LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.C.A. DEGREE EXAMINATION – COMPUTER APPLICATIONS

FOURTH SEMESTER – APRIL 2016

CA 4808 - RESOURCE MANAGEMENT TECHNIQUES

Date: 18-04-2016   Dept. No.   Max. : 100 Marks
Time: 09:00-12:00

PART A

Answer ALL Questions   10 X 2 = 20

1. In simplex method, what is the condition that a l.p.p has infeasible solution?
2. Define the following: i. Feasible solution   ii. Optimal solution.
3. Give mathematical formulation of Transportation Problem
4. State True or False

   i. In Transportation Problem, VAM is more efficient than North – West Corner rule.
   ii. For a balanced transportation Problem, no. of rows need not be equal to no. of columns.
5. What do you mean by decision making under conditions of uncertainty?
6. In game theory, what is saddle point?
7. What is dummy activity?
8. Define the terms: i. Total Float ii. Independent Float.
9. What is queue discipline?
10. What is traffic intensity?

PART B

Answer ALL Questions   5 X 8 = 40

11a. Solve graphically the following l.p.p
    Maximize $Z = 4x_1 - 3x_2$
    Subject to $5x_1 + 3x_2 \leq 15$
              $x_1 + 3x_2 \leq 6$
              $x_1 - x_2 \leq 2$
              $x_1, x_2 \geq 0$

(or)

11b. Solve graphically the following l.p.p
    Maximize $Z = 3x_1 - x_2$
    Subject to $2x_1 + x_2 \geq 2$
              $x_1 + 3x_2 \leq 3$
              $x_2 \leq 4$
              $x_1, x_2 \geq 0$

12a. A department has 4 employees with 4 jobs to be performed. The cost (in rupees) each employee will charge per hour to perform each job is given in the following matrix. How should the jobs be allocated to the employees so as to minimize the total cost.

Employee→ Job↓	A	B	C	D
1	30	60	30	70
2	50	40	65	70
3	50	70	80	75
4	40	80	55	70

(or)

12b. Describe MODI method in Transportation Problem.

13a. i. Define the terms: (a) Laplace criterion   (b)   Hurwicz criterion
     ii. The manager of a Flower Shop purchases flowers on the previous day and delivers the
         customers the next day. The daily demand for roses is in the range of 70, 80, 90, and 100 with
         respective probabilities 0.1, 0.2, 0.4, and 0.3 . How many dozens of roses should the manager order
         to maximize the profit? The payoff matrix is given below:

Action→ Event↓	Probability	70	80	90	100
70	0.1	140	130	120	110
80	0.2	140	160	130	130
90	0.5	140	160	180	170
100	0.2	140	160	180	200

(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	0-1	1-2	1-3	2-4	2-5	3-4	4-5
Duration (days)	2	12	15	7	4	3	10

i.   Draw the network diagram
ii.   Identify critical path and find the total project duration.
iii.   Determine total, free, and independent floats.

(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	6	3	2	4
T_M	4	5	3	9	6	8	4
T_P	7	14	3	21	15	17	4

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

15a. At a one-man barber shop, customers arrive according to Poisson distribution with a mean of
      5 per hour and service is exponential with mean of 10 minutes. If it is assumed that customers are
      willing to wait, then find the following:
   i.   Average number of customers in the shop and average no. of customers waiting
   ii. The % of time a customer can walk in without having to wait
   iii. Average waiting of a customer 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
      ii. The proportion of time for which the pump attendant is idle.

PART C

16a. Solve the following linear programming problem

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

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

$\quad\quad\quad\quad 4x_1 - 2x_3 \leq 12$

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

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

16b. Obtain initial allocation using VAM for the following: **(8 marks)**

Destination→ Source↓	D1	D2	D3	Supply
S1	50	30	220	1
S2	90	45	170	3
S3	250	200	50	4
Requirement	4	2	2	

17a. A company has 4 salesmen A, B, C and D. These salesmen are to be allotted 4 districts 1, 2, 3, and 4. The estimated profit per day for each salesman in each district is given in the following table.

Districts→ Salesmen↓	1	2	3	4
A	16	10	14	11
B	14	11	15	15
C	15	15	13	12
D	13	12	14	15

What is the optimal assignment which will yield maximum profit?   **(12 marks)**

17b. Write the procedure for Hungarian method of solving Assignment Problem.   **(8 marks)**

18a. The marketing department of a food products company worked out the payoffs in terms of yearly net profits for each of the strategies of three events (expected sales). This is represented in the following table:

Nature of states→ Strategies↓	N1	N2	N3
S1	70000	30000	15000
S2	50000	45000	0
S3	30000	30000	30000

Select the strategy on the basis of the following:

     i. Maxmin criteria ii. Laplace criteria iii. Hurwicz criteria iv. Savage criteria.   **(8 marks)**

18b. A supermarket has two sales girls serving at the customers. The customers arrive in a Poisson fashion at the rate of 12 per hour. The service time for each customer is exponential distribution with mean 6 minutes. Find

   i.   The probability that an arriving customer has to wait for service.

   ii.   The average number of customer in the system

   iii.   The average time spent by a customer in the supermarket   **(12 marks)**

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