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) One of the disadvantages of MH system is
(a) cut down labour cost (b) improve efficiency of production
(c) more chances of accidents (d) additional capital cost.

(ii) Statement 1: It is generally not possible to change the direction of flow with belt Conveyors
Statement 2: If belt conveyors are to be used in the bent position, slat belts are used
(a) true, false (b) true, true
(c) false, false (d) false, true.

(iii) Steel scrap can be lifted best by
(a) hook (b) clamshell grab
(c) orange peel grab (d) tongs.

(iv) Rope drum is used in a
(a) winch (b) multi pulley system
(c) chain pulley block (d) robot.

(v) Which of the following elements consists of a conveyor belt?
(a) Piles and rubber
(b) Top cover, carcass and bottom cover
(c) Belt splicing and idlers
(d) Synthetic rubber and plastics.

(vi) In the vibrating feeder, material is moved by
(a) circular motion (b) linear motion
(c) hopping motion (d) reciprocating motion.

(vii) Belt conveyors are generally employed for _____ of materials
(a) intermittent flow (b) continuous flow
(c) vibration (d) mixing

(viii) Troughed belt conveyors have _____ carrying capacity than flat belt conveyors of equal belt width.
(a) more (b) less (c) equal (d) both (b) and (c)

(ix) Dynamic loading phenomena is common in
(a) belt conveyors (b) chain conveyors
(c) screw conveyors (d) pneumatic conveyors.

(x) Moving a large load over some distance in a construction site is best done by
(a) truck mounted crane (b) crawler type crane
(c) EOT crane (d) level luffing crane.

Fill in the blanks with the correct word

(xi) To avoid the chance of toppling while lifting a load, out riggers are used in _____.

(xii) As an unit load is moved by a Level Luffing Crane, the height of the load from ground _____.

(xiii) The hoisting equipment which is used for self-loading and shifting them to different places in a factory is _____.

(xiv) Counter balance in fork lift truck lies in _____.

(xv) Work envelope of a Cartesian co-ordinate robot is _____.

Group - B

2. (a) Define the term "Materials Handling". Explain the objectives of MH. *[(CO1)(Remember /LOCQ)]*

(b) Briefly mention the selection criteria of MH equipment in a particular Industry according to your choice. *[(CO1)(Understand/LOCQ]*

6 + 6 = 12

3. (a) Explain the process of load unitization with suitable examples. *[(CO1)(Analyse/LOCQ)]*
(b) Explain the major constructional features of fork lift trucks. *[(CO2)(Understand/LOCQ)]*

6 + 6 = 12

Group - C

4. (a) Specify the various characteristics of troughed belt conveyor. *[(CO3)(Understand/LOCQ)]*

(b) With the help of suitable schematic diagrams, explain the constructional features of Trolley type chain conveyors. *[(CO3)(Understand /LOCQ)]*

6 + 6 = 12

5. (a) What are the advantages of pneumatic conveyors? *[(CO3)(Analyse/IOCQ)]*
(b) Calculate the safe volumetric capacity of a screw conveyor inclined at 10° to the horizontal plane, having 200mm nominal screw diameter, and screw pitch

160mm, running at 100rpm. Given, loading efficiency of the vertical cross sectional area Φ=0.25 and inclination factor C=0.8. *[(CO3)(Evaluate/HOCQ)]*

6 + 6 = 12

Group - D

6. (a) What is "Wire Rope"? Mention the types and the construction of Wire Rope. *[(CO4)(Analyse/IOCQ)]*

   (b) What are the advantages and disadvantages of Regular Lay and Parallel Lay Ropes? *[(CO4)(Remember/LOCQ)]*

6 + 6 = 12

7. (a) Describe with a neat sketch the hoisting mechanism of a clamshell grab. What are the types of material it can handle? *[(CO4)(Analyse/HOCQ)]*

   (b) Describe with a schematic diagram, working of aLvel Luffing Wharf crane. Why it is called Level Luffing. *[(CO4)(Apply/HOCQ)]*

6 + 6 = 12

Group - E

8. (a) Briefly mention the types and usages of Belt Feeders and Apron Feeders. *[(CO6)(Analyse/HOCQ)]*

   (b) Explain Chutes and Trough Gate with line sketches and their applications. *[(CO6)(Remember/IOCQ)]*

6 + 6 = 12

9. (a) Define the term "Robot". What are the classifications of Robots? *[(CO5)(Analyse/HOCQ)]*

   (b) Illustrate briefly robotic handling application in respect of (i) material transfer and (ii) machine loading and unloading. *[(CO5)(Remember/LOCQ)]*

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

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	50	19	31

Course Outcomes (CO):

After completing this course, the students will be able to

CO1: State the importance of materials handling equipment, its classification and select appropriate material handling equipment.
CO2: 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: Implement 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

**LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question.*