

2019

MBA

2nd Semester Examination

OPERATIONS RESEARCH

PAPER - MBA-205

Full Marks : 100

Time : 3 Hours

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their Own words as far as practicable.

Illustrate the answers wherever necessary.

(Turn Over)

Group - A

Answer Any **EIGHT** questions out of 16 questions:

8 X 2=16

1. What is Linear Programming problem?
2. What do you mean by slack variable?
3. What is artificial slack variable?
4. Mention any four areas of operations research.
5. What are the objectives to solve transportation problem?
6. What type of problem can be solved through assignment?
7. Distinguish between transportation and assignment problem.
8. Define the terms: Predecessor and Successor Activities.
9. What do you mean by Forward Pass and Backward Pass in Network Analysis?
10. Write the key points that should be kept in mind while taking inventory decisions.
11. State the concept of Quantity Discounts in inventory management.
12. Write about the costs involved in inventory management.
13. Briefly explain the assumption of Queueing Theory.
14. State the various techniques used for solving problems under certainty in Decision Theory.
15. State different functional areas having scope of Operation Research.
16. What is Linear Programming ?

Group - B

Answer Any **EIGHT** questions from the following: $8 \times 4 = 32$

17. Mention the scope of operations research.
18. Write the dual form from the following problem:
 Max $Z = 5x + 6y$
 s.t. $x + y \leq 6$
 $2x + 3y \leq 10$
 $x \geq 0, Y \geq 0$
19. Solve the following transportation problem using N-W corner method.

	D_1	D_2	D_3	D_4	Supply
O_1	4	2	5	3	6
O_2	5	4	3	2	13
O_3	1	4	6	5	9
Demand	7	8	5	8	

20. Solve the following problem using least cost method.

	D_1	D_2	D_3	D_4	Supply
O_1	4	6	9	5	16
O_2	2	6	4	1	12
O_3	5	7	2	9	15
Demand	12	14	9	8	

21. State the rules of Row minimization method to solve a transportation problem.
22. Discuss the concept of unbalanced transportation problem with a suitable example.
23. State the rule for the transformation of the non-key row in linear programming problem.

24. Old hens can be bought at Rs. 2 each and young ones at Rs. 5 each. The old hens lay 4 eggs per week and the young ones lay 6 eggs per week; each egg being worth 50 paise. If there are only Rs. 80 available to spend on purchasing the hens and if it is not possible to house more than 25 hens at a time then formulate the above problem as a LPP.
25. Explain briefly M/M/1 queueing model.
26. Customers arrive at a sales counter managed by a single person according to a poisson process with a mean rate of 20 per hour. The time required to serve a customer has an exponential distribution with a mean of 100 seconds. Find the average waiting time of customer.
27. Explain in brief, Customers' Behaviour in Queueing Theory.
28. Describe the objectives of inventory management.
29. Briefly explain different types of float in network analysis.
30. Describe the common errors in drawing network.
31. Draw the network from the following activity and find critical path and total duration of project.
- | Activity | Duration(Days) | Activity | Duration(Days) |
|----------|----------------|------------|----------------|
| 1-2 | 3 | 3-4(Dummy) | 0 |
| 2-3 | 4 | 4-5 | 2 |
| 2-4 | 5 | 5-6 | 3 |
| 2-5 | 3 | | |
32. Discuss the role of VED analysis in inventory control technique.

Group - C

Answer Any **FOUR** questions from the following: 4 X 8

33. Solve the LPP using simplex method.

$$\text{Max } z = 6X_1 + 7X_2$$

$$\text{s.t. } 2X_1 + 3X_2 \leq 12$$

$$2X_1 + X_2 \leq 8$$

$$(X_1, X_2) \geq 0$$

34. Solve the following problem using VAM

	D ₁	D ₂	D ₃	Supply
O ₁	16	20	12	200
O ₂	14	08	18	160
O ₃	26	24	16	90
Demand	180	120	150	

35. Solve the following problem using UV method.

	D	E	F	Supply
A	6	4	1	50
B	3	8	7	40
C	4	4	2	60
Demand	20	95	35	

36. Solve the following assignment problem using Hungarian method.

Maximization problem:

	A	B	C	D
1	10	5	7	8
2	11	4	9	10
3	8	4	9	7
4	7	5	6	4
5	8	9	7	5

37. Find the optimal order quantity for a product for which the price discounts are:

Order Quantity	Unit price (Rs.)
$0 \leq Q < 500$	10
$500 \leq Q < 750$	9.25
$750 \leq Q$	8.75

The monthly demand for the product is 200 units, storage cost is 2% of unit cost and cost of ordering is Rs. 100.

38. A project has the following activities:

Activity	Immediate Predecessors	Duration (weeks)
A	-	3
B	-	2
C	-	2
D	A	4
E	B	4
F	B	7
G	C	4
H	D	2
I	E	5
J	F, G	6
K	H, I	3
Required :		

- Critical path and total project duration.
- Compute earliest event time and latest event time.
- Total, free and independent float for each activity.

39. Write short notes on:

- (i) Programme Evaluation and Review Technique;
- (ii) Service Discipline in Queueing Theory.

40. What is EOQ?

A manufacturing firm needs 2500 units of a particular component every year. The firm buys it at the rate of Rs. 30/unit. The order processing cost for this part is estimated at Rs. 15 and the cost of carrying a part in stock comes to about Rs. 4 per year.

- i) Determine the EOQ and optimal number of orders placed in a year.
- ii) Determine the optimum production lot size and the average duration of the production run.

[Internal Assessment : 20 Marks]