Seat No. : _____

JA-101

January-2021

B.B.A., Sem.-V

CC-304 : Operations Research & Q.T.

Time : 2 Hours] **[Max. Marks : 50**

Instructions : (1) **All** Questions in Section – I carry equal marks.

(2) Attempt any **two** questions in Section – I.

(3) Question – **5** in Section II is compulsory.

SECTION – I

1. (A) What is LPP ? State its uses. **10**

(B) Two types of hens are kept in a poultry farm. A type of hen costs ₹ 20 each and B type of hen costs ₹ 30 each. A type of hen lays 4 eggs per week and B type of hen lays 6 eggs per week. At the most 40 hens can be kept in the poultry. Not more than ₹ 1050 is to be spent on the hens. How many hens of each type should be purchased to get maximum eggs ? **10**

2. (A) Solve the following transportation problem by NW Rule, Matrix minima method : **10**

Source	A	B	C	D	Supply
X	15	18	22	16	30
Y	15	19	20	14	40
Z	13	16	23	17	30
Demand	20	20	25	35	100

(B) Obtain basic feasible solution by Vogel's approximation method. Also obtain its optimum solution. **10**

Source	A	B	C	Supply
X	6	4	14	10
Y	14	10	4	7
Z	4	10	8	8
Demand	12	8	5	

3. (A) Draw PERT diagram. Also calculate EST, EFT, LST, LFT and Float Time. State its Critical Path. 1(

Activity	1-2	1-3	1-4	2-3	2-6	3-5	3-6	4-5	5-6	5-7	6-7
Duration (Months)	8	7	3	6	8	6	4	12	0	6	8

(B) Draw a PERT diagram for given details. Determine the critical path and the expected duration of completion of the entire project. 10

Activity Node	Optimistic Time	Most likely time	Pessimistic time
1-2	2	4	6
1-3	6	6	6
1-4	6	12	24
2-3	2	5	8
2-5	11	14	23
3-4	15	24	45
3-6	3	6	9
4-6	9	15	27
5-6	4	10	16

4. (A) Apply the principle of dominance in Game theory and solve the Adjoining game : 10

		Y			
		1	2	3	4
X	1	8	10	9	14
	2	10	11	8	12
	3	13	12	14	13

(B) Solve the following assignment problem for minimization : 10

	A	B	C	D	E
P	4	10	12	18	17
Q	7	16	16	22	18
R	8	6	9	19	21
S	11	12	15	12	13
T	9	14	19	18	14

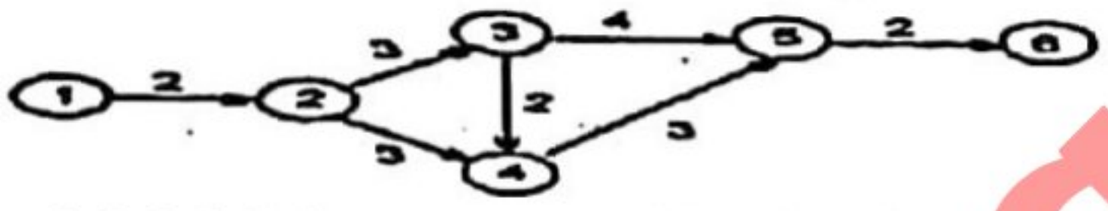
SECTION – II

5. Do as Directed : (Any ten) **10**

(1) Hungarian Method is used to solve
   (a) A transportation problem
   (b) A LP problem
   (c) A travelling salesman problem
   (d) Both (a) and (b)

(2) In a zero-sum game,
   (a) what one player wins, the other loses.
   (b) the sum of each player's winnings if the game is played many times must be zero.
   (c) the game is fair—each person has an equal chance of winning.
   (d) long-run profits must be zero.

(3) In the network shown in Fig., the critical path is



   (a) 1-2-3-4-5-6 (b) 1-2-4-5-6
   (c) 1-2-3-5-6 (d) 1-2-4-3-5-6

(4) Every LPP is associated with another LPP is called _____
   (a) Primal (b) Dual
   (c) Non-linear programming (d) None

(5) Operations Research started just before World War II in Britain with the establishment of teams of scientists to study the strategic and tactical problems involved in military operations.
   (a) True (b) False

(6) The main limitation of operations research is that it often ignores the human element in the production process.
   (a) True (b) False

(7) Which of the following is not the phase of OR methodology ?
   (a) Formulating a problem (b) Constructing a model
   (c) Establishing controls (d) Controlling the environment

(8) Operations research was known as an ability to win a war without really going in to _____
   (a) Battle field (b) Fighting
   (c) The opponent (d) Both (a) and (b)

(9) OR has a characteristics that it is done by a team of
   (a) Scientists (b) Mathematicians
   (c) Academics (d) All of the above

(10) What enables us to determine the earliest and latest times for each of the events and activities and thereby helps in the identification of the critical path ?
   (a) Programme Evaluation (b) Review Technique (PERT)
   (c) Deployment of resources (d) Both (a) and (b)

(11) Graphical optimal value for Z can be obtained from
(a) Corner points of feasible region
(b) Both (a) and (c)
(c) Corner points of the solution region
(d) None of the above

(12) In game theory, the outcome or consequence of a strategy is referred to as the
(a) payoff (b) penalty
(c) reward (d) end-game strategy.

(13) If there were n workers & n jobs, there would be
(a) n! s ‘ions (b) (n-1)! solutions
(c) (n!), olutions (d) n solutions

(14) In a transportation problem, when the number of occupied routes is less than the number of rows plus the number of columns -1, we say that the solution is :
(a) Unbalanced (b) Infeasible
(c) Optimal (d) Degenerate

(15) Which of the following methods is used to verify the optimality of the current solution of the transportation problem ?
(a) Modified distribution method
(b) Least cost method
(c) Vogel’s approximation method
(d) All of the above

16) When total supply is equal to total demand in a transportation problem, the problem is said to be
(a) Balanced (b) Unbalanced
(c) Degenerate (d) None of the above

(17) The solution to a transportation problem with ‘m’ rows (supplies) & ‘n’ columns (destination) is feasible if number of positive allocations are
(a) m+n (b) m*n
(c) m+n+1 (d) m+n-1

(18) _____ or _____ are used to “balance” an assignment or transportation problem.
(a) Destinations; sources
(b) Units supplied; units demanded
(c) Large cost coefficients; small cost coefficients
(d) Dummy rows; dummy columns

(19) In assignment problem of maximization, the objective is to maximize
(a) Profit (b) Optimization
(c) Cost (d) None of the above

(20) Total Float = _____
(a) LFij – EFij (b) LSij – ESij
(c) Both (a) and (b) (d) None of given