[Total No. of Questions - 9] [Total No. of Printed Pages - 4]
(2125)

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B. Tech 8th Semester Examination

Material Handling and Plant Layout (OS)

ME-8015

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt Five questions in all, selecting one question from each sections A, B, C and D. Section E is compulsory. Assume missing data suitably, if any.

SECTION - A

1. (a) Explain the factors which govern plant layout economics for (i) manufacturing organizations (ii) service organizations, say software company.

   (b) Explain principle considerations for location of (i) Steel industry around Bihar (ii) Sugar industry in Maharashtra and U.P (iii) Bed sheet industry at Sholapur, Maharashtra.

   (c) Potential locations X, Y and Z have the cost structures shown below. The ABC company has a demand of 1,30,000 units of a new product. Three potential locations X, Y and Z having following cost structures shown are available. Select which location is to be selected and also identify the volume ranges where each location is suited?

	Location X	Location Y	Location Z
Fixed Costs	Rs. 150,000	Rs. 350,000	Rs. 950,000
Variable Costs	Rs. 10	Rs. 8	Rs. 6

(6+6+8=20)

[P.T.O.]

2. (a) Provide a case study for selection of site for XYZ company.

   (b) Give classification of different plant layouts. Discuss essential differences between (i) product layout (ii) process layout (iii) cellular layout, in respect of layout of plants and machinery in a manufacturing organization.

   (c) Define Plant layout. State Objectives of Plant Layout. Explain key principles of Plant Layout. (6+6+8=20)

SECTION - B

3. (a) Explain various factors such as material, machinery, man, waiting movement, service, change, building that affect the plant layout. Also, explain the Apple's plant layout procedure.

   (b) What are the common problems in plant layout? How they are solved? Explain (i) operation process chart (ii) flow process chart (iii) string diagram (10+10=20)

4. (a) Define Line balancing and types of line balancing . What are various methods (heuristics) of solving line balancing problems? Explain any two.

   (b) A small electrical appliance is to be produced on a single model assembly line. The work content of assembling the product has been reduced to the work elements listed in Table below. The table also lists the standard times that have been established for each element as well as the precedence order in which they must be performed. The line is to be balanced for an annual demand of 100,000 unit/yr. The line will operate 50 wk/yr, 5 shifts/wk. and 7.5 hr/shift. Manning level will be one worker per station. Previous experience suggests that the uptime efficiency for the line will be 96%, and repositioning time lost per cycle will be 0.08 min. Determine: (a) total work content time, (b) required hourly production rate to achieve the annual demand, (c) cycle time (d) theoretical minimum number of workers required on the line, and (e) service time T, to which the line must be balanced. (10+10=20)

No.	Work Element Description	T_{ek} (min)	Must Be Preceded By
1	Place frame in workholder and clamp	0.2	–
2	Assemble plug, grommet to power cord	0.4	–
3	Assemble brackets to frame	0.7	1
4	Wire power cord to motor	0.1	1,2
5	Wire power cord to switch	0.3	2
6	Assemble mechanism plate to bracket	0.11	3
7	Assemble blade to bracket	0.32	3
8	Assemble motor to bracket	0.6	3,4
9	Align blade and attach to motor	0.27	6,7,8
10	Assemble switch to motor bracket	0.38	5,8
11	Attach cover, inspect, end test	0.5	9,10
12	Place in tote pan for packing	0.12	11

SECTION - C

5. (a) Define material handling. What are basic features of material handling'? Explain the principles of material handling.

   (b) Explain with neat sketches (i) Fixed path material handling equipments, and (b) Variable path material handling equipments (10+10=20)

6. (a) Suggest some guidelines which can prove beneficial for the design and cost reduction of the materials handling system.

   (b) What are the relationship between plant layout and material handling? Explain. (10+10=20)

SECTION - D

7. Write short notes on (any two)

   (i) Selection and maintenance of material handling equipments in cellular manufacturing.

[P.T.O.]

   (ii) Amount of equipments required and predicting in process inventory.

   (iii) Procedure for travel charting. (20)

8. (a) Explain load path matrix method which aims to reduce transportation of in-process inventory from one section to another section.

   (b) Explain the maintenance system for following material handling equipments (i) Hoists and cranes (ii) Conveyors. Provide a typical repair cycle which involves various stages of preventive maintenance for both of the systems. (10+10=20)

SECTION - E

9. (i) Slate the advantages of line balancing in fabrication work

   (ii) Explain importance of man machine chart in designing a work place layout.

   (iii) How can one perform cost analysis of material handling equipments? State important methods.

   (iv) Define the principle of unit load for material handling

   (v) State some preventive means to achieve balanced production line.

   (vi) What are the advantages of cellular or Group layout?

   (vii) What are typical constraints in line balancing problem?

   (viii) What do you understand by flow patterns? Which material handling principles forms the basis of design of different flow patterns?

   (ix) Which type of maintenance system is more appropriate for material handling equipments? and why?

   (x) Define the concept of containerization and palletization in material handling. (10×2=20)