M.Sc. MATHEMATICS
THIRD SEMESTER
OPERATION RESEARCH
MSM - 304B
[USE OMR FOR OBJECTIVE PART]

SET A

Duration: 1:30 hrs.

Full Marks: 35

(**Objective**)

Time: 15 mins.

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. In operations research, they are prepared for situations.
   a. Mathematical models
   b. physical models diagrammatic
   c. diagrammatic models
   d. None of these

3. Which of the following is not the phase of OR methodology?
   a. Formulating a problem
   b. Constructing a model
   c. Establishing controls
   d. Controlling the environment

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. Operations research was known as an ability to win a war without really going in to - --------------
   a. Battle field
   b. Fighting
   c. The opponent
   d. Both A and B

6. Who defined OR as scientific method of providing execuitive 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

7. OR has a characteristics that it is done by a team of
   a. Scientists
   b. Mathematicians
   c. Academics
   d. All of the above

8. Hungarian Method is used to solve
   a. A transportation problem
   b. A travelling salesman problem
   c. A LP problem
   d. Both a & b

9. A solution can be extracted from a model either by
   a. Conducting experiments on it
   b. Mathematical analysis
   c. Both A and B
   d. Diversified Techniques

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

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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   4+6=10
graphical method.
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. Find the minimum cost by using **Lowest cost entry method** and   5+5=10
North west corner   **Method of**
the following data

	W_1	W_2	W_3	
F_1	2	7	4	5
F_2	3	3	1	8
F_3	5	4	7	7
F_4	1	6	2	14
	1	6	2	

3

4. Four different jobs can be done on four different machines. The set up and take down time costs are assumed to be positively high for changeovers. The matrix below gives the cost in rupees of producing job i and j

3+1+6 =10

	Machine			
Jobs	M_1	M_2	M_3	M_4
J_1	5	7	11	6
J_2	8	5	9	6
J_3	4	7	10	7
J_4	10	4	8	3

i. Formulate the mathematical model for the problem.
ii. How should the jobs be assigned to the various machines so that the total cost is minimized?
iii. Explain the rationale of assignment algorithm.

5.
   a. Solve by **Big –M method**
     Minimize $Z = 12x_1 + 20x_2$
     Subject to $6x_1 + 8x_2 \geq 100$
     $7x_1 + 12x_2 \geq 120$,
     $x_1, x_2 \geq 0$

5+5=10

   b. Solve by **Two -Phase** method
     Maximize $Z = 5x_1 + 3x_2$
     Subject to $2x_1 + x_2 \leq 1$
     $x_1 + 4x_2 \geq 6$,
     $x_1, x_2 \geq 0$

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