Semester Syllabus for Postgraduates
As recommended by Board of Studies of Computer Science and Applications
Barkatullah University, Bhopal
Session 2018-19 onwards

Class: M. Sc. Computer Science Semester I (for Regular Students only)

Paper Code	Paper Title	Internal	Theory	Grand Total
MSCS -101	Discrete Mathematics Structures	15	85	100
MSCS -102	Programming skills with C++	15	85	100
MSCS -103	Computer Organization & Architecture	15	85	100
MSCS -104	Office Tools	15	85	100
MSCS -105	**Lab-I**(programming with c++)			50
MSCS -106	**Lab-II**(Office tools)			50
			Grand Total	500

Paper Code :MSCS-101

Paper Title: Discrete Mathematics Structures Max.Marks: 85

Unit I

Mathematical Logic: Statements and notations, Connectives: Negation, Conjunction, Disjunction. Statement formulas and truth tables, Conditional and Biconditional,Well formed formulas.Tautologies, Equivalence of formulas, duality law, Tautological implications, contradiction contingency, Algebra of propositions, the predicate calculus: predicates, the statement function, Variables and Quantifiers, predicate formulas, free and bound variables, the universe of discourse.

Unit II

Set Theory:Basic concepts of set theory, notation, inclusion and equality of sets, the power set,types of sets, operations on set , Venn diagrams , some basic set identities,the principle of specification, ordered pains, Cartesian products, relations & ordering.

Unit III

Algebraic Structures: Introduction, algebraic system: examples and its general properties, semigroups and monoids: definitions and examples, homomorphism of semigroups and monoids, grammars and languages, Polish expressions and their compilations: polish notations, conversion of infix expressions to polish notation.

Unit IV

Lattices and Boolean Algebra: Lattices and algebraic systems , principle of duality , basic properties of algebraic systems defined by lattices, distributive and complemented lattices,Boolean lattices and boolean algebra , identity of Boolean algebraic Boolean functions and Boolean expressions, normal forms, simplification of logic expressions using Karnaugh map,switching circuits .

Unit V

Graph Theory: Introduction, basic terminology, multi-graphs and weighted graphs , digraphs and relations , representation of graphs : incidence matrix, adjacency matrix , operations on graphs, path and circuits, Graph traversal: Depth first search, breadth first search, shortest paths in weighted graphs.

Text Books& Reference Books:

1. J. P. Tremblay , "Discrete Mathematics structures with application to computer science"
2. C.L. Liu, "Element of discrete mathematics"
3. J.K Sharma , "Discrete Mathematical", Macmillan publication

Paper Code :MSCS-102

Paper Title :PROGRAMMING IN C ++

UnitI Max.Marks: 85

OOPS :Introduction to oops principles, procedure oriented programming vs. object oriented programming, advantages ofOOPs, applications, examples of object oriented languages. Introduction to C++ : tokens, expressions, keywords, identifiers, basic data types, user defined data types, derived data types, symbolic constants, type compatibility, variable declaration, dynamic initialization of variables, reference variables.Operators in C++: scope resolution operator, memory management operators, manipulators, type cast operators, operator precedence .Control structures
Arrays: single, multidimensional, array of strings. Functions: function prototyping, function call, scope rules of functions, call by value, call by reference, calling functions with arrays.

UnitII

Classes and Objects : specifying a class, defining member function,private member functions, scope resolution operator, memory allocation for objects, static data members, static member functions, arrays of objects, objects as function arguments, returning objects, Inline functions, friend functions.
Pointers: pointer variables, operators and expressions, initializing pointers, array of pointers, this pointer, C++ dynamic memory allocation operator.
Constructors: definition, types:default, copy,parameterized ,multiple, constructors with default arguments, Destructors.

UnitIII

Overloading : definition, rules of overloading,function overloading,Operator overloading and its restrictions, overloading unary and binary operators, operator overloading using a friend function.

UnitIV

Inheritance: derived class and base class, defining derived classes, types of inheritance- single, multiple, multilevel, hierarchical, hybrid inheritance. Making a private member inheritable, passing parameter to the base class, constructors and destructors in derived classes, nesting of classes.Virtual Base class, abstract classes.

Template, Template Classes, Explicit Class, Exception handling, Exception Handling Fundamentals, The try Block, the catch Exception Handler, The throw Statements.

UnitV

Managing console I/O operations: C++ streams, stream classes, unformatted and formatted i/o operations, managing output with manipulators.Working with files: classes for file stream operations, opening and closing files, detecting end of file, sequential i/o operations, command line argument.

ext Books& Reference Books:

1. Herbert Schildt , "C++ The complete reference", TMH
2. E.Balaguruswamy, "Object Oriented Programming in C++".
3. E.RobertLafore , "Programming in C++".
4. John Hubbard , "Outline of Programming with C++" (Schaum Series)
5. M Kumar , "Programming inC++ made simple".

Paper Code: MSCS-103

Paper Title: **Computer Organization & Architecture** Max.Marks: 85

UnitI

Data Representation: Data Types (Number System - Octal and Hexadecimal Number, Decimal Representation, and Alphanumeric Representation), Complements, Fixed Point and Floating-Point Representation.

Digital Logic Circuits: Digital Computers, Logic Gates, Boolean Algebra, Map Simplification, Combination Circuits: Adder, subtractor, multiplexor, DEmultiplexoretc. Flip-Flops : SR Flip-flops, D Flip-Flops, JK Flip-Flops, T Flip-Flops, Edge Triggered Flip-Flops,master-slave, Execution Table, Sequential Circuits.

UnitII

Register Transfer and Micro-operations: Register Transfer Language, Register Transfer, Bus and Memory Transfer, Micro operations : Arithmetic, Logical, Shift Micro- operations, Arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory Reference Instruction, Input-Output and Interrupt, Complete Computer Description, Design of Basic Computer.

UnitIII

Programming the Basic Computer: Machine language, Assembly language, The Assembler, Program Loops, programming arithmetic and logic operations, input-output programming, character manipulation, program interrupt.

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, RISC and CISC Characteristics.

UnitIV

Memory Organization: Introduction, memory hierarchy, main memory, auxiliary memory, Associative memory, cache memory, locality of reference, hit/miss ratio, various mapping process: Associative mapping, direct mapping, and Set-Associative mapping, memory management hardware.

UnitV

Input-Output Organization: Peripheral Devices -ASCII alphanumeric Characters, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Access (DMA), Input-Output Processor (IOP), Serial Communication.

Introduction to parallel processing, pipelining. Introduction to multiprocessors.

Text Books & Reference books:

1. M.MorrisMano , "Computer System Architecture", PHI.
2. Heuring Jordan , "Computer System Design & Architecture" (A.W.L.)
3. William Stalling, "Computer Organization & Architecture", Pearson Education Asia.
4. V. Carl Hamacher, "Computer Organization", TMH
5. Tannenbaum, "Structured Computer Organization", PHI .

Paper Code: MSCS-104
Paper Title: Office Tools

UnitI Max.Marks: 85

Introduction to Windows: Features of Windows. Difference between CUI & GUI Interfaces,Hardware Requirement for Running Version of Windows. New Installation &Upgradation, Managing Hardware & Software - Installation of Hardware & Software, Desktop, Start Button, Start Menu,Wall Paper, Use of Recycle Bin, Computer, Network Icon, Using Scanner Web Camera, Printers, Searching files and programs,Multiple User Feature of Windows, Creating and Deleting User, Changing User Password, etc. Creating folder and shortcuts of application on desktop, Using Windows Explorer, Accessories, Control Panel: Display, Internet Options, User Accounts, Backup and Restore, Date and Time, Taskbar, Start Menu, Windows Firewall, Windows Update, Devices and Printers.

UnitII

System Tools - Backup, Character Map, Clipboard Viewer, Disk Defragmenter, Drive Space, Scandisk, System Information, System Monitor, Disk Cleanup, Browsing the Web with Internet Explorer and other browsers, Accessibility Features of Windows - Sharing Folders and Drives, Browsing the Entire Network, Using Shared Printers. OLE - Embed/Link Using Cut and Paste an Embed/ Link, Using Insert Object Manage Embedded/Linked Object.
Introduction to Word Processing (MS Word) Advantages of Word Processing, Introduction & Installation Editing a File, Working with '**options**' under file menu, Formatting Tool Bar, Setting margins, orientation and size of page. Using Paragraph Styles, Formatting Text, Inserting page number, Format Painter, Spell Check & Word Count, Newspaper Style Column, Drop Cap, Header & Footer, Endnote and Footnote.

UnitIII

Advanced Features of MS-Word: managing page breaks and section breaks, Inserting Objects, Inserting Hyperlink, Cross reference, Bookmark. Inserting Illustrations(Smart Art, Shapes, Charts & Pictures), Adding symbols, signature & equations, Setting Up Printer, Printing options, Inserting watermark, Mail Merge, printing labels and envelops, Mathematical Calculations, Using Macros,Table Handling, Creating Table of Contents & Index, Use of Thesaurus, saving document versions, comparing two versions of document, protecting document.

UnitIV

Introduction to Spread Sheet(MS Excel): Definition and Advantages ofElectronic Worksheet Working on Spreadsheet, Range and Related Operations,Inserting, Deleting, Copying and Moving of Data Cells, Inserting and Deleting Rows and Columns, ProtectingCells, protecting worksheet and workbook, Printing a Worksheet, Graph Creation: Types of Graphs, Creating a Chart on Chart Sheet, Printing the Chart. Sort & Filter, Data Validation, Consolidate data, Goal seek, Data Table, Subtotal, Group & ungroup data. Freeze panes, split window, conditional formatting, inserting comment, pivot able, text to column/ column to text, what-if-analysis. Importing data from access, from web and from other sources.built n functions- mathematical, logical, text, date& time, lookup and reference. Working with 'options' under file menu.

JnitV

ntroduction to MS Power Point: Elements of Power Point, Exploring Menus of Power Point, Working with Dialog oxes, Creating presentation with Auto content Wizard, Designing Presentation: Slide Setup, Adding Text, Formatting ext, Inserting Photo Album, WordArt, Graph, Object and Picture to Slide, Inserting , deleting and duplicating slides, dding movie and sound to slide, Adding animation to slide, Custom Animation, Slide Transition, Protecting esentation, Printing Slides, View Slide, Outline, Slide Sorter Notes and Slides Show.

xt Books:

1. Kevin Wilson, Essential Office 365 Second Edition: The Illustrated Guide to using Microsoft Office (Computer Essentials), Elluminet Press
2. Lisa A. Bucki, Word 2013 Bible, Wiley
3. John Walkenbach, Excel 2013 Bible, Wiley
4. FaitheWempen, PowerPoint 2013 Bible, Wiley

Paper Code: MSCS-105 Lab I (C++ Programming) Max.Marks: 50

Suggested List of Practicals

1. Define a STUDENT class with Roll No., Name, and Marks in 3 tests of a subject. Declare an array of 10 STUDENT objects. Using appropriate functions, find the average of the two better marks for each student. Print the student details.
2. Write a volume function which calculates the volume of sphere, rectangle and cylinder using function overloading.
3. Write a program to find roots of Quadratic equation ,displaying the answer, whether roots are equal ,real or complex..
4. Write a C++ program to demonstrate private, public and protected access specifiers.
5. Write a program to implement single and multiple level inheritance.
6. Write a C++ program to create a class called COMPLEX and implement the following overloading functions ADD that return a complex number:
   (i) . ADD(a, s2) – where 'a' is an integer (real part) and s2 is a complex number
   (ii) ADD(s1, s2) – where s1 and s2 are complex numbers
7. Write a C++ program to create an ACCOUNT class which has a parameterized constructor for inputting values of account number, name and balance. Class should also contain three more functions-Deposit for adding amount, Withdraw for subtracting amount(if account balance is more than withdrawal amount)and Print_Details for printing the whole account details.
8. Write a C++ program to create a template function for sorting of integers and doubles.
9. Write a C++ program to create a class called STUDENT with data members Roll No., Name and Age. Using inheritance, create the classes UGSTUDENT and PGSTUDENT having fields as Semester, Fees and Stipend. Enter the data for at least 5 students. Find the semester-wise average age for all UG and PG students separately.
10. Write a program to create a file and then write some text into the file through C++ program.
11. Write a C++ program to write and read values using variables in/from file.
12. Write a C++ program to write and read object using read and write function.
13. Write a program implementing basic operation of class ios i.e. setf, unsetf, precision etc.
14. Write a program to implement I/O operations on characters. I/O operations includes inputting a string, Calculating length of the string, Storing the string in a file, fetching the stored characters from it, etc.
15. Write a program to copy the contents of one file to another.
16. Write a program to perform read/write binary I/O operation on a file (i.e. write the object of a structure/class to file).
17. Write a program to maintain elementary database of students using files.

Paper Code: MSCS-106 **Lab II (Office Tools)**

Suggested List of Practicals **Max.Marks: 50**

I. System Tools &MS Word

1) Usage of System Tools(Backup, Character Map, Clipboard Viewer, Disk Defragmenter, Drive Space, Scandisk, System Information, System Monitor, Disk Cleanup etc.)
2) Printing documents with even-odd pages on both sides on a network printer.
3) Revision of basic tools of MS-Word.
4) Implementing Newspaper Style Column, Drop Cap.
5) Use of Header & Footer, Endnote and Footnote
6) Learning to manage page breaks and section breaks
7) Inserting Objects, Hyperlinks, Cross reference, Bookmark, Illustrations,symbols, signature & equations, watermark.
8) Mail Merge, printing labels and envelops, Mathematical Calculations, Using Macros.
9) Table Handling, Creating Table of Contents & Index.
10) Protecting documents.

II. MS Excel

1) Revision of basic formulaes of MS-Excel.
2) Protecting cells, worksheet and workbook
3) Applying Sort & Filter, Data Validation, Conditional Formatting
4) Formulaes: and, or, if, sumif, sumifs, countif, countifs
5) Implementing Pivot Table

III. MS Powerpoint

1) Adding animation to slide, Custom Animation, Slide Transition
2) Creation of Photo Album, with automatic transition of slides in 10 seconds with loopback on end
3) Creation of presentation with continuation of single audio during whole presentation(despite of slide change)
4) Printing using Handouts