

### AS-488

## M.Sc. (Maths) IV Semester (Reg./Pvt./ATKT) Examination June 2019

### OPERATIONS RESEARCH - II

Optional (any four)

Paper - VIII

Time Allowed : Three Hours] [Maximum Marks : { Reg.-85  
Pvt.-100

Note : Attempt all the questions.

Section - A

Objective Type Questions

15 × 1 = 15

Q.1. Choose the correct answer:

- i) Transportation problem is basically a
  - (a) Maximization model
  - (b) Minimization model
  - (c) Transshipment problem
  - (d) Iconic model

- ii) MODI stands for
  - (a) Modern distribution
  - (b) Mendel's distribution method
  - (c) Modified distribution method
  - (d) Model index method
- iii) For optimality test:
  - (a) BFS must contain  $m + n$  allocations
  - (b) BFS must contain  $m + n + 1$  allocations
  - (c) BFS must contain  $m + n - 1$  allocations
  - (d) None of these
- iv) The assignment matrix is always a:
  - (a) Square matrix
  - (b) Rectangular matrix
  - (c) Identity matrix
  - (d) None of these
- v) The assignment problem is solved by
  - (a) Simplex method
  - (b) Graphical method
  - (c) Vector method
  - (d) Hungarian method

vi) The assignment problem will have alternative solutions when total opportunity cost matrix has:

- (a) At least one zero in each row and column
- (b) When all rows have two zeros
- (c) When there is a die between zero opportunity cost cells.
- (d) If two diagonal elements are zeros

vii) In critical path analysis, the word CPM means:

- (a) Crash Project manager
- (b) Critical path method
- (c) Critical Project management
- (d) Critical path management

viii) Slack equals:

- (a)  $LF - EF$                       (b)  $EF - LF$
- (c)  $EF - LS$                       (d)  $LF - ES$

ix) Which of the following does not belongs to project planning technique?

- (a) CPM                      (b) PERT
- (c) Gantt chart              (d) IRR

x) The result obtained by applying the simulation technique is :

- (a) Exact                      (b) Approximate
- (c) Unrealistic              (d) None of these

xi) Simulation is :

- (a) descriptive in nature
- (b) useful to analyse problem where analytical solution is difficult
- (c) a statistical experiment as such its results are subject to statistical errors
- (d) All of these

(5)

xii) When events occur at discrete points in time:

- (a) A simulation clock is required
- (b) The simulation advances to the next event
- (c) The model is a discrete event simulation
- (d) All of the alternatives are connect

xiii) A Saddle point exists when:

- (a) Minimax value = Maximin value
- (b) Maximin value = Maximax value
- (c) Minimax value = Minimin value
- (d) None of these

xiv) A game is said to be fair If both the lower and upper values of the game are

- (a) equal to zero
- (b) greater than zero
- (c) less than zero
- (d) None of these

(6)

xv) For a salesman, who has to visit cities, following are the ways of his tour plan:

- (a)  $n$
- (b)  $(n-1)!$
- (c)  $n!$
- (d)  $(n+1)!$

Section - B

Short Answer Type Questions

5 × 5 = 25

Q.2. Obtain the initial basic feasible solutions to the following transportation problem using North-West corner rule:

		supply		
	2	7	4	5
Plants	3	3	1	8
	5	4	7	7
	1	6	2	14
Demand	7	9	18	

OR

Define the following:

- a) Feasible solution
- (b) Basic feasible solution

(7)

Q.3. Explain Assignment problem. Write mathematical formulation of assignment problem.

OR

Obtain the set of necessary conditions for the non-linear programming problem:

Minimize  $Z = k x^{-1} y^{-2}$  subject to the constraints:  
 $x^2 + y^2 - a^2 = 0$  with  $x \geq 0, y \geq 0$  and find the minimum value of z.

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Q.4. Explain the following terms in PERT:

- a) Pessimistic time
- b) Optimistic time
- c) Most likely time

OR

Write rules of Network construction.

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Q.5. What do you understand by simulation? Classify simulation models.

OR

Write five advantages of simulation.

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P.T.O.

(8)

Q.6. Define the following terms in game theory

- a) Strategy
- b) Optimal strategy

OR

Solve the following game:

Player B

B<sub>1</sub> B<sub>2</sub>

Player A  $\begin{matrix} A_1 \\ A_2 \end{matrix} \begin{bmatrix} 3 & 5 \\ 4 & 1 \end{bmatrix}$

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Section - C

Long Answer Type Questions

5 × 9 = 45

Q.7. Solve the following transportation problem

		Destinations			Supply
		D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	
Origins	01	2	2	3	10
	02	4	1	2	15
	03	1	3	1	40
Demand		20	15	30	65

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Contd.

(9)

OR

Write the steps of Vogel's approximation method of solving transportation problem.

Q.8. State and prove Kuhn-Tucker necessary and sufficient conditions in non-linear programming.

OR

There are 4 jobs to be assigned to the machines, only one job could be assigned to one machine. The amount of time in hours required for the jobs in a machining are given in the following matrix.

Job	Machine				
	A	B	C	D	E
1	4	3	6	2	7
2	10	12	11	14	16
3	4	3	2	1	5
4	8	7	6	9	6

Find an optimum assignment of jobs to machine to minimize the total processing time and also find for which machine no job is assigned. What is total processing time to complete all jobs.

(10)

Q.9. The following table gives the activities in a construction project and time duration.

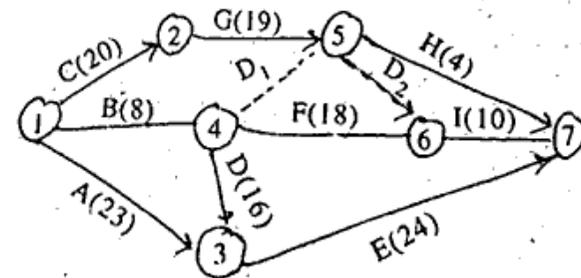
Activity	Preceding Activity	Normal time(days)
1-2	-	20
1-3	-	25
2-3	1-2	10
2-4	1-2	12
3-4	1-3, 2-3	05
4-5	2-4, 3-4	10

- Draw the activity network of the project.
- Find the total float and free float for each activity.
- Determine the critical path and Project duration.

OR

For the following network diagram find total float, free float and independent float:

Task:	A	B	C	D	E	F	G	H	I
Time:	23	8	20	16	24	18	19	4	10



---> Dummy Activity      -> O - Node

Q.10. Explain Monte - Carlo simulation with example.

OR

A tourist car operator finds that during the past for months the car's use has varied to much that the cost of maintaining the car has varied considerably. During the past 200 days the demand for the car fluctuated as below:

Trips / week	Frequency
0	16
1	24
2	30
3	60
4	40
5	30

Using random numbers simulates the demand for a 10 week period,

82,95,18,96,20,84,56,11,52,03

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Q.11. Explain minimax and maximin criteria is Game theory and solve the following game with graphical method:

	Player B	
	B <sub>1</sub>	B <sub>2</sub>
Player A	A <sub>1</sub>	[ -2   4 ]
	A <sub>2</sub>	[ 8   3 ]
	A <sub>3</sub>	[ 9   0 ]

OR

Solve the following game by linear programming technique.

	Player B		
	1	-1	3
Player A	3	5	-3
	6	2	-2

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