

Reg. No. :

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Sub. Code : HBAM 41

MASTER OF BUSINESS ADMINISTRATION (CBCS)
DEGREE EXAMINATION, APRIL 2017.

Fourth Semester

OPERATIONS RESEARCH

(For those who joined in July 2012-2015)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. An LPP having more than one optimal solution is said to have _____ or _____ optimal solutions.
- (a) multiple, alternative
 - (b) double, alternative
 - (c) triple, alternative
 - (d) none of these

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

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

Using random numbers stimulate the demand for a ten week period.

Or

- (b) Describe decision tree method with suitable example.
- _____



2. The basic solution is said to be _____ if one or more of the basic variable is zero.
- (a) non-degenerate (b) degenerate
(c) pivot column (d) pivot elements
3. A transportation problem is said to be unbalanced if _____.
- (a) $\sum_{ai} = \sum_{bj}$ (b) $\sum_{ai} \neq \sum_{bj}$
(c) $\sum_{ai} \leq \sum_{bj}$ (d) $\sum_{ai} \geq \sum_{bj}$
4. The transportation technique cannot be used to solve the assignment problem because of
- (a) effective matrix (b) degeneracy
(c) cost matrix (d) the method
5. In PERT analysis, the variance of a job having optimistic time 5, most likely time 8 and pessimistic time 17 is _____.
- (a) 7 (b) 16
(c) 9 (d) 27
6. The total float for a critical activity is
- (a) either negative (b) either positive
(c) zero (d) both (a) and (c)

7. In the ABC analysis, C items are those which have
- (a) low unit price (b) low usage value
(c) low consumption (d) low storage cost
8. Games without saddle point require players to play
- (a) mixed strategies
(b) pure strategies
(c) no strategic point
(d) strategic point
9. Name the tests to ensure uniformity and independence of random numbers
- (a) chi square test
(b) frequency test
(c) independence test
(d) all the above
10. The deletion of an unbinding constraint will not affect the _____.
- (a) optimal solution
(b) productivity
(c) feasible solution
(d) growth



PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) State the limitations of the graphical method of solving a LPP.

Or

- (b) Solve the following problem graphically

$$\text{Maximize } Z = 2x_1 + x_2$$

$$\text{Subject to } 3x_1 + 2x_2 \leq 12$$

$$x_1 + 2x_2 \leq 7$$

$$x_1 + x_2 \leq 5$$

$$\text{and } x_1, x_2 \geq 0.$$

12. (a) Define an unbalanced assignment problem and describe the steps involved in solving it.

Or

- (b) Solve the following travelling salesman problem.

To

	A	B	C	D
From A	—	46	16	40
B	41	—	50	40
C	82	32	—	60
D	40	40	36	—

13. (a) Explain PERT procedure to determine

- (i) The expected critical path
- (ii) Expected variance of the project length and
- (iii) The probability of completing the project within a specified time.

Or

- (b) Describe the stepwise procedure for determining the critical path of a project.

14. (a) A certain item cost Rs. 235 per ton. The monthly requirements are 5 tons, and each time the stock is replenished, there is a set up cost of Rs. 1000. The cost of carrying inventory has been estimated at 10% of the average inventory per year. What is the optimum order quantity?

Or

- (b) Discuss various types of inventory models.



15. (a) What is sensitivity techniques? Explain the purpose and advantages of sensitivity techniques.

Or

- (b) Write short notes on "Decision Criteria".

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

16. (a) Describe briefly the Big-M method of solving a LPP with artificial variables.

Or

- (b) Use Big-M method to solve

$$\text{Maximize } Z = 4x_1 + 3x_2$$

$$\text{Subject to } 2x_1 + x_2 \geq 10$$

$$-3x_1 + 2x_2 \leq 6$$

$$x_1 + x_2 \geq 6$$

$$\text{and } x_1, x_2 \geq 0$$

17. (a) Find the initial basic feasible solution for the following transportation problem by least cost method.

	To				Supply
	1	2	1	4	
From	3	3	2	1	50
	4	2	5	9	20
	20	40	30	10	
Demand					

Or

- (b) The processing time in hours for the jobs when allocate to the different machines are indicated below. Assign the machines for the jobs so that the total processing time is minimum.

		Machines				
		M ₁	M ₂	M ₃	M ₄	M ₅
Jobs	J ₁	9	22	58	11	19
	J ₂	43	78	72	50	63
	J ₃	41	28	91	37	45
	J ₄	74	42	27	49	39
	J ₅	36	11	57	22	25



18. (a) Construct a network for the projects whose activities are given below and compute the total, free and independent float of each activity and hence determine the critical path and the project duration

Activity	0-1	1-2	1-3	2-4	2-5	3-4	3-6	4-7	5-7	6-7
Duration (in weeks)	3	8	12	6	3	3	8	5	3	8

Or

- (b) The following time cost table (time in days, cost in rupees) applies to a project. use it to arrive at the network associated with completing the project in minimum time at minimum cost.

Activity	Normal		Crash	
	Time	Cost	Time	Cost
1-2	2	800	1	1400
1-3	5	1000	2	2000
1-4	5	1000	3	1800
2-4	1	500	1	500
2-5	5	1500	3	2100
3-4	4	2000	3	3000
3-5	6	1200	4	1600
4-5	3	900	2	1600

Page 8

Code No. : 9056

19. (a) Find the optimal order quantity for which the price breaks are as follows :

Quantity	Unit Cost
$0 \leq q_1 < 500$	Rs. 10
$500 \leq q_2 < 750$	Rs. 9.25
$750 \leq q_3$	Rs. 8.75

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

Or

- (b) Solve the game whose pay off matrix is given by

		Player B		
		B ₁	B ₂	B ₃
Player A	A ₁	1	3	1
	A ₂	0	-4	-3
	A ₃	1	5	-1

Page 9

Code No. : 9056

