

Examination Scheme
for
Post Graduate Diploma in Computer
Applications (PGDCA)
w.e.f. 2020-21
(Choice Based Credit System)



CH. BANSI LAL UNIVERSITY
BHIWANI

Scheme of Examination for PGDCA**Semester: 1st (w.e.f. 2020-21)****Credits - 24****Marks - 900**

Sr. No.	Course Code	Title of the Course	Course Type	Credit			Contact Hours per week			Examination Scheme			Total Marks
				Theory	Practical /Seminar	Total	Theory	Practical /Seminar	Total	External Marks	Internal Marks	Practical /Seminar Marks	
1	20PGDCA101	Mathematical Foundations of Computing	CC	3	--	3	4	--	4	80	20	--	100
2	20PGDCA102	Data Structure using C	CC	3	--	3	4	--	4	80	20	--	100
3	20PGDCA103	Database Management System	CC	3	--	3	4	--	4	80	20	--	100
4	20PGDCA104	Fundamentals of Web Designing	CC	3	--	3	4	--	4	80	20	--	100
5	20PGDCA105	Computer Architecture and Organization	CC	3	--	3	4	--	4	80	20	--	100
6	20PGDCA106	LAB - I (Based on 20PGDCA102)	SEC	--	2	2	--	4	4	--	20	80	100
7	20PGDCA107	LAB - II (Based on 20PGDCA103)	SEC	--	2	2	--	4	4	--	20	80	100
8	20PGDCA108	LAB - III (Based on 20PGDCA104)	SEC	--	2	2	--	4	4	--	20	80	100
9	Open Elective-I (Offered by Other Departments)		OEC	2	--	2	2	--	2	80	20	--	100
10	Hobby Club		AEC	--	1	1	--	1	1	--	--	--	--
	Total					24			35				900

CC - Core Course;

SEC-Skill Enhancement Course;

AEC- Ability Enhancement Course;

OEC-Open Elective Course

Note: For Open Elective-I, Students will have to choose a course from the list of open electives offered by other Departments of the University. The Syllabi & list of various Open Elective Courses offered is available on University Website.

Scheme of Examination for PGDCA

Semester: 2nd (w.e.f. 2020-21)

Credits – 23

Marks – 850

Sr. No.	Course Code	Title of the Course	Course Type	Credit			Contact Hours per week			Examination Scheme			Total Marks
				Theory	Practical /Seminar	Total	Theory	Practical /Seminar	Total	External Marks	Internal Marks	Practical /Seminar Marks	
1	20PGDCA201	Operating System and UNIX	CC	3	--	3	4	--	4	80	20	--	100
2	20PGDCA202	Data Communication and Computer Networks	CC	3	--	3	4	--	4	80	20	--	100
3	20PGDCA203	Data Mining	CC	3	--	3	4	--	4	80	20	--	100
4	20PGDCA204	Object Oriented Programming using JAVA	CC	3	--	3	4	--	4	80	20	--	100
5	20PGDCA205	Artificial Intelligence	CC	3	--	3	4	--	4	80	20	--	100
6	20PGDCA206	LAB - IV (Based on 20PGDCA201)	SEC	--	2	2	--	4	4	--	20	80	100
7	20PGDCA207	LAB - V (Based on 20PGDCA204)	SEC	--	2	2	--	4	4	--	20	80	100
8	20PGDCA208	MATLAB	SEC	--	2	2	--	4	4	--	20	80	100
9	20PGDCA209	Communication Skills	AEC	--	1	1	--	2	2	--	50	--	50
10	Hobby Club		AEC	--	1	1	--	1	1	--	--	--	--
	Total					23			35				850

CC - Core Course;

SEC-Skill Enhancement Course;

AEC- Ability Enhancement Course;

Post Graduate Diploma in Computer Applications
Semester-I

20PGDCA101**Mathematical Foundations of Computing**

Credit: 3	Contact Hours per week: 4	External Examination: 80
Internal Assessment: 20	Max. Time: 3 Hrs	Maximum Marks: 100

Objectives of the course

- To develop and understand the mathematical and logical basis to many modern techniques in computing like machine learning, programming language design, and concurrency.

Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

UNIT I

Sets: Sets, Subsets, Equal Sets Universal Sets, Finite and Infinite Sets, Operation on Sets, Union, Intersection and Complements of Sets, Cartesian Product, Cardinality of Set, Simple Applications. Relations and **Functions:** Properties of Relations, Equivalence Relation, Partial Order Relation, Function: Domain and Range, Onto, Into and One to One Functions, Composite and Inverse Functions.

UNIT – II

Propositional Logic: Proposition logic, basic logic, Logical Connectives, truth tables, tautologies, contradiction, Logical implication, Logical equivalence, Normal forms, Theory of Inference and deduction. **Predicate Calculus:** Predicates and quantifiers. Mathematical Induction.

Matrices: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint and Inverse of a matrix. Determinants: Definition, Minors, Cofactors, Properties of Determinants, Applications of determinants in finding area of triangle, solving a system of linear equations.

UNIT – III

Graph: Definition, walks, paths, trails, connected graph, regular and bipartite graph, cycles and circuits. Tree and rooted tree. Spanning tree. Eccentricity of a vertex radius and diameter of a graph. Central graphs. Centre(s) of a tree. Hamiltonian and Eulerian graph, planar graphs

UNIT – IV

Probability and Distribution: Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality.

Suggested Readings:

1. Liu C.L., 2017. Elements of Discrete Mathematics, 4th Edition, McGraw Hill.
2. Lipschutz S., 2017. Discrete Mathematics, 3rd Edition, Schaum's Series.
3. Vince J., 2020. Foundation Mathematics for Computer Science, 2nd Edition, Springer.
4. Trembley, J.P. and Manohar R., 2019. Discrete Mathematical Structure with Application to Computer Science, 4th Edition, TMH.



Post Graduate Diploma in Computer Applications Semester-I

20PGDCA102**Data Structure using C**

Credit: 3	Contact Hours per week: 4	External Examination: 80
Internal Assessment: 20	Max. Time: 3 Hrs	Maximum Marks: 100

Objectives of the course

- To impart the basic concepts of data structures and algorithms.
- To understand concepts about searching and sorting techniques.
- To understand basic concepts about stacks, queues, lists, trees and graphs.
- To enable them to write algorithms for solving problems with the help of fundamental data structures.

Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Students will have to attempt one question from each unit. Each question shall carry equal marks.

UNIT-I

Programming in C: Introduction to C, Data type, constants and variable; Structure of a C program, Operators and Expressions, Control statements: Sequencing, Alteration and Iteration; Arrays: Representation of single and multidimensional arrays; String and pointers, Functions, Recursion.

UNIT-II

Data Structures: Definition and its types, Abstract Data Types, Review of strings: String representation and manipulation, Static and dynamic memory storage, Arrays, matrices, sparse matrices, multi-dimensional arrays, operations on arrays. Linked Lists, List Types (singly, doubly, singly circular, header, doubly circular), Operations on Lists – create, insert, delete, search, Applications of linked list

UNIT-III

Stacks: Definition, Array implementation of stacks, Linked implementation of stacks, Applications of Stacks: Infix, Postfix and prefix expression, conversions and evaluation of expressions.

Queues: Definition, Array implementation of queues, Linked implementation of queues, Circular queues, Priority queues, Double-ended queues

Searching and Sorting: Linear search, Binary search, Insertion sort, selection sort, Bubble sort, Merge sort, Quick Sort, Heap Sort; Hashing, Hash table, Hash functions.

UNIT-IV

Trees: Binary Trees and their properties, Linked and static Representation of binary trees, Complete Binary Tree, Threaded Binary tree, Different tree traversal algorithms, Binary Search Tree (create, delete, search, insert, display) and its complexity analysis, AVL Trees, Balanced multi-way search trees.

Graphs: Definition, Array and linked representation of graphs, Graph Traversal (BFS and DFS), Adjacency matrix and adjacency lists, path matrix, Finding Shortest Path - Warshall's Algorithm.

Suggested Reading:

1. Horowitz E., Sahni S., 2007. Fundamentals of Data Structures in C, 2nd Edition, Silicon Pr.
2. Lipschutz S., 2017. Data Structure with C, 1st Edition, Schaum's outline series, TMH.
3. Tenenbaum, Langsam, Augenstein, 1996. Data Structures using C, Pearson Education.
4. E. Horowitz and S. Sahani, 1984. Fundamentals of Data Structures, Galgotia Book source Pvt. Ltd.
5. Balagurusamy E., 2017. Data Structures Using C, 1st Edition, TMH.

Post Graduate Diploma in Computer Applications Semester-I

20PGDCA103**Database Management System**

Credit: 3	Contact Hours per week: 4	External Examination: 80
Internal Assessment: 20	Max. Time: 3 Hrs	Maximum Marks: 100

Objectives of the course

To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing.

Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Student will have to attempt one question from each unit. Each question shall carry equal marks.

UNIT- I

Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML).

Data models: Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.

UNIT-II

Relational query languages: Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server.

Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design.

Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

UNIT-III

Transaction processing: Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.

UNIT-IV

Database Security: Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.

Advanced topics: Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.

Suggested Readings:

1. Silberschatz A., Korth H.F. and Sudarshan S., 2014. Database System Concepts, 6th Edition, McGraw-Hill.
2. Ullman J. D., 1988. Principles of Database and Knowledge – Base Systems, Vol 1, Computer Science Press.
3. Elmasri R. and Navathe S., 2007. Fundamentals of Database Systems, 5th Edition, Pearson Education.
4. Abiteboul S., Hull R. and Vianu V., 1994. Foundations of Databases, 1st Edition, Addison-Wesley.

Post Graduate Diploma in Computer Applications Semester-I

20PGDCA104**Fundamentals of Web Designing**

Credit: 3	Contact Hours per week: 4	External Examination: 80
Internal Assessment: 20	Max. Time: 3 Hrs	Maximum Marks: 100

Objectives of the course:

- To impart the basic concepts of Web designing and web programming.
- To understand concepts about client side and server side programming.

Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Student will have to attempt one question from each unit. Each question shall carry equal marks.

UNIT-I

Introduction to Web programming – Introduction to SGML features – HTML, XHTML, DHTML, XML – HTML Vs XML – Creating XML documents – Parsing an XML document – Writing well-formed documents – Organizing elements with namespaces – Defining elements in a DTD – Declaring elements and attributes in a DTD. Overview of HTML - basic formatting tags - heading, paragraph, underline break, bold, italic, underline, superscript, subscript, font and image. Attributes - align, color, bgcolor, font face, border, size. Navigation Links using anchor tag - internal, external, mail and image links. Lists - ordered, unordered and definition, Table tag, HTML Form controls - form, text, password, text area, button, checkbox, radio button, select box, hidden controls.

Unit-II

Cascading Style Sheets: Introduction, Inline, Internal, External CSS, Linking CSS to Web Page. Client-Side Programming: Introduction to JavaScript, Basic Syntax, Variables and Data types, Statements, Operators, Literals, Functions, Objects, Arrays. XML: Relation between XML and HTML, Goals of XML, Structure and Syntax of XML, Well Formed XML, DTD and its Structure, tree structures in data organization, Searching with XPath.

Unit-III

Web Application and Information Gathering: HTTP Request, Response, Header Fields and HTTPS, Understanding Same Origin, Sessions, Web Application Proxies. **Web server** – role - Apache Web Server – Introduction – Architecture – Features - Apache's Role in the Internet – LAMP – WAMP - Installation and Configuration - Build and Install Apache Web Server - Verify Initial Configuration Start, Stop, and Status the Apache Server Process.

UNIT-IV

Server side programming – server side scripts – PHP – Designing dynamic web pages using PHP - Defining PHP variables – variable types – operators – control flow constructs in PHP – passing form data between pages - Establishing connection with MySQL database – managing database

Suggested Readings:

1. Godbole A. and Kahate A., 2002. Web Technologies, 3rd Edition, Tata McGraw Hill, India.
2. Jain V. K., 2000. "O" – Level Information Technology, BPB Publications.
3. Gill N. S., 2000. Essentials of Computer and Network Technology, Khanna Books Publishing Co., New Delhi.
4. Young M. L., 1999. Internet – The Complete Reference, Millennium Edition.
5. Hahn H., 1996. The Internet – Complete Reference, TMH.
6. Chhillar R.S. Application of IT to Business, Ramesh Publishers, Jaipur.

Post Graduate Diploma in Computer Applications Semester-I

20PGDCA105**Computer Architecture and Organization**

Credit: 3	Contact Hours per week: 4	External Examination: 80
Internal Assessment: 20	Max. Time: 3 Hrs	Maximum Marks: 100

Objectives of the course

- To have a thorough understanding of the basic structure and operation of a digital computer
- To study the different ways of communicating with I/O devices and standard I/O interfaces

Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Student will have to attempt one question from each unit. Each question shall carry equal marks.

UNIT-I

Boolean Algebra and Logic Gates: Basic definition, Axiomatic Definition, Basic theorem and Properties of Boolean algebra, Minterms and Maxterms, Logic Operations, Digital logic gates, IC digital logic families

Simplification of Boolean functions: Different types map method, product of sum simplification, NAND or NOR implementation, Don't care condition, Tabulation method, Adder, Subtractor, Code Conversion, Universal Gate.

UNIT-II

Sequential Logic: Flip-flops, Triggering of Flip-flops, Analysis of clocked sequential circuits, State reduction and Assignment, Flip-flop excitation, Design of counters, Design with state equations

Overview of Register Transfer and Microoperations: Register Transfer Language, Register transfer, Bus and Memory transfer, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic Shift Unit

UNIT-III

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

Programming The Basic Computer: Introduction, Machine Language, Assembly Language, the Assembler, Program loops, Programming Arithmetic and logic operations, Subroutines, I-O Programming

UNIT-IV

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction format, Addressing Modes, Data transfer and manipulation, Program Control, Reduced Instruction Set Computer (RISC).

Pipeline Processing: Pipeline and Vector Processing, Parallel processing, Pipelining, Arithmetic Pipeline, Instruction pipeline and Arrays Processors.

Suggested Readings:

1. Mano M.M., 2007. Computer System Architecture, 3rd Edition, Pearson Education India.
2. Tanenbaum A. S. and Austin T., 2012. Structured Computer Organization, 6th Edition, Pearson Education.
3. Stallings W., 2012. Computer Organization and Architecture, 9th Edition, PHI.
4. Hayes J. P., 2017. Computer Architecture and Organization, 3rd Edition, McGraw Hill Education.
5. Gaonkar R. S., 2002. Microprocessor Architecture, Programming, and Applications with the 8085, 5th Edition, Prentice Hall.

Post Graduate Diploma in Computer Applications
Semester-I

20PGDCA106**LAB - I (Based on 20PGDCA102)**

Credit: 2	Contact Hours per week: 4	External Practical Examination: 80
Internal Assessment: 20	Max. Time: 3 Hrs	Maximum Marks: 100

Note: Every student shall individually prepare a practical file consisting of 10 practical related to Problem solving in C Language. A panel consisting of two teachers (internal and External) should take the practical examination after the end of the semester. Marks are distributed as under:

Practical Record: 10 Marks

Viva-voce: 40 Marks

Written exam/executing the practical on the PC: 30 Marks

List of Practical:

1. Write a C program to implement recursive and non-recursive Linear search and Binary search
2. Write a C program to implement Searching and Sorting
3. Write a C program to implement Linked List.
4. Write a C program to implement list ADT to perform following operations a) Insert an element into a list. b) Delete an element from list c) Search for a key element in list d) count number of nodes in list
5. Write C program to implement the following using a singly linked list. a) Stack ADT b) Queue ADT
6. Write C programs to implement the deque (double ended queue) ADT using a doubly linked list and an array.
7. Write a C program to perform the following operations: a) Insert an element into a binary search tree. b) Delete an element from a binary search tree. c) Search for a key element in a binary search tree.
8. Write C programs for implementing the following sorting methods: Merge sort b) Heap sort
9. Write C programs that use recursive functions to traverse the given binary tree in a) Preorder b) inorder and c) postorder.
10. Write a C program to perform the following operations a) Insertion into a B-tree b) Deletion from a B-tree
11. Write a C program to perform the following operations a) Insertion into an AVL-tree b) Deletion from an AVL-tree
12. Program for Queue and Circular Queue Task
14. Program for Single Link List to insert a node at any point and display all nodes Task
15. Program for Single Link List to delete a node at any point and display all nodes

**Post Graduate Diploma in Computer Applications
Semester-I**

20PGDCA107**Lab-II (Based on 20PGDCA103)**

Credit: 2	Contact Hours per week: 4	External Practical Examination: 80
Internal Assessment: 20	Max. Time: 3 Hrs	Maximum Marks: 100

Note: Every student shall individually prepare a practical file consisting of 10 practical related to Database Management System. A panel consisting of two teachers (internal and External) should take the practical examination after the end of the semester. Marks are distributed as under:

Practical Record: 10 Marks

Viva-voce: 40 Marks

Written exam/executing the practical on the PC: 30 Marks

List of Practical:

1. To study DBMS, RDBMS.
2. To study Data Definition Language Statements.
3. To study Data Manipulation Statements.
4. Study of SELECT command with different clauses.
5. Study of SINGLE ROW functions (character, numeric, Data functions).\
6. Study of GROUP functions (avg, count, max, min, Sum).
7. Study of various type of SET OPERATORS (Union, Intersect, Minus).
8. Study of various types of Integrity Constraints.
9. Study of Various types of JOINS.
10. To study Views and Indices.

Post Graduate Diploma in Computer Applications Semester-I

20PGDCA108**Lab-III (Based on 20PGDCA104)**

Credit: 2	Contact Hours per week: 4	External Practical Examination: 80
Internal Assessment: 20	Max. Time: 3 Hrs	Maximum Marks: 100

Note: Every student shall individually prepare a practical file consisting of 10 practical related to Database Management System. A panel consisting of two teachers (internal and External) should take the practical examination after the end of the semester. Marks are distributed as under:

Practical Record: 10 Marks

Viva-voce: 40 Marks

Written exam/executing the practical on the PC: 30 Marks

List of Practical:

1. Create a simple HTML page with title, heading, and paragraph, formatting tags, hyperlinks, list items and image elements.
2. Create a simple HTML page having image elements with the use of map.
3. Create a simple HTML page having a complex table.
4. Create a simple HTML page having multiple Frames.
5. Embed Video in a HTML page.
6. Create a simple HTML page that uses Inline CSS
7. Create a simple HTML page that uses Document level CSS
8. Create a simple HTML page that uses External level CSS
9. Create a HTML page that uses all CSS properties Contents Tasks List Description
10. Write a simple JavaScript to print text on to the HTML document.
11. Write a simple script in head portion of HTML document.
12. Write a simple script in body portion of the HTML document.
13. Write an external script and link it to the HTML document.
14. Write a PHP script to get the PHP version and configuration information
15. Write a PHP script to display any multi-line string
16. Write a PHP script to place a variable to a title and as hyperlink of the Web page
17. Create a simple HTML form and accept the user name and display the name through PHP echo statement.
18. Use MySQL console to use database

Post Graduate Diploma in Computer Applications Semester-II

20PGDCA201**Operating System and UNIX**

Credit: 3	Contact Hours per week: 4	External Examination: 80
Internal Assessment: 20	Max. Time: 3 Hrs	Maximum Marks: 100

Objectives of the course

- Basic Concepts of Operating Systems
- Explain basic Unix concepts related to concurrency and control of programs
- Identify and define key terms related to operating system
- Capability to name and state the function of Unix commands

Note: *There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Student will have to attempt one question from each unit. Each question shall carry equal marks.*

UNIT-I

Operating systems overview: Operating systems as an extended machine & resource manager, operating systems classification; Operating systems and system calls; Operating systems architecture.

Process Management functions: Process model, hierarchies, and implementation; process states and transitions; multi-programming, multi-tasking, multi-threading; level of schedulers and scheduling algorithms.

UNIT-II

Memory Management and Virtual Memory: Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Performance of Demanding Paging, Page Replacement, Page Replacement Algorithm, Allocation of Frames, Thrashing.

UNIT-III

Device Management function: I/O devices and controllers interrupt handlers, device independent I/O software, user-space I/O software; disk scheduling; clock hardware software; terminal input/output software.

File management functions: file naming, structure, types, access mechanisms, attributes and operations; directory structures and directory operations; file space allocations; file sharing, file locking; symbolic links; file protection and security: distributed file systems.

UNIT-IV

Concurrent programming: sequential and concurrent process; precedence graph, Bernstein's condition; time dependency and critical code section, mutual exclusion problem; classical process coordination problems; deadlock handling, inter-process communication.

UNIX Operating System: Overview of UNIX OS in general and implementation of all above functions in Unix Operating System.

Suggested Readings:

1. Kanetkar Y., 2003. Unix shell programming, BPB Pub.
2. Tenenbaum A. S., 2008. Modern Operating Systems, 3rd Edition, Prentice-Hall.
3. Silberschatz A., Galvin P. B. and Gagne G., 2008. Operating System Concepts, 8th Edition, John Wiley & Sons Inc.
4. Peterson J. L., Silberschatz A. and Galvin P. B., 1991. Operating System Concepts, 3rd Edition, Addison Wesley Publ.
5. Deitel, H.M., An Introduction to Operating System, Addison Wesley Publ.
6. Kernighen B. W. and Pike R., 1983. The UNIX Programming Environment, 1st Edition, Prentice Hall.

Post Graduate Diploma in Computer Applications Semester-II

20PGDCA202**Data Communication and Computer Networks**

Credit: 3	Contact Hours per week: 4	External Examination: 80
Internal Assessment: 20	Max. Time: 3 Hrs	Maximum Marks: 100

Objectives of the course

- Explain basic concepts related to Data Communication
- To explore the issues and challenges of protocols design while delving into TCP/IP protocol suite.
- To study the types of modes and channels for communications
- To explore the inter-working of various layers of OSI

Note: *There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Student will have to attempt one question from each unit. Each question shall carry equal marks.*

UNIT-I

Introduction to Computer Network: Types of Networks, Network Topologies, OSI and TCP/IP Reference Models; Comparison of Models. Data Communications Concepts: Digital Vs. Analog communication; Parallel and Serial Communication; Synchronous, Asynchronous and Isochronous Communication; Communication modes: simplex, half duplex, full duplex; Multiplexing; Transmission media: Wired-Twisted pair, Coaxial cable, Optical Fiber, Wireless transmission: Terrestrial, Microwave, Satellite, Infra-red.

UNIT-II

Communication Switching Techniques: Circuit Switching, Message Switching, Packet Switching. Data Link Layer Fundamentals: Framing, Basics of Error Detection, Forward Error Correction, Cyclic Redundancy Check codes for Error Detection, Flow Control. Media Access Protocols: ALOHA, Carrier Sense Multiple Access (CSMA), CSMA with Collision Detection (CSMA/CD), Token Ring, Token Bus.

UNIT-III

High-Speed LAN: Standard Ethernet, Fast Ethernet, Gigabit Ethernet, 10G; Wireless LANs: IEEE 802.11, Bluetooth. Network Layer: IP Addressing and Routing, Network Layer Protocols: IPv4 (Header Format and Services), ARP, ICMP (Error Reporting and Query message); IPv6 (Header Format and Addressing).

UNIT-IV

Transport Layer: Process-to-Process Delivery: UDP, TCP; Connection Management by TCP; Basics of Congestion Control. Application Layer: Domain Name System (DNS); SMTP; HTTP; WWW. Network Security: Security Requirements and attacks; Cryptography: Symmetric Key (DES, AES), Public Key Cryptography (RSA); Firewall

Suggested Readings:

1. Tomasi W., 2004. Introduction to Data Communications and Networking, 1st Edition, Pearson Education.
2. Kurose J. F. and Ross K. W., 2007. Computer Networking, A Top-Down Approach Featuring the Internet, 3rd Edition, Pearson Education.
3. Tanenbaum A. S., 2003. Computer Networks, 4th Edition, Pearson Education.
4. Hassan M. and Jain R., 2003. High Performance TCP/IP Networking-Concepts, Issues and Solutions, Pearson Education.
5. Tanenbaum A. S. and Steen M. V., 2016. Distributed Systems-Principles & Paradigms, 2nd Edition, Pearson Education.

Post Graduate Diploma in Computer Applications Semester-II

20PGDCA203**Data Mining**

Credit: 3	Contact Hours per week: 4	External Examination: 80
Internal Assessment: 20	Max. Time: 3 Hrs	Maximum Marks: 100

Objectives of the course

- Basic Concepts of Mining the relevant information
- Basic understanding about the processing of data
- To study the different types of techniques for Data Mining
- To analyze data, choose relevant models and algorithms for respective applications

Note: *There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Student will have to attempt one question from each unit. Each question shall carry equal marks.*

Unit I

Introduction to Data Mining: Scope of Data Mining, how does Data Mining Works, Predictive Modelling on Data Mining, and Architecture for Data Mining, Profitable Applications of Data Mining, Data Mining Tools

Business Intelligence: Introduction, Business Intelligence, Business Intelligence tools, Business Intelligence Infrastructure, Business Intelligence Applications, BI versus Data Warehouse, BI versus Data Mining, Future of BI.

Unit II

Data Pre-processing: Data Pre-processing Overview, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

Data Mining Techniques- An Overview: Introduction of Data Mining Techniques, Data Mining Versus Database Management System, Data Mining Techniques- Association rules, Classification, Regression, Clustering, Neural networks.

Unit III

Clustering: Introduction of Clustering, Cluster Analysis, Clustering Methods- K means, Hierarchical clustering, Agglomerative clustering, Divisive clustering, clustering and segmentation software, evaluating clusters.

Web Mining: Terminologies, Categories of Web Mining – Web Content Mining, Web Structure Mining, Web Usage Mining, Applications of Web Mining, and Agent based and Data base approaches, Web mining Software

Unit IV

Applications of Data mining: Business Applications Using Data Mining- Risk management and targeted marketing, Customer profiles and feature construction, Medical applications (diabetic screening), Scientific Applications using Data Mining, Other Applications.

Suggested Readings:

1. Han J. and Kamber M., 2011. Data Mining - Concepts & Techniques, 3rd Edition, Harcourt India PVT Ltd. (Morgan Kaufmann Publishers).
2. Whiffen I. H., Data Mining, Practical Machine Learning tools & techniques with Java (Morgan Kaufmann)
3. Pujari A. K., 2013. Data Mining Techniques, 3rd Edition, University Press.
4. Adriaans P. and Zantinge D., 1996. Data Mining, 1st Edition, Addison Wesley.
5. Hand D. J., Mannila H. and Smyth P., 2001. Principles of Data Mining, 1st US edition, PHI Publication



Post Graduate Diploma in Computer Applications Semester-II

20PGDCA204**Object Oriented Programming using JAVA**

Credit: 3	Contact Hours per week: 4	External Examination: 80
Internal Assessment: 20	Max. Time: 3 Hrs	Maximum Marks: 100

Objectives of the course

- Basic Concepts of Object Oriented Programming
- Basic understanding of JAVA language
- To study the use of Java for GUI programming

Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Student will have to attempt one question from each unit. Each question shall carry equal marks.

Unit I

Introduction to Java: Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java.

Objects and Classes: Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, String Buffer, File, this reference

Unit II

Inheritance and Polymorphism: Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package.

Unit III

Event and GUI programming: Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing.

Unit IV

I/O programming: Text and Binary I/O, Binary I/O classes, Object I/O, Random Access Files.

Multithreading in java: Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try-catch-finally, Collections in java, Introduction to JavaBeans and Network Programming.

Suggested Readings:

1. Naughton P. and Schildt H., 1999. Java 2.0: The Complete Reference, 3rd Edition, TMH.
2. Holzner S.: Java 2, Swing, Servlets, JDBC & Java Beans Programming (Black Book), IDG Books India (P) Ltd.
3. Hatman & Eden: ASP with VBScript, SQL and HTML Programming Reference, IDG Books India(P), Ltd.
4. Jackson, J., 1995. Java by Example, Sunsoft Press.
5. Wiber, J., 1999. Using Java 2 Platform, PHI.

Post Graduate Diploma in Computer Applications Semester-II

20PGDCA205**Artificial Intelligence**

Credit: 3	Contact Hours per week: 4	External Examination: 80
Internal Assessment: 20	Max. Time: 3 Hrs	Maximum Marks: 100

Objectives of the course

- To conceptualize the basic ideas and techniques underlying the design of intelligent systems
- To make students understand advanced representation formalism and search techniques
- To make students understand and Explore the mechanism of mind that enable intelligent thought and action.

Note: *There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Student will have to attempt one question from each unit. Each question shall carry equal marks.*

Unit-I

Introduction: Introduction to Artificial Intelligence, various definitions of AI, AI Applications and Techniques, Turing Test and Reasoning - forward & backward chaining. Introduction to Intelligent Agents, Rational Agent, their structure, reflex, model-based, goal-based, and utility-based agents, behaviour and environment in which a particular agent operates.

Unit-II

Problem Solving and Search Techniques: State space search, Problem Characteristics, Production Systems, Control Strategies, Breadth First Search, Depth First Search, iterative deepening, uniform cost search, Hill climbing and its Variations, simulated annealing, genetic algorithm search; Heuristics Search Techniques: Best First Search, A* algorithm, AO* algorithm, Minmax & game trees, refining min max, Alpha – Beta pruning, Constraint Satisfaction Problem, Means-End Analysis.

Unit-III

Reasoning with Uncertain Knowledge: Different types of uncertainty - degree of belief and degree of truth, various probability constructs - prior probability, conditional probability, probability axioms, probability distributions, Bayes' rule, other approaches to modelling uncertainty such as Dempster-Shafer theory.

Fuzzy logic: Definition, Difference between Boolean and Fuzzy logic, fuzzy subset, fuzzy membership function, fuzzy expert system, Inference process for fuzzy expert system, fuzzy controller

Unit-IV

Expert system development life cycle: Problem selection, Prototype construction, Formalization, Implementation, Evaluation, Knowledge acquisition: Knowledge engineer, Cognitive behavior, Acquisition techniques. Knowledge representation: Level of representation, Knowledge representation schemes, Formal logic, Inference Engine, Semantic net, Frame, Scripts.

Suggested Readings:

1. Rich E., Knight K. and Nair S. B., 2010. Artificial Intelligence, 3rd Edition, Tata McGraw Hill.
2. Tanimoto S. L., 1995. The elements of Artificial Intelligence using Common LISP, 2nd Edition, W H Freeman & Co.
3. Patterson D. W., 1990. Introduction to Artificial Intelligence and Expert Systems, Prentice-Hall.
4. Sangal R., LISP Programming, Tata McGraw Hill.
5. Balagurusamy E., 1994. Artificial Intelligence Technology: Applications and Management, McGraw-Hill.
6. Mishkoff H. C., 1986. Understanding Artificial Intelligence, 1st Edition, BPB Publ.
7. Bharti A., Chaitanya V. and Sangal R., Natural Language Processing, PHI.

Post Graduate Diploma in Computer Applications
Semester-II

20PGDCA206**Lab-IV (Based on 20PGDCA201)**

Credit: 2	Contact Hours per week: 4	External Practical Examination: 80
Internal Assessment: 20	Max. Time: 3 Hrs	Maximum Marks: 100

Note: Every student shall individually prepare a practical file consisting of 10 practical related to Data Structure and Programming in C++. A panel consisting of two teachers (internal and External) should take the practical examination after the end of the semester. Marks are distributed as under:

Practical Record: 10 Marks

Viva-voce: 40 Marks

Written exam/executing the practical on the PC: 30 Marks

List of Practical:

1. Getting started with UNIX / Linux: a) Basic Commands for login and logout, b) Change password, c) Shutdown or rebooting system
2. Commands for Basic Utilities: a) Calender, Help, command manual, b) date & time, current user status, knowing present working directory
3. Commands for Directories & File listing
4. Commands for identifying UNIX shell - Listing the shell variables - Changing the shell - Path setting - Setting Prompt variable Contents Tasks List Description
5. Commands for File Management
6. Commands for Directory Management
7. Commands to change file and directory access permissions
8. Using Pipes & filters & meta characters
9. Command to deal with processes - Listing of processes - Running foreground & background processes - Stopping processes
10. Commands for communication - Pinging another computer in the network
11. Commands for vi editor - Open and closing, Operation modes, editing, navigation, copying text, searching

Post Graduate Diploma in Computer Applications Semester-II

20PGDCA207**Lab-V (Based on 20PGDCA204)**

Credit: 2	Contact Hours per week: 4	External Practical Examination: 80
Internal Assessment: 20	Max. Time: 3 Hrs	Maximum Marks: 100

Note: Every student shall individually prepare a practical file consisting of 10 practical related to Python Programming. A panel consisting of two teachers (internal and External) should take the practical examination after the end of the semester. Marks are distributed as under:

Practical Record: 10 Marks

Viva-voce: 40 Marks

Written exam/executing the practical on the PC: 30 Marks

1. A Simple Program in Class & Object.
2. A Program for Simple Inheritance.
3. A Program for Multilevel Inheritance.
4. A Program for Multiple Inheritance.
5. A Program of Polymorphism with Overloading.
6. Program of Polymorphism with Overriding.
7. A Program to Use Interface.
8. A Program to Use Abstract Class.
9. Write a program for Multiple Inheritance using Interface.
10. Write a program for using multidimensional array in java.

**Post Graduate Diploma in Computer Applications
Semester-II**

20PGDCA208**MATLAB**

Credit: 2	Contact Hours per week: 4	External Practical Examination: 80
Internal Assessment: 20	Max. Time: 3 Hrs	Maximum Marks: 100

Objectives of the course

- To familiarize the student in introducing and exploring MATLAB & LABVIEW softwares.
- To enable the student on how to approach for solving Engineering problems using simulation tools.
- To prepare the students to use MATLAB/LABVIEW in their project works.
- To provide a foundation in use of this softwares for real time applications.

UNIT-I

Introduction to MATLAB programming, Basic of MATLAB programming, Variables and assignments, data types, operators, working with numbers, mathematical operations, functions, good programming style, commands, M-files.

Unit-II

Introduction to Vectors in MATLAB: Vector types, referencing the elements of vector, Matrix generations, Array operations and Linear Equations; Introduction to programming in Matlab: M-File scripts, M-File functions, Colon notations; Introduction to Matrices in Matlab: defining Matrix, Matrix functions, Vector operations, Matrix operations.

Unit-III

Looping and Decision Making: for loops, while loop, branching and nesting, if statement, if-else statement, else-if statement, subroutine, built in function and user defined functions, handling functions in m-files.

Unit-IV

Data Files: Data import and data output, read/write, Plotting and Graphics in MATLAB: Polar plot, 2D and 3D plots, mesh, contour, Algebra, Optimization, Numerical Integration, Numerical Differentiation, solving polynomial equations, Introduction to SIMULINK.

Suggested Readings:

1. Gilat A., 2014. MATLAB-An Introduction with Applications, 5th Edition, Wiley.
2. Ahlersten K., 2012. An Introduction to Matlab, Bookboon.com.
3. Chapman S. J., 2015. MATLAB Programming for Engineers, Cengage Learning.

Post Graduate Diploma in Computer Applications Semester-II

20PGDCA209**Communication Skills**

Credit: 1	Contact Hours per week: 2	Internal Assessment: 20
Max. Time: 3 Hrs	Maximum Marks: 50	

Note: *There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Student will have to attempt one question from each unit. Each question shall carry equal marks.*

Unit-I

Human Communication, Verbal and Non Verbal Communication, Barriers to communication; the seven C's of effective communication. Preparing for interviews, CV/ Bio-data, Group Discussion, Public Speaking, Mass Communication.

Unit -II

Common Courtesies, Introducing Oneself Formally and Informally; Introducing Oneself on Social Media; Speaking Strategies: Making Enquiries, Clarifications, Recommendations, Explanations, Rejections, etc.; Being Diplomatic; Telephonic Communication.

Unit-III

Conversational Practice in Various Situations:

(meeting, parting, asking/talking about daily activities, at railway station, seeking information, buying at shops, asking about buses, travelling by bus, using expressions of time, talking about money, identifying people, at the post office, at the bank, at the grocery store, immediate family and relatives, hiring a taxi, talking about weather/weather conditions, breakfast or lunch at a restaurant, ordering food, dinner conversations, at the doctors clinic, quitting and finding jobs, office conversations, conversations about school/ college/ university, the English class, driving a car).

Students shall develop dialogue-based conversations on the above-mentioned situations.

Unit-IV

Personality Development Skills: Personal Grooming; Assertiveness; Improving Self-Esteem; Significance of Critical Thinking; Confidence Building; SWOC analysis.

Emotional intelligence: Recognizing and Managing Emotions and Situations; Stress and Anger Management; Positive Thinking; Developing Sense of Humour.

Suggested Readings:

1. Kumar, S. and PushpLata, 2016. English for Effective Communication. OUP.
2. Mohan, Krishna and Meera Banerji, 2013. Developing Communication Skills 2nd ed. Trinity Press.
3. Dutt, P. Kirammai and GeethaRajeevan, 2016. A Course in Communication Skills. Foundation Books, CUP.