

NO-109

December-2015

BBA.LLB., Sem.-III**IL BBA-202 : Operational Research & Quantitative Techniques****Time : 3 Hours]****[Max. Marks : 70**

1. (A) State various types of operational research models. 7
 (B) State different techniques of operational research. 7

OR

- (A) Define operational research and explain its advantages.
 (B) Mention the applications of operational research in marketing.
2. (A) What is linear programming and state its assumptions. 7
 (B) Explain simplex method and its assumptions. 7

OR

- (A) Explain the concept of Game Theory.
 (B) Solve the following payoff matrix.

	Player B		
	6	8	- 16
Player A	0	3	- 4
	18	4	10

3. Solve the following L.P.P. by simplex method. 14

Maximize $Z = 2x^1 + x^2$

Subject to $4x^1 + 3x^2 \leq 12$

$4x^1 + x^2 \leq 8$

$4x^1 - x^2 \leq 8$

$x^1, x^2 \geq 0$

OR

- (A) A salesman estimates that the following would be the cost of his route visiting the cities given below. It is given that he starts his journey from city A1. Find optimum route. 7

	A1	A2	A3	A4	A5
A1	-	2	5	7	1
A2	6	-	3	8	2
A3	8	7	-	4	7
A4	12	4	6	-	5
A5	1	3	2	8	-

- (B) An Airline that operates seven days a week has a time table as follows :

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Mumbai-Goa			Goa-Mumbai		
Flight No.	Depart.	Arrive	Flight No.	Depart.	Arrive
G1	7.00 am	8.00 am	G 101	8.00 am	9.15 am
G2	8.00 am	9.00 am	G102	8.30 am	9.45 am
G3	1.30 pm	2.30 pm	G 103	12.00 noon	1.15 pm
G4	6.00 pm	7.30 pm	G 104	5.30 pm	6.45 pm

Crew must have a minimum layover of 5 hours between flights. Obtain the pairing of flights that minimize layover time away from home. For each pair also mention the town where the crew should be based.

4. (A) A project is carried out through activities 1 to 8. The time estimates of different activities are as follows. Determine the critical path.

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Activity	Sequence	Time (in hours)
1	1-2	3
2	2-3	4
3	3-4	6
4	2-5	8
5	5-6	10
6	4-7	7
7	6-7	11
8	7-8	5

- (B) Solve the following transportation problem for maximum profit.

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Origin	Sales Centre				Supply
	P	M	C	S	
A	40	25	22	33	100
B	44	35	30	30	30
C	38	38	28	30	70
Demand	40	20	60	30	

OR

- (A) Solve graphically :

	Player B	
	3	5
Player A	4	1
	2	2

- (B) Solve the following practical problem.

A manufacturer produces two types of machines A & B. There are two sections in his factory. In section 1 the assembling of part is done and in section 2 the finishing of the product is done. The following are certain information available :

Section	No. of workers required	
	A	B
1	5	2
2	3	3

In section 1 not more than 180 workers can be employed and in section 2 not more than 135 workers can be employed. The numbers of B type machine are to be manufactured, double or less than that of A type of machine. If each A type machine gives profit of ₹ 100 and B type of machine gives profit of ₹ 150. Find out how many machines of each type the manufacturer should produce so as to obtain maximum profit.

5. Rewrite the sentence in your answer book by choosing right option from below :
(one mark each)

- (1) Assume that activity G has the following times :
Early start time = 7 days
Early finish time = 13 days
Late start time = 15 days
Late finish time = 21 days
Which of the following statements is true about activity G ?
(a) activity G takes 9 days to complete
(b) activity G has a slack time of 8 days
(c) activity G is on the critical path
(d) activity G takes 8 days to complete
- (2) The objective of project crashing is to
(a) reduce the project duration
(b) revise the network critical path and completion times when the schedule falls hopelessly behind
(c) minimize the cost of crashing
(d) reduce indirect costs such as interest on investments
(e) more than one statement above is true
- (3) Assume that activity G has the following times :
Early start time = 7 days
Early finish time = 13 days
Late start time = 15 days
Late finish time = 21 days
Which of the following statements is true about activity G ?
(a) activity G takes 9 days to complete
(b) activity G has a slack time of 8 days.
(c) activity G is on the critical path
(d) activity G takes 8 days to complete
- (4) Using the network above, which of the following statements is true ?
(a) the critical path is 1-3, 3-5, 5-7
(b) the earliest start data for activity 5-7 is 10
(c) the latest start date for activity 2-5 is 11
(d) the project completion time is 15 weeks

Rewrite the sentence and write true or false in your answer book.

- (5) Using the data above to calculate the expected time and variance for each activity, which of the following statements is true ?
(a) the expected time for activity 1-3 is 12.67
(b) the variance for activity 3-5 is 3.36
(c) the largest expected time occurs for activity 1-4
(d) the largest variance is for activity 1-3
(e) more than one statement above is true

- (6) There is usually more pressure, real and perceived, associated with project management than in a normal management position.
- (a) True (b) False
- (7) In the PERT approach, using the project mean time and standard deviation to perform probabilistic analysis should be done with caution unless the number of activities is large enough to support the assumptions of the central limit theorem.
- (a) True (b) False
- (8) In a balanced transportation model where supply equals demand,
- (a) all constraints are equalities
 (b) none of the constraints are equalities
 (c) all constraints are inequalities
 (d) none of the constraints are inequalities
- (9) In a transportation problem, items are allocated from sources to destinations
- (a) at a maximum cost (b) at a minimum cost
 (c) at a minimum profit (d) at a minimum revenue

Fill in the blanks and rewrite the sentence in your answer book.

- (10) The assignment model is a special case of the _____ model.
- (a) maximum-flow (b) transportation
 (c) shortest-route (d) none of the above
- (11) The linear programming model for a transportation problem has constraints for supply at each _____ and _____ at each destination.
- (a) destination/source (b) source/destination
 (c) demand/source (d) source/demand
- (12) The trans-shipment model is an extension of the transportation model in which intermediate trans-shipment points are _____ between the sources and destinations.
- (a) decreased (b) deleted
 (c) subtracted (d) added
- (13) In linear programming, the most popular non-graphical procedure is classified as
- (a) linear procedure (b) non-graphical procedure
 (c) graphical procedure (d) None of these
- (14) The non-basic variable which is used to replace basic variable is the variable which has
- (a) most positive column (b) most negative column
 (c) most negative row (d) most positive row

OR

Short notes :

- (A) Importance of Game theory
 (B) History of Operational Research

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