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Paper Code : ME-605A

MATERIAL 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 the following : $10 \times 1 = 10$

i) The value of packing coefficient for bulk material is

a) >1 b) $= 1$

c) < 1 d) 0.

ii) The objective of materials handling is

a) lowest cost solution

b) efficient and safe movement

c) timely movement of material

d) all of these.

iii) Angle of repose of bulk material is used for determination of its

a) flowability b) Mobility

c) Fluidity d) none of these.

iv) A conveyor belt consists of which of the following elements ?

a) Plies and rubber

b) Top cover, carcass and bottom cover

c) belt splicing and idlers

d) none of these.

v) An essential requirement of a good MH system is

a) Capital cost expenditure

b) Flexibility reduction

c) Sale ability of plant & equipment

d) Storing maeterials utilizing minimum space.

vi) Work envelope of a Cartesian coordinate robot is

a) parallelepiped b) cylinder

c) conical d) sphere.

vii) The fork lift attachment used for lifting loads using hook and sling is called

a) clamp b) boom

c) drum grab d) dram.

viii) Lay of steel wire ropes classifies them into

a) regular lay long lay, reverse lay

b) Warrington compound and non-spinning

c) locked coil and flattened

d) none of these.

ix) Based on air pressure, pneumatic conveying systems may be classified as

a) dilute phase and dense phase

b) blow vessels and air slides

c) positive pressure, negative pressure, combined positive negative system

d) none of these.

x) The choice of appropriate type of pneumatic conveying system depends upon

a) Bulk density and particle size

b) Flowability

c) Abrasiveness

d) all of these.

GROUP – B

(Short Answer Type Questions)

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

2. Why the value of "artificial frictional co-efficient" is so large in a screw conveyor ?

3. Discuss about dynamic phenomenon in chain conveyors.

4. What are the major advantages of a overhead travelling crane ?

5. a) The power required at driving pulley just for the driving the belt is 120 kW. The tension at slack side is 50 N and Meu(μ) is 0.4 and Alpha (α) is 150 degrees. Calculate the belt speed in mm/sec.

   b) Calculate the conveying capacity of a troughed belt conveyor if B = belt width = 500 m, V = 1200 mm/sec, γ = bulk density is 2 tonnes/m^3. $\varnothing$ = static angle of repose is 45 degrees. λ = 60 degrees.

6. Boxes of size 220 mm × 180 mm × 100 mm have to be conveyed by a belt conveyor of sufficient belt strength, at the rate of 2500 boxes per hour. What is the belt size and speed of the conveyor ? Place the boxes with a gap of 250 mm between boxes and calculate the side clearance.

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) What are main features of fork lift truck ? What do you mean by capacity rating of FLT ? 8

b) Rated capacity of FLT is 2000 kg and load centre is 550 mm. Distance between front wheel to heel of the fork is 450 mm :

i) Find out true capacity of FLT.

ii) If load is carried whose centre of gravity is at distance 650 mm from heel of fork, then find out maximum safe weight. 7

8. a) In a neat sketch, show the general arrangement of a belt conveyor system and label the different important parts. 8

b) Discuss briefly the types of vibrating conveyor. 7

9. a) An iron ore of slurry condition need to be transported 50 km through undulation area. Select the suitable method of transport and explain it. 9

b) Compare the truck, rail and conveyor transport system. 6

10. a) Calculate the conveyor capacity of a troughed belt conveyor if belt width is 500 mm, velocity is 1200 mm/sec, bulk density of carrying material is 2000 tonnes/m^3, static angle of repose is 45° and troughing angle is 60°. 5

b) In an E.O.T. crane, number of falls of the rope is 8. The pay load is 80 tons. Weight of the bottom block is 3% of the pay load. Friction loss per fall is 2.5%. Taking a factor of safety of 6, calculate the design load per fall of rope. 5

c) Draw a neat sketch of a Belt conveyor levelling the different important parts. 5

11. a) Explain the objectives and principles of material handling. 7

b) What are the important technical factors that should be considered in the choice of material handling equipment ? Briefly discuss any one factor. 8