



**MAULANA ABUL KALAM AZAD UNIVERSITY OF
TECHNOLOGY, WEST BENGAL**

Paper Code : ME-605A

MATERIALS HANDLING

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

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

GROUP - A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any ten of the
following : $10 \times 1 = 10$

i) Loads are usually classified into

- a) pay load and dead load
- b) unit load and bulk load
- c) pallet load and hoisting load
- d) none of these.

ii) Bulk materials are generally handled by

- a) skip hoist b) cranes
- c) under shed d) silos.

iii) Which of the following conveyors is also called
pallet-type conveyor ?

- a) Trolley type conveyor
- b) Car type conveyor
- c) Apron type conveyor
- d) Pan type conveyor.

iv) The characteristic of flowability of bulk material is
expressed in code as .

- a) 1, 2, 3, 4 b) A, B, C, D
- c) LSUZN d) none of these.

v) Which of the following is an example of bulk load ?

- a) Crate full of casting
- b) Sand
- c) Packing box
- d) A trailer full of sand.

- vii) Skid is a type of
- Hoist
 - Hand lift truck
 - Non powdered truck
 - Unitization devices.
- viii) Snub pulley is used in a belt conveyor
- to decrease angle of lap
 - to increase angle of lap
 - for continuous discharge
 - none of these.
- ix) Apron conveyor is a type of
- belt conveyor
 - chain conveyor
 - Pneumatic conveyor
 - Screw conveyor.
- x) In $\Phi 20 \times 6 \times 19$ wire rope, no. of wire ropes is
- | | |
|-------|---------|
| a) 20 | b) 6 |
| c) 19 | d) 114. |
- xi) Lifting motion is associated with
- | | |
|-----------------------|-------------------------|
| a) Hoisting motion | b) Slewing motion |
| c) Long travel motion | d) Cross travel motion. |

- xii) In the vibrating feeder, material is moved by
- Circular motion
 - Linear motion
 - Hopping motion
 - Reciprocating motion.
- xiii) The choice of appropriate type of pneumatic conveying system depends upon
- Bulk density and particle size
 - Flowability
 - Abrasiveness
 - all of these.

GROUP - B

(Short Answer Type Questions)

Answer any three of the following. $3 \times 5 = 15$

2. A screw conveyor is to be designed to convey moulding sand at an inclination of 30° with the horizontal. The required capacity is 50 tonnes per hour, length of conveying is 25 m, bulk density of sand 1.60 tonne/cubic m and is abrasive in nature, loading efficiency is 0.125, screw pitch = $1.0D$, where D is nominal diameter of screw, r.p.m. of the screw is 60, inclination factor is 0.65, mass flow rate is 60 tonnes / hr, progress resistance coefficient is 4. Find out total power required for the screw in kW.

3. Rated capacity of the FLT is 2000 kg and load centre is 550 mm. Distance between front wheels to heel of the fork is 450 mm.

- Find out true capacity of the FLT.
- If a load is to be carried whose CG is at a distance of 650 mm from the heel of the forks (distance B to C = 550), then find out the maximum safe weight.

4. What are the different types of idlers used in a belt conveyor system and where ? Discuss the constructional feature and application of impact idler.

1 + 4

5. Calculate the motor power output required in kW in belt conveyor if required peripheral force = 2444.07 N, belt speed = 2.65 m/sec, wrap resistance at driving pulley = 230 N, drive pulley bearing resistance = 44 N and final transmission efficiency is 0.80%.

6. Describe with neat sketch a Forklift truck. How is an FTL specified ?

2 + 3

GROUP - C

(Long Answer Type Questions)

Answer any three of the following. $3 \times 15 = 45$

- What is system concept ? What are the advantages and disadvantages of material handling ? $3 + 6$
 - What are the functional scopes of material handling within an industry ? 3
 - Classify unit loads as per BIS specification number IS 8005 : 1976. 3
- A battery-operated FLT weighs 4000 lbs including battery & operator. It is carrying a weight of 2000 lbs. The truck lifts the load to 2 ft & carries the load to a distance of 200 ft of which 170 ft is along level road & balance 30 ft on and upgrade of 6%. After discharging the load, it returns by the same route. Calculate total watt-hr of energy spent by the truck. Select suitable battery if the truck has to make 200 such trips daily. (Assume 2 tilts with load & 1 tilt without load in each trip). 8

Approx Watt-Hrs Req'd by FLT's to Travel on Level Concrete

Wt of Truck + Load (lb)	Length of Run (ft)			
	50	100	200	300
1000	1.8	2.5	4	5.5
2000	3.5	6	8	11
4000	7	10	16	22
6000	10.5	15	24	33
8000	14	20	32	44

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- Q.1. Explain the following terms as discussed in the text. Explain the use of FLTs with sketch. Briefly explain the use of FLTs. 7
- a) Derive an expression for efficiency of a movable pulley, applicable for gun in force. 5
- b) A horizontal belt conveyor with 3-roiler troughing arrangement handles coal at the rate of 150 t/hr at a speed of 2.5 m/sec. The side troughing idlers are set at an angle of 15° with respect to the axis of the central idler. If the bulk weight of the material is 0.8 t/m^3 and static angle of repose of the load is 45° , then find out the width of the belt. Deduce the expression that you use in solving the problem with necessary assumptions. 10
- a) Name the major components of the robots with their function. 5
- b) Classify the robot manipulators. 5
- c) Write down about the cranes. What is luffing or booming in a revolving crane? 5
- a) Describe the capacity of a bucket elevator in terms of capacity of bucket, bucket filling factor, elevator speed, bucket spacing, bulk density of material. 8
- b) Describe the capacity of a screw conveyor in terms of its screw diameter, screw pitch, rotational speed and loading efficiency, bulk density of material and inclination of conveyor. 7

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