R20 Regulation *Subject code:3P5BA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech V Semester Supplementary Examinations, June/July 2023

POWER ELECTRONICS

(Electrical and Electronics Engineering)

Maximum Marks: 70 Date:23.06.2023 Duration: 3 hours

Part-A

All the following questions carry equal marks **(10x2M=20 Marks)**

1 List any two advantages of IGBT.
2 IGBT is a voltage-controlled device. Why?
3 What is meant by distortion factor?
4 Define Commutation.
5 What is the duty cycle in ON-OFF control method?
6 What is meant by DC chopper?
7 What is a series inverter?
8 Define space vector modulation.
9 Compare CSI and VSI.
10 What are the applications of a CSI?

Part-B

Answer All the following questions. **(10MX 5=50Marks)**

11 Explain the steady state and switching characteristics of MOSFET. (10 Marks)

OR

12 Describe with circuit IGBT static I-V, transfer and turn –on and turn–off characteristics. (10 Marks)

13 A. What is the importance of snubber circuits in respect of Thyristors? (2 Marks)
B. Explain the operation of Single-Phase half-controlled bridge rectifier with R-Load with neat Sketch. (8 Marks)

OR

14 A. List the applications of Phase Controlled Rectifier. (3 Marks)
B. A three phase half wave thyristor rectifier delivers constant load current of 20A over the firing angle range of 0° to 60°. At these two firing angles, compute the power delivered to load for an AC input voltage of 300V from a delta star transformer? (7 Marks)

15 Describe the operation of single-phase full wave AC voltage controller with the help of voltage and current waveform. Also derive the expression for average value of output voltage. (10 Marks)

OR

16 Describe the working principle of boost converter with necessary circuit and waveforms. (10 Marks)

17 A. Differentiate the Current Source and Voltage Source Inverter. (5 Marks)
B. List the advantages, disadvantages, and applications of voltage source inverter. (5 Marks)

OR

18 Discuss the types of harmonic control for single phase inverter. (10 Marks)

19 Explain the principle of operation of 3-phase auto sequentially commutated CSI with power circuit. Draw the equivalent circuits and relevant waveforms. (10 Marks)

OR

20 Explain the principle of operation of 3 phase voltage source inverter with 180°conduction mode with necessary waveforms and circuits. Also obtain the expression for line to line voltage. (10 Marks)