

MATERIALS HANDLING
(MECH 4142)

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) Large quantity of stable liquid material can be handled by [CO1/LOCQ]
(a) pneumatic Conveying (b) hydraulic Conveying
(c) belt conveyor (d) industrial trucks.
- (ii) For a sample of bulk material, if maximum and minimum sizes of the particle are 0.1 mm and 0.05 mm then the average lump size is [CO1/IOCQ]
(a) 0.075 mm (b) 0.15 mm (c) 0.3 mm (d) 0.45 mm.
- (iii) Which one is not an attachment of FLT [CO2/LOCQ]
(a) boom (b) clamp (c) drum grab (d) rope.
- (iv) The minimum aisle width expression is (A= width of the aisle, TR= Minimum turning radius, L is length of the weight, X = distance between center line of drive (front) wheel to face of fork, C = clearance.) [CO2/IOCQ]
(a) $A = TR + X + L + C$ (b) $A = TR - X + L + C$
(c) $A = TR - X - L + C$ (d) $A = TR + X + L - C$
- (v) Which one is not the part of speed factor [CO3/LOCQ]
(a) lump size factor (b) slip factor
(c) air borne factor (d) abrasiveness factor.
- (vi) If the twist of the wires is opposite to the twist of the strands the rope is called [CO4/LOCQ]
(a) regular lay (b) parallel lay
(c) straight lay (d) cross lay.
- (vii) Sprocket is a part of [CO3/LOCQ]
(a) chain conveyor (b) belt conveyor
(c) Screw conveyor (d) hydraulic conveyor.

- (viii) A pulley with larger than desirable groove radius will have following effect [CO4/LOCQ]
(a) the wire rope will slip (b) the wire rope will flatten
(c) the pulley groove wears at two zones (d) no appreciable effect.
- (ix) Pivoted gates are [CO5/LOCQ]
(a) not good for controlling material flow rate
(b) very difficult to take up and down to close the hopper outlet
(c) generally rectangular in shape
(d) auxiliary equipment requiring huge effort.
- (x) Which one from the following is the part of truck maintenance [CO6/LOCQ]
(a) chain and sprocket maintenance (b) belt maintenance
(c) sheave maintenance (d) brakes and transmission maintenance.

Group - B

2. (a) Write down the disadvantages of Material Handling system. Discuss lump size with proper example. [(CO1) (Remember/LOCQ)]
(b) Briefly describe planning principle and material flow principle of a good Material Handling principle. [(CO1) (Understand/LOCQ)]
(4 + 2) + (3 + 3) = 12
3. (a) A fork lift truck has the rated capacity of 1500 kg and the load centre is 450 mm. The distance between front wheels to the heel of the fork is 350 mm. The CG of the load is at 500 mm from the heel. Find out the safe load of FLT.
[(CO2) (Evaluate/HOCQ)]
(b) Explain Walkie truck with a neat sketch. [(CO2) (Understand/LOCQ)]
7 + 5 = 12

Group - C

4. (a) Describe Positive pressure type Pneumatic Conveyor with neat sketch.
[(CO3)(Analyze/IOCQ)]
(b) Find out the belt used for carrying 15 tonnes/hr of wheat through a troughed belt conveyor. The belt speed and inclination angle is 2.5 m/s and 20° respectively. The static angle of friction of the material is 34°. The bulk density of wheat is 790 kg/m³. [(CO3)(Evaluate/HOCQ)]
6 + 6 = 12
5. (a) Briefly describe Gravity type Roller Conveyor with sketch.
[(CO3)(Describe/IOCQ)]
(b) Explain the power calculation with expression for a Screw Conveyor.
[(CO3) (Analyze/HOCQ)]
6 + 6 = 12

Group - D

6. (a) Draw the cross sectional view of a 6× 7 (6-1) rope system. [(CO4) (Explain/IOCQ)]
 (b) Explain Clamshell grab bucket with a neat sketch. [(CO4) (Explain/IOCQ)] **6 + 6 = 12**
7. (a) With a neat sketch, describe different types of hooks used in MH system. [(CO4) (Describe/IOCQ)]
 (b) An EOT crane is supposed to take a pay load of 120 tonnes. The weight of the bottom block of crane is 1.75% of pay load. Friction loss is 3.5% of pay load. The number of falls for the rope is 6 and factor of safety is 5. Find out the load per fall for the rope system. [(CO4)(Evaluate/HOCQ)] **6 + 6 = 12**

Group - E

8. (a) Describe with figure slide gates, troughed gates and pivoted gates. [(CO5)(Remember/IOCQ)]
 (b) Describe the working principle of ball table as auxiliary equipment. [(CO5)(Explain/IOCQ)] **9 + 3 = 12**
9. (a) Write down the difference between the automatic system and manually operated system of MH equipment. [(CO6)(Remember/LOCQ)]
 (b) Briefly describe the maintenance procedure of a conveyor system. [(CO6)(Describe/LOCQ)] **6 + 6 = 12**

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	34.92%	41.50%	23.58%

Course Outcome (CO):

After the completion of the course students will be able to

CO1: State the importance of materials handling equipment, its classification and select appropriate material handling equipment.

CO 2: State the constructional features of different trucks and vehicle

CO3: Describe the constructional features and designs of conveyor systems

CO4: Explain the working principle of different hoisting equipment and their purpose

CO5: Understand the application of automation and robotics in materials handling system

CO6: Distinguish different types of auxiliary handling equipment and apply the knowledge of maintenance and safety in materials handling system

Department & Section	Submission link:
ME	https://classroom.google.com/c/NDA50DUwNzg5NTYz/a/NDYzODI00TU30Dg0/details