Regular Sem-IV S&A Sem-IV (L) 25 copies
4/5/19 4-5-19
2-30pm to 5-30pm.
No. of pages → 03.

Paper / Subject Code: 96641 / Statistics :Paper III

Q. P. Code: 38578

Time: 3 hours Marks: 100

N.B. 1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Use of non-programmable calculator is allowed.
4. Graph papers will be provided on request.

Q.1 (a) Choose correct Answer for the following (ANY FIVE) (10)

i. A dummy activity is used in the network diagram when- (2)
a) two parallel activities have the same tail and head events
b) The chain of activities may have a common event yet be independent by themselves
c) both (a) and (b)
d) none of the above

ii. The term commonly used for activity slack time is (2)
a) free float
b) independent float
c) total float
d) all of the above

iii. Network models have advantage in terms of project- (2)
a) planning
b) scheduling
c) controlling
d) all of the above

iv. When the sum of gains of one player is equal to the sum of losses to another player in a game, the situation is known as- (2)
a) biased game
b) zero-sum game
c) fair game
d) all of the above

v. What happens when maximin and minimax values of the game are same? (2)
a) no solution exists
b) solution is mixed
c) saddle point exists
d) none of the above

vi. Which of the following might be viewed as an 'optimistic' decision criterion? (2)
a) Hurwicz
b) maximin
c) maximax
d) minimax

vii. The minimum EOL will always result in the same decision as- (2)
a) minimax
b) maximin
c) maximum EMV
d) maximax

Q.1 (b) Answer the following in one/ two sentences (ANY FIVE) (10)

i. Define dummy activity. (2)
ii. Define preceding activity. (2)
iii. What is critical path? (2)
iv. Define pay off matrix in game theory. (2)
v. State one assumption of Game theory. (2)
vi. Define risk in decision theory (2)
vii. What is optimum strategy in decision theory? (2)

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Q2 Attempt Any Two sub-questions: (20)

i A small project is composed of seven activities whose time estimates in weeks are given in the table as follows- (10)

Activity node	1 - 2	1 - 3	1 - 4	2 - 5	3 - 5	4 - 6	5 - 6
t_o	1	1	2	1	2	2	3
t_m	1	4	2	1	5	5	6
t_p	7	7	8	1	14	8	15

(a) Draw the project network.
(b) Identify the critical path.
(c) Find the expected duration and variance of each activity.

ii (a) What is network analysis? What are its objectives? (05)
(b) A small project consists of following activities. Construct a network diagram for the Project and identify critical path and project completion time. (05)

Activity	1 -2	2 - 3	2 -4	2 - 5	3 - 6	4-8	5 -7	6 - 8	7- 8
Time (days)	5	3	2	1	4	6	5	7	2

iii What are three time estimates in PERT? Explain. (10)

Q3 Attempt Any Two sub-questions: (20)

i Use graphical method in solving the following game and find the value of the game. (10)

Player B→ / Player A ↓	B_1	B_2	B_3	B_4
A_1	2	2	3	-2
A_2	4	3	2	6

ii Describe the dominance property to reduce a two person zero-sum game to 2 × 2 matrix. State the formula to calculate value of the game. (10)

iii (a) Mention the rules for determining a saddle point. Also determine whether the game is a fair game for the following payoff matrix: (05)

Player B→ / Player A ↓	B_1	B_2
A_1	1	2
A_2	4	-3

(b) Explain following terms with reference to Game theory : (05)
1. Strictly determinable game.
2. Pure strategy
3. Mixed strategy

Q4 Attempt Any Two sub-questions: (20)

i Explain decision making under risk. (10)

ii A consumer goods company has set up following pay off table for the sales returns of their product. Three strategies (S_1, S_2, S_3) are identified to deal with three uncertain states of nature (N_1, N_2, N_3). (10)

Acts→ / States of Nature ↓	S_1	S_2	S_3
N_1	800	500	300
N_2	350	300	100
N_3	400	550	0

Find the best act using-
(1) Maximin
(2) Minimax regret
(3) Laplace criteria.

iii (a) Explain briefly 'Expected value of perfect information (EVPI)' . (04)

(b) Draw a decision tree for the decision-making problem and suggest the best action. (06)

States of nature	Probability	Course of action	
		A_1	A_2
S_1	0.7	45	25
S_2	0.3	5	20

Q5 Attempt Any Two sub-questions: (20)

i Draw a network diagram for the following data: (10)

Activity	A	B	C	D	E	F	G
Preceding activity	-	-	A	A	B, C	D	E
Time (days)	4	6	4	3	3	1	2

1. Identify critical path and project completion time.
2. Find earliest and latest start and finish time for each activity.
3. Calculate Total float for each activity.

ii Explain the reduction of two person zero-sum game as a linear programming problem. (10)

iii (a) Explain the following terms: (04)
1. Course of action
2. State-of-Nature

(b) Prepare opportunity loss table from the following pay off table.. Calculate expected opportunity loss (EOL) and hence decide which act is to be selected. (06)

Acts → / Events ↓	1	2	3	4	Event probabilities
A	60	40	-5	-10	0.3
B	150	70	250	400	0.6
C	240	300	500	350	0.1

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