BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – Dip.ME-2022/Dip.ME-2023
Course Name – Operations Research
Course Code - DMEOE402A
(Semester IV)

Full Marks : 60   **Time : 2:30 Hours**
[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question)   1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Predict the significance of constraints in the mathematical equation of Linear Programming Problem.

a) Mathematical relation between the variables.

b) Limitations imposed by the problem characteristics.

c) Domain of definition.

d) Establish a relation between the decision variables and the possible outcomes.

(ii) Interpret the accurate justification for the name of the subject of Operation Research.

a) Problems can be solved by war approach.

b) The researchers do the operations.

c) The war problems are generally known as operations and inventing a new way of solving such problems.

d) Mathematical operations are used in solving the problems.

(iii) Identify the region bounded by the constraints while solving a linear programming problems.

a) Feasible region.

b) Infeasible solution.

c) Solution space and feasible solution.

d) Unbounded solution.

(iv) Choose the option by which the simplex method can be terminated for maximization of linear programming problem.

a) Negative.

b) Zero.

c) Positive.

d) Imaginary.

(v) Predict the significance of the constraints used in the mathematical equations of linear programming problems.

a) Mathematical relation between the variables.

b) Limitations imposed by the problem characteristics.

c) Domain of definition.

d) Establish a relation between the decision variables and the possible outcomes.

(vi) Examine the correct duration when operation research came into operations.

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a) Freedom fighting movement of India. b) World War – I.
c) World War – II. d) Cold War.

(vii) Identify the name of the first country to use Operations Research method to solve problems.

a) India. b) U.K.
c) China. d) U.S.A.

(viii) Identify the year Operations Research is first coined.

a) 1945. b) 1935.
c) 1915. d) 1940.

(ix) Identify the correct statement related to feasible solution.

a) A solution for which all the constraints of a LPP are satisfied. b) A solution for which at-least one of the constraints of an LPP is violated.
c) Solution that can increase or decrease infinitely the value of the objective function. d) None of these.

(x) Determine the option that signifies a constraint in an linear programming problem.

a) value of objective function. b) value of a decision variable.
c) use of available resource. d) uncertainity of optimum value.

(xi) Identify the option that gives minimization of objective function in linear programming problems.

a) least value chosen among the allowable decision. b) greatest value chosen among the allowable decisions.
c) both least value chosen among the allowable decision and greatest value chosen among the allowable decisions. d) none of these.

(xii) Determine the option that gives general linear programming problems in standard form.

a) the constraints are strict equations. b) the constraints are inequalities of 'less than or equal to' type.
c) the constraints are inequalities of 'greater than or equal to' type. d) the decision variables are unrestricted in sign.

(xiii) Determine the option that signifies feasible solution to the linear programming problems.

a) must satisfy all of the problem's constraints simultaneously. b) must be a corner point of the feasible region.
c) need not satisfy all of the constraints, only some of them. d) must optimize the value of the objective function.

(xiv) Identify the number of variables have in the formulation of 5*5 assignment problem.

a) 20 b) 25
c) 30 d) 35

(xv) Identify the number of constraints in the dual formulation of 5*5 assignment problem.

a) 15 b) 20
c) 25 d) 30

Group-B
(Short Answer Type Questions)
3 x 5=15

2. Write the limitations of game theory. (3)
3. Classify the various managerial decision used in management. (3)
4. Illustrate Vogel's Approximation method. (3)
5. Write the advantages of linear programming. (3)
6. Explain the term critical path in project management . (3)

OR

Compare CPM and PERT in project management.

(3)

Group-C
(Long Answer Type Questions)

5 x 6=30

7. Write the following primal problem into dual problem.   (5)

   Maximize Z = 3x+ 4y

   subject to the following constrains

   2x+ 3y <= 16

   5x +2y >= 20

   x, y > 0

8. Convert the following primal problem into dual one   (5)

   Minimize Z = 40x +120y

   subject to the following constrains

   -x+ 2y>=-8

   3x +5y>=90

   -15x-44y>=-660

   x, y>=0

9. Solve the problems using linear programming method   (5)

   Maximize Z = 3x + 4y

   subject to

   2x + y<=20

   4x-3y>= 0

   x, y > 0

10. Explain the importance of Queuing theory in various industries.   (5)

11.   (5)

	W1	W2	W3	W4	Capacity
F1	21	16	25	13	11
F2	17	18	14	23	13
F3	32	27	18	41	19
Demand	6	10	12	15	43

Evaluate the total cost by Least cost method.

12. A departmental store has only one cashier. During the rush hours, customers arrive at a (5) rate of 20 customers per hour. The average number of customers that can be handeled by the cashier is 24 per hour. Assume the conditions for use of the single-channel queuing model. Predict: (i) Probability that cashier is idel, (ii) average number of customers in the system, (iii) average time a customer spends in the system, (iv) average number of customers in the queue and (v) average time a customer spends in the queue.

OR

XYZ Tailoring house has one tailor specialized in men's shirts. The number of customers (5) requiring stitching of shirts appears to follow the Poisson distribution with men arrive at rate of 12 per hour. Customers are attended to by the tailor on a first come first serve basis and they are willing to serve if there be queue. The time tailors take to attend a customer is exponentially distributed with a meaning of 4 minutes. Predict: (i) The utilization parameter, (ii) The probability that the queue is idle, (iii) The average time the tailor is free in 8 hours working day, (iv) Total number of customers in the shop, (v) Expected length of the non-empty queue.

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