COURSE TITLE	**DESIGN OF MATERIAL HANDLING EQUIPMENT**
COURSE CODE	**01ME1606**
COURSE CREDITS	**4**

Objective:

1 To equip students with the ability to design and analyze material handling systems, including conveyors, elevators, and hoisting equipment, to meet desired needs within practical constraints.

Course Outcomes: After completion of this course, student will be able to:

1 Apply the principles of material handling to select appropriate equipment for diverse industrial applications.

2 Analyze and design hoisting elements such as ropes, chains, pulleys, hooks, girders, and arresting gear to ensure safe and reliable lifting operations.

3 Analyze and design various types of conveyors considering functional requirements, power transmission, and operational constraints.

4 Evaluate and validate the performance of bucket and cage elevators, including loading arrangements, shaft design, counterweights, and guide systems.

5 Apply and analyze robotic handling systems by integrating robot classification, end-effectors, and workplace automation for modern material handling applications.

Pre-requisite of course:FMD, MDID, Machine Design - I

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	**Materials Handling Equipment** Introduction to material handling Equipment, Detail classification of MHE., Application and their selection, Role of MHE in productivity and cost reduction.	4
2	**Design of Hoists** Design of hoisting Equipment likes: Wire and Hemp Rope, Welded and roller chains, Design of ropes, pulleys, Pulley systems, Sprockets and drums, Load handling attachments, Design of Hooks: forged hooks and eye hooks, Girder Design, Crane grabs, Grabbing attachments, Design of arresting gear.	14
3	**Conveyors** Classification of Conveyors, Design and applications of Belt Conveyors, Apron Conveyors and Escalators Pneumatic Conveyors, Screw conveyors and vibratory conveyors.	10

Contents : Unit	Topics	Contact Hours
4	**Elevators** Design of Bucket elevators: , Loading and bucket arrangements, Cage elevators, Shaft way, Guides, counter weights.	9
5	**Robotic Handling** Materials handling at the workplace, Robots: types and classification, End-effectors for gripping and positioning, Robotic handling applications in machining cells, automated storage/retrieval systems, Case studies on the integration of robotics in material handling.	5
Total Hours		**42**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Experiment 1** Apply the fundamental principles of Material Handling (MH) systems to identify, classify, and select appropriate material handling equipment for a given industrial scenario.	2
2	**Experiment 2** Design of the wire rope for hoisting application	2
3	**Experiment 3** Design the chain drive for hoisting application	2
4	**Experiment 4** Design of the Belt conveyor for conveying bulk material	2
5	**Experiment 5** 3D Modelling of Crane Hook Using CAD Software	2
6	**Experiment 6** Prototype Making of Material Handling Equipment (MHE) System	2
7	**Experiment 7** Study of Hoisting Equipment	2
8	**Experiment 8** Study of Hoisting Wire Rope	2
9	**Experiment 9** Study of Crane and its Components	2
10	**Experiment 10** Study of Different Types of Elevators	2
11	**Experiment 11** Case Study of Elevator	2
12	**Experiment 12** Case Study on Robotic Applications in Material Handling	2
Total Hours		**24**

Textbook :

1 Introduction to Material handling , Siddhartha Ray, NEW AGE INTERNATIONAL (P) LIMITED, 2008

2 Materials handling handbook, Harold A. Bolz, George E. Hagemann , Ronald Press Co, 2000

References:

1 Material Handling Equipments, Material Handling Equipments, Rudenko, MIR Publisher, 1999

2 Materials Handling Equipments, Materials Handling Equipments, Alexandrov M, MIR Publisher , 2004

3 MATERIALS HANDLING HANDBOOK By ASME, MATERIALS HANDLING HANDBOOK, MATERIALS HANDLING HANDBOOK By ASME, MATERIALS HANDLING HANDBOOK, Raymond A. Kulweic, Wiley & Sons, Incorporated, 2008

4 Conveying Machines, Volume I and II, Conveying Machines, Volume I and II, Spivakovsy A.O. and Dyachkov V K, MIR Publisher , 2000

5 Design Data Book, Design Data Book, Kalaikathir Achchagam, Tech P S G, 2020

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation

Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
5.00	5.00	20.00	30.00	20.00	20.00

Instructional Method:

1 Presentation

2 Videos and animation

3 case study

Supplementary Resources:

1 https://archive.nptel.ac.in/courses/113/105/113105104/