PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
MSc DEGREE EXAMINATION DECEMBER 2025
(First Semester)

Branch- APPLIED ELECTRONICS

POWER ELECTRONICS AND CONTROL SYSTEMS

Time: Three Hours   Maximum: 75 Marks

SECTION-A (10 Marks)
Answer ALL questions
ALL questions carry EQUAL marks   (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	In a TRIAC, current conduction can take place in: a) Only one direction b) Both directions c) Only when positive gate signal is applied d) Only when negative gate signal is applied	K1	CO1
	2	The IGBT combines the characteristics of: a) BJT and FET b) MOSFET and BJT c) SCR and MOSFET d) Diode and MOSFET	K2	CO1
2	3	The device most commonly used in static switches for AC applications is: a) SCR b) TRIAC c) IGBT d) MOSFET	K1	CO2
	4	The input power factor of AC voltage controllers is generally: a) Lagging b) Unity c) Leading d) Zero	K2	CO2
3	5	A chopper is a device that converts: a) AC to DC b) DC to AC c) Fixed DC to variable DC d) AC to variable AC	K1	CO3
	6	A dual converter provides: a) Two-way AC to DC conversion b) Bidirectional DC voltage c) AC to AC direct conversion d) DC to AC conversion	K2	CO3
4	7	In a closed-loop control system, the output is: a) Independent of the input b) Dependent only on disturbances c) Fed back to the input for correction d) Constant at all times	K1	CO4
	8	Which of the following is an open-loop system? a) Automatic electric iron b) Traffic light system c) Room heater with thermostat d) Speed control of motor with tachometer	K2	CO4
5	9	The order of a system is determined by: a) Input signal b) Output signal c) Number of energy storage elements d) Controller used	K1	CO5
	10	Which criterion is commonly used for stability analysis of linear systems? a) Nyquist criterion b) Root locus method c) Bode plot method d) Routh-Hurwitz criterion	K2	CO5

SECTION - B (35 Marks)
Answer ALL questions
ALL questions carry EQUAL Marks   (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Describe the theory, construction, and working of an SCR with neat diagram.	K2	CO1
		(OR)		
	11.b.	Illustrate the operation of PUT along with its typical applications.		
2	12.a.	Apply the concept of static switching to design and explain a single-phase AC static switch using SCRs.	K3	CO2
		(OR)		
	12.b.	Explain the operation of a single-phase bidirectional AC voltage controller with inductive load.		
3	13.a.	Differentiate between Buck and Boost regulators in terms of circuit configuration, voltage conversion ratio, and practical applications.	K4	CO3
		(OR)		
	13.b.	Analyze the differences between a three-phase half-wave controlled converter and a three-phase fully controlled converter.		
4	14.a.	Justify the need for a closed-loop control system over an open-loop system in terms of accuracy, stability, and disturbance rejection.	K5	CO4
		(OR)		
	14.b.	Evaluate the role of Mason's Gain Formula in determining the overall transfer function of a system.		
5	15.a.	Propose a PID control scheme for a temperature control system.	K6	CO5
		(OR)		
	15.b.	Explain the concept of stability in control systems with suitable examples.		

SECTION -C (30 Marks)
Answer ANY THREE questions
ALL questions carry EQUAL Marks   (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Describe about different TRIAC triggering circuits and their significance in power control.	K2	CO1
2	17	Explain the operation of a single-phase cycloconverter in both step-up and step-down modes.	K4	CO2
3	18	Analyze the working of a three-phase inverter. Compare its performance with that of a single-phase bridge inverter in terms of efficiency.	K4	CO3
4	19	Critically evaluate the Force–Voltage analogy for modeling mechanical systems.	K5	CO4
5	20	Design a PI controller for a second-order system to improve steady-state error while maintaining system stability.	K6	CO5

Z-Z-Z   END