1.	Title of the course	Robotic Control Systems
2.	Course number	ME523L
3.	Structure of credits	3-0-0-3
4.	Offered to	PG
5.	New course/modification to	Modification To ME5223/14
6.	To be offered by	Department of Mechanical Engineering
7.	To take effect from	July 2022
8.	Prerequisite	CoT
9.	**Course Objective(s):** To introduce algorithmic approaches, mathematical models and computational and motion control methods applicable to robotic systems. To establish the fundamental techniques for understanding the nonlinear control schemes used in robotic fields. To analyze and design control system models in the state space approach. To develop and verify various robot motion control schemes in virtual and numerical environments.	
10.	**Course Content:** Overview of robotic systems and their dynamics; Forward and inverse dynamics; Properties of the dynamic model and case studies; Nonlinear systems and control schemes; System stability and types of stability; Lyapunov stability analysis, both direct and indirect methods; Lemmas and theorems related to stability analysis; Joint space and task space control schemes: Position control, velocity control, trajectory control and force control; Nonlinear control schemes; Observer based on acceleration, velocity and position feedback; Numerical simulations using software packages namely MATLAB/MATHEMATICA.	
11.	**Textbook(s):** 1. Kelly R, Santibanez D,Victor L P and Antonio J, *Control of Robot Manipulators in Joint Space*, 1st Edition, Springer (2005). 2. Sabanovic A and Ohnishi K, *Motion Control Systems*, 1st Edition, John Wiley & Sons (Asia) (2011).	
12.	**Reference(s):** 1. Craig J J, *Introduction to Robotics: Mechanics and Control*, 3rd Edition, Prentice Hall (2004). 2. Murray R M, Li Z and and Sastry S S, *A Mathematical Introduction to Robotic Manipulation*, 1st Edition, CRC Press (1994). 3. Slotine J J E and Li W, *Applied Nonlinear Control*, 1st Edition, Prentice Hall (1991). 4. Spong M W, Hutchinson S,Vidyasagar M and Sastry S S, *Robot Modeling and Control*, John Wiley & Sons (2006).	