B.Sc.(CS)- Odd (III) Semester (Scheme and Syllabus):

Semester III						
Sr. No.	Course Code	Courses	Periods Per Week			Credits
			L	T	P	
1	BC3CO09	Data Structure	3	0	4	5
2	BC3CO10	Computer Organization	3	1	0	4
3	BC3CO11	Mathematics -III	3	1	0	4
4	BC3CO12	Physics-III	4	0	2	5
5	BC3SE01	OOP using C++	3	0	2	4
		Total	16	2	8	**22**
			26			

Course Code	Course Name	Hours per Week			Total	Total
		L	**T**	**P**	**Hrs.**	Credits
BC3CO09	Data Structure	3	0	4	7	5

Unit- I

Data Structures Basics:

Data Definition, Built in data types, Basic Data Structure, Classification of Data Structure, Data structure Operations, Complexity of Algorithms: Time and space trade-off, notations of time complexity

Unit - II

Arrays:

Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C, Character string operation, Array as Parameters, Ordered List.

Unit - III

Stacks and Queues:

Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Applications of stack: Conversion of Infix to prefix and postfix Expressions, Applications of recursion.Queues: Array representation and implementation of queues, Operations on Queue.

Unit - IV

Linked List and Trees:

Linked list: Representation and Implementation of Singly Linked Lists, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists. Trees: Basic terminology, Binary Trees, Binary tree representation, Complete Binary Tree, Array and Linked Representation of Binary trees, Traversing Binary trees,AVL Trees, B-trees.

Unit - V

Searching, Hashing, Sorting, Graph:

Sequential search, binary search, comparison and analysis. Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation. Sorting: Insertion Sort, Bubble Sorting, Quick Sort and Heap Sort. Graphs: definition, representation, traversal and applications.

Text Books:

1. E. Horowitz and Sahani,"Fundamentals of data Structures", Galgotia Publication Pvt. Ltd..
2. R. Kruse, "Data Structures and Program Design in C", Pearson Education Asia.
3. A. M. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd..

Reference Books:

1. Bruno R Preiss, "Data Structures and Algorithms with Object Oriented Design Pattern in C++", Jhon Wiley & Sons, Inc.
2. Adam Drozdek, "Data Structures and Algorithms in C++", Thomson Asia Pvt. Ltd.(Singapore).
3. N. Wirth, "Algorithmsm+ Data Structure= Program", Prentice Hall of India.
4. Goodrich and Tamassia, " Data Structure and Algorithms in C++", John Wiley and Sons.
5. Michael McMillan, "Data Structures and Algorithms Using C#",Cambridge.

List of Experiments

1. Write a program for Array implementation of Stack.
2. Write a program for Array Implementation of Queue.
3. Write a program for Insertion and Deletion in Stack.
4. Write a program for Insertion and Deletion in Queue.
5. Write a program for Implementation of PUSH and POP operation on stack.
6. Write a program for Implementation of circular Queue.
7. Write a program for Implementation of Tree Structures, Binary Tree.
8. Write a program for Implementation of Linear SearchAlgorithm.
9. Write a program for Implementation of Binary search Algorithm.
10. Write a program for Implementation of Insertion Sort Algorithm.
11. Write a program for Implementation of Bubble Sort Algorithm.
12. Write a program for Implementation of Heap Sort Algorithm.
13. Write a program for Implementation of Quick Sort Algorithm.
14. **Make a Mini-Project Using Data Structure.**

Course Code	Course Name	Hours per Week			Total	Total
		L	**T**	**P**	**Hrs.**	Credits
BC3CO10	Computer Organization	3	1	0	4	4

Unit-I

Introduction: Man and Computing, Digital Computer, Computer Organization and Functional Units, Main Memory, CPU Operational Concepts, Interrupt Concept, Input Output(I/O) Techniques, Bus Concept, System software, Computer types, Computer performance factors, System performance measurement, High performance techniques, Computer Design process, Computer Structure, Computer Function, Architecture and Organization.

Unit-II

Basic Computer Organization and Design: Instruction codes, Computer registers, Computer instructions, Timing and Control, Instruction cycle, Memory-Reference Instructions, Input-output and interrupt, complete computer description, Design of Basic computer.

Unit -III

Input-Output Organization: Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA, Input–Output Processor (IOP), CPUIOP Communication, Serial communication.

Unit-IV

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Cache Memory, Virtual Memory, Address Space and Memory Space, Associative Memory, Page Table, Page Replacement.

Unit-V

Processor Organization: Register organization – user visible registers, control and status registers, **Case Study** – register organization of microprocessor 8086. **Instruction Cycle** – The machine cycle and Data flow, **Instruction Pipelining** – Pipelining Strategy, pipeline performance, pipeline hazards, dealing with branches, **Case Study** – pipelining in Pentium.

Text Books:

1. B. Govindarajalu, "Computer Architecture and Organization, Design Principles and Applications", Tata McGraw Hill.
2. W. Stallings, "Computer Organization and Architecture: Designing for performance", Pearson Education/ Prentice Hall of India.
3. Zaky S, Hamacher, "Computer Organization", Tata McGraw Hill Publications.

Reference Books:

1. John P Hays, Computer Architecture and Organization, McGraw-Hill Publication.
2. Miles Murdocca and Vincent Heuring, "Computer Architecture and Organization- an integrated approach", Wiley India Pvt. Ltd.
3. A. Tanenbaum, "Structured Computer Organization", Prentice Hall of India.

4. Patterson and Hennessy, “Computer Organization and Design”, Morgan Kaufmann Publishers.
5. Andrew S. Tanenbaum and Todd Austin, “Structured Computer Organization”, PHI.
6. M. Murdocca and V. Heuring, “Computer Architecture & Organization”, Wiley Publication.
7. M. Morris Mano, “Computer System Architecture”, Pearson.

Web Reference:

1. http://nptel.ac.in/syllabus/106103068/
2. http://www.cse.iitm.ac.in/~vplab/courses/comp_org/

Reference of Open Learning Course:

1. https://onlinecourses.nptel.ac.in/noc17_cs35/announcements

Course Code	Course Name	Hours per Week			Total	Total
		L	**T**	**P**	**Hrs.**	Credits
BC3CO11	Mathematics-III	3	1	0	4	4

Unit-I

Real Analysis:

Definition of a sequence, Theorems on limits of sequences, Bounded and monotonic sequences, Cauchy's convergence criterion, Series of non-negative terms, Comparison test, Cauchy's integral test, Ratio test, Raabe's test, logarithmic test, Leibnitz's theorem, Absolute and conditional convergence.

Unit-II

Series Solution of ODE , Bessels and Legendre's function:

Series solution to a second order linear ordinary differential equation about an ordinary point and a regular singular point. Bessel's equation(without solution), Bessel functions, recurrence relations, orthogonality property, generating function. Legendre's equation(without solution), Legendre Polynomials, Rodrigue's formula, recurrence relations, orthogonality property.

Unit-III

Partial Differential Equations:

Partial differential equations of the first order, linear equations: Lagrange's solution, Non linear partial differential equation of first order, Charpit's method of solution, Partial differential equations of second and higher orders: Homogeneous and Non- Homogeneous with constant coefficients.

Unit-IV

Vector Calculus:

Vector differentiation, Gradient, Divergence and Curl, Vector integration, Theorem of Gauss (without proof) and problems based on it, Green's Theorem (without proof) and problems based on it, Stoke's theorem (without proof) and problems based on it.

Unit-V

Complex Analysis: Continuity and differentiability of Complex functions, Analytical function, Cauchy Riemann equation, Harmonic function, Conformal Mapping, Mobius transformations. Complex Integral: line integral , Cauchy theorem Cauchy's Theorem, Cauchy's Integral Formula, Singular Points, Poles & Residues, Residue Theorem , Application of Residues theorem for evaluation of real integrals.

Texts Books:

1. S.C. Malik, Mathematical Analysis, Wiley Eastern Ltd. New Delhi.
2. Grewal B. S., "Higher Engineering Mathematics", Khanna Publishers, Delhi.
3. Dass H.K., "Advanced Engineering Mathematics, S. Chand.

References Books:

1. R.R. Goldberg, Real Analysis, I.B.H. Publishing Co. New Delhi.
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & sons.
3. I.N. Sneddon, Elemets of Partial Differential Equations Mc graw Hill, Co.
4. Shanti Narayan, Theory of Functions of a Complex Variable, S. Chand & Co., New Delhi.
5. N. Saran & S.N. Nigam – Introduction to Vector Analysis, Pothishala Pvt. Ltd., Allahabad.

S. No	Course Code	Course Name	Hours per Week			Total Hrs.	Total Credits
			L	T	P		
1	BC3CO12	Physics-III	4	0	2	6	5

Unit I

Interferenceoflight

Conditions for sustained interference, Young's double slit experiment, Fresnel's biprism experiment, Interference by a film with two parallel reflecting surfaces, Wedge shape film, Newton's rings experiment and its applications for determination of wavelength, radius of curvature of plano convex lens and refractive index of liquid, Michelson interferometer, its application for precision determination of wavelength, wavelength difference and thickness of mica sheet.

Unit II

Diffraction

Difference between fresnels and fraunhoffer diffraction, Fresnel's theory of half period zone, diffraction at straight edge, rectilinear propagation, Fraunhoffer diffraction due to single slit double slit, Plane diffractiongrating, N-Slit diffraction and Absent orders, Rayleigh criterion of resolution of images.

Unit III

Polarisation

Transverse nature of light waves, Polarization of electromagnetic(em) waves, Plane, circularly and elliptically polarized light–production and analysis, Brewster law, Malus law, Propagation of emwaves in anisotropic media, uniaxial and biaxial crystals, double refraction, Huygen's principle, Nicol prism, half wave plate, quarter wave plate and optical rotation.

Unit IV

Optical Instruments

General theory about spectrometer, travelling microscope, resolving power of telescope, resolving power of a grating and comparison with resolving power of prism and Fabry Parot etalon, Optical rotation in liquids and its measurement through biquartz and half shade polarimeter.

Unit V

Lasers

A brief history of lasers, characteristics of laser light, spontaneous emission, stimulated emission Einstein prediction, Relationship between Einstein's coefficients, Pumping schemes (

III and IV level), optical resonator, Rubylaser, He-Ne laser, applications of lasers.

Text Books

1. Fundamentals of Optics: F.A. Jenkinsand H.E.White, McGraw-Hill.
2. Principles of Optics: B.K.Mathur, Gopal Printing.
3. .Fundamentals of Optics: H.R. Gulatiand D.R. Khanna, S.Chand Publication.
4. University Physics: F.W.Sears, M.W.Zemanskyand H.D.Young.

References:

1. R.P.Goyal, "Unified Physics III Semester", Shivlal Agrawal and Company Publishers.
2. Brijlal and N. Subrahmanyam, "Text book of optics", S. Chand& Company Ltd, New Delhi.
3. An introduction to Lasers–Theory and Applications: M.N.Avadhanalu, S. Chand and Co, Ltd.
4. Optics: Ajoy Ghatak, McGraw Hill Publications.
5. Principles of Optics: MaxBorn and Wolf, Pregmon Press.

List of Practical

Semester-III

1. Study of interference using biprism.
2. Study of diffraction at straight edge.
3. Resolving power grating.
4. Resolving power of telescope.
5. Polarization by reflection and verification of Brewster's Law.
6. Study of optical rotation in Sugar solution.
7. Refractive index and dispersive power of prism using spectrometer.
8. Beam divergence of He-Ne Laser.
9. Determination of wavelength of Laser by diffraction.
10. Determination of radius of curvature of plano-convex lens by Newton's rings.

11. Project: On any one topic from the syllabus (compulsory).

Course Code	Course Name	Hours per Week			Total	Total
		L	**T**	**P**	**Hrs.**	Credits
BC3SE01	OOP using C++	3	0	2	5	4

Unit-I

Introduction: Basic concepts of OOP: object, class, data abstraction, data encapsulation, inheritance, polymorphism, Static and dynamic binding, message passing, benefits of OOP's, disadvantage of OOP's, application of OOP's, a simple program, anatomy of program, creating a source file, compiling and Linking.

Unit-II

Tokens and Expressions: Preprocessor directive, Tokens, keywords, Identifiers and constants, Data types- Basic, User defined and Derived, Variables- Declaration and Dynamic initialization, operators- scope resolution operator, Member Referencing operators, Memory management operators, manipulator, Expression and their types, Special Assignment Expressions, Type conversions, Implicit & Explicit conversions.

Unit-III

Functions & Classes: Main function, Function prototyping, Call by value, Call by reference, Return by reference, Inline functions, Arguments - default, constant.
Defining classes and objects, constructors and destructors, access modifiers-public, private, protected, Defining member functions inside and outside class definition, Arrays within a class, Memory allocation of objects, Static data members and static member functions, Array of objects, Object as function arguments, Returning objects, Friend functions.

Unit-IV

Inheritance: Introduction, Base class and derived class, reusability of code through inheritance Examples, Types of Inheritance ,Virtual base class, Abstract class, Constructors in derived class.
Polymorphism: Introduction, Compile Time Polymorphism, Function overloading, Operator Overloading ,Overloading unary and binary operator, Overloading using friend function Overloading insertion and extraction operators, String manipulation using operator overloading, Runtime Polymorphism, this Pointer, pointers to objects, pointer to derived classes, Virtual functions and pure virtual functions.

Unit-V

File Handling: Classes for File Stream operations, File operations - Opening, Closing and updating, Error handling during File operations, Command Line arguments, Introduction Exception Handling.

Text Books

1. Herbert Schildt, "C++ The Complete Reference", Mcgraw Hill Education.
2. **E. Balagurusamy, "Object oriented programming with C++" ,** Mc Graw Hill Education**.**

3. **Rajesh K Shukla, "Object Oriented Programming by C++", Wiley, India.**

References Books

1. S.B. Lippman and J. Lajoie , "C++ Primer", Pearson Education.
2. B.Stroutstrup, "The C++ Programming Language", Pearson Education.
3. T.Gaddis, J.Walters and G.Muganda , "OOP in C++", Wiley DreamTech Press .
4. R. Lafore, Object Oriented Programming in C++, Galigotia Publications pvt ltd.
5. Dr. G. T. Thampi, Dr. S. S. Mantha "Object Oriented Programming in C++" , DreamTech Press.

Web Reference:

1. http://nptel.ac.in/courses/106105151/

Reference of Open Learning Course:

1. http://nptel.ac.in/courses/106105151/

List of Practicals:

1. Write a program (WAP) to sum of all even and odd number.
2. WAP to find smallest of three numbers.
3. WAP to check the given number is palindrome or not.
4. WAP to calculate the average of three numbers.
5. WAP to find maximum and minimum of three numbers using functions.
6. WAP to understand concept of class & objects.
7. WAP to understand concept of constructors & destructors.
8. WAP to understand working of different access specifiers.
9. WAP to understand concept of inline functions.
10. WAP to understand concept of call by value & call by reference.
11. WAP to understand working of static functions & data members.
12. WAP to understand concept of friend function.

13. WAP to understand concept Inheritance & its type.
14. WAP to understand concept of abstract class.
15. WAP to understand concept of virtual base class.
16. WAP to understand concept of function overloading.
17. WAP to understand concept of operator overloading(unary & binary operator).
18. WAP to understand concept of overloading using friend function.
19. WAP to demonstrate concept of runtime polymorphism.
20. WAP to demonstrate concept of exception handling.
21. **Mini-Project using C++.**