

**MATERIALS HANDLING
(MECH 3263)**

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) Material handling inside a medium sized gear box plant is usually done by
 - (a) gantry crane
 - (b) level luffing crane
 - (c) chain-pulley blocks
 - (d) EOT crane.
 - (ii) 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 the number of wires in a strand
 - (c) breaking load in KN followed by diameter of strand in millimetre and number of wires in strand
 - (d) none of these.
 - (iii) The choice of appropriate type of pneumatic conveying system depends upon
 - (a) bulk density and particle size
 - (b) flow ability
 - (c) abrasiveness
 - (d) all of these.
 - (iv) 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) none of the above.
 - (v) “Dollies” are multiple wheel hand trucks where
 - (a) the source of power is battery driven motor
 - (b) two handles are provided with multiple wheels
 - (c) no handle is provided
 - (d) none of these.
 - (vi) 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.

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- (vii) An essential requirement of a good MH system is
(a) capital expenditure
(b) scaleability of plant & equipment
(c) storing material utilizing minimum space
(d) all of these.
- (viii) In the vibrating feeder, material is moved by
(a) circular motion (b) linear motion
(c) hopping motion (d) reciprocating motion.
- (ix) Counter balance in fork lift truck lies in
(a) front wheel (b) forks (c) main body (d) mast.
- (x) Belt conveyors can be operated in
(a) horizontal plane
(b) inclined plane
(c) vertical plane
(d) combination of horizontal & inclined plane.

Group - B

2. List four types of material handling equipment and for each equipment explain what kinds of material they can handle best and why. Draw a sketch of each equipment.
 $(3 + 3 + 3 + 3) = 12$
3. (a) Explain fastened unit load, self contained unit load and unit load on a platform.
(b) Enumerate the general problems that are found while handling of materials in an industry. State the remedial measures for solving those problems.
 $(2 + 2 + 2) + (3 + 3) = 12$

Group - C

4. (a) Show mast, counter balance, steering wheel, forks, cylinder and other different parts of a FLT through a neat sketch.
(b) The rated capacity of a FLT having load centre of 80 cm is 5000 kgs. The distance from the middle of the front wheel to the front face of the fork with the vertical mast is 60 cm. Determine the safe load capacity of the FLT if the load centre is increased by 10% of its earlier load centre.
 $6 + 6 = 12$
5. (a) Briefly mention the types and usages of Belt Feeders and Apron Feeders.
(b) Explain Chutes and Trough gate with line sketch and their applications.
 $(3 + 3) + (3 + 3) = 12$

Group - D

6. (a) With neat sketch show the difference between flat belt conveyor and troughed belt conveyor? What are the application areas of those type of belt conveyors.

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(b) In a belt conveyor, what are the factors that help to determine the belt speed? How do you calculate the resistive forces against the motion of belt carrying the load?

(3 + 3) + (3 + 3) = 12

7. (a) What are the different types of pneumatic conveyors? Illustrate the concept of positive pressure system, negative pressure system and the combined negative-positive pressure system in a pneumatic conveyor system.

(b) Illustrate the functioning of an unpowered roller conveyor with the suitable sketches.

(2 + 4) + 6 = 12

Group - E

8. (a) How do you define hoisting equipment? Briefly discuss its characteristics and usage.

(b) Mention with a suitable sketch, the constructional features of a hoisting equipment.

6 + 6 = 12

9. (a) Explain utilities of truck mounted and crawler crane.

(b) Illustrate briefly robotic handling application in respect of (i) material transfer and (ii) machine loading and unloading.

(3 + 3) + (3 + 3) = 12

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