5. **a.** what do you mean by Assignment Problem?   10

b. Distinguish between assignment problem and transportation problem.

c. Four jobs are to be done on four different machines. The cost (in rupees) of producing ith job on the jth machine is given below:

		Machines					M_4
		M_1	M_2	M_3	M4		
Jobs	J_1	15	11	13	15		15
	J_2	17	12	12	13		13
	J_3	14	15	10	14		14
	J_4	16	13	11	17		17

Assign the jobs to different machines so as to minimize the total cost.

6. **a.** What is an unbalanced transportation problem? How such a problem handled and solution is obtained?   3+7=10

b. Compute initial basic feasible solution by North –West- Corner Method and Vogel's approximation method. Give your justification which method is most appropriate method?

Plants		Sales Outlet		Capacity
	A	B	C	
X	3	9	6	20
Y	4	4	6	40
Z	8	3	5	55
Requirement	40	50	30	115 / 120

7. What is the problem of decision making? How decision theory helps in this process?   4+6=10

8. **a.** What is meant by regret ? How is the concept useful in decision making.   2+8=10

b. A newspaper distributor assigns probabilities to the demand for a magazine as follows:

Copies demanded	1	2	3	4
Probability	0.4	0.3	0.2	0.1

== *** ==

[4]

MASTER of BUSINESS ADMINISTRATION
SECOND SEMESTER
OPERATIONS RESEARCH
MBA –207
(Use Separate Answer Scripts for Objective & Descriptive)

Duration : 3 hrs.   Full Marks : 70

(**PART-A : Objective**)

Time : 20 min.   Marks : 20

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

1. Operations Research is a _____ approach to problem solving for executives.
   a. multi- disciplinary   **b.** Scientific
   c. Intuitive   **d.** all of the above

2. For analyzing a problem, decision- makers should normally study
   a. its qualitative aspects   **b.** its quantitative
   c. both (a) and (b)   **d.** neither (a) nor (b)

3. Managerials decisions are based on
   a. an evaluation of quantitative data   **b.** the use of quantitative
   c. numbers produced by formal model   **d.** all of the above

4. A constraints in an LP model restricts
   a. value of objective function   **b.** value of decision variable
   c. use of the available resource **d.** all of the above

5. Constraints in an LP model represents
   a. Limitations   **b.** Requirements
   c. balancing limitations and requirements   **d.** all of the above

6. The graphical method of LP problem uses
   a. objective function equation   **b.** constraint equations
   c. linear equations   **d.** all of the above

7. If two constraints do not intersect in the positive quadrant of the graph, then
   a. the problem is infeasible   **b.** the solution is unbounded
   c. none of the above   **d.** one of the constraint is redundant

8. For maximization LP model, the simplex is terminated when all values
   a. $c_j - z_j \leq 0$ **b.** $c_j - z_j \geq 0$
   c. $c_j - z_j = 0$ **d.** $z_j \leq 0$

9. For a maximization problem the objective function coefficient for a slack variable is
   a. + 1   **b.** – 1
   c. 0   **d.** None of the above

10. An optimal assignment requires that the maximum number of lines that can be drawn through squares with zero opportunity cost be equal to the number of
    a. rows or columns
    b. rows and columns
    c. rows + columns – 1
    d. none of the above

11. The purpose of dummy row or column in an assignment problem is to
    a. obtain balance between total activities and total resources
    b. prevent a solution from becoming degenerate
    c. provides a means of representing a dummy problem
    d. none of the above

12. If there were n workers and n jobs there would be
    a. n! Solutions
    b. (n- 1)! Solutions
    c. (n!)n solutions
    d. n solutions

13. 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. Maximization problem
    d. None of these

14. 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

15. A game whose decision value is zero is termed as_____ Game
    a. Competitive   b. Fair   c. Both a and b   d. None of these

16. 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 these

17. Leaving variable is selected with key row having positive _____ ratio in simplex method.
    a. Maximum   b. Minimum   c. both a) and b)   d. None of these

18. The result of combinations of an act with each of the states of nature is the outcome and monetary gain or loss of each outcome is the_____.
    a. Utility
    b. possible profit
    c. Both a) & b)
    d. None of these

19. Sometimes with reference to past records ,experience ,probabilities to future events could be allotted in decision making under
    a. Risk
    b. Certainty
    c. Uncertainty
    d. None of these

20. In decision theory EVPI=_____
    a. EPPI+ Maximum EMV
    b. EPPI- Maximum EMV
    c. EPPI- Maximum EMV+ Average outcome
    d. None of these

= = *** = =

PART-B : Descriptive

Time : 2 hrs. 40 min.   Marks : 50

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

1. a. Differentiate between pure strategies and mixed strategies in game theory.   3+2+5 =10

   b. Explain the principle of Dominance in game theory?

   c. Solve the following game using Dominance Method.

Player B		Player B					
		B_1	B_2	B_3	B_4		B_4
Player B	A_1	8	10	9	14		14
	A_2	10	11	8	12		12
	A_3	13	12	14	13		13

2. What are the different approaches of OR Methodology? Explain the approaches with the help of diagram.   5+5=10

3. a. Distinguish between Slack variable and Surplus variable.   4+6=10
   b. Solve the following LPP by Graphical Method.
      Maximize Z= $6X_1$+ $8X_2$ Profit function
      Subject to $30X_1$+ $20X_2 \leq 50$ [Raw Material Constraints
                   $5X_1$+ $10X2 \leq 60$ [Labour constraints
                   Where X_1, $X_2 \geq 0$

4. a. Explain the term linearity in relation to LP problem   2+8=10

   b. A company produces two types of pen, say A and B. Pen A is a superior quality and pen is a lower quality. Profit on pens A and B is Rs.5 and Rs.3 per pen respectively. Raw Material required for each pen A is twice as that for pen B. The supply of raw materials is sufficient only for 1000 pens of type B per day. Pen A requires a special clip and only 4oo such clips are available per day. For pen B, only 700 clips are available per day. Formulate the problem as a linear programming model in order to maximize the profit and solve it by simplex method.