B.Sc.- III CBCS Pattern Semester-VI

021C - Mathematics Paper-I (DSE-V) : Numerical Methods

P. Pages : 2 **GUG/W/23/13363**

Time : Three Hours Max. Marks : 60

Notes : 1. Solve all **five** questions.
2. All questions carry equal marks.

UNIT – I

1. a) Find the real positive root of the equation $3x-\cos x-1=0$, by the Newton-Raphson method correct to six decimal places. **6**

b) Perform the four iterations of the regulafalsi method to find a real root of the equation $x^2-x-10=0$. **6**

OR

c) Using Gauss elimination method, obtained the solution of the system. $2x-y+3z=9,\ 3x+2y+z=3, x+y-z=-2$. **6**

d) Use Gauss-Jordan method to solve the system. $3x-y+9z=12,\ x+2y+3z=4,\ 2x-2y-z=1$ **6**

UNIT – II

2. a) Express the polynomial $f(x)=3x^2-5x+7$ into factorial polynomial and obtain their forward differences. **6**

b) Let $y=f(x)$ be a polynomial of degree two. Compute y_5 from the value. **6**

x :	1	2	3
y :	1	6	13

OR

c) Use Newton-Gregory forward interpolation formula to find a cubic polynomial from the data: **6**

x :	0	1	2	3	4
y :	7	10	13	22	43

d) Using Lagrange interpolation formula, express **6**

$\dfrac{3x^2-8x+13}{(x+1)(x-2)(x-3)}$ as sum of partial fractions.

UNIT – III

3. a) Find the values of the derivatives $y'(x)$ at $x=1.2$ from the following data: **6**

x :	1.0	1.2	1.4	1.6	1.8	2.0	2.2
y :	2.7	3.4	4.1	5.2	6.3	7.6	8.9

b) The distance covered by an athlete for the 40 meters is given by the following values: **6**

$t(\text{sec})$:	0	1	2	3	4	5
$s(\text{distance})$:	0	4	11	19	28	40

Find the speed of the athlete at t = 4.8 sec.

OR

c) From the values of x and y: **6**

x:	−2	−1	0	2	3
$y(x)$:	57	13	7	−11	−23

Find $y'(x)$ at $x = 1$ by using Newton dividend difference formula of derivatives.

d) Discuss maxima and minima of the function y = f (x) specified by the values: **6**

x:	−2	0	2	4
$y = f(x)$:	−1	1	3	53

UNIT – IV

4. a) Evaluate the integral $\int_0^6 \frac{dx}{1+x}$ by the Simpson's one-third rule. **6**

b) Evaluate the integral $\int_{0.1}^{0.2} \frac{x^2}{1+x^3} dx$ by the trapezoidal rule. **6**

OR

c) Evaluate the integral $\int_0^4 \frac{dx}{1+x^2}$ by Boole's rule. **6**

d) Evaluate the integral $\int_0^3 \frac{dx}{1+x^2}$ by Simpson three-eighth rule. **6**

5. Solve **any six.**

a) Define a triangular factorization. **2**

b) Show that the Newton-Raphson iteration for determining a square root of A has the form. **2**

$$x_{n+1} = \frac{1}{2}\left(x_n + \frac{A}{x_n}\right)$$

c) Prove that $E = 1 + \Delta$ **2**

d) If h is the interval of differencing, then prove that $E = e^{hD}$ **2**

e) Write the Newton general forward difference formula for first derivatives. **2**

f) Write the Newton divided difference formula for first derivatives. **2**

g) Define a truncation error. **2**

h) Define a degree of precision. **2**

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