LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

THIRD SEMESTER – **NOVEMBER 2019**

16/17/18PCA3ES01 – RESOURCE MANAGEMENT TECHNIQUES

Date: 09-11-2019   Dept. No.   Max. : 100 Marks
Time: 09:00-12:00

Part – A

ANSWER **ALL** QUESTIONS   **10 x 2 = 20**

1. State the Morse and Kimbil definition for OR.
2. List any two advantages of Revised Simplex Method.
3. What is use of learning about transportation problem?
4. Define 'closed loop'.
5. Define 'State of nature'.
6. What is mixed strategy?
7. Write a short note on PERT.
8. What is 'Looping and Dangling'?
9. List the essential features of a Queuing System.
10. Define 'Service Mechanism'.

Part – B

ANSWER ANY **FIVE** QUESTIONS   **5 x 8 = 40**

11. a) Explain the steps involved in Simplex Method.

                    OR

   b) Solve the following linear programming problem using Revised Simplex Method.

   Maximize $Z = X_1 + 2X_2$

   Subject to

   $X_1 + X_2 \leq 3$

   $X_1 + 2X_2 \leq 5$

   $3X_1 + X_2 \leq 6$

   $X_1, x_2 \geq 0$

12. a) Elaborate the mathematical formulation of transportation problem.

                    OR

   b) Explain the differences between Transportation problem and Assignment problem.

13) a) A firm manufactures three types of products. The fixed and variable costs are given below:

		Fixed Cost (Rs)	Variable Cost per Unit (Rs)
Product	A:	25000	12
Product	B:	35000	9
Product	C:	53000	7

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The likely demand (units) of the product is given below:

        Poor demand   : 3000
        Moderate demand   : 7000
        High demand   : 11000

If the sale price of each type of product is Rs.25, then prepare the payoff matrix and provide interpretations thereof.

<div align="center">OR</div>

b) Elaborate the types of failure.

14 a) Explain the differences between PERT and CPM.

<div align="center">OR</div>

b) Listed in the table are the activities and sequencing necessary for a maintenance job on the heat exchangers in a refinery.

Activity	Description	Predecessor Activity
A	Dismantle the pipe connections	-
B	Dismantle heater, closure, and floating point	A
C	Remove tube bundle	B
D	Clean bolts	B
E	Clean heater and floating heat front	B
F	Clean tube bundle	C
G	Clean shell	C
H	Replace tube bundle	F, G
I	Prepare shell pressure test	D,E, H
J	Prepare tube pressure test and reassemble	I

Draw a network diagram for the project.

15 a) Explain the two conflicting costs dealt with queuing theory.

<div align="center">OR</div>

b) Describe the main characteristics and notations used in queuing models.

<div align="center">

Part – C

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ANSWER ANY **TWO** QUESTIONS   **2 x 20 = 40**

16. a) Enumerate the applications of Resource Management Techniques.
    b) Find the total cost for the following transportation problem through LCM.

Source	Destination				Supply (in Units)
	D_1	D_2	D_3	D_4	
S_1	1	2	1	4	30
S_2	3	3	2	1	50
S_3	4	2	5	9	20
Demand (in Units)	20	40	30	10	100

17. a) A food product company is contemplating the introduction of a revolutionary new product with new packaging or replace the existing product at much higher price (S1) or a moderate change in the composition of the existing product with a new packaging at a small increase in the price (S2) or a small change in the composition of the existing product except the word 'New' with a negligible increase in price (S3). The three possible states of nature or events are: (i) high increase in sales (N1), (ii) no change in sales (N2), (iii)

decrease in sales (N3). The marketing department of the company worked out the payoffs in terms of yearly

net profits for each of the strategies of three events (expected sales). This is presented in the following table:

Strategies	States of Nature		
	N1	N2	N3
S1	700,000	300,000	150,000
S2	500,000	450,000	0
S3	300,000	300,000	300,000

Which strategy should the concerned executive choose on the basis of the following?
- (i)   Maximin Criterion
- (ii)   Maximax Criterion
- (iii)   MInimax Regret Criterion

b) Draw a network diagram for the following activities. Calculate earliest and latest starting, finishing times of each activity, total and free floats for non-critical activities.

Activity Sequence	Activity	Description	Direction (Day)
1-2	A	Study of plant layout	2
2-3	B	Clearance of site	4
3-4	C	Earth work	10
2-4	D	Procurement of sand, cement and concrete	4
4-5	E	Laying of foundations	10
2-5	F	Procurement of bricks	5
5-8	G	Construction of building	36
5-6	H	Laying of conduit pipe lines for electric wires	12
6-8	I	Laying of electric wires	4
5-7	J	Laying of drainage and sewage system	12
7-8	K	Laying of water pipe lines and taps	8
8-9	L	Connecting building to water and electricity	6
9-10	M	Finishing work in building	12

18. a) Universal Bank is considering opening a drive in window for customer service. Management estimates that customers will arrive at the rate of 15 per hour. The teller whom it is considering to staff the window can service customers at the rate of one every three minutes.

Assuming Poisson arrivals and exponential service find

- i.   Average number in the waiting line.
- ii.   Average number in the system.
- iii.   Average waiting time in line.
- iv.   Average waiting time in the system.

b) Using Artificial Variable Technique

Minimize $Z = 40 X_1 + 24 X_2$
Subject to : $20X_1 + 50X_2 >= 4800$
$80X_1 + 50X_2 >= 7200$
$X_1, X_2 >= 0$

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