**Code: 9F00205**

MCA II Semester Supplementary Examinations June/July 2018

**OPERATIONS RESEARCH**

(For students admitted in 2011 (LC), 2012, 2013, 2014, 2015 & 2016 only)

Time: 3 hours Max. Marks: 60

Answer any FIVE questions

All questions carry equal marks

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1 A diet is to contain at least 4000 units of carbohydrates, 500 units of fat and 300 units of protein. Two foods A and B are available. Food A costs Rs.2 per unit and food B costs Rs.4 per unit. A unit of food A contains 10 units of carbohydrates, 20 units of fat and 15 units of protein. A unit of food B contains 25 units of carbohydrates, 10 units of fat and 20 units of protein. Formulate the problem as an LPP so as to find the minimum cost for a diet that consists of a mixture of these two foods and also find minimum cost.

2 Solve the following transportation problem.

| | P | Q | R | S | Supply |
|---|---|---|---|---|---|
| A | 6 | 4 | 1 | 5 | 20 |
| B | 8 | 9 | 2 | 7 | 16 |
| C | 4 | 3 | 6 | 2 | 5 |
| Demand | 6 | 10 | 15 | 4 | |

3 Traveling salesman has to visit 5 cities. He wishes to start at a particular city and visits each city once and returns to his starting city. Cost of traveling one city to another is given below. You are required to find the least cost route.

| | A | B | C | D | E |
|---|---|---|---|---|---|
| A | - | 4 | 10 | 14 | 2 |
| B | 12 | - | 6 | 10 | 4 |
| C | 16 | 14 | - | 8 | 14 |
| D | 24 | 8 | 12 | - | 10 |
| E | 2 | 6 | 4 | 16 | - |



4 Arrivals at a telephone booth are considered to be Poisson at an average time of 8 minutes between our arrival and the next. The length of the phone call is distributed exponentially, with a mean of 4 minutes.

Determine: (i) Expected fraction of the day that the phone will be use.

(ii) Expected number of units in the queue expected waiting time in the queue.

(iii) Expected number of units in the system.

(iv) Expected waiting time in the system.

5 (a) Explain two persons zero sum theory concept.

(b) Solve the given pay off matrix.

| | $B_1$ | $B_2$ | $B_3$ | $B_4$ |
|---|---|---|---|---|
| $A_1$ | 5 | 7 | 1 | 2 |
| $A_2$ | 4 | 5 | 5 | 8 |

Contd. in page 2

6 A student has to take examination in three courses X, Y and Z. He has three days available to study. He feels it would be best to devote a whole day to the study of the same course, so he may study a course for one day, two days or three days or not at all. His estimation of grades he may get by study are as given in the following table. How should he plan to study so that he maximizes the sum of his grades? (Use dynamic programming).

| | X | Y | Z |
|---|---|---|---|
| 0 | 1 | 2 | 1 |
| 1 | 2 | 2 | 2 |
| 2 | 2 | 4 | 4 |
| 3 | 4 | 5 | 4 |

7 Give a brief account of situations of which the replacement problems arise. Why does the theory of replacement establish? Also discuss briefly replacement procedure for the items that deteriorate with time.

8 Discuss the importance of inventory models. What are the objectives that should be fulfilled by an inventory control system? Illustrate with an example.

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