

NATIONAL EXAMS – MAY 2002

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. Any non-communicating calculator is permitted. You must indicate the type of calculator being used, i.e. the make and model designation of the calculator, on the first inside left hand sheet of the exam work book.
3. This is an Open Book Examination.
4. Any five questions constitute a complete paper. Only the first five questions as they appear in your answer book will be marked.
5. All questions are of equal value.
6. Show all calculations.

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Question 1 – 20 Marks

An electronics plant is to produce 500 calculators at 85% efficiency one an operator paced assembly line. On the basis of the table below develop the balanced work station configurations required to meet the production goal.

Task	Time in minutes	Immediate Predecessor Tasks
1	1.10	
2	0.45	-
3	0.38	1
4	0.25	2,3
5	2.50	4
6	0.50	5
7	0.10	5
8	0.05	6,7

Question 2 – 20 Marks

- a) Distinguish between the following types of equipment and give specific reasons for choosing each:
- i. Reach truck.
 - ii. Straddle truck.
 - iii. Side-reach truck.
 - iv. Turret truck.
- b) Robots have been developed with the capability of sensing the orientation of randomly placed parts on a conveyor such that parts can be picked up, oriented and loaded automatically. What are three other approaches that can be used to overcome the problem of randomly oriented parts?

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Question 4 – 20 Marks

The XYZ Company has six retail stores in the city of Lafayette. The company needs a new warehouse facility to serve its retail stores. The travel distance within the city is rectilinear and after each delivery the delivery truck must return to the warehouse. The location of the stores and the expected deliveries per week from the warehouse to each store are:

Store	Location	Expected Deliveries
1	(1,0)	1
2	(2,5)	7
3	(3,8)	5
4	(1,6)	3
5	(-5,-1)	6
6	(-3,-3)	2

Where should the warehouse ideally be located?

Question 5 – 20 Marks

- a) Describe the following packaging equipment, specifying their characteristics and how they can be used:
1. Automatic adhesive sealer.
 - ii. Strapper.
 - iii. Wrapper.
 - iv. Palletizer.
- b) What are four types of bag packaging? Describe and give an example of each.

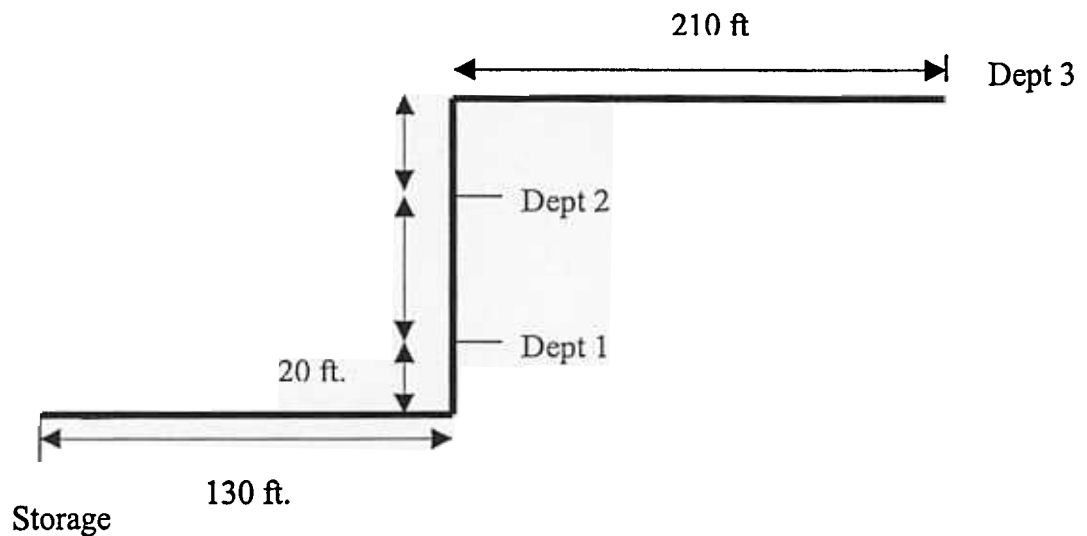
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Question 6 – 20 Marks

Parts needed for production in Departments 1, 2 and 3 are moved from storage by automated guided vehicles, that travel at 200 ft per minute. The distance from the storage to each department is as shown in the figure below. The number of trips that will be made per hour to each department and the time needed for loading and unloading are given in the table below. Determine how many vehicles are needed to ensure the congestion factor does not exceed 0.85.

Department	Number of Trips per hour	Loading/Unloading (minutes)
1	10	2
2	15	4
3	20	3



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Question 7 – 20 Marks

Production of a unit follows the schematic diagram shown below. The probability (P_i) of generating a defective unit in Stage i , and the unit cost (C_i) of processing in Stage i are given in the table below. Determine the cost of producing 100 good units and the number of units (N) that must be started in stage 1 to obtain 100 good units.

Stage	1	2	3	4	5	6	7
P_i	0.2	0.1	0.1	0.15	0.3	0.4	0.3
C_i	5	8	6	4	5	4	15

