LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Com. DEGREE EXAMINATION – **COMMERCE**

THIRDSEMESTER – NOVEMBER 2017

16UMT3AL01- BUSINESS MATHEMATICAL TECHNIQUE

Date: 09-11-2017 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

Part- A

(Answer ALL the questions) **10 X 2 = 20**

1. If $y=(3x^2+1)(x^2+2x)$ find $\frac{dy}{dx}$.
2. The total cost function of a firm is given by $C=0.04q^3-0.9q^2+10q+10$. Find the average cost (AC) and marginal cost (MC)
3. Find $\frac{\partial u}{\partial x}$ and $\frac{\partial u}{\partial y}$ from $u=3x^2+2xy+4y^2$
4. Explain the general linear programming problem.
5. Define artificial variable technique.
6. Write the difference between the transportation problem and the assignment problem.
7. Write the integral formula for x^n w. r. t. x.
8. State any two properties of definite integral.
9. Define a project.
10. Write the types of float in networking.

Part B

Answer ANY FIVE questions) **5 X 8 = 40**

11. If $y = sin(msin^{-1}x)$, then show that $(1-x^2)y_2 - xy_1 + m^2y = 0$.
12. Find the maximum and minimum values of the function $\frac{2}{3}x^3+\frac{1}{2}x^2-6x+8$.
13. Evaluate $\int \log x \, dx$.
14. Evaluate $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x}+\sqrt{\cos x}} dx$.
15. Find an initial basic feasible solution for the following transportation problem by using North West corner rule method.

O/D	D_1	D_2	D_3	D_4	Available
O_1	1	2	1	4	30
O_2	3	3	2	1	50
O_3	4	2	5	9	20
Required	20	40	30	10	100

16. Find the optimal assignment by Hungarian method for the following problem

$Machine/Operator$	I	II	III	IV
A	10	5	13	15
B	3	9	18	3
C	10	7	3	2
D	5	11	9	7

17. Construct the network for the given project whose activities and precedence relationships are as given below:

$$A < C, D;\ B < E;\ C, E < F, G;\ D < H;\ G < I;\ H, I < J$$

18. Construct the network for the project whose activities are given below and hence determine the critical path and the total duration.

Activity	0 – 1	1 – 2	1 – 3	2 – 4	2 – 5	3 – 4	3 – 6	4 – 7	5 – 7	6 – 7
Duration (weeks)	3	8	12	6	3	3	8	5	3	8

Part C

(Answer ANY TWO questions) **2 X 20 = 40**

19. Solve the following Linear programming problem using simplex method.
Maximize $Z = 4x_1 + 10x_2$
Subject to $2x_1 + x_2 \leq 50;\ 2x_1 + 5x_2 \leq 100\ ;\ 2x_1 + 3x_2 \leq 90,\ x_1, x_2 \geq 0.$

20. (a) Evaluate $\int \frac{(3x+7)}{2x^2+3x-2} dx$.
(b) The demand law for a commodity is $p = 20 - D - D^2$. Find the consumer surplus when the demand is 3. (12+8)

21. (a)A marketing manager has 5 salesman and 5 sales districts, considering the capability of salesman and nature of district the marketing manager estimates that sales. The marketing manager estimates the sales/ month (in 100's) for each salesman in each district would be as follows

	A	B	C	D	E
1	32	38	40	28	40
2	40	24	28	21	36
3	41	27	33	30	37
4	22	38	41	36	36
5	29	33	40	35	39

Find the assignment of salesman to district that will result in minimize sales.
(b) Obtain an optimum basic feasible solution to the following transportation problem by using MODI method.

	Destination			Available
Source	7	3	2	2
	2	1	3	3
	3	4	6	5
Demand	4	1	5	10

22. Construct the network for the project whose activities and the three time estimates of these activities (in weeks) are given below:

Activity	1-2	2-3	2-4	3-5	4-5	4-6	5-7	6-7	7-8	7-9	8-10	9-10
t_0	3	1	2	3	1	3	4	6	2	1	4	3
t_m	4	2	3	4	3	5	5	7	4	2	6	5
t_p	5	3	4	5	5	7	6	8	6	3	8	7

Compute
(a) Expected duration of each activity
(b) Expected variance of each activity
(c) Expected variance of the project length.

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