# MA ECONOMICS

## FOURTH SEMESTER

## OPERATION RESEARCH

## MEC-403

**Duration: 2 Hrs. 40 Mins.** **Marks: 50**

{ PART : A (OBJECTIVE) = 20
PART : B (DESCRIPTIVE) = 50 }

[ PART-B : Descriptive ]

***[ Answer question no. One (1) & any four (4) from the rest ]***

1. When Sub –Games Method used to solve a game with mixed strategy? Solve the following Game : 10

| B \ A | I | II | III | IV | V |
|---|---|---|---|---|---|
| I | 2 | -4 | 6 | -3 | 5 |
| II | -3 | 4 | -4 | 1 | 0 |

2. **a.** Define operations research as stated by C. W. Churchman. 2+3+5 =10
**b.** Describe two features of operations research.
**c.** What are the different types of models used in operations research. Explain any two.

3. **a.** What do you mean by linearity and non-negativity in context of LPP. 5+5=10

**b.** A firm manufactures 3 products A, B and C. The profits are Rs.3, Rs.2 and Rs 4 respectively. The firm has 2 machines and below is the required processing time in minutes foe each machine on each product.

| | Products | | |
|---|---|---|---|
| | A | B | C |
| Machine C | 4 | 3 | 5 |
| Machine D | 2 | 2 | 4 |

Machine C and D have 2,000 and 2,500 machine minutes respectively. The firm must manufacture 100 A's 200 B's and 50 C's but not more than 150A's. Formulate the problem as a LPP model.

4. a. Distinguish between slack and surplus variable. 3+4=10

b. Solve the following LPP by Graphical Method or by Simplex method.

Maximize $Z = 20X_1 + 30X_2$ Profit function
Subject to $2X_1 + 5X_2 \leq 50$ Raw Material Constraints
$4X_1 + 3X_2 \leq 60$ Labour constraints
Where $X_1, X_2 \geq 0$

5. a. What do you mean by assignment problem in Operation Research. 2+3+5 =10

b. Draw the flowchart of Hungarian Method for solving Assignment problem.

c. Solve the following Assignment problem. The cost of performing each job by each typist is given below (in Rs.)

| Typist \ Job | P | Q | R | S |
|---|---|---|---|---|
| A | 85 | 50 | 30 | 40 |
| B | 90 | 40 | 70 | 45 |
| C | 70 | 60 | 60 | 50 |
| D | 75 | 45 | 35 | 55 |

6. What do you mean by un-balanced transportation Problem? How it can be solved? 10

Solve the following transportation Problem.

| Operators \ Machines | A | B | C | D |
|---|---|---|---|---|
| 1 | 10 | 05 | 07 | 08 |
| 2 | 11 | 04 | 09 | 10 |
| 3 | 08 | 04 | 09 | 07 |
| 4 | 07 | 05 | 06 | 04 |
| 5 | 08 | 09 | 07 | 05 |

The data given in the table refer to Production in units.

7. a. When a competitive situation is called a game? 5+5=10

b. What are the different types of strategy employed in game theory. Discuss.

8. The arrival rate of customers at petrol pump distribution, with an average time of 10 minutes between one customer and the next. The duration of a fill up of vehicle is assumed to follow exponential distribution with a mean time of three minutes. 5+5=10

a. What is the average length of the queue.
b. What is the probability that a person arriving at the both will have to wait.

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## OPERATION RESEARCH

## MEC-403

**Duration: 20 Mnts.** **Marks: 20**

[ PART-A : Objective ]

***Choose the correct answer from the following:*** ***1×20=20***

1. _____ techniques used to allocate scarce resources in an optimum manner in problems of scheduling, product mix etc.
   a. Assignment Problem b. LPP
   c. Network analysis d. None of these

2. Most of the constraints in the linear programming problem are expressed as ____.
   a. Equations b. Inequalities
   c. Both a) and b) d. None of these

3. Every linear programming problem includes _____ which relates variables in the problem to the goal of the firm.
   a. Constraints b. Objective function
   c. Inequalities d. None of these

4. Slack variables are added to constraints of the _____ type, and the objective function Z is of maximizations.
   a. = b. ≥
   c. ≤ d. None of these

5. Leaving variable is selected with key row having positive _____ ratio.
   a. Maximum b. Minimum
   c. Both of these d. None of these

6. Assignment problem deals in allocating the various resources or items to various activities on _____ basis in such a way that the time or cost involved is minimised and sale or profit is maximised.
   a. One to one b. One to many
   c. Many to one d. None of these

7. _____ is the most systematic and easiest method for obtaining initial feasible solution.
   a. Stone square method
   b. North west corner method
   c. Lowest cost entry method
   d. None of these

8. When total supply is equal to the total demand in a transportation problem , the problem is said to be _____.
   a. Unbalanced problem b. Balanced problem
   c. Maximisation problem d. None of these

9. Two person zero- sum game means that the sum of ____ to one player is Equal to the sum of the _____ to other player.
   a. Gain, loss b. Alternatives, Courses of action
   c. Income, Expenditure d. None of these

10. The rules of_____ are used to reduce the size of the payoff matrix.
    a. Probability Method b. Odds Method
    c. Dominanace d. None of these

11. Use of ODDS method is possible only in case of games with__ matrix.
    a. 2x2 b. 3x3
    c. 4x2 d. 2x4

12. The _____ in a pay off matrix is one which is the smallest value in its raw and the largest value in its column.
    a. saddle point b. Pure strategies
    c. Odds d. None of thse

13. Operations research approach is _____.
    a. Multi -disciplinary b. Scientific
    c. Intitutive d. All of the aboves

14. The quantitive approach to decision analysis is a _____
    a. logical approach b. Rational approach
    c. Scientific approach d. All of the above

15. Constraints in an LP Model represents
    a. Limitations
    b. Requirements
    c. Balancing limitations and requirements
    d. All of the above

16. If a negative value appears in the solution values column of the simplex table, then
    a. The solution is optimal
    b. The solution is infeasible
    c. The solution is unbounded
    d. None of these

17. A game which decision value is zero is termed as_____ Game

a. Competitive b. Fair
c. Both a and b d. None of these

18. _____ Time is the average time that a customer has to wait to get service.

a. Waiting b. Total
c. Idle d. None of these

19. ___ represents that a customer that finds the service center busy goes to the end of the que.

a. FIFO b. LIFO
c. Both a & b d. None of theses

20. The probability of ____ customers waiting means a customer arriving for service does not have to wait in que or gets immediate service.

a. Zero b. One
c. Half d. None of these.

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# UNIVERSITY OF SCIENCE & TECHNOLOGY, MEGHALAYA

## Question Paper CUM Answer Sheet

**[PART (A) : OBJECTIVE]**

| Serial no. of the main Answer sheet |
|---|
| |

**Course :** .....

**Semester :** ..... **Roll No :** .....

**Enrollment No :** ..... **Course code :** .....

**Course Title :** .....

**Session :** 2016-17 **Date :** .....

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**Instructions / Guidelines**

- The paper contains twenty (20) / ten (10) questions.
- The student shall write the answer in the box where it is provided.
- The student shall not overwrite / erase any answer and no mark shall be given for such act.
- Hand over the question paper cum answer sheet (Objective) within the allotted time (20 minutes / 10 minutes) to the invigilator.

| Full Marks | Marks Obtained | Remarks |
|---|---|---|
| 20 | | |

*Scrutinizer's Signature* *Examiner's Signature* *Invigilator's Signature*