STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI - 600 086
(For candidates admitted from the academic year 2011-12 & thereafter)

SUBJECT CODE : 11MT/AC/OR44

B. Sc. DEGREE EXAMINATION, APRIL 2014
BRANCH I – MATHEMATICS
FOURTH SEMESTER

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

SECTION – A

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

1. Write any two characteristics of operations research.
2. What is linear programming problem?
3. Define basic feasible solution in a transportation problem.
4. Define assignment problem.
5. Write any two assumptions made in sequencing problem.
6. What is no passing rule in sequencing problem?
7. Define two persons zero sum game.
8. Define pure strategy and mixed strategy.
9. What is dummy activity in a network?
10. Define free float.

SECTION – B

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

11. Solve the following LPP by graphical method.

Minimize $z = 5x_1 + 7x_2$ subject to the constraints
$$12x_1 + 12x_2 \le 840,$$
$$3x_1 + 6x_2 \le 300,$$
$$8x_1 + 4x_2 \le 480,$$
$$x_1, x_2 \ge 0.$$

12. Solve the following LPP by simplex method.

Maximize $z = 21x_1 + 15x_2$ subject to the constraints
$$-x_1 - 2x_2 \ge -6,$$
$$4x_1 + 3x_2 = 2,$$
$$x_1, x_2 \ge 0.$$

13. Solve the following transportation problem using least cost method.

	D_1	D_2	D_3	D_4	Supply
S_1	6	8	8	5	6
S_2	5	11	9	7	1
S_3	8	9	7	13	10
Demand	35	28	35	25	

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14. Find the optimal solution for the assignment problem.

Salesman/Area	W	X	Y	Z
A	11	17	8	16
B	9	7	12	6
C	13	16	15	12
D	14	10	12	11

15. Find the sequence of 6 jobs that minimizes the total elapsed time to complete the following jobs on 2 machines. Also find the idle time for machine A and machine B.

Job	1	2	3	4	5	6	7
Machine A	3	12	15	6	10	11	9
Machine B	8	10	10	6	12	1	3

16. Find the range of p and q which will render the entry (2, 2) a saddle point for the game.

	B1	B2	B3
A1	2	4	7
A2	10	7	q
A3	4	p	8

17. A project consists of a series of jobs and activities. Draw a network for the project.

Activity	A	B	C	D	E	F	G
Precedence	-	-	-	A, B	A, B	C, D, E	C, D,E

SECTION – C

ANSWER ANY TWO QUESTIONS: (2×20=40)

18. a) Using Big M method solve the following LPP.

Minimise $z = 16x_1 + 16x_2$ subject to the constraints $2x_1 + 4x_2 \geq 3,$ $3x_1 + 2x_2 \geq 4,$ $x_1, x_2 \geq 0.$

b) Solve the following transportation problem using Vogel's approximation method.

	W_1	W_2	W_3	W_4	Supply
F_1	48	60	56	58	140
F_2	45	55	53	60	260
F_3	50	65	60	62	360
F_4	52	64	55	61	220
Demand	200	320	250	210	

19. a) Solve the following sequencing problem and give an optimal solution.

Machines	M_1	M_2	M_3
Job A	3	4	6
Job B	8	3	7
Job C	7	2	5
Job D	4	5	11
JOB E	9	1	5
JOB F	8	4	6
JOB G	7	3	12

b) A salesman wants to visit cities A, B, C, D and E. He does not want to visit any city twice before completing his tour of all cities and wishes to return to the starting point. Cost in Rs. are given in the table. Find the least cost route.

	A	B	C	D	E
A	0	2	5	7	1
B	6	0	3	8	2
C	8	7	0	4	7
D	12	4	6	0	5
E	1	3	2	8	0

20. a) The activities of a project and their time estimates are given below.

	Estimated duration in week		
	t_o	t_m	t_p
1-2	2	5	8
1-4	4	19	28
1-5	5	11	17
2-3	3	9	27
2-6	3	6	15
3-6	2	5	14
4-6	3	6	15
5-7	1	4	7
5-8	2	5	14
6-8	6	12	30
7-8	2	5	8

(i) Draw the arrow diagram.
(ii) Find the critical path.
(iii) Find the probability that the project is completed within 43 days?

b) Solve the following game by the principle of dominance.

$$\begin{pmatrix} 2 & 4 & 3 & 8 & 4 \\ 5 & 6 & 3 & 7 & 8 \\ 6 & 7 & 9 & 8 & 7 \\ 4 & 2 & 8 & 4 & 2 \end{pmatrix}$$