P.E.S. COLLEGE OF ENGINEERING

(AN AUTONOMOUS INSTITUTE)

CHH. SAMBHAJINAGAR-431002

Regular Winter Examination – 2025

Course: F.Y.M. Tech. Branch : M.Tech. EE (EPS) Semester : I

Subject Code & Name: MTPESEPS102T & Advance Power Electronics

Max Marks: 60 Date: 30-01-2026 Duration: 3 Hr.

Instructions to the Students:

1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/CO)	Marks
Q. 1	**Solve Any one of the following.**		
A)	Explain the structure and operation of a thyristor. What are its key characteristics? **Particulars** **Marks** Structure of thyristor (PNPN, terminals) 4 Operation (forward blocking, conduction, triggering) 4 Key characteristics (V–I, latching current, holding current) 4 **Total** **12**	**L2/CO1**	**12**
B)	Describe the commutation methods used for turning off thyristors. **Particulars Marks** Definition of commutation 2 Natural (line) commutation 3 Forced commutation (any 2 methods) 5 Applications / significance 2 **Total 12**	**L2/CO1**	**12**
Q.2	**Solve Any one of the following.**		
A)	Explain the working principle of a single-phase full converter and derive its output voltage equation. **Particulars** **Marks** Circuit diagram & description 3 Working principle 3 Derivation of output voltage equation 4 Final expression & conclusion 2 **Total** **12**	**L3/CO2**	**12**
B)	What is a dual converter? How is it used to control the direction of DC motor?	**L3/CO2**	**12**

	Particulars Marks Definition of dual converter 3 Modes of operation (circulating / non-circulating current) 4 Direction control of DC motor 4 Neat conclusion 1 **Total 12**		
Q. 3	**Solve Any one of the following.**		
A)	Describe the operation of a Class A chopper and write the expression for output voltage. **Particulars Marks** Circuit & definition of Class A chopper 3 Operating principle 4 Output voltage expression derivation 4 Conclusion 1 **Total 12**	**L3/CO3**	**12**
B)	Explain the difference between buck, boost, and buck-boost converters under continuous conduction mode. **Particulars Marks** Brief explanation of converters 3 Buck converter analysis 3 Boost converter analysis 3 Buck-boost converter analysis 3 **Total 12**	**L4/CO3**	**12**
Q.4	**Solve Any one of the following.**		
A)	What are the different PWM techniques used in inverters? Describe sinusoidal PWM in detail. **Particulars Marks** List of PWM techniques 3 Principle of SPWM 4 Generation method & waveforms 3 Advantages of SPWM 2 **Total 12**	**L2/CO4**	**12**
B)	Explain the method of selective harmonic elimination in PWM inverters. **Particulars Marks** Definition of SHE 3 Harmonic elimination concept 4 Switching angle calculation 3 Advantages 2	**L4/CO4**	**12**

	Total 12		
Q. 5	**Solve Any one of the following.**		
A)	Explain the working principle of a multilevel DC/DC converter. **Particulars Marks** Definition & need 3 Working principle 5 Advantages 2 Applications 2 **Total 12**	**L2/CO5**	**12**
B)	Explain the simulation process of a full bridge rectifier and key parameters analyzed. **Particulars Marks** Full bridge rectifier description 3 Simulation steps (modeling, parameters) 5 Key parameters (Vout, ripple, THD, PF) 3 Conclusion 1 **Total 12**	**L3/CO6**	**12**
	***** End *****		