Total No. of Questions : 11] [Total No. of Printed Pages : 11

EF-465

M.A./M.Sc. III[st] Semester (Reg./Pvt./ATKT)

Examination, 2021-22

Maths

Operations Research-I

Paper - VIII

Time : 3 Hours] **[Maximum Marks : Reg. 85**
Pvt. 100

Note :- Attempt all questions.

A Graph paper must be given if required.

SECTION - 'A'

Objective Type Questions

1. Choose the correct answer :

(i) Which of the following is not correct ?

Operations research came into existence.

(a) In the year 1940

(b) In the military context

(c) During world war I

(d) During world war II

(ii) International federation of operations research societies was established in.

(a) 1957

(b) 1959

(c) 1940

(d) None of these

(iii) Which of the following is not correct ?

(a) O.R. is applied decision theory

(b) O.R. is the art of giving good answers to prob lems which otherwise have best answers.

(c) O.R. is a scientific approach to problems solving for executive management.

(d) O. R. is the science of use

(iv) The Scientific method in operations research does not consists.

(a) Formulation phase

(b) Judgement phase

(c) Research phase

(d) Action phase

(v) Which of the folloiwng is not associated with an LPP ?

(a) Proportionality

(b) Uncertainty

(c) Additivity

(d) Divisibility

(vi) A physical model is an example of :

(a) Iconic model

(b) Analogue model

(c) Verbal model

(d) Symbolic model

(vii) Which of the following is not correct ?

(a) The graphic approach to the solution of LPP's cannot handle problems with more than three

variables.

(b) A feasible solution to an LPP is one that satisfies atleast one of the constraints of the problem.

(c) An optimum solution to an LPP is a feasible solu tion which optimizes the objective function.

(d) The feasible region is also termed as the solution space

(viii) Which of the following is not correct ?

(a) The graphic approach to an LPP is most suitble when there are any two decision variables.

(b) A possible solution on the graph corresponds to every point (x,y)

(c) The graphic approach to an LPP is applicable when the number of decision variable are more than the number of constrients.

(d) The common region that satisfies all the constraints is called the feasible (convex) region.

(ix) Given an LPP to maximize $z = -5x_2$, subject to

$x_1 + x_2 \leq 1$

$0.5\, x_1 + 5x_2 \geq 0$ and $x_1 \geq 0, x_2 \geq 0$, we have

(a) No feasible solution

(b) Unbounded solution

(c) Unique optimum solution

(d) Multiple optimum solutions

(x) Which of the following is correct ?

(a) The coefficients of stock variables are zero where as the coefficients of surplus variables are not zero in the objective function.

(b) The coefficients of surplus variables are zero where as the coefficients of stock variables are non zero in the objective function.

(c) The coefficients of stock/surplus variables are always zero in the objective function.

(d) None of these

(xi) A necessary and sufficient condition for a basic feasible solution to a maximization LPP to be an optimum is that (for all j) :

(a) $Zj - Cj \geq 0$

(b) $Zj - Cj \leq 0$

(c) $Zj - Cj \leq 0$ or $Zj - Cj < 0$

(d) None of these

(xii) Costs in objective function in phase 2 of two phase method are

(a) Actual coefficients

(b) Zero

(c) –1

(d) None of these

(xiii) The right hand side constant of a constreint in a primal problem appears in the corresponding dual as :

(a) A coefficient in the objective function

(b) A right-hand side constant of a constraint in a dual problem.

(c) An input - output coefficient

(d) None of these

(xiv) Which of the following is not correct ?

(a) The number of dual constraints is exactly equal to the number of primal variables.

(b) The number of dual variables is exactly equal to

the number of primal constraints

(c) The dual of the dual is primal

(d) None of these

(xv) Which of the following is not correct ?

(a) Duality does not play any role in the post - opti mal analysis of on LPP.

(b) The optimum simplex table provides informa tion about the status and worth of the resources in addition to the optimum values of the decision variables.

(c) In the optimum solution of a profit maximization LPP, the total (optimum) profit must be equal to the total worth of the resources.

(d) To write the dual problem, it is necessary that its primal LPP must have all its variables as greater than or equal to zero.

SECTION - 'B'

Short Answer Type Questions **5×5=25**

2. Give any five definitions of operations research.

OR

Write short note on features of operations research.

3. Describe classification of models by function.

OR

Write main characteristics of good model for operations re-search.

4. A company produces two types of Hats. Each hat of the first types requires twice at much labour time as the second types. If all hats are of the second type only ? the comapny can pro-duce a total of 500 hats a day. The market limits daily sales of the first and second type to 150 and 250 hats. Assuming that the profits per hat are Rs. 8 for type A and Rs. 5 for type B, formulate the problem as a linear programming model in order to determine the number of hats to be produced of each type so as to maximize the profit.

OR

Write major steps in the solution of a linear programming prob-lem by graphial method.

5. Obtain all the basic solutions to the following system of linear equation

$x_1 + 2x_2 + x_3 = 4$

$2x_1 + x_2 + 5x_3 = 5$

OR

Prove that any convex combination of K different optimum solutions to an LPP is again on optimum solution to the problem.

6. Write various steps involved in the formulation of a primal - dual pair.

OR

Formulate the dual or the following linear programing programming problem.

Minimize $z = 2x_1 + 3x_2 + 4x_3$

Subject to the constraints

$2x_1 + 3x_2 + 5x_3 \geq 2$

$3x_1 + x_2 + 7x_3 = 3$

$x_1 + 4x_2 + 6x_3 \leq 5$

$x_1 \geq 0$, $x_2 \geq 0$ and x_3 is unrestricted.

SECTION - 'C'

Long Answer Type Questions **9×5=45**

7. Write five applications of operations research.

OR

Write origin and development of operations research.

8. Describe phases of operations research write short note on models by structure and models by nature of the environment.

9. Solve the following L.P.P by using graphial method.

Maximize $z = 2x_1 + 4x_2$

Subject to the constraints

$x_1 + 2x_2 \leq 5$

$x_1 + x_2 \leq 4$

$x_1 \geq 0, x_2 \geq 0$

OR

Write short note on infeasible solution. Give one example.

10. Write steps for the solution of any L.P.P by simplex Algorithm.

OR

Use two - phase simplex method to maximize $z = 5x_1 - 4x_2 + 3x_3$ subject to the constraints.

$2x_1 + x_2 - 6x_3 = 20$

$6x_1 + 5x_2 + 10x_3 \leq 76$

$8x_1 - 3x_2 + 6x_3 \leq 50$

$x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$

11. State and prove weak duality theorem.

OR

Use duality in solving the LPP :

minimize $z = 2x_1 - x_2 + x_3 + 5x_4 - 3x_5$

Subject to the constraints.

$4x_1 + 2x_2 + x_3 + x_4 = 3$

$2x_1 + 2x_2 + x_3 + x_5 = 2$

$Xj \geq 0 \ (J = 1, 2, 3, 4, 5)$