National Examinations May 2016
98-Ind-A3- Facilities Planning
3 hours duration

Notes:

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.

2. This is a Closed Book exam. Candidates may use one of two calculators, the Casio or Sharp approved models.

3. Any five questions constitute a complete paper. Only the first five questions as they appear in your answer book will be marked.

4. All questions are of equal value.

5. Write your answers in point-form whenever possible, but fully.
   Show all calculations.

Marking Scheme (marks)

1.	(i) 6,	(ii) 7,	(iii) 7
2.	(i) 8,	(ii) 6,	(iii) 6
3.	(i) 5,	(ii) 5,	(iii)10
4.	(i) 8,	(ii) 7,	(iii) 5
5.	(i) 5,	(ii) 8,	(iii) 6
6.	(i) 6,	(ii) 7,	(iii) 7
7.	(i) 6,	(ii) 6,	(iii) 8

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1. (i) What factors are considered in developing facilities design alternatives?
(ii) Explain your understanding of: (a) material flow planning hierarchy, (b) work simplification approach to material flow, and (c) principle of minimizing the cost of material flow.
(iii) What are the resources of physical distribution systems for finished goods produced by a firm?

2. (i) What are the advantages and disadvantage of non-progressive assembly or progress layout compared to progressive assembly or line layout?
(ii) State your understanding of computer-integrated manufacturing systems (CIMS).
(iii) Discuss the dramatic impact of an automated storage and retrieval system (AS/RS) on manufacturing and warehousing.

3. ((i) State the steps that are followed to determine the total machine space requirements in the design of an entire manufacturing facility.
(ii) How would you determine the amount of space per machine?
(iii) The assembly task elements and their assembly precedence requirements are known. An output of approximately 65 units per hour is required and the plan is to produce them all on one assembly line. Show a schematic of the number of stations. What is the actual possible efficiency? Use *Ranked Positional Weight Technique* in solving the assembly line problem.

Task element	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Element time(min)	0.2	0.4	0.7	0.3	0.8	0.6	0.2	0.2	0.8	0.3	0.5	0.1	0.3	0.6
Preceding elements	-	1	1	2	3	3	4	4	5	6	6	7,8	10,11	9,12,13

4. (i) (a) The average operator of a certain company performs at 100% (average pace) and the range of performance is from about 60% to 140%, and the distribution is assumed to be normal. Determine the station speed of the company's assembly line assuming that it is set for the operator whose pace is 85% of average (Z value for 85% or 15% = 1.04 or, -1.04).
(b) Suppose the assembly line is decoupled and the line could be set for an average operator, what would be the gain in station speed?
(ii) Explain the characteristics of the following two programs in the context of computerized layout of multiple items: (a) CRAFT and (b) CORELAP.
(iii) State the basic requirements of computerized layout programs for multiple items.

5. (i) Explain the concept of manufacturing cell.
(ii) What are the benefits of integrating manufacturing cell with Just-in-Time (JIT), Total Quality Management (TQM) and Total Employee Involvement (TEI) concepts?
(iii) What is your understanding of: (a) logistics system and (b) flow patterns?

6. (i) Explain the characteristics of traditional manufacturing (TM) and contemporary manufacturing (CM).
(ii) Briefly state the primary elements of just-in-time (JIT) production system.
(iii) What are the most common sources of waste in industry?

7. (i) Define the concept of materials handling in the context of facilities planning. State the objectives of materials handling.
(ii) Explain the concept of the material handling equation.
(iii) You have been entrusted to improve the facilities design (plant layout and materials handling) of a manufacturing plant.
(a) State the areas of the manufacturing plant that have the greatest opportunity for improvement. Explain briefly.
(b) Explain the systematic procedure you would follow to accomplish your objective.
(c) State the nature of the data or information you would require to solve the problem and the specific techniques you would employ.