Paper Name: Quantitative Techniques for Management

Vth Semester

Assignment

Q1a) Given the payoff matrix of two players:

Player B

Player A	B_1	B_2	B_3	B_4	B_5
A_1	8	10	-3	-8	-12
A_2	3	6	0	6	12
A_3	7	5	-2	-8	17
A_4	-11	12	-10	10	20
A_5	-7	0	0	6	2

i) What is the value of the game?

(4)

ii) Is it strictly determinable game?

(2)

OR

The two players A& B have a bet with each other in rolling two die. If the two die turns six, A is paid Rs10 & if it does not turn six in both the die, he is paid Rs 4. Player B is paid Rs 5 when two die does not match. Given the choice of being A or B. Which one would you choose and what would be your strategy?

b) What is Saddle point? (4)

Q2 Five Contractors C_1, C_2, C_3, C_4,C_5 are available to a manager who has to get four roads repair R_1, R_2, R_3 & R_4 done by assigning one job to each contractor.The govt has given a grant of 50 lakh towards the cost of repair Given the time needed by different for contractors different jobs in the matrix below:

C_1/R_1	**R_1**	**R_2**	**R_3**	**R_4**
C_1	9	14	19	15
C_2	7	17	20	19
C_3	9	18	21	18
C_4	10	12	18	19
C_5	10	15	21	16

i) Find the best of assigning repair work to the contractors.

ii) Which of the five contractors will be unsuccessful in his bid? (10)

Q3 a) You are given a following transportation problem

$X1/W_1$	W_1	W_2	W_3	W_4	Available Units
X_1	6	1	9	3	70
X_2	11	5	2	8	55
X_3	10	12	4	7	90
Required Units	85	35	50	45	215

An initial basic solution to the above problem was obtained as X_{13} = 50 units, X_{14}=20 units & X_{21} = 55, X_{31} = 30 units, X_{32} = 35 & X_{34} = 25 units. You are required to test whether this is an optimal solution, if not then modify & obtain an optional solution. (Use MODI Method) (8)

b) What are row & column penalty? (2)

Q4 a)The manager of a Sadhana Company has decided on the number of luxury gift packs of cosmetics to buy for the Diwali season. The gift packs have to be bought from manufacturer in cases of 50. The profit per pack is Rs 20. The manager 's estimate of the sales of the gift packs during this season is as follows:

Sales :	5	10	15	20	25
Probability:	0.20	0.20	0.30	0.20	0.10

Any unsatisfied demand does not affect the probability of future sales. Any unsold pack will be sold after Diwali at a loss of Rs10 per pack.

i) Assuming that the quantity of stock is bought in units of 5 cases & ignoring storage costs, how many cases should the manager but to maximize her expected profit. (3)
ii) Calculate expected value of perfect information for the manager. (3)

b) Explain Laplace and Hurwicz principle

(4)

Q5 The following table gives data

Activity	Preceding Activity	Time (days)

A	-	3
B	-	8
C	B	6
D	B	5
E	A	13
F	A	4
G	F	2
H	C,E,G	6
I	F	2

(i) Draw the network diagram.
(ii) Identify the critical path.
(iii) Determine earliest and latest finish times. (!0)

TEST

Q.1 a) Max $Z = 30X_1 + 20X_2$

subject to the Constraints

$-X_1 - X_2 \geq -8$
$-6X_1 - 4X_2 \leq -12$
$5X_1 + 8X_2 = 20$
$X_1, X_2 \geq 0$
(Clearly show all additional variables introduced & also variables dropped & entered at each stage) (8)

b) What are slack, surplus & artificial variables? (2)

Q.2 a) You are given a following transportation problem

X1/W1	**W_1**	**W_2**	**W_3**	**W_4**	**Available Units**
X_1	6	1	9	3	70
X_2	11	5	2	8	55
X_3	10	12	4	7	90
Required Units	85	35	50	45	215

An initial basic solution to the above problem was obtained as $X_{13} = 50$ units, $X_{14}=20$ units & $X_{21} = 55$, $X_{31} = 30$ units, $X_{32} = 35$ & $X_{34} = 25$ units. You are required to test

whether this is an optimal solution, if not then modify & obtain an optional solution. (Use MODI Method) (8)

b) What are row & column penalty? (2)

Q.3 Four operators O_1, O_2, O_3 & O_4 are available to a manager who has to get four jobs J_1, J_2, J_3 & J_4 done by assigning one job to each operator. Given the time needed by different operators for different jobs in the matrix below:

O1/J1	**J_1**	**J_2**	**J_3**	**J_4**
O_1	12	10	10	8
O_2	14	12	15	11
O_3	6	10	16	4
O_4	8	10	9	7

i) How should manager assign the jobs so that the total time needed for all four jobs is minimum?

ii) If job J_2 is not to be assigned to operator O_2, what should be the assignment over how much additional total time will be required? (10)

Q.4 A project has the following activities & other characteristics

Activity	**Preceding Activity**	**Most Optimistic**	**Most likely**	**Most pessimistic**
A	-	4	7	16
B	-	1	5	15
C	A	6	12	30
D	A	2	5	8
E	C	5	11	17
F	D	3	6	15
G	B	3	9	27
H	E,F	1	4	7
I	G	4	19	28

(iv) Draw the PERT network diagram & identify the critical path. (4)

(v) Determine the mean project completion time. (1)

(vi) If the manager wishes to be 99% sure that the project is completed on 30th June 2010, when should he start the project work? (3)

(vii) Find the probability that the project will take more than 36 weeks but not more than 40 weeks. (2)

MULTIPLE CHOICE QUESTIONS(MCQ'S)

1.Operation research approach is

A) Multi-disciplinary

B) Artificial

C) Intuitive

D) All of the above

2. Operation research analysis does not

A) Predict future operation

B) Build more than one model

C) Collect the relevant data

D) Recommended decision and accept

3. Mathematical model of Linear Programming is important because

A) It helps in converting the verbal description and numerical data into mathematical expression

B) decision makers prefer to work with formal models.

C) it captures the relevant relationship among decision factors.

D) it enables the use of algebraic techniques.

4. A constraint in an LP model restricts

A) value of the objective function

B) value of the decision variable

C) use of the available resourses

D) all of the above

5. In graphical method of linear programming problem if the ios-cost line coincide with a side of region of basic feasible solutions we get

A) Unique optimum solution

B) unbounded optimum solution

C) no feasible solution

D) Infinite number of optimum solutions

6. A feasible solution of LPP

A) Must satisfy all the constraints simultaneously

B) Need not satisfy all the constraints, only some of them

C) Must be a corner point of the feasible region

D) all of the above

7. The objective function for a L.P model is $3x1+2x2$, if $x1=20$ and $x2=30$, what is the value of the objective function?

A) 0

B) 50

C) 60

D) 120

8. In a balanced transportation model where supply equals demand,
a. all constraints are equalities
b. none of the constraints are equalities
c. all constraints are inequalities
d. none of the constraints are inequalities

9.In a transportation problem, items are allocated from sources to destinations
a. at a maximum cost
b. at a minimum cost
c. at a minimum profit
d. at a minimum revenue

10.The assignment model is a special case of the _____ model.
a. maximum-flow
b. transportation
c. shortest-route
d. none of the above

11.If an activity cannot be delayed without affecting the entire project, it is a _____ activity
a. completed
b. critical
c. conjugated
d. none of the above

12. A _____ represents the beginning and end of activities, referred to as events.
a. path
b. arc
c. branch
d. node

13. According to the _____, the defensive player will select the strategy that has the smallest of the maximum payoffs.
a. maximax strategy
b. minimin strategy
c. maximin strategy
d. minimax strategy

14.The expected opportunity loss criterion will always result in the same decision as the expected value criterion.
a. True
b. False

15. In a transportation problem, items are allocated from sources to destinations
a. at a maximum cost
b. at a minimum cost
c. at a minimum profit
d. at a minimum revenue

Answers- A,A,A,C,B,A,D,A,B,D,B,A,D,A,B