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

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</tbody>
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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

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<tr>
<th>Code</th>
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<th>University Examination</th>
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<td>PGDCA-204</td>
<td>Fundamentals of Computer Networks, Internet and Scripting Languages</td>
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<tr>
<td>PGDCA-205</td>
<td>Software Lab – III Data Structures and Programming with C++</td>
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<td>PGDCA-206</td>
<td>Software Lab – IV MS ACCESS and Scripting Languages</td>
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<td>60</td>
<td>100</td>
<td>3</td>
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</tbody>
</table>

| Total     | 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/Quizzes : 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
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.

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.

Text Books:

References:
PGDCA-102  Operating Systems

Maximum Marks:  70  
Minimum Pass Marks: 35 %

Lectures to be delivered: 40-50  
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.


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 Neighborhood, 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
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:

References:
1. Ram Kumar and Rakesh Aggarwal : Programming in Ansi C, TMH
Kalyani Publishers.
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:

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

Maximum Marks: 100*  
Minimum Pass Marks: 35 %

Lectures to be delivered: 40-50
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*
Minimum Pass Marks: 35 %

Practical Unites to be conducted: 40-50
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 and Execution 15 Marks
PGDCA-201 : Data Structures

Maximum Marks: 70
Minimum Pass Marks: 35 %

Lectures to be delivered: 40-50
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:
2. Thomas Naps and Bhagat Singh, Introduction to Data Structures.
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 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.
Difference between function overloading, redefining, and overriding.

Text Book:
References:
PGDCA-203  :  Database Management System with MS ACCESS

Maximum Marks: 70
Minimum Pass Marks: 35 %
Lectures to be delivered: 40-50
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: Definition 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, Applying integrity constraints, Introduction to forms, sorting and filtering, Controls, Reports and Macro: creating reports, using Macros.

Text Book:

Reference:
8. Elmisry Nawathy, "Introduction to database System", Pearson Education India.
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

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:
2. B Forousan, Introduction to data communication and networking.

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

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

This laboratory course will comprise as exercises to supplement what is learnt under paper PGDCA-201: Data Structures 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 structures 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 and Execution 15 Marks
PGDCA-206 : Software Lab – IV
(Scripting Languages)

Maximum Marks: 100*
Minimum Pass Marks: 35 %

Practical Unites to be conducted: 40-50
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