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

SUBJECT CODE : 15MT/AE/OR45

B. Sc. DEGREE EXAMINATION, APRIL 2017
BRANCH I – MATHEMATICS
FOURTH SEMESTER

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

SECTION – A

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

1. What are the characteristic of LPP?
2. Define unrestricted variable and artificial variable.
3. What are the methods used in transportation problem to obtain the initial basic feasible solution.
4. What do you understand by degeneracy in a transportation problem?
5. What is assignment problem?
6. Explain the difference between transportation and assignment problems.
7. Write the procedure to find the saddle point.
8. What are the different methods for solving a mixed strategy game?
9. Define float or slack.
10. What is the difference between CPM and PERT?

SECTION – B

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

11. Formulate the LPP for the following:
ABC Company produces both interior and exterior paints from 2 raw materials m1 and m2. The following table produces basic data of problem.

	Exterior paint	Interior paint	Availability
M1	6	4	24
M2	1	2	6
Profit per ton	5	4	

A market survey indicates that daily demand for interior paint cannot exceed that for exterior paint by more than 1 ton. Also maximum daily demand for interior paint is 2 tons. Formulate LPP to determine the best product mix of interior and exterior paints that maximizes the daily total profit.

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	

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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.

		Player B				
		I	II	III	IV	V
	I	-2	0	0	5	3
Player A	II	3	2	1	2	2
	III	-4	-3	0	-2	6
	IV	5	3	-4	2	-6

15. For a project

Task:	A	B	C	D	E	F	G	H	I	J	K
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

Find the earliest and latest expected time to each event and also critical path in the network.

16. Formulate the LPP and solve graphically A manufacturer of furniture makes two products – chairs and tables. Processing of this product is done on two machines A and B. A chair requires 2 hours on machine A and 6 hours on machine B. A table requires 5 hours on machine A and no time on machine B. There are 16 hours of time per day available on machine A and 30 hours on machine B. Profit gained by the manufacturer from a chair and a table is Rs. 2 and Rs. 10 respectively. What should be the daily production of each of two products? Solve graphically.

17. Explain the four steps in project scheduling by PERT/CPM.

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

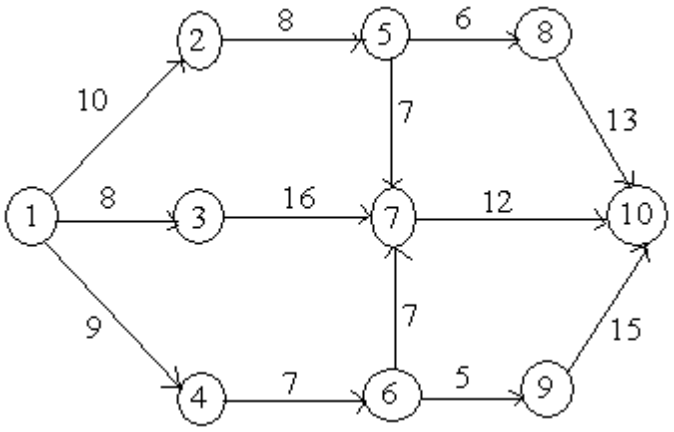
	B1	B2	B3
A1	4	-1	0
A2	-1	4	2

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

	W1	W2	W3	W4	Availability
F1	19	30	50	10	7
F2	70	30	40	60	9
F3	40	8	70	20	18
Requirement	5	8	7	14	

(20)

20. Determine the early start and late start in respect of all node points and identify critical path for the following network.



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