STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI - 600 086
(For candidates admitted from the academic year 2015-16& thereafter)

SUBJECT CODE :15MT/AE/OR45

B.A./ B.C.A./B.Com./ B.Sc. DEGREE EXAMINATION, APRIL 2019
BRANCH I – MATHEMATICS
FOURTH SEMESTER

COURSE : ALLIEDELECTIVE
PAPER : OPERATIONS RESEARCH
TIME : 3 HOURS **MAX. MARKS : 100**

SECTION – A

ANSWER ALL THE QUESTIONS: **(10×2=20)**

1. When a solution is said to be Degenerate basic feasible solution?
2. Define "Feasible solution and infeasible solution".
3. What are the methods used in transportation problem to obtain the initial basic feasible solution?
4. When a solution is said to be Basic Feasible Solution in transportation problem?
5. What is assignment problem?
6. Explain the difference between transportation and assignment problems.
7. What are then two types of strategy in the game theory?
8. What are the different methods for solving a mixed strategy game?
9. Define float or slack.
10. What is the difference CPM and PERT?

SECTION – B

ANSWER ANY FIVE QUESTIONS: **(5×8=40)**

11. A company produces two products A and B which possess raw materials 400 quintals and 450 labour hours. It is known that 1 unit of product A requires 5 quintals of raw materials and 10 manhours and yields a profit of Rs 45. Product B requires 20 quintals of raw materials, 15 man hours and yields a profit of Rs 80. Formulate the LPP.

12. Find the initial basic feasible solution using Least cost method.

	To					**Availability**
From	2	11	10	3	7	**4**
	1	4	7	2	1	**8**
	3	9	4	8	12	**9**
Requirement	**3**	**3**	**4**	**5**	**6**	

..2

13. Certain equipment needs 5 repair jobs which have to be assigned to 5 machines. The estimated time (in hours) that a mechanic requires to complete the repair job is given in the table. Assuming that each mechanic can be assigned only one job, determine the minimum time assignment.

	J1	J2	J3	J4	J5
M1	7	5	9	8	11
M2	9	12	7	11	10
M3	8	5	4	6	9
M4	7	3	6	9	5
M5	4	6	7	5	11

14. Solve the payoff matrix and find the value of the game

$$\begin{bmatrix} 9 & 3 & 1 & 8 & 0 \\ 6 & 5 & 4 & 6 & 7 \\ 2 & 4 & 3 & 3 & 8 \\ 5 & 6 & 2 & 2 & 1 \end{bmatrix}$$

15. A project has the following times schedule:

Activity	Times in weeks	Activity	Times in weeks
(1 – 2)	4	(5 – 7)	8
(1 – 3)	1	(6 – 8)	1
(2 – 4)	1	(7 – 8)	2
(3 – 4)	1	(8 – 9)	1
(3 – 5)	6	(8 – 10)	8
(4 – 9)	5	(9 – 10)	7
(5 – 6)	4		

Construct the network and compute (i) earliest time and latest time for each event, (ii) critical path and (iii) project duration

16. Explain the various steps in Network Analysis.

17. Find the optimal strategies of *A* and *B* and the value of game by the method of dominance:

		Firm *B*				
		B_1	B_2	B_3	B_4	B_5
Firm *A*	A_1	4	6	5	10	7
	A_2	6	7	4	8	9
	A_3	9	8	10	9	8

SECTION – C

ANSWER ANY TWO QUESTIONS: (2x20=40)

18. a) Solve by simplex method

Maximize $Z = 5x_1 + 3x_2$

Subject to

$3x_1 + 5x_2 \leq 15$

$5x_1 + 2x_2 \leq 10$ and $x_1 \geq 0,\ x_2 \geq 0.$

b)Solve by graphical method

	B1	B2	B3
A1	4	-1	0
A2	-1	4	2

(10+10)

19. a) Find an optimal solution using MODI method by applying vogel's approximation method for finding the initial basic feasible solution.

		Stores				Availability
		I	II	III	IV	
Warehouse	A	21	16	15	13	11
	B	17	18	14	23	13
	C	32	27	18	41	19
Requirement		6	10	12	15	

b) State the mathematical formulation of assignment problem and define unbalanced assignment problem.

(15 + 5)

20. Construct the project network for the following:

Task:	A	B	C	D	E	F	G	H	I	J	K
Predecessor Task:	-	-	A	-	B,C	D	D	E,F	E,F	I,G	H
Least time:	4	5	8	2	4	6	8	5	3	5	6
Greatest time:	8	10	12	7	10	15	16	9	7	11	13
Most likely time:	5	7	11	3	7	9	12	6	5	8	9

Compute (i) Earliest and latest expected time to each task,

(ii) Total float, free float and independent floats of each task and

(iii) Critical path and project duration.