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 2016
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. What are the characteristics of a good model?
2. Write any five applications areas of linear programming.
3. Define basic feasible solution.
4. Define the assignment problem.
5. Define an idle time.
6. What is sequencing problem?
7. Define optimal strategy.
8. Write any three characteristics of games.
9. Define an event.
10. Define dummy activity.

SECTION – B

ANSWER ANY FIVE QUESTIONS: (5×8=40)

11. Old hens can be bought at Rs.2/- each and young ones at Rs.5 each . The old hens lay 3 eggs per week and the young one lay 5 eggs per week, each egg being worth 30 paise. A hen costs Rs. 1 per week to feed. A person has only Rs.80/- to spend for hens. How many of each kind should he buy to give a profit of more than Rs. 6/- per week, assuming that he cannot house more than 20 hens. Formulate this as a L.P.P.

12. Apply graphical method to solve the LPP

Maximize $Z = x_1 - 2x_2$

Subject to $-x_1 + x_2 \leq 1$,

$6x_1 + 4x_2 \geq 24$,

$0 \leq x_1 \leq 5$ and $2 \leq x_2 \leq 4$.

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13. Determine basic feasible solution to the following transportation problem using – North west corner Rule.

		Sink					
		A	B	C	D	E	Supply
Origin	P	2	11	10	3	7	4
	Q	1	4	7	2	1	8
	R	3	9	4	8	12	9
Demand		3	3	4	5	6	

14. Find the sequence that minimizes the total elapsed time required to complete the following tasks on machines M_1 and M_2 in the order M_1, M_2 . Also find the minimum total elapsed time.

Task	A	B	C	D	E	F	G	H	I
M_1	2	5	4	9	6	8	7	5	4
M_2	6	8	7	4	3	9	3	8	11

15. Reduce the following game by dominance and find the game value:

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

16. Explain the following :

(i) CPM (ii) PERT (iii) The difference between (i) and (ii)

17. Draw the network for the project whose activities with their predecessor relationships are given below.

A,C,D can start simultaneously;

E > B,C ; F ,G > D ; H ,I > E, F ; J > I ,G ; K > H ; B > A.

SECTION – C

ANSWER ANY TWO QUESTIONS: (2×20=40)

18. (a) Write the advantages and limitations of L.P.P

(b) Solve the following LPP by Simplex method

Minimize $Z = 8x_1 - 2x_2$

Subject to $-4x_1 + 2x_2 \leq 1$

$5x_1 - 4x_2 \leq 3$ and $x_1, x_2 \geq 0$.

19. (a) Find the initial basic feasible solution for the following transportation problem by VAM .

		Distribution centres				
		D_1	D_2	D_3	D_4	
Origin	S_1	11	13	17	14	250
	S_2	16	18	14	10	300
	S_3	21	24	13	10	400
Requirements		200	225	275	250	

(b) Solve the following sequencing problem giving an optimal solution if passing is not allowed.

		Machines			
		M_1	M_2	M_3	M_4
Jobs	A	13	8	7	14
	B	12	6	8	19
	C	9	7	8	15
	D	8	5	6	15

20. (a) Solve the following 2x4 game graphically

	Player B			
Player A	1	0	4	−1
	−1	1	−2	5

(b) The following table indicates the details of a project

Activity	:	1-2	1-3	1-4	2-4	2-5	3-5	4-5
t_o	:	2	3	4	8	6	2	2
t_m	:	4	4	5	9	8	3	5
t_p	:	5	6	6	11	12	4	7

(i) Draw the network

(ii) Find the critical path.

(iii) Determine the expected standard deviation of the completion time.