



NAVRACHANA UNIVERSITY

School: School of Engineering and Technology
Program: B.Tech. - Electrical & Electronics Engineering
Year: 3rd **Semester:** 6th
Examination: End Semester Examination
Examination year: May - 2023

Course Code: EE311 **Course Name:** Power Electronics and Drives - II
Date: 18/05/2023
Time: 2pm to 4pm

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	A single-phase voltage controller has an input voltage of 230V, 50Hz and load of $R=15\Omega$. For 6 cycles on and 4 cycles off, determine (a) rms output voltage, (b) input pf and (c) average and rms thyristor currents.	4	CO3	BT1, BT2, BT5
Q.2	A single-phase voltage controller, with two thyristors arranged in anti-parallel, is connected to R load. Draw waveforms of source voltage, gate signals, load and source current, output voltage across both the thyristors, when firing angle is 60 degrees. Hence derive an expression for the rms and average value of output voltage.	6	CO3	BT1, BT2, BT5
Q.3	Describe the working of a single-phase half bridge inverter. What is its main drawback? Explain how this drawback will be overcome.	6	CO1, CO2	BT1, BT2, BT5
Q.4	A single-phase full-bridge inverter may be connected to a load consisting of (a) R (b) RL or RLC over damped (c) RLC under damped. For All these loads, draw the load voltage and load current waveforms under steady operating conditions. Discuss the nature of these waveforms. Also indicate the conduction of various elements of the inverter circuit. Is it possible for this inverter to have load commutation? Explain.	6	CO1, CO2	BT1, BT2, BT5
Q.5	Discuss the principle of working a three-phase bridge inverter with an appropriate circuit diagram. Draw phase and line voltage waveforms on the assumption that each thyristor conducts 120° and the resistive load is star connected. The sequence of firing of various SCRs should also be indicated in the diagram. Derive its Line and Phase Rms Output voltages.	6	CO1, CO2	BT1, BT2, BT5
Q.6	Enumerates the various methods of speed control of a 3-phase induction motor when fed through semiconductor devices. Explain Static Rotor Resistance control for a 3-phase induction motor for its speed control.	6	CO4	BT1, BT2, BT3, BT5
Q.7	Explain Variable Voltage Variable Frequency drive control for a 3-phase induction motor for its speed control. Draw its Speed-Torque characteristics.	6	CO4	BT1, BT2, BT3, BT5

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