

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(AUTONOMOUS)
III B.Tech I Semester Supplementary Examinations, May - 2024

POWER ELECTRONICS
(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70 M

All Questions Carry Equal Marks

Q. No.		Questions	BTL	CO	Marks
UNIT – I					
1.	a)	Draw the V-I characteristics of SCR and explain it briefly?	K1	CO1	7 M
	b)	With a proper circuit diagram and wave forms explain the method of UJT triggering, for the gate of a thyristor that produces pulses for every positive half cycle of AC supply Voltage.	K2	CO1	7 M
OR					
2.	a)	Describe the switching characteristics of power MOSFET	K2	CO1	7 M
	b)	Explain the operation of snubber circuit and also design the parameters of snubber circuit.	K2	CO1	7 M
UNIT – II					
3.	a)	Describe the operation of single phase full converter with relevant voltage and current waveforms and also derive the expression for average output voltage for Resistive load.	K2	CO2	7 M
	b)	A single phase full converter is supplied from 230 V, 50 Hz source. The load consists of $R= 10 \Omega$. Calculate i) Average output voltage ii) Average output current iii) input power factor. For a firing angle of 45^0	K3	CO2	7 M
OR					
4.	a)	Calculate the average load current where resistance is of 100Ω is connected to in series with a large inductance across the single-phase fully controlled bridge converter supplied with 220V,50Hz when the firing angle is 60^0	K3	CO2	7 M
	b)	Explain the operation of single phase dual converter with neat diagram.	K2	CO2	7 M
UNIT – III					
5.	a)	Draw the output voltage waveforms and derive the average and rms voltage expressions of three phase semi converter on discontinuous conduction mode	K2	CO3	7 M
	b)	A three-phase full converter is connected to a load resistance of 5Ω and it is supplied from a 220V, 50Hz ac supply. If the firing angle of the thyristor is $\alpha= 30^0$, determine (i) average output voltage (ii) average output current.	K3	CO3	7 M

OR					
6.	a)	A single phase voltage controller has input voltage of 230 V, 50 Hz; the load consists of a resistance $30\ \Omega$ in series with inductance 15 mH, for 6 cycles off and 4 cycles on. Calculate the RMS value of output voltage and input power factor.	K3	CO3	7 M
	b)	Describe the operation of single phase step-down cyclo converter feeding resistive load.	K2	CO3	7 M
UNIT – IV					
7.	a)	Explain the different control strategies in DC-DC converters?	K2	CO4	7 M
	b)	A buck converter has the input voltage of 220 V and it operates at 1 kHz, when the average load current is 50 A, the load resistance is $3\ \Omega$. Determine the value of inductance to limit the maximum peak to peak ripple current through inductor to 10% and find the value of inductance for maximum ripple current?	K3	CO4	7 M
OR					
8.	a)	Sketch the circuit diagram, draw the relevant waveforms, discuss the operation of Boost converter and derive average output voltage.	K2	CO4	7 M
	b)	A buck-boost converter has the input voltage of 24 V and it operates at 30 kHz, when the duty cycle is 0.25, $L = 300\ \mu\text{H}$, $C = 150\ \mu\text{F}$ and the average load current is 1.5 A. Determine average output voltage, peak to peak ripple current through the inductor, peak to peak ripple voltage and critical values of L and C.	K3	CO4	7 M
UNIT – V					
9.	a)	Explain the working of a three phase inverter with 180° mode of conduction with three phase delta connected resistive load.	K2	CO5	14 M
OR					
10.	a)	Single phase full bridge inverter has a resistive load of $R = 2.4\ \Omega$ and DC input voltage of 48 volts. Calculate: i) RMS output voltage at fundamental frequency, ii) output power, iii) Average and peak current of each thyristors.	K3	CO5	7 M
	b)	Explain sinusoidal PWM technique with neat sketch.	K2	CO5	7 M