LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FOURTHSEMESTER – APRIL 2017

CA 4808- RESOURCE MANAGEMENT TECHNIQUES

Date: 20-04-2017 Dept. No. Max. : 100 Marks
Time: 09:00-12:00

CA 4808 RESOURCE MANAGEMENT TECHNIQUES SET 1

PART A

Answer ALL Questions (10 X 2 = 20 Marks)

1. What are slack and surplus variables?
2. In simplex method, what is the condition that a l.p.p has unbounded solution?
3. Give the steps of Row Minima method for initial allocation in Transportation Problem.
4. State True or False the following:
   i. In Transportation Problem, initial allocation is unique.
   ii. In Assignment Problem, no. of rows and no. of columns need not be equal.
5. What do you mean by decision-making under conditions of risk?
6. What is two-person zero-sum game?
7. Define the following: i. Event ii. Activity.
8. Distinguish between PERT and CPM.
9. What is queue discipline?
10. In a bank, customers arrive every 15 minutes and they are served every 3 minutes. What is clerk's idle time and busy time?

PART B

Answer ALL Questions (5 X 8 = 40 Marks)

11a. Solve graphically the following i.p.p.

. Maximize $Z = -5x_1 + 3x_2$

Subject to $2x_1 + 4x_2 \le 16$

$3x_1 + x_2 \ge 3$

$-7x_1 + 5x_2 \le 35$

$x_1, x_2 \ge 0$

(or)

11b Solve graphically the following l.p.p

Minimize $z = 4x_1 - 3x_2$

Subject to $5x_1 + 3x_2 \le 30$

$3x_1 - x_2 \le 6$

$x_1, x_2 \ge 0$

12a. A company has plants at P1, P2, and P3 which supply to warehouses at W1, W2, W3 and W4.Weekly factory production capacities of plants, the warehouse capacities to store the products and the cost of transportation are given in the following table: Find the initial allocation by VAM

Warehouse→ Plant↓	W1	W2	W3	W4	Supply
P1	25	17	25	14	600
P2	15	10	18	24	400
P3	16	20	8	13	600
Requirement	300	300	500	500	

(or)

12b. A lead draftsman has five drafting tasks and five draftsmen. Each draftsman needs the following number of hours for each task. If each draftsman costs the company Rs.16 per hour, find the assignment of draftsman to task that will result in minimum total cost.

Task→ Draftsman↓	A	B	C	D	E
1	60	50	100	85	95
2	65	45	100	75	90
3	70	60	110	97	85
4	70	55	105	90	93
5	60	40	120	85	97

13a. Define the terms: (a) Laplace criterion (b) Hurwicz criterion

A retailer purchases newspaper everyday and sells on the same day. Any unsold item will be a loss for him. The daily demand for newspaper is in the range of 15, 16, 17, and 18 with respective probabilities 0.1, 0.2, 0.4, and 0.3 . How many papers should the retailer order to maximize the profit? The payoff matrix is given below:

Action→ Event↓	Probability	15	16	17	18
15	0.1	225	200	175	150
16	0.2	225	240	215	190
17	0.4	225	240	255	230
18	0.3	225	240	255	270

(or)

13b. Solve the game whose payoff matrix is given below:

Player B→ Player↓	B1	B2	B3	B4
A1	2	-2	4	1
A2	6	1	12	3
A3	-3	2	0	6
A4	2	-3	7	1

14a. Given the following information:

Activity	A	B	C	D	E	F	G	H	I	J
Predecessor	-	-	-	A	B	C	D	C	H	G,E,F
Duration(Days)	3	2	4	6	5	8	10	6	18	15

i. Draw network diagram and determine the critical path.

ii. For each activity, find earliest start and finish, latest start and finish, total float, free float and independent float

(or).

14b. A project consists of 7 activities. The time estimate are in days.

Activity	A	B	C	D	E	F	G
Predecessor	---	A	A	C	B	D,E	F
T_O	1	2	3	4	3	2	5
T_M	4	5	3	10	6	5	11
T_P	7	14	3	22	15	14	14

i. Draw the PERT network diagram and find the critical path.
ii. Find the expected length of the critical path and its variance.

15a. A television repairman finds that the time spent on his jobs has an exponential distribution with a mean of 30 minutes. If he repairs sets in the first cum first order and if the arrival of sets follows a Poisson distribution with an average rate of 10 per 8-hour day. What is the repairman's expected idle time each day? How many jobs are waiting in the shop? Also find average waiting time of each job in the queue and in the shop.

(or)

15b Cars arrive at a petrol pump with exponential inter-arrival times having mean ½ minute. The attendant takes an average of 1/5 minute per car to supply petrol, the service time being exponentially distributed. Determine
i. the average number of cars waiting to be served.
ii. the average number of cars in the queue and
iii. the proportion of time for which the pump attendant is idle.

PART C

Answer any TWO Questions (2 X 20 = 40 Marks)

16a. Solve the following linear programming problem

Minimize $Z = 3x_1 - 2x_2 - x_3$

Subject to $-x_1 + 2x_2 + 3x_3 \leq 7$

$4x_1 - 2x_3 \leq 12$

$3x_1 + 8x_2 + 4x_3 \leq 10$

$x_1, x_2, x_3 \geq 0$ (12 marks)

16b. Give the steps of MODI method for final allocation in Transportation Problem. (8 marks)

17a. For a transportation problem, unit transportation cost, demand and supply are as given below:which is given below (12 marks)

Source→ Destination↓	D_1	D_2	D_3	D_4	Supply
S_1	6	1	9	3	70
S_2	11	5	2	8	55
S_3	10	12	4	7	70
Demand	85	35	50	45	

i. Find initial allocation by least cost method and VAM ii. Obtain the min. transportation cost

17b. Describe Hungarian method of solving an Assignment Problem. (8 marks)

18a. What are the characteristics of queuing system? (8 marks)

18b. A bank has two Tellers. First Teller handles withdrawals only and the second Teller handles deposits only. It has been found that the service time distribution for the deposits and withdrawals are both exponential distribution with mean 3 minutes per customer. Depositors are found to arrive with a mean arrival rate of 16 per hour and withdrawers arrive at the rate of 14 per hour. What would be the effect on the average waiting time for depositors and withdrawers if each Teller can handle both deposits and withdrawals? (12 marks)