GUJARAT TECHNOLOGICAL UNIVERSITY

INDUSTRIAL ENGINEERING (15)
MATERIAL HANDLING SYSTEMS
SUBJECT CODE: 2151505
B.E. 5th SEMESTER

Type of course: Core

Prerequisite: None

Rationale: Industrial requirements to design appropriate systems to move goods, materials, and other industrial goods between points are addressed in this subject. Movement principles, frequency, and type of movements are studied in light of reducing the overall cycle time, with due consideration on economics and payback period.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
				Theory Marks			Practical Marks			
L	T	P	C	ESE (E)	PA (M)		ESE (V)		PA (I)	
					PA	ALA	ESE	OEP		
4	0	2	6	70	20	10	20	10	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Overview of Material Handling: Principles of Material Handling, Principal groups of Material Handling equipment – General Characteristics and application of Material Handling Equipment, Modern trends in material handling.	**10**	15%
2	Lifting Equipments: Hoist Components of Hoist – Load Handling attachments hooks, grabs and clamps – Grabbing attachments for bulk material – Wire ropes and chains.	**10**	18%
3	Lifting tackle pulleys for gain of force and speed: Tension in drop parts – Drums, Shears and sprockets – Arresting gear and brakes – Block brakes, Band brakes, thrust brakes – Safety and hand cranks. Principle operation of EOT, Gantry and jib cranes Hoisting Mechanisms, Travelling mechanisms, lifting mechanisms – Slewing Mechanisms – Elevators and lifts.	**15**	24%
4	Conveying Machines: Belt conveyors – Types, Principal components of a conveyor and their purpose – conveyor belts – tractive elements – take up devices Special types of belt conveyors – Metal Belt conveyor – Apron conveyor Elevators, Passenger conveyor – Flight conveyor, Principal types and application – Bucket flight conveyors – Cradle conveyor – conveyor elevators. Overhead conveyors – Overhead pusher conveyor, Overhead load towing truck conveyor – Load carrying car conveyors – Load towing and walking beam conveyors – Bucket elevators – Cradle conveyors – Screw conveyors – Oscillating conveyor – Roller conveyor Hydraulic and pneumatic conveyor – Chutes Bins.	**20**	30%

5	Current trends in Material Handling: Computer Aided Systems for Material Handling.	**9**	13%

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
30	40	10	10	5	5

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Text/Reference Books:

1. Material Handling Equipments – Rudanko.
2. Material Handling Equipment – Alexander V
3. Conveying Machines – A.Spivakvsky and V. Dyachkov
4. Plant layout & material Handling - James Apple

Course Outcome:

After learning the course the students should be able to:

- Understand the flow and type of movement of industrial goods
- Apply general rules for the type of movement, and
- Identify the appropriate material handling systems to suit the said requirement
- Design of material handling system

List of Experiments:

1. Basic type of material handling equipments and their applications.
2. Selection criteria for material handling.
3. Principles of Material Handling.
4. Analysis of Material Handling Problems.
5. Cost analysis for material handling.
6. Capacity calculation for
   (I) Belt conveyer
   (II) Screw conveyer
   (III) Bucket elevator

Design based Problems (DP)/Open Ended Problem:

Design-based problems

Major Equipment:

None. Audio-visuals and plant visits to understand and analyze the problem is recommended.

List of Open Source Software/learning website:

www. nptel.ac.in

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.