CS/B.Tech/ME/Even/Sem-6th/ME-605A/2015

WEST BENGAL UNIVERSITY OF TECHNOLOGY
ME-605A
MATERIAL HANDLING

Time Allotted: 3 Hours   Full Marks: 70

The questions are of equal value.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as
practicable. All symbols are of usual significance.

GROUP A
(Multiple Choice Type Questions)

1.   Answer *all* questions.   10×1 = 10

(i) Alumina (Material code B27M), M stands for
    (A) contains explosive dust   (B) free flowing
    (C) packs under pressure   (D) sticky

(ii) Tactile sensors are
    (A) Contact type   (B) Non-contact type
    (C) Hydro   (D) Solar

(iii) Hoisting drum of a crane shall be made of
    (A) Gray cast iron: grade 25 of IS:210-1962
    (B) Cast steel: grade 2 of IS: 1030-1963
    (C) Mild steel IS: 226-1962
    (D) All of these

(iv) The characteristics of flow ability of a bulk material is
     expressed in code as
    (A) 1, 2, 3, 4   (B) a, b, c, d   (C) LSUZN   (D) none of these

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(v) Impact idlers are used in a belt conveyor at
    (A) the loading points
    (B) the return point
    (C) an interval of 15m on a conveyor run
    (D) none of these

(vi) Unit size principle deals with
    (A) select light weight material
    (B) provide good house keeping
    (C) select a versatile equipment
    (D) increase quantity size weight of loads

(vii) Loads are usually classified into
    (A) pay load and dead load   (B) pallet load and hoisting load
    (C) unit load and bulk load   (D) none of these

(viii) An essential requirement of a good M.H. system is
    (A) flexibility reduction
    (B) capital cost expenditure
    (C) sale ability of plant and equipment
    (D) storing materials utilizing minimum space

(ix) Robot grip the material
    (A) manipulation   (B) controller
    (C) end effecter   (D) arm

(x) In the vibrating feeder, material is moved by
    (A) circular motion   (B) linear motion
    (C) hopping motion   (D) reciprocating motion

GROUP B
(Short Answer Type Questions)

Answer any *three* questions.   3×5 = 15

2.   A screw conveyor is to be designed to convey moulding sand   5
        at an inclination of 20° with the horizontal. The required
        capacity is 60 tones per hour, length of conveying is 25 mtr,
        bulk density of sand 1.60 tone/ cubic mtr and is abrasive in
        nature, loading efficiency is 0.125, screw pitch = 1.0D (where

D = nominal diameter of screw), r.p.m. of the screw is 50 r.p.m, inclination factor is 0.65, mass flow rate is 60 tones/hr, progress resistance coefficient is 4. Find out
   (i) nominal diameter of screw in meter.
   (ii) total power of the screw required in kW.

3. What is bulk material? What is bulk density? What is packing co-efficient? What is the general value of packing co-efficient?   5

4. (a) The power required at the driving pulley just for driving the belt is 120kW. The tension in the slack side is 50N and $\mu = 0.4$, $\alpha = 150$ degrees. Calculate the belt speed in mm/sec.   2+3

   (b) Calculate the conveying capacity of a troughed belt conveyor if B = belt width = 500mm, V = 1200mm/sec, γ = bulk density is 2000 tonnes/m^3, ϕ = static angle of repose is 45 degrees, $\lambda = 60$ degrees.

5. Mention the advantages and disadvantages that are associated with unitization of load.   5

6. How a material is coded? Give any one example with code. What is flowability of a material? How it is defined.   5

GROUP C
(Long Answer Type Questions)

Answer any *three* questions. $3\times15 = 45$

7. (a) How industrial trucks are classified? Explain different parts of fork lift trucks with sketch. Briefly explain the use of fork lift trucks.   4

   (b) What is a tractor? Explain wheel type and crawler type tractors with application areas. Differentiate between tractor and trailer.   5

   (c) A battery operated FLT weighs 4000 pounds including weight of battery and operator. It is carrying a weight of 2000 pounds. The truck lifts the load to 2 ft and carries the load to a distance of 200 ft of which 170 is along level road and balance 30 ft on an upgrade of 6%. After discharging the load it returns over same route. Calculate total watt-hours of energy spent by the   6

truck. Select suitable battery if the truck has to make 200 such trips daily.
   (i) Total run with load
   (ii) Extra power for 30 ft of inclined travel at 6% upgrade
   (iii) Return empty run deducting the downgrade run
   (iv) Lifting of load

8. (a) What are the advantage and limitation of chain compared to belts of a belt conveyor.   3

   (b) Describe the use and constructional features of apron type chain conveyor.   6

   (c) Calculate the motor power output required kW in belt conveyor if required peripheral force = 2444.07N, belt speed = 2.65 mtr/sec, wrap resistance at driving pulley = 230N, drive pulley bearing resistance = 44N and final transmission efficiency is 0.80%.   6

9. (a) Describe with neat sketch working of a Electric Overhead Traveling Crane.   4

   (b) Explain for which applications EOT cranes are used.   3

   (c) Describe with neat sketch working of a Level Luffing wharf crane.   5

   (d) Explain why it is called Level Luffing and why it is made Level Luffing.   3

10. (a) Discuss the classification of pneumatic conveying system based on particle concentration modes.   7

   (b) Briefly describe the basic principles of operation of a positive pressure system of low pressure pneumatic conveying. If necessary give figures to enumerate this.   8

11. What are the principal groups of materials handling equipment? State and briefly discuss the essential characteristics of each group. Write different types of powered and non-powered industrial vehicle/truck.   2+8+5