GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering (Part Time)
Subject Code: 2971907
Design of Material Handling Equipment
B.E. 7thSEMESTER

Type of course: Professional Core

Prerequisite: None**.**

Rationale: The course aims to impart basic skills of force and stress analysis for design of machine elements.

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)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	**Introduction:** Objectives of material handling system, Principal groups of materials handling equipment and classification, Scope of Material Handling, Criteria for selection of Material Handling Equipment's, Basic kind of material handling problems, Various methods to analyze material Handling problems.	06
2	**Conveyor Design:** Introduction to Apron conveyors , Pneumatic conveyors, Belt Conveyors, Chain conveyors, Screw conveyors and vibratory conveyors and their applications, Design of Belt conveyor- Belt selection procedure and calculation of drop energy, Idler design.	10
3	**Design of bucket and Cage Elevator:** Introduction, Types of Bucket Elevator, Design of Bucket Elevator- loading and bucket arrangements, Cage elevators, shaft way, guides, counter weights.	05
4	**Design of Hoists:** Design of hoisting elements: Welded and roller chains – Hemp and wire ropes - Design of ropes, pulleys, pulley systems, sprockets and drums, Load handling attachments. Design of forged hooks and eye hooks – crane grabs - lifting magnets - Grabbing attachments - Design of arresting gear -Brakes: shoe, band and cone types.	10
5	**Design of Cranes:** Hand-propelled and electrically driven overhead traveling cranes; Traveling mechanisms of cantilever and monorail cranes , goliath cranes; design considerations for structures of rotary cranes with fixed radius ; fixed post and overhead traveling cranes; Stability of stationary rotary and traveling rotary cranes.	10
6	**Packaging and storage of bulk materials**: Steps for design of packages, protective packaging, testing the physical characteristics of packaging, container testing, types of storage and industrial containers, Automatic guided vehicles, Automatic storage and retrieval system.	04

Reference Books:

1. Belt conveyors for bulk materials Conveyor Equipment Manufacturer's Association, 6th edition, The New CEMA Book.
2. Materials handling equipment, Rudenko N., Elnvee Publishers.
3. Material Handling Handbook, Raymond A Kulwiec, John Wiley & Sons.
4. Engineering Science and application design for belt conveyor , Ishwar G Mulani and Mrs. Madhu I Mulani, Madhu I. Mulani.
5. Materials Handling Equipments, Alexandrov, M, MIR Publishers.
6. Bulk Materials Handling Handbook, Jacob Fruchtbaum, Springer Science +Business Media

Distribution of marks weightage for cognitive level

Bloom's Taxonomy for Cognitive Domain	Marks % weightage
Recall	10
Comprehension	10
Application	30
Analysis	40
Evaluate	10
Create	-

Course Outcome:

After learning the course the students will be able to:

Sr. No.	CO statement	Marks % weightage
CO-1	Compare and select material handling equipment for material transportation.	15
CO-2	Construct the conveyors for handling bulk materials.	35
CO-3	Analyze elements of hoisting mechanisms used in industry for material handling,	35
CO-4	Examine packaging and storage systems used in industry.	15

List of Experiments:

Computation and drawing work related to design of belt conveyor, hoisting mechanism, cranes and packaging systems.

Major Equipment:

1. Computational facility.

List of Open Source Software/learning website: http://nptel.ac.in