COMPUTER - ORIENTED NUMERICAL METHODS

Time : 3 Hours *Maximum Marks : 80*

Note : Attempt five questions in all, selecting one question from each unit. Question No. 1 is compulsory.

(Compulsory Question)

1. i) Define Error. Explain different types of errors with example.
   ii) What do you mean by Normalized floating point representation?
   iii) What do you mean by term Iteration method? List out various iterative methods and their order of convergence.
   iv) What do you mean by term Pivoting?
   v) Write formula for approximation of function by Taylor series. Also find the truncation error.
   vi) Differentiate between Integration and Differentiation.

Unit-I

2. a) Define the terms Significant digitsm, Accuracy and Precision.
   b) If a = 0.6554 EI, b = 0.5646E-1 and c=0.6534 EI show that (a+b)-c $\neq$ (a-c) + b.
   c) Discuss Newton-Raphson method is a 2nd order convergence.
3. a) Discuss the False position method of finding root. Also find a positive root of x-cos x =0 by false position method, correct up to 4 decimals.

b) Obtain $\sqrt{12}$ correct to four places of decimals by Newton-Raphson method.

Unit-II

4. a) Solve the following system of Linear equations by Gauss-Seidel method :

$3x + 2y - z = -18$

$20x + y - 2z = 17$

$2x - 3y + 20z = 25$

b) Given that $\frac{dy}{dx} = \log_{10}(x+y)$ with the initial condition thay $y = 1$ when $x=0$. Find y for $x=0.2$ using Euler's modified formula.

5. a) Write short note on Refinement of solution.

b) Tabulate by Milne's predictor-corrector method the numerical solution of $\frac{dy}{dx} = x + y$ with initial condition $x_0 = 0$, $y_0 = 1$ from $x = 0.20$ to $x=0.30$

Unit-III

6. a) Define Interpolation. Explain the need or significance of Interpolation. Also explain the limitations of Interpolation.

b) Using Newton-Backward difference formula, estimate number of persons earning between Rs. 90 to Rs. 100 :

Wages	below 40	40-60	60-80	80-100	100-120
No. of Persons	250	120	100	70	60

a) Compute the values of f (x) for x = 2.5 from the following table :

x	:	1	2	3	4
f (x)	:	1	8	27	64

Using Lagrange's Interpolation method.

b) Define Chebyshev polynomial. Also prove that

$$\left(1-x^2\right)\frac{d^2y}{dx^2}-x\frac{dy}{dx}+x^2y=0$$

where $y = T_x(x)$

Unit-IV

8. a) Evaluate $\int_0^{0.6} e^x dx$ taking seven ordinates by trapezoidal rule upto 3 decimal places.

b) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Simpson's 3/8th rule.

Compare the result with its actual value.

9. a) Find $\frac{dy}{dx}$ & $\frac{d^2y}{dx^2}$ at x=6 given that

x	:	4.5	5.0	5.5	6.0	6.5	7.0	7.5
y	:	9.69	12.90	16.71	21.18	26.37	32.34	39.15

b) Evaluate $f(x)=2x^3-3x^2+4x-5$ using aussian Quadrature formula from -2 to 4.

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