

MATERIALS HANDLING
(MECH 4142)

Time Allotted : 2½ hrs

Full Marks : 60

Figures out of the right margin indicate full marks.

*Candidates are required to answer Group A and
any 4 (four) from Group B to E, taking one from each group.*

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

Group – A

1. Answer any twelve:

12 × 1 = 12

Choose the correct alternative for the following

- (i) Most preferred MH equipment used for simultaneous mixing & conveying purpose is
 - (a) pneumatic conveyor
 - (b) screw conveyor
 - (c) bucket elevator
 - (d) belt conveyor.
- (ii) Impact idlers are used in a belt conveyor at
 - (a) the loading points
 - (b) the return point
 - (c) an interval of 15 m on a conveyor run
 - (d) at mid point.
- (iii) Generally apron or pan type chain conveyors are used to perform severe duties of conveying large quantities of _____ load.
 - (a) bulk
 - (b) unit
 - (c) liquid
 - (d) both (b) and (c)
- (iv) Pneumatic conveyors are generally used for conveying
 - (a) packaged goods
 - (b) granular material
 - (c) mineral ores
 - (d) heavy goods.
- (v) Steel wire ropes are specified by
 - (a) weight of the wire per meter length
 - (b) nominal rope diameter in millimetres followed by number of strands and number of wires in a strand
 - (c) breaking load in KN followed by diameter of strand in millimetre and number of wires in a strand
 - (d) large diameter welded chain sprocket which is rotated by pulling of an endless chain.
- (vi) A level luffing crane is so called because
 - (a) loads can be lifted up to the level of the crane
 - (b) level of the load is changed by luffing
 - (c) the lifted load remains at the same level during luffing
 - (d) the crane operates on a level ground.

- (vii) To avoid the chance of toppling while lifting a load, out riggers are used in
 - (a) gantry crane
 - (b) wharf crane
 - (c) crawler crane
 - (d) truck mounted crane
- (viii) In the vibrating feeder, material is moved by
 - (a) circular motion
 - (b) linear motion
 - (c) hopping motion
 - (d) reciprocating motion
- (ix) Robot is better suited over an EOT crane for
 - (a) shifting of material from one place to another in a job shop
 - (b) handling of jobs of irregular sizes and varying weights
 - (c) repetitive accurate positioning and loading of components in a machine
 - (d) long distance movement of materials.
- (x) Chutes are
 - (a) inclined connections between two systems of MH equipment
 - (b) motor driven disk shaped table
 - (c) similar to belt feeders
 - (d) used to tilt horizontally and vertically movement of materials.

Fill in the blanks with the correct word

- (xi) Unpowered roller conveyors use _____ force to convey loads in one direction.
- (xii) _____ conveying system is used to handle large volumes of gas.
- (xiii) In belt conveyor training idlers are used for _____.
- (xiv) In regular lay ropes, directions of twist of the wires in the strand is _____ to the twist of the strands.
- (xv) Crawler cranes are _____-_____ but can work outdoors on field.

Group - B

- 2. (a) Describe Gravity Principle and Space Utilization Principle with respect to material handling systems. [[CO1](Understand/LOCQ)]
- (b) Classify different Material Handling equipment. [[CO1](Understand/LOCQ)]
- 6 + 6 = 12**
- 3. (a) The rated capacity of a FLT having a load center of 50 cm is 2000 kgs. The distance from the middle of the front wheel to the front face of the fork with the vertical mast is 40 cm. Calculate the safe load capacity of the FLT if the load center is increased by 6 cm. [[CO2](Apply/IOCQ)]
- (b) Define the term "Materials Handling". Explain the objectives of MH. [[CO1](Understand/LOCQ)]
- 6 + 6 = 12**

Group - C

- 4. (a) Discuss the advantages and disadvantages of a Pneumatic Conveyor. [[CO3](Understand/LOCQ)]

- (b) Differentiate between unpowered roller conveyor and powered roller conveyor. [[CO3](Understand/LOCQ)]
6 + 6 = 12

5. (a) Describe the working principle of bucket elevators. [[CO3](Understand/LOCQ)]
 (b) Find the nominal diameter of a screw for a conveyor which conveys wheat at the rate of 10 tonnes/hr horizontally. The pitch of the screw is 0.9 times the diameter of the screw. The flowability of grain is 0.4 and the bulk density of the material is 7900 kg/m³. The speed of the motor is 450 rpm. [[CO3](Apply/IOCQ)]
6 + 6 = 12

Group - D

6. (a) Describe with a schematic diagram the working mechanism of a Level Luffing Wharf Crane. Why is it called Level Luffing? [[CO4](Analyse/IOCQ)]
 (b) What are the advantages of using steel wire ropes over chains? [[CO4](Remember/LOCQ)]
8 + 4 = 12
7. (a) A mobile crane supported on 4 wheels has slewing centre equidistant from both the wheels. The following data are given for this crane:
 Wheel centre to centre distance = 4 m
 Boom length = 15 m
 Static tipping load at 5 m radius = 10 T (boom in forward direction)
 Calculate the SWL at 8 m radius if Stability Margin is kept 25%. [[CO4](Evaluate/HOCQ)]
 (b) How do you distinguish between a wire rope and a winch? [[CO4](Remember/LOCQ)]
8 + 4 = 12

Group - E

8. (a) Briefly mention the types and the usages of Belt Feeders and Apron Feeders. [[CO6](Analyse/HOCQ)]
 (b) Explain the terms Chutes and Trough Gate with line sketches and their applications. [[CO6](Remember/LOCQ)]
6 + 6 = 12
9. (a) What is "Robot"? [[CO6](Analyse/HOCQ)]
 (b) How do you classify a "Robot"? [[CO6](Analyse/HOCQ)]
 (c) Define various types of Robotic Manipulators. [[CO6](Analyse/HOCQ)]
4 + 4 + 4 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	52.08	20.83	27.09

