

B.E. DEGREE EXAMINATION, MAY 2012

INDUSTRIAL ENGINEERING

SIXTH SEMESTER

IE 9354– FACILITY LAYOUT AND MATERIAL HANDLING

Time : 3 hr

Max Marks : 100

Answer ALL questions

PART A – (10 X 2 = 20 Marks)

1. Differentiate between feasible set approach and infinite set approach of location decision.
2. How the location analysis techniques are decided?
3. What is the objective of minimax location problem?
4. Draw the design cycle given by KRICK.
5. When does a layout problem arise?
6. Contrast between ALDEP and CRAFT computerized algorithm.
7. What are the advantages of group technology?
8. What are the technological constraints considered in line balancing?
9. Write the classification of basic material handling system?
10. What are the various functions of packaging?

PART B – (5 X 16 = 80 Marks)

- 11 Two models A and B are to be assembled on a mixed model line. Hourly production rates for the two models are: A, 25 units/hr and B, 18 units/hr. The work elements, element times and precedence requirements are given below. Assume $E = 1.0$, repositioning time $T = 0.15$ min and $M = 1$. (a) Construct the precedence diagram for each models combined into one diagram. (b) Use the Kilbridge and Wester method to solve the line balancing problem. (c) Determine the balance efficiency for the solution.

| Work element k | T (min) | Preceded by | T (min) | Preceded by |
|-------------------|---------|-------------|---------|-------------|
| 1 | 3 | - | 3 | - |
| 2 | 4 | 1 | 4 | 1 |
| 3 | 2 | 1 | 3 | 1 |
| 4 | 6 | 1 | 5 | 1 |
| 5 | 3 | 2 | - | - |
| 6 | 4 | 3 | 2 | 3 |
| 7 | - | - | 4 | 4 |
| 8 | 5 | 5,6 | 4 | 7 |

12 a) The travel time between possible locations for ambulance stations and areas in a city are given below. According to the Government policy, the ambulance station must be at most 30 minutes away from all population areas. Find the best location to achieve the policy.

Areas

| A | B | C | D | E | F | G |
|----|----|----|----|----|----|----|
| 5 | 12 | 20 | 34 | 26 | 35 | 34 |
| 38 | 35 | 17 | 10 | 50 | 40 | 18 |
| 19 | 38 | 40 | 15 | 33 | 23 | 36 |
| 15 | 7 | 42 | 26 | 37 | 34 | 20 |
| 35 | 46 | 41 | 42 | 16 | 50 | 40 |

(16)

(OR)

12 b) (i) Describe the general formulation of a single facility location problem. (8)

(ii) Discuss the various factors affecting location decision. (8)

13 a) Explain the advantages and disadvantages of product and process layout with suitable example. (16)

(OR)

13 b) Explain the complete procedure of Systematic Layout Planning (16)

14 a) The machine component incidence matrix is given below. Follow the steps of Rank Order Clustering (ROC)-2 Algorithm and find the machine cells. (16)

| Machine | Component | | | | | | |
|---------|-----------|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| A | 0 | 1 | 0 | 1 | 1 | 1 | 0 |
| B | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| C | 1 | 0 | 1 | 0 | 0 | 0 | 1 |
| D | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| E | 1 | 0 | 0 | 0 | 0 | 0 | 1 |

(OR)

14 b) The Toy Job shop has requested that a new layout be designed for their operation in Salem, Tamilnadu. There are 12 departments involved:

Activity Area (sq.ft)

Office 600

Personnel Services 1000

Welding 800

Press 900

Foundry 1200

Machining 1000

Assembly 700

Painting 500

Steel storage 600

Finished storage 1000

Other storage 800

Maintenance 600

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The department areas and activity relationships for the job shops are given above. Design a block layout using ALDEP algorithm. (16)

15 a) Explain the classification of material handling equipments (16)

(OR)

15b) Discuss the principles of materials handling system and its application area. (16)