Avinashilingam Institute for Home Science and Higher Education for Women

(Deemed to be University under Category 'A' by MHRD, Estd. u/s 3 of UGC Act 1956)
Re-accredited with 'A+' Grade by NAAC. Recognised by UGC Under Section 12B
Coimbatore - 641 043, Tamil Nadu, India

Bachelor's Degree Examination –July 2020
IV Semester

Class : II UG **Time: 3 hours**
Major : Information Technology **Max. Marks: 100**

18BITI04 DSE-IV Operations Research

Part A **10 x 1 = 10**

Choose the correct answer

1. Graphical solution method for solving LPP can be used to solve problems having _____ variables.
   a. One b. Two c. Three d. Any number of

2. Any solution to a General LPP which satisfies the non-negative restriction of the problem is called a
   a. Optimum solution b. Feasible solution
   c. Degenerate solution d. Basic solution

3. The vogel's approximation method is used to solve
   a. Assignment problem b. Inventory problem
   c. Queuing problem d. Transportation problem

4. Moving towards optimality in a transportation problem is known as
   a. North-West corner method b. VAM method
   c. MODI method d. matrix-minima

5. The assignment problem should be a _____ matrix
   a. $n \times n$ b. $m \times n$ c. $2 \times n$ d. $m \times 2$

6. The method used to find the solution of an assignment problem is
   a. Simplex method b. Two-phase method
   c. Hungarian method d. Big M method

7. A game is said to be a fair game if
   a. v = 0 b. v = 1 c. v = -1 d. v = ∞

8. In Two Person Zero sum game, there are exactly _____ players.
   a. Two b. Three c. One d. None

9. The time interval between starting the first job and completing the last job including the idle time in a particular order by the given set of machines
   a. Processing time b. Total elapsed time
   c. idle time d. Total passing time

10. The time for which a machine does not have a job to process is called
    a. Processing time b. Total elapsed time
    c. idle time d. Total passing time

Part B **5 x 6 = 30**

Answer ALL questions

Each answer should not exceed 400 words or two pages

11.a. Explain slack and surplus variables

(or)

11.b. Use graphical method to solve L.P.P

Maximize $z= 2x_1+4x_2$ subject to the constraints

$x_1+2x_2 \leq 5$, $x_1+x_2 \leq 4$, $x_1+x_2 \geq 0$, $x_1, x_2 \geq 0$,

12.a. Obtain an initial basic feasible solution to the transportation problem by using north west corner rule

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Requirement	200	225	275	250	

(or)

12.b. Obtain an initial basic feasible solution to the transportation problem by using Least cost method

	D	E	F	G	Requirement
A	1	2	3	4	6
B	4	3	2	0	8
C	0	2	2	1	10
Demand	4	6	8	6	

13.a. Explain the mathematical formulation of the Assignment problem

(or)

13.b. A departmental head has four subordinates and four tasks to be performed. The subordinates differ in efficiency and the tasks differ in their intrinsic difficulty. His estimate of the time each man would take to perform each task, is given in the matrix below

Tasks	Men			
	E	F	G	H
A	18	26	17	11
B	13	28	14	26
C	38	19	18	15
D	19	26	24	10

How should the tasks should be allocated , one to a man , so as to minimize the total man hours?

14.a. Check the two persons zero sum game is strictly determinable or not

Player B

Player A $\begin{pmatrix} 5 & 0 \\ 0 & 2 \end{pmatrix}$

(or)

14.b. Determine the range of values of p and q that will make the payoff elements a_{22} saddle elements for the pay off matrix (a_{ij}) is given below

Player B

Player A $\begin{pmatrix} 2 & 4 & 7 \\ 10 & 7 & q \\ 4 & p & 8 \end{pmatrix}$

15.a. Explain the processing n jobs through two machines

(or)

15.b. In a factory there are six jobs to perform each of which should go through two machines A and B in the order A,B. The processing time (in hours) for the jobs are given here. Determine the sequence for performing the jobs that would minimize the total elapsed time T. What is the value of T?

Job	J1	J2	J3	J4	J5	J6
Machine A	1	3	8	5	6	3
Machine B	5	6	3	2	2	10

Part C **5 x 12 = 60**

Answer ALL questions

Each answer should not exceed 800 words or four pages

16.a. A company makes two kinds of belts. Belt A is high quality belt , and belt B is of lower quality. The respective profits are Rs 4.00 and Rs 3.00 per belt. Each belt of type A requires twice as much time as belt of type B, if all belts were of type B, the company could make 1000 per day. The supply of leather is sufficient only for 800 belts per day (Both A and B combined). Belt A requires a fancy buckle and only 400 per day available. There are only 700 buckles a day available for belt B. Determine the optimal product mix.

(or)

16.b. Use graphical method to solve L.P.P

Maximize $z= x_1+x_2$ subject to the constraints

$x_1+x_2 \leq 1, \quad -3x_1+x_2 \geq 3, \quad x_1, x_2 \geq 0,$

17.a. Obtain an initial basic feasible solution to the transportation problem by using Vogel's approximation method and hence find the optimal solution

	D_1	D_2	D_3	D_4	Supply
S_1	3	7	6	4	5
S_2	2	4	3	2	2
S_3	4	3	8	5	3
Demand	3	3	2	2	

(or)

17.b. Solve the following transportation problem

	D_1	D_2	D_3	D_4	Supply
O_1	1	2	1	4	30
O_2	3	3	2	1	50
O_3	4	2	5	9	20
Demand	20	40	30	10	

18.a. Solve the following Assignment problem

	A	B	C	D
I	1	4	6	3
II	9	7	10	9
III	4	5	11	7
IV	8	7	8	5

(or)

18.b. Solve the following Assignment problem

	A	B	C	D
I	10	25	15	20
II	15	30	5	15
III	35	20	12	24
IV	17	25	24	20

19.a. Solve the following 2XN game graphically

		Player B			
		B1	B2	B3	B4
Player A	A1	2	1	0	−2
	A2	1	0	3	2

(or)

19.b. Solve the following NX2 game graphically

		Player B	
		B1	B2
Player A	A1	1	−3
	A2	3	5
	A3	−1	6
	A4	4	1
	A5	2	2
	A6	−5	0

20.a. A book binder has one printing press , one binding machine and the manuscripts of a given number of different books. The time required to perform the printing and binding operations for each book is shown below. Determine the order in which the book should be processed in order to minimize the total time required to turn all the books.

Book	1	2	3	4	5	6
Printing time (hrs)	30	120	50	20	90	100
Binding time (hrs)	80	100	90	60	30	10

(or)

20.b. We have five jobs each of which must go through the two machines A and B in the order of A,B Processing times in hours are given in the table below

Job(i)	1	2	3	4	5
Machine A (Ai)	5	1	9	3	10
Machine B (BJ)	2	6	7	8	4

Determine a sequence for the five jobs that will minimize the elapsed time

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