

NED UNIVERSITY OF ENGINEERING & TECHNOLOGY, KARACHI
FINAL YEAR (COMPUTER SCIENCE AND INFORMATION TECHNOLOGY)

ANNUAL EXAMINATION 2007
 BATCH 2003-04

000093

Time: 3 Hours

Dated: 14-11-2007

Max. Marks: 80

NUMERICAL ANALYSIS - (MS-451)

Instructions: - Attempt any five questions in all.

All questions carry equal marks.

Q.1 (a) Solve any two difference equations from the following (8)

(i) $(\Delta^2 - 2\Delta + 3)y_k = 0$ (ii) $(\Delta^2 - 5\Delta + 6)y_k = 5^k$

(iii) $(\Delta^2 - 4\Delta + 4)y_k = k^2 + k + 3$

(b) Find the single error in the given data then construct the correct difference table (8)

20, 25, 50, 100, 170, 270, 400, 562.5

Q.2 (a) Find the missing entries in the given data of an International (8)

Software developer firm by using the relation of Δ and E ,

Years(x)	2000	2001	2002	2003	2004	2005	2006
No. of Software(y)	63	91	121	-----	167	201	-----

(b) The analytical solution of a problem is 2.634143254 and the numerical solution (8)

is 2.63414334205. Find the Simple error, Absolute error, Relative error and Percentage error for the calculated solutions.

Q.3 (a) Find a polynomial for given data then find Y for X = 5. (8)

X	01	03	04	06
Y	02	05	08	10

(b) Find an interpolating polynomial by using Newton's Forward formula. (8)

X	1	3	5	7	9
Y	4	10	22	38	56

Q.4 (a) What do you mean by $y'(x)$ and $y''(x)$. Find the formulae for (8)

$y'(x)$ and $y''(x)$ using Newton's Forward difference formula.

(b) Find the Fourier series for $f(x) = \begin{cases} 1 & ; -\pi \leq x < 0 \\ x & ; 0 < x \leq \pi \end{cases}$ (8)

Q.5 (a) Applying *Jacobi's iteration* to solve the following system correct to six (8)

decimal places
 $x - 20y - z = 40$
 $x + y - 10z = 40$
 $10x + 2y + 3z = 80$

(b) Find the approximate solution correct to six decimal places for the function (8)

$f(x) = x^3 - 2x^2 - 5$ using *Secant method*.

Q.6 (a) Evaluate the following integral by using Hermite two point formula (8)

$\int_{-\infty}^{+\infty} e^{-x} \sqrt{1+x^2} dx$

(b) Evaluate the integral $\int_0^1 \sin(x)^{\frac{3}{2}} dx$, using Simpson's $\frac{1}{3}$ rd and $\frac{3}{8}$ th rules (n=10). (8)

Q.7 (a) Find the approximate value of y at $x = 0.1$ for the differential Equation $\frac{dy}{dx} = x^2 + 2y$; with $y(0) = 1$ By using **R.K method** of Order four. (8)

(b) Using Euler's method to obtain a solution for $\frac{dy}{dx} = 2x - y^2$ with $y = 1$ when $x = 0$ for the range $0 \leq x \leq 0.2$ in step of 0.1, give the correct result up to three decimal places. (8)

Q.8 (a) Investigate the convergence of any two from the following. (8)

(i) $\int_0^{\infty} \frac{1}{1+x^2} dx$ (ii) $\int_{-\infty}^0 e^{-(x^2+2x+1)} (-2-2x) dx$ (iii) $\int_{-1}^1 \frac{dx}{x^3}$

(b) Express the following integral in term of Elliptic Integral also find the numerical value up to five decimal places (8)

$$\int_0^{\pi/2} \frac{1}{\sqrt{\sin x}} dx$$