Seat No:_____   Enrollment No:_____

PARUL UNIVERSITY
FACULTY OF MANAGEMENT
MBA Summer 2017 - 18 Examination

Semester: 2   Date: 01/06/2018
Subject Code: 06200157   Time: 10.30 am to 1.00 pm
Subject Name: Operation Research   Total Marks: 60

Instructions
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Do as Directed.

  A).Multiple choice type questions/Fill in the blanks. (Each of 1 mark)   **(05)**
  1. OR approach is typically based on the use of
       a) Physical model   **c)** Mathematical model
       b) Iconic model   **d)** Descriptive model

  2 The right-hand side constant of a constraint in a primal problem appears in the corresponding dual as

       a) a coefficient in the objective function **c)** an input-output coefficient
       b) A right-hand side constant of a   **d)** none of the above
       constraint

  3 Maximization assignment problem is transformed into a minimization problem by
       a) adding each entry in a column from the   **c)** subtracting each entry in the table from the
       maximum value in that column   maximum value in that table
       b) subtracting each entry in a column from **d)** any one of the above
       the maximum value in that column

  4 A game is said to be fair if
       a) both upper and lower values of the game **c)** upper value is more than lower value of the
       are same and zero   game
       b) upper and lower values of the game are   **d)** none of the above
       not equal

  5 Which technique is used to connect all points of a network together while minimizing the distance
     between them?
       a)Maximal Flow   **c)** minimum spanning tree
       b) shortest route   **d)** minimal flow

  B).Define the following. (Each of 1 mark)   **(05)**
  1. Degeneracy
  2. Feasible region
  3. Utilization Factor
  4. Unbalanced transportation problem
  5. Two-person zero sum game

  C).Direct questions. (Each of 1 mark)   **(05)**
  1. State the various assumptions of Liner programming problem.
  2. Differentiate between primal and dual (2 points)
  3. State the limitation of graphical method for solving LPP
  4. Differentiate between System length and queue length.
  5. State the different components of LPP

Q.2 Answer the following questions.

A).   **(07)**
Universal Electric manufactures and sells two models of lamps L1 and L2 the profit being Rs.15 and Rs.
10 respectively. The process involves two workers W1 and W2 who are available for this kind of work
with 100 and 80 hours per month respectively. W1 assembles L1 in 20 minutes and L2 in 30 minutes.
W2 paints L1 in 20 minutes and L2 in 10 minutes. Assuming that all lamps made can be sold without
difficulty, determine production figures that maximize the profit using graphical method.

**B).** A book stall owner stocks a particular magazine. Past records show weekly demand as follows: **(08)**

Demand	20	25	30	35	40	45
Probability	0.1	0.16	0.2	0.34	0.15	0.05

Using the following sequence of random numbers 23, 32, 14, 35, 75, 90, 62, 74, 31, 40, 95, 89.
Simulate the demand for next 12 weeks. If the stall owner decides to order 35 copies every week, compute
   a) The average number of copies not sold
   b) The average size of unfilled demand

.
Q.3 Answer the following questions.

A). Solve Minimum spanning tree and find total length of it **(07)**
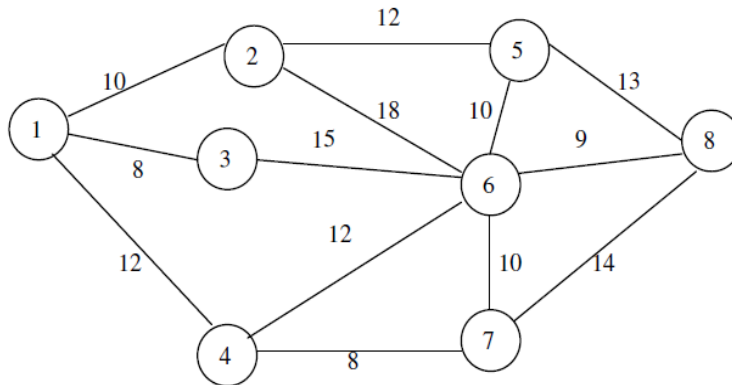
B). In the modification of a plant layout of a factory 4 new machines M1, M2, M3 and M4 are to be installed **(08)**
in a machine shop. There are 5 vacant places A, B, C, D and E available. Because of limited space,
machine M2 cannot be placed at C and M2 cannot be placed at A. The cost of locating of machine is
shown below:

	A	B	C	D	E
M1	9	11	15	10	11
M2	12	9	-	10	9
M3	-	11	14	11	7
M4	14	8	12	7	8

Find optimum assignment schedule

Q.4 Attempt any two questions.   **(Each of 7.5 mark)** **(15)**

1. Find the dual of the following problem:
   Maximize z = 6x1 + 8x2
   Subject to
       2x1 + 3x2 <= 16
       4x1 + 2x2 >=16
       2x1 + x2 = 16
       X1 , x2 >=0

2.

		Market				
		P	Q	R	S	Supply
Warehouse	A	6	3 12	5 1 4	9	22
	B	5	9	2 15 7		15
	C	5 7	7	8 1 6		8
	Demand	7	12	17	9	45

   a. Check if the given solution is an optimum solution?
   b. Find the optimum solution and the minimum total transportation cost

3. An Airline organization has one reservation clerk on duty in its local branch at any given time. The clerk handles information regarding passenger reservation and flight timings. Assume that the no. of customers arriving during any given time is Poisson distributed with an arrival rate of eight per hour and that the reservation clerk can service a customer in six minutes on an average.
    a. What is the probability that the system is busy?
    b. What is the average time a customer spends in the system?
    c. What is the average length of the queue and what is the no. of customers in the system?

4. A stockiest of a particular commodity makes a profit of Rs. 30 on each sale made within the same week of purchase; otherwise he incurs a loss of Rs. 30 on each item. The data on the past sales are given below:

No. of items sold within the same week	5	6	7	8	9	10	11
Frequency	0	9	12	24	9	6	0

a. Find the optimum number of items the stockiest should buy every week in order to maximize the profit.
b. Calculate the expected value of perfect information.