Q.CODE: 205949

Ref. No. | | | | | | | | | | | | | | |

B.E / B.TECH. DEGREE EXAMINATION, MAY 2023

Fifth Semester

EE18502 – POWER ELECTRONICS

(Regulation 2018)

TIME: 3 HOURS **MAX. MARKS: 100**

CO1 Acquire knowledge about fundamental concepts and techniques used in Power Electronics.

CO2 Ability to identify basic requirements for Power Electronics based design applications.

CO3 Develop skills to build and troubleshoot Power Electronics circuits.

CO4 Ability to understand the use of Power Converters in Commercial and Industrial applications.

PART- A (10x2=20Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Deduce the effect of circuit turn-off time towards commutation failure in thyristor.	**1**	**4**
2.	Draw the VI characteristics of TRIAC.	**1**	**1**
3.	Give an expression for average voltage of single phase half controlled converter.	**2**	**1**
4.	What are the effects of freewheeling diode on the performance of a converter?	**2**	**2**
5.	Define Duty cycle.	**3**	**1**
6.	Enumerate the applications of DC choppers.	**3**	**2**
7.	Why thyristors are not preferred for inverters?	**3**	**2**
8.	What are the methods used to reduce harmonics in inverters?	**3**	**1**
9.	Compare ON-OFF control and phase control.	**4**	**2**
10.	What is the control range of firing angle in ac voltage controller with RL load?	**4**	**3**

PART- B (5x 14=70Marks)

		Marks	CO	RBT LEVEL
11. (a)	Describe about the structure and different modes of operation with the characteristics of TRIAC.	**(14)**	**1**	**2**
	(OR)			
(b)	Explain the turn-on and turn-off characteristics of IGBT with neat waveforms.	**(14)**	**1**	**2**
12. (a)	Construct a bridge converter with four controllable devices and analyze its operation for pure resistive load and derive the expression for average output and rms output voltage equations.	**(14)**	**2**	**4**

(OR)

(b)	**(i)**	Analyze the operation of single phase dual converter and derive the expression for circulating current with relevant current and voltage waveforms.	**(7)**	**2**	**4**
	(ii)	A six pulse converter is fed from a 400V, 3phase, 50 Hz supply. The load on the converter is a pure resistance of 2 Ω, For $\alpha = 30^o$, determine (1) average value voltage (2) average value of current (3) displacement factor and (4) power factor.	**(7)**	**2**	**4**
13. (a)		Sketch the waveforms of boost regulator used in SMPS application and comment on the critical values of inductance and capacitance.	**(14)**	**3**	**3**
		(OR)			
(b)		Draw the V-I characteristics of four quadrant chopper and explain its working.	**(14)**	**3**	**3**
14.(a)		Analyze the operation of single phase full bridge inverter (assume RL load) with relevant circuit and waveforms.	**(14)**	**3**	**4**
		(OR)			
(b)		With the neat circuit and output waveforms, explain the operation of three phase bridge inverter in 120 degree mode of operation. Derive its rms output voltage expression.	**(14)**	**3**	**4**
15. (a)		Describe the operation of single phase full wave AC voltage controller with the help of voltage and current waveforms. Also derive its expression for average value of output voltage.	**(14)**	**4**	**3**
		(OR)			
(b)		Discuss about the working of matrix converter.	**(14)**	**4**	**3**

PART- C(1x 10=10Marks)

(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	Two SCRs are connected back to back have a load resistance of 400 Ω and a supply of 110 V AC. If the firing angle is 60^o, find a) RMS output voltage b) Average power	**(10)**	**4**	**4**