JC-003-001618 Seat No. _____

Third Year B. Sc. (Sem. VI) (CBCS) Examination

August - 2019

Mathematics : Maths - 603 (A)

(Optimization & Numerical Analysis - 2) (Theory)

Faculty Code : 003

Subject Code : 001618

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) All the questions are compulsory.

(2) Numbers written to the right indicate full marks of the question.

1 Answer the following short questions : **20**

(1) Define: Feasible points.

(2) Define: Unbounded Solution of LPP.

(3) Define: Slack Variable.

(4) In the problem of maximization if all the constraints are of $\geq$ then the feasible region is _____.

(5) Write the full form of NWCM.

(6) Write the full form of LCM.

(7) In Transportation Problem having m rows and n columns, the number of allocations should be _____.

(8) Define: Convex Set.

(9) Define: Strictly Concave Function.

(10) Define: Optimum Solution.

(11) For which value of p Sterling's method is a good estimate ?

(12) For $f(x)=x^3$ find $f(a,b,c)$.

(13) What is the main drawback of Lagrange's Method of interpolation?

(14) The nth difference of a polynomial of degree n is _____.

(15) Name any three central interpolation formulae.

(16) _____ formula is the average of Gauss forward and Gauss backward formula.

(17) What is the value of n to derive Simpson's 1/3 rule.

(18) To apply Milne's method at least how many values are Priorly required ?

(19) The auxiliary equation k_1 obtained by Runge-Kutta for the differential equation $\frac{dy}{dx}=x^2+y^2, y(0)=1$ when $h=0.1$ is _____.

(20) In general quadrature formula integral

$$\int_{x_0}^{x_1} y\,dx = \_\_\_\_\_.$$

2 (a) Answer the following questions : (any **three**) **6**

(1) Write the Mathematical Form of LPP.

(2) Explain in Brief : Artificial Variable.

(3) Explain the meaning of Optimization.

(4) Explain the rules of constructing the Dual form of given primal LPP.

(5) Explain Graphical method for solving LPP.

(6) Explain the steps of NWCM.

(b) Answer the following questions : (any **three**) **9**

(1) Solve the LPP by Graphical Method.

Maximize : $Z=6x_1+11x_2$

Subject to :

$2x_1+x_2\le 104$

$x_1+2x_2\le 76$

and $x_1\ge 0, x_2\ge 0$

(2) Write the dual of M in $Z = x_1 + x_2 + x_3$

Subject to

$7x_1 - 8x_2 + 4x_3 = 8,$

$x_1 - 2x_2 \leq 2,$

$4x_2 - x_3 \geq 4$

$x_1, x_2 \geq 0, x_3$ *is unrestricted in sign*

(3) Obtain Initial Solution by LCM.

		TO				
		D_1	D_2	D_3	D_4	Supply
From	P_1	2	3	11	7	6
	P_2	1	0	6	1	1
	P_3	5	8	15	9	10
Demand		7	5	3	2	

(4) Explain MODI method to find the optimum solution of Transportation Problem.

(5) Explain Simplex method.

(6) Explain Hungarian Method to solve Assignment Problem.

(c) Answer the following questions : (any **two**) **10**

(1) Explain Big M method to solve The LPP.

(2) Explain Vogel's Approximation method to obtain initial solution of Transportation Problem.

(3) Solve the following Assignment Problem

		Men			
		1	2	3	4
Jobs	I	12	30	21	15
	II	18	33	9	31
	III	44	25	24	21
	IV	23	30	28	14

(4) Solve By Big M method.

Minimize : $Z = x_1 + x_2$

Subject to the Constraints :

$2x_1 + x_2 \geq 4,$

$x_1 + 7x_2 \geq 7$

and $x_1, x_2 \geq 0$

(5) Explain Two Phase Method to solve the LPP.

3 (a) Answer the following questions : (any **three**) **6**

(1) State any two properties of divided difference.

(2) Write the Mine's Predictor formula.

(3) Write the algorithm of RK method of second order.

(4) Define Lagrange's inverse interpolation and write its formula.

(5) Write Gauss's Forward interpolation formula.

(6) Define Numerical Integration.

(b) Answer the following questions : (any **three**) **9**

(1) If $f(x) = x^3 - 2x$, then compute $f(2, 4, 9, 10)$.

(2) Find $f(x)$ by Lagrange's Formula if $f(0) = 648, f(2) = 704, f(3) = 729, f(6) = 792$.

(3) Solve $\frac{dy}{dx} = 1 - y, y(0) = 0$ in the range $0 \le x \le 0.3$ using modified Euler's method.

(4) Derive Trapezoidal rule.

(5) Find the value of $\int_2^6 \frac{dx}{x}$ by Simpson's 1/3 rule by taking $h = 1$

(6) Derive Sterling's Interpolation formula.

(c) Answer the following questions : (any **two**) **10**

(1) Derive Gauss Backward interpolation formula.

(2) Explain Milne's Predictor and corrector method.

(3) Explain Newton's Divided Difference Formula.

(4) Explain Bessel's interpolation formula.

(5) Derive Simpson's 3/8 rule form quadrature formula.
