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10ME/PM81

Eighth Semester B.E. Degree Examination, June/July 2018

Operations Management

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. What is productivity? Explain the factors affecting productivity. (10 Marks)
b. Describe the term operations management. Explain the basic functions of business organization with the help of block diagram. (10 Marks)
- 2 a. Explain break even analysis with the necessary equations, graphs and assumptions. (10 Marks)
b. A computer company evaluating three cities for a new plant to manufacture hardware components which will sell at Rs.170/- each. The economic portion of a plant location study shows the following cost and market data:

| Cities | A | B | C |
|-----------------------|-----|-----|-----|
| F.C/Yr (in Rs.1000's) | 300 | 200 | 150 |
| V.C/unit | 30 | 45 | 65 |

Cost data

| Volume | Probability |
|--------|-------------|
| 4500 | 0.1 |
| 5500 | 0.3 |
| 6500 | 0.6 |

Market data

- i) On the basis of maximizing an economic expected value, graph the plant location curve (cost) using appropriate scale.
 - ii) Which city should be selected on the basis of given volume estimate (from graph)?
 - iii) What is the break even volume for the city selected? (10 Marks)
- 3 a. Define forecast. Explain the element of a good forecast. (10 Marks)
b. What is weighted moving average? Considering the following data:

| Period | 1 | 2 | 3 | 4 | 5 |
|--------|----|----|----|----|----|
| Demand | 42 | 40 | 43 | 40 | 41 |

- i) Compute a weighted average forecast using a weight of 0.4 for the most recent period, 0.3 for the next most recent, 0.2 for the next, and 0.1 for the next.
 - ii) If the actual demand for the period 6 is 39, forecast the demand for period 7 using the same weights as in part (i). (10 Marks)
- 4 a. Differentiate design capacity and effective capacity with examples. (06 Marks)
b. List and explain the factors that may inhibit capacity utilization. (10 Marks)
c. Outline to general approach for developing location alternatives. (04 Marks)

PART – B

- 5 a. List the important strategies for aggregate planning. (04 Marks)
b. Discuss general procedure for aggregate planning. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- c. A clothing producer has generated a forecast for the next eight weeks. Demand is expected to be fairly steady, except for periods 3 and 4, which have higher demands.

| Period | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Total |
|----------|------|------|------|------|------|------|------|------|-------|
| Forecast | 1200 | 1200 | 1400 | 3000 | 1200 | 1200 | 1200 | 1200 | 11600 |

The company typically hires seasonal workers to handle the extra workload in periods 3 and 4. The cost for hiring and training a seasonal worker is Rs.50/worker, and the company plans to hire two additional workers and train them period 3, for work load in period 4, and then lay them off (no cost for layoff). Develop an aggregate plan that uses steady o/p from regular workers with added o/p from the two seasonal workers in period 4. The o/p rate for the seasonal workers is slightly less than that of regular workers, so their cost/unit is higher. The cost/unit for regular workers is Rs.4/hr, while cost/unit for seasonal worker is Rs.5/unit. Backlog cost is Rs.1/unit/period. (10 Marks)

- 6 a. Define the term 'inventory'. List the major functions of inventory. (10 Marks)
 b. Describe the basic EOQ model and its assumptions. (05 Marks)
 c. A local distributor for a national tyre company expects to sell approximately 9600 steel-belted radial tyres of a certain size and tread design next year. Annual carrying cost is Rs.16/tyre, and ordering cost is Rs.75.
 i) What is the EOQ?
 ii) How many times per year does the store reorder? (05 Marks)
- 7 a. What do you understand by the term MRP? Describe the inputs, outputs and nature of MRP processing with the help of a neat block diagram. (10 Marks)
 b. Describe MRP-11 with the help of a flow chart. (10 Marks)
- 8 a. Write short notes on:
 i) SCM
 ii) The procurement process
 iii) Concept of tenders
 iv) Importance of purchasing (12 Marks)
 b. List and explain the key performance measures of supply chain. (08 Marks)

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10ME / PM 81

Scheme & Solutions

Signature of *[Signature]*

Subject Code : 10ME / PM 81

Subject Title : Operations Management

| Question Number | Solution | Marks Allocated |
|-----------------|--|-----------------|
| 1 (a) | <p><u>Productivity</u>: A measure of effective use of resources usually expressed in ratio of OP to IP.</p> <p><u>Factors affecting Productivity</u>: Methods, Capital, Quality, Technology, Management, Standardizing, Use of internet, Computer virus, Search for lost items, Safety, Scrap rates, Labour turnover, Layoff's, New workers, design of workplace, reward for productivity increase</p> <p><u>Listing</u> - 2 M <u>Explanation</u> - 6 M</p> | 2 M |
| 1 (b) | <p><u>Operations management</u> - The management of systems or processes that create goods and/or provide services</p> <p><u>Functions of business orgⁿ</u>:</p> <pre> graph TD A[Organization] --> B[Finance] A --> C[Operations] A --> D[Marketing] </pre> <p><u>Figure</u> - 2 M <u>Explanation</u> - 6 M</p> | 2 M |
| 2 (a) | <p><u>Break even Analysis</u>: The relationship between Cost, revenue and volume of output</p> <p><u>Defⁿ</u> - 2 M</p> <p><u>equation with explaiⁿ</u> - 2 M</p> $Q_{BEP} = \frac{FC}{SR - VC}$ <p><u>Graph with explanation</u> - 4 M</p> <p><u>Assumptions</u> : 1. one product is involved - 2 M 2. Everything produced can be sold 3. VC/unit is same regardless of volume 4. FC don't change with vol. changes 5. Revenue/unit is same regardless of vol. 6. Revenue/unit exceeds V.C/unit</p> | 2 M |

"APPROVED"

[Signature]

Registrar (Evaluation)

Visvesvaraya Technological University
BELAGAVI - 590018

10M

[Signature]

Dr. T. Rangaswamy
Chairman, BOE (Mech. Engg. Board)
VTU, Belagavi
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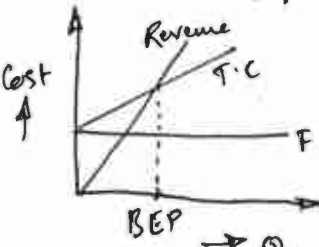
10ME/PM81

Scheme & Solutions

Signature of *[Signature]*

Subject Title: Operations Management

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| Question Number | Solution | Marks Allocated |
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| 1 (a) | <p><u>Productivity</u>: A measure of effective use of resources usually expressed in ratio of OP to IP.</p> <p><u>Factors affecting Productivity</u>: Methods, capital, quality, technology, management, Standardizing, use of internet, Computer virus, Search for lost items, Safety, Scrap rates, Labour turnover, Layoff's, New workers, design of workplace, reward for productivity increase.</p> | <p>Defⁿ: - 2M</p> <p>Listing - 2M</p> <p>Explanation - 6M.</p> |
| 1 (b) | <p><u>Operations management</u> - The management of systems or processes that create goods and/or provide services</p> <p><u>Functions of business orgⁿ</u></p> <pre> graph TD A[organization] --> B[Finance] A --> C[operations] A --> D[Marketing] </pre> | <p>Defⁿ: - 2M</p> <p>Figure - 2M</p> <p>Explanation - 6M</p> |
| 2 (a) | <p><u>Break even Analysis</u>: The relationship between Cost, revenue and volume of output</p> $Q_{BEP} = \frac{FC}{SR - VC}$ <p>equation with explanⁿ - 2M</p>  <p>Graph with explanation - 4M</p> <p><u>Assumptions</u> :</p> <ol style="list-style-type: none"> one product is involved - 2M Everything produced can be sold VC/unit is same regardless of volume FC donot change with vol. changes. Revenue/unit is same regardless of vol. Revenue/unit exceeds V.C/unit. | <p>Defⁿ: - 2M</p> <p>equation with explanⁿ - 2M</p> <p>Graph with explanation - 4M</p> <p>Assumptions : - 2M</p> <p><u>10M</u></p> |

| Question Number | Solution | Marks Allocated |
|-----------------|----------|-----------------|
|-----------------|----------|-----------------|

2(b) From the market data, volume estimate is

$$E_x(P[x]) = 4500 \times 0.1 + 5500 \times 0.3 + 6500 \times 0.6$$

$$= \underline{6000 \text{ units}}$$

T.C of A = $FC + VC \times Q = 300 \times 1000 + 30(6000)$

$(TC)_A = ₹ 4,80,000 / -$

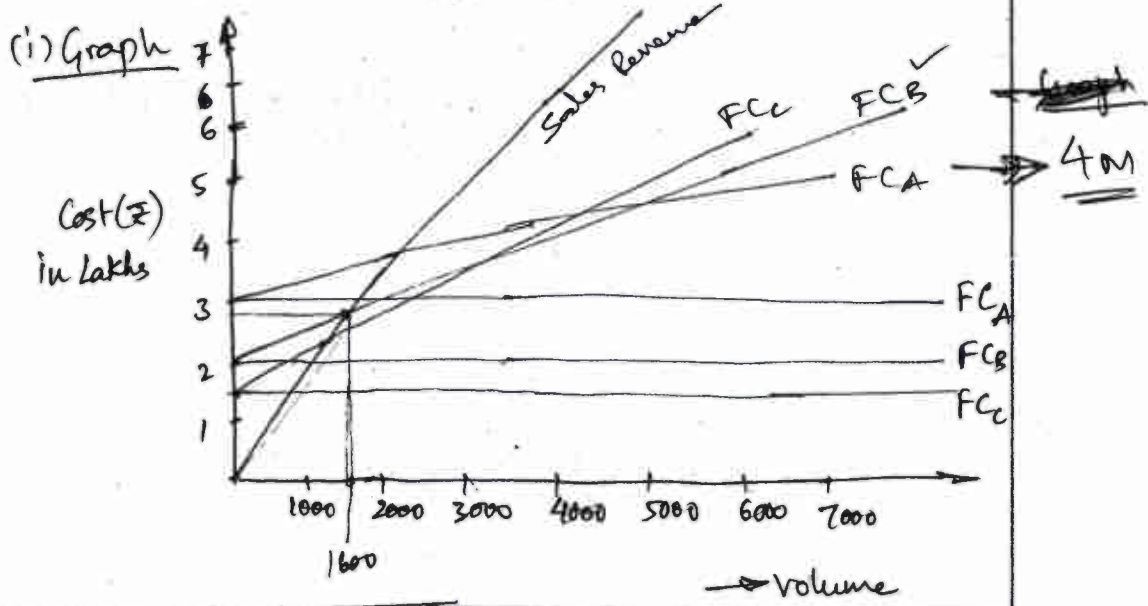
$(TC)_B = 200 \times 1000 + 45(6000) = ₹ 4,70,000 / -$

$(TC)_C = 150 \times 1000 + 65(6000) = ₹ 5,40,000 / -$

(ii) From the graph and above calcⁿ, B is best → 4M

(iii) B.E. volume for the quantity selected for CHB

$$Q_{BEP} = \frac{FC}{S.P - VC} = \frac{200 \times 1000}{170 - 45} = 1600 \text{ units} \quad \text{--- 2M}$$



3(a) Forecast: A statement about the future value of a variable of interest.
Elements of good forecast

| | |
|-------|----|
| Defn. | 2M |
| List | 3M |
| expln | 5M |

Timely, accurate, reliable, meaningful units, in writing, Simple to understand & use, Cost effective.

| Question Number | Solution | Marks Allocated |
|-----------------|---|--|
| 3(b) | <p>Weighted Moving average: In WMA, more recent values in a series are given more weight in computing a forecast.</p> <p>(i) $F_6 = 40(0.1) + 43(0.2) + 40(0.3) + 41(0.4)$ $\quad \quad \quad = 41.0$ Ans</p> <p>(ii) $F_7 = 43(0.1) + 40(0.2) + 41(0.3) + 39(0.4)$ $\quad \quad \quad = 40.2$ Ans.</p> | <p><u>Defn</u> 2 M</p> <p>(i) 4 M</p> <p>(ii) 4 M</p> <hr/> <p>10 M</p> |
| 4(a) | <p><u>Design Capacity</u>: The max op rate or service capacity an operation, process, or facility is designed for es: ideal conditions viz no. of seats in a theater</p> <p><u>Effective capacity</u>: Design capacity minus allowances such as personal time & maintenance. es: no. of ticket sold / show</p> <p>(b) <u>Factors inhibit capacity utilization</u>: Facilities, product and service factors, process factors, Human factors, Policy factors, operational factors, Supply chain factors, External factors —</p> <p>(c) <u>Procedure for developing location alternatives</u></p> <p>(i) Decide on the criteria to use for evaluating location alternatives</p> <p>(ii) Identify imp. factors, such as location of markets</p> <p>(iii) Develop location alternatives identifying countries, general region, community alternatives</p> <p>(iv) Evaluate alternatives and make a selection</p> | <p>3+3 = 6 M</p> <div style="border: 1px solid black; padding: 5px; display: inline-block;"> List — 4 M Expl — 6 M </div> <p><u>4x1</u> = 4 M</p> |

| Question Number | Solution | Marks Allocated | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | <u>PART B</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5(a) | <p><u>Strategies for aggregate planning</u></p> <p><u>Pure strategy</u>: maintaining a level work force, maintain a steady O/P rate, match demand period</p> <p><u>Mixed strategy</u>: Use a combination of decision variable</p> | 2+2 = 4 M | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (b) | <p><u>Procedure</u>: (i) Determine demand for each period</p> <p>(ii) Determine Capacities for each period</p> <p>(iii) Identify Company that are pertinent.</p> <p>(iv) Determine unit costs for RT, OT, SC holding inventories, backorders, layoff, relevant costs.</p> <p>(v) Develop alternative costs plans & compute the cost for each.</p> <p>(vi) If satisfactory plans emerge, select the best alternatives.</p> | 6x1 = 6 M | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (c) | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Period</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Forecast</td> <td>1,200</td> <td>1,200</td> <td>1,400</td> <td>3,000</td> <td>1,200</td> <td>1,200</td> <td>1,200</td> <td>1,200</td> <td>11,800</td> </tr> <tr> <td>output</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> Regular</td> <td>1,200</td> <td>1,200</td> <td>1,200</td> <td>1,200</td> <td>1,200</td> <td>1,200</td> <td>1,200</td> <td>1,200</td> <td>9,600</td> </tr> <tr> <td> Part time</td> <td></td> <td></td> <td></td> <td>2,000</td> <td></td> <td></td> <td></td> <td></td> <td>2,000</td> </tr> <tr> <td> OT</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0</td> </tr> <tr> <td> SC</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0</td> </tr> <tr> <td>output-forecast</td> <td>0</td> <td>0</td> <td>-200</td> <td>200</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Inventory</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> Beginning</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td></td> </tr> <tr> <td> Ending</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td></td> </tr> <tr> <td> Average</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0</td> </tr> <tr> <td>Backlog</td> <td>0</td> <td>0</td> <td>200</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>200</td> </tr> <tr> <td>Costs</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> Regular @ 4</td> <td>4,800</td> <td>4,800</td> <td>4,800</td> <td>4,800</td> <td>4,800</td> <td>4,800</td> <td>4,800</td> <td>4,800</td> <td>38,400</td> </tr> <tr> <td> Part time @ 5</td> <td>0</td> <td>0</td> <td>0</td> <td>10,000</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>10,000</td> </tr> <tr> <td> OT @</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td> SC @</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td> Hire/layoff @ 50</td> <td></td> <td></td> <td>100</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>100</td> </tr> <tr> <td> Inventory @</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> </tr> <tr> <td> Backorder @ 1</td> <td>0</td> <td>0</td> <td>200</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>200</td> </tr> <tr> <td>Total</td> <td>4,800</td> <td>4,800</td> <td>5,100</td> <td>4,800</td> <td>4,800</td> <td>4,800</td> <td>4,800</td> <td>4,800</td> <td>48,700</td> </tr> </tbody> </table> | Period | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Total | Forecast | 1,200 | 1,200 | 1,400 | 3,000 | 1,200 | 1,200 | 1,200 | 1,200 | 11,800 | output | | | | | | | | | | Regular | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | 9,600 | Part time | | | | 2,000 | | | | | 2,000 | OT | | | | | | | | | 0 | SC | | | | | | | | | 0 | output-forecast | 0 | 0 | -200 | 200 | 0 | 0 | 0 | 0 | 0 | Inventory | | | | | | | | | | Beginning | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | Ending | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | Average | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | Backlog | 0 | 0 | 200 | 0 | 0 | 0 | 0 | 0 | 200 | Costs | | | | | | | | | | Regular @ 4 | 4,800 | 4,800 | 4,800 | 4,800 | 4,800 | 4,800 | 4,800 | 4,800 | 38,400 | Part time @ 5 | 0 | 0 | 0 | 10,000 | 0 | 0 | 0 | 0 | 10,000 | OT @ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | SC @ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Hire/layoff @ 50 | | | 100 | | | | | | 100 | Inventory @ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Backorder @ 1 | 0 | 0 | 200 | 0 | 0 | 0 | 0 | 0 | 200 | Total | 4,800 | 4,800 | 5,100 | 4,800 | 4,800 | 4,800 | 4,800 | 4,800 | 48,700 | 10M |
| Period | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Total | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Forecast | 1,200 | 1,200 | 1,400 | 3,000 | 1,200 | 1,200 | 1,200 | 1,200 | 11,800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| output | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Regular | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | 9,600 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Part time | | | | 2,000 | | | | | 2,000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OT | | | | | | | | | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SC | | | | | | | | | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| output-forecast | 0 | 0 | -200 | 200 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Inventory | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Beginning | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ending | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Average | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Backlog | 0 | 0 | 200 | 0 | 0 | 0 | 0 | 0 | 200 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Costs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Regular @ 4 | 4,800 | 4,800 | 4,800 | 4,800 | 4,800 | 4,800 | 4,800 | 4,800 | 38,400 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Part time @ 5 | 0 | 0 | 0 | 10,000 | 0 | 0 | 0 | 0 | 10,000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OT @ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SC @ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Hire/layoff @ 50 | | | 100 | | | | | | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Inventory @ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Backorder @ 1 | 0 | 0 | 200 | 0 | 0 | 0 | 0 | 0 | 200 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | 4,800 | 4,800 | 5,100 | 4,800 | 4,800 | 4,800 | 4,800 | 4,800 | 48,700 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Question Number | Solution | Marks Allocated |
|-----------------|---|---|
| 6(a) | <p><u>Inventory</u>: It is a stock or store for goods</p> <p><u>Functions of Inventory</u></p> <ul style="list-style-type: none"> (i) TO meet anticipated customer demand (ii) TO smooth production requirements (iii) TO decouple operations (iv) TO protect against stockouts. (v) TO take advantage of order cycles. (vi) TO hedge against price increases. (vii) TO permit operations. (viii) TO take advantage of quantity discounts | <p>Defn 2M</p> <p>+ 8x1 = 8M</p> <hr/> <p>10M</p> |
| (b) | <p><u>EOQ Model</u> - used to identify a fixed order size that will minimize the sum of annual costs.</p> <p><u>Assumptions</u> ① only one product involved ② Annual demand requirements are known ③ Demand is spread evenly throughout the year. ④ Lead time is known & constant ⑤ Each order is received in a single delivery ⑥ There are no quantity discounts.</p> | <p>Defn 2M</p> <p>(6x1/2M) = 3M</p> <hr/> <p>5M</p> |
| (c) | <p><u>Given</u>: $D = 9,600 \text{ tyres/yr}$, $H = ₹16/\text{unit/yr}$, $S = ₹75$</p> <p>(i) $EOQ = \sqrt{2DS/H} = \sqrt{2(9,600)75/16} = \underline{\underline{300 \text{ tyres}}}$</p> <p>(ii) <u>No.</u> of orders/yr = $D/Q = \frac{9,600 \text{ tyres/yr}}{300 \text{ tyres/order}} = \underline{\underline{32 \text{ orders}}}$</p> | <p>(2.5x2) = 5M</p> |
| 7(a) | <p><u>MRP</u>: (Material Requirement Planning) - A Computer based information system that translates master schedule requirements for end items into time phased requirements for subassemblies, components and raw mtl's</p> | <p>5</p> |

| Question Number | Solution | Marks Allocated |
|-----------------|---|---|
| 7(a) | <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p><u>MRP inputs</u></p> <p>Orders Forecast → Master Schedule</p> <p>Design changes → B.O.M</p> <p>Receipts with draw → Inventory</p> </div> <div style="width: 35%; text-align: center;"> <p><u>MRP processing</u></p> <p>MRP Computer Programs</p> </div> <div style="width: 30%;"> <p><u>MRP outputs</u></p> <p>Primary → Changes Order releases Planned order schedule</p> <p>Sec. → Exception reports Planning reports Performance control</p> <p>Inventory transaction</p> </div> </div> | <p>Def'n MRP = <u>2 M</u></p> <p>Block diagram = <u>4 M</u></p> <p>Description = <u>4 M</u></p> |
| 7(b) | <p><u>MRP-II</u></p> | <p>Flow chart = <u>6 M</u></p> <p>Explanation = <u>4 M</u></p> |
| 8(a) | <p><u>Short notes</u></p> <p>4 Marks x 3 = 12 M</p> | <p>12 M</p> |
| | <p>(b) <u>Performance measures of supply chain</u></p> <p>Financial (Return on assets, Cost, Cash flow, profits)</p> <p>operations (Productivity, quality)</p> <p>order fulfilment (order accuracy, Time to fill orders, % of incomplete order shipped)</p> <p>Suppliers (quality, on time delivery, Cooperation, flexibility)</p> <p>Inventory (Average value, Turnover, weeks of supply)</p> <p>Customers (Customer satisfaction, % of customer complaints)</p> | <p>8 M</p> |

| Question Number | Solution | Marks Allocated |
|-----------------|---|---|
| 7(a) | <p><u>MRP inputs</u></p> <p><u>MRP processing</u></p> <p><u>MRP outputs</u></p> | <p>Def'n MRP = 2 m</p> <p>Block diagram = 4 m</p> <p>Diagrams = 4 m</p> |
| 7(b) | <p><u>MRP-II</u></p> | <p>Flow chart = 6 m</p> <p>Explanation = 4 m</p> |
| 8(a) | <p><u>Short notes</u></p> <p>4 Marks x 3 = 12 m</p> <p>(b) <u>Performance measures of supply chain</u></p> <p>Financial (Return on assets, Cost, Cash flow, profits)</p> <p>operations (Productivity, quality)</p> <p>order fulfilment (order accuracy, Time to fill orders, % of incomplete order shipped)</p> <p>Suppliers (quality, on time delivery, cooperation, flexibility)</p> <p>Inventory (Average value, Turnover, weeks of supply)</p> <p>Customers (Customer satisfaction, % of customer complaints)</p> | <p>12 m</p> <p>8 m</p> |

"APPROVED"

Amis

Registrar (Evaluation)

Vivekvaraya Technological University
BELAGAVI - 590018

Dr. T. R. Rameshwarthy
Chairman, BOE (Board)
VTU, Bellary
Prof. in Road
Dept. of Mechanical Engg.
Engineering College.
59201