1T01438 - B.E.(Mechanical) Engineering)(SEM-VIII)(Choice Base Credit Grading System )(R- 2019-20)
(C Scheme) / 53371 - Operations Planning and Control
QP CODE: 10041876                                              DATE: 08/12/2023

**Time: 3 Hrs**                                                                                    **Marks: 80**

**Note  :**
- **Question No.1 is compulsory.**
- Solve **ANY THREE** questions from the **remaining** five questions.
- Assume suitable data wherever required, but justify the same.

**Q. 1**     Solve **ANY FOUR** questions

**a)**   Explain the 'Customer as Participant' and 'Customer as Product' service operations.          5

**b)**   What are the factors influencing effective capacity?                                         5

**c)**   Differentiate between CPM and PERT.                                                          5

**d)**   Define the following terms for assembly line:                                                5
         i) Workstation ii) Cycle Time iii) Task iv) Predecessor Task v) Balance Delay

**e)**   Explain the JIT concept and highlight the seven wastes considered in it.                     5

**Q. 2**  **a)**  Illustrate the Production System with its characteristics. Explain the different types of   10
                  Production Systems.

**b)**   A firm uses a simple exponential smoothing method with a smoothing constant of 0.15 for   10
         estimating the demand for a particular product. The actual demand for six months is
         available. The forecast for June is 500 units. Estimate the forecast for December. Calculate
         Mean Absolute Deviation (MAD) and BIAS if the actual demand for December is 510 units.

| Months | Jun | Jul | Aug | Sep | Oct | Nov |
|---|---|---|---|---|---|---|
| Actual Demand | 450 | 505 | 516 | 488 | 467 | 554 |

**Q. 3**  **a)**  Use a graphical method to minimize the time required to process the following jobs on the   10
                  machines. For each machine specify the job which should be done first. Also, calculate the
                  total elapsed time to complete both jobs.

| Machines | | | | | | |
|---|---|---|---|---|---|---|
| Job 1 | Sequence | A | B | C | D | E |
| | Time (Hrs) | 6 | 8 | 4 | 12 | 4 |
| Job 2 | Sequence | B | C | A | D | E |
| | Time (Hrs) | 10 | 8 | 6 | 4 | 12 |

**b)**   Explain the step-by-step evolution of ERP and give its features and limitations.          10

**Q. 4**  **a)**  A project scheduled has the following characteristics as shown in the table. Draw the network   10
                  diagram, find the total float for each activity and find the critical path.

| Activity | 1-2 | 1-3 | 2-4 | 3-4 | 3-5 | 4-9 | 5-6 | 5-7 | 6-8 | 7-8 | 8-10 | 9-10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time | 4 | 1 | 1 | 1 | 6 | 5 | 4 | 8 | 1 | 2 | 5 | 7 |

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**b)** Draw a Travel Chart for a workshop that manufactures three products P, Q & R by using the same manufacturing facilities arranged in 6 departments A, B, C, D,E & F. The material handling is done by forklift truck. Pallets designed for material handling can carry 200, 300 & 150 pieces of the products P, Q & R respectively. The annual demand for each product is12, 000 numbers. The sequence of operation of the product demand that the products move is given in the table below.    10

| Product | Movements |
|---------|-----------|
| P | A-E-B-D-C-F |
| Q | A-B-C-D-E-F |
| R | C-B-A-E-D-F |

**Q. 5  a)** The following table gives the details of the workstations. Show the precedence diagram and determine the balance delay by Rank Positional Weight Method.    10

| No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|-----|---|---|---|---|---|---|---|---|---|----|----|----|
| Time (Mins) | 0.2 | 0.4 | 0.7 | 0.1 | 0.3 | 0.11 | 0.32 | 0.6 | 0.27 | 0.38 | 0.5 | 0.12 |
| Preceded by | -- | -- | 1 | 1,2 | 2 | 3 | 3 | 3,4 | 6,7,8 | 5,8 | 9,10 | 11 |

Assume cycle time as 0.92 minutes.

**b)** Explain the principles of Lean and Agile manufacturing.    10

**Q. 6  a)** Illustrate forward scheduling and backward scheduling.    5

**b)** Explain the strategies in aggregate planning.    5

**c)** Explain the concept of a Relationship chart.    5

**d)** Complete the material requirement plan for an item shown below. The order quantity is 50 units, lead time is 2 weeks with no safety stock required.    5

| Week | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|------|---|---|---|---|---|---|---|---|---|
| Projected Requirement | 10 | 12 | 15 | 18 | 20 | 22 | 25 | 28 | 30 |
| Receipts | | | | | | | | | |
| On hand at the end of the period (30) | | | | | | | | | |
| Planned Order Release | | | | | | | | | |

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