MECHANICAL HANDLING OF MATERIALS
(MECH 4123)

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) A truck is used to move
(a) unit load (b) bulk load
(c) both unit load and bulk load (d) stack of unit load.

(iii) Belt conveyors are operated in
(a) inclined plane (b) horizontal plane
(c) combination of horizontal & inclined plane (d) all of these.

(iv) Sprocket is a part of
(a) chain conveyor (b) belt conveyor
(c) Screw conveyor (d) hydraulic conveyor.

(v) Pneumatic conveyors are generally used for conveying
(a) packaged goods (b) granular material
(c) mineral ores (d) heavy goods.

(vi) Flowability of a bulk material is generally determined by its
(a) angle of repose (b) weight per unit volume
(c) packing coefficient (d) all of these.

(vii) 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

(viii) 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

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

(x) Bowl feeders are used for
(a) continuous and controlled flow of bulk materials
(b) materials which do not deteriorate on crushing
(c) feeding components one by one, from a large quantity of small components, into the workplace or the processing machine
(d) conveying bulk material through vibration.

Fill in the blanks with the correct word

(xi) For simultaneous mixing and conveying purpose _____ conveyor is used.

(xii) Unpowered roller conveyors use _____ force to convey loads in one direction.

(xiii) Packing coefficient is the ratio of the bulk density of a packed material to _____.

(xiv) In regular lay ropes, the direction of twist of the wires in the strand is _____ to the twist of the strands.

(xv) Winch is a _____ equipment which is fixed to the floor or wall.

Group - B

2. (a) Discuss different components of a troughed belt conveyor with a neat sketch. *[(CO2)(Understand/LOCQ)]*

(b) Briefly describe the different methods of handling a unit load. *[(CO1)(Understand/LOCQ)]*

6 + 6 = 12

3. (a) Calculate the motor power output (kW) required in the belt conveyor if required Driving force = 2444 N, belt speed = 2.65 mtr/sec, wrap resistance at driving pulley = 230 N, drive pulley bearing resistance = 44N, and final transmission efficiency is 0.8%. *[(CO2)(Apply/IOCQ)]*

(b) Discuss the belt construction of a belt conveyor with a schematic diagram. *[(CO2)(Understand/LOCQ)]*

6 + 6 = 12

Group - C

4. (a) Discuss the applications and advantages of the different Roller Conveying systems. *[(CO3)(Understand/LOCQ)]*

(b) Briefly explain the basic principles of operation of a positive pressure system of low pressure pneumatic conveying with a sketch. *[(CO3)(Understand/LOCQ)]*

6 + 6 = 12

5. (a) A screw conveyor is to be designed to convey moulding sand at an inclination of 20° with the horizontal. The length of the conveyor is 25 m and the nominal diameter of the screw is 550 mm. Bulk density of sand may be taken as 1.6 tones/cubic metre and is abrasive in nature. Assume loading efficiency as 0.125. Screw pitch = 1.0 times the nominal diameter of the screw, r.p.m. of the screw is 50 rpm and inclination factor is 0.65, progress resistance coefficient is 4.
Find out:
(i) Capacity of the screw conveyor.
(ii) Total power required for the conveyor in kW. *[(CO3)(Apply/IOCQ)]*

(b) What are the advantages and limitations of a chain conveyor compared to a belt conveyor? *[(CO3)(Understand/LOCQ)]*

6 + 6 = 12

Group - D

6. (a) Define the term "Hoisting Equipment". *[(CO4)(Remember/LOCQ)]*
(b) Briefly discuss the major parts of Hoisting Equipment. *[(CO4) (Understand/LOCQ)]*

2 + 10 = 12

7. (a) What is a winch? *[(CO4)(Remember/LOCQ)]*
(b) What is the use of winch in a crane? *[(CO4)(Remember/LOCQ)]*
(c) Describe the constructional features of a winch. *[(CO4) (Understand/LOCQ)]*

2 + 4 + 6 = 12

Group - E

8. (a) What are hand trucks? *[(CO5)(Understand/LOCQ)]*
(b) Describe any four types of hand trucks with sketches. *[(CO5)(Understand/LOCQ)]*

2 + 10 = 12

9. (a) Describe with a neat sketch the essential parts of a Fork lift truck and label the important parts. *[(CO5)(Understand/LOCQ)]*
(b) How do you specify a Fork lift Truck? *[(CO5)(Understand/LOCQ)]*

6 + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	87.5	12.5	0