UPES
UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM & ENERGY STUDIES

End Semester Examination, December 2021

Course: Program: BBA-FAS | **Semester: III**
Subject/Course: Spreadsheet Modeling | **Max. Marks: 100**
Course Code: DSQT 2005 | **Duration: 3 Hours**

Instructions : The Question Paper has 4 Sections, and there is internal choice in Section C

Q.No	SECTION A - 10Q x 2M = 20 Marks	Marks	CO
Q1	The _____ models have a specific mathematical structure and thus can be solved by the known mathematical techniques a)Analytical b)Heuristic c)Simulation d)None of these	**2**	**CO3**
Q2	If the total investment in stock is limited, then the best order quantity for each item will be (a) equal to the economic order quantity (b) greater than the EOQ (c) less than the EOQ (d) either greater or less than the *EOQ*	**2**	**CO3**
Q3	The basic information required for an efficient control of inventory is to do with (a) What items should be stocked? (b) When should an order be placed to replenish inventory? (c) How much should be ordered in each replenishment? (d) all of the above	**2**	**CO3**
Q4	If EOQ is calculated, but an order is then placed which is smaller than this, then the variable cost will (a) increase (b) decrease (c) either increase or decrease (d) no change	**2**	**CO3**
Q5	The _____ Excel function returns the count of cells that contain numbers, text, logical values, error values, and empty text (""). a) COUNTA b) COUNT C)COUNTIF d)COUNTBLANK	**2**	**CO3**
Q6	Degeneracy occurs while moving quantities in a closed loop when _____cells become _____ at the same time.	**2**	**CO2**
Q7	Redundant constraints _____ affect the optimal solutions to the problem	**2**	**CO2**
Q8	The _____ chart in Excel compares values across categories in a circular orientation a)Bubble b) Radar c)Scatter d)Column	**2**	**CO2**
Q9	A Random variable expressed in monetary units, its expected value is known as _____	**2**	**CO2**
Q10	In Decision-making, _____ the amount of profit foregone due to uncertainty	**2**	**CO2**
	SECTION B - 4Q x 5M = 20 Marks		
Q11	Use the graphical method to solve the following LP problem : Maximize $Z = 15x_1 + 10x_2$ subject to the constraints (i) $4x_1 + 6x_2 \leq 360$, (ii) $3x_1 \leq 180$, (iii) $5x_2 \leq 200$ and $x_1, x_2 \geq 0$.	5	**CO2**
Q12	The payoffs (in Rs) of three Acts A1, A2 and A3 and the possible states of nature S1, S2 and S3 are given below :	**5**	**CO4**

<table>
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<tr><td>States of Nature ↓</td><td colspan="3">Act</td></tr>
<tr><td></td><td>A1</td><td>A2</td><td>A3</td></tr>
<tr><td>S1</td><td>-20</td><td>-50</td><td>200</td></tr>
<tr><td>S2</td><td>200</td><td>-100</td><td>-50</td></tr>
<tr><td>S3</td><td>400</td><td>600</td><td>300</td></tr>
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The probabilities of the states of nature are 0.3, 0.4 and 0.3 respectively.
Determine the optimal action to be taken on the basis of EMV Criterion.
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<tr><td>Q13</td><td>Explain the various costs involved in an inventory control model</td><td>5</td><td>CO3</td></tr>
<tr><td>Q14</td><td>Explain the significance of Pivot tables in Excel. Elucidate its components</td><td>5</td><td>CO1</td></tr>
<tr><td colspan="4">SECTION C - 3Q x 10M = 30 Marks</td></tr>
<tr><td>Q15</td><td>a) Elucidate the significance of Quality and explain the ISO Quality Model.
b) Explain any five Statistical / Mathematical functions of Excel with examples.</td><td>10</td><td>CO2</td></tr>
<tr><td>Q16</td><td>Fair Deal Limited uses Rs. 1,00,000 materials per year. The administration cost per purchase in Rs. 100 and the carrying cost is 20% of the average inventory. The company has a purchase policy on the basis of economic order quantity but has been offered a discount of 0.5% in the case of purchase five times per year. Advise the company whether it should accept new offer or not?</td><td>10</td><td>CO3</td></tr>
<tr><td>Q17</td><td>A company needs to increase its production beyond its existing capacity. It has narrowed down on two alternatives in order to increase the production capacity: (a) expansion, at a cost of Rs 8 million, or (b) modernization at a cost of Rs 5 million.
Both approaches would require the same amount of time for implementation. Management believes that over the required payback period, demand will either be high or moderate. Since high demand is considered to be somewhat less likely than moderate demand, the probability of high demand has been set at 0.35. If the demand is high, expansion would gross an estimated additional Rs 12 million but modernization would only gross an additional Rs 6 million, due to lower maximum production capability. On the other hand, if the demand is moderate, the comparable figures would be Rs 7 million for expansion and Rs 5 million for modernization.
(a) Calculate the conditional profit in relation to various action-and-outcome combinations and states of nature.
(b) If the company wishes to maximize its expected monetary value (EMV), should it modernize or expand?
(c) Calculate the EVPI.
(d) Construct the conditional opportunity loss table and also calculate EOL</td><td>10</td><td>CO5</td></tr>
<tr><td></td><td>OR</td><td></td><td></td></tr>
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<tr><td>Q17</td><td>Indicate the difference between decision-making under risk, and uncertainty, in statistical decision theory. Also state any two differences between EOL and EVPI</td><td>10</td><td>CO5</td></tr>
<tr><td colspan="4">SECTION D - 2Q x 15M = 30 Marks</td></tr>
<tr><td>Q18</td><td><u>Case Study 1 - Dairy Farm Production</u>
A dairy firm has three plants located in a state. The daily milk production at each plant is as follows:
Plant 1 $\rightarrow$ 6 million litres, Plant 2 $\rightarrow$ 1 million litres, and Plant 3 $\rightarrow$ 10 million litres
Each day, the firm must fulfil the needs of its four distribution centres D_1, D_2, D_3 and D_4. The minimum requirement of each centre (in million litres) is as follows:
$D_1 \rightarrow 7$, $D_2 \rightarrow 5$, $D_3 \rightarrow 3$, and $D_4 \rightarrow 2$.
Cost (in hundreds of rupees) of shipping one million litre from each plant to each distribution centre is given in the following table:

<table><tr><th>Plant ↓</th><th>D_1</th><th>D_2</th><th>D_3</th><th>D_4</th></tr><tr><td>P_1</td><td>2</td><td>3</td><td>11</td><td>7</td></tr><tr><td>P_2</td><td>1</td><td>0</td><td>6</td><td>1</td></tr><tr><td>P_3</td><td>5</td><td>8</td><td>15</td><td>9</td></tr></table>Find the initial basic feasible solution for given problem by using following methods:
(a) Least cost method (bc) Vogel’s approximation method

State the transportation problem. Explain clearly the steps involved in solving it.</td><td>10+5</td><td>CO4</td></tr>
<tr><td>Q19</td><td><u>Case Study 2 – Soft Drink Company</u>
A soft drink manufacturing company has 300 ml and 150 ml canned cola as its products with profit margin of Rs. 4 and Rs. 2 per unit respectively. Both the products have to undergo process in three types of machine. The following Table indicates the time required on each machine and the available machine-hours per week.
<table><tr><td>Requirement ↓</td><td>Cola 300 ml</td><td>Cola 150 ml</td><td>Available machine hours per week</td></tr><tr><td>Machine 1</td><td>3</td><td>2</td><td>300</td></tr><tr><td>Machine 2</td><td>2</td><td>4</td><td>480</td></tr><tr><td>Machine 3</td><td>5</td><td>7</td><td>560</td></tr></table>Formulate the linear programming problem specifying the product mix which will maximize the profits within the limited resources, and solve it graphically.

What is linear programming? What are its major assumptions and limitations?</td><td>10+5</td><td>CO1</td></tr>
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