



R18 Regulation

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

Subject code:207BA

B.Tech VII Semester Supplementary Examinations, November 2023

ADVANCE CONTROL SYSTEMS (Electrical and Electronics Engineering) (Open Elective)

Maximum Marks: 70

Date:08.12.2023 Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
 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

(10x2M=20 Marks)

1	Define Polar Plot.	L1
2	Write the transfer function of lag compensator and draw its pole-zero plot?	L1
3	Define Linear Autonomous Systems	L1
4	What is Lyapunov function?	L1
5	What is phase plane?	L1
6	What is phase trajectory?	L1
7	What is saturation? Give an example	L1
8	Write the describing function of dead zone and saturation nonlinearity	L1
9	What is state vector?	L1
10	Write the properties of state transition matrix?	L1

Part-B

Answer All the following questions.

(5X10M=50Marks)

11	Draw the polar Plot of the open loop transfer function for K=1 and $G(S)H(S)=K/S(S+1)(S+4)$	L3
	OR	(10M)
12	Explain the procedure to design the Lead Compensator using Bode plot. (10M)	L2
13	A) What are the sufficient conditions of Lyapunov stability. (5M) B) Differentiate between the Lyapunov stability and instability theorem. (5M)	L1 L3
	OR	
14	Check the stability of the system described by $\dot{x}_1 = -x_1 + 2x_1^2 x_2$ $\dot{x}_2 = -x_2$ Use variable gradient method. (10M)	L4
15	Describe the isoclines method of drawing phase plane trajectory. (10M)	L2
	OR	

16	Construct a phase trajectory by delta method for a nonlinear system represented by the differential equation. $\ddot{x} + 4 \dot{x} + 4x = 0$ Choose the initial conditions. $x(0) = 1.0$ and $\dot{x}(0) = 0$. (10M)	L3
17	Explain describing function analysis of nonlinear systems. (10M) OR	L2
18	Explain the following describing function with diagrams. i) saturation non-linearity (5M) ii) dead-zone non-linearity (5M)	L2
19	A) Explain the state variable and state transition matrix. (5M) B) Derive the expression for the calculation of the transfer function from the state variables for the analysis of system? (5M) OR	L2 L3
20	Determine state model of Armature controlled DC Motor. (10M)	L4