2018

MCA

MCA : 2.5

COMPUTER ORIENTED NUMERICAL METHODS

Full Marks: 75

Time: 3 Hour

The figures in the margin indicate full marks for the questions :

1. Answer the following questions: **1x5=5**

(a) In the Gauss elimination method for solving a system of liner algebraic equations, triangularaization leads to,

(i) Diagonal matrix.

(ii) Lower triangular matrix.

(iii) Upper triangular matrix.

(iv) Singular matrix.

(b) If $f(x) = 0$ has a root between a & b than $f(a)$ & $f(b)$ are of.....signs,

(i) Opposite

(ii) Same

(iii) Negative

(iv) Positive

(c) Gauss Elimination Method and Gauss Jordan Method are.....methods.

(i) Direct

(ii) Indirect

(iii) Self correcting

(iv) Step by step

(d) The forward difference operator is denoted by the symbol.....

(i) Delta

(ii) Omega

(iii) Nabla

(iv) Infinite

(e) Lagrange's interpolation formula is used to compute the values for.....intervals.

(i) Equal

(ii) Unequal

(iii) Open

(iv) Closed

2. Answer the following questions: 2x5=10

(a) Evaluate, $\Delta^2(e^{ax+b})$

(b) Show that, $\Delta = \nabla E = \delta E^{1/2}$

(c) Write down the Runge-Kurtta method of 4th order.

(d) Using Newton's forward difference formulae for the first and second order derivation at the value $x = x_0$ up to fourth order difference term.

(e) State Simpson's one third rule.

3. Answer any six questons of the following: 6x10=60

(a) Use the secant method to estimate the root of the equation, $x^2 - 4x - 10 = 0$ with the initial estimates of $x_1 = 4$ & $x_2 = 2$.

(b) Evaluate $\int_0^2 \frac{dx}{x^3+x+1}$ by Simpson's $\frac{3}{8}$ rule with $h = 0.25$ & 0.50

(c) Find $\frac{dy}{dx}$ & $\frac{d^2y}{dx^2}$ at $x = 1$ from the following table,

X	0.7	0.8	0.9	1.0	1.1	1.2	1.3
f(x)	0.644218	0.717356	0.783327	0.841471	0.891207	0.932039	0.963558

(d) For the date,

X	-4	-2	0	2	4	6
f(x)	-139	-21	1	23	141	451

Construct forward and backward difference tables. Using the corresponding interpolation show that the interpolating polynomial is same.

(e) Solve the equation $\frac{dy}{dx} = x + y$ with initial condition $y^{(0)} = 1$. Runge-Kurtta rule from $x = 0$ *to* $x = 0.4$ with $h = 01$.

(f) Compute $f(0.3)$ & $f(0.5)$ for the date,

X	0	1	3	4	7
f(x)	1	3	49	129	813

Using Newton's divided difference formula.

(g) Interpolate the value of the function corresponding to $x = 4$ using Lagrange's interpolating formulae from the following set of date:

x	2	3	5	8	12
f(x)	10	15	25	40	60

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