

# LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



U.G. DEGREE EXAMINATION – ALLIED

THIRD SEMESTER – APRIL 2022

16 / 17 / 18UMT3AL01 – BUSINESS MATHEMATICAL TECHNIQUE

Date: 28-06-2022

Dept. No.

Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

## Part A

Answer *ALL* the questions

( 10 x 2 = 20 )

1. If  $u = \cos x + e^y$ , then find  $\frac{\partial u}{\partial x}$  and  $\frac{\partial u}{\partial y}$ .
2. If  $y = a \sin x + b \cos x$  find  $\frac{d^2 y}{dx^2}$
3. State any two properties of definite integrals.
4. Evaluate:  $\int (4x^2 + 5) dx$
5. Define an optimal solution.
6. Define feasible solution.
7. What are the methods of finding initial basic feasible solution of transportation problem?
8. Define assignment problem.
9. Define critical path.
10. What is an activity?

## Part B

Answer any *FIVE* questions

( 5 X 8 = 40 )

11. If  $y = \sin(m \sin^{-1} x)$ , then show that  $(1 - x^2)y_2 - xy_1 + m^2 y = 0$ .
12. Integrate:  $\int \frac{dx}{3x^2 + 2x + 5}$ .
13. Find the maxima and minima for the following function  $2x^3 + 3x^2 - 36x + 10$ .
14. Find consumer and producer surplus for  $y = 16 - x^2$  and  $y = 4 + 2x^2$ .
15. Consider the problem of assigning five jobs five persons. The assignment costs are given as follows

	Persons	I	II	III	IV	V
A		8	4	2	6	1
Jobs	B	0	9	5	5	4
C		3	3	9	2	6
D		4	3	1	0	3
E		9	5	8	9	5

Determine the optimum assignment schedule.

16. Solve the following LPP by graphical method.

$$\text{Maximize } z = 5x_1 + 8x_2$$

$$\text{Subject to the constraints: } 15x_1 + 10x_2 \leq 180,$$

$$10x_1 + 20x_2 \leq 200,$$

$$15x_1 + 20x_2 \leq 210$$

$$\text{and } x_1, x_2 \geq 0.$$

17. Find the initial basic feasible solution to the following transportation problem by  
(i) North west – corner rule (ii) Least cost method.

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1	2	6	7
0	4	2	12
3	1	5	11
1010	10	10	

18. Draw the network for the following:

Activity	A	B	C	D	E	F	G	H	I	J	K
Immediate Predecessor	-	-	-	A	B	B	C	D	D	H,I	F,G

**Part C**

Answer any **TWO** question

( 2 x 20 = 40 )

19. a) The total cost function of a firm is given by  $C = 0.04q^3 - 0.9q^2 + 10q + 10$ . Find  
 (i) Average cost, (ii) Marginal cost, (iii) Slope of Average cost and (iv) Slope of Marginal cost.  
 b) Find  $\frac{dy}{dx}$ , if  $y = x^x$ . ( 10 + 10 )
20. Obtain the optimum transportation cost using MODI method with the initial basic feasible solution obtained using least cost method.

		<b>To</b>				
		A	B	C	D	<b>Supply</b>
<b>From</b>	I	21	16	25	13	11
	II	17	18	14	23	13
	III	32	27	18	41	19
<b>Demand</b>		6	10	12	15	

21. Solve the following LPP by simplex method.

Minimize  $z = 8x_1 - 2x_2$

Subject to the constraints,  $-4x_1 + 2x_2 \leq 1$ ,

$5x_1 - 4x_2 \leq 3$

and  $x_1, x_2 \geq 0$ .

22. Find the critical path and the project duration for the following network:

Activity	Least time (days)
1 - 2	8
1 - 3	4
2 - 4	10
2 - 5	2
3 - 4	5
4 - 5	3

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