LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

THIRDSEMESTER – APRIL 2018

16UMT3AL01- BUSINESS MATHEMATICAL TECHNIQUE

Date: 03-05-2018 Dept. No. Max. : 100 Marks

Time: 01:00-04:00

PART – A

Answer ALL questions **(10 x 2 = 20)**

1. Find the derivative of $log\ (\sqrt{3x+4})$.
2. Find $\frac{\partial u}{\partial x}$ and $\frac{\partial u}{\partial y}$ when $u(x, y) = 4x^2 + 9xy - 5y^2$.
3. Evaluate $\int (3 - 2x - x^4)\ dx$.
4. Define Producer surplus.
5. Define optimal feasible solution of linear programming problem.
6. Write the dual of the fellowing LPP

   Maximize $Z = x_1 - x_2 + 3x_3$

   Subject to constraints $x_1 + x_2 + x_3 \leq 10$

   $2x_1 - x_2 - x_3 \leq 2$

   $2x_1 - 2x_2 - 3x_3 \leq 6\ ,\ x_1, x_2, x_3 \geq 0$
7. What is the transportation problem?
8. Define Non- degenerate basic feasible solution.
9. Define project in network analysis.
10. Define critical path in network.

PART – B

Answer any FIVE questions **(5 x 8 = 40)**

11. If $y = (x + \sqrt{1+x^2})^m$, show that $(1 + x^2)y_2 + xy_1 = m^2$y.
12. Find the maximum and minima of the function $2x^3 + 3x^2 - 36x + 10$.
13. Evaluate $\int \frac{(2x+3)dx}{x^2+x+1}$.
14. Solve the following L.P.P by the graphical method

    Max $Z = 3x_1 + 4x_2$

    Subject to constraints $x_1 + x_2 \leq 450$

    $x_1 + x_2 \leq 600$

    and $x_1, x_2 \geq 0$
15. Determine Consumer surplus and producer surplus under pure competition for the demand function $p = 36 - x^2$ and supply function $p = 6 - \frac{x^2}{4}$, where p is the price and x is quantity.
16. Consider the problem of assigning four job to four persons. The assignment cost are

given as follows:

$$\text{Job} \begin{pmatrix} 5 & 7 & 11 & 6 \\ 8 & 5 & 9 & 6 \\ 4 & 7 & 10 & 7 \\ 10 & 4 & 8 & 3 \end{pmatrix} \quad \text{person}$$

Find the optimal assignment by Hungarian method.

17. Draw the network for the project whose activity and relationship are given below:

Activity	A	B	C	D	E	F	G	H	I
Predecessor	–	A	A	–	D	B,C,E	F	E	G,H

18. Find initial transportation cost of the following matrix using north west corner method and least cost method

				Available
1	2	1	15	30
3	3	2	1	50
15	2	5	9	20
Demand	20	40	30	10

PART – C

Answer any TWO question **(2 x 20 = 40)**

19. a)Find the maximum and minima of the function $u(x,y) = 2(x^2 - y^2) - x^4 + y^4$.

b) Evaluate $\int_0^{\frac{\pi}{2}} \frac{(sinx)^{\frac{3}{2}}}{(sinx)^{\frac{3}{2}}+(cosx)^{\frac{3}{2}}} dx$. (14 + 6)

20. Using simplex method to solve the liner programming problem

Maximize $Z = 4x_1 + 10x_2$

Subject to constraints $2x_1 + x_2 \leq 50$

$2x_1 + 5x_3 \leq 100$

$2x_1 + 3x_2 \leq 90$ and $x_1, x_2 \geq 0$

21. Construct network for the project whose activities and the three time estimate of there activities (in weeks) are given below. Compute

a) Expected duration of each activity

b) Expected variance of each activity and also fine the critical path of the project and the expected project duration.

Activity	1- 2	2-3	2-4	3-5	4-5	4-6	5-6	6-7	7-8	7-9	8-10	9-10
t_o	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

22. Find the optimal transportation cost of the following matrix using vogals method for the critical solution.

Origin/Distribution	D_1	D_2	D_3	D_4	Availability
S_1	11	13	17	14	250
S_2	16	18	14	10	300
S_3	21	24	13	10	400
Requirement	200	225	275	250	950

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