

B.E. (EE) Part-III 6th Semester Examination, 2007

**Numerical Methods and Computer Programming
(EE-605)**

Time : 3 hours

Full Marks : 100

Use separate answerscript for each half.

Answer SIX questions, taking THREE from each half.

Two marks are reserved for neatness in each half.

FIRST HALF

1. a) What is LINUX and how it is different from UNIX?
b) Explain the features of LINUX processes and process manipulation commands.
c) Discuss about the file system permission in UNIX environment. [2+6+8]

2. a) Discuss "function call" by value and by reference with examples.
b) Fill up the blanks :
 - i) vi is an _____
 - ii) ls stands for _____
 - iii) killall is used to _____
 - iv) A valid C variable name must be started with _____
 - v) chown is used to _____
 - vi) cp is used to _____ . [10+6]

3. a) Write a C function to find out the root of an equation.
b) Discuss functions and recursive function calls in C. [7+9]

4. a) How <, >>, > and | operators of UNIX operating system can be used with appropriate examples.
b) What is a header file and why we need it? Write a sample library and header to integrate a function. [7+9]

5. Write short notes on any three of the following : [4×4]
 - a) Pointers in C
 - b) Global and local variables in C
 - c) GNUPlot
 - d) Type of loops and control structures in C.

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SECOND HALF

6. Solve the following system of equations by Gaussian Elimination Method.

$$\begin{aligned}x_1 + x_2 + \frac{1}{2}x_3 + x_4 &= 3.5 \\ -x_1 + 2x_2 + x_4 &= -2 \\ -3x_1 + x_2 + 2x_3 + x_4 &= -3 \\ -x_1 + 2x_4 &= 0\end{aligned}\quad [16]$$

7. a) Using the method of false position, find a real root (correct to two decimal places) of the equation $f(x) = x^3 - 2x - 5 = 0$ that lies between 2 & 3.

- b) Evaluate $\int_0^{0.8} (\log(1+x) + \sin 2x) dx$ using Simpson's $1/3$ rule with step size $h=0.1$. [10+6]

8. a) In a zoological study the length of an insect at various times have been recorded as follows :

Days	10	25	47	81
Length (mm)	14.1321	17.2172	19.1729	21.1892

Using Lagrange's Interpolation, find the length in 28 days.

- b) $\frac{dy}{dx} = 1 + y^2$, where $y = 0$ when $x = 0$. Find $y(0.4)$ using fourth order Runge-Kutta method. Use $h=0.2$. [9+7]

9. a) Using Newton-Raphson method, find a real root (correct to 3 decimal places) of the equation $x^3 - 3x - 5 = 0$ that lies between 2 and 3.

- b) Find the exponential fit $y = Ce^{Ax}$, for the five data points (0, 1.5), (1, 2.5), (2, 3.5), (3, 5.0) and (4, 7.5). Use data linearization method. [9+7]

10. a) Solve using Euler's method

$$5 \frac{dy}{dx} = 3x^3y, \quad y(0) = 1$$

for the interval $0 \leq x \leq 0.3$, with step size $h=0.1$.

- b) Using the following table find $\tan 0.12$

x	0.10	0.15	0.20	0.25	0.30
tanx	0.1003	0.1511	0.2027	0.2553	0.3093

 [7+9]