



R22 Regulation

Subject code: E122PC1

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous, Accredited by NAAC with 'A+' Grade)

M.TECH II Semester Supplementary Examinations, March 2026

ADVANCED POWER ELECTRONIC CONVERTERS-II

(PE)

Maximum Marks: 60

Date:05.03.2026

Duration: 3 hours

- Note: 1. This question paper contains two parts A and B.
2. Part A is compulsory which carries 10 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 (10X1M=10 Marks)		Marks	CO	BTL
1.a)	Define duty cycle in DC-DC converters.	1M	1	1
b)	What is the primary function of a boost converter?	1M	1	1
c)	List any two types of isolated DC-DC converters.	1M	2	1
d)	How many switches are used in a half-bridge converter?	1M	2	2
e)	What happens to output voltage when operating above resonance?	1M	3	4
f)	Mention one application of resonant pulse inverters.	1M	3	3
g)	What is the role of L and C in resonant converters?	1M	4	3
h)	What is zero current switching (ZCS)?	1M	4	1
i)	List any two types of power line disturbances.	1M	5	1
j)	Define Luo Converter.	1M	5	1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	a) Explain the operation of a buck converter with waveforms.	5M	1	2
	b) A buck converter with $V_s=20$ V, $D=0.3$, and load $R=4 \Omega$ has an inductor of $L=100 \mu\text{H}$. Determine whether the inductor current is continuous if the switching frequency is 20 kHz.	5M	1	3
OR				
3	a) Explain the concept of state-space modelling for DC-DC converters.	5M	1	2
	b) Explain the operation of a multi-output boost converter.	5M	1	2
4	a) Explain the working of a half-bridge converter with a neat diagram.	5M	2	2
	b) Discuss various applications of isolated DC-DC converters.	5M	2	3
OR				
5	a) Explain the operation of a full-bridge converter with waveforms.	5M	2	2
	b) Compare push-pull converters with forward converters.	5M		
			2	3
6	a) Describe the operation of a series resonant inverter.	5M	3	2
	b) Explain the operation of a full-bridge resonant inverter with bidirectional switches.	5M	3	2

	OR			
7	a) Compare the frequency response of series loaded and parallel loaded resonant inverters. b) For a parallel resonant inverter, the resonant frequency is 50 kHz, capacitance is 0.05 μF , and load resistance is 50 Ω . Find the required inductance and calculate the load current at resonance.	5M 5M	3 3	3 3
8	a) Explain the working principle of resonant converters with a neat diagram. b) Compare ZCS and ZVS resonant converters?	5M 5M	4 4	2 3
	OR			
9	a) Explain how soft switching is achieved in resonant converters. b) Derive the conditions required for zero current switching in terms of L, C, and load.	5M 5M	4 4	2 3
10	a) Explain the operation of an Uninterruptible Power Supply (UPS) b) Explain the principle of operation of a Matrix converter with circuit diagram.	5M 5M	5 5	2 3
	OR			
11	a) Explain Advantages and limitations of Matrix Converter b) Explain how power conditioners improve power quality.	5M 5M	5 5	2 2