ORDINANCES
AND OUTLINES OF TESTS,
SYLLABI AND COURSES OF READING

FOR

POST GRADUATE DIPLOMA IN COMPUTER APPLICATIONS

(First and Second Semester Examinations)

2016-17 and 2017-18 Sessions

(As per RUSA Guidelines)

DEPARTMENT OF COMPUTER SCIENCE
PUNJABI UNIVERSITY
PATIALA

OUTLINE OF PAPERS AND TESTS
For 2016-17 & 2017-2018 Sessions

P.G.D.C.A.– First Semester

Code	Title of Paper	University Examination	Continuous Assessment	Max. Marks	Exam. Duration Hours
PGDCA-101	Fundamentals of Information Technology	70	30	100	3
PGDCA-102	Operating Systems	70	30	100	3
PGDCA-103	Programming Fundamentals through "C" Language	70	30	100	3
PGDCA-104	Computer Organization and Architecture	70	30	100	3
PGDCA-105	Software Lab – I Office Automation and Productivity Tools	40	60	100	3
PGDCA-106	Software Lab – II Programming Fundamentals through "C" Language	40	60	100	3
		360	**240**	**600**	

CONTINUOUS ASSESSMENT (THEORY PAPERS)

1.	Two tests will be conducted during the Semester. Both the tests will be considered for assessment.	:	60% of the marks allotted for Continuous Assessment
2.	Assignment/Quizes	:	20% of the marks allotted for Continuous Assessment
3.	Attendance	:	10% of the marks allotted for Continuous Assessment.
4.	Class Participation and behaviour	:	10% of the marks allotted for Continuous Assessment.

2.   The break up of for the Continuous Assessment for the practical will be as under:
   i.   Two tests (60% of Total marks)   36 Marks
   ii. Lab Assignments
        (30% of Total marks)   18 Marks
   iii. Attendance/Class participation and behaviour
        (10 % of Total marks)   6 Marks

OUTLINE OF PAPERS AND TESTS
For **2016-17 & 2017-2018 Sessions**
P.G.D.C.A. – Second Semester

Code	Title of Paper	University Examination	Internal Assessment	Max. Marks	Exam. Duration Hours
PGDCA-201	Data Structures	70	30	100	3
PGDCA-202	Object Oriented Programming with C++	70	30	100	3
PGDCA-203	Database Management System with MS ACCESS	70	30	100	3
PGDCA-204	Fundamentals of Computer Networks, Internet and Scripting Languages	70	30	100	3
PGDCA-205	Software Lab – III Data Strucutres and Programming with C++	40	60	100	3
PGDCA-206	Software Lab – IV MS ACCESS and Scripting Languages	40	60	100	3
		360	**240**	**600**	

CONTINUOUS ASSESSMENT (THEORY PAPERS)

1.	Two tests will be conducted during the Semester. Both the tests will be considered for assessment.	:	60% of the marks allotted for Continuous Assessment
2.	Assignment/Quizes	:	20% of the marks allotted for Continuous Assessment
3.	Attendance	:	10% of the marks allotted for Continuous Assessment.
4.	Class Participation and behaviour	:	10% of the marks allotted for Continuous Assessment.

2.   The break up of for the Continuous Assessment for the practical will be as under:
    i.   Two tests (60% of Total marks)   36 Marks
    ii.   Lab Assignments
       (30% of Total marks)   18 Marks
    iii. Attendance/Class participation and behaviour
       (10 % of Total marks)   6 Marks

PGDCA-101 Fundamentals of Information Technology

Maximum Marks: **70**   Lectures to be delivered: **40-50**
Minimum Pass Marks: **35** %   Time allowed: **3 Hrs.**

A) INSTRUCTIONS FOR THE PAPER SETTER
The question paper will consist of three Sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 10.5 marks for each question. Section C will consist of 7-15 short answer type questions covering the entire syllabus uniformly and will carry a total of 28 marks.

B) INSTRUCTIONS FOR THE CANDIDATES
1. Candidates are required to attempt five questions in all, selecting two questions each from Section A and Section B and compulsory question of Section C.
2. Use of non programmable scientific calculator is allowed.

SECTION A
Historical Evolution of Computer: Block Diagram of computer, characterisation of computers, types of computers, the computer generations.
Basic Anatomy of Computers: memory unit, input-output unit, arithmetic logic unit, control unit, central processing unit, RAM, ROM, PROM, EPROM.
Input-Output Devices: Keyboard, Mouse, Joy tick, Track Ball, Touch Screen, Light Pen, Digitizer, Scanners, Voice Recognition Devices, Optical Recognition devices, Dot matrix, Character and Line printer, DeskJet printer, Laser printer, and plotters.

Number System: Non-positional and positional number systems, Base conversion, binary, decimal, hexadecimal, and octal systems, conversion from one system to the other.
Binary Arithmetic: Addition, subtraction and multiplication.
Computer Codes: weighted and non-weighted code, BCD, EBCDIC, ASCII, Unicode, XS-3, Grey Codes.

SECTION B
Computer Software: Introduction, types of software, systems software, GUI, operating system, high level languages, assemblers, compilers and interpreters, system utilities, application packages, stages in the development of software, program testing and debugging, program documentation, concept of firmware.

Applications of Information Technology and Trends: IT in Business and Industry, IT in Education & training, IT in Science and Technology, IT and Entertainment, Current Trends in IT Application - AI, Virtual Reports, voice recognition, Robots, Multimedia Technology.
E-Commerce: Meaning, its advantages & limitations, Infrastructure for E-commerce, Types of E-Commerce Applications. **Multimedia:** Concepts, Components and Application.

Text Books:

1.   P.K. Sinha and P. Sinha, Foundations of Computing, First Edition, 2002, BPB.

References:
1.   Chetan Srivastva, Fundamentals of Information Technology, Kalyani Publishers.
2.   Turban Mclean and Wetbrete, Information Technology and Management, Second Edition, 2001, John Wiley & Sons.
3.   Satish Jain, Information Technology, BPB, 1999.
4.   Sukhmeen Kaur, Vikram Gupta, S. S. Hatia and Navneet Kaur, "Fundamentals of Information Technology", Kalyani Publishers.

PGDCA-102   Operating Systems

Maximum Marks: **70**   Lectures to be delivered: **40-50**
Minimum Pass Marks: **35** %   Time allowed: **3 Hrs.**

A) INSTRUCTIONS FOR THE PAPER SETTER
The question paper will consist of three Sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 10.5 marks for each question. Section C will consist of 7-15 short answer type questions covering the entire syllabus uniformly and will carry a total of 28 marks.

B) INSTRUCTIONS FOR THE CANDIDATES
1. Candidates are required to attempt five questions in all, selecting two questions each from Section A and Section B and compulsory question of Section C.
2. Use of non programmable scientific calculator is allowed.

SECTION A
Introduction to operating System: Definition, its need and Operating system services, Early systems, Introduction to various types of operating systems: Batch processing operating system, Multiprogramming operating system, Time Sharing operating system, Multi tasking operating system, Distributed operating system, Network operating system, Real time operating system, Multi processor system and parallel processing.

Process Management: Process concept, types of Process scheduling, Basci concept of CPU Scheduling, Scheduling criteria, and Scheduling algorithms: FCFS, SJF, Round Robin & Queue Algorithms, Deadlock definition and its characterization.

SECTION B
Windows: GUI, Icon, Toolbar
Working with files, closing and saving a file
Mouse Mechanics: Click, double click, Drag and drop method,
Installation of a new software, Control panel, Explorer, Accessories, Network Neighbour hood, system tools, Recycle bin, Files and directory management under windows, Running programs

Unix: Structure of Unix, Kernel and shell, Commands of Unix, Unix file system, own file system, Electronic mail.
Vi Editor: Editing text, screen controls
Printing and spooling
Unix Administration: Superuser, Booting, Backup, Creating and managing new accounts.

Text books:
1. Rathbone," Windows for dummies", Pustak mahal
2. Stan Kelly-Bootley,"Understanding UNIX", Sybex Tech asian edition
3. Silverschatz,"Operating system concepts", Pearson Education India.

PGDCA-103 Programming Fundamentals through "C" Language

Maximum Marks: **70**   Lectures to be delivered: **40-50**
Minimum Pass Marks: **35** %   Time allowed: **3 Hrs.**

A) INSTRUCTIONS FOR THE PAPER SETTER
The question paper will consist of three Sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 10.5 marks for each question. Section C will consist of 7-15 short answer type questions covering the entire syllabus uniformly and will carry a total of 28 marks.

B) INSTRUCTIONS FOR THE CANDIDATES
1. Candidates are required to attempt five questions in all, selecting two questions each from Section A and Section B and compulsory question of Section C.
2. Use of non programmable scientific calculator is allowed.

SECTION A
Programming process: Problem definition, program design, coding, compilation and debugging.
Fundamentals of C: Identifiers and keywords, data types, input and output, type conversion, operators and expressions: Arithmetic, unary, logical and relational operators, assignment operator, conditional operator, and library functions.

Control statements: branching, looping using for, while and do-while statements, nested control structures, switch, break and continue statement
Functions: definition, call prototype and passing arguments to a function, recursion versus iteration
Storage classes: automatic, external and static variables.

SECTION B
Arrays: Definition, accessing elements, initialization, passing to functions, multi dimensional arrays, strings
Pointers: address and referencing operators, declaration, assignment, passing pointer to functions, pointer arrays

Structures: variables, accessing members, nested structures, pointer to structures, self referential structures.
Files in C: Sequential files, random access files, Unformatted files, Text files, binary files.

Text Book:
1.   Byron Gottfried , "Programming with C, Second edition, Schaum' s outline series" TMH

References:
1.   Ram Kumar and Rakesh Aggarwal : Programming in Ansi C, TMH
2.   B.W. Kerrighan and D.M.Richie, " The C programming language", 2nd edition, PHI
3.   H.H. Tan & T.B. Dorazio," C Programming for engineers & Computer Science", Mcgraw Hill international edition.
4.   Vikram Gupts and S. S. Bhatia, "Programming Fundamentals through C Language" Kalyani Publishers.

PGDCA-104 Computer Organization and Architecture

Maximum Marks: **70**   Lectures to be delivered: **40-50**
Minimum Pass Marks: **35** %   Time allowed: **3 Hrs.**

A) INSTRUCTIONS FOR THE PAPER SETTER
The question paper will consist of three Sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 10.5 marks for each question. Section C will consist of 7-15 short answer type questions covering the entire syllabus uniformly and will carry a total of 28 marks.

B) INSTRUCTIONS FOR THE CANDIDATES
1. Candidates are required to attempt five questions in all, selecting two questions each from Section A and Section B and compulsory question of Section C.
2. Use of non programmable scientific calculator is allowed.

SECTION A
Boolean Algebra: Boolean operations, Truth Tables, Boolean Laws, K-maps (2,3 and 4 variable maps, don't care conditions).

Basic Gates, Combinational logic design: half-adder, full adder, parallel adder.
Sequential circuits: concept, flip-flops (D, RS, JK, T), counters (Ripple, Asynchronous, Synchronous).
Instruction codes, Instruction formats, Instruction cycle, Addressing modes.

SECTION B
Register Transfer Language, Arithmetic, Logic and Shift micro-operations, Arithmetic Logic Shift unit
Control Memory: Design of control unit, Micro programmed and hardwired control unit (overview only), Features of RISC and CISC

Memory Organisation: memory hierarchy, Memory types: cache, associative and other types.
I/O organization: I/O interface, Modes of data transfer: Programmed I/O, Interrupt initiated I/O, DMA.
Block diagram depicting architecture of 8085 machine.

Text Book:
1.   M.M. Mano, "Computer System Architecture". Third Edition, Prentice-Hall of India, 2002.
References:
1.   A.S.Tannenbaum, "Structured Computer Organisation". Prentice-Hall of India, 1999.
2.   William Stallings, "Computer Organisation and Architecture". 6th Edition, Pearson Education, 2002.

PGDCA-105: Software Lab – I
(Office Automation and Productivity Tools)

Maximum Marks: **100***   Lectures to be delivered: **40-50**
Minimum Pass Marks: **35** %   Time allowed: **3 Hrs.**

This laboratory course will comprise as exercises based on Office Automation and Productivity Tools. Students are required to practice following:

WINDOWS: Windows concepts, features, windows structure, desktop, taskbar, start menu, my computer, Recycle Bin, Windows Accessories. System Tools**,** communication, Sharing Information between Programs.

MS Word: Introduction to Word Processing, Interface, Toolbars, Ruler, Menus, Keyboard Shortcut, Editing a Document, Previewing documents, Printing documents, Formatting Documents, Checking the grammar and spelling, Formatting via find and replace, Using the Thesaurus, Using Auto Correct, Auto Complete and Auto Text, word count, Hyphenating, Mail merge, mailing Labels Wizards and Templates, Handling Graphics, tables and charts, Converting a word document into various formats.

MS-PowerPoint: Creating slides, Applying transitions and sound effects, setting up slide shows, Animation.

MS EXCEL: Creating worksheet, entering data into worksheet, heading information, data, text, dates, alphanumeric, values, saving & quitting worksheet, Opening and moving around in an existing worksheet, Toolbars and Menus, keyboard shortcuts, Working with single and multiple workbook, Working with formulas & cell referencing, Formatting of worksheet.

*Maximum Marks for continuous assessment   : 60
 Maximum Marks for University examination   : 40

The break up of marks for the University examination will be as under

i.	Lab Record	10 Marks
ii.	Viva Voce	15 Marks
iii.	Task given in the examination/Program Development and Execution	15 Marks

PGDCA-106: Software Lab – II
(Programming Fundamentals through "C" Language)

Maximum Marks: **100***   Practical Unites to be conducted: **40-50**
Minimum Pass Marks: **35** %   Time allowed: **3 Hrs.**

This laboratory course will comprise as exercises to supplement what is learnt under paper PGDCA-103: Programming Fundamentals through "C" Language. Students are required to develop programs based upon:

1.   Various data types in C language
2.   Various constructs in the C language
3.   Reading writing text files.

*Maximum Marks for continuous assessment   : 60
 Maximum Marks for University examination   : 40

The break up of marks for the University examination will be as under
        i.   Lab Record   10 Marks
        ii.   Viva Voce   15 Marks
        iii.   Task given in the examination/Program Development   15 Marks
              and Execution

PGDCA-201 : Data Structures

Maximum Marks: **70**   Lectures to be delivered: **40-50**
Minimum Pass Marks: **35** %   Time allowed: **3 Hrs.**

A) INSTRUCTIONS FOR THE PAPER SETTER
The question paper will consist of three Sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 10.5 marks for each question. Section C will consist of 7-15 short answer type questions covering the entire syllabus uniformly and will carry a total of 28 marks.

B) INSTRUCTIONS FOR THE CANDIDATES
1. Candidates are required to attempt five questions in all, selecting two questions each from Section A and Section B and compulsory question of Section C.
2. Use of non programmable scientific calculator is allowed.

SECTION A
Basic concept and notations, data structures and data structures operations, mathematical notation and functions, algorithmic complexity, Big 'O' notations and time space trade off.
Arrays: Linear array, representation of linear array in memory, Traversing linear array, insertion and deletion in an array, multi-dimensional array: row-major, column major order, sparse array.

Stacks: Push and Pop in stack. Representation of stack in memory (linked and sequential) applications of Stack: conversion from infix notation to post fix notations, evolution of postfix notation, matching of Parenthesis, recursion, Tower of Hanoi.

SECTION B
Linked list: representation of linked list using static and dynamic data structures, Comparison of Linear and non-linear data structures, Insertion and deletion of a node from a linear linked list, Introduction to doubly and circular linked lists, Application of linked lists.

Searching and Sorting: Linear and binary search, Bubble Sort, Insertion Sort, Selection Sort, Merge Sort, Radix Sort and Quick Sort comparison of various searching and sorting algorithms.

Text Books:

1. Seymour Lipschutz "Theory & Practice of Data Structures", McGraw Hil, 1998
2. Thomas Naps and Bhagat Singh, Introduction to Data Structures.

PGDCA-202 : Object Oriented Programming with C++

Maximum Marks: **70**   Lectures to be delivered: **40-50**
Minimum Pass Marks: **35** %   Time allowed: **3 Hrs.**

A) INSTRUCTIONS FOR THE PAPER SETTER
The question paper will consist of three Sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 10.5 marks for each question. Section C will consist of 7-15 short answer type questions covering the entire syllabus uniformly and will carry a total of 28 marks.

B) INSTRUCTIONS FOR THE CANDIDATES
1. Candidates are required to attempt five questions in all, selecting two questions each from Section A and Section B and compulsory question of Section C.
2. Use of non programmable scientific calculator is allowed.

SECTION A
Evolution of OOP : Procedure Oriented Programming, OOP Paradigm, Advantages and disadvantages of OOP over its predecessor paradigms. Characteristics of Object Oriented Programming.
Introduction to C++ : Identifier, Keywords, Constants, Operators: Arithmetic, relational, logical, conditional and assignment. Size of operator, Operator precedence and associativity. Type conversion, Variable declaration, expressions, statements, manipulators. Input and Output statements, stream I/O, Conditional and Iterative statements, breaking control statements.

Storage Classes, Arrays, Arrays as Character Strings, Structures, Unions, Bit fields, Enumerations and User defined types.
Pointers : Pointer Operations, Pointer Arithmetic, Pointers and Arrays, Multiple indirections, Pointer to functions. Functions: Prototyping, Definition and Call, Scope Rules. Parameter Passing: by functions, recursion, function overloading, Default Arguments, Const arguments, Pre-processor, Type casting.

SECTION B
Classes and Objects : Class Declaration and Class Definition, Defining member functions, making functions inline, Nesting of member functions, Members access control, this pointer, Objects: Object as function arguments, array of objects, functions returning objects, Const member. Static data member and Static member functions, Friend functions and Friend classes.
Constructors: Properties, types of constructors, Dynamic constructors, multiple constructors in classes.
Destructors: Properties, Virtual destructors, Destroying objects, Rules for constructors and destructors. Array of objects. Dynamic memory allocation using new and delete operators, Nested and container classes, Scopes: Local, Global, namespace and Class.

Inheritance: Defining derived classes, inheriting private members, single inheritance, types of derivation, function redefining, constructors in derived class, Types of inheritance, Types of base classes, Code Reusability.
Polymorphism: Methods of achieving polymorphic behavior. Polymorphism with pointers, virtual functions, late binding, pure virtual functions and abstract base class.
Operator overloading: over loading binary operator, overloading unary operators, rules for operator overloading, operator overloading using friend function. Function overloading: early binding.
Difference between function overloading, redefining, and overriding.

Text Book:
1.   Herbert Schildt. "The Complete Reference C++",Tata McGraw-Hill,2001

References:

1. Deitel and Deitel, "C++ How to Program", Pearson Education, 2001
2. Robert Lafore, "Object Oriented Programming in C++", Galgotia Publicationsk, 1994.
3. Bjarne Strautrup, "The C++ Programming Language", Addition-Wesley Publication Co., 2001.
4. Stanley B. Lippman, Josee Lajoie, "C++ Primer", Pearson Educaion, 2002
5. E.Balagurusamy, "Object Oriented Programming with C++", Tata McGraw-Hill, 2001.

PGDCA-203 : Database Management System with MS ACCESS

Maximum Marks: **70**   Lectures to be delivered: **40-50**
Minimum Pass Marks: **35** %   Time allowed: **3 Hrs.**

A) INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three Sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 10.5 marks for each question. Section C will consist of 7-15 short answer type questions covering the entire syllabus uniformly and will carry a total of 28 marks.

B) INSTRUCTIONS FOR THE CANDIDATES

1. Candidates are required to attempt five questions in all, selecting two questions each from Section A and Section B and compulsory question of Section C.
2. Use of non programmable scientific calculator is allowed.

SECTION A

Traditional file processing system : Characteristics, limitations, Database : Definition, composition.
Database Management System: Definition, Characteristics, advantages over traditional file processing system, User of database, DBA and its responsibilities, Database schema, instance.
DBMS architecture, data independence, mapping between different levels.
Database languages: DDL, DML, DCL.
Database utilities, Data Models, Keys: Super, candidate, primary, unique, foreign.
Entity relationship model: concepts, mapping cardinalities, entity relationship diagram, weak entity sets, strong entity set, aggregation, generalization, converting ER diagrams to tables.
Overview of Network and Hierarchical model.
Relational Data Model: concepts, constraints. Relational algebra: Basic operations, additional operations.

SECTION B

Database Design: Functional dependency, decomposition, problems arising out of bad database design, normalization, multi-valued dependency, Database design process, data base protection, database integrity.
Database concurrency: Defintion and problems arising out of concurrency.
Database security: Authentication, authorization, methods of implementing security.
MS-ACCESS: Introduction to MS-ACCESS, working with database and tables, queries in Access, Appling integrity constraints, Introduction to forms, sorting and filtering, Controls, Reports and Macro: creating reports, using Macros.

Text Book:
1.   B.P. Desai, "Database management system" BPB publications, New Delhi.

Reference:
1.   C.J. Date, "An Introduction to Data Base Systems", 3rd Ed., Narosa Publishers, 1997
2.   Jeffrey D. Ullman, "Principles of Database Systems", 2nd Ed., Galgotia Pub., 1984.
3.   D. Kroenke., "Database Processing", Galgotia Publications, 1987.
4.   Henry F. Korth, "Database System Concepts", McGraw Hill. Inc., 1997.
5.   Naveen Prakash, "Introduction to Database Management", TMH, 1993.
6.   Ivan Bayross, " Oracle 7 The complete reference", BPB Publications.
7.   Bobrowsky, " Client server architecture and Introduction to Oracle 7", 1996
8.   Elmisry Nawathy, "Introduction to database System", Pearson Education India.
9.   Content Development Group "Working with MS-OFFICE 2000", TMH

PGDCA-204 : Fundamentals of Computer Networks, Internet and Scripting Languages

Maximum Marks: **70**   Lectures to be delivered: **40-50**
Minimum Pass Marks: **35** %   Time allowed: **3 Hrs.**

A) INSTRUCTIONS FOR THE PAPER SETTER
The question paper will consist of three Sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 10.5 marks for each question. Section C will consist of 7-15 short answer type questions covering the entire syllabus uniformly and will carry a total of 28 marks.

B) INSTRUCTIONS FOR THE CANDIDATES
1. Candidates are required to attempt five questions in all, selecting two questions each from Section A and Section B and compulsory question of Section C.
2. Use of non programmable scientific calculator is allowed.

SECTION A
Computer Networks: Introduction, Applications, Network hardware and Software (protocol hierarchies, design issues for layers, interfaces and services: connection oriented and connection less), Network structure and architecture - point to point, multicast, broadcast, Classification of networks-LAN, MAN and WAN. Reference models - the OSI reference model, TCP / IP reference model. Comparison between OSI and TCP / IP models.

Internet: Introduction, Relays, Repeaters, Bridges, Routers, Gateways.
Internet working: How networks differ, concatenated virtual circuits, connectionless internetworking, tunnelling, internetwork Routing, fragmentation, Firewalls, internet architecture.

SECTION B
Application layer: The DNS Name Space, Electronic Mail, The World Wide Web, FTP: introduction, data transfer and distributed computation, Generalised File Transfer, The File Transfer Protocol.
Network security: Introduction to cryptography, substitution ciphers, transposition ciphers, one-time pads, two fundamental cryptographic principles.

Scripting languages: HTML: Introduction to HTML, HTML and the World Wide Web, HTML elements, basic structure elements of HTML, the two categories of body elements – block level and text level, creating HTML pages, viewing pages in different browsers, rule for nesting.

HTML tags, colours and fonts, formatting the body section, creating links, creating external links, creating internal links.

Text Book:
1. Andrew S. Tanenbaum, "Computer Networks", Third Edition, PHI Publications, 1997.
2. B Forousan, Introduction to data communication and networking

References:
3. Douglas E. Comer , "Computer Networks and Internets" 2nd Editon, Addison Wesley.
4. D. Bertsellas and R. Gallager, "Data Networks", 2nd Edition, Prentice Hall, 1992.

PGDCA-205 : Software Lab – III
(Data Structures and Object Oriented Programming with C++)

Maximum Marks: **100***   Lectures to be delivered: **40-50**
Minimum Pass Marks: **35** %   Time allowed: **3 Hrs.**

This laboratory course will comprise as exercises to supplement what is learnt under paper PGDCA-201: Data Strucutres and 202 : object Oriented Programming with C++. Students are required to develop programs

1. Based upon various constructs in the C++ language.

2. Searching and sorting algorithms in C++ language

3. Data strcutres like stack, queues and linked lists in C++ language.

*Maximum Marks for continuous assessment   : 60
 Maximum Marks for University examination   : 40

The break up of marks for the University examination will be as under
  i.   Lab Record   10 Marks
  ii.   Viva Voce   15 Marks
  iii. Task given in the examination/Program Development   15 Marks
        and Execution

PGDCA-206 : Software Lab – IV
(Scripting Languages)

Maximum Marks: **100***   Practical Unites to be conducted: **40-50**
Minimum Pass Marks: **35** %   Time allowed: **3 Hrs.**

This laboratory course will comprise as exercises to supplement what is learnt under paper PGDCA-203: Database Management System with MS ACCESS and PGDCA-204: Fundamentals of Computer Networks, Internet and Scripting Languages. Students are required to practices:

MS ACCESS: Creating tables, queries in MS Access, Appling integrity constraints, creating forms, sorting and filtering, creating reports.

HTML: Tables, Forms, Frames and other text formatting tags
DHTML: Cascading style sheets and Document object model
JavaScript: Introduction to JavaScript.

*Maximum Marks for continuous assessment   : 60
 Maximum Marks for University examination   : 40

The break up of marks for the University examination will be as under
i.	Lab Record	10 Marks
ii.	Viva Voce	15 Marks
iii.	Task given in the examination/Program Development and Execution	15 Marks