B.TECH/ME/6TH SEM/MECH 3263/2019
MATERIALS HANDLING
(MECH 3263)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

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

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) An essential requirement of a good MH system is
(a) flexibility reduction
(b) capital cost expenditure
(c) saleability of plant & equipment
(d) storing materials utilizing minimum space.

(ii) Impact idlers are used in a belt conveyor at
(a) the return point (b) the loading points
(c) an interval of 15m on a conveyor run (d) belt tension take-up.

(iii) Dead weight principle in MH relates to
(a) movable handling equipment should be made of light materials
(b) movable handling equipment should have bigger areas with light weight
(c) movable handling equipment should have bigger areas with heavy weight
(d) no overloading of materials.

(iv) A conveyor belt consist 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) Work envelope of a Cartesian co-ordinate robot is
(a) parallelepiped (b) cylindrical
(c) conical (d) spherical.

(vi) Steel scrap can be lifted best by
(a) hook (b) tongs (c) clamshell grab (d) orange peel grab.

(vii) The choice of appropriate type of pneumatic conveying system depends upon
(a) bulk density and particle size (b) flow ability
(c) abrasiveness (d) all of these.

(viii) Robot is better suited over an EOT crane for
(a) shifting of material from one place to another in a job shop
(b) handling of jobs of irregular sizes and varying weights
(c) repetitive accurate positioning and loading of components in a machine
(d) none of the above.

(ix) Angle of repose of bulk material is used for determination of its
(a) flow ability (b) mobility (c) fluidity (d) flexibility.

(x) Rope drum is used in a
(a) winch (b) multi pulley system
(c) chain pulley block (d) all of these.

Group – B

2. List three (3) types of material handling equipment and for each equipment explain what kinds of material they can handle best and why. Draw a sketch of each equipment.

4+ 4 + 4 = 12

3. (a) Mention the characteristics of the bulk materials.

(b) How do you define the term unit load? Mention the basis of classification of unit load. Specify three most popular equipment that are used for handling unit load.

4 + (2 +3 + 3) = 12

Group – C

4. (a) What are the major specifications of FLT?

(b) The rated capacity of a FLT having load center of 50 cm is 2000 kgs. The distance from the middle of the front wheel to the front face of the fork with the vertical mast is 40 cm. Calculate the safe load capacity of the FLT if the load center is increased by 6 cm.

(c) Briefly mention the types and usages of Belt Feeders and Apron Feeders.

2+ 6 + 4 = 12

5. Write short notes with sketch on the following auxiliary equipments.
(i) Vibratory feeder
(ii) Screw feeder
(iii) Chutes
(iv) Trough gate

3+3+3+3 = 12

Group – D

6. (a) Discuss the advantages & disadvantages of Pneumatic Conveyor.

(b) Calculate the conveying capacity of a troughed belt conveyor if B = belt width = 500 mm, V = 1200 mm/sec, γ = bulk density is 2 tonnes/m^3, φ = static angle of repose= 45^0. Material is spread up to the edge of the belt conveyor.

6 + 6 = 12

7. (a) What are the characteristics of a conveyor?

(b) Through a neat sketch, show the general arrangement of a belt conveyor system and label the different important parts.

(c) What are the advantages and limitations of chain conveyor compared to belt conveyor?

3 + 6+ 3 = 12

Group – E

8. (a) What are the major advantages of using steel wire rope compared to chains?

(b) What are the advantages and disadvantages of Regular Lay and Parallel (Lang) Lay ropes?

(c) Draw a neat sketch of a Clamshell Grab. What type of material it can handle?

(d) Draw a neat sketch of an Orange Peel Grab. What type of material it can handle?

3+ 3+ 3 + 3 = 12

9. (a) Describe with neat sketch the working principle of an EOT crane and label the important parts. What are the major advantages of overhead travelling cranes?

(b) A mobile crane supported on 4 wheels has slewing centre equidistant from both the wheels. Following data are given for this crane:
Wheel centre to centre distance = 4 m
Boom length = 15 m
Static tipping load at 5m radius = 10 T (boom in forward direction).

Calculate the S.W.L at 8m radius if Stability Margin is kept at 25%.

(4 + 2) + 6 =12

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