Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech/(ME-NEW)/SEM-6/ME-605 A/2013

2013

MATERIALS HANDLING

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full ma ks

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 usua ly classified into

a) pay load and dead load

b) unit oad and bulk load

) p llet load and hoisting load

d) none of these.

ii) 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.

iii) The characteristic of flowability 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.

iv) Rope reeving is used to indicate

a) the relative direction of twist in the steel wire

b) the minimum breaking load of a rope

c) the payload is lifted on two, four or six or eight parts of rope

d) none of these.

v) Impact idlers are used in a belt conveyor

a) At the loading p ints

b) At the return point

c) At an int rval of 15 m on a conveyor run

d) None of these.

vi) 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.

vii) Based on air pressures, 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.

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

a) Bulk density and particle s ze

b) Flowability

c) Abrasiveness

d) All of these.

ix) Lay of steel wire r pes classifies them into

a) Regular Lay Long Lay, Reverse Lay

b) Warrington compound and non-spinning

c) L cked coil and flattened

d) None of these.

x) 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 the 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) None of these.

xi) An essential requirement of a good MH system is :

a) Capital cost expenditure

b) Flexibility reduction

c) Sale ability of Plant & equipment

d) Storing Materials utilizing minimum space.

xii) The simplification principle in M.H method deals with

a) Make optimum use of equipment

b) Eliminate obstacles from mater als f ow

c) Integrate operations into Handling systems

d) Reduce combine or eliminate unnecessary movement.

xiii) Unit Size principle d als with

a) Select Light we ght Material

b) provide Good Housekeeping

c) selec a versatile equipment

d) Increase quantity size weight of loads.

xiv) Idle time principle is similar to

a) Dead weight principle

b) Standardisation principle

c) Safety principle

d) Motion principle.

GROUP – B

(Short Answer Type Questions)

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

2. Write at least four points on advantage & disadvantage associated with Unitization of load.

3. Discuss about dynamic phenomenon in Chain conveyors.

4. What are the major advantages of using steel wire rope compared to chains ? What is Parallel (lang) lay rope ?

5. What are the major advantages of overhead travelling crane ?

6. Boxes of size 220mm × 180mm 100mm 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.

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

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

GROUP – C

(Long Answer Type Questions)

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

8. a) What are the principal groups of material handling equipment ? State and briefly discuss the essential characteristics of each group. 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

9. a) Show by schematic diagram, the essential parts of an E.O.T. crane and label the important parts. 9

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

10. a) In a neat ske ch, show the general arrangement of a belt conveyor system and label the different important parts. 9

    b) What are the different types of idlers used in a belt c nveyor system and where ? Discuss the constructional feature and application of impact idler. 6

11. 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

12. a) Name the major components of the robots with their function.

    b) Classify the robot manipulators.

    c) What are the major applications of Robotic handling ?

5 + 5 + 5

13. Write short notes on any *three* of the following : 3 × 5

    a) Material code as per IS : 8730:1997

    b) Load utilization process

    c) Simple *vs*. multiple pulley system

    d) Level buffing system

    e) Shrink wrapping *vs* Stretch wrapping.