GALGOTIAS UNIVERSITY

ADMISSION NUMBER												

School of Engineering

B.TECH Mechanical Engineering
Semester End Examination - Nov 2023

Duration : 180 Minutes
Max Marks : 100

Sem VII - BME072 - Automatic Control Systems

General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1)	Explain the concept of performance indices in control systems. What role do they play in evaluating control system performance?	K1 (2)
2)	How does the analog-to-digital converter impact the accuracy and performance of a digital control system?	K2 (4)
3)	Apply the Popov's stability criterion to analyze the stability of a non-linear system with appropriate constraints.	K2 (6)
4)	How does the design process of a digital control system using state feedback differ from classical state feedback in continuous-time control?	K3 (9)
5)	Describe the steps involved in using the z-transform for analyzing the transient response of a digital control system. Provide an example.	K3 (9)
6)	Compare the stability analysis results obtained using the bilinear transform and the Jury method. Under what conditions would one method be preferred over the other?	K5 (10)
7)	Create a stability analysis framework that combines Liapunov's stability criterion and Popov's stability criterion for a complex non-linear system.	K4 (12)
8)	Design a comprehensive control strategy for a challenging non-linear system by integrating Liapunov-based stability analysis, describing function method, and phase plane analysis.	K5 (15)
9)	Develop a computational tool or software that automates the stability analysis and design process for non-linear control systems, incorporating multiple stability criteria.	K5 (15)
10)	Find the inverse Laplace transform of $F1(s) = (\frac{1}{s+2})^2$	K6 (18)