LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Com. DEGREE EXAMINATION – COMMERCE

THIRD SEMESTER – NOVEMBER 2018

16/17UMT3AL01 – BUSINESS MATHEMATICAL TECHNIQUE

Date: 29-10-2018   Dept. No.   Max. : 100 Marks
Time: 01:00-04:00

SECTION A

Answer **ALL** the questions: **(10x2 = 20)**

1. Find $\frac{\partial u}{\partial x}$ and $\frac{\partial u}{\partial y}$ from $u = 3x^2 + 2xy + 4y^2$.

2. The total cost function of a firm is given by $C = 0.04q^3 - 0.9q^2 + 10q + 10$. Find the Average cost.

3. Integrate x^n with respect to x.

4. State any two properties of definite integral.
5. What is duality?
6. Define Objective function.
7. What are the methods of finding the initial basic feasible solution in the transportation problem?
8. When an assignment problem is said to be unbalanced?
9. What is a project?
10. Define Critical Path.

SECTION B

Answer any **FIVE** questions: **(5x8 = 40)**

11. Let the cost function of a firm be $C = 300x - 10x^2 + \frac{1}{3}x^3$. Calculate

    (i)   Output at which, MC is minimum

    (ii)   Outout at which, AC is minimum

    (iii)   Output at which $AC = MC$

12. If $y = \left(x + \sqrt{1 + x^2}\right)^m$ then show that $(1 + x^2)y_2 + xy_1 = m^2 y$.

13. Integrate $\frac{x}{(x-1)(2x+1)}$ with respect to x.

14. Find consumer and producer surplus for $y = 16 - x^2$ and $y = 2x^2 + 4$. Also find the market price (p_0).

15. Solve the Linear programming problem graphically:
    Maximize $Z = 3x_1 + 4x_2$

    Subject to the constraints $x_1 + x_2 \leq 450$, $2x_1 + x_2 \leq 600$ and $x_1, x_2 \geq 0$

16. Find the starting solution of the following transportation model by using (i) North West Corner Rule and (ii) Least Cost method:

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

17. Consider the problem of assigning five jobs to five persons. the assignment costs are given as follows:

		Job				
		1	**2**	**3**	**4**	**5**
Person	**A**	8	4	2	6	1
	B	0	9	5	5	4
	C	3	8	9	2	6
	D	4	3	1	0	3
	E	9	5	8	9	5

Determine the optimum assignment schedule.

18. Draw the network for the following:

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

SECTION C

Answer any **TWO** questions: **(2x20 = 40)**

19. (a) Find $\frac{dy}{dx}$. If $y = x^x$.

(b) Find the maximum and minimum values of the function $x^4 + 2x^3 - 3x^2 - 4x + 4$.

(8+12)

20. (a) Solve the following Linear Programming problem using simplex method:

Maximize $Z = 21x_1 + 15x_2$

Subject to the constraints $-x_1 - 2x_2 \geq 6, \ 4x_1 + 3x_2 \leq 12, \ x_1, x_2 \geq 0$.

(b) Prove that $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx = \frac{\pi}{4}$

(13+7)

21. Solve the transportation problem:

	1	**2**	**3**	**4**	**Supply**
I	21	16	25	13	11
II	17	18	14	23	13
III	32	27	18	41	19
Demand	6	10	12	15	

(20)

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

Activity	$1-2$	$1-3$	$2-4$	$2-5$	$3-4$	$4-5$
Time(Days)	8	4	10	2	5	3

(20)

****