

CS/B.TECH (PE)/SEM-8/PE-801/2013

2013

**PLANT LAYOUT & AUTOMATED 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 any *ten* of the following :

10x1 = 10

- i) Haulage & hoisting ropes are frequently greased to
 - a) minimize wear b) prevent corrosion
 - c) both (a) and (b) d) none of these.
- ii) Which hoist is generally preferred for repetitive or high speed lifting ?
 - a) Magnetic lifting hoist b) Hand chain hoist
 - c) Electric hoist d) All of these.
- iii) Jacks may be of
 - a) screw type
 - b) hydraulic type
 - c) rack-lever type
 - d) any of these.
- iv) Vehicle manufacturing assembly line is an example of
 - a) product layout
 - b) process layout
 - c) fixed layout
 - d) cellular layout.
- v) The dominant problem in a design of process layout is

- a) balancing the line
 - b) providing efficient maintenance crew
 - c) reducing variety of goods
 - d) minimizing material handling effort.
- vi) The quantitative analysis of material flow in a plant layout is done by
- a) Process flow chart
 - b) Activity relation chart
 - c) Travel chart
 - d) Gantt chart.
- vii) Which is not a symptom of a bad plant layout ?
- a) Less ventilation
 - b) Insufficient lighting
 - c) Zero accident
 - d) Less aisle space.
- viii) Which is an improvement algorithm for a computerized plant layout ?
- a) CORELAP b) CRAFT
 - c) LAYOPT d) ALDEP.
- ix) Closeness rating of two departments in a plant layout can be ascertained from
- a) Activity relationship chart
 - b) Flow chart
 - c) String diagram
 - d) Travel chart.
- x) Plant layout is related with the design and installation of the systems of
- a) men
 - b) machines
 - c) materials
 - d) all of these.

xi) The problem of plant location arises when

- a) there are changes in the equipment
- b) starting a new concern
- c) relocating an equipment
- d) changing the transportation facility.

xii) Unit handling system is a / an

- a) equipment oriented system
- b) materials oriented system
- c) method oriented system
- d) function oriented system.

GROUP – B

(Short Answer Type Questions)

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

2. What are the basic factors to be considered for selecting material handling equipment ?
3. What are the symptoms of a bad plant layout ?
4. Write in detail about the automated storage and retrieval system of any factory.
5. Explain with a sketch about a vertical bucket conveyor in an industry.
6. Describe CORELAP with its advantages and limitations.
7. What are the advantages of a product layout ?

GROUP – C

(Long Answer Type Questions)

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

8. a) What do you mean by Line Balancing ? What are the advantages and limitations of line balancing ? 5
- b) A company is engaged in the assembly of railway wagon on a conveyor. Production of 500 wagons are required per day. Production time available per day is 420 minutes. The other information are given below

regarding the assembly steps and precedence relationships. Find the cycle time, minimum number of work stations, line efficiency and balance delay : 10

| <i>Task</i> | <i>Immediate Predecessors</i> | <i>Task Time (Seconds)</i> |
|-------------|-------------------------------|------------------------------|
| A | None | 45 |
| B | A | 11 |
| C | B | 9 |
| D | A | 50 |
| E | D | 15 |
| F | C | 12 |
| G | C | 12 |
| H | E | 12 |
| I | E | 12 |
| J | F,G,H | 18 |
| K | J | 9 |

9. a) Explain a Travel chart by giving an example. 5

b) A company manufactures three products *P*, *Q* & *R* using the same manufacturing facilities, in six departments *A*, *B*, *C*, *D*, *E* and *F*. The material handling is done by a Fork-lift truck. The containers can carry 300, 400 and 600 pieces of products of *P*, *Q* and *R* respectively. The annual demand of each product is 12000 pieces. Sequences of operation of product mentioned are given below :

| <i>Product</i> | <i>Movement Sequence</i> |
|----------------|------------------------------|
| P | A — E — B — D — C — F |
| Q | A — B — C — D — E — F |
| R | C — B — A — E — D — F |

Draw a Travel chart. 10

10. a) What are the advantages and disadvantages of a unit handling concept ? 5

b) What is the relationship between plant layout and

material handling system ? 5

c) Enumerate the factors for selecting the material handling equipment. 5

11. a) Explain the different types of warehouses in use. 5

b) What are the advantages of warehouses ? 5

c) How is material handling linked with the operation of the warehouses ? 5

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

a) Chute

b) Tool-crib

c) Pneumatic conveyor with positive pressure system

d) Jib crane

e) String diagram.

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