



**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**

**M.C.A.DEGREE EXAMINATION – COMPUTER APPLICATIONS**

THIRD SEMESTER – APRIL 2018

**16PCA3ES01/ CA 4808 – RESOURCE MANAGEMENT TECHNIQUES**

Date: 07-05-2018  
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

**SECTION-A**

**Answer ALL the Questions**

**(10 x 2 = 20)**

1. Define feasible solution & optimum solution.
2. Write the three components of linear programming problem with its role.
3. What is the necessary and sufficient condition for a transportation problem to have a feasible solution?
4. Define assignment problem.
5. What do you mean by decision making under certainty? Give some example.
6. When is a game said to be strictly determinable?
7. Define dummy activity.
8. Define total float & independent float
9. What is queue discipline?
10. What is traffic intensity?

**SECTION-B**

**Answer ALL the Questions**

**(5 x 8 = 40)**

11. a) Use the graphical method to solve the following linear programming problem.

Maximize  $Z = x_1 - 2x_2$  subject to the constraints

$$-x_1 + x_2 \leq 1, \quad 6x_1 + 4x_2 \geq 24, \quad 0 \leq x_1 \leq 5, \quad 2 \leq x_2 \leq 4$$

$$\&x_1, x_2 \geq 0$$

Or

- b) Use simplex method to solve the following linear programming problem.

Subject to the constraints

$$2x_1 + x_2 \leq 50, \quad 2x_1 + 5x_2 \leq 100, \quad 2x_1 + 3x_2 \leq 90 \text{ and } x_1, x_2 \geq 0$$

12. a) The assignment cost of assigning any one operator to any one machine is given in the following table

		Operators			
		I	II	III	IV
Machines	A	10	5	13	15
	B	3	9	18	3
	C	10	7	3	2
	D	5	11	9	7

Find the optimum assignment by Hungarian method.

Or

b) Find the initial basic feasible solution for the following transportation problem by Vogels approximation method.

		Distribution centre				
		D1	D2	D3	D4	Availability
Origin	S1	11	13	17	14	250
	S2	16	18	14	10	300
	S3	21	24	13	10	400
Requirements		200	225	275	250	

13.a) Solve the following game using dominance property

		B		
		I	II	III
A	I	1	7	2
	II	6	2	7
	III	6	1	6

Or

b) Mr. Girish wants to invest Rs.10,000 in one of the three options A,B,C. The pay-off for his investment depends on the nature of the economy. The possible returns under each economic situation are given below.

Strategy	Nature of Economy		
	Inflation E1	Recession E2	No change E3
A	2000	1200	1500
B	3000	800	1000
C	2500	1000	1800

What course of action should he take according to

(b) Maximin criteria (ii) Maximax criteria (iii) Laplace criteria (iv) Savage criteria.

14.a) Construct the network for the project whose activities are given below & compute total float, free float & independent float of each activity & hence determine the critical path & project duration.

Activity	0-1	1-2	1-3	2-4	2-5	3-4	3-6	4-7	5-7	6-7
Duration (weeks)	3	8	12	6	3	3	8	5	3	8

Or

b) Three time estimates (in months) of all activities of a project are as given below.

Activity	Optimistic time. a	Most likely time. m	Pessimistic time . b
1-2	0.8	1.0	1.2
2-3	3.7	5.6	9.9
2-4	6.2	6.6	15.4
3-4	2.1	2.7	6.1
4-5	0.8	3.4	3.6
5-6	0.9	1.0	1.0

(i) Construct the project network

(ii) Determine the critical path, expected project length & expected variance of project length.

15.a) Cars arrive at a petrol pump having one period unit in poisson fashion with an average of 10 cars per hour. The service time is distributed exponentially with a mean of 3 minutes. Find (i) average number of cars in the system. (ii) average waiting time in the queue . (iii) average queue length (iv) probability that the number of cars in the system is 2.

Or

b) At a one –man barber shop, the customers arrive following poisson process at an average rate of 5 per hour & they are served according to exponential distribution with an average service rate of 10 minutes. Assuming that only 5 seats are available for waiting customers, find the average time a customer spends in the system.

### SECTION-C

Answer any TWO Questions  
marks)

(2 X 20=40

16.a) Use Two Phase simplex method to Maximize  $Z=5x_1 - 4x_2 + 3x_3$  subject to  $2x_1 + x_2 - 6x_3 = 20$ ,  $6x_1 + 5x_2 + 10x_3 \leq 76$ ,  $8x_1 - 3x_2 + 6x_3 \leq 50$   $x_1, x_2, x_3 \geq 0$

b) Solve the transportation problem

		Destination				Supply
		A	B	C	D	
Source	1	11	20	7	8	50
	2	21	16	20	12	40
	3	8	12	18	9	70
Demand		30	25	35	40	

17.a) A company wants to introduce a new product in place of an old one. It is to be decided whether the price is to be fixed as very high, moderate or slightly increased (H, M, S) . Three possible outcomes are expected., viz. Increase in sales, no change in sales or decrease in sales (I, N, D). The expected sales are

given in the following table (in lakhs of rupees)

Strategies'	Event		
	I	N	D
<b>H</b>	70	30	15
<b>M</b>	50	45	0
<b>S</b>	30	30	30

Which alternatively should be chosen according to (i) Maximin criteria (ii) Hurwicz criteria (iii) Laplace criteria.

b) A project consists of following activities & time estimates.

Activity	Optimistic time, $t_0$	Pessimistic time, $t_p$	Most likely time, $t_m$
1-2	3	15	6
2-3	2	14	5
1-4	6	30	12
2-5	2	8	5
2-6	5	17	11
3-6	3	15	6
4-7	3	27	9
5-7	1	7	4
6-7	2	8	5

(b) Find the expected duration & standard deviation of each activity.

(ii) Construct the project network

(iii) Determine the critical path, expected project length & expected variance of project length.

(iv) What is the probability that will be completed 2 months later than expected.

18.a) A super market has 2 girls serving at the counters. The customers arrive in a poisson fashion at the rate of 12 per hour. The service time for each customer is exponential with mean 6 minutes. Find

(i) Find the probability that an arriving customer has to wait for service.

(ii) Find the average number of customers in the system.

(iii) Find average time spent by a customer in the super market.

b) Solve the following travelling salesman problem

		To			
		A	B	C	D
From	A	-	46	16	40
	B	41	-	50	40
	C	82	32	-	60
	D	40	40	36	-

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