Program : **Diploma in Mechanical Engineering / Tool & Die Engineering / Manufacturing Technology**	
Course Code : **5023B**	Course Title: **Material Handling**
Semester : **5**	Credits: **4**
Course Category: **Program Elective**	
Periods per week: **4 (L:4, T:0, P:0)**	Periods per semester: **60**

Course Objectives:

- To impart knowledge about the operational features of the material handling equipment & its practical applications.
- To develop idea about selection, operation and maintenance of material handling equipment.
- To familiarize with different material handling processes used in industries.
- To familiarize with safety and maintenance practices in material handling

Course Pre-requisites:

Topic	Course Code	Course Name	Semester
Plant layout, material handling, types of maintenance		Industrial Engineering	4

Course Outcomes:

On completion of the course, the student will be able to

COn	Description	Duration (Hours)	Cognitive Level
CO1	Explain the classification and selection of material handling equipment and economics of material handling.	11	Understanding
CO2	Describe the functions of various components of hoisting equipment, cross handling equipment and arresting mechanisms	14	Understanding
CO3	Explain the scope and working of different conveying machineries and surface transport equipment	17	Understanding

CO4	Describe different types of cranes, hoists and elevating equipment used for material handling	16	Understanding
	Series Test	2	

CO-PO Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2					2	
CO2	2						
CO3	2						
CO4	2						

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO1	Explain the classification and selection of material handling equipment and economics of material handling		
M1.01	Identify the types of material handling equipment and applications	2	Remembering
M1.02	Explain the types of stacking, loading and unloading systems and the concept of palletization	3	Understanding
M1.03	Explain the principles of material handling, the factors affecting their selection	3	Understanding
M1.04	Appreciate the need for maintenance and the economics of material handling equipment	3	Understanding

Contents:

Introduction to Material Handling System: Types of Material handling equipment, their classification & applications; Types of load to be handled; Types of Movements; Methods of stacking, loading & unloading systems;

Principles of Material Handling Systems. Factors affecting choice of material handling equipment. Relation with plant layout -Economics of material handling - Unit load, palletization, containerization- Type of maintenance needed for material handling equipment-major points in maintenance of material handling equipment

CO2	Describe the functions of various components of hoisting equipment, cross handling equipment and arresting mechanisms		
M2.01	Identify and appreciate various components of hoisting machinery	2	Understanding
M2.02	Explain the various types of load handling attachments and cross handling equipment	4	Understanding
M2.03	Explain the construction, design and working of arresting gear	4	Understanding
M2.04	Identify and explain the construction, design and working of different types of brakes in material handling systems	4	Understanding
	Series Test – I	1	

Contents:

Components of Flexible hoisting appliances such as Welded load chains, Roller chains, Hemp ropes, Steel wire ropes- fastening methods of wire and chains

Load handling attachments- Various types of hooks-Forged, Triangular eye hooks-Appliances for suspending hooks - Crane grab for unit & piece loads - Electric lifting magnet, vacuum lifter.

Construction & Working of Arresting gear & Brakes; Construction & use of electromagnetic shoe brakes

Mechanism used in Material Handling Equipment: Steady state motion; Starting & stopping of motion in Hoisting mechanism, Lifting Mechanism, Traveling Mechanism.

Function, Working of Cross handling equipment such as Winches, Capstans, Turntables, Transfer tables, Monorail conveyors

CO3	Explain the scope and working of different conveying machineries and surface transport equipment		
M 3.01	Explain the construction and working of traction type conveyor system	6	Understanding
M 3.02	Explain the construction and working of traction less type conveyor system	6	Understanding
M 3.03	Explain the construction and working of different types of surface transportation equipment	5	Understanding

Contents:

Conveying Machinery: Construction, Working of Traction type conveyors such as Belt conveyors, Roller conveyors, Chain conveyors- Bucket elevators, Escalators

Construction, Working of Traction less type conveyors such as Gravity type conveyors, Vibrating & Oscillating conveyors, Screw conveyors, Pneumatic & Hydraulic conveyors – maintenance strategies for conveyors

Surface Transportation Equipment- Function and, applications of Trackless equipment.

List the different types of Hand operated trucks and Powered trucks used in material handling

Principle of working of Automatic Guided vehicle, Industrial Trailers

CO4	Describe different types of cranes, hoists and elevating equipment used for material handling		
M 4.01	Identify the different types of hoisting equipment and machineries	2	Understanding
M 4.02	Explain the construction and working of different types of hoists	5	Understanding
M 4.03	Explain the construction and working of different types of cranes	5	Understanding
M 4.04	Explain the construction and working of different types of elevating equipment	4	Understanding
	Series Test – II	1	

Contents:

Hoisting Machinery & Equipment: Construction, Working & Maintenance of different types of hoists such as Lever operated hoist, Differential hoists, Worm geared and Spur geared hoists

Cranes Construction, Working & Maintenance of different types of cranes such as Rotary cranes, Mobile cranes, Bridge cranes, cable crane, Floating crane, jib crane, derrick crane, overhead and gantry cranes

Construction, Working & Maintenance of Elevating equipment such as Stackers, Industrial lifts, Passenger lifts, hydraulic lift

Safety principles in material handling

Text / Reference

T/R	Book Title/Author
T1	Material handling (Principles & Practice) – Allegri T. H., CBS Publisher, New Delhi.
R1	Plant Layout & Materials Handling – Apple J. M., John Wiley Publishers.
R2	Material Handling Equipment – N. Rudenko, Peace Publisher, Moscow.
R3	Material Handling Equipment – M. P. Alexandro, MIR Publisher, Moscow.
R4	Material Handling Equipment – Y. I. Oberman, MIR Publisher, Moscow.
R5	Aspects of Material handling – Dr K.C Arora, Vikas V Shinde
R6	Plant layout and material handling- R.B. Chaudhary, G.R.N Tagore

Online Resources

S.No	Website Link
1	https://nptel.ac.in/courses/material handling
2	https://nptel.ac.in/courses/organisation facility and material handling
3	https://ndl.iitkgp.ac.in/