D 100450 **(Pages : 3)** **Name.....**

Reg. No.....

SIXTH SEMESTER U.G. DEGREE EXAMINATION, MARCH 2024

(CBCSS—UG)

B.B.A.

BBA 6B 13—MANAGEMENT SCIENCE

(2019 Admission onwards)

Time : Two Hours and a Half Maximum : 80 Marks

Part A

Answer **all** *questions.*

1. Define operation research.
2. What is network analysis ?
3. What is Dummy Activity ?
4. What is free float ?
5. What is PERT ?
6. What is Decision Theory ?
7. What is critical path ?
8. What is Least Cost Method ?
9. What is laplace criterion ?
10. What is Huurwics alpha criterion ?
11. What is Minimax criterion ?
12. What do you mean by Expected value of perfect information ?
13. What is Scheduling ?
14. Define Risk.
15. What do you mean by pure strategy ?

(15 × 2 = 30, Maximum ceiling 25 marks)

Turn over

Part B

Answer **all** *questions.*

16. What are the phases of operation research ?

17. What are the advantages and disadvantages of linear programming ?

18. What are the objectives of network analysis ?

19. Explain the techniques of operation research.

20. A dealer wishes to purchase a number of fans and sewing machines. He has only Rs. 5,760 to invest and has space atmost for 20 items. A fan cost him Rs. 360 and a sewing machine Rs. 240. His expectation is that he can sell a fan at a profit of Rs. 22 and a sewing machine at a profit of Rs. 18. Assuming that he can sell all the items that he can buy, how should he invest his money in order to maximise his profit ?

21. Explain the importance of game theory.

22. Find the initial feasible solution to the transportation problem by North West Corner rule :

Destination

Origins	D1	D2	D3	Supply
O1	2	7	4	5
O2	3	3	1	8
O3	5	4	7	7
O4	1	6	2	14
Demand	7	9	18	

23. Draw the network for the project whose activities and their precedence relationship are as given below :

Activities	:	A	B	C	D	E	F	G	H	I
Predecessor	:	–	A	A	–	D	B, C, E	F	E	G, H

(8 × 5 = 40, Maximum ceiling 35 Marks)

Part C

Answer any **two** *questions.*

24. Explain different operation research techniques useful in managerial decisions.

25. Solve the following transportation problem :

Warehouse

	W1	W2	W3	W4	Capacity
F1	19	30	50	10	7
F2	70	30	40	60	9
F3	40	8	70	20	18
Requirement	5	8	7	14	

26. Solve the following problem :

Maximize $Z = 6X_1 + 4X_2$

subject to $-2X_1 + X_2 \leq 2$

$X_1 - X_2 \leq 2$

$3X_1 + 2X_2 \leq 9$

$X_1, X_2 \geq 0.$

27. A project schedule has the following characteristics :

Activity :	1–2	1–3	2–4	3–4	3–5	4–9	5–6	5–7	6–8	7–8	8–10	9–10
Time :	4	1	1	1	6	5	4	8	1	2	5	7

(1) Construct network diagram.

(2) Compute T_E and T_L for each event.

(3) Find EST, LST, EFT and LFT values of all activities.

(4) Find critical path and project duration.

(2 × 10 = 20 marks)

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Part A

Answer **all** *questions.*

1. Define OR.
2. Explain the properties of linear programming problem.
3. Explain the term activity in network analysis.
4. What is Decision Tree ?
5. Explain various types of floats.
6. What is linear programming problems ?
7. What is feasible solution ?
8. Explain optimism criterion.
9. Explain saddle point.
10. What are the elements of decision making ?
11. Name any *two* methods finding initial feasible solution in transportation problem.
12. What is game theory ?
13. What is payoff matrix ?
14. Explain head event slack.
15. What is critical path ?

(15 × 2 = 30 Maximum ceiling 25 marks)

Turn over

Part B

Answer **all** *questions.*

16. Discuss the limitations of CPM.

17. What are the limitations of LPP ?

18. Discuss some methods which are useful for decision making under uncertainty.

19. Write a short note on :

    a) Optimistic time ;

    b) Pessimistic ; and

    d) Most likely time.

20. The characteristics of a project schedule are given below :

S. No.	Activity	Time	S. No.	Activity	Time
1.	1–2	6	2.	1–3	4
3.	2–4	1	4.	3–4	2
5.	3–5	5	6.	4–7	7
7.	5–6	8	8.	6–8	4
9.	8–7	2	10.	7–9	2
11.	8–9	1			

Construct a suitable network.

21. Solve the LPP problem graphically :

Maximize $Z = 8x_1 + 5x_2$

subject to $2x_1 + 2x_2 \leq 500$

$x_1 \geq$

$x_2 \geq 250$

$x_1, x_2 \geq 0.$

22. A company is planning for its sales targets and the strategies to achieve these targets. The data in terms of three sales targets, their respective utilities, various strategies and appropriate probability distribution are given in the table given below. What is the optimal strategy ?

Sales targets (× lakhs)	50	75	100
Utility	4	7	9
	Prob	Prob.	Prob.
Strategies			
S_1	0.6	0.3	0.1
S_2	0.2	0.5	0.3
S_3	0.5	0.3	0.2

23. Determine an initial basic feasible solution to the following transportation problem by using the North-West corner rule.

Destination

	D_1	D_2	D_3	D_4	Supply
S_1	21	16	15	3	11
S_2	17	18	14	23	13
S_3	32	27	18	41	19
Demand	6	6	8	23	

(8 × 5 = 40 Maximum ceiling 35 marks)

Part C

Answer any **two** *questions.*
Each question carries 10 *marks.*

24. A company manufactures two products A and B. These products are processed in the same machine. It takes 10 minutes to process one unit of product A and 2 minutes for each unit of product B and the machine operates for a maximum of 35 hours in a week. Product A requires 1 kg and B 0.5 kg of raw material per unit, the supply of which is 600 kg per week. The market constraint on product B is known to be 800 units every week. Product A costs 5 per unit and is sold at 10. Product B costs 6 per unit and can be sold in the market at a unit price of 8. Develop mathematical model using LPP.

Turn over

25. A small maintenance project consists of the following Jobs whose precedence relationships are gives below :

Job	:	1–2	1–3	2–3	2–5	3–4	3–6	4–5	4–6	5–6	6–7
Duration	:	15	15	3	5	8	12	1	14	3	14

1 Draw an arrow diagram.

2 Find the total float for each activity.

3 Find the critical path and the project duration.

26. A retailer purchases Apple every morning at Rs 50 a case and sells them for Rs 80 a case. Any case that remains unsold at the end of the day can be disposed of the next day at a salvage value of Rs 20 per case. (Thereafter they have no value). Past sales have ranged from 15 to 18 cases per day. The following is the record of the sales for the past 120 days :

Cases sold	:	15	16	17	18
Number of days	:	12	24	48	36

Find out how many cases should the retailer purchase per day in order to maximize his profit ?

27. Discuss the important Operations Research techniques.

(2 × 10 = 20 marks)

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BBA 6B 13—MANAGEMENT SCIENCE

(2019 Admissions)

Time : Two Hours and a Half Maximum : 80 Marks

Section A

Answer at least **ten** *questions.*
Each question carries 3 *marks.*
All questions can be attended.
Overall Ceiling 30.

1. What are Stochastic Models ?
2. What is non-negativity integer in LPP ?
3. Explain minimax criterion.
4. What is Independent Float ?
5. Explain EOL.
6. What is constraints in LPP ?
7. What is non-zero sum game ?
8. Explain decision node decision tree.
9. Explain optimal solution in LPP.
10. What is Decision trees ?
11. What is mixed strategy ?
12. What is Float ?
13. State any *two* uses of network analysis.
14. Write the feature of decision under uncertainty.
15. What is PERT ?

(10 × 3 = 30 marks)

Turn over

Section B

Answer at least **five** *questions.*
Each question carries 6 *marks.*
All questions can be attended.
Overall Ceiling 30.

16. Discuss the applications area of Operations Research.

17. State Application of Linear Programming problem.

18. Discuss the difference between PERT and CPM.

19. Explain the methods of finding the initial feasible solution in transportation problem.

20. Draw a network diagram based on the following project schedule infirmation available and find the project duration :

S.No.	Activity	Immediate Activity	Predecessor Time
1	A	–	2
2	B	–	4
3	C	A	6
4	D	B	5
5	E	C, D	8
6	F	E	3
7	G	F	2

21. From the following Pay-off tables find the suitable strategy by using :

Alternatives	States of nature			
	S1	S2	S3	S4
A1	3	5	8	– 1
A2	6	5	2	0
A3	0	5	6	4

a) Maximax ;

b) Maximin ; and

c) Minimax regret.

22. Use the graphical method to solve the following LP problem :

Minimize $Z = 3x_1 + 2x_2$

subject to constraints,

$$5x_1 + x_2 \geq 10$$
$$x_1 + x_2 \geq 6$$
$$x_1 + 4x_2 \geq 12$$
$$x_1, x_2 \geq 0.$$

23. Determine an initial basic feasible solution to the following transportation problem by using VAM

		Destination				
		D1	D2	D3	D4	Supply
Source	A	11	13	17	14	250
	B	16	18	14	10	300
	C	21	24	13	10	400
	Demand	200	225	275	250	

(5 × 6 = 30 marks)

Section C

Answer any **two** *questions.*
Each question carries 10 *marks.*

24. The Anita Electric Company produces two products P1 and P2. Products are produced and sold on a weekly basis. The weekly production cannot exceed 25 for product P1 and 35 for product P2 because of limited available facilities. The company employs total of 60 workers. Product P1 requires 2 man-weeks of labour, while P2 requires one man-week of labour. Profit margin on P1 is Rs. 60 and on P2 is Rs. 40. Formulate this problem as an LP problem and solve that using graphical method.

25. The time estimates (in hours) for the activities of a PERT network are given below :

Activity	t_0	t_m	t_p
1–2	1	1	7
1–3	1	4	7
1–4	2	2	8
2–5	1	1	1

Turn over

Activity	t_0	t_m	t_p
3–5	2	5	14
4–6	2	5	8
5–6	3	6	15

(a) Draw the project network ;

(b) Identify all paths through it and write critical path ; and

(c) Determine the expected project length and standard deviation.

26. From the following table find :

a) Expected Monetary Value (EMV) ;

b) Expected Opportunity Loss (EOL) ; and

c) Expected Value of Perfect Information (EVPI).

P (S1) = 0.6 , P (S2) = 0.1 , P (S3) = 0.2 , P (S4) = 0.1

Alternatives	States of nature			
	S1	S2	S3	S4
A1	3	5	8	– 1
A2	6	5	2	0
A3	0	5	6	4
Probability	0.6	0.1	0.2	0.1

27. Discuss the models of Operations Research.

(2 × 10 = 20 marks)