B.B.A. Semester-V (Honours) Examination, 2022-23

BACHELOR OF BUSINESS ADMINISTRATION

Course ID : 53212 **Course Code : BBA/CC-12**

Course Title : Operations Research

Time : 3 Hours Full Marks : 80

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP-A

1. Answer **all** the questions: 1×10=10

i) Game theory models are classified by the
   a) number of players
   b) sum of all payoffs
   c) number of strategies
   d) all of these
   e) None of these

ii) A mixed strategy game can be solved by
   a) algebraic method
   b) matrix method
   c) graphical method
   d) all of these
   e) None of these

iii) Games which involve more than two players are called
   a) conflicting games
   b) negotiable games
   c) N-person games
   d) all of these
   e) None of these

iv) A competitive situation is known as
   a) competition b) marketing
   c) games d) all of these
   e) None of these

v) The list of courses of action with each player____
   a) is finite b) is infinite
   c) two only d) three only
   e) None of these

vi) In a transportation problem with 4 supply points and 5 demand points, how many number of constraints are required in its formulation?
   a) 20 b) 1
   c) 0 d) 9
   e) None of these

vii) The problem of maximizing $Z=x_1-x_2$, subject to constraints $x_1+x_2 \le 10,\ x_1 \ge 10,\ x_2 \ge 0$ and $x_2 \le 5$ has

a) no solution

b) one solution

c) two solutions

d) more than two solutions

e) None of these

viii) The value of (x_1, x_2) for an optimal solution for

Minimize $Z=6x_1-8x_2$

subject to $5x_1+10x_2 \le 30,$

$4x_1+4x_2 \le 20,$

$x_1 \ge 0,\ x_2 \ge 0$ is

a) (0,0) b) (1,6)

c) (0,3) d) (3,7)

e) None of these

ix) In PERT Chart, the activity time distribution is

a) Normal b) Binomial

c) Poisson d) Beta

e) None of these

x) Critical activities have

a) Maximum float b) Minimum float

c) Zero float d) Negative float

e) None of these

GROUP-B

2. Answer any **ten** questions: 2×10=20

a) Define Saddle point.

b) Define Assignment problem.

c) Define Critical path.

d) Define Standard form of a L.P.P.

e) Define Mixed Strategy.

f) Define Zero Sum game.

g) Define Forward and Backward pass.

h) Define Decision Making Environments.

i) Solve by Graphical Method :

Maximize $Z=x_1+3x_2$

subject to $3x_1+6x_2 \le 8,$
$5x_1+2x_2 \le 10,$
$x_1, x_2 \ge 0$

j) Define OR models.

k) Show that the 2×2 game $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ is, non-strictly determined, if a<b, a<c, d<b and d<c

l) Show that whatever may be the the value of a the game with the following payoff matrix is strictly determinable:

3	7
−3	a

m) Define optimal solution.

n) Define basic feasible solution

o) Solve Row Minima Method :

1	2	1	4	30
3	3	2	1	50
4	2	5	9	20
20	40	30	10	a_{ij}

GROUP-C

3. Answer any **four** from the following questions: 5×4=20

a) Define Fundamental Theorem of L.P.P

b) Define Payoff matrix and Games with Saddle point.

c) Solve the following L.P.P Graphically :

Minimize $Z = 3x_1 + x_2$

subject to $2x_1 + 3x_2 \le 6$

$x_1 + x_2 \ge 1$

$x_1, x_2 \ge 0$

d) Find the optimal assignment for a problem with the following cost:

	M_1	M_2	M_3	M_4	M_5
J_1	8	4	2	6	1
J_2	0	9	5	5	4
J_3	3	8	9	2	6
J_4	4	3	1	0	3
J_5	9	5	8	9	5

e) Solve the following L.P.P (Simplex Method) :

Maximize $Z = 60x_1 + 50x_2$

subject to $x_1 + 2x_2 \le 40$

$3x_1 + 2x_2 \le 60$

$x_1, x_2 \ge 0$

f) Solve by North-West Corner rule :

19	20	50	10	7
70	30	40	60	9
40	8	70	20	18
5	8	7	14	a_{ij}

GROUP-D

4. Answer any **three** from the following questions: 10×3=30

i) a) Define Unbounded Solution.

b) Solve the following L.P.P :

Maximize $Z = x_1 + x_2 + 3x_3$

Subject to $3x_1 + 2x_2 + x_3 \le 3$
$2x_1 + x_2 + 2x_3 \le 2$
$x_1, x_2, x_3 \ge 0$

2+8=10

ii) a) Define Saddle Point.

b) For what value of a, the game with the following payoff matrix is strictly determinable?

	I	II	III
I	a	5	2
II	-1	a	-8
III	-2	3	a

2+8=10

iii) a) Full form of PERT and CPM.

b) Solve the following L.P.P graphically :

Maximize $Z = 9x + 8y$

subject to $4x + 3y \le 30$
$2x + 3y \le 18$
$x, y \ge 0$

2+8=10

iv) a) Show that the set $X = \{(x_1, x_2) : x_1^2 + x_2^2 = 16\}$ is not a convex set.

b) Put the following problem in a standard form :

Minimize $Z = 3x_1 - 4x_2 - x_3$

subject to $x_1 + 3x_2 - 4x_3 \le 12$
$2x_1 - x_2 + x_3 \le 20$
$x_1 - 4x_2 - 5x_3 \ge 5,$

$x_1 \ge 0$, x_2 and x_3 are unrestricted in sign.

2+8=10

v) a) Define Assignment Problems.

b) Find the optimal assignment for a problem with the following cost:

	J_1	J_2	J_3
P_1	12	24	15
P_2	23	18	24
P_3	30	14	28

2+8=10

vi) a) Define Transportation Problems.

b) Solve the following transportation problem :

	D_1	D_2	D_3	a_i
O_1	5	1	8	12
O_2	2	4	0	14
O_3	3	6	7	4
b_j	9	10	11	

2+8=10

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