R20 Regulation *Subject code: 3P5BA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, April 2026

POWER ELECTRONICS

(EEE)

Maximum Marks: 70 Date: 15.04.2026 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X2M=20 Marks)		Marks	CO	BTL
1	What are the different methods to turn on the thyristor?	2M	1	L1
2	IGBT is a voltage controlled device. why?	2M	1	L1
3	List the applications of controlled rectifier.	2M	2	L1
4	Define delay angle.	2M	2	L1
5	What is meant by dc chopper?	2M	3	L1
6	What are the applications of dc chopper?	2M	3	L1
7	What is inverter?	2M	4	L1
8	What are the applications of inverter?	2M	4	L1
9	How can a PWM control signal be obtained using a carrier wave and reference wave with the help of diagram.	2M	5	L1
10	What is current source inverter (CSI) & voltage source inverter (VSI)?	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	Discuss the basic structure and operation of power IGBT.	10M	1	L2
	OR			
12	Explain the resistance firing circuit with the help of circuit diagram and waveforms.	10M	1	L2
13	Explain the operation of single-phase bridge converter with the help of load voltage and load current waveforms for R-L Load.	10M	2	L2
	OR			
14	Explain the operation of 3- phase half-wave converter for resistive load with necessary waveform and circuit diagram.	10M	2	L2
15	Describe the operation of a single-phase AC voltage controller with a neat circuit diagram and output wave forms with respect to source voltage waveforms at $\alpha = 60^0$ for R-load.	10M	3	L2
	OR			

16	A single-phase voltage controller has input voltage of 230 V, 50Hz and a load of R = 15 Ω. For 6 cycles on and 4 cycles off, determine. (i) rms output voltage (ii) input pF and (iii) average and rms thyristor currents.	10M	3	L2
17	Draw the circuit diagram of a single-phase half bridge inverter and explain its operation.	10M	4	L2
	OR			
18	Explain the operation of single-phase bridge inverter with the help of load voltage and load current waveforms for R-L load.	10M	4	L2
19	Describe the operation of 3-phase bridge inverter circuit diagram with resistive load in 120^0 conduction mode	10M	5	L2
	OR			
20	A three phase bridge inverter delivers power to a resistive load from a 400V DC source. For a star connected load of 8Ω per phase, determine RMS value of load current and RMS value of thyristor current for 120^0 conduction mode of operation.	10M	5	L2

9