



AWADHESH PRATAP SINGH UNIVERSITY, REWA (MP)

Bachelor of Computer Application (BCA)

Full-Time Eight Semester Programme

Choice Based Credit System (CBCS)

SESSION 2021-22

PROGRAMME OBJECTIVES & STRUCTURE

The BCA Programme structure is divided into eight semesters that spread over four years. The Courses are classified as major core courses, minor core courses, discipline centric electives, generic electives, ability enhancement and skill enhancement.

The semesters include **Major Core Courses** on Programming in C, Data Structures, OOPS Using C++, Computer Graphics, Java Programming, Software Engineering, Artificial Intelligence, and Cryptography & Network Security to develop multi-disciplinary foundation and what the critical thinking, analytical ability and problem solving skills of the participants. This will develop an integrative foundation by imparting an understanding of computer skills in all functional areas, mathematics & statistics applicable in the IT industry.

Minor Core Courses on Computer Fundamentals, Computer Organization, Operating System, System Software, Research Methodology and Cloud Computing have been incorporated to build a holistic approach and strong foundation of the students by demonstrating knowledge of facts, research related skills and principles in the field of Computer Application.

Discipline Specific Elective Courses (DSE) on Computer Network, Discrete Mathematics, Mobile Computing, Information Storage Management, RDBMS, Web Application Development, Internet of Things, Software Quality Assurance and Big Data Analytics & Visualization as elective areas of specialization to ensure better employability by updating their multi-professional skills have been also included.

Besides, the programme also includes courses for **Skill Enhancement (SE)** of the participants like Basic Mathematics and Personality Development & Character Building to ameliorate the professional skills of the participants and prepare them to fit suitably into their field of work.

The **Ability Enhancement (AE)** courses like English Language and Environmental Studies have been incorporated with the intention to develop the language proficiency through interactions embedded in meaningful contexts and to impart knowledge on natural processes to sustain life has been included. **Generic Elective Courses (GE)** on PC Software, Web Technology, DBMS and VB.Net are included. These courses can be opted by other students of the same level in UTD courses.

Class presentations, assignments & Co-curricular activities are an intrinsic part of the programme to give practical exposure to the participants regarding local, regional, national & global developments in the field of Computer Application. The programme structure also includes dissertation and comprehensive viva voce to gauge student's skills to execute the learned concepts into practice and examine their comprehension and conception ability.

This curriculum of BCA aims to provide enriched educational experience to the students by upgrading their stock of knowledge, skills and attitude and equipping them for a bright professional life in a complex and rapidly changing Computer Industry.

Programme Objectives POs:

The objectives of the Programme are:

- The primary objective of this program is to provide a foundation of computing principles and business practices for effectively using/managing information systems and enterprise software
- It helps students to develop the ability to identify, analyze, formulate and develop computer applications.
- To enable the students to select modern computing tools and techniques and use them with practical expertise.
- This course provides students with options to specialize in legacy application software, system software or mobile applications
- To produce outstanding IT professionals who can apply the theoretical knowledge into practice in the real world and develop standalone live projects themselves
- To provide opportunity for the study of modern methods of information processing and its applications.
- To develop among students the programming techniques and the problem-solving skills through programming
- To prepare students who wish to go on to further studies in computer application and related subjects.
- To acquaint students to Work effectively with a range of current, standard, Office Productivity software applications

Programme Outcomes

- **Critical thinking:** Take informed action after identifying the assumptions that frame our thinking and actions check out the degree to which these assumption are accurate and valid and look at our ideas and decision (intellectual, organization and personal) from different perspectives.
- **Effective Communication:** Speak, read, write and listen clearly in person and throw electronic media in English and in one Indian language, and make meaning of the word by connecting people, ideas, books, media and technology.
- **Social Interaction:** Elicit views of others, mediate disagreements and help reach conclusions in group settings.
- **Social Citizenship:** Demonstrate empathetic social concern and equity-centered national development and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
- **Ethics:** Recognize different value system including your own understands the moral dimensions of your decisions and accept responsibility for them.

- **Environment and sustainability:** Understand the issues of environmental context and sustainable development.
- **Self directed and life-long learning:** Acquire the ability to engage in independent and life-long learning in the broadest context of socio-technological changes.

Programme Specific Outcomes (PSOs)

The programme is designed to

PSO 1: Acquiring knowledge on basics of Computer Science and ability to apply to design principles in the development of solutions for problems of varying complexity

PSO2: Ability to design and development of algorithmic solutions to real world problems and acquiring a minimum knowledge on statistics and optimization problems. Establishing excellent skills in applying various design strategies for solving complex problems.

PSO3: Exhibiting strong skills required to program a computer for various issues and problems of day-to-day applications with thorough knowledge on programming languages of various levels.

PSO4: Practicing of existing projects and becoming independent to launch own project by identifying a gap in solutions.

BACHELOR OF COMPUTER APPLICATION (BCA)

PROGRAMME STRUCTURE (As per NEP 2020 & CBCS Ordinance 14 A)

1st Year

SEMESTER – I					
Course Code & Name	Course Type	Theory Paper	Internal Assessment	Maximum Marks	Credits
101 Programming in C	Major Core Th	60	40	100	4
101(PR) Lab C	Major Core PR			100	2
102 Computer Fundamentals	Minor Core	60	40	100	6
103 PC Software	GE	60	40	100	3
103 (PR) Lab MS Office				100	1
104 Environmental Studies	AE	60	40	100	4
SEMESTER TOTAL				600	20
CUMULATIVE TOTAL				600	20

SEMESTER – II					
Course Code & Name	Course Type	Theory Paper	Internal Assessment	Maximum Marks	Credits
201 Data Structure	Major Core Th	60	40	100	4
201(PR) Lab DS	Major Core PR			100	2
202 Computational Mathematics	Minor Core	60	40	100	6
203 Lab Web Technologies	GE	60	40	100	3
203 (PR) Web Technologies				100	1
204 English Language	AE	60	40	100	4
SEMESTER TOTAL				600	20
CUMULATIVE TOTAL				1200	40

GE: Generic Elective

AE: Ability Enhancement

*Students may choose this course as a **Generic Elective** or may choose a Generic Elective Course offered in other UTDs at the same level or may choose a Course offered by MOOCs through SWAYAM.

The student will be awarded a Certificate in Computer Application (CCA) on successful completion of the first year.

2nd Year

SEMESTER – III					
Course Code & Name	Course Type	Theory Paper	Internal Assessment	Maximum Marks	Credits
301 Object Oriented Programming using C++ 301(PR) Lab C++	Major Core Th Major Core PR	60	40	100 100	4 2
302 Operating System	Minor Core	60	40	100	6
303 Database Management System 303(PR) Lab DBMS	GE	60	40	100 100	3 1
304 Probability and Statistics	SE	60	40	100	4
SEMESTER TOTAL				600	20
CUMULATIVE TOTAL				1800	60

SEMESTER – IV					
Course Code & Name	Course Type	Theory Paper	Internal Assessment	Maximum Marks	Credits
401 Computer Graphics 401(PR) Lab CG	Major Core Th Major Core PR	60	40	100 100	4 2
402 Software Engineering	Minor Core	60	40	100	6
403 VB .NET 403 (PR) Lab VB.NET	GE	60	40	100 100	3 1
404 Discrete Mathematics	SE	60	40	600	4
SEMESTER TOTAL				600	20
CUMULATIVE TOTAL				2400	80

GE: Generic Elective

SE: Skill Enhancement

*Students may choose this course as a **Generic Elective** or may choose a Generic Elective Course offered in other UTDs at the same level or may choose a Course offered by MOOCs through SWAYAM.

The student will be awarded a Diploma in Computer Application (DCA) on successful completion of second year.

3rd Year

SEMESTER – V					
Course Code & Name	Course Type	Theory Paper	Internal Assessment	Maximum Marks	Credits
501 JAVA Programming	Major Core Th	60	40	100	4
501(PR) Lab Java	Major Core PR			100	2
502 (A) Computer Network** 502 (B) Mobile Computing**	DSE	60	40	100	4
503 Personality Development & Character Building	SE	60	40	100	4
504 Field Project	Core			100	6
SEMESTER TOTAL				500	20
CUMULATIVE TOTAL				2900	100

SEMESTER – VI					
Course Code & Name	Course Type	Theory Paper	Internal Assessment	Maximum Marks	Credits
601 Web Application Development	Major Core Th	60	40	100	4
601(PR) Lab Web Application Development	Major Core PR			100	2
602 (A) Data Mining & Warehousing ** 602 (B) Information Storage Management**	DSE	60	40	100	4
603 (A) Parallel Computing** 603 (B) Theory of Computation**	DSE	60	40	100	4
604 Internship	Core			100	6
SEMESTER TOTAL				500	20
CUMULATIVE TOTAL				3400	120

SE: Skill Enhancement DSE: Discipline Specific Elective

Students may choose any one set of specialization Course; (Group A or B or C) as **Discipline Specific Electives.

The student will be awarded a Bachelor Degree in COMPUTER APPLICATION (BCA) on successful completion of third year.

4th Year

SEMESTER – VII					
Course Code & Name	Course Type	Theory Paper	Internal Assessment	Maximum Marks	Credits
701(1) Artificial Intelligence	Major Core	60	40	100	4
701(PR) Lab AI				100	2
702 (A) Internet of Things** 702 (B) Software Quality Assurance**	DSE	60	40	100	4
703 Research Methodology	Minor Core	60	40	100	4
704 Research Project	Core			100	6
SEMESTER TOTAL				500	20
CUMULATIVE TOTAL				3900	140

SEMESTER – VIII					
Course Code & Name	Course Type	Theory Paper	Internal Assessment	Maximum Marks	Credits
801 Big Data Analytics & Visualization	Major Core	60	40	100	6
802 Cryptography & Network Security	Minor Core	60	40	100	4
803 Internship & Dissertation	Core			100	10
SEMESTER TOTAL				300	20
CUMULATIVE TOTAL				4200	160

DSE: Discipline Specific Elective

Student may choose any one set of specialization Course; (Group A or B or C) as **Discipline Specific Electives.

The student will be awarded Honors Bachelor Degree in Computer Application (BCA Honors) on successful completion of fourth year.

Credit Distribution as per the Ordinance 14 A

		Main Faculty (as per prerequisite)		Any Faculty	Skill Enhancement Course (SEC)	Ability Enhancement Course (AEC)	Field Projects/ internship/ apprenticeship /community engagement & service	Credits	Qualification Title (Credits Requirements)	
		Subject I	Subject II	Subject III						
Level	Sem	Major		Minor	Generic Elective Course	Vocational Course	#Inter/Intra Faculty			
		Core	DSE							
Level 5	1	6		6	4	-	4	-	6+6+4+4 =20	(40) Undergraduate Certificate in Main Faculty
	2	6		6	4	-	4	-	6+6+4+4 =20	
Level 6	3	6		6	4	4	-	-	6+6+4+4 =20	(80) Undergraduate Diploma in Main Faculty
	4	6		6	4	4	-	-	6+6+4+4 =20	
Level 7	5	6	4	-	-	4	-	6	6+4+4+6 =20	(120) Bachelor Degree in Main Faculty
	6	6	4+4	-	-	-	-	6	6+4+4+6 =20	
Level 8	7	6	4	4 Research Methodology	-	-	-	6	4+4+4+6 =20	(160) Bachelor Degree (Honours/Research) in Main Faculty
	8	6	-	4	-	-	-	10	6+4+10 = 20	
Total		48	16	32	16	12	8	28	160 Credits	

101: Programming in C

Max. Marks : Theory 60 IA 40

Course Objective:

To help the students to acquire basic knowledge in concepts and theory of principles of programming and to familiarize the students in the C programming language.

UNIT-I

C language programming: Flowchart, Algorithm, Introduction to C language, Character set of C-language. The structure of a simple C program; Simple I/O functions (scanf, printf, gets, puts, getchar, getch); Use of semicolon, braces, parentheses, comments and newline character; Data types in C. Assignment statement, Arithmetic, Relational & Logical operators; Unary operator, sizeof operator, Conditional operators, Precedence of operators.

UNIT-II

Control structure: The if-else statements, nesting of if-else, switch statement, Loops: while and do-while loop, the for loop, Functions: User defined functions, Returning a value from a function, Local and Global variables, Parameters, Type declaration of a function, Functions with more than one parameters, Prototype of a function. Functions with arguments, functions without arguments. Storage classes.

UNIT-III

Arrays: Declaration and initialization; the break and continue statement; String and Character arrays, operations with arrays; searching in array (linear and binary). Sorting an array (Bubble, Selection and Insertion), String & String functions: sprintf, strcpy, scanf, strcat, strlen, malloc, strcmp. Two dimensional array, matrix, types of matrix – addition and product of two matrices.

UNIT-IV

Pointers: The concept of pointers, passing pointers as parameters, arrays of pointers, Pointer to pointers, Array of pointers to strings, Sorting an array, using pointers, Structures: The concept of structure, Initializing, Arrays of structures, Arrays within structures, Structures within Structures, passing structures to function, unions.

UNIT-V

Files: Files in 'C', Modes for files; Functions used in files (getc, putc, fopen, fclose, fscanf, fread, fwrite, fprintf, fseek, ftell, rewind), text versus binary files, The C preprocessor, Preliminaries of C preprocessor Directives, (#define, #undef, #include, #ifdef, #ifndef, #endif, #else, #if).

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Learn, understand and trace the execution of programs written in C language.

CO2: Apply programming control structures for a given problem to create C code.

CO3: Learn and understand derived data types and develop C code using arrays and strings.

CO4: Understand user defined functions, pointers and data types to develop C code.

CO5: Learn file handling techniques and use of preprocessors in C.

Text Book(s):

1. E. Balagurusamy, Programming in ANSI C, TMH
2. Y. Kanetkar, Let us C, BPB

Reference Book(s):

1. Rajaraman, Introduction to C, PHI
2. Gottfried, Programming with C, TMH
3. Cooper, Mullish, The Spirit of C, An introduction to modern programming, Jaico Pub. House, N. Delhi.

Online Resource(s):

https://www.youtube.com/playlist?list=PLJvIzs_rP6R73WlvumJvCQJrOY3U5zq1j

<https://nptel.ac.in/courses/106104128>

<https://nptel.ac.in/courses/106105171>

101 (PR): Lab ‘C’
Max. Marks: Practical 100

LIST OF PRACTICALS

1. Given the values of the variables x, y and z, write a program to rotate their values such that x has the value of y, y has the value of z, and z has the value of x
2. Write a program that reads a floating point number and then displays the right-most digit of the integral part of the number.
3. The distance between two cities (in Km) is input through the keyboard. Write a C program to convert and print this distance in meter, feet, inches and centimeter.
4. If a five-digit number is input through the keyboard, write a C program to calculate the sum of its digits without using a loop.
5. If a four-digit number is input through the keyboard, write a C program to obtain the sum of the first and last digit of this number.
6. Program to find largest and smallest numbers from four given numbers.
7. Program to find whether a year is leap or not.
8. A library charges a fine for every book returned late. For first 5 days the fine is 50 paise, for 6- 10 days fine is one rupee and above 10 days fine is 5 rupees. If you return the book after 30 days your membership will be canceled. Write a program to access the number of days the member is late to return the book and display the fine or the appropriate message.
9. Write a C program in which enter any number by the user and perform the operation of product of digits of entered number.
10. Write a C program in which enter any number by the user and perform the operation of Sum of digits of entered number.
11. Write a C Program to convert Decimal number to Binary number.
12. Find the sum of this series upto n terms $1+2+4+7+11+16+\dots\dots\dots$
13. Program to print Armstrong numbers from 1 to 10000.
14. Write a C program to perform the factorial of given number.
15. Program to calculate factorial of a number using recursion. Number being entered by the user.
16. Write a C program to generate Fibonacci series using recursion. The user enters the limit of series.
17. Write a C Program to print the reverse of an integer number entered by user
18. Program to count the number of positive, negative and zero number in the given list of numbers.
19. Program for swapping of two arrays as per indexes accordingly both array have the same size.
20. Program to read a name through the keyboard. Determine the length of the string.
21. Write a program to remove the Occurrences of “The” word from entered text.
22. Write a program to delete all the occurrences of the vowels in a given text. Assume that the text length will be of one line.
23. Write a program to copy the content of one string into another string using pointer and function.
24. Write a program to find that two strings are identical or not using pointer and function.
25. Generate a result table which consists of student id, student name, marks of three subjects and total marks. Write a program which takes input for ten students and displays the result table. Also display student information separately who got the highest total. Use structure.
26. Store information of 10 persons. Information includes name and age. But the criteria is: for the child age should be in the form of full birth date, for an adult the age should be in years only, while for aged person store age indicating the status ‘O’. Use union for memory efficiency.
27. Write a program to maintain the library record for 100 books with book name, author’s name, and edition, year of publishing and price of the book.
28. Write a program to copy the contents of a text file into another text file.
29. Write a program to write a structure variable in file.
30. Write a C program to demonstrate random access in a file.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Learn programming skills and trace the execution of programs written in C language.

CO2: Apply programming control structures for a given problem to create C code.

CO3: Learn and understand creation of derived data types and develop C code using arrays and strings.

CO4: Learn creation of user defined functions, pointers and data types to develop C code.

CO5: Learn programming skills for file handling techniques and use of preprocessors in C.

102: Computer Fundamentals

Max. Marks : Theory 60 IA 40

Course Objectives:

To help the students to acquire basic knowledge of Computer Fundamentals and basics of data communication.

UNIT-I

History, Generation of Computers, Characteristics, Capabilities and Limitations, Classification of Computers and types of Digital computers. Hardware, Software, types of software. Generations of Computer Languages, High and low level languages, Types of Translators (Compiler, Interpreter and Assembler)

UNIT-II

Working of a computer using block diagram, Components of Computer system, Central Processing UNIT, Address, Control and Data Bus, Arithmetic Logic UNIT, Control UNIT, storage units : Bits and Bytes; external & internal devices, Booting of PC system, Comparative study of various series of IBM PC Family.

UNIT-III

Introduction and working of various input/output devices: Keyboard, mouse, MICR, OCR, OMR, Bar Code, Audio Response UNIT, Scanner, VDU, Plotter, Impact and Nonimpact printers, Computer Output Microfilm (COM).

UNIT-IV

Introduction to primary memories (RAM, ROM, PROM and EPROM), Preliminary concept of Extended, Expanded and Virtual Memory, Registers, Counters, Storage devices: Hard disks, Floppy disks (sector, cylinder, track, seek time, latency time and response time). Number system : Introduction to decimal, binary, octal, hexadecimal number systems and their interconversion; Coding: (ASCII, EBCDIC, BCD, Unicode).

UNIT-V

Basics of data communication, Communication media, Methods of data transmission, modes of data transmission, Analog versus digital and serial versus parallel communication. Introduction to computer Network: Advantages, type, various LAN topologies, Distinction between LAN, WAN, MAN. Overview of Internet: www, email, ftp, telnet, chat, browser, newsgroup.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Learn and understand the characteristics & capabilities of Computers.

CO2: Learn working of computer system .

CO3: Learn and understand various Input Output devices used with computers

CO4: Understand number systems and different types of computer memories.

CO5: Learn basics of data communication.

Text Book(s):

1. Sinha, P.K.: Computer Fundamentals, BPB Publ.

Reference Book(s)

1. Jain, Satish: Introduction to Computer Science, BPB Publ.

Online Resource(s):

<https://www.youtube.com/c/iit/playlists>

https://www.academia.edu/2021391/Computer_Fundamentals_Lectures_1_to_5

103: PC Software

Max. Marks : Theory 60 IA 40

Course Objective:

To help the students to acquire basic knowledge of MS-Word, MS-Excel, MS-Power point and MS-Access.

UNIT-I

Introduction to Microsoft Office: The Office Manager, Sharing Information with Microsoft Office, The Clipboard, Object Linking and Embedding (OLE), Editing Linked Information, Editing Embedded Objects, Word Processing with Word for Windows: Word Basics: Undo, Redo, Repeat, Inserting Text, Replacing Text, Formatting Text, Cut, Copying from one Word Document to Another, Print, Auto format.

UNIT-II

MS WORD : Working with Headers, Footers, Endnotes, Footnotes, tabs, tables, sorting, Working with graphics: Importing graphics, Sizing and Cropping graphics with the picture command, Drawing objects, Text in Drawings (Word Art), Pictures using Drawing objects, Rotating and Flipping Objects, Callouts, Filling: Templates, Wizards: Spelling Checker, Autocorrect, Auto text, Grammar Checker, Word Count and Other Statistics, Creating Tables of Contents and Index, Macros, Introduction to Mail Merge.

UNIT-III

MS EXCEL: Overview of Excel Features, Rearranging worksheets: Excel page setup, changing column widths and row heights, auto format, manual formatting, using different styles, hiding rows and columns, working with multiple worksheets. An Introduction to excel functions, Excels chart features: Instant charts with the chart Wizard, creating charts on separate Worksheets, Resizing and Moving charts, adding chart notes and arrows, editing charts, Working with graphics in excel: creating and placing graphic objects, resizing graphics, Introduction to Excel's command Macros, using worksheets as databases.

UNIT-IV

MS POWERPOINT: Creating presentations, Auto content wizard, editing slides, Working with Text in PowerPoint, Formatting and Aligning Text; Working with graphics in PowerPoint; Importing images from the outside and drawing in PowerPoint, creating organizational charts, inserting clip arts & picture/photos in PowerPoint Presentation, Excel charts in PowerPoint, inserting table from word, Arranging, Previewing and rehearsing, transition and building effects, printing presentation elements, creating overhead transparencies.

UNIT-V

MS ACCESS : Creation of databases, tables, forms, reports & queries, use of macros & modules, creation of relationships among tables, generating simple queries using databases. Administering & securing a database, Writing expressions for queries.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: To familiarize students with Office Automation and Component of Office Automation.

CO2: To make them comfortable to evaluate, select and use of MS Word for Office Automation.

CO3: To make them work on MS Excel for Office Automation.

CO4: To develop expertise in Presentation Skills using MS Power point.

CO5: To understand about databases in the context of MS Access.

Text Book(s):

1. "MS-Office 2007 Training Guide", 2nd Edition, Satish Jain, BPB Publication, 2010.
2. "Working with Personal Computer Software", 2nd Edition, Harshal A. Arolkar, S Jain, Wiley India, 2010.

Reference Book(s):

1. "Using Microsoft Office 2007", First edition, Ed Bott, Pearson Education, 2007.
2. "Learn Microsoft Office", Russell A. Shultz, BPB Publication.

Online Resource(s):

<http://anucde.info/bba3a.pdf>

<https://algonquincollege.libguides.com/student-survival-guide/office-tutorials>

103 (PR): Lab MS Office
Max. Marks: 100

LIST OF PRACTICALS

MS Word

1. Creating documents with Special effects like underline, bold, different size, font face and color.
2. Working with formatting features including; paper-size, margins, indentation.
3. Creating Paragraphs, Inserting Pictures and Graphics, Bullets and Numbering.
4. Usage of Spell check, and Find & Replace.
5. Applying Header and Footer, Endnotes, Footnotes and insertion of Table.
6. Creation of mail merge.
7. Recording Macros.

MS Excel

8. Creating Worksheets; Inserting, Deleting, Copying, Moving worksheets.
9. Excel Page setup, working with Rows, Columns and Cells.
10. Usage of formulas, Built-in functions.
11. Applying Sorting, Filtering and Data Validation.
12. Working with Charts and Graphics.
13. Macro in MS Excel

MS PowerPoint

14. Creating Presentations and adding slides.
15. Applying Templates and Themes.
16. Working with Slide size, Orientation, Presentation Views.
17. Inserting Tables, Illustrations, Text, Movie clips and Sound.
18. Applying Animations and Transitions.
19. Setting-up Slide Show.
20. Printing Slides, Outline view, Notes pages, Handouts.

MS Access

21. Creating database, tables, forms, reports and queries.
22. Applying different Data Type and Formatting.
23. Working with various Views.
24. Applying Sorting, Filtering.
25. Importing and Exporting Data.
26. Creation of Relationships among Tables.
27. Generating Queries.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: To learn students with Office Automation and Component of Office Automation.

CO2: To make them comfortable to evaluate, select and use Office Software appropriate to specific tasks.

CO3: To make them work on MS Excel for Office Automation.

CO4: To develop expertise in Word Processing, Spreadsheet, and Presentation Skills.

CO5: To learn about databases in the context of MS Access.

104: ENVIRONMENTAL STUDIES

Max. Marks: Theory 60 IA 40

Course Objectives:

The aim of this course is to provide basic knowledge of the environment and familiarize with its management.

UNIT - I

Introduction to environmental studies - Multidisciplinary nature of environmental studies; Scope and importance; the need for environmental education, Concept of sustainability and sustainable development.

UNIT – II

Ecosystem-What is an ecosystem? Structure: food chains, food webs and function of ecosystem: Energy flow in an ecosystem, nutrient cycle and ecological succession, Ecological Interactions.

UNIT - III

Biodiversity - Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hotspots; India as a mega-biodiversity nation; Endangered and endemic species of India; Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions.

UNIT - IV

Environmental Pollution and Global Environmental Issues:- Environmental pollution. Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture. Nuclear hazards and human health risks (Chernobyl, 3 mile Island, Daiichi- Fukushima). Solid waste management; Pollution Tragedies: Love canal, Bhopal Gas, Endosulfan, Minamata and Flint water

UNIT - V

Environmental Management: Policies & Practices-Environmental ethics: Role of Indian and other religions and cultures in environmental conservation. Green Politics, Earth Hour, Green Option Technologies. Environmental communication and public awareness, Role of National Green Tribunal.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: To understand students about Scope and importance of Environmental studies.

CO2: To learn structure of ecosystem like food chain, energy flow and food web in ecosystem.

CO3: To understand Biodiversity and threats of Biodiversity

CO4: To understand the Environmental Pollution and Global Environmental Issues

CO5: To learn policies of Environmental Management.

Text Book(s):

1. Basu, M. and Xavier, S., Fundamentals of Environmental Studies, Cambridge University Press.
2. Mitra, A. K and Chakraborty, R., Introduction to Environmental Studies, Book Syndicate.

Reference Book(s):

1. Enger E. and Smith B., Environmental Science: A Study of Interrelationships, McGraw-Hill Higher Education.
2. Basu, R.N, Environment, University of Calcutta.

201 : DATA STRUCTURE

Max. Marks: Theory 60 IA 40

Course Objective:

The aim of this course is to provide knowledge of various data structures, operations on them & various applications and searching & sorting algorithms.

UNIT – I

Data Structure: Primitive Data Structures, Operations on Data Structures; Integer, Real number, Character Information, Logical and Pointer Information, Algorithm analysis for time and space requirements, Non-primitive data structures, Storage structure for arrays, operations on arrays; Stack : Contiguous implementation of stack, PUSH & POP, applications of stack : Various polish notations – infix, prefix, postfix, conversion using stack; Applications of stack.

UNIT – II

Queue: Implementation of queue, operations on queue, priority queue, Linear queue and circular queue, dequeue, applications of queue. General List: list and it's contiguous & linked implementation, it's drawback; singly linked list-operations on it; doubly linked list-operations on it; circular linked list; applications of linked list.

UNIT – III

Trees: Definition – height, depth, order degree, etc; Binary Tree, complete binary tree, implementation of Binary tree, Tree traversal algorithms – preorder, inorder & post order, operations on binary tree , Binary search tree, operations on binary search tree, applications of binary tree.

UNIT – IV

Graph: related definition, terminology, representation of graph, directed, undirected and weighted graph; adjacency matrix, adjacency list and adjacency set, graph traversal algorithms - depth first search, breadth first search; minimum spanning tree, Applications of Graph .

UNIT – V

Searching: Sequential search, binary search, indexed sequential search, Hashing, hash methods, collisions & its resolution techniques. Sorting: bubble sort, selection sort, quick sort, merge sort, heap sort, insertion sort and tree sort.

Course Outcomes:

On completion of this course, the student will be able to:

CO1:To Learn different operation of stack data structures, and complexity of algorithms.

CO2:To understand students about queues and linked list data structures.

CO3: Understand non linear data structure tree and algorithm for operations.

CO4: To understand graph and its applications.

CO5: Learn various searching and sorting algorithms

Text Book(s):

1. Lipschutz, Data Structure, Schaum Outline Series
2. Trembly "Introduction to Data Structure with Applications"

Reference Book(s):

1. Tennenbaum A.M. & others: Data Structures using C & C++; PHI
2. Horowitz & Sahni: Fundamentals of Data Structures, Galgotia Publishers.
3. Ullman "Analysis and Design of Algorithm" TMH

Online Resource(s):

<https://nptel.ac.in/courses/106/102/106102064/>

<https://nptel.ac.in/courses/106103069>

<https://nptel.ac.in/courses/106106130>

201 (PR): Lab Data Structure

Max. Marks : Practical 100

LIST OF PRACTICALS

Programs based on:

1. **Array:** Insertion of element in an array , deletion of element from an array.
2. **Stack:** Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Conversion of Infix to Prefix and Postfix Expressions.
3. **Queue:** Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Circular queue
4. **Linked list:** Representation and Implementation of Singly Linked List, Traversing and Searching, Inserting and Deleting of Linked List. Same operation in Doubly Linked List, Circular Linked List.
5. **Binary Search Tree:** Creation, searching and traversal.
6. **Sorting :** Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort and Heap Sort.
7. **Searching :** Sequential search, Binary search.

Course Outcomes:

On completion of this course, the student will be able to:

CO1:To Learn different operation of stack data structures, and complexity of algorithms.

CO2:To understand students about queues and linked list data structures.

CO3: Understand non linear data structure tree and algorithm for operations.

CO4: To understand graph and its applications.

CO5: Learn various searching and sorting algorithms

202 : Computational Mathematics

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire the knowledge related to trigonometry, equations, basic statistics, mathematical logic and set theory.

UNIT - I

Trigonometry: Angles and their Measurement, values of Trigonometric ratios, Height and Distances.
Elementary Matrices and types of Matrices.

UNIT - II

Equations: Simultaneous linear equations, Methods of solving Simultaneous equations, Quadratic equations

UNIT - III

Statistics: Frequency distribution, Measure of Central Tendency: Mean, Mode, Median,

Measures of variations: Mean Deviation, Standard Deviation.

UNIT - IV

Mathematical Logic: Statements and Notations, Connectives: Negation, Conjunction and Disjunction, Statement Formulas and truth tables, Tautologies, Tautological implications, Contradiction contingency.

UNIT - V

Set Theory: Basic concepts of set theory, notation, inclusion and equality of sets, the power set, type of sets, operations on set, Venn diagrams.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Implement trigonometry tricks solutions for measurements in real world scenarios.

CO2: Implement matrices and simultaneous equations to solve complex problems.

CO3: Use statistical tools efficiently.

CO4: Use Mathematical Logic and predicate calculus for solving problems.

CO5: The concepts of set theory for finding solutions to set related problems.

Text Book(s):

1. Business Mathematics, S.M. Shukla, Sahitya Bhawan Publication
2. Business Mathematics D.C. Agrawal, Sri Sai Publication
3. S.K. Sarkar: A Textbook of Discrete Mathematics 9/E Sarkar S.K., S. Chand, New Delhi 2016

Reference Book(s):

1. Fundamental of Statistics, ELHANCE & ELHANCE, Kitab Mahal Publication.
2. Mathematical Statistics, 8/E, Ray and H.S. Sharma, Ram Prasad and Sons
3. Business Mathematics, J.K. Singh, Himalaya Publishing House, 2017.

Online Resource(s):

<http://epathshala.ncert.org.in/>

203 :Web Technologies

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire knowledge related to the Internet, its security, HTML , Javascript & XML and PHP programming.

UNIT – I

Internet : History and evolution of Internet .Internet & intranet ,Basic concept of www , HTTP, FTP, URL, domain name, IP address, web browser, web server, web page, web site, Portals, email, chatting, Searching , downloading , uploading, files on internet ,Search Engines. Conferencing: voice & video conferencing. Internet Protocol:TCP/IP, three levels of Internet connectivity. ISPs, Introduction to DNS.

UNIT-II

Internet Security & HTML: Overview of internet security, access security, transaction security, security zones, digital IDS, sending / receiving signed & encrypted emails. Introduction to firewalls. web page design : static and dynamic, Introduction to HTML. HTML elements and tags, Basic Tags, Formatting tags, Form and Input Tags, List Tags, Link Tags, Meta Tags

UNIT-III

ADVANCE HTML: Working with Images,Image Tags, Style and Semantic Tags, Programming Tags, Table Tags, Frame & Frameset tags, Audio tags, Video tags, Adding controls on forms, submitting data from forms,Style Sheets: Inline CSS, External CSS, Attributes of CSS.

UNIT-IV

JavaScript & XML: introduction to client and server side scripting, introduction to Javascript, data types, operators, conditional statements, loops in Javascript, functions, arrays, objects and elements in Javascript, form validation using Javascript. Introduction to XML, Creating XML documents, specifying attributes in DTDs, accessing XML data with XML Data Island, Handling events while loading XML documents.

UNIT-V

Basics of PHP Programming: PHP Programming: Introduction – Syntax – Variables - Controls and functions – Strings -Arrays: Using Arrays, Manipulating Arrays, Associative Arrays – Advanced Array Functions; Object-Oriented Programming with PHP – Strings and Regular Expression Functions – File system and System Functions – Sessions, Cookies and HTTP; PHP and MySQL: PHP and MySQL: SQL Tutorial – MySQL Database Administration – PHP/MySQL Functions – Displaying Queries in Tables – Building Forms from Queries

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Understand the Internet, basic concepts of www and search engines.

CO2 : Understand security concerns of Internet and basics of HTML

CO3 : Learn advanced HTML – creation of tables, frames and forms.

CO4 : Understand javascript & xml

CO5 : Learn basics of PHP programming

Text Book(s):

1. Html Complete : BPB Publication.

Reference Book(s):

1. Teach Yourself Internet In 24 Hours : Techmedia.
2. Internet Complete : BPB Publication.
3. HTML Blake Book: Steven Holzer.
4. The Internet :Christian Crumlish (BPB Publication).

Online Resource(s):

<https://htmlcssjavascript.com/downloads/css.ppt>

<https://cupdf.com/document/html-css-and-javascript.html>

203 (PR): LAB - Web Technologies

Max. Marks : Practical 100

LIST OF PRACTICALS

1. Write HTML to format heading in document using head tags.
2. Write HTML to create 3 x 4 table in html document and demonstrate all tags related with table.
3. Write HTML to create Hyperlink and interlink multiple page.
4. Write HTML to include audio and video files html document.
5. Write HTML to include an image and set border, height and width of that image.
6. HTML code to drop down menu.
7. Html code to create a form in document using all necessary input tags.
8. Program to make calculator using JavaScript and Html
9. Write program to slide image using array in JavaScript.
10. Write a program to validate Form using JavaScript.
11. Html code to demonstrate all Formatting Tags and Empty tags.
12. Program in PHP to print even or odd numbers.
13. PHP program to check prime numbers.
14. PHP program to print fibonacci series without using recursion and using recursion.
15. Program to connect html document with database.
16. Write a PHP program to create, open and read File.
17. Write a program to include external files.
18. Write css code to format paragraph with different attributes.
19. Html code to use frame and framesets.
20. Write a program to moving car with key event using JS.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Learn the programming skills of web pages using HTML.

CO2 : Understand security concerns of Internet and basics of HTML

CO3 : Learn advanced HTML – creation of tables, frames and forms.

CO4 : Learn dynamic web page designing using javascript & xml

CO5 : Learn basics of PHP programming

204 : ENGLISH LANGUAGE

Max. Marks : Theory 60 IA 40

Course Objective: The objectives of the course are to improve the competence of the student's basic language skills and to acquaint student with working official English Language.

UNIT-I

Language content: Structural Items: Simple, Compound and Complex Sentences, Co-ordinate clauses (with, but or, neither-no, Otherwise or else), Sub-ordinate clauses- Noun clauses- as subject object and complement. Relative clauses, (restrictive and non-restrictive clauses) Adverb Clauses (open and hypothetical, conditional: with because, though, where, so, that, as long as, as soon as) Comparative clauses (as+ adjective / adverb + as no soonerthat)

UNIT-II

Tense: Simple present, Progressive and present perfect, Simple past, progressive and past perfect, Indication of futurity, The passive (Simple present and past, Present and perfect and to infinitive structure) , Reported speech

UNIT-III

Declarative sentences, Imperatives, Interrogative-wh-questions, yes/no questions , Exclamatory sentences. Modals (Will, shall, would, ought, to have to/have got to, can-could, may-might and need)

UNIT-IV

Verb Structures (infinitive and gerundial)

Linking devices : Note: The above language item will be introduced to express the following communicative functions: Seeking and imparting information, Expressing attitudes-intellectual and emotional Persuasion and discussion etc.

Reading Comprehension: Adequate practice should be provided in reading with understanding through graded materials prescribed in the text book. Attempt should also be made to expand the learner's vocabulary.

UNIT-V

Writing Skills: Graded practice should be provided in the basic skills of composition. The following forms of composition should be practiced.

- a) Paragraph writing (150 words)
- b) Letter Writing (both formal and informal)

Speaking: Contextualized vocabulary teaching and oral work should be used to strengthen the learner's acquirement of the sound distinction, stress and intonation in English.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: To Understand reading, writing and over all communication skills of the participants

CO2 : To Learn students about Tense and formation of English statement.

CO3 : To Learn formation of different types of sentences

CO4 : To increase the capability of reading comprehensive.

CO5 : To Learn writing and speaking skills.

Text Book(s):

1. English Grammar & Composition by S. C. Gupta, Arihant publication
2. English Grammar & Composition by P C Wren & H Martin

Reference Book(s) :

1. Shashikumar and Dhameja-Spoken English
2. The McGraw-Hill Handbook of English Grammar and Usage by Mark Lester

301: Object Oriented Programming Using C++

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire the knowledge related to basic concepts of OOP, functions, constructors & destructors, inheritance & streams

UNIT-I

Introduction to OOP :- Procedural, Structured and Object Oriented Programming(OOP) , Basic concepts of OOP : Object, Classes, Inheritance, Polymorphism, Reusability; Benefits & applications of OOP, C++ and OOP. Characters used in C++. Basic data types, user defined data types, Structure of C++ program, use of conditional and looping statements in C++. Arrays in C++. Reference variable, operators, structures, union, enum.

UNIT-II

Functions : prototypes, default arguments, const arguments in functions, Inline functions, call by value, call by reference, function overloading. Classes and objects : Declaring a class, defining an object, data hiding and encapsulation, public and private data members & functions, friend function. Pointer to data member, pointer to member function and pointer to object, virtual function.

UNIT-III

Constructors & Destructors: Parameterized constructors, multiple constructor in a class, copy constructors, arrays of object, object as function, arguments, returning objects, the this pointer, memory allocation for objects. Operator Overloading : Unary and binary operators, type conversions.

UNIT-IV

Inheritance : Inheritance and derivation, single, multilevel, multiple, hierarchical & hybrid inheritance, constructors in multiple inheritance, private and protected inheritance. Overriding functions, virtual methods, ambiguity resolution, virtual base class. Constructors in derived class. Member classes : nesting of classes.

UNIT-V

Streams : C++ streams, stream classes, unformatted & formatted I/O operations, member functions of cin, manipulators, managing output with manipulators, user defined manipulators with arguments. Files : Classes for file stream operations, file I/O with streams, file modes, binary versus text files, binary I/O, random access, error handling during file operations, command line arguments, Exception handling.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Learn to apply object-oriented paradigm for problem solving.

CO2: Understand a suitable programming construct and learn class and objects

CO3: To learn use of constructor and destructor in real time application.

CO4: To use of Inheritance and their types.

CO5: To Understand stream and File I/O

Text Book(s):

1. E. Balagurusamy, Object Oriented Programming with C++ , TMH

Reference Book(s):

1. Yashwant Kanetkar, Let us C++, BPB
2. Jesse Liberty, Teach Yourself ANSI C++ , Techmedia
3. Robert Lafore, Object Oriented Programming in Turbo C++ , Galgotia Publications
4. Herbert Schildt, C++ Complete Reference, TMH

Online Resource(s):

- https://www.youtube.com/playlist?app=desktop&list=PL0gIV7t6l2iIsR55zsSgeiOw9Bd_IUTbY
<https://nptel.ac.in/courses/106105151>
<https://nptel.ac.in/courses/106101208>

301 (PR): Lab C++
Max. Marks : Practical 100

LIST OF PRACTICALS

Write programs in C++ for

1. Program illustrating basic input/output operations using cin, cout.
2. Implementing class and objects.
3. Program for differentiating static and non static members of class.
4. Program for various types of constructor and destructors.
5. Program for default argument of function.
6. Program for object as return type.
7. Program for array of objects.
8. Program for various types of inheritance
9. Program for ambiguity problem and their solution.
10. Program for abstract class
11. Program for use of ios function.
12. Program for using manipulators.
13. Implementing function overloading.
14. Program for function overriding.
15. Implementing various constructors and destructor
16. Program illustrating overloading of various operators.
17. Program to overload + operator for adding Amount objects.
18. Program to overload - operator for difference between two DATE objects.
19. Program illustrating use of Friend function.
20. Program to demonstrate Inline function.
21. Program to demonstrate Static Member functions.
22. Program to demonstrate default arguments.
23. Program illustrating various forms of Inheritance
24. Program illustrating use of virtual functions, virtual Base Class.
25. Program illustrating use of file handling

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Apply object-oriented paradigm for problem solving.

CO2: Select a suitable programming construct and in-built data structure for the given problem.

CO3: Design, develop, document, and debug modular programs.

CO4: Use recursion as programming paradigm for problem solving.

CO5: Understand stream and File I/O

302: Operating System

Max. Marks : Theory 60 IA 40

Course Objectives:

To understand the fundamental concepts of Operating Systems, process management, memory management and File and Device management.

UNIT-I

Fundamental Concepts of Operating Systems: Evolution of operating systems -Serial processing, Batch Processing, Multi-programming, Types of Operating systems- Batch operating system, Time-sharing operating systems, Real-time operating system, multitasking operating system, distributed operating system. Overview of Process Management, Memory Management, File Management, Device Management, Operating system services,

UNIT-II

Process Management : Process concept, process scheduling, operation on processes, threads, enterprises communication, basic concepts, scheduling criteria, scheduling algorithms, Multiple processor scheduling, real-time scheduling, algorithm evaluation.

UNIT-III

Inter Process Synchronization: Concurrent processes, the critical section problem, the Critical Region and Conditional Critical Region problem, Inter process synchronization, Inter process communication, Deadlock occurrence, Deadlock characterization, Deadlock prevention, Deadlock avoidance, Deadlock detection and recovery.

UNIT-IV

Memory Management: Single Process Monitor, Static Partitioned memory allocation, Swapping, Relocation. Dynamic Partitioned memory allocation, Compaction. Multiple fence register. Segmentation - Address translation, Descriptor caching. Paging, Page allocation. Virtual memory, Instruction interruptibility, Management of virtual memory, Page replacement, Replacement algorithms. Comparison of various memory management techniques with reference to Protection and shareability.

UNIT-V

File and Device Management: File system organization, File operations, Access methods, Directory structure organization, File protection - Goals of protection, Access matrix model of protection, Dynamic Protection Structure, Security encryption, Device management: Dedicated, Shared and Virtual devices, Sequential Access and Direct Access devices, Channel and Control UNITs, I/O buffering, I/O schedulers, Spooling system.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Describe basic functions of an Operating System.

CO2: Understand process management of operating system

CO3: Describe different techniques for managing computer resources like CPU Deadlock

CO4: Implement simple algorithms for managing computer memories.

CO5: Understand file and device management of the computer system.

Text Book(s):

1. Peterson & Silberschatz : Operating system concepts, Sybex.

Reference Book(s) :

1. Senart E. Madnick and J.J. Donovan : Operating Systems, McGraw Hill.
2. Milan Milenkovic : Operating Systems, Concept and Design, McGraw Hill

Online Resource(s):

<https://nptel.ac.in/courses/106106144>

<https://nptel.ac.in/courses/106102132>

<https://nptel.ac.in/courses/106105214>

303: Database Management System

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire the knowledge related to DBMS, RDBMS, PL/SQL and Stored functions.

UNIT-I

Basic Concept: An Introduction to database System, Advantages and limitations of DBMS. Database System Architecture, Purpose of DBMS, Data Independency. Basic File Systems: Types of file, operations on file, file activity ratio, access time, response time, volatility, file size. File Organization: Sequential, Index Sequential, Direct access. Detail design of E-R Model. Data Models: Hierarchical Model, Network Model, Relational Model and their Inter-comparison. Basic Operations of Relational Algebra: Union, Intersection, Difference, Product, Join and its types.

UNIT-II

Normalization: Relational Database Design: Integrity Constraints, Functional Dependency: Single Valued and Multivalued Functional dependence, I, II, III, Boyce Codd, IV & V Normal forms. Security & Integrity: Introduction, Access Control, Crypto Systems. The Power of SQL (Creation, Insertion, Deletion, Indexing & Modification of Databases in SQL). Logical operators, range searching, pattern matching, oracle functions, grouping data from tables in SQL, manipulating data in SQL.

UNIT-III

Data constraints: column level and table level constraints, NULL value, primary key, unique key, default value, foreign - key reference, check integrity constraints. Views: creation of views, renaming the column of a view, using view, updatable views, destroying a view. Granting Permissions: permission on the objects created by the user, granting permissions using GRANT statement, object privileges, referencing a table belonging to another user, granting permissions to another user, revoking the permissions given.

UNIT-IV

PL/SQL: introduction, performance, performance improvement, portability, PL/SQL data types, PL/SQL execution environment, PL/SQL syntax, character set, PL/SQL block structure, oracle transactions, locks, cursors, error handling in PL/SQL, stored procedures: introduction, where do procedures reside, creating a procedure, executing procedures, advantages of procedures, syntax of procedure, an application using a procedure, deleting a procedure.

UNIT-V

Stored functions: introduction, where do functions reside, how oracle creates a function, how oracle executes a function, advantages of functions, syntax for creating a stored function, an application using a function, deleting a stored function. Database triggers: introduction, use of database triggers, how to apply database triggers.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Understand concept of DBMS, data models and relational algebra.

CO2: Understand database normalizations and SQL.

CO3: Learn the use of keys in a database and granting permission to users.

CO4: Learn pl/sql commands for oracle databases.

CO5: Understand the sorting of records in a database.

Text Book(s):

1. Henry F. Korth & A. Silberschatz: Database System Concepts, MGH.
2. Ivan Bayross: Oracle Developer 2000 BPB Pub.

Reference Book(s):

1. Michael Abbey & Michael J. Corey: Oracle Beginners guide TMH.
2. Arun K. Majumdar & P. Bhattacharya: Database Management System, TMH.

Online Reference(s):

<https://nptel.ac.in/courses/106106220>

<https://nptel.ac.in/courses/106104135>

<https://nptel.ac.in/courses/106/105/106105175/>

303 (PR): Lab DBMS

Max. Marks : Practical 100

LIST OF PRACTICALS

The Programme to be implemented using SQL:

1. Create Table, insert data into tables, Deletion, Updation
2. Retrieval of data using SQL statements with all possible clauses.
3. Using aggregate function .
4. Using group by and having clause .
5. Write a query for Join, set operation, and nested queries.
6. Creating View .
7. Program to find the greatest of three numbers in PL/SQL.
8. Program for reverse of a number in PL/SQL.
9. Program to check numbers is odd or even in PL/SQL.
10. Program for Palindrome Number in PL/SQL .
11. Write a Program to Implement all Loop in PL/SQL .
12. Write a Program to demonstrate all decision making statements in PL/SQL .
13. Write a PL/SQL program to implement TRIGGER in the database.
14. Program in PL/SQL to handle Exceptions.
15. Program in PL/SQL to perform multiple insertions in a single request.
16. Program to Implement nested query.
17. Write a Query to demonstrate "Wildcard" characters.
18. Write a query to implement "Aliases" in SQL.
19. Write a program in PL/SQL to create function and procedure.
20. Demonstrate array in PL/SQL.
21. Program to demonstrate Declaring, Defining and Invoking a simple PL/SQL function which will compute and return the maximum of two values.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: To learn creation of tables using SQL commands

CO2: To create some queries for different operations in data base

CO3: Learn the use of keys in a database and granting permission to users.

CO4: Learn pl/sql commands for oracle databases.

CO5: To apply sorting of records in a database.

304: Probability and Statistics

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire the knowledge related to theory of probability, dispersion & distribution, curve fitting and sampling.

UNIT - I

Theory of Probability-I: Event and sample space, Probability of an event, Addition and multiplication theorem of probability, Inverse probability, Baye's Theorem, Continuous probability.

UNIT- II

Theory of Probability-II: Probability density function and its application, Standard deviation of various continuous probability distributions, Mathematical expectation, Expectation of sum and product of random variables.

UNIT - III

Dispersion and distribution: Measures of dispersion: Range and interquartile range, Mean deviation and Standard deviation, Moments, Skewness and kurtosis. Moment generating function. Theoretical distribution: Binomial, Poisson rectangular, Exponential.

UNIT - IV

Curve fitting and Correlation: Method of least squares, Curve fitting, Correlation and regression, Partial and multiple correlation (up to three variables only).

UNIT - V

Sampling : Sampling of large samples, Null and alternative hypothesis, Errors of first and second kinds, Level of significance and critical region, Test of significance based on chi's square (χ^2), t , F and Z distribution.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Understand and use the terminology of probability.

CO2 : Calculate probability is using the addition and multiplication rules.

CO3: Describe and calculate the mean deviation and standard deviation and range

CO4 : Calculate and interpret the correlation Coefficient.

CO5 : Interpret the student's t probability distribution Chi-square goodness-of-fit F and Z test.

Text Book(s):

1. H.C. Saxena and J.N. Kapoor: Mathematical Statistics, S. Chand and Company, 2010.
2. E. Rukmangadachari; Probability and Statistics, Pearson Edition India, 1st Edition 2012.

Reference Book(s):

1. Vijay K. Rohatgi, A.K. Md. Ehanes Saleh: Introduction to Probability and Statistics, Wiley; 3rd edition, 2015
2. S.C. Gupta and V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand and Sons, 2014.

401: Computer Graphics

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire the knowledge related to computer graphics, transformations, windowing & clipping, algorithms and shading & Color models.

UNIT-I

Introduction: Applications of Computer Graphics, Raster Graphics, Fundamentals; Scan conversion, Pixel, frame, buffer, Graphics Primitives : Line, Circle, Ellipse, character generation, polygon : representation, polygon filling algorithms, antialiasing

UNIT-II

Devices: Display Devices, random scan and raster scan monitors, color CRT monitor, direct view storage tube, Plasma Panel, Hardcopy devices : printers and plotters, Input Devices : Joysticks, mouse, digitizer, scanner, camera, Transformations : Translation, scaling, rotation, Shear, Reflection, homogeneous coordinates, composite transformation, concatenation properties, Raster method of transformation.

UNIT-III

Windowing and Clipping: Window, viewport, line clipping, polygon clipping, text clipping, Window & Viewport transformation, Display file concepts & Segmentation : display File, segment table, segment creation, deletion, rename, segment display file.

UNIT-IV

Interaction: Locator & Selector devices, interactive picture construction techniques, Three Dimensions : 3D geometry, 3D display techniques, transformation, viewing parameters.

UNIT – V

Hidden surface removal : Back face removal algorithm, Z buffers algorithm, Scan line algorithm, painter's algorithm, Shading & Color Models : Diffuse illumination, point source illumination, specular reflection, refraction, shadows, colour, colour models, dithering, halftoning Curves & Surfaces : Interpolation algorithm for curve fitting, B splines, bezier curves, fractals.

Course Outcomes:

After the completion of this course, students will be able to:

CO1 : Understand the concept of computer graphics fundamentals.

CO2 : Understand the computer graphics display device and 2D transformation

CO3 : Understand computer graphics clipping and clipping algorithms.

CO4 : To learn 3D display techniques and transformation.

CO5 : Understand the basics of color model and manipulate graphics & images.

Text Book(s):

1. D. Hearn and Baker : Computer Graphics, Prentice Hall of India Pvt. Ltd.
2. Steven Harrington : Computer Graphics, MGH.

Reference Book(s):

1. Newman and R.F. Sproull: Principles on Interactive Computer Graphics, MGH.
2. W.K. Giloi : Interactive Computer Graphics, PHI.
3. R.A. Piastock and G. Kalley : Theory and Problems of Computer Graphics, MGH

Online Resource(s):

<https://nptel.ac.in/courses/106102065>

<https://nptel.ac.in/courses/106106090>

401 (PR): Lab CG

Max. Marks : Practical 100

LIST OF PRACTICALS

1. Programs for designing objects in graphics by using Library functions.
2. Programs to draw the line & circle by using DDA algorithms.
3. Programs to draw the line & circle by using Bresenham's algorithms.
4. Programs to draw the ellipse by using algorithms.
5. Programs to draw and colour the picture.
6. Programs to fill polygons by using Flood Fill method.
7. Programs to fill polygons by using Boundary Fill method.
8. Programs to fill polygons by using scan line method.
9. Programs to implement line clipping.
10. Programs to implement polygon clipping.
11. Programs for creating various type of text and font.
12. Programs for creating two dimensional object.
13. Programs to implement 2-D transformation on objects.
14. Programs to draw Bezier curve.
15. Programs to draw B-spline curve.
16. Programs to implement digital clock.
17. Programs to demonstrate traffic light with difference of time.
18. Programs to implement bouncing ball and ball color will change in every bounce.
19. Programs to draw moving car by using different shapes.
20. Programs to do basic animation by using graphics.

Course Outcomes:

After the completion of this course, students will be able to:

- CO1 : Understand the line and circle drawing algorithms.
- CO2 : Learn polygon filling algorithm.
- CO3 : Understand computer graphics clipping and clipping algorithms.
- CO4 : To learn 3D display techniques and transformation.
- CO5 : Understand the basics of Bezier and B-spline curve.

402: Software Engineering

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire the knowledge related to software development life cycle models, software requirement analysis & specification, software design, coding & testing and software reliability & quality assurance.

UNIT-I

Introduction: The product and the process, program vs software products, Emergence of software engineering, software development life cycle models, classical waterfall, iterative waterfall, prototyping, evolution, spiral & RAP model, comparison of various life cycle models, project management process, process management process.

UNIT- II

Software Requirement Analysis & Specification (SRAS) : Need for software requirement specification, requirement process, requirement analysis, requirement specification, planning a software project; cost estimation, project scheduling, staffing & personnel planning, software configuration management, plans: quality assurance plan, risk management.

UNIT-III

Software Design : Criteria for Software design, software design & design principle; module level concepts: Coupling and Cohesion, design notation & specifications, design methodology, verification, object oriented design: Basic concepts, design methodology & Metrics, object oriented vs function oriented design, detailed design.

UNIT-IV

Coding and Testing : Standard guideline for coding, programming practice, testing fundamentals, unit testing, verification vs validation, black box & white box testing, functional testing, structural testing, object oriented program testing.

UNIT-V

Software reliability & quality assurance: Reliability metrics, growth and modeling, software quality management system, evolution, ISO 9000. CASE: scope and benefit, support in software life cycle, CASE tools, hardware and environmental requirements, architecture of a CASE environment. Software maintenance.

Course Outcomes :

On completion of this course, the student will be able to:

CO1: Understand the process of software development model.

CO2: Understand SRAS and project planning.

CO3: Learn software design methodology.

CO4: Learn coding and testing..

CO5: Learn Reliability and case tools.

Text Book(s):

1. Pankaj Jalote: An Integral Approach to Software Engineering, Narosa
2. Rajib Mall: Fundamental of Software Engineering, PHI

Reference Book(s):

1. Rogers Pressman: Software Engineering, a practitioner's approach, MGH
2. Richard Farley: Software Engineering Concept, TMH

Online Resource(s):

- <https://www.youtube.com/playlist?app=desktop&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt>
<https://nptel.ac.in/courses/106105182>
<https://nptel.ac.in/courses/106101061>

403 : VB.Net

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire the knowledge related to .Net Technology, framework and programming constructs, window forms and file handling.

UNIT-I

Introduction to .Net Technology, Introduction to VB.NET, Building VB.net Application, IDE, Evolution of Dot.net Framework, Keywords, Statement, Variables, Constant, Data Types, Operators, Comments, Decision Making, Looping, Array and string.

UNIT-II

Sub Procedure and Function, Creating Function, Passing Values as arguments, Creating Properties, Handling Exception, Resume Next, Resume Line, ON Error GOTO, Structure Exception Handling. Throwing Exception, Custom Exception.

UNIT-III

Classes and Objects : Types, Field, Properties, Methods and Events, Members Overloading, Overriding, Creating Class, Object, Creating Interfaces, Polymorphism, Early and Late binding, Using MyBase and MyClass Keyword, Inheritance.

UNIT-IV

Window Forms: Creating Window Forms, Controls to Form, Setting Title bars, Dialog Boxes, Handling Mouse Events, Handling Key Press Events, Controls Classes: Textbox, Labels, Buttons, Checkbox, Panels, Group Boxes, Radio Button, Drop Down, List Boxes, Combo Box, Scroll Bars, Menu, Image and other controls..

UNIT-V

File Handling: File Opening and Creating, Writing Files, Reading Binary Data, Data Access and ADO.NET: Creating Data set, Populating Dataset, Displaying data in Grids, Data access using Data Adapter Controls, Binding Data to Controls, Using Data Views.

Course Outcomes:

On completion of this course, the student will be able to:

CO1 : Learn .Net Technology.

CO2 : Understand the Visual Basic fundamentals.

CO3 : Describe the classes, interfaces & arrays.

CO4 : Learn creation of window forms & controls.

CO5 : Understand file handling and graphics in VB.

Text Book(s):

1. Steven Holzner, Visual Basic .NET Programming Black Book, Dreamtech Press

Reference Book(s):

1. Jeffrey R. Shapiro "The Complete Reference Visual Basic .NET" Tata Mcgraw Hill.
2. Rox "Beginner and Professional Edition VB.NET" Tata Mcgraw Hill.
3. Bill Evzen, Bill Hollis "Professional VB.NET 2003" Wiley Dreamtech
4. Tony Gaddis "Starting Out VB.NET PROG.2nd Edition" Wiley Dreamtech

Online Resource(s):

http://www.tmv.edu.in/pdf/Distance_education/BCA%20Books/BCA%20V%20SEM/BCA-521%20VB%20.Net.pdf

<https://www.ics.uci.edu/~cs237/lectures/old/dotNETfinal.ppt>

403 (PR): Lab VB.Net

Max. Marks : Practical 100

LIST OF PRACTICALS

1. Write a Program to create a String object with Properties of the String Class.
2. Program in VB.Net to access individual characters from Strings in VB.NET
3. Create a program to understand the uses of the Concat() function to append or concatenate one or more strings.
4. Program to understand the uses of Copy() function.
5. Program to print the number from 1 to 10 using the For Next loop.
6. Program to understand the uses of With End statement.
7. Program to pass the empty, a single or double parameter of Sub procedure.
8. Program to understand the concept of passing parameters by value.
9. Create a program to understand the dynamic array.
10. Program using the Try-Catch statement in VB.NET to handle the exceptions.
11. Create a simple program of Windows form control based on following Controls
 - A. Check Box
 - B. Button
 - C. RadioButton
 - D. ListBox
 - E. ComboBox
 - F. TextBox
 - G. Menu
 - H. Picture Box
 - I. Dialog Box
 - J. MDI Form
 - K. List View
 - L. Progress Bar
12. Program to display the KeyPressEvent in the VB.NET Windows Forms.
13. Create a simple program to display the use of KeyDown events in the VB.NET Windows Forms.
14. Program to display the use of KeyUp events in the VB.NET Windows Forms.
15. Console Program to add the elements of an array in VB.NET programming language.
16. Console program to take input values from the user and display them in VB.NET programming language.
- 17. Course Outcomes:**
18. On completion of this course, the student will be able to:
19. CO1 : Learn .Net Technology.
20. CO2 : Understand the Basic function of .NET.
21. CO3 : Learn the classes, interfaces & arrays.
22. CO4 : Learn creation of window forms & controls.
23. CO5 : Understand file handling and graphics in .Net.

404 : Discrete Mathematics

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire the knowledge related to discrete mathematics, understanding the concepts related to boolean algebra, trees and graphs.

UNIT - I

Relation: Binary, Inverse, Composite and Equivalence relation, Equivalence classes and its properties, Partition of a set, Partial order relation, Partially ordered and totally ordered sets, Hasse Diagram.

Lattice: Definition and examples, Dual, bounded, distributed and complemented lattices.

UNIT - II

Boolean Algebra: Definition and properties, Switching circuits and its applications, Logic gates and circuits.

Boolean functions: Disjunctive and conjunctive normal forms, Boole's Expansion theorem, Minimize the Boolean function using Karnaugh Map.

UNIT - III

Graphs: Definition and types of graph, Sub graphs, Walk, Path and circuit, connected and disconnected graphs, Euler graph, Hamiltonian path and circuit, Dijkstra's algorithm for shortest path in weighted graph.

UNIT - IV

Trees: Definition and its properties, Rooted, Binary and Spanning Tree Rank and nullity of a graph, Kruskal's and Prim's Algorithm, Cut-set and its properties, Fundamental Circuit and Cut-set, Planar graphs.

Matrix representation of graphs: Incidence, Adjacency, Circuit, Cut-set path

UNIT - V

Discrete numeric and generating functions: Operations on numeric functions, Asymptotic behavior of numeric functions, Generating functions.

Recurrence Relations and recursive algorithm: Recurrence relations, Linear recurrence relations with constant coefficients, Homogeneous solutions, Particular solutions, Total solutions, Solution by the method of generating function.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Learn Relation and lattice.

CO2: Minimize the Boolean function using Karnaugh map.

CO3: Understand the Lattices and their types

CO4: Graphs, their types and its application in study of shortest path algorithms.

CO5: Understand the discrete numeric function, generating function and Recurrence Relation.

Text Book(s):

1. J.P. Tremblay and R Manohar, Discrete Mathematical Structures with Application to Computer Science, McGraw Hill Education, 1st edition, 2017.
2. C.L. Liu, Elements of Discrete Mathematics, McGraw Hill Education, 4th edition 2017.
3. Narsingh Deo: Graph Theory with Applications to Engineering and Computer Science, Prentice Hall India Learning Private Limited, 1979.

Reference Book(s)

1. Seymour Lipschutz and Mark Lipson: Discrete Mathematics (Schaums Outline), McGraw Hill Education, 3rd edition, 2017
2. Edgar G. Goodaire and Michael M. Parmenter, Discrete Mathematics with Graph Theory Pearson Education Pt. Ltd. Indian Reprint, 2003.

Online Resource(s):

<https://nptel.ac.in/courses/106106183>

<https://nptel.ac.in/courses/106103205>

501 : Java Programming

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire knowledge related to the programming language Java.

UNIT- I

Introduction to Object Oriented Programming: Basic concepts, benefits of OOPS, Application of OOP, Java evolution : history, features, C, C++ & Java a comparison, Java and WWW, HW, & SW requirements for Java, Structure of simple Java program, Java tokens, statements, Java virtual machine, command line arguments, programming style, constants & variables, symbolic constants, type casting; Various operators in Java; Type conversions in expressions, operator precedence and associativity, mathematical functions.

UNIT-II

Decision making and branching; the switch statement, Loops, Defining a class, adding variables and methods, creating objects, accessing class members, constructors, method overloading, static members, nesting of methods inheritance; extending a class, overriding methods, final variables and methods, final classes, finalize methods, abstract methods and classes visibility control.

UNIT-III

Arrays, strings and vectors; Arrays, one dimensional arrays, creating an array, two dimensional arrays, strings, vectors, wrapper classes, defining interfaces, multiple inheritance, extending interfaces, implementing interfaces, accessing interface variable, Packages: Java API packages, using system packages, naming conventions, creating packages, accessing a package, using a package, adding a class to a package. Exception Handling.

UNIT- IV

Multithreaded programming; creating threads, extending the thread class, stopping and blocking a thread, thread lifecycle, using thread methods, thread exceptions, thread priority, synchronization, implementing the runnable interface. JDBC: JDBC ODBC bridge; The connectivity model; The driver manager; Navigating the resultset object contents; java.sql Package; The JDBC exception classes; Connecting to Remote database.

UNIT- V

Applet programming; Local and remote applets, preparing to write applets, building applets code, applet lifecycle, creating and executing applet, designing a web page, adding applet to HTML file, running the applet, passing parameters to applets, displaying numerical values, getting input from the user, The AWT: The class hierarchy of window fundamentals; The basic user interface components; Layout managers; The Java Event Handling Model, Adapter classes; Event classes. Key Event, Mouse Event and Windows Event.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Understand the object-oriented concepts – Classes, Objects, Inheritance, Polymorphism.

CO2: Handle program exceptions.

CO3: Design, implement, document, test, and debug a Java application consisting of multiple classes.

CO4: Handle input/output through files.

CO5: Create Java applications with graphical user interface (GUI).

Text Book(s):

1. Programming with Java a primer by E. Balagurusamy.

Reference Book(s):

1. Peter Norton's Guide to Java Programming, Techmedia Pub.
2. Mastering in Java, Techmedia Pub.schatz & Galvin
3. Core JAVA 2 Volume_I Fundamentals Sun Microsystems

Online Resource(s):

<https://nptel.ac.in/courses/106105191>

https://www.youtube.com/playlist?list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho

501 (PR): Lab Java

Max. Marks : Practical 100

LIST OF PRACTICALS

1. Developing, compiling and executing a simple console application in Java.
2. Programs based on loops, arrays and operators.
3. Programs based on classes and objects.
4. Programs based on method overloading.
5. Simple application based on static keywords.
6. Simple application based on the final keyword.
7. Program that illustrates the working of constructor.
8. Program for copy constructor in a java class.
9. Program based on different types of Inheritance.
10. Program based on Method Overriding, Dynamic Method Dispatch, Abstract Classes.
11. Programs based on String Handling.
12. Program based on various types of Exception Handling.
13. Program based on Wrapper class.
14. Program based on command line argument.
15. Simple application to demonstrate the working of Interface.
16. Simple application to demonstrate the working of Packages.
17. Program based on thread and thread priority.
18. Developing a Simple Applet.
19. Creating graphics in an applet.
20. An applet to demonstrate the working of Mouse Events.
21. Programs based on the usage of all AWT controls.
22. Program based on controlling various types of events in a window application.
23. A simple application to demonstrate working with Frames.
24. Program based on java database connectivity.
25. Program based on jdbc and various operations like insertion, deletion, updating and retrieving data from database.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: To Learn the object-oriented concepts

CO2: To learn programming exceptions.

CO3: Design, implement, document, test, and debug a Java application consisting of multiple classes.

CO4: Handle input/output through files.

CO5: Create Java applications with graphical user interface (GUI).

502(A): Computer Network

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire the knowledge related to computer networks and OSI reference model and seven layers of OSI.

UNIT-I

Introduction to Computer Networks: Basics of data communication, digital vs analog transmission, mode of transmission, Computer Networks: Goals and kinds (LAN/WAN), idea of hardware and software requirements for computer networks, inter comparison of various communication media, wireless transmission., various topologies: bus, ring, tree & mesh, OSI reference model vs TCP/IP.

UNIT-II

Data Link Layer: Data Link Layer Design Issues: Framing Error Control and Flow Control, Error Detection & Correction, Elementary Data Link Protocols, Sliding Windows Protocols, HDLC frame packet.

UNIT- III

Medium Access Sublayer: Channel allocation problem, Multiple access protocols: ALOHA, CSMA, Collision free; Standards in LAN/WAN (CCITT & IEEE), High speed LANs: FDDI, Fast Ethernet; Satellite Networks: Polling, FDM, TDM, CDMA.

UNIT- IV

The Network and Transport Layer: Network Layer design issues, routing and switching techniques, Routing Algorithms, congestion control algorithms, the network layer in the internet; transport layer: Elements of transport services, transport protocols, the internet transport protocol, TCP & UDP.

UNIT- V

Application Layers and Network Management: Network Security: Traditional cryptography, cryptography principles, secret key algorithms, public key algorithm, Authentication protocol, Domain Name System, Simple Network Management Protocol, E-mail, News group, WWW, Future trends in computer networks.

Course Objectives:

On completion of this course, the student will be able to:

CO1 : Learn the basics of Computer network Technologies.

CO2 : Understand the fundamentals of types of transmission mediums and Data link Layer.

CO3 : Learn flow control and error control techniques and Computer Network protocols at Conceptual level.

CO4 : Learn WAN and TCP/IP.

CO5: Learn the architecture & protocols of email and subnet masking.

Text Book(s):

1. Tanenbaum: Computer Networks, PHI
2. Behrouz A. Forouzan: DATA COMMUNICATIONS AND NETWORKING (SIE), McGraw Hill Education;

Reference Book(s):

1. John Freer: Computer Communication & Networks, EWP
2. William Stalling: Data & Computer Communication, PHI
3. Basandra & Jaiswal: Local Area Network, Galgotia
4. James Martin: Computer Networks & Distributed processing , PHI
5. Uyles Black: Computer Networks, PHI

Online Resource(s):

<https://nptel.ac.in/courses/106106091>

<https://www.youtube.com/playlist?list=PLEAYkSg4uSQ2NMmzNNsEK5RVbhxqx0BZF>

<https://nptel.ac.in/courses/106105183>

502 (B) : Mobile Computing

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire the knowledge related to wireless communication, mobile data communication, WLAN and Bluetooth technology.

UNIT-I

Overview of OSI Model: Significance of layered Model , PDUs, SDUs, IDUs, Higher layer Protocols. Switching and Components. Introduction, Applications, history of wired & wireless Communication systems. . Radio Transmission: frequencies ,signal propagation, antenna, types of modulation, FHSS, DSSS. Multiple Access technology for Wireless Communication : FDMA,TDMA,CDMA Cellular System: Introduction, types.

UNIT-II

Mobile Data Communication : -Cellular Telephony; Structure, Fading, Small scale fading, Multi-path Fading, Speech Coding, Error Coding and Correction, Hand off Management, Switching and authentication, MTSO interconnections, frequency happing, frequency reuse. Circuit Switched Data Services & Packet Switched Data Services an Cellular Networks, Personal Communication Systems (PCS) Architecture, Digital Enhanced Cordless Telecommunications (DECT,) Personal Access Comm. System (PACS).

UNIT-III

Digital Cellular Systems and Standards : GSM System overview, Architecture; GSM Practical Model, GSM Mobility Management, SMS security aspects. Broadcast System overview. General Packet Service (GRPS) Architecture, GRPS Network, Interfaces and Procedures (2.5 G), 3G Mobile Services: UMTS and International Mobile Telecommunications (IMT-2000), W-C DMA. and CDMA 2000, Quality of service in 3G .

UNIT-IV

WLAN: Components and working of Wireless LAN, Transmission Media for WLAN, Infrastructure & types of WLAN, IEEE 802.11 Standards, Protocols for WLAN ,MACA, MACAW , Infrared technology. Wireless Application Protocol (WAP) model, architecture;-Gateway, WAP protocols and WML

UNIT-V

Introduction to. Bluetooth technology. Wireless in Local Loop (WLL) architecture, products. Satellite as a switch, Components of VSAT system, VSAT topologies access schemes.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: learn multiple access technology for Wireless Communication .

CO2: understand the concept of mobile data communication.

CO3 : learn Digital Cellular Systems and Standards.

CO4: describe Components and working of Wireless LAN.

CO5 : understand Bluetooth technology & WLL architecture.

Text Book(s):

1. Jochen Schiller "Mobile Communication", Pearson Education.

Reference Book(s):

1. Yi -Bing Lin and Imrich Chlamtac "Wireless and Mobile Network Architectures", Wiley India.
2. Raj Pandaya "Mobile and Personal Communication System & Services".

Online Resource(s) :

<https://nptel.ac.in/courses/106106147>

<https://nptel.ac.in/courses/117/102/117102062/>

503 : Personality Development & Character Building

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire the knowledge related to personality development and employability quotient.

UNIT- I

Introduction to Personality Development : The concept of personality - Dimensions of personality – Theories of Freud & Erickson-Significance of personality development. The concept of success and failure: What is success? - Hurdles in achieving success - Overcoming hurdles - Factors responsible for success – What is failure - Causes of failure. SWOT analysis.

UNIT-II

Attitude & Motivation : Attitude - Concept - Significance - Factors affecting attitudes - Positive attitude – Advantages –Negative attitude- Disadvantages - Ways to develop positive attitude - Differences between personalities having positive and negative attitude. Concept of motivation - Significance – Internal and external motives - Importance of self- motivation- Factors leading to de-motivation

UNIT-III

Self-esteem : Term self-esteem - Symptoms - Advantages - Do's and Don'ts to develop positive self-esteem – Low self-esteem - Symptoms - Personality having low self esteem - Positive and negative self esteem. Interpersonal Relationships – Defining the difference between aggressive, submissive and assertive behaviours – Lateral thinking.

UNIT-IV

Other Aspects of Personality Development : Body language - Problem-solving - Conflict and Stress Management - Decision-making skills - Leadership and qualities of a successful leader – Character building -Team-work – Time management - Work ethics –Good manners and etiquette.

UNIT- V

Employability Quotient : Resume building- The art of participating in Group Discussion – Facing the Personal (HR & Technical) Interview -Frequently Asked Questions - Psychometric Analysis - Mock Interview Sessions.

Course Outcomes:

On completion of this course, the student will be able to:

CO1:Learn the concept of personality, success and failures.

CO2 : understand concept attitude and importance of motivation

CO3 : understand self esteem

CO4: learn conflict & stress management

CO5 : learn resume building and facing the INTERVIEW

Text Book(s):

1. Hurlock, E.B (2006). Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill.
2. Stephen P. Robbins and Timothy A. Judge(2014), *Organizational Behavior 16th Edition*: Prentice Hall.

Reference Book(s):

1. Andrews, Sudhir. How to Succeed at Interviews. 21st (rep.) New Delhi.Tata McGraw-Hill 1988.
2. Heller, Robert.Effective leadership. Essential Manager series. Dk Publishing, 2002
3. Hindle, Tim. Reducing Stress. Essential Manager series. Dk Publishing, 2003
4. Lucas, Stephen. Art of Public Speaking. New Delhi. Tata - Mc-Graw Hill. 2001
5. Mile, D.J Power of positive thinking. Delhi. Rohan Book Company, (2004).
6. Pravesh Kumar. All about Self- Motivation. New Delhi. Goodwill Publishing House. 2005.
7. Smith, B . Body Language. Delhi: Rohan Book Company. 2004

601 : Web Applications Development

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire the knowledge related to web designing, java servlet, JSP, web services and android fundamentals.

UNIT - I

Introduction to Web Designing: Web architecture, Parsing in Browsers, Web site design standards, Client Side Technologies: Introduction to Markup languages HTML 5, Building a form and form elements, Dynamic HTML - JavaScript - Cascading Style Sheets - Including Multimedia. HTTP, Web Server and Application Servers, Installation of application servers, Config files, Web.xml.

UNIT - II

Java Servlet: Servlet Development Process, Deployment Descriptors, The Generic Servlet, Life Cycle of Servlet. Servlet Packages, Classes, Interfaces, and Methods, Handling Forms with Servlet. Various methods of Session Handling. Various elements of deployment descriptors.

UNIT - III

JSP Basics: JSP lifecycle, Directives, scripting elements, standard actions, implicit objects. Connection of JSP and Servlet with different database viz. Oracle, MS-SQL Server, MySQL. java.sql Package. Querying a database, adding records, deleting records, modifying records. Type of Statement.

UNIT - IV

Separating Business Logic and Presentation Logic, Building and using JavaBean. Session handling in JSP, Types of errors and exceptions handling. Introduction to Web Services, MVC Architecture, Struts and Hibernate.

UNIT - V

Introduction to Android: Fundamentals, Application Structure, Basic UI design, Android Application Deployment Environment, Dalvik virtual machine, Testing and Debugging Android Application.

Course Outcomes:

On completion of this course, the student will be able to:

CO1 : Understand web architecture.

CO2 : Learn HTML & CSS.

CO3 : Apply different modern technologies used for real-time client server application.

CO4 : Develop different attractive and interactive web pages.

CO5 : Learn basics of android application deployment environment.

Text Book(s):

1. K. Santosh Kumar, "JDBC, Servlet and JSP Black Book", Dreamtech Press India Pvt. Ltd.

Reference Book(s):

1. K. Mukhar, "Beginning Java EE 5: From Novice to Professional", Wrox Press.
2. M. Hall, L. Brown, "Core Servlets and Java Server Pages", 2nd edition, Pearson Education
3. G. Franciscus, "Struts Recipes", Manning Press
4. Android application development for java programmers. By James C. Sheusi. Publisher: Cengage Learning, 2013.

Online Resource(s) :

https://www.youtube.com/playlist?list=PL9m2Lkh6odgL4oPITc_9PyCsLHMoM1ml

https://www.ics.uci.edu/~lopes/teaching/ics123F05/notes/web_programming_survey.pdf

601 (PR): Lab Web Application Development

Max. Marks : Practical 100

LIST OF PRACTICALS

1. Create a web page that uses an image and hyperlink tag to show any image and connect with other web pages.
2. Create a web page that displays one table each displaying some student details like roll no, name, class, dob and address.
3. Create a generic servlet application.
4. Create an HTTP servlet application.
5. Create a servlet application with static form.
6. Create a servlet application with dynamic form.
7. Create a servlet application for url rewriting session tracking
8. Create a servlet application for http session tracking.
9. Create a servlet application for cookie session tracking .
10. Create a servlet application for request dispatching.
11. Create a servlet application that connects with an oracle database using JDBC in servlet.
12. Create a JSP application using the Scriptlet tag.
13. Create a JSP application using Directive tag.
14. Create a JSP application using the Expression tag.
15. Create a JSP application using the Action tag.
16. Create a JSP application using Declarative tag.
17. Create a JSP application for session tracking.
18. Create a JSP application to connect to the oracle database.
19. Print current date & time
20. JSP Program to upload file into server
21. JSP Program to auto refresh a page
22. JSP Program to count no. of visitors on website
23. JSP Program for session tracking
24. JSP program for error handling
25. Demonstrate expression tag
26. Detect locale, language settings & local specific time
27. Demonstrate JSP implicit object
28. JSP Program to validate username and password
29. JSP Program to select record from database
30. JSP Program to display given number in words

Course Outcomes:

On completion of this course, the student will be able to:

CO1 : To learn servlet deployment in web server.

CO2 : Learn HTML & CSS for static web page construction.

CO3 : Apply different modern technologies used for real-time client server application.

CO4 : Develop different attractive and interactive web pages.

CO5 : Learn basics of android application deployment environment.

602(A) : Data Mining & Warehousing

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire the knowledge related to data mining & data warehouse.

UNIT – I

Motivation, importance, Data type for Data Mining: Relational Databases, Data Warehouses, Transactional databases, advanced database system and its applications, Data mining Functionalities: Concept/Class description, Association Analysis classification & Prediction, Cluster Analysis, Outlier Analysis, Evolution Analysis, Classification of Data Mining Systems, Major Issues in Data Mining.

UNIT – II

Data Warehouse and OLAP Technology for Data Mining: Differences between Operational Database Systems and Data Warehouses, a multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Architecture, Data Warehouse Implementation, Data Cube Technology.

UNIT- III

Data Preprocessing: Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation. Data Mining Primitives, Languages, and System Architectures, Concept Description: Characterization and Comparison, Analytical Characterization.

UNIT – IV

Mining Association Rules in Large Databases: Association Rule Mining: Market Basket Analysis, Basic Concepts, Mining Single-Dimensional Boolean Association Rules from Transactional Databases: the Apriori algorithm, Generating Association rules from Frequent items, Improving the efficiency of Apriori, Mining Multilevel Association Rules, Multidimensional Association Rules, Constraint-Based Association Mining.

UNIT – V

Classification & Prediction and Cluster Analysis: Issues regarding classification & prediction, Different Classification Methods, Prediction, Cluster Analysis, Major Clustering Methods, Applications & Trends in Data Mining: Data Mining Applications, currently available tools.

Course Outcomes:

On completion of this course, the student will be able to:

CO1 : learn the data mining functionalities.

CO2 : understand and exhibit the basics of data warehousing and multi-dimensional modeling.

CO3 : describe data preprocessing.

CO4 : understand classification , clustering, frequent pattern analysis and regression .

CO5 : learn cluster analysis and DM tools.

Text Book(s):

1. J. Han and M. Kamber, “Data Mining: Concepts and Techniques”, Morgan Kaufmann Pub.
2. W.H. Inmon “ Building the Data Warehouse, 3ed, Wiley India.

Reference Book(s)

1. Berson “Data warehousing, Data Mining & DLAP, @004, TMH.
2. Anahory, “Data Warehousing in the Real World”, Pearson Education.
3. Adriaans, “Data Mining”, Pearson Education.
4. S.K. Pujari, “Data Mining Techniques”, University Press, Hyderabad.

Online Resource(s):

https://www.youtube.com/watch?v=ykZ_UGcYWg&list=PLCQnW0zDwSURB7xd3rKmt1bO7LQudolbd

<https://nptel.ac.in/courses/106105174>

602(B) : Information Storage Management

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire knowledge related to storage technology, architecture and networked storage.

UNIT-I

Introduction to Storage Technology: Data proliferation, evolution of various storage Technologies, Overview of storage infrastructure components, Information Lifecycle Management, Data categorization.

UNIT-II

Storage Systems Architecture: Intelligent disk subsystems overview, Contrast of integrated vs. modular arrays, Component architecture of intelligent disk subsystems, Disk physical structure components, properties, performance, and specifications, RAID levels, hot sparing.

UNIT-III

Introduction to Networked Storage: JBOD, DAS, NAS, SAN & CAS evolution and comparison. Applications, Elements, connectivity, standards, management, security and limitations of DAS, NAS, CAS & SAN.

UNIT-IV

Hybrid Storage solutions; Virtualization: Memory, network, server, storage & appliances. Data center concepts & requirements, Backup & Disaster Recovery: Principles Managing & monitoring : Industry management standards (SNMP, SMI-S, CIM).

UNIT-V

Information storage on cloud :Concept of Cloud, Cloud Computing, storage on Cloud, Cloud Vocabulary, Architectural Framework, Cloud benefits, Cloud computing Evolution, applications & services on cloud, Cloud service providers and Models, Essential characteristics of cloud computing, Cloud Security and integration.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Understand data categories and different types of advanced storage techniques.

CO2: Understand intelligent storage management

CO3: Learn which storage topology are used in enterprise

CO4: Understand how to monitor and manage storage.

CO5: Learn about cloud computing technologies.

Text Book(s):

1. G. Somasundaram & Alok Shrivastava (EMC Education Services) editors; Information Storage and Management: Storing, Managing, and Protecting Digital Information; Wiley India.

Reference Book(s):

1. Ulf Troppens, Wolfgang Muller-Friedt, Rainer Erkens, Rainer Wolafka, Nils Haustein; Storage
2. Network explained : Basic and application of fiber channels, SAN, NAS, iSESI, INFINIBAND
3. and FCOE, Wiley India.
4. John W. Rittinghouse and James F. Ransome; Cloud Computing : Implementation , Management and Security, CRC Press, Taylor Frances Pub.
5. Nick Antonopoulos, Lee Gillam; Cloud Computing : Principles, System & Application, Springer.
6. Anthony T. Velete, Toby J.Velk, and Robert Elsenpeter, Cloud Computing : A practical Approach,

Online Resource(s):

http://aad.tpu.ru/practice/EMC/ISM%20v2_with_notes.pdf

603(A): Parallel Computing

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire the knowledge related to Parallel Computing, modeling of parallel computing, basic communication operation of parallel computing and message passing interfaces and topologies.

UNIT- I

Introduction to Parallel computing: Parallel programming platforms: Trends in Microprocessor Architectures, Limitations of memory system performance, Dichotomy of parallel computing platforms, physical organization of parallel platforms, communication costs in parallel machines, Routing mechanisms for interconnection network, Impact of process processors mapping and mapping techniques.

UNIT – II

Principles of parallel algorithm design: Preliminaries, Decomposition techniques, Characteristics of tasks and interactions, Mapping techniques for load balancing, Methods for containing. Interaction overheads, Parallel algorithm models.

UNIT - III

Basic communication operations: One-to-All Broadcast and All-to-One Reduction, All-to-All broadcast and reduction All-Reduce and prefix sum operations, scatter and gather, All-to-All personalized communication, circular shift, Improving the speed of some communication operation.

UNIT – IV

Analytical modeling of parallel programs: Performance metrics for parallel systems, Effect of granularity of performance, scalability of parallel system, Minimum execution time and minimum cost-optimal execution time, Asymptotic analysis of parallel programs, other scalability metrics.

UNIT - V

Programming using the message passing paradigm: Principle of message – Passing programming, Send and receive operations, The message passing interface, Topologies and embedding, Overlapping communication with computation, collective communication and computation operations, Groups and communicators. Dense matrix algorithm: Matrix-vector multiplication, Matrix-matrix algorithm, Solving a system of linear equations.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Understand introduction of Parallel computing.

CO2: Learn Techniques of parallel computing and its principles.

CO3: Understand the basic communication operations and its improvements.

CO4: Understand the models of parallel programming and analysis.

CO5: Understand the principle of message, topologies and matrix algorithms.

Text Book(s):

1. Introduction to Parallel Computing, Second Edition, Ananth Gram, Anshul Gupta, George
2. Karypis, Vipin Kumar Pearson Education. Parallel computing Theory and Practice, Second Edition, Michael J. Quinn, TMH.

Reference Book(s):

1. Michael J. Quinn: Parallel Computing: Theory and Practice, McGraw-Hill Education.
2. Michael McCool : Structured Parallel Programming: Patterns for Efficient Computation, Morgan Kaufmann.

Online Resource(s):

<https://nptel.ac.in/courses/106/102/106102114/>
<https://nptel.ac.in/courses/106102114>

603(B) : Theory of Computation

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire the knowledge related to theory of computation.

UNIT-I

Review of Mathematical Preliminaries : Set, Relations and functions, Graphs and trees, string, alphabets and languages. Principle of induction, predicates and propositional calculus. Theory of Automation : Definition, description, DFA,NFA, Transition systems,2DFA, equivalence of DFA & NFA, Regular expressions, regular grammar, FSM with output (mealy and moore models), Minimisation of finite automata.

UNIT-II

Formal Languages : Definition & description, Phrase structure grammars & their classification, Chomsky classification of languages, closure properties of families of language, regular grammar, regular set & their closure properties, finite automata, equivalence of FA and regular expression, equivalence of two way finite automata, equivalence of regular expressions.

UNIT -III

Context-Free grammar & PDA : Properties unrestricted grammar & their equivalence, derivation tree simplifying CFG, unambiguous CFG, - productions, normal form for CFG, Pushdown automata, 2 way PDA, relation of PDA with CFG, Determinism & Non determinism in PDA & related theorems, parsing and pushdown automata.

UNIT-IV

Turing Machine : Model, design, representation of TM, language accepted by TM, universal turing machine, determine & non-determinism in TM, TM as acceptor/generator/algorithms, multidimensional, multitracks, multitape, Two way infinite tape, multihead, Halting problems of TM.

UNIT-V

Computability : Concepts, Introduction to complexity theory, Introduction to undecidability, recursively enumerable sets, primitive recursive functions, recursive set, partial recursive sets, concepts of linear bounded Automata, context sensitive grammars & their equivalence.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Understand theory of automation.

CO2: Learn concepts related to formal languages.

CO3: Understand the context-free grammar & pushdown automata.

CO4: Understand the turing machine.

CO5: Understand the concepts of computability.

Text Book(s):

1. Hopcroft & Ullman "Introduction to Automata theory, languages & Computation", Narosa Publishing house.
2. Mishra & Chander Shekhar "Theory of Computer Science (Automate, Language & Computations), PHI.

Reference Book(s):

1. Lewis Papadimitriou "Theory of Computation", Prentice Hall of India, New Delhi .
2. Peter linz, "An Introduction to formal language and automata", Third edition, Narosa publication.
3. Marvin L. Minsky "Computation : Finite & Infinite Machines", PHI.

Online Resource(s):

<https://www.youtube.com/playlist?list=PLbMVogVj5nJSd25WnSUI44ZyGmsqjuKr3>

<https://nptel.ac.in/courses/106104028>

<https://nptel.ac.in/courses/106104148>

701(1) : Artificial Intelligence

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire the knowledge related to artificial intelligence, problem solving, search and control strategies, natural language processing and probabilistic reasoning & uncertainty

UNIT-I

General Issues and Overview of AI : The AI problems, what is an AI technique, Characteristics of AI applications. Introduction to LISP programming: Syntax and numeric functions, Basic list manipulation functions, predicates and conditionals, input output and local variables, iteration and recursion, property lists and arrays.

UNIT-II

Problem Solving, Search and Control Strategies : General problem solving, production systems, control strategies forward and backward chaining, exhaustive searches depth first breadth first search. Heuristic Search Techniques : Hill climbing, branch and bound technique, best first search & A* algorithm, AND / OR graphs, problem reduction & AO* algorithm, constraint satisfaction problems.

UNIT-III

Knowledge Representations : First order predicate calculus, skolemization, resolution principle & unification, interface mechanisms, horn's clauses, semantic networks, frame systems and value inheritance, scripts, conceptual dependency.

UNIT-IV

Natural Language processing : Parsing techniques, context free grammar, recursive transition nets (RNT), augmented transition nets (ATN), case and logic grammars, semantic analysis. Game playing : Minimax search procedure, alpha-beta cutoffs, additional refinements. Planning : Overview an example domain the block world, component of planning systems, goal stack planning, non linear planning.

UNIT-V

Probabilistic Reasoning and Uncertainty : Probability theory, bayes theorem and Bayesian networks, certainty factor. Expert Systems : Introduction to expert system and application of expert systems, various expert system, knowledge acquisition, case studies, MYCIN. Learning ; Rote learning, learning by induction, explanation based learning.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Describe various approaches to Artificial Intelligence and Lisp programming.

CO2: Understanding different Algorithms related to AI.

CO3: Learn techniques of Knowledge Representation.

CO4: Understanding the concept of Natural Language processing.

CO5: Acquire basic knowledge of Expert System.

Text Book(s):

1. Elaine Rich and Kevin Knight "Artificial Intelligence" - Tata McGraw Hill.
2. Stuart Russell: Artificial Intelligence: A Modern Approach, Pearson;

Reference Book(s):

1. "Artificial Intelligence" 4 ed. Pearson.
2. Dan W. Patterson "Introduction to Artificial Intelligence and Expert Systems", Prentice India.
3. Nils J. Nilson "Principles of Artificial Intelligence", Narosa Publishing House.
4. Clocksin & C.S.Mellish "Programming in PROLOG", Narosa Publishing House.

Online Resource(s):

https://www.youtube.com/playlist?list=PLwdnzlV3ogoXaceHrrFVZCJkbm_laSHcH

<https://nptel.ac.in/courses/106105077>

<https://nptel.ac.in/courses/106105079>

701(2): Python Programming

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire the knowledge related to python statements, collection, loops, file handling and OOPs in python.

UNIT -1

Installing Python, Simple program using Python, Expressions and Values, Variables and Computer Memory, error detection, Multiple line statements, Designing and using functions, functions provided by Python, Tracing function calls in memory model, omitting return statement. Working with Text: Creating Strings of Characters, Using Special Characters in Strings, Creating a Multiline String, Printing Information, Getting Information from the Keyboard.

UNIT-2

A Boolean Type , Choosing Statements to Execute, Nested If Statements , Remembering the Results of a Boolean Expression Evaluation , A Modular Approach to Program Organization, Importing Modules , Defining Your Own Modules, Testing Code Semi automatically Grouping Functions Using Methods: Modules, Classes, and Methods , Calling Methods the Object-Oriented Way, Exploring String Methods, Underscores.

UNIT-3

Storing Collections of Data Using Lists: Storing and Accessing Data in Lists, modifying Lists, Operations on Lists, Slicing Lists, Aliasing, List Methods, Working with a List of Lists. Repeating Code Using Loops: Processing Items in a List, Processing Characters in Strings, Looping Over a Range of Numbers, Processing Lists Using Indices, Nesting Loops in Loops, Looping Until a Condition Is Reached, Repetition Based on User Input, Controlling Loops Using Break and Continue Reading and Writing.

UNIT-4

Files: Kinds of files, Opening a File, Techniques for Reading Files, Files over the Internet, Writing Files, and Writing Algorithms That Use the File-Reading Techniques, Multiline Records. Storing Data Using Other Collection Types: Storing Data Using Sets, Storing Data Using Tuples, Storing Data Using Dictionaries, Inverting a Dictionary, Using the In Operator on Tuples, Sets, and Dictionaries, Comparing Collections.

UNIT-5

Collection of New Information Object-Oriented Programming : Understanding a Problem Domain , Function “Isinstance,” Class Object, and Class Book , Writing a Method in Class Book, Plugging into Python Syntax: More Special Methods ,Creating Graphical User interface: Building a Basic GUI, Models, Views, and Controllers, Customizing the Visual Style Introducing few more Widgets, Object-Oriented GUIs, Keeping the Concepts from Being a GUI Mess.

Course Outcomes:

On completion of this course, the student will be able to:

CO1 : Understand the introduction and basics of Python.

CO2 : Learn decision making statements, class and methods.

CO3 : Learn list and control statements.

CO4 : Understand file handling.

CO5: Learn about OOPs and basic Graphics user interfaces.

Text Book(s):

1. O'Reilly, Python Crash Course, 2nd Edition: A Hands-On, Project-Based Introduction to Programming

Reference Book(s):

1. John Zelle, Python Programming: An Introduction to Computer Science
2. Mark Lutz, Python Pocket Reference: Python in Your Pocket
3. O'Reilly, Head First Python: A Brain-Friendly Guide, by Paul Barry

Online Resource(s):

https://www.youtube.com/playlist?list=PLIdgECt554OVFKXRpo_kuI0XpUQKk0ycO

<https://nptel.ac.in/courses/106106182>

<https://nptel.ac.in/courses/106106212>

702(A) : Internet Of Things

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire the knowledge related to Internet of Things, types of sensors, IOT smart applications, protocols and challenges.

UNIT-I

Introduction – Digital Electronics, Logical gates and its working, Types of sensors: Temperature sensor (LM35,RTD,Thermocouple), Light sensor(photodiode, optocoupler), Distance and range sensor (IR,LVDT), Accelerometer sensor, Touch screen sensor.

UNIT-II

Introduction to IOT - Definition & Characteristics, Importance of IoT, Physical Design of IOT, Logical Design of IOT, IOT Enabling technologies, IoT and M2M, IOT Platform Design Methodology, Purpose & Requirements Specification, Process Specification, Domain Model Specification, Information model Specification, Service specification, IOT level Specifications, Functional View Specifications, Operational View Specification, device and component integration, application development

UNIT-III

IoT Smart X Application - Smart Cities, Smart Energy & Smart Grid, Smart Mobility & transport, Smart Home, Smart Building & Infrastructure, Smart Factory & Manufacturing, Smart Health, Smart Logistics & Retail. **Embedded suite for IoT Physical device** – Arduino / Raspberry Pi Interfaces, Hardware requirement of Arduino / Pi, Connecting remotely to the Arduino /Raspberry Pi, GPIO Basics

UNIT-IV

Protocols in IOT: RFID: Introduction, Principle of RFID, Components of an RFID system, RFID Protocols & NFC protocols, CoAP, XMPP, AMQP, MQTT

Resource Management In The Internet Of Things: Clustering, Software Agents, Clustering Principles in an Internet of Things Architecture, Design Guidelines, Software Agents for Object Representation, Data Synchronization.

UNIT-V

Internet of things Challenges: Vulnerabilities of IoT, Security, Privacy & Trust for IoT, Security requirements Threat analysis, Use cases and misuse cases, Introduction to cloud computing, Role of Cloud Computing in IoT, Cloud-to-Device Connectivity, Cloud data management, cloud data monitoring, Cloud data Exchange.

Course Outcomes:

On completion of this course, the student will be able to:

CO1 : Understand the IOT Terminology and Technology.

CO2 : Describe IOT applications.

CO3 : Analyze Protocol standardization for IOT.

CO4 : Perform an analysis of IOT security issues.

CO5: Identify the role of cloud computing in IOT.

Books Recommended :

1. Pethuru Raj, Anupama C. Raman, The Internet of Things Enabling Technologies, Platforms, and Use Cases, CRC Press Taylor & Francis Group
2. Internet of Things: A Hands-on Approach", by Arshdeep Bahga and Vijay Madisetti (UniversitiesPress)

Reference Book(s):

1. Rajkumar Buyya, Amir Vahid Dastjerdi Internet of Things – Principles and Paradigms, Morgan Kaufmann is an imprint of Elsevier, ISBN: 978-0-12-805395-9
2. Hakima Chaouchi, " The Internet of Things Connecting Objects to the Web" ISBN : 978-1- 84821-140-7, Willy Publications
3. Olivier Hersent, David Boswarthick, Omar Elloumi, The Internet of Things: Key Applications and Protocols, ISBN: 978-1-119-99435-0, 2nd Edition, Willy Publications

Online Resource(s):

<https://nptel.ac.in/courses/106105166>

http://library.iitd.ac.in/arpit_2020-2021/Week%208%20-%20Module%2019%20-%20PPT-%20Internet%20of%20Things%20for%20Libraries.pdf

702 (B) : Software Quality Assurance

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire the knowledge related to software quality, testing, integration, system test planning, automation & execution and software quality standards.

UNIT-I

Introduction : Software Quality, Role of testing, v & v, objectives and issues of testing, Testing activities and levels, Sources of Information for Test Case Selection, White-Box and Black-Box Testing, Test Planning and Design, Monitoring and Measuring Test Execution, Test Tools and Automation, Test Team Organization and Management; UNIT Testing: Concept, Static UNIT Testing, Defect Prevention, Dynamic UNIT Testing, Mutation Testing, Debugging.

UNIT-II

Control Flow & Data Flow Testing: Outline of CFT, CF Graph, Paths in a Control Flow Graph, Path Selection Criteria, Generating Test Input, Examples of Test Data Selection; Overview of Dynamic Data Flow Testing, Data Flow Graph, Data Flow Testing Criteria, Comparison of Testing Techniques.

UNIT-III

System Integration Testing & Test Design: Concept of Integration Testing, Different Types of Interfaces and Interface Errors, Granularity of System Integration Testing, System Integration Techniques, Test Plan for System Integration, Off-the-Shelf Component Testing, System Test Categories.

UNIT-IV

System Test Planning, Automation & Execution: Structure of a System Test Plan, Test Approach, Test Suite Structure, Test Environment, Test Execution Strategy, Test Effort Estimation, Scheduling and Test Milestones, System Test Automation, Selection of Test Automation Tools, Test Selection Guidelines for Automation, Structure of an Automated Test Case, Test Automation Infrastructure Metrics for Tracking System Test, Metrics for Monitoring Test Execution, Beta Testing, System Test Report, Measuring Test Effectiveness, Acceptance Testing.

UNIT-V

Software Quality: Five Views of Software Quality, McCall's Quality Factors and Criteria, Quality Factors Quality Criteria, Relationship between Quality Factors and Criteria, Quality Metrics, ISO 9126 Quality Characteristics, ISO 9000:2000 Software Quality Standard ISO 9000:2000 Fundamentals, ISO 9001:2000 Requirements.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: Understand quality management processes.

CO2: Understand the importance of standards in the quality management process and role of SQA function in an organization.

CO3: Gain knowledge of software quality assurance.

CO4: Understand the need and purpose of software testing.

CO5: Learn the five views of software quality.

Text Book(s):

1. N.S. Godbole, Software Quality Assurance: Principles and Practice for the New Paradigm (2nd Ed.), Narosa Publishing, 2017.

Reference Book(s):

1. S.H. Kan, Metrics and Models in Software Quality Engineering (2nd ed.), Pearson Education Inc., 2003.
2. Stephen H.Khan ,Metrics and Models in Software Quality Engineering Pearson Education, India
3. Shari Lawrence Pfleeger,"Software Engineering Theory and Practice Pearson Education, India.

Online Resource(s):

<https://nptel.ac.in/courses/106105150>

<https://homepage.cs.uri.edu/student/tseytlin/SQA.ppt>

703 : Research Methodology

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire the knowledge related to research formulation & design, data collection & analysis, soft computing, research ethics and report writing.

UNIT - I

RESEARCH FORMULATION AND DESIGN: Motivation and objectives – Research methods vs. Methodology. Types of research – Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical, concept of applied and basic research process, criteria of good research. Defining and formulating the research problem, selecting the problem, necessity of defining the problem, importance of literature review in defining a problem, literature review-primary and secondary sources, reviews, monograph, patents, research databases, web as a source, searching the web, critical literature review, identifying gap areas from literature and research database.

UNIT-II

DATA COLLECTION AND ANALYSIS: Accepts of method validation, observation and collection of data, methods of data collection, sampling methods, data processing and analysis strategies and tools, data analysis with statically package (SPSS t-test, ANOVA, etc.), hypothesis testing.

UNIT-III

SOFT COMPUTING: Computer and its role in research, Use of statistical software SPSS, GRETL etc in research. Introduction to evolutionary algorithms - Fundamentals of Genetic algorithms, Simulated Annealing, Neural Network based optimization, Optimization of fuzzy systems.

UNIT-IV

RESEARCH ETHICS, IPR AND SCHOLARLY PUBLISHING: Ethics-ethical issues, ethical committees (human & animal); IPR- intellectual property rights and patent law, commercialization, copyright, royalty, trade related aspects of intellectual property rights (TRIPS); scholarly publishing- IMRAD concept and design of research paper, citation and acknowledgement, plagiarism, reproducibility and accountability.

UNIT-V

INTERPRETATION AND REPORT WRITING: Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports, Conclusions.

Course Outcomes:

On completion of this course, the student will be able to:

CO1 : Learn how to design research proposal.

CO2 : Understand data collection and analysis for research

CO3 : Learn soft computing and its role in research.

CO4 : Learn research paper publishing

CO5 : Understand how to prepare research report.

Text Book(s):

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Research Methodology, RBSA Publishers.
2. Kothari, C.R., 1990. Research Methodology: Methods and Techniques. New Age International.

Reference Book(s):

1. Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, Ess Publications. 2 volumes.
2. Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing.
3. Wadehra, B.L. 2000. Law relating to patents, trade marks, copyright designs and geographical indications. Universal Law Publishing.

Online Resource(s):

https://onlinecourses.swayam2.ac.in/nou22_cm06/preview

https://onlinecourses.swayam2.ac.in/aic21_ge02/preview

801: Big Data Analytics & Visualization

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire the knowledge related to big data, its characteristics, big data modeling and visualization

UNIT-I

Introduction of big data, Big data characteristics - Volume, Veracity, Velocity, and Variety – Data, Appliance Challenges and Issues, Case for Big data, Big data sources, Features of data, Evolution of Big data, Best Practices for Big data Analytics and Integration tools.

UNIT-II

Introduction to Data Modeling, Data Models Used in Practice: Conceptual data models, Logical data models, Physical data models, Common Data Modeling Notations, How to Model Data : Identify entity types, Identify attributes, Apply naming conventions, Identify relationships, Apply data model patterns, Assign keys, Normalize to reduce data redundancy.

UNIT-III

Introduction to elementary data analysis: Measures of center: Mean, Median, Mode, Variance, Standard deviation, Range. Normal Distribution: Center, Spread, Skewed Left, Skewed Right, outlier. Correlations: Correlation Patterns: Direction relationship, Magnitude Relationship.

UNIT-IV

Introduction to Bayesian Modeling: Bayes Rule, Probabilistic Modeling Introduction to Predictive Analytics: Simple Linear regression, Multiple Linear regression, Logistic Linear Regression.

UNIT-V

Visualization: History of Visualization, Goals of Visualization, Scientific Visualization, Information Visualization, Visual Analytics, Impact of visualization Introduction to Data Processing, MapReduce Framework, Hadoop, HDFS, S3, Hadoop Distributed file systems, Apache Mahout, Hive, Sharding, Hbase, Impala, Case studies : Analyzing big data with twitter, Big data for Ecommerce, Big data for blogs.

Course Outcomes:

On completion of this course, the student will be able to:

CO1 : Learn Big data and its characteristics.

CO2 : Understand best practices for Big data Analytics and Integration tools.

CO3 : Describe data modeling.

CO4 : Learn elementary data analysis.

CO5 : Understand basics of visualization.

Text Book(s):

1. Frank J Ohlhorst, “Big Data Analytics: Turning Big Data into Big Money”, Wiley and SAS Business. Series, 2012.
2. The Data Modeling Handbook: A Best-Practice Approach to Building Quality Data Models 1st Edition by Michael C. Reingruber (Author), William W. Gregory(Author) A Wiley QED publications

Reference Book(s):

1. Colleen Mccue, “Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis”,Elsevier, 2007
2. Correlation and Regression: Applications for Industrial Organizational Psychology And Management (Organizational Research Methods) 1st Edition, by Philip Bobko Multiple
3. Regression and Beyond 1st Edition by Timothy Z. Keith.

Online Resource(s):

<https://nptel.ac.in/courses/106104189>

<https://nptel.ac.in/courses/106106142>

<http://luthuli.cs.uiuc.edu/~daf/courses/CS-199-BD/Slides/intro-bigdata.pptx>

802 :Cryptography & Network Security

Max. Marks : Theory 60 IA 40

Course Objectives:

To acquire the knowledge of classical encryption techniques, secret and public key cryptography, message authentication, IP, web and system security.

UNIT-I

Classical Encryption Techniques: Symantec Cipher model, substitution Techniques, transposition techniques, rotor machines, steganography. Block Ciphers and the Data Encryption standards: Simplified DES, block cipher principles, the data encryption standard, the strength of DES, block cipher design principles, block cipher modes of operation, Triple DES.

UNIT-II

Confidentiality using symmetric encryption: Placement of Encryption function, traffic confidentiality, key distribution; Public key Encryption, Public key cryptography and RSA: Principles of Public key cryptosystems, the RSA algorithm; Key Management other public key cryptosystems : Key management, Diffie-Hellman key exchange algorithm.

UNIT-III

Message authentication and Hash function : Authentication Requirements, Authentication functions, message authentication codes, hash functions, security of hash function and MACs. Hash Algorithms: MD5 message digest algorithm, secure Hash algorithm; Digital Signature and Authentication protocols: Digital signatures, Authentication protocols, and digital signature standard. Authentication Applications: Kerberos, X.509 Authentication service.

UNIT-IV

Electronic Mail Security: Pretty Good privacy, S/MIME; IP Security : IP Security overview, IP security architecture, authentication header, encapsulating security payload, combining security associations, key management; Web Security: Web security considerations, Secure sockets layer and transport layer security, Secure Electronic Transaction(SET).

UNIT-V

System security: Intruders, intrusion detection, and password Management. Malicious software: Viruses and related threats, virus countermeasures. Firewalls: Firewall Design Principles, Trusted systems.

Course Outcomes:

On completion of this course, the student will be able to:

CO1: learn classical encryption techniques and block cipher modes of operation.

CO2: implement a symmetric and asymmetric cryptographic methods

CO3 : learn Message authentication and Hash functions.

CO4: describe the role and implementation of digital signatures.

CO5 : understand IP security, Web security and system security.

Text Book(s):

1. William Stallings “Cryptography and Network Security”, 4 ed, Pearson Education.

Reference Book(s):

1. Kanfren “Network Security : Private Communications in a public world 2/e
2. W.Stallings “ Network security Essential “ Applications & Standards”, Pearson ed.
3. Eric Maiwald “ Network Security : A Beginner's Guide, second ed.”, Tata Mcgraw Hill.

Online Resource(s)

<http://williamstallings.com/Crypto/Crypto4e-inst.html>

<https://www.box.net/s/h164at4gsc>
<https://nptel.ac.in/courses/106105162>