

## **Core theory course (Disciplinary)**

### **CPH-502: CLASSICAL MECHANICS AND PROGRAMMING IN C-I**

#### **UNIT - I**

##### **Canonical transformation : :**

Gauge transformations, Canonical transformation, Condition for transformation to be canonical, Illustration of canonical transformations, Poisson brackets, canonical equations in terms of Poisson brackets notation, Infinitesimal transformation, Relation between Infinitesimal transformation and Poisson brackets, The Hamilton Jacobi equations, separation of variables.

##### **Basic reference:**

Introduction to classical mechanics by R. G. Takwale and P. S. Puranik 1979 TMH, New Delhi

#### **UNIT - II**

##### **Small Oscillation and Rotating Frame:**

Stable and unstable equilibriums, Small Oscillation in a system with one degree of freedom, Small Oscillation in a system with more than one degree of freedom, Normal coordinates and Normal frequencies of vibration.

Rotating Frame, Euler angles, Inertia tensor, Euler's equations of motion of a rigid body, Free motion of a rigid body, Motion of a symmetric top.

##### **Basic reference :**

Classical mechanics-A Text Book by Suresh Chandra, Narosa Publishing House New Delhi.

#### **UNIT- III**

##### **Decision making and Looping:**

Introduction, while statement, do statement, do while, for statement, jumps in loops – continue and break statements.

##### **Arrays:**

Introduction, One dimensional arrays, declaration and initialization of arrays one dimensional arrays, two dimensional arrays, initialization of two dimensional arrays , multidimensional arrays.

##### **Basic reference :**

**Balagurusamy E.**, Programming in ANSI C (IIIrd Ed.), TMH Pub.

#### **UNIT- IV**

##### **Character Arrays and Strings :**

Declaring and initializing string variables, reading and writing strings, arithmetic operations on characters, Putting Strings together, comparison of two Strings, String handling functions, Table of strings, other features of strings.

##### **Functions :**

Need for user defined functions, A multi function program, Elements of user defined functions, Definition of functions, return values and their types, Function Calls, Function Declaration, category of functions, No argument and no return values, Arguments but no return values, Arguments with return values, No arguments but returns a value, Functions that returns multiple values, nesting of functions, recursion.

##### **Basic reference :**

**Balagurusamy E.**, Programming in ANSI C (IIIrd Ed.), TMH Pub.

##### **Other references :**

- (1) Classical Mechanics by H. Goldstein, C. Poole, J. Safko 3rd edition, first india reprint (2002) Pub: Pearson Education.
- (2) Classical mechanics by V. B. Bhatia 1997, Narosa Publishing House New Delhi
- (3) Classical mechanics by N. C. Rana and P. S. Jog TMH, New Delhi.
- (4) P. Day and M. Ghosh, Programming in C, Oxford Univ. Press, 2007
- (5) Gottfried B.S. Programming with C
- (6) Kochan S.G Programming in C, CBS Pub.
- (7) Kenetker Y., Let us C, BPB Pub.
- (8) Kernighan B.W. and Ritchie D.K., C Programming language, PH Pub.
- (9) Stan Kelly - Bootle, Mastering Turbo C, BPB Pub.