

- Note:** (i) All questions are compulsory.
(ii) Figures to the right indicate marks.
(iii) Scientific calculators are allowed.
(iv) Mixing of sub-questions is not allowed.

Q1. Attempt all sub questions:

[20 marks]

(A) State TRUE or FALSE and correct if necessary. (10)

- i) CPM means Critical process Method.
- ii) Network should have only one start event and one end event.
- iii) In game theory, the value of game is always positive.
- iv) EVPI is maximum EMV.
- v) In pessimistic criterion, we use maximin values to decide optimal action.

(B) Answer the following: (10)

- i) State 2 advantages of PERT.
- ii) Define merge event and burst event.
- iii) Explain maximin-minimax principle in game theory.
- iv) Write two limitations of game theory.
- v) State any 4 methods used in decision making under uncertainty.

Q2. Attempt any two sub questions:

[20 marks]

a) i) Write 2 limitations of CPM. (02)

ii) A project consists of following 8 activities: (08)

Activity	Preceding activity	Time(days)
A	-	6
B	A	7
C	A	9
D	B	12
E	C	7
F	D, E	8

1. Draw network diagram. Find critical path and project completion time.
2. Find EST, EFT, LST, LFT for all the activities.

b) i) Compare PERT and CPM. (05)

ii) Define three time estimates in PERT. What is meant by expected time of an activity in PERT? Give its formula. (05)

c) i) What is meant by project crashing? (02)

ii) The following table gives data on normal time and cost and crash time and (08)

cost for a project:

Activity	1-2	2-3	2-4	2-5	3-4	4-6	5-6
Normal time(weeks)	3	3	5	4	4	3	3
Normal cost(Rs.)	300	75	200	120	100	90	60
Crash time(weeks)	2	3	3	4	1	2	1
Crash cost(Rs.)	450	75	300	120	190	130	110

1. Draw the network and find out critical path and the normal project duration.
2. If the indirect costs are Rs. 100 per week, find out the optimum duration by crashing and the corresponding project cost.

Q3. Attempt any two sub questions:

[20 marks]

- i) Explain dominance principle to reduce size of payoff matrix. (03)
- ii) Obtain the optimal strategy by principle of dominance. (07)

Player B					
	I	II	III	IV	V
Player A					
I	2	4	3	6	4
II	5	6	3	7	8
III	6	7	9	8	7
IV	4	2	6	4	3

- i) Define (1) saddle point (2) zero sum game (3) fair game (05)
(4) pure strategy (5) payoff matrix
 - ii) Describe the graphical method for solving 2 X n game without saddle point. (05)
- (c) i) State the assumptions for a competitive game. (05)
- ii) Find the value of the following 2X2 game algebraically by using mixed strategies. Also find the optimal strategies of the two players. (05)

Player B Player A	I	II
I	2	3
II	4	-1

Q4. Attempt any two sub questions:

[20 marks]

a) Explain briefly steps involved in Decision Theory. (10)

b) Consider the following cost matrix and determine the best order size using (10)

- i) Pessimistic criterion ii) Optimistic criterion iii) Laplace criterion
iv) Hurwitz criterion ($\alpha = 0.7$) v) Minimax regret criterion

Order size	Demand				
	50	100	150	200	250
75	50	125	375	375	125
150	40	500	100	250	500
225	750	550	250	750	125
300	500	40	500	400	540

c) i) Explain rules to draw decision tree. (04)

ii) A manufacturing company has to select one of two products A and B for (06)
manufacturing product A requires investment of Rs.20,000 and product B Rs.40,000.
Market research survey shows high, medium and low demands with corresponding
Probabilities and returns from sales in Rs. Thousand for the two products in the
following table. Construct an appropriate decision tree. What decision the company
should take?

Market demand	Product (A)		Product (B)	
	Probability	Returns from sale	Probability	Returns from sale
High	0.4	50	0.3	80
Medium	0.3	30	0.5	60
Low	0.3	10	0.2	50

Q5. Attempt any two sub questions:

[20 marks]

a) i) State two objectives of network analysis. (02)

ii) A project consists of 7 activities. Time estimates are given for each activity: (08)

Activity	Optimistic time(days)	Most likely time(days)	Pessimistic time(days)
1-2	2	4	6
1-3	3	6	9
2-3	1	4	7
2-4	2	3	4
3-5	1	3	5
4-6	1	1	1
5-6	1	2	3

1. Draw the PERT network and find expected completion time of project.
2. What is the probability that project will be completed in 15 days?

b) Solve the following game using LPP. (10)

Player B \ Player A	I	II	III
I	1	-1	3
II	3	5	-3
III	6	2	-2

(c) i) For the following payoff table determine optimal decision by evaluating (06)

- 1) EMV 2) EOL

State of nature	Probability	A1	A2	A3
S1	0.3	-20	-30	200
S2	0.4	200	-100	-50
S3	0.3	400	600	300

ii) Explain decision making situations. (04)