



Shri Vile Parle Kelavani Mandal's
DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING
(Autonomous College Affiliated to the University of Mumbai)
NAAC Accredited with "A" Grade (CGPA : 3.18)



Shri Vile Parle Kelavani Mandal's
**Dwarkadas J. Sanghvi College of
Engineering**

(Autonomous College Affiliated to the University of Mumbai)

Scheme and detailed Syllabus (DJS22)

of

Honors Degree Program

in

Robotics

Revision: 2 (2024)

With effect from the Academic Year: 2024-2025



**Scheme for Honors Robotics
 (Academic Year 2024-2025)**

Sr. No.	Course Code	Course	Teaching Scheme (hrs.)				Continuous Assessment (A) (Marks)			Semester End Assessment (B) (marks)					(A+B)	Total Credits
			Th	P	T	Credits	Th	T/W	Total CA (A)	Th/Cb	O	P	P&O	Total SEA (B)		
Semester V																
1	DJS22MEHN2C1	Introduction to Robotics	4	--	--	4	35	--	35	65	--	--	--	65	100	4
Semester VI																
1	DJS22MEHN2C2	Modelling and Design of Robotics	4	--	--	4	35	--	35	65	--	--	--	65	100	4
3	DSJ22MEHN2L1	Robotics Laboratory 1	--	2	--	1	--	25	25	--	--	--	25	25	50	1
Semester VII																
4	DJS22MEHN2C3	Advance Robotics	4	--	--	4	25	--	25	75	--	--	--	75	100	4
5	DJS22MEHN2L2	Robotics Laboratory 2	--	2	--	1	--	25	25	--	--	--	25	25	50	1
Semester VIII																
6	DJS22MEHN2C4	AI and ML for Robotics	4	--	--	4	35	--	35	65	--	--	--	65	100	4
		Total	16	4	--	18	140	50	190	260	--	--	50	310	500	18



Program: Mechanical Engineering	T.Y B. Tech	Semester: V
Course: Introduction to Robotics (DJS22MEHN2C1)		

Pre-requisite:

1. Knowledge of basic elements of mechanical engineering
2. Knowledge of electrical engineering like motors & drives
3. Knowledge of instrumentation related topics like sensors & applications
4. Basic knowledge of control systems engineering

Objectives:

1. Gain a comprehensive understanding of automation principles and its various types, along with the historical evolution of robotics.
2. Familiarize oneself with the anatomy of robots, including drive systems, actuators, power transmission systems, and activation components.
3. Learn about the different types of sensors used in robotics and their applications, including touch sensors, proximity sensors, force sensors, and encoders.
4. Understand the materials used in robot design, transmission devices, end effectors, and their classifications.
5. Gain knowledge about robot controllers, their types, the significance of programming in robotics, and the various programming languages and techniques used in industrial robot programming.
6. Explore the wide range of applications of robots in industries, while also considering social, environmental, and economic implications.

Outcomes: On completion of the course, the learner will be able to:

1. Students will develop a thorough understanding of the fundamentals of robotics, including automation principles, historical evolution, and the definition of robots.
2. Students will be able to identify and describe the components of robot anatomy, including drive systems, actuators, and power transmission systems.
3. Students will be proficient in understanding sensor technology and its applications in robotics, including touch sensors, proximity sensors, and encoders.
4. Students will gain knowledge about mechanical systems in robotics, including materials used in design, transmission devices, and end effectors.
5. Students will develop programming skills necessary for robot control, simulation, and industrial applications, using various programming languages and techniques.
6. Students will be able to identify and discuss the wide range of applications of robotics in different industries and understand the associated advantages, disadvantages, and ethical considerations.



Introduction to Robotics – DJS22MEHN2C1		
Unit		Duration
1	Introduction to Robotics : to automation & its types, History & evolution of robotics, Definition of robots, Robotic manipulators, Types of robots, Generations of robots, Laws of robotics, Classification of robots & its applications, Specifications of robots.	9
2	Robot Anatomy : Anatomy of robots, Drive systems, Actuators and Power Transmission systems, Types of drives & its applications, Hydraulic drives, Pneumatic drives, Electric drives, Hybrid drives, Robot activation & feedback components.	9
3	Sensors in robotics : Touch Sensors, Tactile Sensors, Proximity & Range Sensors, Sensor Based Systems, Force Sensors, Light sensors, Pressure sensors, Ultrasonic sensors, Infra-red sensors, Pots, Encoders, Position & Velocity Sensors.	9
4	Articulated Mechanical System: Materials used for robot design & its properties, Transmission devices in robots & its types, End effectors, Types of end effectors, Tools & Grippers, Classification of tools & grippers, Types of tool & gripper actuations.	9
5	Robot Controllers & Programming : Robot brain, Controller & its types, Need for controller in robots, Robot simulation, Robot software, Robot Programming & the Languages, Types of robot programming, Industrial robot programming.	8
6	Robot Applications : Industrial applications of robots, Medical, Household, Entertainment, Space, Underwater, Defense, Social, Environmental & economic issues in robot applications, Advantages & Disadvantages of Robotization.	8
	Total	52

Books Recommended:

Text books:

1. Dr. T. C. Manjunath, "Fundamentals of Robotics", Nandu Publishers, 5th Edn., India, 2005.
2. Elaine Rich & Kevin Knight, "Artificial Intelligence", Mac Graw Hill, Singapore, 3rd Edn., 2017.
3. Dr. T. C. Manjunath, "Fast Track to Robotics", Nandu Publishers, 2nd Edn., Mumbai, Maharashtra, India, 2005.
4. K.S. Fu, R.C. Gonzalez, C.S.G. Lee, "Robotics: Control Sensing Vision & Intelligence", Mac Graw Hill, USA, 5th Edition, 2010.
5. Robin R. Murphy, "Introduction to AI and Robotics", MIT Press, Second Edition, 648 pp., Oct. 2019.

Reference Books:

1. Industrial Robotics, Technology, Programming & Applications, Grover, Weiss, Nagel, Ordey, Mc Graw Hill.



2. Robotic technology & Flexible Automation, S R Deb. TMH.
3. Robotics for Engineers, Yoram Koren, Mc Graw hill.
4. Fundamentals of Robotics, Larry Health.
5. Robot Analysis & Control, H Asada, JJE Slotine.
6. Robot Technology, Ed. A Pugh, Peter Peregrinus Ltd. IEE, UK. 8. Handbook of Industrial Robotics, Ed. Shimon. John Wiley
7. Roland Siegwart, Illah Reza Nourbakhsh, and Davide Scaramuzza, "Introduction to Autonomous Mobile Robots", Bradford Company Scituate, US
8. Fundamentals of Robotics – Analysis & Controls, Robert Schilling, Prentice Hall Inc, India.
9. Robotics – Amitaabh Bhattacharya
10. P.A. Janaki Raman, "Robotics and Image Processing an Introduction", Tata McGraw Hill Publishing company Ltd., 1995.

Prepared by

Checked by

Head of the Department

Principal