Printed Pages : 7

NMBA025

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 270228

Roll No. 1 4 0 3 2 7 0 0 9 3

# M. B. A.

## (SEM. II) THEORY EXAMINATION, 2014-15

## OPERATIONS RESEARCH

Time : 3 Hours] [Total Marks : 100

Note : Attempt all questions from each section, as per given instructions.

### SECTION - A

1 Attempt any four parts of this question : [4×5=20]

(a) What is the role of operations research in decision making ?

(b) Discuss the historical back ground of O.R.

(c) What is assignment problem ?

(d) Briefly explain the assumptions of queuing theory.

(e) What do you understand by a basic feasible solution in transportation ?

(f) What do you mean by a competitive situation ?

## SECTION - B

2 Attempt any two questions from this section : [2×15=30]

(a) Solve the following LPP.

$$Max\ Z = 5X_1 + 10X_2 + 8X_3$$

s.t. $3X_1 + 5X_2 + 2X_3 \leq 60$

$4X_1 + 4X_2 + 4X_3 \leq 72$

$2X_1 + 4X_2 + 5X_3 \leq 100$

where $X_1, X_2, X_3 \geq 0$

(b) The time estimates (in weeks) for the activities of PERT network are given below :

| Activity | Optimistic time ($t_0$) | Most Likely time ($t_m$) | Pessimistic time ($t_p$) |
|---|---|---|---|
| 1 – 2 | 1 | 1 | 7 |
| 1 – 3 | 1 | 4 | 7 |
| 1 – 4 | 2 | 2 | 8 |
| 2 – 5 | 1 | 1 | 1 |
| 3 – 5 | 2 | 5 | 14 |
| 4 – 6 | 2 | 5 | 8 |
| 5 – 6 | 3 | 6 | 15 |

(i) Draw the project network.

(ii) Determine the expected project length.

(iii) Calculate the standard deviation and variance of project.

(c) An airline organization has one reservation clerk on duty in its local branch at any given time. The clerk handles information regarding passenger reservation and flight timings. Assume that the no. of customers arriving during any given period is Poisson distributed with an arrival rate of eight per hour and that the reservation clerk can service a customer in six minutes on an average with an exponentially distributed service time.

(i) What is the probability that the system is busy?

(ii) What is the average time a customer spends in the system ?

(iii) What is the average length of the queue?

(iv) What is the no of customers in the system ?

## SECTION - C

**Note :** Attempt all questions from this section : [5×10=50]

3 Describe methods to obtain an initial feasible solution for a transportation problesm.

**OR**

3 Consider the following transportation problem.

| | | **Destination** | | | | **Availability** |
|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | |
| | **1** | 21 | 16 | 25 | 13 | 11 |
| | **2** | 17 | 18 | 14 | 23 | 13 |
| **Source** | **3** | 32 | 27 | 18 | 41 | 19 |
| **Requirement** | | **6** | **10** | **12** | **15** | **43** |

Determine an initial basic feasible solution using Vogel's approximation method.

4 What is a pay-off table ? Explain pay off table with an example and convert that into opportunity loss table.

**OR**

4 If you make a unit product and it is sold you gain Rs.5; If you make a unit and it is not sold you loose Rs.3 Suppose the probability distribution of the no. of units demanded is as follows :

| No.of units demanded: | 0 | 1 | 2 | 3 | 4 | 5 | Or above |
|---|---|---|---|---|---|---|---|
| Probability | .20 | .20 | .25 | .30 | .05 | .00 | |

How many units should you make ?

5 What is sequencing problem ? Give its essential characteristics ?

**OR**

5 In a factory, there are six jobs to process, each of which should go to machine A and B in order AB. The processing timings in minutes are given. Determine the optimal sequence and total elapsed time :

| Jobs | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Machine A | 7 | 4 | 2 | 5 | 9 | 8 |
| Machine B | 3 | 8 | 6 | 6 | 4 | 1 |

6 Explain the minimax – maximin principle for mixed strategy game.

**OR**

6 Solve the following game whose pay off matrix is given by

Player B

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

7 What is replacement? Describe some important replacement situation and replacement policies?

**OR**

7 The maintenance cost and resale value per year of a machine whose purchase price is Rs.7000 is given below.

| Year | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Operating Cost | 900 | 1200 | 1600 | 2100 | 2800 | 3700 | 4700 | 5900 |
| Resale Value(Rs.) | 4000 | 2000 | 1200 | 600 | 500 | 400 | 400 | 400 |

When should the machine be replaced?

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