Suryadatta Education Foundation's
Suryadatta Group of Institutes, Pune-21

MCA Department
END Term Examination- August, 2022

MCA-I (SEM - II): A.Y. 2021-22

Subject-Optimization Techniques

Subject Code: MT -21
Date:4/08/2022

Total Marks: 50
Time: 10:00AM to 12:30PM

Note:
1. Q1. is compulsory of MCQ type consisting 20 questions for 10 marks.
2. Each Question Carry equal 10 marks.

Q1.   (10 marks)
1.The linear function of the variables which is to be maximize or minimize is called
A) Constraints B) Objective function C) Decision variable D) None of the above
2.The relationship between two or more variables in the function must be linear.
A. TRUE B. FALSE C. Can be true or false D. Cannot say
3.Pessimistic Time and Optimistic Time of completion of an activity are given as
10days and 4days respectively, the variance of the activity will be
a)   1   b) 6   c) 12   d) 18
4. According to the time estimates made by the PERT planners, the maximum time
that would be needed to complete an activity is called as _____
A. The most likely time estimate B. Optimistic time estimate C. Pessimistic time
estimate
D. Expected time estimate
5. Earliest expected time of completion for an activity is found using
a) Expected time calculation b) Forward Pass method c) Backward Pass Method)
Crashing
6.When the game is not having a saddle point, then the following method is used to
solve the game:
a. Linear Programming method b. Minimax and Maximin criteria. Algebraic method
d. Graphical method
7. In case, there is no saddle point in a game then the game is
a. Deterministic game b. Fair game c. Mixed strategy game d. Multiplayer game.
8. The total time required to complete all the jobs in a job sequencing problem is
known as
1. Processing time 2. Waiting Time 3. Elapsed time 4. Idle time
9. Operations Research Models in which values of all variables and all possible
outcomes

are known with certainty are called models

a) Physical b) Symbolical c) deterministic d) probabilistic

10. The intersection value of key column and key row is called

A) Vital element B) Important element C) Basic element D) Key element

11. The time during which a machine remains waiting or vacant in sequencing problem is called time.

i) Processing ii) Waiting iii) Free iv) Idle

12. Floats for critical activities will be always be

a) One b) Zero c) Highest d) Equal to duration

13. Decision Theory is concerned with

a) The amount of information that is available b) criteria for measuring the goodness of a decision c) selecting optimal decisions in sequential problem d) all of the above

14. What enables us to determine the earliest and latest times for each of the events and activities and thereby helps in the identification of the critical path?

A. Programme Evaluation B. Review Technique (PERT) C. Both A and B D. Deployment of resources

15. The objective of network analysis is to_____.

1) Minimize total project duration 2) minimize total project cost 3) minimize production delays, interruption and conflicts 4) maximize total project duration

16. A mixed strategy game can be solved by_____.

a) Simplex method b) Hungarian method c) Graphical method d) Degeneracy

17. Key element is also known as_____.

1) Slack 2) Surplus 3) Artificial 3) Pivot

18. An activity which does not consume neither any resource nor time is known as ___

1. Predecessor activity 2. Successor activity 3. Dummy activity 4. Activity

19. A type of decision-making environment is

i) Certainty ii) uncertainty iii) risk iv) all of these

20. The decision-making criterion that should be used to achieve maximum long-term payoff is

(a) EOL (b) EMV (c) Hurwicz (d) Maximax

Q2. (a) A small Project consisting of eight activities has the following schedule (6 marks)

TIME ESTIMATES (IN WEEKS)

Activity	Preceding activity	Optimistic Time	Most Likely Time	Pessimistic Time
A	----------	2	4	12
B	----------	10	12	26
C	A	8	9	10
D	A	10	15	20
E	A	7	7.5	11

F	B,C	9	9	9
G	D	3	3.5	7
H	E,F,G	5	5	5

i) Draw the PERT network for the project

ii) Determine the critical path and project completion duration

iii) Find the probability that the project will completed in 34 weeks.

(b)Solve the following by SIMPLEX Method   (4 marks)

Max Z= $3X_1+2X_2$

Subject to

$2X_1 + X_2 \leq 5$

$X_1 + X_2 \leq 3$

Where $X_1, X_2 \geq 0$

OR

Q2.   (5 marks)

(a) Determine the optimal sequence of performing 5 jobs on 4 machines that minimizes total elapsed time. The machining of each job is required in the order ABCD and the process timings (in hrs.) are as follows:

Job	M_1	M_2	M_3	M_4
J1	24	9	12	21
J2	27	6	15	15
J3	18	12	15	24
J4	36	15	3	27
J5	21	3	6	9

Find:1) Total elapsed time   2) Idle time

(b) Solve LPP by TWO PHASE Method
          (5 marks)

Max Z= $5X_1+3X_2$

Subject to

④

$3X_1 + 2X_2 \geq 3$

$X_1 + 4X_2 \geq 4$

$X_1 + X_2 \leq 5$

Where $X_1, X_2 \geq 0$

Q3 (a) Solve the following Game (5 marks)

		b1	b2	b3	b4
Player	a1	8	10	9	14
	a2	10	11	8	12
	a3	13	12	14	13

(b) The following table gives the activities in a construction project and other relevant

information: (5 marks)

Activity:	1-2	1-3	2-3	2-4	3-4	4-5
Duration:	20	25	10	12	6	10

(i)   Draw the network for the project

(ii)   Find Critical Path and Project Duration

(iii) Find Free, Total, and Independent floats for each activity

OR

Q3. 1) A small maintenance project consists of the following jobs (6 marks)

Job	A	B	C	D	E	F	G	H	I	J	K
Predecessor	----	A	B	C	B	E	D,F	E	H	G,I	J
Job Time(days)	13	8	10	9	11	10	8	6	7	14	18

a)   Draw network diagram

b)   Find Critical path and project duration

c)   Find float for each activity

2) Solve the game whose payoff matrix is given below (4 marks)

B

$$A \begin{bmatrix} 6 & 2 & 7 \\ 1 & 9 & 3 \end{bmatrix}$$

Q4.

(a)   Use the 'concept of dominance' to reduce the following game 2*2 game and then, from the reduced game, find the optimum strategies and the value of the game:

(6 marks)

Strategies		Player Y				
		I	II	III	IV	V
Player X	I	2	2	1	-2	-3
	II	4	3	4	-2	0
	III	5	1	3	3	3

(b)   The adjoining payoff table gives the payoffs resulting from the acts A1, A2, and A3 and the states of nature E1, E2, and E3 whose probabilities are 0.1, 0.7 and 0.2 respectively.

States of Nature	Acts		
	A1	A2	A3
E1	25	-10	-125
E2	400	440	400
E3	650	740	750

(i) Set up the opportunity loss table and calculate expected opportunity loss(EOL)

of each alternative course of action.

(ii) Verify that the decision for selection the best act using EMV and EOL gives the same result.

(4marks)

Q4.

(a)Solve Graphically the following LPP
        (6 marks)

Max Z= $9X_1+3X_2$

Subject to

$2X_1 + 3X_2 \leq 13$

$2X_1 + X_2 \leq 5$

Where $X_1, X2 \geq 0$

(b)Find the sequence that minimizes the total Elapsed time required to complete the following tasks on Two machines   (4marks)

Task	I	II	III	IV	V	VI	VII	VIII	IX
Machine A	4	10	8	18	12	16	14	10	8
Machine B	12	16	14	8	6	18	6	16	22

Q5. Write short notes: (Attempt ANY TWO)   (10 marks)

(a) Difference between PERT and CPM

(b) Types of Decision Making Environments

(c)Linear Programming Problem

(d) Simplex Method Algorithm