



UNIVERSITY OF PETROLEUM & ENERGY STUDIES
End Semester Examination, December 2021

Course: Program: BBA-FBE
Subject/Course: Spreadsheet Modeling
Course Code: DSQT 2005

Semester: III
Max. Marks: 100
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 <i>EOQ</i>	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

	States of Nature	Act				
	↓					
		A1	A2	A3		
	S1	-20	-50	200		
	S2	200	-100	-50		
S3	400	600	300			
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.						
Q13	Explain the various costs involved in an inventory control model				5	CO3
Q14	Explain the significance of Pivot tables in Excel. Elucidate its components				5	CO1
SECTION C - 3Q x 10M = 30 Marks						
Q15	a) Elucidate the significance of Quality and explain the ISO Quality Model. b) Explain any five Statistical / Mathematical functions of Excel with examples.				10	CO2
Q16	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?				10	CO3
Q17	<p>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.</p> <p>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.</p> <p>(a) Calculate the conditional profit in relation to various action-and-outcome combinations and states of nature.</p> <p>(b) If the company wishes to maximize its expected monetary value (EMV), should it modernize or expand?</p> <p>(c) Calculate the EVPI.</p> <p>(d) Construct the conditional opportunity loss table and also calculate EOL</p>				10	CO5
OR						

Q17	Indicate the difference between decision-making under risk, and uncertainty, in statistical decision theory. Also state any two differences between EOL and EVPI	10	CO5
-----	--	----	-----

SECTION D - 2Q x 15M = 30 Marks

Q18	<p><u>Case Study 1 - Dairy Farm Production</u></p> <p>A dairy firm has three plants located in a state. The daily milk production at each plant is as follows: Plant 1 → 6 million litres, Plant 2 → 1 million litres, and Plant 3 → 10 million litres Each day, the firm must fulfil the needs of its four distribution centres D₁, D₂, D₃ and D₄. The minimum requirement of each centre (in million litres) is as follows: D₁ → 7, D₂ → 5, D₃ → 3, and D₄ → 2. Cost (in hundreds of rupees) of shipping one million litre from each plant to each distribution centre is given in the following table:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Plant ↓</th> <th>D₁</th> <th>D₂</th> <th>D₃</th> <th>D₄</th> </tr> </thead> <tbody> <tr> <td>P₁</td> <td>2</td> <td>3</td> <td>11</td> <td>7</td> </tr> <tr> <td>P₂</td> <td>1</td> <td>0</td> <td>6</td> <td>1</td> </tr> <tr> <td>P₃</td> <td>5</td> <td>8</td> <td>15</td> <td>9</td> </tr> </tbody> </table> <p>Find the initial basic feasible solution for given problem by using following methods: (a) Least cost method (bc) Vogel's approximation method</p> <p>State the transportation problem. Explain clearly the steps involved in solving it.</p>	Plant ↓	D ₁	D ₂	D ₃	D ₄	P ₁	2	3	11	7	P ₂	1	0	6	1	P ₃	5	8	15	9	10+5	CO4
Plant ↓	D ₁	D ₂	D ₃	D ₄																			
P ₁	2	3	11	7																			
P ₂	1	0	6	1																			
P ₃	5	8	15	9																			

Q19	<p><u>Case Study 2 – Soft Drink Company</u></p> <p>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.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Requirement ↓</th> <th>Cola 300 ml</th> <th>Cola 150 ml</th> <th>Available machine hours per week</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>Formulate the linear programming problem specifying the product mix which will maximize the profits within the limited resources, and solve it graphically.</p> <p>What is linear programming? What are its major assumptions and limitations?</p>	Requirement ↓	Cola 300 ml	Cola 150 ml	Available machine hours per week	Machine 1	3	2	300	Machine 2	2	4	480	Machine 3	5	7	560	10+5	CO1
Requirement ↓	Cola 300 ml	Cola 150 ml	Available machine hours per week																
Machine 1	3	2	300																
Machine 2	2	4	480																
Machine 3	5	7	560																