



R20 Regulation

Subject code:3P5BA

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, May 2025

POWER ELECTRONICS

(EEE)

Maximum Marks: 70

Date: 17.06.2025

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	Mention some applications of controlled rectifier	2M	2	L1
4	What is meant by natural commutation ?	2M	2	L1
5	What is meant by duty -cycle?	2M	3	L1
6	What is meant by FM control in dc chopper?	2M	3	L1
7	What is meant by load commutation	2M	4	L1
8	What do you meant by PWM control	2M	4	L1
9	Give two advantages of CSI	2M	5	L1
10	Compare VSI & CSI	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	a) Discuss the basic structure and operation of power IGBT. b) Explain the static characteristics and modes of operation of SCR.	5M 5M	1	L2
OR				
12	a) Explain the resistance firing circuit with the help of circuit diagram and waveforms. b) Explain the turn on and turn off characteristics of the MOSFET.	5M 5M	1	L2
13	a) Thyristor the input and output load voltage waveform of 1- Phase half-controlled bridge converter having highly inductive load with firing delay angle of 60°. Justify your comments about the power flow. b) Derive an expression for i) average load voltage ii) average load current iii) RMS load voltage of 1-phase half-controlled converter with inductive load.	5M 5M	2	L2
OR				
14	Explain the operation of three phase half wave rectifier with R load.Derive the expression for (i) Average output voltage (ii) RMS value of output voltage.	10M	2	L2

15	Explain in detail working principle of step up and step down chopper.	10M	3	L2
	OR			
16	A 1 – phase a.c.regulator feed power to a resistive load of 4Ω from 230 V, 50 Hz a.c.source. Determine i) the peak value of average and rms thyristor currents for any firing angle α . ii) the minimum circuit turn-off time for any firing angle α .	10M	3	L2
17	How do you use PWM to inverters? Explain operation of single half-bridge inverter with quasi-square wave pulse width modulation.	10M	4	L2
	OR			
18	Explain the operation of single-phase full-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° conduction mode.	10M	5	L2
	OR			
20	A 3-phase bridge inverter is 180° mode fed from a dc source of 200 V. If the load is star connected of 10 ohms / phase, determine rms value of load current and required current rating of thyristors.	10M	5	L2