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5th SEMESTER
SKILL ENHANCEMENT COURSE (SEC)

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PH517S: COMPUTATIONAL PHYSICS

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(CREDITS: THEORY: 02, PRACTICAL: 02)

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THEORY (2 CREDITS)

UNIT-I

Scientific Programming: Some fundamental Linux Commands (Internal and External commands). Development of FORTRAN, Basic elements of FORTRAN: Character Set. Constants and their types, Variables and their types, Keywords, Variable Declaration and, concept of instruction and program. Operators: Arithmetic, Relational, Logical and Assignment Operators. Expressions: Arithmetic, Relational, Logical, Character and Assignment Expressions. Fortran Statements: l/O Statements (unformatted/formatted), Executable and Non—Executable Statements, Layout of Fortran Program, Format of writing Program and concept of coding, Initialization and Replacement Logic. Examples from physics problems.

UNIT-II

Control Statements: Types of Logic (Sequential. Selection. Repetition), Branching Statements (Logical IF, Arithmetic IF, Block IF, Nested Block IF. SELECT CASE and ELSE IF Ladder statements), Looping Statements (DO—CONTINUE, DO- ENDDO, DO- WHILE, Implied. an: Nested DO Loops), Jumping Statements (Unconditional GOTO. Computed GOTO, Assigned GOTO) Subscripted Variables (Arrays: Types of Arrays,. DIMENSION Statement. Reading and Writing Arrays), Functions and Subroutines (Arithmetic Statement Function. Function Subprogram and Subroutine), RETURN, CALL. COMMON and EQUIVALENCE Statements), Structure, Disk I/O Statements, open

PRACTICAL (2 CREDITS):
Fortran Programmes
    01) Exercise on syntax usage of FORTRAN
    02) To printout natural even/odd numbers between given limits.
    03) To find maximum/minimum and range of a given set of numbers.
    04) To find area of Triangle, Rectangle etc.
    05) Calculating Eulers number using exp(x) series evaluated at x=1.
    06) To compile a frequency distribution and evaluate mean standard deviation etc.
    07) To evaluate sum of finite series and area under a curve.
    08) To find the sum of two matrices.
    09) To find the product of two matrices.
    10) To find the roots of a quadratic equation.
    11) Motion of a projectile using simulation and plot the output for visualization.
    12) To find a set of prime numbers and Fibonacci series.

REFERENCE BOOKS:
    1) *Introduction to Numerical Analysis: S. S. Sastry*
    2) *Computer Programming in Fortran 77 : V. Rajaraman*