2M6204

Roll No. : _____ Total Printed Pages : 8

# M.B.A. - I Year (Sem. II) Examination, June – 2008
## Operation & Production Management

Time : 3 Hours] [Total Marks : 70
[Min. Passing Marks : 28

The question paper is divided into three sections. Section A contains 10 questions of 02 marks each. All questions are compulsory. Section B will contains 05 questions of 10 marks each. The candidate is required to answer three questions from this section.

Section C is of 20 marks and contains case studies or numerical problems only questions for 40 marks are given in this section.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. Normal distribution table 2. Nil





## SECTION - A

1 Give definition of operations management.

2 A company has five machines and on particular day it has 5 jobs to be performed. All machines can do all type of jobs. Cost estimate of performing each job on each machine is given in table. Assign one machine each to all jobs :

*Cost (in thousand)*

| | | *Machine* | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| *Machine* | 1 | 9 | 5 | 13 | 12 | 17 |
| | 2 | 13 | 19 | 9 | 17 | 16 |
| | 3 | 11 | 5 | 4 | 7 | 13 |
| | 4 | 9 | 2 | 7 | 13 | 5 |
| | 5 | 3 | 7 | 9 | 5 | 17 |

3 Name four principles of material handling.

4 How process design depends on product diversity and batch size ?

5 Why does JIT execution require a less-intensive capacity planning approach ?

6 It is usually presumed that 'resistance to change is a characteristic attributed to people'. What should be your personal reactions, if some work design analyst came to your work station to conduct a study of your work ?

7 List the various principles of motion economy.

8 Give some examples from your experience that either conform to or are at variance from the 'bath tub curve' of failure rate phenomena.

9 What is design for manufacturing ?

10 Why might the Economic Order Quantity (EOQ) model not be appropriate for a dependent - demand item ?





## SECTION - B

11 A tractor dealer has needs to estimate sales for next year. Sales in past years have tended to be seasonal as shown below :

*Quarterly Sales*

| *Year* | (*number of products*) | | | |
|---|---|---|---|---|
| | $Q_1$ | $Q_2$ | $Q_3$ | $Q_4$ |
| 1 | – | – | – | 32 |
| 2 | 49 | 72 | 114 | 41 |
| 3 | 55 | 88 | 135 | 44 |
| 4 | 60 | 93 | 149 | 49 |
| 5 | 63 | – | – | – |

(a) Develop forecasts for the next four quarters using time series decomposition.

(b) Develop a 90 percent confidence interval for each of your forecasts.

12 A particular city is trying to find the best location for a master waste disposal station. At present four substations are located at the following coordinate locations : Station 1 (4, 12), Station 2 (6.5, 4), Station 3 (11, 9) and Station 4 (1, 13).

The number of loads hauled monthly to the master station will be 300, 200, 350 and 400 from the substations 1, 2, 3 and 4, respectively.

Find the best location using :

(i) Rectilinear path model

(ii) Euclidean distance model.

13 A work sampling study revealed that out of a total number of readings, 1050 taken thus for, the number of times a machine was idle was 345. If the limit of error required is to be ±2% for 95 cases in 100, how many more readings are required ?

**10**

14 In an inventory system the cost of placing an order is Rs. 100/ order. The annual demand is 5000 units and the inventory carrying charge is 2% of the value per month. The item cost is Rs. 75 each.

(i) Calculate EOQ and total system cost if shortage is not allowed.

(ii) If shortages are allowed to back logged at cost of Rs. 5 per unit short/month, determine EOQ, maximum stock level, maximum backlog level and the total system cost.

**4, 6**

15 A project manager has compiled a list of major activities that will be required to install a computer information system in her firm. The list includes estimated completion times for activities and precedence relationships.





| Activity | Immediate Predecessor | Estimated Times (weeks) | | |
|---|---|---|---|---|
| | | Optimistic | Most Likely | Pessimistic |
| A | – | 2 | 4 | 6 |
| B | A | 6 | 8 | 10 |
| C | B | 7 | 9 | 12 |
| D | C | 2 | 3 | 5 |
| E | A | 3 | 4 | 8 |
| F | E | 5 | 7 | 9 |
| G | – | 2 | 2 | 3 |
| H | G | 2 | 3 | 6 |
| I | H | 3 | 4 | 5 |
| J | I | 4 | 5 | 8 |
| K | – | 5 | 8 | 12 |
| L | K | 1 | 1 | 1 |
| M | L | 6 | 7 | 11 |
| N | M | 8 | 9 | 13 |
| End | D, F, J, N | | | |

If the project is finished within 26 weeks of its start, the project manager will receive a bonus of Rs. 1 lacs; and if the project is finished within 27 weeks of its start, the bonus will be Rs. 50,000.. Find the probability of each bonus.

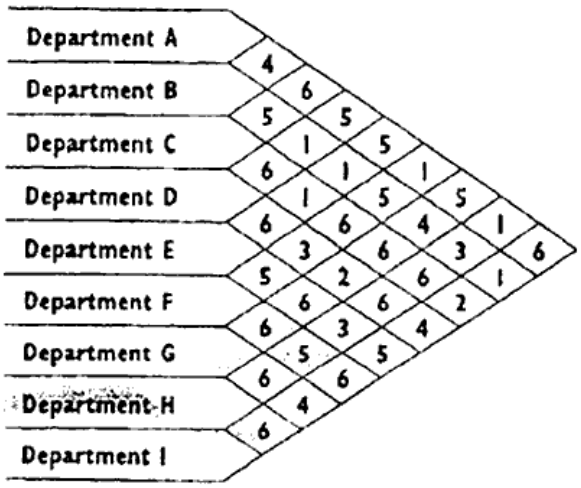
## SECTION - C

**16 Case Study :**

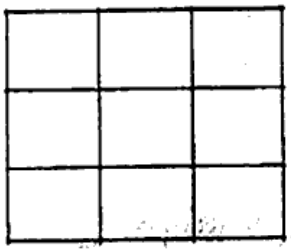
**Precision Machine Works :**

Precision Machine Works (PMW) in Frankfurt, Germany, manufacturers aluminum parts for a variety of companies throughout Europe. PMW has decided to build a new manufacturing plant to replace its current facility, which it has outgrown. Franz Beckler, the production manager, is in charge of developing the production area layout within the new plant. Mr. Beckler has already decided that the production equipment should be organized into nine departments. With the help of his staff, Mr. Beckler has also developed closeness rating scores that represent the desirability level of having any two departments adjacent to each other. The volume of part flow between each pair of departments as well as certain technological restrictions have been considered in developing the closeness ratings. Below are shown the closeness rating between each pair of departments and the meaing of each rating :

| Closeness Rating | Meaning of Rating |
|---|---|
| 1 | Necessary |
| 2 | Very important |
| 3 | Important |
| 4 | Slightly important |
| 5 | Unimportant |
| 6 | Undesirable |




Here is a template of the plant floor space to represent the layo of the nine departments.



(1) Use trial and error to develop a layout of the nine departments that attempts to minimize the sum of the closeness ratings of adjacent departments. Two departments are considered adjacent if they share a common side (not a corner).

(2) Besides the volume of part flow between each pair of departments, what other factors should be considered in deciding on the plant layout ?

17 **Case Study :**

**Integrated Products Corporation :**

A methods analyst at Integrated Products Corporation (IPC) has been studying the assembly line that produces bar code scanners. The objective of the analysis is to reduce worker idle time on the assembly line to reduce the labour cost of the scanners. This information applies :

| Task | Tasks That Must Immediately Precede | Task Time (Minutes) |
|---|---|---|
| A. Kit the purchased assemblies. | — | 1.35 |
| B. Inspect the kitted assemblies. | A | 2.20 |
| C. Process controller board auto-insertion equipment line. | — | 1.90 |
| D. Process controller board through soldering equipment line. | C | 2.39 |
| E. Trim and finish controller board | D | 1.75 |
| F. Assemble power unit into chassis. | B | 1.25 |
| G. Assemble reader unit into chassis. | F | 0.90 |
| H. Assemble controller board into chassis. | E,G | 2.49 |
| I. Assemble display unit into chassis. | H | 2.19 |
| J. Inspect and test finished scanner. | I | 2.40 |
| K. Package finished scanner. | J | 0.69 |
| | | Total 19.51 |

Twenty bar code scanners must be produced by the production line per hour. An average of 50 minutes per hour are productive because of personal time, machine break-down, and start-up and shutdown times. Because the union contract restricts the

kinds of tasks that can be combined into workstations, tasks can be grouped only within these compatibility groups :

| Compatibility Group | Tasks |
|---|---|
| Group I | A,B |
| Group II | C |
| Group III | D |
| Group IV | E |
| Group V | F,G,H,I,J,K |

For example, Tasks F and G could be combined into one workstation, but Tasks E and F could not. Tasks within compatibility groups may be combined while observing the precedence relationships; in other words, adjacent tasks along the network diagram may by combined. Group I work is essentially hand work requiring only inexpensive and plentiful tools.

(1) Draw a diagram of the precedence relationships.

(2) Compute the cycle time per bar code scanner.

(3) Compute the minimum number of workstations required.

(4) Solve this line-balancing problem.

(5) Compare and explain the solutions of the incremental utilization heuristic and the longest-task-time heuristic.

(6) Discuss how you would implement your solution in a real manufacturing setting. What obstacles would you expect to encounter ? How would you overcome these obstacles ?