

APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY
08 PALAKKAD CLUSTER

Q. P. Code :PE 0823118

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Name:

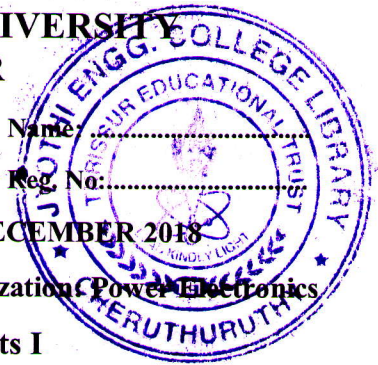
Reg. No:

FIRST SEMESTER M.TECH. DEGREE EXAMINATION DECEMBER 2018

Branch: Electrical and Electronics

Specialization: Power Electronics

08EE6231 Analysis of Power Electronic circuits I



Time:3 hours

Max.marks: 60

Answer all six questions.

Modules 1 to 6:Part 'a' of each question is compulsory and answer either part 'b' or part 'c' of each question.

Q.no.	Module 1	Marks
1.a	Explain the reverse recovery characteristics of power diode	3
Answer b or c		
b	The single phase diode bridge rectifier is supplying very high inductive load such as a dc motor. The turns ratio of the transformer is unity. The load is such that the motor draws a ripple free armature current of I_a . a) determine the harmonic factor of input current (b) The input power factor of the rectifier	6
c	Analyse two transistor model of thyristor	6
Q.no.	Module 2	Marks
2.a	Explain the inversion mode of operation of rectifier with relevant waveforms	3
Answer b or c		
b	Determine the performance parameters of single phase fully controlled converter with R load	6
c	With neat waveforms explain the working of 3 phase fully controlled converter for RL load with $\alpha=60^\circ$	6
Q.no.	Module 3	Marks
3.a	Explain the control methods of DC-DC converters	3

Answer b or c

- b** Explain the operation of Boost converter with neat circuit diagram and relevant waveforms. Derive the expression for average output voltage **6**
- c** The buck-boost regulator has input voltage $V_s = 12$ V. The duty cycle $k=0.25$ and the switching frequency is 2 kHz. The inductance $L= 150\mu\text{H}$ and filter capacitance $C= 220\mu\text{F}$. The average load current $I_a=1.25$ A. Determine a) average output voltage V_a b) The peak to peak output voltage ripple ΔV_c c) peak to peak ripple current of inductor ΔI d) peak current of the transistor I_p **6**

Q.no.	Module 4	Marks
4.a	Explain the principle of on-off control in ac voltage controllers	3

Answer b or c

- b** A single phase ac voltage controller has resistive load of $R= 10\Omega$ and input voltage $V_s= 120$ V, 60 Hz. The delay angle of thyristor T_1 is $\alpha=\pi/2$. Determine the rms value of output voltage V_0 b) input power factor c) the average input current **6**
- c** Analyse the working of three phase bidirectional delta connected controllers **6**

Q.no.	Module 5	Marks
5.a	Explain the working of thyristor switched capacitor	4

Answer b or c

- b** With relevant waveforms explain the operation of 3 phase to three phase cycloconverter **8**
- c** With relevant waveforms explain the operation of single phase to single phase cycloconverter with RL load **8**

Q.no.	Module 6	Marks
6.a	What are the main differences between voltage source and current source inverters	4

Answer b or c

- b** Analyse with neat circuit diagram, the operation of 3 phase inverter with 180° conduction. Draw the thyristor currents, phase voltage and line voltage waveforms **8**
- c** Explain the methods of harmonic elimination in PWM inverters **8**