



**NAVVRACHANA
UNIVERSITY**

a UGC recognized University

School: School of Engineering and Technology
Program/s: B.Tech- Electrical Engineering
Year: 3rd **Semester:** 5th
Examination: End Semester Examination
Examination year: December - 2021

Course Code: EE301 **Course Name:** Power Electronics and Drives-I

Date: 01/12/2021

Time: 11:30am to 01:30pm

Total Marks: 40

Total Pages: 01

Instructions:

- Write each answer on a new page.
- Use of a calculator is permitted/not permitted.
- * COs=Course Outcome mapping. # BTL=Bloom's Taxonomy Level mapping

Q. No.	Details	Marks	COs*	BTL#
Q.1	Write the names of different power electronics devices with symbols, ratings, and maximum operating frequencies. Explain the types of power electronic converter with its applications.	8	CO1	BT1, BT2
Q.2	Describe three phase half-wave SCR converter using R load with circuit diagram and relevant waveforms of source voltage, output voltage, gate pulses for all thyristors for $\alpha=30^\circ$ and also derive expressions for the average output voltage for firing angle of $\alpha < 30^\circ$. OR Describe the working of a single-phase full converter in rectifier mode with RLE load. Discuss how one pair of SCRs is commutated by an incoming pair of SCRs. Illustrate your answer with waveforms for source voltage, E, output voltage and current, source current, current through and voltage across one thyristor. Assume continuous conduction.	8	CO2	BT1, BT2, BT4, BT5
Q.3	A step-up/step-down chopper has input dc voltage of 220V and output voltage of 660V. If the conduction time of thyristor chopper is $120\mu\text{s}$, compute the pulse width of load voltage. In case pulse width of load voltage is increased to three times its previous width, for constant frequency operation, calculate the new value of average output voltage.	8	CO3	BT2, BT5
Q.4	What is meant by step-up chopper? Explain its operation. Sketch the input voltage, output voltage, input current and output current waveforms. State the various assumptions made. How can a step-up chopper be used for regenerative braking of dc motors? Discuss. OR Explain different control strategies of chopper? Explain the use of this for controlling the output voltage in choppers. How does it differ from each other? Which of these control strategies is preferred over the other and why?	8	CO3	BT1, BT2, BT4, BT5
Q.5	Give two methods of speed control normally employed for dc motors. Hence, sketch the characteristics of separately excited dc motor based on these two methods. Indicate clearly constant-torque drive and constant-power drive regions.	8	CO4	BT3, BT4, BT6

*****End of Question Paper*****