

SVKM's NMIMS
NMIMS – GLOBAL ACCESS SCHOOL FOR CONTINUING EDUCATION

Programme: PGDSCM

Examination: June 2015

Subject: Decision Analysis & Modeling

Date: 23.06.2015

Semester: IV

Course : New

Marks : 70

Time: 3.00 p.m. to 6.00 p.m.

-
- Instructions:
- 1) Candidates should read carefully the instructions printed on the question paper and on the cover of the answer-book, which is provided for their use
 - 2) Answer to each new question to be started on a fresh page
 - 3) Figures in brackets indicate full marks
 - 4) Required Statistical Tables attached
 - 5) **Only simple, ordinary calculators to be used.** No other electronic devices, cell-phones, laptops, etc., to be used.
 - 6) Graph paper will be available, on request

Q.1) Attempt any 2 (two) out of 4 (four) (Marks: 2x5 = 10)

1a) State the salient points in the VROOM and YETTON'S Normative Model in Decision Making

1b) Solve the following L.P.P. graphically:

$$\begin{aligned} \text{Maximize } Z &= 7x + 9y \\ \text{subject to } 13x - y &\leq 0 \\ -x + y &\leq 8 \\ x \geq 0, y &\geq 0 \end{aligned}$$

1c) Briefly explain the important points of Kruskal's algorithm

1d) Consider the following Transportation problem. Develop a *Linear Programming (LP)* model, where the given matrix is a *cost* matrix.

<u>Source</u>	<u>Destination →</u>			
↓	1	2	3	Supply ↓
1	15	20	30	350
2	10	9	15	200
3	14	12	18	400
Demand →	250	400	300	

Q.2) Write short notes on (2 out of 5)

(Marks: 2x5=10)

- 2a) What is the Brain Storming Process in Demand Simulation. Briefly explain the four basic rules/steps in brainstorming as developed by Osborn (1963)
- 2b) Multicollinearity
- 2c) Briefly explain *any five* non-parametric test
- 2d) Bayesian approach in Decision-Making
- 2e) Game Theory

Q.3) Attempt any 3 out of 5

(Marks: 3x10 = 30)

- 3a) From the data given below, find (i) the two regression equations (ii) Coefficient of Correlation between marks in Economics and marks in Statistics (iii) most likely marks in Statistics when the marks in Economics is 30

Marks in Economics	26	28	35	32	31	36	29	38	34	32
Marks in Statistics	43	46	49	41	36	32	31	30	33	39

- 3b) The ABC Company is faced with four decision alternatives relating to investments in a capital investments programme. Since these investments are made in future, the company foresees different market conditions as expressed in the form of states-of-nature. The following table summarizes the decision alternatives, the various states-of-nature and the rate of return associated with each state-of-nature

Decision ↓	States-of-Nature →		
	A	B	C
D ₁	17%	15%	8%
D ₂	18%	16%	9%
D ₃	21%	14%	9%
D ₄	19%	12%	10%

If the company has no information regarding the probability of the occurrence of the three states-of-nature, give the recommended decision for the decision criteria listed below:

- (i) Maximax Criterion
- (ii) Maximin Criterion
- (iii) Minimax Regret Criterion
- (iv) Laplace's Rational Criterion
- (v) Hurwicz Alpha Criterion ($\alpha = 0.75$)

- 3c) A company has 4 terminals U, V, W, and X. At the start of a particular day, 10, 4, 6, 5 trailers are respectively available at these terminals. During the previous night 13, 10, 6 and 6 trailers respectively were loaded at plants A, B, C, and D. The company dispatcher has come up with the costs between the terminals and the plants as follows:

Terminal	Plant			
	A	B	C	D
U	20	36	19	28
V	40	20	45	20
W	75	35	45	50
X	30	35	40	25

Find the allocation of loaded terminals from plants to terminals to minimize the transportation cost. Use Vogel's Approximation method to find the initial basic feasible solution. Find the initial cost. Then, using the MODI method, test whether the solution is optimum. Find the final cost as well.

- 3d) A company manufactures 30 items per day. The sale of these items depends upon the demand which has the following distribution:

Sales (units)	27	28	29	30	31	32
Probability	0.10	0.15	0.20	0.35	0.15	0.05

The production cost and sale price of each unit are Rs 40 and Rs 50 respectively. Any unsold product is to be disposed off at a loss of Rs 15 per unit. There is a penalty of Rs 5 per unit if the demand is not met

Using the following random numbers, estimate total profit/loss for the company for the next 10 days:

10, 99, 65, 99, 95, 01, 79, 11, 16, 20

- 3e) Solve the Game given below, after reducing it to 2 x 2 game, using the principle of Dominance

		Player B		
		1	2	3
Player A	1	1	7	2
	2	6	2	7
	3	5	1	6

3/4

Q.4) Attempt both the questions given below

(Marks: 2x10=20)

4a) Following data are available for a firm which manufactures three items, namely, A, B, C

Product	Time required (in hours)		Profit (Rs) (per unit)
	Assembly	Finishing	
A	10	2	800
B	4	5	600
C	5	4	300
Firm's capacity	2,000	1,009	

- i) Express the above data in the form of a linear programming problem to *maximize* the profit
- ii) Solve it by *simplex* method

4b) The following table show the consumption of oil in a district in different years. Using the method of least squares, find the trend equation. Also find the trend values

Year	1987	1988	1989	1990	1991	1992
Consumption ('000 kgs)	60	80	90	120	145	170

TABLE OF VALUES OF e^{-m}

m	e^{-m}	m	e^{-m}	m	e^{-m}
0.1	0.90484	1.1	0.33287	2.5	0.08208
0.2	0.81873	1.2	0.30119	3.0	0.04979
0.3	0.74082	1.3	0.27253	3.5	0.03020
0.4	0.67032	1.4	0.24660	4.0	0.01832
0.5	0.60653	1.5	0.22313	5.0	0.00674
0.6	0.54881	1.6	0.20190	6.0	0.00248
0.7	0.49659	1.7	0.18268	7.0	0.00091
0.8	0.44932	1.8	0.16530	8.0	0.00034
0.9	0.40657	1.9	0.14957	9.0	0.00012
1.0	0.36788	2.0	0.13534	10.0	0.000045

