Scheme and Syllabi
of
Post Graduate Diploma of Computer Applications
(PGDCA)

One Year Programme

CHOICE BASED CREDIT BASED SYSTEM
(80:20)
(w.e.f. session 2019-20)

Department of Computer Science& Engineering
Guru JambheshwarUniversity Science and Technology
Hisar

SCHEME OF EXAMINATION
P G D C A (Choice Based Credit System)

Semester I

Paper No	Nomenclature of Paper	Total Credits	No. of Hours
PGDCA101	Introduction to Information Technology	4	4
PGDCA102	Computer Programming Using C	4	4
PGDCA103	Operating Systems	4	4
PGDCA104	Database Management Systems	4	4
PGDCA105	Web Technologies	4	4
PGDCA106	Software Laboratory –I Programming using C	2	4
PGDCA107	Software Laboratory –II HTML and MS-Office	2	4
PGDCA108	Seminar	1	2
Total		**25**	**44**

Semester –II

Paper No	Nomenclature of Paper	Total Credits	No. of Hours
PGDCA201	Data Structure and Algorithms	4	4
PGDCA202	Computer Networks	4	4
PGDCA203	Object Oriented Systems and C++	4	4
PGDCA204	Computer Organization	4	4
PGDCA205	Software Engineering	4	4
PGDCA206	Software Laboratory –III Data structure implemented in C/C++	2	4
PGDCA207	Software Laboratory –IV Programming in C++	2	4
PGDCA208	Seminar	1	2
Total		**25**	**44**

Grand total of Credits (Semester I and II)	**88**

Note:

1) One credit in theory paper is equivalent to one hour classroom teaching per week.
2) One credit in practical/lab course is equivalent to 2 hours practical/lab work per week
3) A teacher will conduct practical class in a group of 15-20 students.

PGDCA101:Introduction to Information Technology

General Course Information:

Course Code: PGDCA101 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 20; external: 80)** Two minor examinations each of 15 marks, Class Performance measured through percentage of lectures attended (2 marks) Assignment and quiz (3 marks), and end semester examination of 80 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains eight short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

About the Course and its Objectives & Outcomes:

The objectives of this course are

- To make student understand various components of computer and their working.
- Learn MS-Office and its components.
- To make student understand about Internet and Internet services.

By the end of the course a student is expected to:

- Learn how computer works and the importance of various components of computers.
- Understand about how Internet works.
- Select particular configuration of computer necessary for the application.

Syllabus

Unit I

Computer Fundamentals: Introduction to Computers: Characteristics and Limitations of Computers, Evolutions of Computers, Classification of Computers, Computer Languages, Types of software, Structured Programming Concepts.

Basic Computer Organization: Units of a computer, CPU, ALU, Memory Hierarchy, Registers, I/O devices, Mother Board.

Unit II

Word Processing: Introduction to MS-Word, Creating & Editing Text: Paragraph Formatting, Page Formatting, Template, Page, Views, Table; Advanced Features: Bookmark, Mail Merge, Macros.

Unit III

Spread Sheets: Introduction to MS-Excel, Creating & Editing Worksheet, Formatting data, Formulas and Functions, Creating Charts, Pivot Tables.

Power Point Presentations: Creating, Manipulating & Enhancing Slides, Organizational Charts, Animations & Sounds, Inserting Animated Pictures

Unit IV

Internet Basics: History of Internet, Web Browsers, Web Servers, Hypertext Transfer Protocol, Internet Protocols Addressing, Internet Connection Types, How Internet Works, ISPs, Search Engines, Emails and Its Working, Internet Security, Uses of Internet, Computer Networks and their

advantages, Types of Computer Network, Network Topologies, Basics of Transmission Media; Cloud Computing Basics: Overview, Applications, Intranets and the Cloud; Benefits, Limitations and Security Concerns.

Text and Reference Books:

- Satish Jain, Kratika, M. Geetha, "MS Office", BPB Publications, 2010.
- ITL Education Solutions Limited, "Introduction to Computer Science", Pearson Education, 2nd Edition 2012.
- P. K. Sinha, "Computer Fundamentals", 6th edition, 2003
- Tony Feldman,"Introduction to Digital Media", Routledge; 1 edition, 1996.
- Bartee, Thomas C, "Digital Computer Fundamentals", McGraw-Hill Inc., 6th Edition, 1984

PGDCA102:Computer Programming Using C

General Course Information:

Course Code: PGDCA102 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 20; external: 80)** Two minor examinations each of 15 marks, Class Performance measured through percentage of lectures attended (2 marks) Assignment and quiz (3 marks), and end semester examination of 80 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains eight short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

About the Course and its Objectives & Outcomes:

The objectives of this course are to make students to understand programming language, concepts of structured programming, Control structures, Stepwise refinement, Functions, Arrays, and Pointers etc. The main emphasis of the course will be on problem solving aspect i.e. developing proper algorithms.

By the end of the course a student is expected to:

- Use the various constructs of a programming language.
- Write program in 'C' language to solve a problem.
- Implement the algorithms in 'C' language.
- Handle Files in 'C'

Syllabus

Unit I

Programming process: Problem definition, Algorithm development, Flowchart, Program Coding, compilation, debugging,testing and execution, Types of errors.

C Programming Fundamentals: Identifiers and keywords, Structure of C Program data types, input and output, type conversion.

Unit II

Operators &Expressions: Arithmetic, unary, logical and relational operators, assignment operator, Bit-wise, conditional operator, library functions.

Control statements: Decision making using if, if-else, Nested IF,Else If Ladder switch, break, continue statement and goto Statement, looping using for, while and do-while statements, nested loops.

Unit III

Functions: Library functions, Defining & accessing User defined functions, function prototype and passing arguments to a function, recursion versus iteration. Macro vs function.

Arrays: Definition, accessing elements, initialization, passing to functions, multi-dimensional arrays, Strings & operations of Strings, String Handling through Built-in and User Defined Functions. Pointers declaration, assignment, Pointer Arithmetic,passing pointer to functions, pointer arrays,Dynamic Memory Allocation.

Unit IV

Structure and Union: Defining and Initializing Structure, accessing members, nested structures, pointer to structures, self-referential structures, Unions: Introduction to Unions and its Utilities.
File Handling and Storage classes: automatic, register, external and static variables; Opening and Closing file in C,Modes of File,Reading and Writing data to a file.

Text and Reference Books:

- E.Balaguruswamy, "Programming in C",TMH.
- Y.Kanetkar, "Let Us C" BPB Publication.
- Byron Gottfried, "Programming with C", Schaum's outline series" TMH.

PGDCA103: Operating Systems

General Course Information:

Course Code:PGDCA103 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 20; external: 80)** Two minor examinations each of 15 marks, Class Performance measured through percentage of lectures attended (2 marks) Assignment and quiz (3 marks), and end semester examination of 80 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains eight short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

About the Course and its Objectives & Outcomes:

The objective of this course is to help students become familiar with the fundamental concepts of operating systems and provide students with sufficient understanding of operating system design.

By the end of the course a student is expected to:

- Exhibit familiarity with the fundamental concepts of operating systems.
- Exhibit competence in recognizing operating systems features and issues.

Syllabus

Unit I

Introductory Concepts: Operating systems functions and characteristics, operating system structure,operating system services, system calls, system programs. Types of Operating system: Batch operating system, Time-sharing operating system, Distributed operating system, Real time systems

Process Management: Process concept, Process States, Process Control Block, Cooperating processes.

Unit II

CPU scheduling: Levels of Scheduling, Scheduling criteria, Comparative study of scheduling algorithms, Multiple processor scheduling.

Concurrent Processes: Critical section problem, Semaphores, Classical process co-ordination problems and their solutions, Monitors, Inter-process Communications.

Unit III

Deadlock: System model, Deadlock characterization, Methods for handling Deadlocks: Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from Deadlock.

Storage Management: Storage allocation methods: Single contiguous allocation, Multiple contiguous allocation, Paging; Segmentation combination of Paging and Segmentation, Virtual memory concepts, Demand Paging, Page replacement Algorithms, Thrashing.

Unit – IV

Device and file management: Disk scheduling, Disk structure, Disk management, File Systems: Functions of the system, File access and allocation methods, Directory Systems: Structured Organizations, directory and file protection mechanisms.
Case Studies: Comparative study of WINDOW, UNIX, ANDROID & LINUX system.

Text and References Books:

- D.M.Dhamdhere, "Operating systems- A Concept based Approach", 2nd Edition.TMH
- Silberschatz, Galvin and Gagne, "Operating System Concepts", Sixth Edition, Wiley India Pvt. Ltd.
- Andrew S.Tanenbaum,"Modern Operating Systems", Second Edition, Pearson Education.
- Harvey M. Deital, "Operating Systems", Third Edition, PearsonEducation.
- Godbole, A.S., "Operating Systems", Tata McGraw-Hill Publishing Company, New Delhi.

PGDCA104: Database Management Systems

General Course Information:

Course Code: PGDCA104 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 20; external: 80)** Two minor examinations each of 15 marks, Class Performance measured through percentage of lectures attended (2 marks) Assignment and quiz (3 marks), and end semester examination of 80 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains eight short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

About the Course and its Objectives & Outcomes:

The objectives of this course are

- To provide comprehensive coverage of the problems involved in database design, in-depth coverage of data models and database languages, and a survey of implementation techniques applied in modern DBMS.
- To provide practical skills of conceptual/logical database design and general familiarity with the problems and issues of database management.
- To develop skills that is appropriate for Database Administrators, Database Application Developers, Database Specialists, and DBMS developers.

By the end of the course a student is expected to be familiar with:

- The basic concepts and appreciate the applications of database systems.
- The basics of SQL and construct queries using SQL.
- A relational database system theory and be able to design database based on relational data model.

Syllabus

Unit I

Overview: File Systems vs. DBMS, Characteristics of the Data Base Approach, Database users, Advantages and Disadvantages of a DBMS, Responsibility of Database Administrator.

Data Base Systems Concepts and Architecture: Data Models, Schemas and Instances, DBMS architecture and various views of Data, Data Independence, Database languages.

Unit II

Entity Relationship Model: Basic Concepts-Entity, Attributes, Types of Attributes, Entity set and Keys, Relationships-Relationship set, Degree of Relationship, Roles and Structural Constraints, E-R Diagrams, Reduction of an E-R Diagram to Tables, Binary Representation and Cardinality, Participation Constraints

Unit III

Relational Data Model:-Brief History, Relational Model Terminology-Relational Data Structure, Database Relations, Properties of Relations, Keys, Domains, Integrity Constraints over Relations, Base Tables and Views.

Unit IV

SQL: Introduction to SQL, Data Types in SQL, Common Commands in SQL- Select, Insert, Update and Delete, views in SQL; Relational Database Design: Functional Dependencies, Decomposition, Desirable properties of decomposition, Normal Forms (1 NF, 2 NF, 3 NF and BCNF).

Text and Reference Books:

- Elmasri&Navathe,"Fundamentals of Database Systems", 3rd Edition, Addison Wesley, New Delhi.
- R.Pannerselvam,"Database Management Systems",2nd Edition, PHI Learning Pvt. Ltd., New Delhi, 2011
- Bipin C. Desai,"An Introduction to Database System", Galgotia Publication, New Delhi
- Korth and Silberschatz ,"Database System Concept", 4th Edition, McGraw Hill International Edition

PGDCA105: Web Technologies

General Course Information:

Course Code: PGDCA105 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 20; external: 80)** Two minor examinations each of 15 marks, Class Performance measured through percentage of lectures attended (2 marks) Assignment and quiz (3 marks), and end semester examination of 80 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains eight short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

About the Course and its Objectives & Outcomes:

The objectives of this course are

- Learn HTML and design various web pages.
- Learn tags and its uses in web designing process with HTML.

By the end of the course a student is expected to be familiar with:

- Become skilled at Web Designing Complete Process.
- Make Web Pages using tags in HTML.
- Get proficient in using HTML.

Syllabus

Unit I

Introduction to Internet and World Wide Web; Evolution and History of World Wide Web; Basic features; Web Browsers; Web Servers; Hypertext Transfer Protocol; URLs; Searching and Web-Casting Techniques; Search Engines and Search Tools.

Unit II

Web Publishing: Hosting your Site; Internet Service Provider; Planning and designing your Web Site; Steps for developing your Site; Choosing the contents; Home Page; Domain Names; Creating a Website; Website and its Categories.

Unit III

Web Development: Introduction to HTML; Hypertext and HTML; HTML Document Features; HTML Document structure; HTML command Tags; Creating Links; Heading tags; Text styles; Text Structuring; Text colors and Background colors; Text Formatting; Page Layouts.

Unit IV

Images; Inserting Graphics; Images as Hyperlinks; Ordered and Unordered lists; Table Creation and Layouts; Frame Creation and Layouts; Working with Forms and Menus; Working with Radio Buttons; Check Boxes; Text Boxes.

Text and Reference Books:

- Raj Kamal, “Internet and Web Technologies”, Tata McGraw-Hill.
- Ramesh Bangia, “Multimedia and Web Technology”, Firewall Media.
- Thomas A. Powell, “Web Design: The Complete Reference”, 3-edition, Tata McGraw-Hill.
- Wendy Willard, “HTML: A Beginners Guide”, Tata McGraw-Hill.
- Deitel and Goldberg, “Internet and World Wide Web, How to Program”, PHI.

PGDCA106: Software Laboratory –I
Programming in C

General Course Information:

Course Code: PGDCA106 *Course Credits: 2 Type: Compulsory Contact Hours: 4 hours/week Mode: Experimental Lab. *In lab work one credit is equivalent to two hours	**Course Assessment Methods (internal: 20; external: 80)** An internal practical examination is conducted by the course coordinator. The end semester practical examination is conducted jointly by external and internal examiners. External examiner is appointed by the COE of the university from the panel of examiners approved by BOSR of the Department of Computer Science and Engineering, Hisar and the internal examiner is appointed by the Chairperson of the Department.

Pre-requisites:
Students are expected to have the strong theoretical concepts and computer fundamentals as well as capability to develop logic, to write algorithm and draw flowchart.

The objectives of this lab.course are to:
- Provide a way to interact and understand the way a computer works.
- Learn how to input data for a given problem from keyboard and obtain outputs from monitor.

By the end of the course a student is expected to be able to:
- Write code for a given problem in „C" language.
- Present results in an informative way

Students are given eight to ten laboratory assignments with soft and hard deadlines. The lab assignments are evenly spread over the semester. Every student is required to prepare a file of laboratory experiments done

List of Laboratory Assignments:
1. Write a program to find ASCII value of a character.
2. Write a program to swap two numbers without using third variable.
3. Write a program to check whether a number is Even or Odd.
4. Write a program to find largest among three numbers without using if.
5. Write a program to display Fibonacci sequence.
6. Write a program to print first ten prime numbers.
7. Write a program to check number is Armstrong or not using while.
8. Write a program to design a simple calculator using switch.
9. Write a program to find largest and smallest using global declaration.
10. Write a program to find factorial of a Number using recursion.
11. Write a program to reverse a String.
12. Write a program to find number is int or float.
13. Write a program to find largest and smallest element of an array.
14. Write a program to find addition of two matrices.
15. Write a program to find Multiplication of two Matrices.

16. Write a program to check matrix is sparse or not.
17. Write a program to perform concatenation of strings using pointers.
18. Write a program to implement structures.
19. Write a program to add two numbers using pointers.
20. Write a program to read and write data in a file.

PGDCA107: Software Laboratory –II
HTML and MS-Office

General Course Information:

Course Code: PGDCA106 *Course Credits: 2 Type: Compulsory Contact Hours: 4 hours/week Mode: Experimental Lab. *In lab work one credit is equivalent to two hours	**Course Assessment Methods (internal: 20; external: 80)** An internal practical examination is conducted by the course coordinator. The end semester practical examination is conducted jointly by external and internal examiners. External examiner is appointed by the COE of the university from the panel of examiners approved by BOSR of the Department of Computer Science and Engineering, Hisar and the internal examiner is appointed by the Chairperson of the Department.

Pre-requisites:
Students are expected to have basic knowledge of computers.

The objectives of this lab.course are to:
- To design web pages using different tags in HTML.
- To understand the Office Packages.
- To have hands on knowledge of MS Word and MS Excel.
- To have practical knowledge of MS PowerPoint.

By the end of the course a student is expected to be able:
- Use MS-Word to create resume, letters, tables etc.
- Use MS-Excel to store numerical data and perform calculations on it.
- Use MS-PowerPoint to create professional presentation.
- Design web pages of web sites using HTML language.

Students are given ten or more laboratory assignments with soft and hard deadlines. The lab assignments are evenly spread over the semester. Every student is required to prepare a file of laboratory experiments done.

List of Laboratory Assignments:
1. Write a HTML code to show body, title, text formatting, color and background color tag.
2. Write a program in HTML to create a web page to show comment and H1-----H6 tags.
3. Write a HTML code to illustrate the usage of the following
   a. Ordered List
   b. Unordered List
   c. Definition List
4. Write a program in HTML to show map of India.
5. Write a HTML code to display your education details in a tabular format.
6. Write a HTML code to create a Homepage having three links: About Us, Our Services and Contact Us. Create separate web pages for the three links.

7. Write a HTML code to create a Registration Form. On submitting the form, the user should get navigated to a profile page.
8. Write a program in HTML to create a webpage with four frames.
9. Create a class timetable using table option in MS- Word.
10. Using MS-Word, create personal letter and company letter.
11. Use mail merge to create a form letter.
12. Make your resume in MS-Word.
13. Create a presentation in MS PowerPoint on any topic of your choice with animation and transition effects.
14. Enter the data given below into a worksheet.

	A	B	C	D	E
1	**Stationery Supplies Ltd**				
2					
3	**Date**	**SalesPerson**	**Item**	**Receipt No**	**Amount**
4	21-Nov	Carl	Toys	1238	1,782.10
5	26-Nov	Carl	Stationery	1255	4,853.55
6	26-Nov	Carl	Toys	1395	51.35
7				**Carl's Total**	
8	21-Nov	John	Cards	1141	91.15
9	24-Nov	John	Books	1982	442.60
10	21-Nov	John	Toys	1885	561.50
11	26-Nov	John	Toys	1875	62.75
12				**John's Total**	
13	22-Nov	Judy	Books	1032	234.50
14	26-Nov	Judy	Sports goods	1920	472.60
15				**Judy's Total**	
16	25-Nov	Mary	Toys	1774	364.15
17				**Mary's Total**	
18	22-Nov	Susan	Electronics	1160	52.95
19	23-Nov	Susan	Cards	1075	81.60
20	23-Nov	Susan	Others	1745	132.95
21	24-Nov	Susan	Sports goods	1662	2,580.10
22				**Susan's Total**	
23					
24				**Grand Total**	

(i). Calculate the totals for each salesperson and get the grand total;
(ii). Format the worksheet as follows:
Make all the Totals bold, two decimal places, comma, center the title across columns A-E and make it size 16, bold and Italic.
(iii). Put a double border round the whole table and a single line border inside the table.
(iv). Save the worksheet as **Stationery Analysis**.

15. Using the information given in the table below, calculate the amount and total amount payable by the company to the employees.

	A	B	C	D	E
1	**Services Company Ltd**				

2	**Overtime Details**				
3	**Date**	**Name**	**Hours Worked**	**Rate**	**Amount**
4	26-Nov	Kennedy	5	70	
5	26-Nov	Kennedy	5	100	
6	26-Nov	Mary	5	100	
7	26-Nov	Lewis	4	100	
8	30-Nov	Judy	3	100	
9	30-Nov	Kennedy	6	70	
10	30-Nov	Lewis	5	100	
11	30-Nov	Kennedy	4	70	
12	30-Nov	Judy	5	100	
13	30-Nov	Lewis	5	100	
14	02-Dec	Judy	4	70	
15			**Total Amount**		

PGDCA108 Seminar

General Course Information:

Course Code: PGDCA108 *Course Credits: 1 Type: Compulsory Contact Hours: 2 hours/week Mode: Lab. *In lab work one credit is equivalent to two hours	**Course Assessment Methods (internal: 100)** An internal examination is conducted by the assigned teacher on regular basis in lab and based evaluation is done by the teacher.

The objectives of this Seminar course are to:

- Understanding of the basics of the application of the various models of verbal and non-verbal communication in the social and professional sphere
- Develop the following skills in the students-
  - Communication Skills
  - Presentation Skills
  - Active Listening etc.

By the end of the course a student is expected to be able:

- To understanding the importance of intonation, word and sentence stress for improving communicative competence, identifying and overcoming problem sounds.
- To establish a repo with the audience.
- To present his/her ideas clearly and confidently.
- To address the queries from the audience.

General Guidelines:

- Students are required to prepare a presentation.
- The content of presentation can be on any topic from the core subject.
- Students are required to submit hard as well as soft copy of the presentation to the concerned teacher.

PGDCA201: Data Structures and Algorithms

General Course Information:

Course Code: PGDCA201 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 20; external: 80)** Two minor examinations each of 15 marks, Class Performance measured through percentage of lectures attended (2 marks) Assignment and quiz (3 marks), and end semester examination of 80 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains eight short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:
Students are expected to have knowledge of programming in a standard programming language like C.

About the Course and its Objectives & Outcomes:
The objectives of this course are to

- Achieve an understanding of fundamental data structures, which allow one to store collections of data with fast updates and queries
- Study theoretical analysis, implementation and application of data structures, and
- Learn tradeoffs between different implementations of these abstractions.

By the end of the course a student is expected to:

- Design algorithms for various computing problems.
- Analyze the time and space complexity of algorithms.
- Efficiently implement your solution using programming language C.

Syllabus

Unit I

Introduction: Data Structures Definition and its types, Data Structure operations, Static and dynamic memory storage,Algorithms complexity and time-space tradeoff, Big-O notation.
Strings: Introduction, storing strings, String operations, Pattern matching algorithms.

Unit II

Arrays: one-dimensional arrays,matrices, sparse matrices, multi-dimensional arrays, operations on arrays, Linear search, Binary search, Insertion sort, selection sort, Bubble sort, Merge sort.
Linked List: Array vs linked list, Types (singly, doubly, singly circular, header, doubly circular,), Operations on Lists – create, insert, delete, search, Applications of linked lists.

Unit III

Stack: Definition, Array implementation of stacks, Linked implementation of stacks, Applications of Stacks: Infix, Postfix and prefix expression, conversions and evaluation of expressions, Recursion, Quick Sort.
Queue: Definition, Array implementation of queues, Linked implementation of queues, Circular queues, Priority queues, Double-ended queues, Applications of queue.

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), Heap Sort and its complexity analysis, Introduction to AVL Trees and Balanced multi-way search trees.
Graph: 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.

Text and Reference Books:

- Seymour Lipschutz, “Data Structures”, Tata McGraw- Hill Publishing Company Limited, Schaum’s Outlines, New Delhi.
- YedidyanLangsam, Moshe J. Augenstein, and Aaron M. Tenenbaum, “Data Structures Using C”, Pearson Education., New Delhi.
- BalaGuruswamy, “Data Structures Using C”, TMH.
- Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Addison- Wesley.

PGDCA202: Computer Networks

General Course Information:

Course Code: PGDCA202 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 20; external: 80)** Two minor examinations each of 15 marks, Class Performance measured through percentage of lectures attended (2 marks) Assignment and quiz (3 marks), and end semester examination of 80 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains eight short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Prerequisite:
Student is required to have the knowledge of Data representation, Digital and Control Logic, Memory Hierarchy, Input/ output devices and overall system design.

About the Course and its Objectives & Outcomes:
The objectives of this course are:

- To introduce to various types of Networks. Networks relates to the Communication among various Gadgets and Networking devices.
- To understand the OSI model for Networks that defines collection of protocols for the related communication.
- To learn various wired and wireless connections for communication.

By the end of the course a student is expected to:

- Able to understand the nature of computer network.
- Able to identify the type of Network in the work environment and identify the protocols at various layers.
- Define OSI reference models and its layers.

Syllabus

Unit I

Introduction: Computer Communications and Networking Technologies; Uses of Computer Networks; Network Devices: Nodes, and Hosts; Types of Computer Networks and their Topologies; Network Software: Network Design issues and Protocols; Connection-Oriented and Connectionless Services; Computer Communications and Networking Models: Decentralized and Centralized Systems, Distributed Systems, Client/Server Model.

Unit II

OSI Reference Model: Physical, Data Link, Network, Transport, Session, Presentation and Application layer; Advantages and Disadvantages of OSI model; Example Networks: Internet, ATM.

Unit III

Network hardware components: Connectors, Transceivers, Network Interface Cards, Hubs, Switches, Repeater, Bridges, Routers, Gateways; Transmission media: Guided- Twisted, Co-axial, Fiber –optic cable, Unguided-Radiowaves, Microwaves, Infrared Transmission, Wired versus Wireless Networks.

Unit IV

Analog and Digital Communications Concepts: Representing Data as Analog Signals, Representing Data as Digital Signals, Data Rate and Bandwidth, Capacity, Baud Rate; Digital Carrier Systems; Communication Satellites; Switching and Multiplexing; Dialup Networking, Broadband Connection, Wireless Connection.

Text and Reference Books:

- Andrew s. Tanenbaum, “Computer Networks”, PHI.
- Fred Halsall, “Data Communications, Computer Networks and Open Systems”, fourth edition, Addison Wesley.
- Behrouz, Forouzan, “Introduction to Data Communications and Networking”, Tata Mc-Graw Hill.
- William Stallings, “Data and Computer Communications”, fifth edition, PHI.

PGDCA203: Object Oriented Systems and C++

General Course Information:

Course Code: PGDCA203 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 20; external: 80)** Two minor examinations each of 15 marks, Class Performance measured through percentage of lectures attended (2 marks) Assignment and quiz (3 marks), and end semester examination of 80 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains eight short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites: Basic knowledge of C language concepts like Data-Types, Loops, Array, Structure etc.

About the Course and its Objectives & Outcomes:

The objectives of this course are to:

- Understand the advanced programming concepts of OOPS.
- Develop efficient applications with greater ease using the concepts like Abstraction, Encapsulation, Polymorphism and Inheritance.

By the end of the course a student is expected to:

- Design and Develop different computer software applications.
- Implementation of various algorithms in programming languages for research purpose

Syllabus

Unit 1

Introduction to object oriented programming: Procedural vs Object oriented programming Characteristics of OOP; Classes& Object, Data encapsulation and Abstraction, Polymorphism, Inheritance, Dynamic Binding and message passing, OOPs Application, Structure of C++ Program ,Data types ,Variables, Operators, Namespaces, Enums, Type Conversion, Control Statements Arrays, Strings, Structure, Pointers.

Unit II

Introduction to Class: Struct vs. Classes, Class Definition, Classes and Objects, Access Specifiers: Private, Public and Protected, Member functions of the class, Constructor and Destructor, Parameterized Constructor, Copy Constructors. Inheritance: Reusability, Types of Inheritance: Single inheritance, Multiple, Multilevel, Hybrid Inheritance, Public, Private, and Protected Derivations, Using derived class, Constructor and destructor in derived class, Object initialization and conversion, Nested classes (Container classes), Virtual Inheritance and Virtual base class.

Unit III

Polymorphism and Exception Handling: Function Overloading, Static Class Members, Static Member Functions, Friend Functions, Operator Overloading: Unary and Binary Operator Overloading. Abstract class, Virtual function, Pure virtual function, Overloading vs. Overriding. Memory management: new, delete, object Creation at Run Time, This Pointer. Exception handling: Throwing, Catching, Re-throwing an exception, specifying exceptions, processing unexpected exceptions, Exceptions when handling exceptions, resource capture and release.

UNIT IV

Templates and Files: Introduction, Class templates and Function templates, Overloading of template function, namespaces. Introduction to STL: Standard Template Library: benefits of STL, containers, adapters, iterator, vector, list. Working with files: C++ streams, C++ stream classes, creating, opening, closing and deleting files, file pointers and their manipulators, updating file, random access to file, Error handling during file operations.

Text and Reference Books:

- Herbert Schildt, "C++ - The Complete Reference", Tata McGraw Hill Publications.
- E. Balaguruswamy, "C++", Tata McGraw Hill Publications.
- E. Balaguruswamy, "Object Oriented Programming and C++", TMH.
- Shah and Thakker, "Programming in C++", ISTE/EXCEL.
- Johnston, "C++ Programming Today", PHI.
- Olshevsky, "Revolutionary Guide to Object Oriented Programming Using C++", SPD/WROX.
- R.Rajaram,"Object Oriented Programming and C++", New Age International.

PGDCA204: Computer Organization

General Course Information:

Course Code: PGDCA204 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 20; external: 80)** Two minor examinations each of 15 marks, Class Performance measured through percentage of lectures attended (2 marks) Assignment and quiz (3 marks), and end semester examination of 80 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains eight short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Prerequisites:
Students are expected have the elementary knowledge about computers.

About the course objectives and outcomes:
The objectives of this course are to:

- Basic understanding of computer organization: roles of processors,
- Understanding the concept of information Representation.
- Understanding arithmetic and logical operations with integer operands.
- To understand digital, binary, combinational, sequential logic.

By the end of the course a student is expected to be able:

- To solve basic binary math operations using the computer.
- To demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target computer.
- To apply knowledge of the processor's internal registers.

Syllabus

Unit I

Information Representation: Number Systems, Binary Arithmetic Operations, Fixed-point and Floating point representation of numbers, BCD, ASCII, EBCDIC, Grey Code.

Unit II

Binary Logic: Boolean Algebra, Duality Principal, Boolean Theorems, Boolean Functions Truth Tables, De Morgan's Law, Simplification of Boolean Functions using Venn Diagram, Karnaugh Maps, Digital Logic: Logic Gates -AND, OR, NOT, Universal Gates - NAND, NOR, others- XOR, XNOR.

Unit III

Combinational Logic: Design Procedure, Adders, Subtractors, Encoders, Decoders, Multiplexers and De-multiplexers. Sequential Logic: Flip-flops, Registers and Counters.

Unit IV

Basic Computer Organization: Instruction Code, Computer Registers, Computer instructions, Timing and control, Instruction Cycle.

CPU organization: General Register Organization, Stack Organization, Instruction Formats, Addressing Modes.

Text and References Books:

- Mano, M. Morris,"Digital Logic and Computer Design", Prentice Hall of India Pvt. Ltd.
- V. Rajaraman, T. Radhakrishnan,"An Introduction to Digital Computer Design", PrenticeHall of India Pvt. Ltd.
- Mano, M. Morris,"Computer System Architecture", Prentice Hall of India Pvt. Ltd.
- Andrew S. Tanenbaum,"Structured Computer Organization", Prentice Hall of India Pvt.Ltd.

PGDCA205: Software Engineering

General Course Information:

Course Code: PGDCA205 Course Credits: 4 Type: Compulsory Contact Hours: 4 hours/week Mode: Lectures Exam Duration: 3hours	**Course Assessment Methods (internal: 20; external: 80)** Two minor examinations each of 15 marks, Class Performance measured through percentage of lectures attended (2 marks) Assignment and quiz (3 marks), and end semester examination of 80 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains eight short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites:
Students are expected to have knowledge of algorithms, flow charts and at least one programming language.

About the Course and its Objectives & Outcomes:
The objectives of this course are to:

- Introduce students to software development life cycle and models for developing and effective and efficient software
- Identify software requirements for manual or automated real-world systems
- Compare and contrast software process models and software development methodologies
- Moreover, student will learn the skill of software requirement specification and software quality assurance techniques

By the end of the course a student is expected to:

- Describe the software development life cycle as well as describing the various software development model and understand the advantages and disadvantages of each model;
- Illustrate the software requirement specification, Effort estimation
- Understand the use of model checking and be able to use it effectively.

Syllabus

Unit I

Introduction: Program vs. Software, Software Engineering paradigms, Software Crisis – problem and causes.
Phases in Software development: Requirement, Analysis, Software Design, Coding, Testing, Maintenance.
Software Development Process Models: Waterfall, Prototype, Evolutionary and Spiral models.

Unit II

Software Requirement Analysis and Specifications: Feasibility Study Software Requirements, Need for SRS, Characteristics of an SRS, Components of an SRS, Structure of a requirements

document, validation and metrics, Problem Analysis, Data Flow Diagram, Data Dictionary, Decision table, Decision trees.

Unit III

Software Project Planning: Process Planning, Effort estimation, COCOMO model, Project scheduling and Staffing, team structure, Software configuration management, Quality assurance plans, Risk Management, Project monitoring plans.

Software Implementation and Maintenance: Type of maintenance, Management of Maintenance, Maintenance Process, maintenance characteristics.

Unit IV

Testing: Testing fundamentals, Error, Fault, and Failure, Test Oracle, Test Case and Test Criteria, Psychology of testing, Black Box Testing, Boundary value analysis, Equivalence Class Partitioning, Decision Table based testing, Cause effect graphing, White box testing , Control flow based criteria, level of testing, Unit testing, Integration testing, System testing, Validation testing, alpha, beta, and Acceptance testing.

Text and Reference Books:

- Pressman R. S., "Software Engineering – A Practitioner's Approach", Tata McGraw Hill.
- Jalote P., "An Integrated approach to Software Engineering", Narosa.
- Sommerville, "Software Engineering", Pearson Education.
- Fairley R., "Software Engineering Concepts", Tata McGraw Hill.

PGDCA206: Software Laboratory –III
Data structure implemented in C/C++

General Course Information:

Course Code: PGDCA206 *Course Credits: 2 Type: Compulsory Contact Hours: 4 hours/week Mode: Experimental Lab. *In lab work one credit is equivalent to two hours	**Course Assessment Methods (internal: 20; external: 80)** An internal practical examination is conducted by the course coordinator. The end semester practical examination is conducted jointly by external and internal examiners. External examiner is appointed by the COE of the university from the panel of examiners approved by BOSR of the Department of Computer Science and Engineering, Hisar and the internal examiner is appointed by the Chairperson of the Department.

Pre-requisites:
Students are expected to have the strong theoretical concepts and computer fundamentals as well as are expected to be proficient in programming language like "C or C++".

The objectives of this lab.course are to:
- Learn how to implement data structure in a programming language.
- Make the students familiar with various operations on data.
- Learn the students how to deal with memory management.

By the end of the course a student is expected to be able to:
- Make a differentiation in abstract data type and dynamic data type.
- Model real world data aggregations using different data structures.

Students are given ten or more laboratory assignments with soft and hard deadlines. The lab assignments are evenly spread over the semester. Every student is required to prepare a file of laboratory experiments done.

List of Laboratory Assignments:
1. Write a program to insert an element in an array.
2. Write a program to delete an element from an array.
3. Write a program for Pattern Matching Algorithm.
4. Write a program for Bubble Sort/ Selection Sort/ Insertion Sort.
5. Write a program for Linear Search/ Binary search.
6. Write a program to insert a node in linked list at beginning, end, after a given node, before a given node.
7. Write a program to delete the starting node, last node or a given node from a linked list.
8. Write a program to implement push and pop operation in a stack using array.
9. Write a program to implement push and pop operation in stack using Linked List.
10. Write a program for Quick Sort.
11. Write a program to insert and delete an element in Queue using array.
12. Write a program to insert and delete an element in Queue using Linked List.
13. Write a program for tree traversal.

PGDCA207: Software Laboratory –IV
Programming in C++

General Course Information:

Course Code: PGDCA206 *Course Credits: 2 Type: Compulsory Contact Hours: 4 hours/week Mode: Experimental Lab. *In lab work one credit is equivalent to two hours	**Course Assessment Methods (internal: 20; external: 80)** An internal practical examination is conducted by the course coordinator. The end semester practical examination is conducted jointly by external and internal examiners. External examiner is appointed by the COE of the university from the panel of examiners approved by BOSR of the Department of Computer Science and Engineering, Hisar and the internal examiner is appointed by the Chairperson of the Department.

Pre-requisites:
Students are expected to have basic concepts (theoretical) of object oriented language.
The objectives of this lab.course are to:
- Learn how to input data for a given problem from keyboard and obtain outputs from monitor
- Extend the programming capability of students using object oriented language.

By the end of the course a student is expected to be able to:
- Write code for a given problem in C++.
- Present results in an informative way
- Understand the importance of concepts of object oriented approaches in software development.

Students are given ten or more laboratory assignments with soft and hard deadlines. The lab assignments are evenly spread over the semester. Every student is required to prepare a file of laboratory experiments done

List of Laboratory Assignments:
1. Write a Write a program to find simple interest using default arguments.
2. Write a program to find area of circle using inline function.
3. Write a program to find volume of cylinder, cube and cuboid using function overloading.
4. Write a program to show static data member and static function.
5. Write a program to enter name, age and salary of 5 employees using array of objects.
6. Write a program to swap private data member of two different classes using friend function.
7. Write a program to find maximum of two numbers belonging to two different classes using friend function.
8. Write a program to add two complex numbers using constructor.
9. Write a program to show copy constructor.
10. Write a program to show destructor.
11. Write a program to show single inheritance.
12. Write a program to show multilevel inheritance.
13. Write a program to call a member function of a class using a non-member function.
14. Write a program to show overloading of binary operator.

15. Write a program to show use of this pointer.
16. Write a program using virtual functions.
17. Write a program to show concatenation of strings using operator overloading.
18. Write a program to show the use of template.
19. Write a program to read data from two files simultaneously.

PGDCA208: Seminar

General Course Information:

Course Code: PGDCA208 *Course Credits: 1 Type: Compulsory Contact Hours: 2 hours/week Mode: Lab. *In lab work one credit is equivalent to two hours	**Course Assessment Methods (internal: 100)** An internal examination is conducted by the assigned teacher on regular basis in lab and based evaluation is done by the teacher.

The objectives of this Seminar course are to:

- Understanding of the basics of the application of the various models of verbal and non-verbal communication in the social and professional sphere
- Develop the following skills in the students-
  - Communication Skills
  - Presentation Skills
  - Active Listening etc.

By the end of the course a student is expected to be able:

- To understanding the importance of intonation, word and sentence stress for improving communicative competence, identifying and overcoming problem sounds.
- To establish a repo with the audience.
- To present his/her ideas clearly and confidently.
- To address the queries from the audience.

General Guidelines:

- Students are required to prepare a presentation.
- The content of presentation can be on any topic other than the core subjects. However, it should be recent and relevant.
- Students are required to submit hard as well as soft copy of the presentation to the concerned teacher.