Approved by the Competent Authority U/S 11(7) of University Act, 2014 on dated 01.07.2019

DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS
SCHEME OF EXAMINATION FOR
POST GRADUATE DIPLOMA IN COMPUTER APPLICATIONS (PGDCA)
w. e. f. Academic Session 2019-20

Semester – I				
Paper Code	Title of the Paper	Maximum Marks		Total
		External	Internal	
PGDCA-19-11	Computer Fundamentals	80	20	100
PGDCA-19-12	PC Softwares	80	20	100
PGDCA-19-13	Data Base Management System	80	20	100
PGDCA-19-14	Programming through C	80	20	100
PGDCA-19-15	Software Engineering	80	20	100
PGDCA-19-16	Software Lab – I	80	20	100
PGDCA-19-17	Software Lab - II	80	20	100
	Total			700

Semester – II				
Paper Code	Title of the Paper	Maximum Marks		Total
		External	Internal	
PGDCA-19-21	Advanced C	80	20	100
PGDCA-19-22	Operating System	80	20	100
PGDCA-19-23	Web Designing	80	20	100
PGDCA-19-24	Digital Electronics	80	20	100
PGDCA-19-25	Data Communication and Computer Networks	80	20	100
PGDCA-19-26	Software Lab – III	80	20	100
PGDCA-19-27	Software Lab - IV	80	20	100
	Total			700

Contact Hour for each paper will be 5 lectures /week.

Internal Marks must be awarded in accordance with PGDCA Ordinance.

PGDCA-19-11 Computer Fundamentals

Maximum marks: 100
Time: 3 hours

External: 80
Internal: 20

Course Objectives:

1. *To understand the components of computer, software, hardware.*
2. *To provide an overview of peripheral devices.*
3. *To provide internet, multimedia and animation concepts.*
4. *To get familiar with Windows Operating System.*

Examiner's Note: *All Question are compulsory. The Question Paper is divided into four sections A, B, C, and D. Section A is compulsory and comprises of 12 questions of one mark each, 3 from each unit of the syllabus. The question shall be asked in such a manner that there are no direct answers including one word answer, fill in the blanks or multiple choice questions. Section B comprises of 4 questions of 3 marks each, one from each unit. Section C comprises of 4 questions of 6 marks each, one from each unit. Each question shall have two alternatives, out of which student will be required to attempt one. Section D comprises of 4 questions of 8 marks each, one from each unit. Each question shall have two alternatives, out of which student will be required to attempt one.*

UNIT-I

Computer Fundamentals: Computer components, Generations of computers, Characteristics and classification of computers, hardware, software, firmware, Memory and its types: Random access, sequential access, Magnetic disk, optical disc, flash memory, Programming languages: Low level programming languages, High level languages, Assembler, Complier, Interpreter.

UNIT-II

Peripheral devices:-Keyboard, Pointing Devices: Mouse, Trackball, Touch Panel, Joystick, Light Pen, Scanners, Monitor, OMR, Bar-code Reader, Hard Copy Devices: Impact and Non-Impact Printers-Daisy Wheel, Dot Matrix, Laser Printer, Plotters, speakers, Projector.

UNIT-III

Internet and Multi Media: What is Internet?, Advantages and Disadvantages of Internet, Electronic Mail, Attaching a document with e- mail, FTP, Telnet, World Wide Web, Uniform Resource Locator (URL), Web Browsers, Internet Search Engine, What is Multimedia?, Multimedia Components: Text, Graphics, Animation, Audio, Video, Multimedia applications.

UNIT-IV

Using Windows Operating System: What is an Operating System, Main functions of an Operating System, Starting Windows, Using the Mouse, Start Menu, Shutting Down, Customizing the Desktop, Maximizing Minimizing Restoring Moving Resizing and Closing an Application Window, Control Panel , Taskbar, Window Explorer, Creating new Folder or File, copying and moving files and folders, Recycle Bin, Using System Tools, User Accounts, Creating Shortcuts on Desktop, Windows Media Player, Windows accessories.

Suggested Readings:

1. Sinha, P. K., Sinha, Priti, *"Computer Fundamentals"*, BPB Publications, 6th Edition.

2. Rajaraman, V., Adabala, N., *"Fundamentals of Computers"*, PHI, 6th Edition, 2014.
3. Norton, Peter, *"Introduction to Computers"*, Mc Graw Hill, 7th Edition, 2017.
4. Taxali, Ravi Kant, *"Computer Course"*, Mc Graw Hill, 2014.

PGDCA-19-12 PC Softwares

Maximum marks: 100
Time: 3 hours

External: 80
Internal: 20

Course Objectives:

1. *To understand the important Application softwares used in office automation.*
2. *To provide the concepts word processing software for document writing.*
3. *To provide spreadsheet designing and presentation skills.*
4. *To get familiar with Database management concepts using Access.*

Examiner's Note: *All Question are compulsory. The Question Paper is divided into four sections A, B, C, and D. Section A is compulsory and comprises of 12 questions of one mark each, 3 from each unit of the syllabus. The question shall be asked in such a manner that there are no direct answers including one word answer, fill in the blanks or multiple choice questions. Section B comprises of 4 questions of 3 marks each, one from each unit. Section C comprises of 4 questions of 6 marks each, one from each unit. Each question shall have two alternatives, out of which student will be required to attempt one. Section D comprises of 4 questions of 8 marks each, one from each unit. Each question shall have two alternatives, out of which student will be required to attempt one.*

UNIT-I

Word Processing with Microsoft Word: Word Processing, MS Word, Creating and saving a document, Opening a document, Inserting, selecting, copying, moving, deleting and pasting, text, Undoing ,redoing, Applying bold, italic, underline style on text, changing size, color and font of text, using Format painter, aligning text, Formatting paragraphs: Line spacing, paragraph indents, space before and after paragraph, using bullets and numbering in paragraphs, Spelling and grammar, Autocorrect, inserting page number, page break, header and footer, border and shading, inserting picture, shapes and screenshot, using Mail merge.

UNIT-II

Microsoft Excel: Starting MS Excel, Workbook and Worksheet or Spreadsheet, Aligning and formatting data in cells, Cell range, Functions (Math, Financial and Text) , AutoSum, inserting/deleting rows, columns and cells, Merge and center, creating charts (column, line, pie, bar), changing column width and row height, using IF() function, Sorting data, Filtering data.

UNIT-III

Microsoft PowerPoint: Starting PowerPoint, Creating New Presentation, adding slides, Entering/Editing Text in Slides, Formatting text and paragraph, inserting a picture, Clip Art and Screenshot, Inserting Chart, Shapes, Word Art, Text Box, Inserting table, PowerPoint Views, Slideshow, Slide Transition Effects, Animation, Inserting Video and Audio, Printing Presentation Slides

UNIT-IV

Microsoft Access: Starting Access, Creating database, creating a Table, inserting a new Record, deleting records, sorting and filtering records, Repositioning and renaming a Field, deleting a Field, Primary Key, Relationship between tables, Query Wizard, Form Tool, Report Tool

Suggested Readings:

1. Taxali , Ravi Kant, *"Computer Course"*, Mc Graw Hill Education, 2014.
2. Saxena , Sanjay, *"A First Course in Computers"*, Vikas Publishing House, 2015.
3. Balagurusami , E., *"Fundamentals of Computers"*, Mc Graw Hill, 2009.
4. Weverka, Peter, *"Office 2010 All-in-One for Dummies"*, Wiley Publishing, Inc., 2010

PGDCA-19-13 Data Base Management System

Maximum marks: 100
Time: 3 hours

External: 80
Internal: 20

Course Objectives:

1. *To understand the basic concept of DBMS.*
2. *To know about the Entity relationship model.*
3. *To get familiar Structured Query Language.*
4. *To acquire the knowledge of Transaction Processing Concepts of Relational Database.*

Examiner's Note: *All Question are compulsory. The Question Paper is divided into four sections A, B, C, and D. Section A is compulsory and comprises of 12 questions of one mark each, 3 from each unit of the syllabus. The question shall be asked in such a manner that there are no direct answers including one word answer, fill in the blanks or multiple choice questions. Section B comprises of 4 questions of 3 marks each, one from each unit. Section C comprises of 4 questions of 6 marks each, one from each unit. Each question shall have two alternatives, out of which student will be required to attempt one. Section D comprises of 4 questions of 8 marks each, one from each unit. Each question shall have two alternatives, out of which student will be required to attempt one.*

UNIT- I

Basic Concepts: Definition of Data Base and Data Base Management System, File Systems vs. DMBS, Characteristics of the Database Approach, Abstraction and Data Integration, Database users, Advantages and Disadvantages of DBMS. Database Systems Concepts and Architecture: Data Models, Schema and Instances, DBMS architecture, Data Independence, Database languages, DBMS functions.

UNIT - II

Entity Relationship Model: Purpose of ER Model, Entity Types, Entity Sets, Attributes, keys, Relationships, Roles and Structural Constraints, E-R Diagrams, Design of an ER Database Schema, Reduction of an ER schema to Tables. Relational Data Model: Relational Model Concepts, Integrity Constraints over Relations, Relational Algebra – Basic Operations.

UNIT - III

SQL: Data Definition and Data Types, DDL, DML, and DCL, Views & Queries in SQL, Specifying Constraints & Indexes in SQL. Relational Database Management System: ORACLE-Basic structure, Storage Management in ORACLE Database Structure & implementation in ORACLE, Programming ORACLE Applications. Conventional Data Models: Network and Hierarchical Data Models.

UNIT - IV

Relational Database Design: Functional Dependencies, Decomposition, Normal forms based on primary keys- (1NF, 2NF, 3NF, BCNF), Multi-valued Dependencies, 4 NF, Join dependencies, 5 NF. Transaction Processing Concepts: Introduction to Transaction, Properties of Transaction,

Transaction Processing System Concepts, Schedules and Recoverability, Serializability of Schedules.

Suggested Readings:

1. Elmasri, R. and Navathe, S. B., *"Fundamentals of Database Systems"*, Pearson Education, 7th Edition, 2017.
2. Silberschatz, A., Korth, H. F., Sudarshan, S., *"Database System Concepts"*, McGraw Hill, 6th Edition, 2010.
3. Ramakrishnan, R., Gehrke, J., *"Database Management Systems"*, McGraw Hill, 3rd Edition, 2002
4. Bayross, Ivan, *"SQL, PL/SQL the Programming Language of Oracle"*, BPB Publication, 4th Edition, 2010.

PGDCA-19-14 Programming through C

Maximum marks: 100
Time: 3 hours

External: 80
Internal: 20

Course Objectives:

1. *This course aims to provide the students with a foundation in computer programming.*
2. *To develop the basic programming skills in students.*
3. *To applying the basic knowledge of programming to solve problems.*
4. *To get familiar with High Level Language 'C'.*

Examiner's Note: *All Question are compulsory. The Question Paper is divided into four sections A, B, C, and D. Section A is compulsory and comprises of 12 questions of one mark each, 3 from each unit of the syllabus. The question shall be asked in such a manner that there are no direct answers including one word answer, fill in the blanks or multiple choice questions. Section B comprises of 4 questions of 3 marks each, one from each unit. Section C comprises of 4 questions of 6 marks each, one from each unit. Each question shall have two alternatives, out of which student will be required to attempt one. Section D comprises of 4 questions of 8 marks each, one from each unit. Each question shall have two alternatives, out of which student will be required to attempt one.*

UNIT-I

Introduction to C: C Character set, Tokens, keywords and identifiers, constants, variables, data types and preprocessors. C Operators: Arithmetic, relational, logical, bitwise, unary, assignment and conditional operators and their hierarchy.

UNIT-II

Input/Output Statements in C: format specifiers, getch, getchar, getche, gets and puts. Formatted input and output using scanf and printf statements.

UNIT-III

Control Statements: Types of control statements, if-else, nested if-else, else-if ladder, switch statement, conditional control statement (? :), loops: for, while and do- while, break, continue and go to.

UNIT-IV

Arrays and Strings: Array definition and its types, declaration & Initialization of one-dimensional and two-dimensional array, String definition, reading and writing strings, string handling functions, Enumeration, Structure and Union.

Suggested Readings:

1. Balaguruswami, E., *"Programming in ANSI C"*, Tata McGraw Hill, 7th Edition.
2. Kanetker, Yashwant, *"Let us C"*, BPB Publications, 15th Edition.
3. Gottfried, Byron, *"Programming with C"*, Tata McGraw Hill, 2nd Edition.
4. Kernighan, B. W., Ritchie, D. M., *"The C Programming Language"*, PHI, 2nd Edition.
5. Koffman, Hanly, *"Problem Solving and Program Design in C"*, Pearson, 8th Edition.

PGDCA-19-15 Software Engineering

Maximum marks: 100
Time: 3 hours

External: 80
Internal: 20

Course Objectives:

1. *To understand the concept of Software Engineering and Requirement Specification.*
2. *To know how to plan and design a software project.*
3. *To get familiar with coding, testing and maintenance of the software.*

Examiner's Note: *All Question are compulsory. The Question Paper is divided into four sections A, B, C, and D. Section A is compulsory and comprises of 12 questions of one mark each, 3 from each unit of the syllabus. The question shall be asked in such a manner that there are no direct answers including one word answer, fill in the blanks or multiple choice questions. Section B comprises of 4 questions of 3 marks each, one from each unit. Section C comprises of 4 questions of 6 marks each, one from each unit. Each question shall have two alternatives, out of which student will be required to attempt one. Section D comprises of 4 questions of 8 marks each, one from each unit. Each question shall have two alternatives, out of which student will be required to attempt one.*

UNIT-I

Introduction to Software Engineering: Software crisis, Software engineering Approach and Challenges, Software development process models: Waterfall, Rapid prototyping, Time boxing and Spiral Models, Comparison of models.

Requirement Analysis: Software Requirements, Problem Analysis, Requirement Specification: characteristics, components and structure of SRS document, functional and non functional requirements, Functional specification with use cases.

UNIT-II

Planning a Software Project: Process Planning, Effort Estimation: uncertainties in effort estimation, building effort estimation models, COCOMO model, Project Scheduling and Staffing, Software configuration management plan, Quality Plan, Risk Management, Project Monitoring Plan

UNIT-III

Designing a Software Project: Function Oriented Design: Design Principles, Module level concepts, design notations and specification, Structured design methodology. Object-oriented design: OO Analysis and Design, OO concepts, Coupling, cohesion, Unified modeling language(UML), Detailed Design and PDL, verification and validation, Cyclomatic complexity.

UNIT-IV

Coding and Testing: Common coding errors, Coding Process, Refactoring, Verification, Metrics, Testing: Error, Fault and Failures, Test cases and test criteria, Black Box testing, White Box testing, Testing Process, Reliability estimation Metrics, Types of Maintenance

Suggested Readings:

1. Pressman, S. R., *"Software Engineering- A Practitioner's Approach"*, Tata McGraw Hill, 8th Edition.
2. Jalote, Pankaj, *"An integrated Approach to Software Engineering"*, Narosa Publishing House, 3rd Edition.
3. Gill, Nasib S., *"Software Engineering"*, Khanna Book Publishing, 2018.

PGDCA-19-16 Software Laboratory - I

Maximum marks: 100
Time: 3 hours

External: 80
Internal: 20

The practical exam will be divided into two parts.

1. Typing Test (30 Marks for External)

The department / concerned college may use freeware software for typing test which are able to check speed as well as accuracy.

The award of typing test will be as under:

Accuracy-> Speed	<70%	>=70% to <75%	>=75% to <80%	>=80% to <85%	>=85% to <90%	>=90% to <95%	>=95%
<20 WPM	0	10	12	14	16	18	20
>=20 WPM to <30WPM	0	12	15	17	20	23	25
>=30 WPM	0	15	18	21	24	27	30

2. PC Software (50 Marks for External)

The examiner has to set two questions with internal choice for practical implementation of the concepts studied by student in Paper PGDCA – 19 – 12

PGDCA-19-17 Software Laboratory - II

Maximum marks: 100
Time: 3 hours

External: 80
Internal: 20

The students have to implement atleast 15 programs during the course in accordance with paper PGDCA-19-14

The examiner has to set two programs with internal choice on the spot covering the concepts covered in paper PGDCA-19-14

PGDCA-19-21 Advanced C

Maximum marks: 100
Time: 3 hours

External: 80
Internal: 20

Course Objectives:

1. *This course aims to provide the students with advanced concepts of programming.*
2. *To work with design and use user defined functions.*
3. *To get familiar with Pointer operations, handling Files.*
4. *To understand the Preprocessor directives.*

Note: All Question are compulsory. The Question Paper is divided into four sections A, B, C, and D. Section A is compulsory and comprises of 12 questions of one mark each, 3 from each unit of the syllabus. The question shall be asked in such a manner that there are no direct answers including one word answer, fill in the blanks or multiple choice questions. Section B comprises of 4 questions of 3 marks each, one from each unit. Section C comprises of 4 questions of 6 marks each, one from each unit. Each question shall have two alternatives, out of which student will be required to attempt one. Section D comprises of 4 questions of 8 marks each, one from each unit. Each question shall have two alternatives, out of which student will be required to attempt one.

UNIT-I

User Defined Functions: Definition of Function, function prototype, Function Calls, Function declaration, Category of Functions, Nesting of functions, Recursion, passing array to functions, passing strings to function, The scope, visibility and lifetime of variables.

UNIT-II

Pointers: accessing the address of a variable, declaring and initialization of a pointer variable, accessing a variable through its pointer, chain of pointers, Pointer arithmetic, relationship between Pointers and arrays, pointers and character strings, pointers and structures, array of pointers, pointer as function argument, Dynamic memory allocation: malloc(), calloc(), realloc() and free( ) function, Sizeof() operator.

UNIT-III

File Handling: File structure, File types, Streams, Text, Binary, The file pointer, Opening a file, Closing a file, reading and writing a character, File handling function: fopen(), getc(), putc(), fclose(), feof() function. Working with string fputs() and fgets(), Standard streams in C, Using fread() and fwrite(), fprintf() and fscanf(),Flushing a stream, Direct access file, fseek() and random access to file.

UNIT-IV

Preprocessor: preprocessor directives, macro substitution (#define), macro with arguments, File inclusion (#include), creating header files, include user defined header files. Conditional compilation directives: # if, #else, #elif, #ifdef, #ifndef, #endif, #error, #pragma, stringizing operator(#), token pasting operator (##)

Suggested Readings:

1. Balaguruswami, E., *"Programming in ANSI C"*, Tata McGraw Hill, 7th Edition.
2. Kanetker, Yashwant, *"Let us C"*, BPB Publications, 15th Edition.
3. Gottfried, Byron, *"Programming with C"*, Tata McGraw Hill, 2nd Edition.
4. Kernighan, B. W., Ritchie, D. M., *"The C Programming Language"*, PHI, 2nd Edition.
5. Koffman, Hanly, *"Problem Solving and Program Design in C"*, Pearson, 8th Edition.

PGDCA 19-22 Operating System

Maximum marks: 100
Time: 3 hours

External: 80
Internal: 20

Course Objectives:

1. *To understand the design and functionality of Operating System.*
2. *To know about Process management and concurrent processes..*
3. *To acquire the knowledge of Memory management.*
4. *To provide the idea of various Disk scheduling techniques and Security.*

Examiner's Note: *All Question are compulsory. The Question Paper is divided into four sections A, B, C, and D. Section A is compulsory and comprises of 12 questions of one mark each, 3 from each unit of the syllabus. The question shall be asked in such a manner that there are no direct answers including one word answer, fill in the blanks or multiple choice questions. Section B comprises of 4 questions of 3 marks each, one from each unit. Section C comprises of 4 questions of 6 marks each, one from each unit. Each question shall have two alternatives, out of which student will be required to attempt one. Section D comprises of 4 questions of 8 marks each, one from each unit. Each question shall have two alternatives, out of which student will be required to attempt one.*

UNIT- I

Introduction and Process Management: Operating System Services, System Calls, System Programs, Process concepts, Process operations, Interprocess Communication, Scheduling Criteria, Scheduling Algorithms, Comparative Study of Scheduling Algorithms.

UNIT - II

Concurrent Processes: Critical Section Problem, Semaphores, Classical Process Co-ordination Problems and their Solutions, Monitors, Synchronization Examples. Deadlocks: Deadlock Characterization, Deadlock Prevention and Avoidance, Deadlock detection and Recovery.

UNIT - III

Memory Management: Swapping, Paging, Segmentation, Virtual Memory Concepts: Demand Paging, Page Replacement Algorithms, Thrashing, Storage Management: File Concepts, File Access and Allocation Methods.

UNIT -IV

Secondary Storage : Disk Structure, Disk Scheduling algorithm: FCFS, SSTF, SCAN, LOOK, C-SCAN, C-LOOK. Protection & Security: Goals & Principles of Protection, Domains of Protection, Access Matrix, Access Controls. Security: Security problem, Threats, Security tools, Classification.

Suggested Readings:

1. Silberschatz, A., Galvin, P. B., Gagne, G., *"Operating System Concepts"*, Wiley, 10th Edition.
2. Tanenbaum, A. S., Woodhull, A. S., *"Operating Systems: Design and Implementation"*, PHI, 3rd Edition.
3. Godbole, A. S., Kahate, A., *"Operating Systems"*, Tata McGraw Hill, 2005
4. Stallings, W., *"Operating Systems"*, PHI, 9th Edition.

PGDCA-19-23 Web Designing

Maximum marks: 100
Time: 3 hours
External: 80
Internal: 20

Course Objectives:

1. *To understand the concept of designing a Web site.*
2. *To know about basics of Internet and HTML, DHTML.*
3. *To acquire the knowledge of Java Script and XML.*

Examiner's Note: *All Question are compulsory. The Question Paper is divided into four sections A, B, C, and D. Section A is compulsory and comprises of 12 questions of one mark each, 3 from each unit of the syllabus. The question shall be asked in such a manner that there are no direct answers including one word answer, fill in the blanks or multiple choice questions. Section B comprises of 4 questions of 3 marks each, one from each unit. Section C comprises of 4 questions of 6 marks each, one from each unit. Each question shall have two alternatives, out of which student will be required to attempt one. Section D comprises of 4 questions of 8 marks each, one from each unit. Each question shall have two alternatives, out of which student will be required to attempt one.*

UNIT- I

Internet Basics: The Internet and its Advantages disadvantages, Basic Internet Protocols, World Wide Web, URL, Web Page, Web Browser, Web Servers, Client-Server model, FTP, Telnet, Search Engine.

Mark Up Languages: Introduction to HyperText Markup Language (HTML), Elements, Lists, Tables, Linking documents, Frames, Forms, Creating HTML pages.

UNIT - II

Dynamic Hypertext Mark Up language: Cascading Style Sheets: Features, Core Syntax, Types, Style Sheets and HTML, StyleRules -Cascading and Inheritance, Text Properties, CSS Box Model, Normal Flow, Box Layout, Positioning and other useful-Style Properties.

UNIT - III

Client-Side Programming: Introduction to JavaScript, Perspective, Basic Syntax, Data Types, Variables Statements, Operators, Literals, Control statements, Functions, Arrays, Document Object Model, Built-in Objects.

UNIT - IV

XML: Relation between XML, HTML, SGML, Goals of XML, Structure and Syntax of XML, Well Formed XML, DTD and its Structure, Namespaces and Data Typing in XML, Transforming XML Documents. XPATH.

Suggested Readings:

1. Jackson, Jeffrey C., *"Web Technologies: A Computer Science Perspective"*, Pearson Education, 2006.
2. Powell, Thomas, *"The Complete Reference HTML"*, Tata McGraw Hill, 3rd Edition.
3. Godbole, A., Kahate A., *"Web Technologies"*, Tata McGraw Hill, 3rd Edition, 2013.
4. Bayross, Ivan, *"Web Enabled Commercial Application Development"*, BPB, 2005.

PGDCA-19-24 Digital Electronics

Maximum marks: 100
Time: 3 hours

External: 80
Internal: 20

Course Objectives:

1. *To introduce the fundamentals of Digital Electronics.*
2. *To get familiar with Number System and Logic Gates, Logic .*
3. *To understand the concept of Logic circuit, Flip-flop, Register, Counters and Memory.*

Examiner's Note: *All Question are compulsory. The Question Paper is divided into four sections A, B, C, and D. Section A is compulsory and comprises of 12 questions of one mark each, 3 from each unit of the syllabus. The question shall be asked in such a manner that there are no direct answers including one word answer, fill in the blanks or multiple choice questions. Section B comprises of 4 questions of 3 marks each, one from each unit. Section C comprises of 4 questions of 6 marks each, one from each unit. Each question shall have two alternatives, out of which student will be required to attempt one. Section D comprises of 4 questions of 8 marks each, one from each unit. Each question shall have two alternatives, out of which student will be required to attempt one.*

UNIT-I

Number System and Logic Gates: Decimal, Binary, Octal and Hexadecimal Number System, Addition, Subtraction, multiplication and division of binary numbers, Number code: 8421, BCD,Grey, ASCII, EBCDIC codes, Conversions from one number system to another, Logic Gates: AND, OR, NOT, NAND, NOR, XOR, XNOR

UNIT-II

Combinational Logic Circuits: Boolean operations, Basic Laws of Boolean Algebra, Demorgan's theorem, Principle of Duality, Sum-of-Products Methods, Truth Table, Karnaugh-Map, Pairs, Quads, and Octets, Kamaugh Simplifications, Don't-care Conditions , Product-of-sums Method, Adder circuits: Half, Full, 4-bit adder

UNIT-III

Flip Flop and Registers: Flip Flop: RS Latch, RS, D,T, JK Flip Flop, JK Master Slave Flip Flop, Clock wave forms, Registers: Types of Registers, Serial In Serial Out (SISO), Serial In Parallel Out (SIPO), Parallel In Serial Out (PISO), Parallel In Parallel Out (PIPO), Universal Shift Register

UNIT-IV

Counters and Memory: Asynchronous counters, Synchronous counters, ring counter, ripple counter, Johnson counter Memories: Basic terms and ideas, Magnetic Memory, Optical Memory, Memory Addressing, ROMs, PROMs, and EPROMs, RAMs.

Suggested Readings:

1. Leach, D. P., Malvino, A.P., Saha, G., *"Digital Principles and Applications"*, Mc-Graw Hill, 8th Edition.

2. Mano, Morris M., *"Digital Logic and Computer Design"*, PHI Publications, 1st Edition.
3. Floyd, T. L., *"Digital Fundamentals"*, Pearson Education, 11th Edition, 2014.
4. Kumar, Anand A., *"Fundamentals of Digital Circuits"*, PHI, 4th Edition, 2016

PGDCA-19-25 Data Communication and Computer Networks

Maximum marks: 100
Time: 3 hours

External: 80
Internal: 20

Course Objectives:

1. *To introduce the fundamentals Computer Networks and Communication.*
2. *To get familiar with various Network Reference model and Communication Model.*
3. *To understand the basics of Data Link and Network Layer.*

Examiner's Note: *All Question are compulsory. The Question Paper is divided into four sections A, B, C, and D. Section A is compulsory and comprises of 12 questions of one mark each, 3 from each unit of the syllabus. The question shall be asked in such a manner that there are no direct answers including one word answer, fill in the blanks or multiple choice questions. Section B comprises of 4 questions of 3 marks each, one from each unit. Section C comprises of 4 questions of 6 marks each, one from each unit. Each question shall have two alternatives, out of which student will be required to attempt one. Section D comprises of 4 questions of 8 marks each, one from each unit. Each question shall have two alternatives, out of which student will be required to attempt one.*

UNIT- I

Introduction to Computer Networks and its uses, Network categorization and Hardware: Broadcast and point-to-point networks, LAN, MAN, WAN, Internetworks, Topologies, Wireless networks, Network Software: Protocols, Services, network architecture, design issues, OSI Reference model, TCP/IP Reference model, Introduction to Example Networks: Internet, Connection-Oriented Networks – X.25, Frame Relay, ATM

UNIT - II

Data Communication Model, Digital and Analog data and signals, Bit rate, Baud, Bandwidth, Guided Transmission Media : Twisted Pair, Coaxial cable, Optical fiber; Wireless transmission : Radio waves, microwaves, infrared waves; satellite communication. Switching: Circuit Switching, Packet Switching; Multiplexing: Frequency Division Multiplexing Time Division Multiplexing

UNIT - III

Data Link Layer Design issues: Framing, error control, Flow Control, Error Detection and correction; Elementary Data Link Protocols, Sliding Window Protocols; Medium Access Control: Aloha, CSMA protocols, Collision free protocols, Limited Contention Protocols; Wavelength division Multiple access protocol, Wireless LAN Protocol: MACA; IEEE 802.3 Ethernet, IEEE 802.4 Token Bus; IEEE 802.5 Token ring, Digital Cellular, Radio: GSM, CDMA, FDDI

UNIT - IV

Network Layer, Design issues, Virtual Circuit and Datagram Subnet, Routing Algorithms, Optimality principle, Shortest path Routing, Flooding , Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast and Multi Cast Routing, Routing for Mobile hosts, Routing in Adhoc Networks, Leaky bucket token bucket, choke packets, Load Shedding.

Suggested Readings:

1. Tanenbaum, Andrew. S., *"Computer Networks"*, PHI, 4th Edition.
2. Forouzan, Behrouz A., *"Introduction to Data communications and Networking"*, McGraw Hill, 5th Edition
3. Shay, William A., *"Understanding Data Communications and Networks"*, Cengage Learning, 3rd Edition.
4. Stallings William, *"Data and Computer Communication"*, Pearson Education, 8th Edition.

PGDCA-19-26 Software Laboratory - III

Maximum marks: 100
Time: 3 hours

External: 80
Internal: 20

The students have to implement atleast 15 programs during the course in accordance with paper PGDCA-19-21

The examiner has to set two programs with internal choice on the spot covering the concepts covered in paper PGDCA-19-21

PGDCA-19-27 Software Laboratory - IV

Maximum marks: 100
Time: 3 hours

External: 80
Internal: 20

The students have to implement atleast 15 programs during the course in accordance with paper PGDCA-19-23

The examiner has to set two programs with internal choice on the spot covering the concepts covered in paper PGDCA-19-23