No	Information of every subject	
1	Unit name:	Robotic Analysis I
2	Code:	McE 51021
3	Classification:	Engineering subject
4	Credit value:	2.5
5	Semester/ Year Offered:	1/6
6	Pre-requisite:	NA
7	Mode of delivery:	Lecture, Assignment
8	Assessment system and breakdown of marks:	Assignments
	Mid-term	35%
	Assignments	15%
9	Academic staff teaching unit:	Department of Mechatronic Engineering
10	Course outcome of unit: In this course, students will be able (a) To know the necessary background information about the Robot (b) To analysis the robotic position and orientation analysis using Kinematic method (c) To analysis the differential motions and velocity analysis of robots and frames	
11	Synopsis of unit: The course introduces students to the study of the Robotic Analysis using three Chapters. Chapter 1 covers introductory subjects that familiarize the students with the necessary background information. This includes some historical information, robot components, robot characteristics, robot languages, and robotic applications. Chapter 2 explores the forward and inverse kinematics of robots, including frame representations, transformations, position and orientation analysis, as well as the Denavit-Hartenberg representation of robot kinematics. Chapter 3 continues with differential motions and velocity analysis of robots and frames. Robotic Analysis can be applied in the field of robotic field and any other various applications.	

12	Topic: **1 Fundamentals** 1.1 Introduction 1.2 What Is a Robot? 1.3 Classification of Robots 1.4 What Is Robotics? 1.5 History of Robotics 1.6 Advantages and Disadvantages of Robots 1.7 Robot Components 1.8 Robot Degrees of Freedom 1.9 Robot Joints 1.10 Robot Coordinates 1.11 Robot Reference Frames 1.12 Programming Modes 1.13 Robot Characteristics 1.14 Robot Workspace 1.15 Robot Languages 1.16 Robot Applications 1.17 Other Robots and Applications 1.18 Social Issues **2 Kinematics of Robots: Position Analysis** 2.1 Introduction 2.2 Robots as Mechanisms 2.3 Conventions 2.4 Matrix Representation 2.5 Homogeneous Transformation Matrices 2.6 Representation of Transformations 2.7 Inverse of Transformation Matrices 2.8 Forward and Inverse Kinematics of Robots 2.9 Forward and Inverse Kinematic Equations: Position 2.10 Forward and Inverse Kinematic Equations: Orientation 2.11 Forward and Inverse Kinematic Equations: Position and Orientation

	2.12 Denavit-Hartenberg Representation of Forward Kinematic Equations of Robots 2.13 The Inverse Kinematic Solution of Robots 2.14 Inverse Kinematic Programming of Robots 2.15 Degeneracy and Dexterity 2.16 The Fundamental Problem with the Denavit-Hartenberg Representation 2.17 Design Projects **3 Differential Motions and Velocities** 3.1 Introduction 3.2 Differential Relationships 3.3 Jacobian 3.4 Differential versus Large-Scale Motions 3.5 Differential Motions of a Frame versus a Robot 3.6 Differential Motions of a Frame 3.7 Interpretation of the Differential Change 3.8 Differential Changes between Frames 3.9 Differential Motions of a Robot and its Hand Frame 3.10 Calculation of the Jacobian 3.11 How to Relate the Jacobian and the Differential Operator 3.12 Inverse Jacobian 3.13 Joint-Space versus Cartesian-Space Descriptions 3.14 Basics of Trajectory Planning 3.15 Joint-Space Trajectory Planning 3.16 Cartesian-Space Trajectories 3.17 Continuous Trajectory Recording 3.18 Design Project
13	Main references: Introduction to Robotics Analysis, Control, Applications, Second Edition, SAEED B. NIKU.
14	Additional references: