

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

Programme: PGDSCM

Examination: December 2016  
Subject: Decision Analysis & Modeling

Semester: IV  
Course : New  
Marks : 70  
Time: 3.00 p.m. to 6.00 p.m.

Date: 17.12.2016

**Instructions:**

1. Answer to each new question to be started on a fresh page.
2. Figures in bracket indicate full marks.

**Q.1) Attempt any 2 out of 4**

(Marks: 2X5=10)

- a) What do you mean by Simons's normative model?
- b) What do you mean by the term shortest path?
- c) What do you mean by network flow?
- d) Explain prim's algorithm.

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

(Marks: 2X5=10)

- a) Slack, surplus and artificial variables.
- b) Degeneracy in LP Problems.
- c) Pure strategy and Mixed strategy.
- d) Monte Carlo simulation
- e) Break-even Analysis under Certainty

**Q.3) Attempt any 3 out of 5**

(Marks: 3X10=30)

- a) Five laths are to be allotted to 5 operators. Table below gives weekly output figures:

Operator	Weekly output in Lathe Machine (L)				
	L1	L2	L3	L4	L5
A	18	20	25	30	34
B	17	21	27	32	38
C	21	26	33	37	32
D	19	22	29	35	40
E	22	26	29	34	39

Profit per piece is Rs. 10. Find the optimum allocation of Lathe machine (L) to the operator and the corresponding maximum profit per week

b) Explain the concept of Game theory, along with examples

c) Explain Autocorrelation, Heteroscedasticity, Multicollinearity

d) A Super Bazar must decide on the level of supplies it must stock to meet the needs of its customers during Diwali days. The exact number of customers is not known, but it is expected to be in one of the four categories; 300,350,400 or 450 customers. Four levels of supplies are thus suggested with level  $j$  being ideal (from the viewpoint of incurred costs) if the number of customers falls in category  $j$ . Deviations from the ideal levels results in additional costs either because extra supplies are stocked needlessly or because demand cannot be satisfied. The table below provides these costs in thousands of rupees.

Customer Category	Supplies Level			
	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	A <sub>4</sub>
E <sub>1</sub>	7	12	20	27
E <sub>2</sub>	10	9	10	25
E <sub>3</sub>	23	20	14	23
E <sub>4</sub>	32	24	21	17

e) The manager of an oil refinery must decide on the optimal mix of two possible blending processes of which the inputs & outputs per production run are as follows:

Process	Input Units		Output Units	
	Crude A	Crude B	Gasoline X	Gasoline Y
1	5	3	5	8
2	4	5	4	4

The maximum amounts available of crude A & B are 200 units & 150 units respectively. Market requirement shows that at least 100 units of Gasoline X and 80 units of Gasoline Y must be produced. The profit per production run from process1 & process2 are Rs. 300 & Rs. 400. Formulate this problem as LP problem. (Do not solve this LPP for optimum solution)

**Q.4) Attempt both the questions**

**(Marks: 2X10=20)**

- a) The tasty company manufactures 2 toothpastes, formula X and formula Y. X is sold at Rs. 50 per unit and Y is sold at Rs. 60 per unit. Sale of X is forecasted to be not more than 50,000 units and Y up to 10,000 units. There are only 10000 ounces of flavoring ingredient. X requires 2 ounces of flavoring per unit and Y requires 4 ounces per unit. Solve the above LP problem by using Simplex Method.
- b) The outdoor furniture corporation manufactures two products; benches and picnic tables for use in gardens and parks. The firm has two main resources, its carpenters (Labour force) and a supply of redwood for use in furniture. During the ext production cycle, 1200 hours of manpower are available under a union agreement. The firm has a stock of 3500 kgs of quality redwood. Each bench requires 4 labour hours and 10 kgs of redwood. Each picnic table takes 6 labour hours and 35 kgs of redwood. Completed bench will yield a profit of Rs. 90 each and table will result in a profit of Rs. 200 each. How many tables and benches should be produced in order to obtain maximum profit? (Use Simplex Method)

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