

Internal Test –IV Feb 2022

Sub: Operations Management
Date: <u>02/02/22</u> Duration: <u>90 mins</u> Max Marks: <u>50</u> Sem: <u>5TH</u>

Code: 18ME56
Branch: ME

Note: Answer any five questions:

Q.No.	Question	OBE																																																						
		Marks	CO	RBT																																																				
1	Define operations management. Sketch and explain the historical evolution of production and operations management	[10]	CO1	L1																																																				
2	Discuss the importance of decision making by today's managers.	[10]	CO2	L3																																																				
3	Define the term forecast and list the objectives of forecasting.	[10]	CO3	L1																																																				
4	A firm uses simple exponential smoothing with $\alpha = 0.1$ to forecast the demand. The forecast for the week of feb 1 st was 500 units whereas actual demand turned out to be 450 units forecast the demand for the week of feb 8 th assume that the actual demand during the week of feb 8 th turned out to be 505 units. Find the forecast demand for Feb 15 th continue forecasting up to march 15 th assuming that the subsequent demands were actually 516, 488, 467, 554 and 510 units. Depict Graphically actual vs forecasted demand.	[10]	CO3	L3																																																				
5	Explain Delphi & Nominal group technique with their relative merits and demerits	[10]	CO3	L1																																																				
6	A company makes two kinds of leather belts. Belt A is a high quality belt, and belt B is of low quality. The respective profits are Rs.4 and Rs.3 per belt. Each belt of type A requires twice as much time as a belt of type B and if all belts were of type B, the company could make 1000 per day. The supply of leather is sufficient for only 800 belts per day (A & B combined). Belt A requires a fancy buckle and only 400 per day are available. There are only 700 buckles in a day available for belt B. Formulate it as an LPP and solve it by graphical method	[10]	CO2	L3																																																				
7	<p>Solve the following transportation problem</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2"></th> <th colspan="5">Destination</th> <th></th> </tr> <tr> <th colspan="2"></th> <th>D1</th> <th>D2</th> <th>D3</th> <th>D4</th> <th>D5</th> <th>Supply</th> </tr> </thead> <tbody> <tr> <th rowspan="5">Origin</th> <th>O1</th> <td>7</td> <td>6</td> <td>4</td> <td>5</td> <td>9</td> <td>40</td> </tr> <tr> <th>O2</th> <td>8</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> <td>30</td> </tr> <tr> <th>O3</th> <td>6</td> <td>8</td> <td>9</td> <td>6</td> <td>5</td> <td>20</td> </tr> <tr> <th>O4</th> <td>5</td> <td>2</td> <td>7</td> <td>8</td> <td>6</td> <td>10</td> </tr> <tr> <th>Demand</th> <td>30</td> <td>30</td> <td>15</td> <td>20</td> <td>5</td> <td>10</td> </tr> </tbody> </table>			Destination								D1	D2	D3	D4	D5	Supply	Origin	O1	7	6	4	5	9	40	O2	8	5	6	7	8	30	O3	6	8	9	6	5	20	O4	5	2	7	8	6	10	Demand	30	30	15	20	5	10	[10]	CO3	L3
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Q.No.	Solutions & Scheme	OBE		
		Marks	CO	RBT
1a	<p>OM Is defined as the transformation process to which various types of inputs are subjected to, for conversion into desired products. These inputs can be the land, building, machinery, equipment, tools, raw materials, labour, managers, and so on. It is imperative that the quality of inputs is monitored to check if they meet the required specifications.</p> <p>Production Management is defined as the design, operation and maintenance of the transformation process, which converts various inputs into outputs of desired products.</p> <p>James Watt, was a Scottish inventor, who invented the steam engine. Watt obtained a patent for the steam engine and started a steam engine manufacturing factory in partnership with Mathew Bolton in 1794. A foundry of the company called Soho Foundry Works, was managed by the sons of Watt and Boulton.</p> <p>James Watt Jr. (son of James Watt) and Robinson Boulton (son of Mathew Bolton) used systematic techniques to manage their foundry. The techniques were demand forecasting, facility layout and work flow, production planning, planned site selection, production standards and standardisation of product standards. They also created systems to determine costs and profits for each machine manufactured (Pollard, 1974). Frederick Winslow Taylor (1856 - 1915) is another major contributor to the field, with his seminal work “The Principles of Scientific Management”. Taylor is renowned for his Stop Watch Time Studies, in which he measured the time taken by workers to perform various tasks in a factory. In the process, he arrived at the Standard Time that should be ideally taken by the workers. This helps in comparing the performance of the workers. Taylor is often hailed as the father of Production Management. Henry Ford (1863 - 1947), the legendary inventor and businessman (Founder of Ford Motors), invented the modern assembly line and used it effectively for the large-scale production of the immensely successful Model T. It was his vision that made the car within the reach of the common man during those times. In more recent times, W. Edwards Deming (1900 - 1993) and Joseph M. Juran (1904 - 2008) are hailed as Quality Gurus for their immense contributions to the field of Production Management. Both these gentlemen were instrumental in bringing Japan to the global world map for its quality products which were beyond competition during the 1980s compared to their Western counterparts. Deming and Juran (both of them Americans) lectured throughout Japan during the 1950s and 1960s, preaching the concepts of quality. Their preaching is hailed as the harbinger of Total Quality Management (TQM) philosophy. It is during this time that Taiichi Ohno (1912 - 1990), the then Vice-President of Toyota, invented the famed Just-in-Time (JIT) production method (known as the Toyota Production System during that time). JIT reduced the inventory in the factories drastically, thus reducing the overall cost of production while improving the quality. It is ironical that Toyota is facing acute quality crisis today and perhaps, needs to revisit the concepts preached by Deming and Juran.</p> <p>OM Definition- 2Marks Evolution -8 Marks (4 of Them)</p>	[10]	CO1	L1
2a	<p>Adequate Information- It is necessary to have adequate information to take decisions that might be costly but it is really important. Non availability of adequate information leads to bounded rationality in taking decisions. 2. Limiting Factors- Limiting factors that can affect ones decisions such as technological factors,</p>	[10]	CO2	L3

	<p>government, political, economic, etc, should be considered while taking decisions.</p> <p>3. Maximization of profits- It is important to evaluate each and every alternative not only on the basis of profit maximization but regarding other parameters also.</p> <p>4. People Reaction- Towards any decision, there might be a chance of reaction or resistance and try to educate people about them.</p> <p>5. Right Timings- If decisions taken are not implemented at the right time, then they will not give the desired result. So, the right timing is very important. Delayed decisions may be harmful for the organizations.</p> <p>6. Participation-Participation of employees in decision making is an important factor to get it approved unanimously. Employee's ideas, opinions and suggestions should be incorporated in decisions to make it more fruitful and profit giving i.e. to be more satisfactory in all results.</p> <p>6. Bounded Rationality in Decision Making.</p> <p>Explanation of 5 features 2X5=10Marks</p>			
3a	<p>Demand Forecasting is an important tool for business decision making and future planning. This involves the determination of the level of production, manpower requirements, equipment and inventory levels.</p> <p>For an organization to provide customer delight it is important that organization can understand what customer wants and how much does they want. If an organization can gauge future demand that manufacturing plan becomes simpler and cost effective.</p> <p>The process of analyzing and understanding current and past information to understand the future patterns through a scientific and systemic approach is called forecasting. And the process of estimating the future demand of product in terms of a unit or monetary value is referred to as demand forecasting.</p> <p>The purpose of forecasting is to help the organization manage the present as to prepare for the future by examining the most probable future demand pattern. However, forecasting has its constraint for example we cannot estimate a pattern for technologies and product where there are no existing pattern or data.</p> <p>Business Forecasting Objective</p> <p>The very objective of business forecasting is to be accurate as possible, so that planning of resources can be done in a very economical manner and therefore, propagate optimum utilization of resources. Business forecasting helps in establishing relationship among many variables, which go into manufacturing of the product. Each forecast situation must be analyzed independently along with forecasting method.</p> <p>Definition-2Marks Objectives -8 Marks.</p>	[10]	CO3	L1
4a	<p>SES Technique- 8 Marks Forecasts are 495,496,498,497,494,500,501</p> <p>Graphical plot- 2 Marks</p>	[10]	CO3	L3
5a	<p>The nominal group technique (NGT) is a group process involving problem identification, solution generation, and decision making. It is a technique in which members of a group, list ideas in writing privately and then the process starts in which the members are asked to open their ideas publicly and this process goes on till all the ideas are exhausted publicly. There is no clarification at this stage verbally and also no evaluation is permitted at this stage. Once all proposals are listed</p>	[10]	CO3	L1

	<p>publicly, the group engages in a discussion of the listed alternatives, which ends in some form of ranking or rating in order of preference. When to Use Nominal Group Technique • Vocal members are in a group • Silence thinkers are in a group • Concern about some members not participating • Ideas are not easily generated in a group • New members in a team • In case of controversial issues Nominal Group Technique Considerations • It is important for the facilitator to remember always that discussion should not turn into an argument rather the discussion should resort to clarification of the matter under consideration. There might be differences in opinions during discussion but that is not important and there is no need to resolve such difference of opinions. • There has to be visibility of all the ideas in discussion. In case of many ideas or its overflow, it is better to post previous ideas pages around the room in order to make it visible to everyone. • Brainstorming technique may be used with this tool for other types of suggestions.</p> <p>Delphi Technique- In this technique, suggestions are invited from a panel of experts who are physically separated and unknown to each other. After collecting all suggestions, they are again sent for panel suggestions and the process of taking and giving suggestion continuous till convergence takes place. This helps to improve the quality of decisions.</p> <p>The following are the differences in Delphi and Nominal Group Decision Making Technique: 1. Nominal Group Technique- It is used for making decisions as quickly as possible with few hours or may be less than this. Delphi Technique- Quality is considered over quick responses and questionnaire is used through postal mails for getting responses. 2. Nominal Group Technique- It is a face to face interactive process Delphi Technique- It is more like a batch process and offline 3. Nominal Group Technique-Less number of iterations are used to get the results Delphi Technique- It may take two or three iterations to get results and that may depend upon the goal for which the technique has been adopted 4. Nominal Group Technique- Large number of opportunities in order to understand the opinions and judgments of others Delphi Technique- It is anonymous in nature. If required, meetings could be arranged.</p> <p>Explanation of delphi and nominal group technique- 5+5 Marks</p>			
6a	<p>Identification of decision variable - 1 Mark</p> <p>Identification of constraints each one mark - (1X4) =4Marks</p> <p>Let x_1, x_2, x_3 be the number of models of 1, 2 & 3 respectively of a certain product</p> <p>Objective function: Maximize $Z = 30x_1 + 20x_2 + 50x_3$</p> <p>Subjected to constraints: $2x_1 + 3x_2 + 5x_3 \leq 4000$, $4x_1 + 2x_2 + 7x_3 \leq 6000$, $x_1 \geq 200$, $x_2 \geq 200$, $x_3 \geq 150$</p> <p>$x_1, x_2, x_3 \geq 0$ (non-negativity restrictions).</p> <p>Total profit-Rs 5,60,000- 1 Mark</p> <p>Graphical solution- 4 Marks</p>	[10]	CO2	L3
7a	<p>Identification of IBFS- 5 Marks using VAM/North west corner rule/row minima method/column minima method. IBFS- Rs235</p> <p>Optimality test using MODI Method-5marks</p>	[10]	CO3	L3

Course Outcomes		Modules covered	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03	PS04
CO1	Describe the concept of operations management and productivity	1	2	2	-	2	-	-	-	-	-	2	2	2	-	-	3	-
CO2	Apply decision models to various real time problems	2	3	2	2	2	-	-	-	-	-	2	-	-	-	-	3	-
CO3	Solve and analyze real time problems using different forecasting techniques	3	2	3	2	3	-	-	-	2	2	2	2	2	-	-	3	-
CO4	Evaluate and rank capacity locations, plan and schedule production by solving the problems	4, 5	2	2	2	-	-	-	-	2	2	2	2	2	-	-	3	-
CO5	Describe MRP & CRP concepts, inventory types and its objectives and calculate EOQ using various models	6,7	3	2	2	-	-	-	-	2	3	2	3	2	-	-	3	-
CO6	Summarize the concepts of purchasing and supply chain management	8	2	3	3	-	-	-	-	2	2	2	2	2	-	-	3	-

