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## AG-125

April-2016
$4^{\text {th }}$ Year M.B.A., Integrated
Production and Operations Management
Time : 3 Hours]
[Max. Marks : 100
l. (A) Define the term Production System Model with the help of a diagram. Name the inputs of the production system. How can they be classified?

## OR

Discuss the emerging role of the Production and Operations Manager in India. What are the recent trends in Production and Operations Management?
(B) Explain the Qualitative and Quantitative methods used for forecasting demand.

## OR

Discuss the various types of process in detail with their main characteristics and examples.
2. Attempt any two from the following :
(1) Compute the production cost per piece from the following data :
(a) Direct material per piece - ₹ 2.
(b) Wage rate ₹ 2,000 per month consisting of 25 working days and 8 hours per day.
(c) Overheads expressed as a percentage of direct labour cost - $200 \%$.
(d) The time for manufacture of 4 pieces of the item was observed during time study. The manufacture of the item consists of 4 elements a, b, c and d. The data collected during the time study are as under.
Time observed (in minutes) during the various cycles are as below :

| Elements | Cycle 1 | Cycle 2 | Cycle 3 | Cycle 4 | Element Rating on <br> B.S. Scale (0-100) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| a | 1.2 | 1.3 | 1.3 | 1.4 | 85 |
| b | 0.7 | 0.6 | 0.65 | 0.75 | 120 |
| c | 1.4 | 1.3 | 1.3 | 1.2 | 90 |
| d | 0.5 | 1.5 | 0.6 | 0.4 | 70 |

The personal, fatigue and delay allowance may be taken as $25 \%$.
(2) The elemental times (in minutes) for 4 cycles of an operation using a stop watch are presented as below :

| Elements | Cycle time in minutes |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | 1 | 2 | 3 | 4 |
| 1 | 1.5 | 1.5 | 1.3 | 1.4 |
| 2 | 2.6 | 2.7 | 2.4 | 2.6 |
| 3 | 3.3 | 3.2 | 3.4 | 3.4 |
| 4 | 1.2 | 1.2 | 1.1 | 1.2 |
| 5 | 0.51 | 0.51 | 0.52 | 0.49 |

Calculate standard time for the operation if
(i) Elements 2 and 4 are machine elements.
(ii) For other elements, the operator is rated at $110 \%$.
(iii) Total allowances are $15 \%$ of the normal shown in time.
(3) The following information is available for a factory :

Daily working hours - 8
No. of working days in a week - 6
No. of Operators - 20
Std. hours per unit of production - 4
During a particular week
No. of units produced - 48
Absentee man days - 40
Idle time due to load shedding - 30 man days
Find :
(a) Absenteeism percentage.
(b) Labour Utilisation percentage.
(c) Productive efficiency of labour.
(d) Overall productivity of labour in terms of units produced/week/employee.
3. (A) "Production Planning and Control is the key to the success of a business organization." Discuss this statement listing the various functions carried out under production control and state their purpose in brief.
(B) A bill of material is desired for a bracket (Z 100) that is made up of a base (A 10), two springs ( B 11 ) and four clamps ( C 20 ). The base is assembled from one clamp (C 20) and two housing (D 21). Each clamp has one handle (E 30) and each housing has two bearings (F 31) and one shaft (G 32).
(a) Design a product structure tree that includes the level coding information.
(b) Show the data in the form of an indented bill of material.

## OR

Complete the MRP Plan for item X shown below :
Note that this item has an independent demand that necessitates a safety stock of 40 units to be maintained.

| Week |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Order Quantity $=70$ <br> Lead time $=4$ weeks <br> Safety Stock 40 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| Project Requirements | 20 | 20 | 25 | 20 | 20 | 25 | 20 | 20 | 30 | 25 | 25 | 25 |
| Scheduled Receipts |  | 70 |  |  |  |  |  |  |  |  |  |  |
| On hand at the end of period 65 |  |  |  |  |  |  |  |  |  |  |  |  |
| Planned Order Release |  |  |  |  |  |  |  |  |  |  |  |  |

4. (A) Explain 'Material Control Cycle'. What are the steps involved in it ?

## OR

(a) Write a note on 'Make or Buy Analysis'.
(b) What is Materials budgeting ? State the benefits of materials budget.
(B) The number of breakdowns of equipment over the past 2 years is as below :

| No. of breakdowns | No. of months this occurred |
| :---: | :---: |
| 0 | 3 |
| 1 | 7 |
| 2 | 9 |
| 3 | 3 |
| 4 | 2 |
| Total | $\mathbf{2 4}$ |

Each breakdown costs an average of ₹ 300 . Preventive maintenance service can be hired at a cost of ₹ 150 per month and it will limit the breakdowns to an average of one per month.

Which maintenance arrangement is preferable, the current breakdown maintenance policy or a preventive maintenance service contract ?
5. (A) State and explain the strategic issues on Operations Management.
(B) The activities of a project and their time estimates are given below :

| Activity | Estimated duration of activity (in weeks) |  |  |
| :---: | :---: | :---: | :---: |
|  | Optimistic <br> Time ( $\mathbf{t}_{\mathbf{0}}$ ) | Most likely <br> time $\left(\mathbf{t}_{\mathbf{m}}\right)$ | Pessimistic <br> time $\left(\mathbf{t}_{\mathbf{p}}\right)$ |
| $1-2$ | 2 | 5 | 8 |
| $1-4$ | 4 | 19 | 28 |
| $1-5$ | 5 | 11 | 17 |
| $2-3$ | 3 | 9 | 27 |
| $2-6$ | 3 | 6 | 15 |
| $3-6$ | 2 | 5 | 14 |
| $4-6$ | 3 | 6 | 15 |
| $5-7$ | 1 | 4 | 7 |
| $5-8$ | 2 | 5 | 14 |
| $6-8$ | 6 | 12 | 30 |
| $7-8$ | 2 | 5 | 8 |

(i) Draw the PERT network diagram.
(ii) Determine the mean time and standard deviation of each activity.
(iii) Determine the Critical path and the Standard Deviation for the Critical Path.
(iv) Calculate the slack for the events.
(v) Calculate the total float, free float and independent float for each activity.

