

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

Programme: PGDSCM

Examination: June 2017
Subject: Decision Analysis & Modeling

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

Date: 18.06.2017

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 network flow?
- b) What do you mean by minimum spanning tree?
- c) Explain Ford Fulkerson's method of network flow.
- d) What do you mean by Simons's normative model?

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

(Marks: 2X5=10)

- a) Monte Carlo simulation
- b) Degeneracy in LP Problems
- c) Autocorrelation
- d) Break-even Analysis under Certainty
- e) Optimistic Decision Criterion

Q.3) Attempt any 3 out of 5

(Marks: 3X10=30)

- a) A biscuit manufacturing company plans to produce two types of biscuits, one with a round shape and another with a square shape. The following resources are used in manufacturing the biscuits,

- (i) Raw material, of which daily availability is 150 kg.
- (ii) Machinery, of which daily availability is 25 machine hours.
- (iii) Labour, of which daily availability is 40 man-hours.

The resources used are shown in Table. If the unit profit of round and square biscuits is Rs 3.00 and Rs 2.00 respectively, how many round and square biscuits should be produced to maximize total profit?

Resources	Requirement/Unit		Daily availability
	Round	Square	
Raw Material	100	115	1500 grams
Machine	10	12	720 minutes
Manpower	3	2	240 minutes

- b) A company manufactures two types of boxes, corrugated and ordinary cartons. The

boxes undergo two major processes: cutting and pinning operations. The profits per unit are Rs. 6 and Rs. 4 respectively. Each corrugated box requires 2 minutes for cutting and 3 minutes for pinning operation, whereas each carton box requires 2 minutes for cutting and 1 minute for pinning. The available operating time is 120 minutes and 60 minutes for cutting and pinning machines. Determine the optimum quantities of the two boxes to maximize the profits.

- c) The advertisement manager of Skylark Ltd. has a budget of 200,000 for the annual sales campaign for a particular year. The current advertising proposal is to promote the Baggies through two leading fashion magazines, "Fashion Today" and "Look". The unit cost of an ad in "Fashion" is Rs. 2000 and that of "Look" is Rs. 3500. Past experience shows that during the sales campaign the company will need at least 25 ads to appear in "Look". "Fashion Today" is a monthly magazine and not more than one insert is desired in one issue. The expected effective readership for unit ad in "Fashion today is 40 thousand and that for "Look" it is 55 thousand. Formulate a suitable LP problem, which will maximize effective readership for the company's advertisements. (Do not solve the LPP for optimum solution)
- d) Commend area development Authority in the commend of river "X" desires to find out the optimal cropping pattern in the area. The total available land is 25 thousand acres. The following crop can be grown:

	Water consumption (in acre feet/acre)	Expected Profit (per acre in Rs.)
Wheat	9	2000
Maize	6	1500
Jowar	6.5	1200

It is felt that we cannot use more than 50% of the available land for wheat. The available water is 50000 acre-feet. At least 20% land must be devoted to maize. To ensure balanced development of various crops, the ratio of land devoted to wheat and Jowar should not be more than 3:2. Formulate the above as a LP problem to maximize total profit. (Do not solve the LPP for optimum solution)

- e) Five men are available to do five different jobs. From past records, the time in hours that each man can take to do each job is known and given in the following table:

Man ↓	Job →				
	I	II	III	IV	V
A	2	9	2	7	1
B	6	8	7	6	1
C	4	6	5	3	1
D	4	2	7	3	1
E	5	3	5	9	1

Determine an optimum allocation of job to the man and the corresponding total time.

Q.4) Attempt both the questions

(Marks: 2X10=20)

- a) A catering manager is in the process of replacing the furniture in the canteen. He wishes to determine how many tables of type S (seating 6) and how many of type T (seating 10) to buy. He estimates that each type S table needs 7 meters sq. Of floor space while each type T needs 9. He has to work under the following constraints:
- The canteen must be able to accommodate at least 60000 people.
 - The available floor space of the canteen is at most 63000 sq. Meters.

Advise the manager on how many tables of each type to buy if type S Rs. 100 and each type T costs Rs. 190. (Use Simplex method.).

- b) 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 flavouring ingredient. X requires 2 ounces of flavouring per unit and Y requires 4 ounces per unit. Solve the above LP problem by using Simplex Method.