M.B.A. (GEN.) / M.B.A. (IT) SEM- III (2012 COURSE)(CHOICE BASED CREDIT SYSTEM) /M.B.A. (FM) SEMESTER - III (2013 (CHOICE BASED CREDIT SYSTEM) :

WINTER - 2017

SUBJECT :→ OPERATIONS RESEARCH

Day: **Saturday** Time: **10.00 AM TO 01.00 PM**

Date: **18/11/2017** Max. Marks: 100

W-2017-1756

N.B.:

1) Attempt any **FOUR** questions from Section –I and any **TWO** questions from Section –II.
2) Figures to the right indicate **FULL** marks.
3) Answers to both the sections should be written in the **SEPARATE** answer book.
4) Use of non-programmable **CALCULATOR** is allowed.
5) Graph papers will be provided on request.

SECTION-I

Q.1 What is Operations Research? Discuss in brief the limitations of Operations Research. **(15)**

Q.2 A manufacturer of furniture makes two products, chairs and tables. Processing of these products is done on two machines A and B. One chair requires 2 hours on machine A and 6 hours on machine B. One table requires 5 hours on machine A and no time on machine B. There are 16 hours available on machine A and 30 hours on machine B. Profit gained by the manufacturer from a chair and a table is Rs. 10 and Rs. 50 respectively. What should be the daily production of each of two products? **(15)**

Formulate the problem as LPP.

Use Graphical method to solve this LPP.

Q.3 A department has five employees with five jobs to be performed. The time (in hours) each man will take to perform each job is given in the effectiveness matrix below: **(15)**

	Employees				
Jobs	**I**	**II**	**III**	**IV**	**V**
A	10	5	13	15	16
B	3	9	18	13	6
C	10	7	2	2	2
D	7	11	9	7	12
E	7	9	10	4	12

How should the jobs be allocated, one per employee, so as to minimize the total man hours?

Q.4 Find the Initial Basic Feasible solution by North West Corner method, Matrix Minimum Method and Vogel's Approximation Method (VAM). **(15)**

	Warehouse				
	D_1	**D_2**	**D_3**	**D_4**	**Availability**
S_1	5	4	3	6	50
S_2	2	5	4	2	40
S_3	3	1	2	1	20
Demand	25	30	35	20	110

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Q.5 Write short notes on any **THREE** of the following: **(15)**

a) Network Analysis
b) Applications of Operations Research
c) Hungarian Method
d) Sensitivity Analysis

SECTION-II

Q.6 The rainfall distribution is as follows: **(20)**

Rainfall in cms	Frequency
0	50
1	25
2	15
3	5
4	3
5	2
Total	100

Simulate the rainfall for 10 days using following random numbers:
67,63,39,55,29,78,70,06,78 and 76

Q.7 **a)** Discuss Assignment Problem of balanced and unbalanced nature. Explain in brief the steps to solve the same. **(10)**

b) Solve the following transportation problem for maximization. The figures given are profit per unit. **(10)**

	D_1	D_2	D_3	Availability
S_1	10	12	15	25
S_2	17	13	9	30
S_3	20	15	7	40
Demand	28	43	24	95

Q.8 A small project is composed of 7 activities whose time estimates are listed in the table below. Activities are identified by their beginning (i) and ending (j) node numbers. **(20)**

	Estimated Duration (weeks)		
Activity (i-j)	Optimistic	Most Likely	Pessimistic
1 – 2	1	1	7
1 – 3	1	4	7
1 – 4	2	2	8
2 – 5	1	1	1
3 – 5	2	5	14
4 – 6	2	5	8
5 – 6	3	6	15

a) Draw a project network
b) Find the critical path and expected duration
c) Variance of project length
d) Standard deviation