is better than a non-circulating type?	10	CO3

6. Attempt any *one* part of the following:

a.	Explain the principle of on-off control in single phase full wave AC voltage controller with R load. Also, derive the expression for the RMS value of load voltage for an AC voltage controller with on-off control.	10	CO4
b.	With the help of a circuit diagram and relevant waveforms explain the operation of a mid-point type step-up cycloconverter.	10	CO4

7. Attempt any *one* part of the following:

a.	With the help of a neat circuit diagram and associated waveforms, explain the operation of a single-phase full-bridge voltage source inverter for resistive load.	10	CO5
b.	Explain the operation of the 3-phase inverter in 180^0 mode with the resistive star-connected load.	10	CO5