REV-01
MSM/13/18

2024/11

SET A

M.Sc. MATHEMATICS
THIRD SEMESTER
OPERATION RESEARCH
MSM - 304B

[USE OMR FOR OBJECTIVE PART]

Duration: 1:30 hrs. **Full Marks: 35**

Objective

Time: 15mins. **Marks: 10**

Choose the correct answer from the following: ***1×10=10***

1. Operations research is the application of _____methods to arrive at the optimal Solutions to the problems.
   a. economical
   b. scientific
   c. a and b both
   d. artistic

2. Operations management can be defined as the application of ----------to a problem within a system to yield the optimal solution.
   a. Suitable manpower
   b. mathematical techniques, models, and tools
   c. Financial operations
   d. None of these

3. OR can evaluate only the effects of ----------
   a. Personnel factors.
   b. Financial factors
   c. Numeric and quantifiable factors.
   d. None of these

4. The objective function and constraints are functions of two types of variables, _____ variables and _____ variables.
   a. Positive and negative
   b. Controllable and uncontrollable
   c. Strong and weak
   d. None of the above

5. Who defined OR as scientific method of providing executive departments with a quantitative basis for decisions regarding the operations under their control?
   a. Morse and Kimball (1946)
   b. P.M.S. Blackett (1948)
   c. E.L. Arnoff and M.J. Netzorg
   d. None of the above

6. Hungarian Method is used to solve
   a. A transportation problem
   b. A travelling salesman problem
   c. A L.P. problem
   d. Both a & b

7. OR uses models to help the management to determine its _____
   a. Policies
   b. Actions
   c. Both A and B
   d. None of the above

8. Which technique is used in finding a solution for optimizing a given objective, such as profit maximization or cost reduction under certain constraints?
   a. Quailing Theory
   b. Waiting Line
   c. Both A and B
   d. None of these

9. OR techniques help the directing authority in optimum allocation of various limited resources like_____

a. Men and Machine
b. Money
c. Material and Time
d. All of the above.

10. Consider the linear equation $2x^1 + 3x^2 - 4x^3 + 5x^4 = 10$. How many basic and non-basic variables are defined by this equation?

a. One variable is basic, three variables are non-basic
b. Two variables are basic, two variables are non-basic
c. Three variables are basic, one variable is non-basic
d. All four variables are basic

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(Descriptive)

Time : 1 hr. 15 mins. **Marks: 25**

[Answer question no.1 & any two (2) from the rest]

1. Describe the role of operation research in India 5

2. a. Find the Maximum value of $Z = 2x_1 + 3x_2$ with the help of **graphical method**. 5+5=10

Subject to $x_1 + x_2 \leq 30$

$x_2 \geq 3$

$x_2 \leq 12$

$x_1 - x_2 \geq 0$

$0 \leq x_1 \leq 20$

b. Use **simplex method**

Maximum $Z = 2x_1 + 5x_2$

Subject to $x_1 + 4x_2 \leq 24$

$3x_1 + x_2 \leq 21,$

$x_1 + x_2 \leq 9$

$x_1, x_2 \geq 0$

3. **a.** Food X contains 6 units of vitamin A per gram and 7 units of vitamin B per gram and costs 12 paise per gram. Food Y contains 8 units of vitamin A per gram and 12 units of vitamin B per gram and cost 20 paise per gram. The daily minimum requirement of vitamin A and vitamin B is 100 units and 120 units respectively. Find the minimum cost of product mix by the Big M method **7+3=10**

b. Solve the following Transportation problem by North west corner rule

	W_1	W_2	W_3	Supply
F_1	2	7	4	5
F_1	3	3	1	8
F_1	5	4	7	7
F_1	1	6	2	14
Demand	7	9	18	34

4. **a.** Solve the problem by Big M method **7+3=10**

Minimum $Z = 5x_1 + 6x_2$

Subject to $2x_1 + 5x_2 \geq 1500$

$3x_1 + x_2 \geq 1200,$

$x_1, x_2 \geq 0$

b. Solve the following Transportation problem by Least Cost Entry Method

	W_1	W_2	W_3	Supply
F_1	2	7	4	5
F_1	3	3	1	8
F_1	5	4	7	7
F_1	1	6	2	14
Demand	7	9	18	34

5. A bakery keeps of a popular brand of cake. Daily demand based on past experience is given below 4+3+3 =10

Daily Demand	0	15	25	35	45	50
Probably	0.01	0.15	0.20	0.50	0.12	0.02

Consider the following sequence of random numbers:
48, 78, 09, 51, 56, 77, 15, 14, 68, and 09

a. Using the sequence, simulate the demand for the next 10 days.

b. Find the stock situation if the owner of the bakery decides to make 35 cakes every day. Also

c. Estimate the daily average of demand for the cakes on the basis of the simulated data.

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