GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

ROBOTICS & AUTOMATED MATERIAL HANDLING
(Code : 3360106)

Diploma Programme in which this course is offered	Semester in which offered
Aeronautical Engineering	SIXTH

1. RATIONALE

The main objective of this course is to understand the working of robotics and material handing process carried out in aircraft industries. This subject addresses the understanding and functioning of robotics and automation in material handling process.

2. LIST OF COMPETENCIES

The course content should be taught and implemented with an aim to develop different types of skills leading to the achievement of the following competencies:

- → **To know about different types of robotics and its working principle.**
- → **To study about automation and material handling system.**

3. TEACHING AND EXAMINATION SCHEME.

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	**T**	**P**	**C**	**ESE**	**PA**	**ESE**	**PA**	**100**
04	00	00	04	70	30	00	00	

Legends: **L**-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** -Practical; **C** – Credit, **ESE** -End Semester Examination; **PA** - Progressive Assessment.

4. DETAILED COURSE CONTENTS

Unit	Major Learning Topics and Sub-topics	Outcomes (in cognitive domain)
UNIT– I INTRODUCTION	• To study about robotics • To study about robot anatomy • To study about robot application	1.1 Basic concepts and definition 1.2 Robot anatomy and terminology used in robotics 1.3 Robot configurations 1.4 Axes nomenclature & Basic robot Motions, 1.5 Work Volume 1.6 Robot drive system 1.7 Sensors in Robotics 1.7 Control System 1.8 Applications & benefits 1.9 Application of robotics in aircraft industries 1.10 Overview of robot programming methods & languages.
UNIT– II ROBOT END EFFECTORS	• To Study about end effectors • To Study about types of end effectors • To Study about tools as end effectors	2.1 Introduction to End effectors 2.2 Types of end effectors 2.3 Mechanical Grippers 2.4 Vacuum Cups 2.5 Magnetic Grippers 2.6 Adhesive Grippers 2.7 Hooks, Scoops and other miscellaneous devices 2.8 Tools as end effectors 2.9 The robot end effectors interface 2.10 Consideration in gripper selection and design
UNIT– III AUTOMATED MATERIAL HANDLING AND STORAGE SYSTEM	• To study about material handling system. • To study about AS/RS	3.1 Introduction & Definition 3.2 Principle of material handling 3.3 Classification of Material Handling equipment 3.4 Conveyor and AGV system 3.5 AS/RS System 3.6 Carousel storage system 3.7 WIP storage system,

5. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (THEORY).

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	INTRODUCTION	12	08	10	07	25
II	ROBOT END EFFECTORS	10	06	08	06	20
III	AUTOMATED MATERIAL HANDLING AND STORAGE SYSTEM	10	08	09	08	25
TOTAL		**34**	**22**	**27**	**21**	**70**

Legends: R = Remember **U**= Understand; **A**= Apply and above levels (Bloom's revised taxonomy).

6. SUGGESTED LIST OF STUDENT ACTIVITIES.

Following is the list of proposed student activities like:

SR.NO.	ACTIVITY
1	Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory.
2	Prepare a model of robotics.

7. SUGGESTED LEARNING RESOURCES.

A. List of Books:

SR. NO.	TITLE OF BOOK	AUTHOR	PUBLICATION
1.	Handbook of Industrial Robotics, Volume	Shimon Y. Nof	John Wiley & Sons
2.	Industrial Robotics	Groover	Tata Mcgraw Hill

B. List of Software/Learning Websites

a. https://www.robots.com/faq/show/what-is-an-industrial-robot

b. http://www.allonrobots.com/types-of-robots.html

c. http://nptel.ac.in/courses/112103174/module7/lec5/1.html

d.http://www.roboticsbible.com/anatomy-of-industrial-robots.html

e. https://en.wikipedia.org/wiki/Material_handling

f. http://www.mhi.org/fundamentals/material-handling

g.http://nptel.ac.in/courses/Webcourse-contents/IIT-ROORKEE/INDUSTRIAL ENGINERRING/part2/material%20handling/lecture1.htm

h. https://www.youtube.com/watch?v=Pb706BLc7gk

i. https://www.youtube.com/watch?v=EjC-C715RNs

j. https://www.youtube.com/watch?v=7iuEdX8G4go

k. https://www.youtube.com/watch?v=EB-lxpHmyi0

8. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnic.

- **Prof. Ankitkumar Patel**, H.O.D., Aeronautical Dept. Parul institute of Engg. & tech-Diploma studies

Faculty Members from Engineering.

- **Prof. Jignesh Vala,** Asst. Professor, Aeronautical Dept. SVIT, Vasad.
- **Prof. Arpit Patel**, Asst. Professor, Aeronautical Dept. SVIT, Vasad.