INDIAN MARITIME UNIVERSITY
(A Central University, Govt.of India)

May/June 2015 End Semester Examinations

SEMESTER – IV, M.B.A (INTERNATIONAL TRANSPORTATION AND LOGISTICS MANAGEMENT)

OPERATIONS RESEARCH (T 1403)

Date:10.06.2015 **Max.Marks:60**
Time:-3 Hrs **Pass Marks:30**

SECTION – A **(12x1=12 Marks)**

Answer ALL the questions. All question carry equal Marks

1. Operations research techniques are not applicable in the following situation
   a) Resources available are unlimited
   b) Objectives can be defined for maximization or minimization
   c) Sufficient input data is available for formulating the problem
   d) Sufficient methods, techniques and tools may e applied.

2. Which of the following is not correct?
   a) An infeasible solution exists, when there is no feasible solution
   b) Iso-profit lines on a graph of an LPP would always be parallel to each other
   c) An ios-cost line cannot be parallel to the line of any constraint
   d) Every LPP has a unique optimum solution.

3. Operations In final optimum simplex table, if Zj-Cj = 0 for at least one non-basic variable, then there will be
   a) an unbounded solution
   b) infeasible solution
   c) alternative solution
   d) none of the above

4. Dual simplex method is applicable to these LPP's that start with
   a) An infeasible solution
   b) An infeasible but optimum solution
   c) A feasible solution
   d) A feasible and optimum solution

5. In transportation problem
   a) A solution is said to be degenerate if the number of occupied cells is smaller than the number of rows plus the number of columns minus one(1)
   b) A degenerate solution may or may not be optimum
   c) To remove degeneracy, an infinitesimally small quality is placed in each of the required number of independent cells
   d) All of the above

6. For two person game with A and B, the minimizing and the maximizing players, the optimum strategies are:
    a) Minimax for A and maximini for B
    b) Maximax for A and Minimax for B
    c) Minimini for A and maximin for B
    d) Maximin for A and minimax for B

7. Games which involves more than two players are called
    a) Biased games
    b) Negotiable games
    c) Conflicting games
    d) N-person games

8. Which of the following is not a key operating characteristic for a queueing system?
    a) Average time a customer spent waiting in the system and queue
    b) Utilization factor
    c) Per cent idle time
    d) None of the above

9. An augmenting path is an algorithm to find
    a) A minimum cost flow pattern
    b) A maximal cost flow pattern
    c) A minimal spanning tree
    d) A shortest path from source to sink

10. The term commonly used for activity slack time is
    a) Free float
    b) Independent float
    c) Total float
    d) All of the above

11. Which of the following O.R problem cannot be expressed as a network flow proble?
    a) An assignment problem
    b) A transportation problem
    c) A replacement problem
    d) A queueing problem

12. Multiple servers may be
    a) In parallel
    b) Jockeying
    c) Reneging
    d) Alternating

SECTION – B (5x4=20 Marks)

Answer ANY five of the following questions. Each answer should not exceed 200 words.

13. Use simplex method to solve the LPP

Min $Z = X_2 - 3X_3 + 2X_5$

Subject to $3X_2 - X_3 + 2X_5 \leq 7$

$-2X_2 + 4X_3 \leq 12$

$-4X_2 + 3X_3 + 8X_5 \leq 10$

And $X_2, X_3, X_5 \geq 0$

14. Discuss the nature and feature of Operations Research.

15. Find an initial basic feasible solution to the following T.P. using north west corner method.

20	28	32	55	70	50
48	36	40	44	25	100
35	55	22	45	48	150
100	70	50	40	40	300

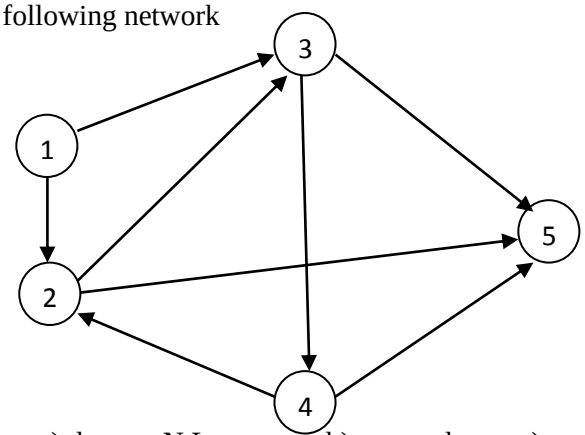
16. Obtain the optimal strategies for both person and the value of the game for zero-sum two-person game whose payoff matrix is as follows:

1	-3
3	5
-1	6
4	1
2	2
-5	0

.

17. Explain the minimal spanning tree algorithm.

18. Consider the following network



Determine a) the sets N,L b) two paths c) an undirected cycle, a directed cycle d) a tree and e)a spanning tree

19. A bank has two tellers working on savings accounts. The first tells handles withdrawals only. The second teller handles deposits only. It has been found that the service time distribution for both deposits and withdrawals is exponential with mean service time 3 minutes per customer. Depositors are found to arrive in Poisson fashion throughout the day with mean arrival rate of 16 per hour.

Withdrawer also arrives in Poisson fashion with mean arrival rate of 14 per hour. What would be the effect on the average waiting time for depositors and withdrawers if each teller could handle both withdrawals and depositors? What could be the effect if this could accomplished by increasing the mean service time to 3.5 minutes?

SECTION – C (4x7=28 Marks)

Question No. 20 is compulsory. Answer ANY THREE of the remaining questions
Each answer should not exceed 500 words.

20. Use duality to solve the following LPP:

Maximize $Z = 2X_1 + X_2$
Subject to $X_1 + 2X_2 \leq 10$
$X_1 + X_2 \leq 6$
$X_1 - X_2 \leq 2$
$X_1 - 2X_2 \leq 1$
$X_1, X_2 \geq 0$

21. Explain logical sequence briefly.

22. Given x13 = 50 units, x14 = 20 units, x21= 55 units, x31 = 30 units, x32 = 35 units and x34 = 25 units. Is it an optimal solution to the transportation problem :

					Available units
	6	1	9	3	70
	11	5	2	8	55
	10	12	4	7	90
Required units	85	35	50	45	

23. Solve the following game and determine the value of the game:

a)

	B	
A	6	-3
	-3	0

b)

	Y	
X	4	1
	2	3

24. Draw the network for the data given below and compute:
(i) Critical path (ii) Early start and Late start times for each activity and
(iii) Total slack for each activity

Activity :	A	B	C	D	E	F	G	H	I
Predecessor:	-	-	-	A	B	C	D,E	B	H,F
Estimated: Time	3	5	4	2	3	9	8	7	9

25. A shipping company has a single unloading berth with ships arriving in a poisson fashion at an average rate of three per day. The unloading time for a ship with n unloading crews is found to be exponential with average unloading time n/2 days. The company has a large labour supply without regular working hours, and to avoid long waiting line the company has a policy of using as many unloading crews on a ship as there are ships waiting in line or being unloaded. (a) Under these conditions what will be the average number of unloading crews working at any time? (b) What is the probability that more than 4 crews will be needed?

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