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 2015
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 advantages of a model in O.R.
2. Define a basic solution of a L.P.P.
3. What do you mean by optimal solution in a transportation problem?
4. Define an assignment problem.
5. Write any two assumptions which are made in solving a sequencing problem.
6. What is 'no passing rule' in a sequencing problem?
7. Define payoff matrix.
8. What is meant by strategy?
9. Define network.
10. Define critical path of a project network.

SECTION – B

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

11. A person wants to decide the constituents of a diet which will fulfil his daily requirements of proteins, fats and carbohydrates at the minimum cost .The choice is to be made from four different types of foods .The yields per units of these foods are given in the following table.

Food type	Yield per unit			cost per unit
	Proteins	Fats	carbohydrates	
1	3	2	6	45
2	4	2	4	40
3	8	7	7	85
4	6	5	4	65
Minimum Requirement	800	200	700	

Formulate the linear programming problem.

12. Solve the following problem graphically
Maximize $Z = 100x_1 + 40x_2$
Subject to $5x_1 + 2x_2 \leq 1000$
$3x_1 + 2x_2 \leq 900$
$x_1 + 2x_2 \leq 500$ and $x_1, x_2 \geq 0$.

13. Find the initial basic feasible solution for the following transportation problem by least cost method.

	To				
From	1	2	1	4	30
	3	3	2	1	50
	4	2	5	9	20
	20	40	30	10	

14. There are five jobs, each of which is to be processed through two machines M1 and M_2 in the order M_1, M_2 processing hours are as follows .

Jobs	1	2	3	4	5
M_1	3	8	5	7	4
M_2	4	10	6	5	8

Determine the optimum sequence for the five jobs and minimum total elapsed time. Find also the idle time of machines M_1 and M_2 .

15. For what values of λ ,the game with the following matrix is strictly determinable.

		Player B		
		B_1	B_2	B_3
Player A	A_1	λ	6	2
	A_2	-1	λ	-7
	A_3	-2	4	λ

16. Solve the following game graphically

		B		
		Y_1	Y_2	Y_3
A	x_1	6	4	3
	$x_2 = 1 - x_1$	2	4	8

17. Explain the following : (i) Activity
(ii) Dummy activity.
(iii) Difference between PERT and CPM.

SECTION – C

ANSWER ANY TWO QUESTIONS: **(2×20=40)**

18. (a) Use Big-M method to solve

Maximize $z = 2x_1 + x_2 + x_3$

Subject to $4x_1 + 6x_2 + 3x_3 \leq 8,$

$3x_1 - 6x_2 - 4x_3 \leq 1,$

$2x_1 + 3x_2 - 5x_3 \geq 4$ and $x_1, x_2, x_3 \geq 0.$

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

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

(10+10)

19. (a) A salesman wants to visit cities 1,2,3 and 4 .He does not want to visit any city twice before completing the tour of all cities and wishes to return to his home city, the starting stations. Cost of going from one city to another in rupees is given in the following table .Find the least cost route.

To city

		1	2	3	4
	1	0	30	80	50
From city	2	40	0	140	30
	3	40	50	0	20
	4	70	80	130	0

(b) Eight jobs 1,2,.......8 are to be processed on a single machine .The processing times, due dates and importance weight of the jobs are represented in the following table.

Job	Processing time t_i(minutes)	Due date d_i(minutes)	Importance w_i(weight)	$\frac{t_i}{w_i}$
1	5	15	1	5.0
2	8	10	2	4.0
3	6	15	3	2.0
4	3	25	1	3.0
5	10	20	2	5.0
6	14	40	3	4.7
7	7	45	2	3.5
8	3	50	1	3.0

Assuming that no new jobs arrive thereafter, determine using SPT rule

(i) Optimal sequence.

(ii) Completion time of the jobs.

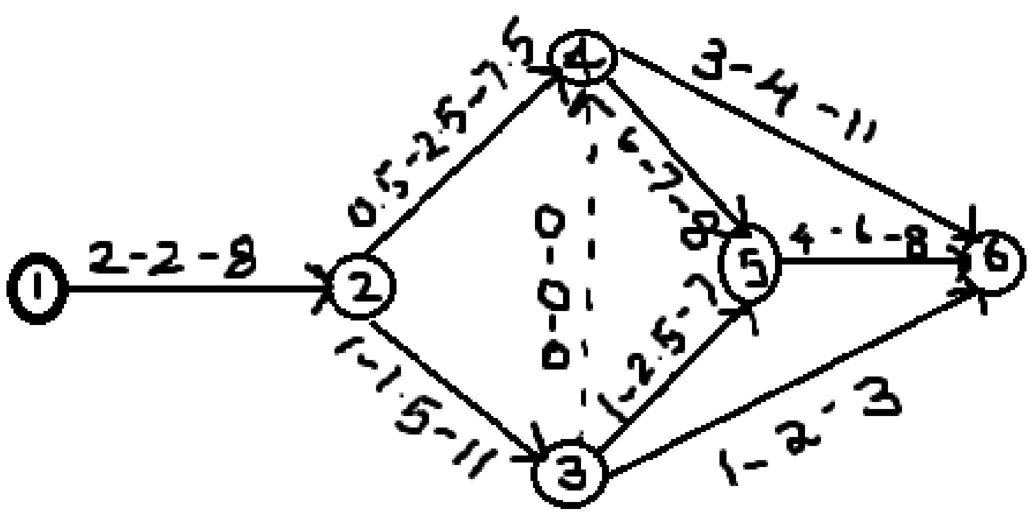
(iii) Mean flow time.

(iv) Average in process inventory. (10+10)

20. (a) Reduce the following game by dominance property and solve it.

		Player B				
		1	2	3	4	5
Player A	I	1	3	2	7	4
	II	3	4	1	5	6
	III	6	5	7	6	5
	IV	2	0	6	3	1

(b) Consider the network shown in the following figure .For each activity , their time estimates t_0,t_m and t_p are given along the arrows in the order t_0-t_m-t_p. Determine variance and expected time for each activity also determine the critical path.



(10+10)

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