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10MBA21

# Second Semester MBA Degree Examination, June/July 2013
# Quantitative Techniques for Management

Time: 3 hrs. Max. Marks:100

**Note:** *1. Answer any FOUR full questions from Q.No.1 to 7.*
*2. Q.No. 8 is compulsory.*



1 a. State the significant features of operation research. **(03 Marks)**

b. Explain briefly the general methods of solving OR models. **(07 Marks)**

c. Use graphical method to solve the L.P.P.
Maximize $Z = 4x1 + 3x3$
Subject to the constraints: $2x_1 + x_2 \leq 1000$
$x_1 + x_2 \leq 800$
$x_1 \leq 400$
$x_2 \leq 700$
$x_1 > 0$ and $x_2 > 0$ **(10 Marks)**

2 a. Explain the terms 'objective function', 'constraints' and linearity used in L.P.P. **(03 Marks)**

b. Write the dual of the following L.P.P.
Maximize $Z = 10x_1 + 12x_2$
Subject to the constraints: $6x_1 + 8x_2 \leq 120$
$12x_1 + 3x_2 \leq 100$
$x_1$ and $x_2 \geq 0$ **(07 Marks)**

c. The manager of an oil refinery must decide on the optimal mix of 2 possible blending processes of which the inputs and outputs of production runs are as follows:

| Process | Input | | Output | |
|---|---|---|---|---|
| | Crude A | Crude B | Gasoline X | Gasoline Y |
| 1 | 6 | 4 | 6 | 9 |
| 2 | 5 | 6 | 5 | 5 |

The maximum amounts available of crude A and B are 250 units and 200 units. Market demand shows that atleast 150 units of gasoline X and 130 units of gasoline Y be produced. The profits for production run from process 1 and 2 are Rs.4/- and Rs.5/- for each unit. Formulate the problem of maximizing the profit. **(10 Marks)**

3 a. What is transportation problem? Where is it applied in business? **(03 Marks)**

b. List out the differences between PERT and CPM. **(07 Marks)**

c. Find the optimal solution to the following transportation problem. The cell entries are unit transportation costs. **(10 Marks)**

| Factory | Destinations | | | | Availability |
|---|---|---|---|---|---|
| | $D_1$ | $D_2$ | $D_3$ | $D_4$ | |
| $F_1$ | 19 | 30 | 50 | 10 | 7 |
| $F_2$ | 70 | 30 | 40 | 60 | 9 |
| $F_3$ | 40 | 8 | 70 | 20 | 18 |
| Requirement | 5 | 8 | 7 | 14 | 34 |

4 a. Explain value of game and saddle print with respect to game theory. **(03 Marks)**

b. Find the saddle point and value of the game whose pay off matrix is given below: **(07 Marks)**

| | | Company strategy | | | |
|---|---|---|---|---|---|
| | | I | II | III | IV |
| Union strategy | 1 | 2 | 15 | 12 | 35 |
| | 2 | 25 | 14 | 8 | 10 |
| | 3 | 40 | 2 | 10 | 5 |
| | 4 | -5 | 4 | 11 | 0 |

c. Solve the following game using dominance property:

| | | Player B | | | |
|---|---|---|---|---|---|
| | | I | II | III | IV |
| Player A | I | 3 | 2 | 4 | 0 |
| | II | 3 | 4 | 2 | 4 |
| | III | 4 | 2 | 4 | 0 |
| | IV | 0 | 4 | 0 | 8 |

**(10 Marks)**

5 a. What is simulation? **(03 Marks)**

b. Explain the steps involved in Monte Carlo simulation method. **(07 Marks)**

c. A confectioner sells confectionery items and the past demand per week (in hundred kilogram) with frequency is given below:

| Demand per week: | 0 | 5 | 10 | 15 | 20 | 25 |
|---|---|---|---|---|---|---|
| Frequency: | 2 | 11 | 8 | 21 | 5 | 3 |

Using the following sequence of random numbers, generate the demand per week for the next 10 weeks. Also find the average demand per week:

35 52 90 13 23 73 34 57 35 83 94 56 67 66 60. **(10 Marks)**

6 a. What are the elements of a queuing system? **(03 Marks)**

b. A TV repairman finds that the time spent on his job has an exponential distribution with mean 30 minutes. If he repairs sets in the order in which they came in and if the arrival of sets is approximately Poisson with an average rate of 10 per 8-hour day, what is repairman's expected idle time each day? How many jobs are ahead of the average set just brought in? **(07 Marks)**

c. A department head has four subordinates and four tasks to be performed. The subordinates differ in efficiencies, and the tasks differ in the intrinsic difficulty. His estimates, of the time each man would take to perform each task, is given in the matrix below:

| Tasks | Men | | | |
|---|---|---|---|---|
| | E | F | G | H |
| A | 18 | 26 | 17 | 11 |
| B | 13 | 28 | 14 | 26 |
| C | 38 | 19 | 18 | 15 |
| D | 19 | 26 | 24 | 10 |

How should the tasks be allocated, one to a man, so as to minimize the total man hours? **(10 Marks)**

7 a. What is a critical path? How does it help the project manager? **(03 Marks)**

b. Describe the rule of dominance in Games theory. **(07 Marks)**

c. In a factory, there are six jobs to perform, each of which should go through two machines A and B in the order A, B. The processing timings (in hours) for the jobs are given here. You are required to determine the sequence for processing the jobs that would minimize the total elapsed time. What is the value of elapsed time? **(10 Marks)**

| Job: | P | Q | R | S | T | U |
|---|---|---|---|---|---|---|
| Machine A: | 1 | 3 | 8 | 5 | 6 | 3 |
| Machine B: | 5 | 6 | 3 | 2 | 2 | 10 |

8 Compulsory:

A small project consists of seven activities for which relevant data are given below:

| Activity | Preceding activities | Activity duration days |
|---|---|---|
| A | - | 4 |
| B | - | 7 |
| C | - | 6 |
| D | A, B | 5 |
| E | A, B | 7 |
| F | C, D, E | 6 |
| G | C, D, E | 5 |

i) Draw the network and find the completion time:

ii) Calculate total float for each of the activities. **(20 Marks)**

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