BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – BBA-2022
Course Name – Quantitative Techniques in Management
Course Code - BBAC501
(Semester V)

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) Choose the correct term for a Dynamic Programming problem where the outcome at any decision stage is unique and known:

a) Deterministic Dynamic Programming
b) Stochastic Dynamic Programming
c) Linear Dynamic Programming
d) Non-Linear Dynamic Programming

(ii) Write the correct statement:If the Primal Problem is a maximization problem, then the Dual Problem will be a:

a) Maximization problem
b) Minimization problem
c) Mixed-integer problem
d) Non-linear problem

(iii) The maximum value of $z = 3x + 4y$ subject to the conditions $x + y \leq 4$, $x \geq 0$, $y \geq 0$

a) 0
b) 12
c) 16
d) 28

(iv) Identify the option that is NOT a decision-making model -

a) Rational Model
b) Administrative Model
c) Strategic Model
d) Contingency Model

(v) Identify the odd one out with respect to PERT Chart

a) Most likely time
b) Optimistic time
c) Failure time
d) Pessimistic time

(vi) Identify the similarity between Assignment Problem and Transportation Problem.

a) Both are rectangular matrices
b) Both are square matrices
c) Both can be solved by graphical method
d) Both have objective function and non-negativity constraints

(vii) If an optimal solution is degenerate, identify -

a) There are alternative optimal solutions
b) The solution is infeasible
c) The solution depends on decision maker
d) None of these

(viii) The feasible region of a linear programming problem has four extreme points: A(0,0),B(1,1), C(0,1), and D(1,0). Identify an optimal solution for minimization problem with the objective function $z = 2x - 2y$

a) An alternative solution at a line segment between A and B
b) An unbounded solution
c) A unique solution at C
d) A unique solution at D

(ix) Identify, the true statement for the graph of inequations $3x+2y\leq 6$ and $6x+4y\geq 2$

a) Both do not contain origin
b) Both graphs are disjoint

c) Both contain point (1, 1) d) None of these

(x) The role of artificial variables in the simplex method is_____.

a) to aid in finding an initial solution b) to find optimal dual prices in the final simplex table
c) to start with Big M method d) all of these

(xi) The coefficient of slack variable in the objective function is _____.

a) -M b) 0
c) +M d) None of them

(xii) Operations Research (OR), which is a very powerful tool for _____.

a) Research b) Decision-Making
c) Operations d) None of these

(xiii) Select the correct option: Dual of the dual is _____.

a) Primal b) Dual
c) Any one may be d) None

(xiv) Select the correct option: The graphical method of Linear Programming Problem can be applicable if there are only -

a) 3 variables b) 2 variables
c) Infinite number of variables d) None

(xv) A mixed strategy game can be solved by; identify -

a) Algebraic method b) Matrix method
c) Graphical method d) All of these

Group-B

(Short Answer Type Questions) 3 x 5=15

2. What is a critical path in CPM? Identify its importance. (3)
3. Describe the main advantage of using PERT analysis in an uncertain project environments. (3)
4. In a project with the following activities: A, B, C, D, and E, where A is succeeded by B and C, C is succeeded by D and Band D are succeeded by E, Identify the critical path if the durations are as follows: A (5 days), B (3 days), C (4 days), D (2 days), and E (3 days)? (3)
5. You are managing a construction project with the following activities and durations: A (4 days), B (5 days), C (7 days), D (3 days), and E (6 days). Calculate the earliest start and finish times for each activity. (3
6. Draw the network diagram and find critical path for the following project. (3

Activity	*Immediate predecessors*	*Duration*
A	*None*	*2*
B	*None*	*3*
C	*A*	*1*
D	*B*	*4*
E	*C, D*	*3*
F	*D*	*1*
G	*E*	*2*
H	*F*	*3*

OR

Evaluate the game whose pay off matrix is given below. Give the value of game and strategies by A and B. (3)

	B1	B2	B3	B4
A1	-5	2	0	7
A2	5	6	4	8
A3	4	0	2	-3

Group-C
(Long Answer Type Questions)

5 x 6=30

7. (5)

Player-A	Player-B				
		I	II	III	IV
	I	-2	0	0	5
	II	4	2	1	3
	III	-4	-3	0	-2
	IV	5	3	-4	2

Estimate the optimal plan for both the players.

8. (5)

Solve the following assignment problem. Cell values represent cost of assigning job A, B, C and D to the machines I, II, III and IV.

		machines			
		I	II	III	IV
jobs	*A*	10	12	19	11
	B	5	10	7	8
	C	12	14	13	11
	D	8	15	11	9

9. Consider the problem of assigning five jobs to five persons. The assignment costs are given as follows. Determine the optimum assignment schedule. (5)

Person	Job 1	2	3	4	5
A	8	4	2	6	1
B	0	9	5	5	4
C	3	8	9	2	6
D	4	3	1	0	3
E	9	5	8	9	5

10. Find the dual of the following problem: (5)

Minimize $Z = 3x_1 + 5x_2 + 7x_3$

Subject to constraints:

$x_1 + x_2 + 3x_3 <= 10$

$4x_1 - x_2 + 2x_3 >= 15$

$x_1, x_2, x_3 >= 0$

11. Obtain the dual problem of the following primal LP problem: (5)

Maximize $Z = 40x_1 + 120x_2$

Subject to constraints,

$x_1 - 2x_2 \leq 8$

$3x_1 + 5x_2 \geq 90$

$5x_1 + 4x_2 = 66$

$x_1, x_2 \geq 0$

12. Find the dual of the following problem (5)

Maximize $Z = 6x_1 + 4x_2 + 6x_3 + x_4$

Subject to constraints:

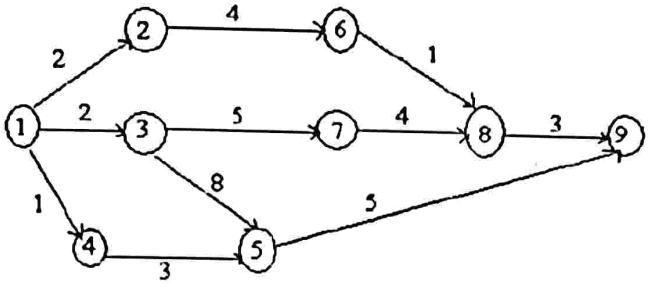
$4x_1 + 5x_2 + 4x_3 + 8x_4 = 21$

$3x_1 + 7x_2 + 8x_3 + 2x_4 <= 48$

x_1 to $x_4 >= 0$

OR

Evaluate the early start and late start in respect of all node points and identify critical path for the following network: (5)



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