

National Exams May 2009
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.

Front Page

Marking Scheme (marks)

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

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1. (i) What are the objectives of facilities planning?
(ii) State the important questions that must be resolved in developing a material handling plan that will support manufacturing and distribution.
(iii) State the issues that may have a long range impact on the strategic facilities plan.
2. (i) 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.
(ii) Explain the concept of activity relationship and space requirements used as a foundation for the facility plan.
(iii) What are the advantages and disadvantages of product (line production) layout?
3. (i) State the basic requirements of computer layout programs for multiple items.
(ii) What are the basic problems associated with computerized layout programs that limit their use in industry?
(iii) A yearly market estimate of a product is 12,000 components. The product requires the following four processing steps: (a) turning, (b) milling, (c) boring and (d) grinding. The scrap rate of the four processing operations are (a) 5%, (b) 4%, (c) 3% and (d) 2% and the rework rates are (a) 3%, (b) 2%, (c) 1% and (d) 1%. For each operation, calculate the following:
(a) production quantity scheduled (pieces) and (b) expected number of good pieces produced.
4. (i) A company works 8 hour days for 5 days per week. The production line of the company is operated 7 hours per day. Given the information in the table below, determine the theoretical minimum number of stations the line should be designed for an output of 130 units per week. Show a schematic of the number of stations. What is the actual possible efficiency? Use the *Ranked Positional Weight Technique* (preferably) or trial and error method to solve the assembly line problem.

Task element	1	2	3	4	5	6	7	8	9	10	11	12
Element time(min)	12	6	6	2	2	12	7	5	1	4	6	7
Preceding elements	-	1	2	2	2	2	3,4	7	5	9,6	8,10	11

- (ii) In progressive assembly, state the reasons for the increase in the line balancing delay.
- (iii) State the manner by which modifications to standard technique can be made to balance assembly/flow lines.
5. (i) What is a unit load? State the advantages and disadvantages of a unit load?
(ii) Explain the characteristics of an automated storage and retrieval system (AS/RS).
(iii) Explain the concept of computer integrated manufacturing systems (CIMS).

6.
 - (i) Explain the concept of manufacturing cell.
 - (ii) What are the benefits of integrating the manufacturing cell concept with Just-in-Time (JIT), Total Quality Management (TQM) and Total Employee Involvement (TEI) concepts?
 - (iii) What is a material management system? Explain the resources of material management systems.

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.