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PH-003-001618 Seat No. _____

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

July - 2018

Mathematics : Paper - BSMT - 603 (A)

(Optimization And Numerical Analysis - II)

(New Course)

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 all the following 20 short answer questions : **20**

(1) Gauss forward interpolation formula is obtained from _____ interpolation formula.

(2) Write the slope value of Euler's method to find the solution of differential equation.

(3) Trapezodial rule is obtained from _____ formula.

(4) For $f(x) = x^{-2}$ find $f(a, b)$

(5) Which method is considered as universal interpolation method?

(6) For what range of p the Stirling's Formula is good estimate?

(7) Write any two methods to solve ordinary differential equations numerically.

(8) For Simpson's $\frac{3}{8}$ Rule the value of $n =$ _____

(9) Runge Kutta method for first order is same as _____ formula.

(10) The process to find the value of independent variable using the values of dependent variable is known as _____

(11) What is feasible solution for an LPP?

(12) Define : Slack variable

(13) What the full form of NWCM.

(14) Which Transportation method gives the nearest answer to the optimal solution

(15) Define : Convex Set

(16) In graphical method if all the constraints are of $\geq$ type in the problem of maximization then the solution is _____.

(17) Define : Objective Function

(18) Write the full form of LCM

(19) Name the method to solve the Assignment method.

(20) Name the method to find the optimum solution of Transportation method.

2 (A) Attempt any **three** : **6**

(1) Write Lagrange's Interpolation formula for four successive pairs of (x, y)

(2) Write the formula of Simpson's $\frac{3}{8}$ rule.

(3) Write the algorithm for RK second order

(4) Write the drawback of Lagrange's interpolation method.

(5) For $f(x) = x^3$ find $f(1, 3, 5, 7)$

(6) For $f(x) = x^{-1}$ show that

$$f(x_0, x_1, \ldots, x_n) = \frac{(-1)^n}{x_0 \cdot x_1 \cdot x_2 \cdot \ldots \cdot x_n}$$

(B) Attempt any **three** : **9**

(1) Evaluate $\int_0^{\pi/2} \sin x \, dx$ by Trapezodial rule.

(2) Find the polynomial $f(x)$ for the given values $f(0) = 648, f(2) = 704, f(3) = 729$ & $f(6) = 792$ using Lagrange's Interpolation formula.

(3) Write the Laplace's Everett's formula.

(4) Explain Euler's method for solving first order differential equation.

(5) Write Algorithms for RK fourth order

(6) For $f(x) = x^3 - 9x^2 + 17x + 6$ then compute $f(-1, 1, 2, 3)$

(C) Attempt any **two** : **10**

(1) Explain Milne's Corrector method.

(2) Explain Bessel's Formula

(3) Explain Gauss Forward interpolation formula

(4) Evaluate $\int_0^{10} \frac{dx}{1+x^2}$ by using Simpson's rules.

(5) Explain Newton's Divided Difference formula

3 (A) Attempt any **three** : **6**

(1) State the mathematical form of Linear Programming Problem.

(2) Define : (1) Constraints (2) Decision variable

(3) State the general mathematical form of Assignment problem.

(4) Write any two differences between Primal problem and Dual Problem of LPP.

(5) Explain Canonical form of Linear Programming Problem.

(6) Write the dual of $Max\ Z = 2x_1 + 4x_2$

Subject to the constraints :

$x_1 + 2x_2 \leq 4,$

$3x_1 - x_2 \leq 10$ Where

$x_1, x_2 \geq 0$

(B) Attempt any **three** : **9**

(1) Explain NWCM method to solve the transportation problem

(2) Solve : $Max\ Z = 6x_1 + 11x_2$

Subject to :

$2x_1 + x_2 \leq 104,$

$x_1 + 2x_2 \leq 76,$

$x_1 \geq 0,$

$x_2 \geq 0$ Graphically.

(3) Explain LCM for solving transportation method.

(4) Obtain the initial feasible solution for the given LPP

$Max\ Z = 3x_1 + 5x_2 + 4x_3$

Subject to :

$2x_1 + 3x_2 \leq 8,$

$2x_2 + 5x_3 \leq 10,$

$3x_1 + 2x_2 + 4x_3 \leq 15$ and

$x_1, x_2, x_3 \geq 0$

(5) Explain the steps of VAM to solve the transportation problem.

(6) Explain the steps to solve the assignment problem.

(C) Attempt any **two** : **10**

(1) Explain the Big M Method to solve an LPP.

(2) Find the optimal solution for the given transportation table using LCM method for initial solution.

Market

Warehouse	*P*	*Q*	*R*	*S*	*Supply*
A	6	3	5	4	22
B	5	9	2	7	15
C	5	7	8	6	8
Demand	7	12	17	9	45 = *Total*

(3) Solve the following Assignment Problem.

Men

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

(4) Explain Two Phase method for solving LPP

(5) Solve the following LPP using Two Phase method.

$\text{Min } Z = x_1 + x_2$

Subject to the constraints

$2x_1 + x_2 \geq 4,$

$x_1 + 7x_2 \geq 7$ and

$x_1, x_2 \geq 0$