

GURU KASHI UNIVERSITY



Bachelor of Science (Information Technology)

Session:2025-26

Faculty of Computing

Graduate Attributes of the Programme: -

Type of learning outcomes	The Learning Outcomes Descriptors
Graduates should be able to demonstrate the acquisition of:	
Learning outcomes that are specific to disciplinary/interdisciplinary are as of learning	Proficiency in programming languages such as C, C++, Java, and Python for developing software applications and IT solutions.
	Comprehensive understanding of core IT concepts, including Database Management Systems, Artificial Intelligence, Cloud Computing, and Data Structures.
	Application of Software Engineering principles to design, implement, and manage complex systems effectively.
	Integration of IT knowledge with interdisciplinary areas like E-commerce, Human Resource Management, and Communication Skills to address diverse industry requirements.
Generic learning outcomes	Critical thinking, analytical, and problem-solving skills for effective decision-making in IT-related challenges.
	Strong teamwork and communication skills for collaborating in professional and diverse environments.
	Ethical responsibility and professionalism in the development and deployment of IT solutions.

Programme Learning outcomes: An Undergraduate Certificate is awarded to students who have demonstrated the achievement of the outcomes located at level 4.5:

Element of the Descriptor	Programme learning outcomes relating to Undergraduate Certificate
The graduates should be able to demonstrate the acquisition of:	
Knowledge and understanding	Basic programming skills in C and C++ to solve computational problems.
	Foundational knowledge of Computer Systems, Operating Systems, and IT tools.
	Understanding of mathematical concepts relevant to computing, such as Discrete Structures.
	Insight into the design and analysis of systems and applications, including System Analysis and Design.
General, technical and professional skills required to perform and accomplish tasks	Ability to write, debug, and test C and C++ programs effectively.
	Skills to analyze operating systems' functionalities and perform system-related tasks.
	Proficiency in using web technologies and IT tools for basic application development.
Application of knowledge and skills	Apply programming and IT skills to develop basic applications and solve real-world problems. Implement knowledge of system analysis to design efficient workflows and processes.
Generic learning outcomes	Develop problem-solving and logical reasoning abilities for IT challenges. Demonstrate effective communication and teamwork in academic and professional settings.
Constitutional, humanistic, ethical, and moral values	Display ethical behavior and professional responsibility in IT practices. Respect cultural and societal diversity while addressing IT needs.
Employability and job-ready skills, and entrepreneurship skills and capabilities/qualities and mindset	Acquire skills suitable for entry-level roles in programming and IT support. Build a mindset to innovate and identify basic solutions for small-scale IT projects. Prepare for advanced learning in programming and system management.
Credit requirements	A student will be allowed an exit option after passing first academic year of the BCA Programme with requisite 52 credits including the 4 credits of internship of 8 weeks duration as per scheme of the

	programme.
Entry requirements	Passed 10+2 or Equivalent with at least 45% in the aggregate. OR Those candidates who have passed their Matriculation examination and have also passed three-year Diploma in any Trade from Punjab State Board of Technical Education & Industrial Training, Chandigarh or such examination from any other recognized State Board of Technical Education, or Sant Longowal Institute of Engineering & Technology, Longowal.

Programme Structure for Bachelor of Science (Information Technology)

Semester 1st									
Course Code	Course Title	Type of Course							
			L	T	P	Credits	Int	Ext	Total Marks
BIT1100	Programming in C	Core	3	0	0	3	30	70	100
BIT1101	Fundamentals of Computer and IT	Core	3	0	0	3	30	70	100
BIT1102	Fundamentals of Math	Core	4	0	0	4	30	70	100
BIT1103	Programming in C Lab	Core	0	0	2	1	30	70	100
BIT1104	Fundamentals of Computer and IT lab	Core	0	0	2	1	30	70	100
BIT1105	Introduction to Web technologies - I	Vocational	0	0	4	2	30	70	100
BIT1106	Internet Tools and its Applications	Skill Enhancement Course	3	0	0	3	30	70	100
BIT1107	E-commerce	Multidisciplinary Course	3	0	0	3	30	70	100
VAC0002	Human Values & Professional Ethics	Value Added Course	2	0	0	2	30	70	100
BIT1108	Communication Skills - I	Ability Enhancement Course	2	0	0	2	30	70	100
Total			20	0	8	24	300	700	1000

Semester 2nd									
Course Code	Course Title	Type of Course							
			L	T	P	Credits	Int	Ext	Total Marks
BIT2150	Programming Using C++	Core	3	0	0	3	30	70	100
BIT2151	Operating System	Core	3	0	0	3	30	70	100
BIT2152	System Analysis & Design	Core	4	0	0	4	30	70	100
BIT2153	Programming using C++ Lab	Core	0	0	2	1	30	70	100
BIT2154	Operating System Lab	Core	0	0	2	1	30	70	100
BIT2155	Introduction to Web technologies - II	Vocational Course	0	0	4	2	30	70	100
BIT2156	Multilingual Typing	Skill Enhancement Course	0	0	6	3	30	70	100
BIT2157	Human Resource Management	Multidisciplinary	3	0	0	3	30	70	100
VAC0002	Environment Education	Value Added Course	2	0	0	2	30	70	100
BIT2158	Communication Skills - II	Ability Enhancement Course	2	0	0	2	30	70	100
Total			17	0	14	24	300	700	1000

Programme learning outcomes: An Undergraduate Diploma is awarded to students who have demonstrated the achievement of the outcomes located at level 5:

Element of the Descriptor	Programme learning outcomes relating to Undergraduate Diploma
The graduates should	be able to demonstrate the acquisition of:
Knowledge and understanding	Understand foundational concepts of programming (C, C++, Python).
	Grasp basic principles of operating systems, computer networks, and database systems.
	Acquire knowledge of software engineering, AI, and web technologies.
	Comprehend the structure and functioning of computer systems and their architecture.
Skills required to perform and accomplish tasks	Develop, test, and debug simple to moderately complex software applications.
	Perform database operations and design using DBMS tools.
	Demonstrate the ability to manage small-scale software projects.
Application of knowledge and skills	Apply programming skills to solve real-world problems. Integrate software development knowledge to build minor projects.
Generic learning outcomes	Communicate technical concepts effectively in verbal and written form. Demonstrate critical thinking, problem-solving, and teamwork abilities.
Constitutional, humanistic, ethical, and moral values	Show awareness of professional ethics and responsibilities. Demonstrate sensitivity towards environmental and human values.
Employability and job-ready skills, and entrepreneurship skills and capabilities/qualities and mindset	Be ready for entry-level roles such as software developer, web assistant, and data entry operator. Possess soft skills and professional behavior needed in a workplace. Show entrepreneurial interest through projects and vocational learning.
Credit requirements	96 credits including the 4 credits of internship of duration 8 weeks duration as per scheme of the programme and will be awarded Undergraduate Diploma in the Computer Applications.
Entry requirements	Passed 10+2 with computer Operator and

	Programming Assistant (COPA) OR Passed Diploma in Engineering with at least 45% in the aggregate. OR Passed 10+2 with 1 year Diploma in Computer Application/IT from a recognized university/Board/Council or equivalent.
--	--

Semester 3rd									
Course Code	Course Title	Course Type							
			L	T	P	Credits	Int	Ext	Total Marks
BIT3200	Data Structures	Core	3	0	0	3	30	70	100
BIT3201	Database Management System	Core	3	0	0	3	30	70	100
BIT3202	Computer System Architecture	Core	4	0	0	4	30	70	100
BIT3203	Data Structure Lab	Core	0	0	2	1	30	70	100
BIT3204	Database Management System Lab	Core	0	0	2	1	30	70	100
BIT3205	Multimedia and its Applications	Vocational Course	2	0	0	2	30	70	100
BIT3206	Multimedia and its Applications Lab	Vocational Course	0	0	4	2	30	70	100
BIT3207	Principles of Management	Multidisciplinary	3	0	0	3	30	70	100
BIT3208	Computer Networks	Skill Enhancement Course	3	0	0	3	30	70	100
BIT3209	Soft Skills and Personality Development	Ability Enhancement Course	2	0	0	2	30	70	100
Total			20	0	8	24	300	700	1000

Semester 4 th									
Course Code	Course Title	Course Type							
			L	T	P	Credits	Int	Ext	Total Marks
BIT4250	Artificial Intelligence	Core	3	0	0	3	30	70	100
BIT4251	Programming using Python	Core	3	0	0	3	30	70	100
BIT4252	Software Engineering	Core	4	0	0	4	30	70	100
BIT4253	Artificial Intelligence Lab	Core	0	0	2	1	30	70	100
BIT4254	Programming using Python Lab	Core	0	0	2	1	30	70	100
BIT4255	Minor Project	Vocational Course	0	0	8	4	30	70	100
IKS0012	The Outreach of Indian Knowledge System	Value Added Course	2	0	0	2	30	70	100
BIT4256	Acquiring Business Communication-ABC	Ability Enhancement Course	2	0	0	2	30	70	100
Discipline Elective- I (Any one of the following)									
BIT4257	Theory of Computation	Discipline Elective-I	4	0	0	4	30	70	100
BIT4258	Big Data								
BIT4259	Internet of Things								
Total			18	0	12	24	210	490	700

Programme learning outcomes: The Bachelor's degree is awarded to students who have demonstrated the achievement of the outcomes located at level 5.5:

Element of the Descriptor	Programme learning outcomes relating to Bachelor Degree
The graduates should be able to demonstrate the acquisition of:	
Knowledge and understanding	Demonstrate comprehensive understanding of core IT subjects including programming (C, C++, Java, Python), databases, operating systems, computer networks, AI, ML, and cloud computing.
	Understand principles of data structures, algorithms, computer architecture, and software engineering.
	Gain awareness of digital marketing, mobile app development, and emerging IT trends like IoT and data science.
	Understand the theoretical foundations and practical applications of data communication, computer graphics, and cybersecurity concepts such as ethical hacking.
General, technical and professional skills required to perform and accomplish tasks	Design and develop software applications using multiple programming paradigms.
	Build and manage relational databases and perform data analysis.
	Create and deploy web and mobile-based applications.
Application of knowledge and skills	Apply theoretical knowledge to solve complex real-world problems using IT solutions. Implement AI/ML models and use cloud infrastructure for scalable computing.
Generic learning outcomes	Exhibit effective communication and teamwork in multi-disciplinary and multicultural environments. Develop critical thinking, decision-making, and leadership qualities. Engage in lifelong learning and professional development.
Constitutional, humanistic, ethical, and moral values	Uphold human values and inclusive practices in technology use. Act in accordance with environmental

	sustainability and professional integrity.
Employability and job-ready skills, and entrepreneurship skills and capabilities/qualities and mindset	Be equipped for roles such as software developer, data analyst, web/app developer, network administrator, cloud engineer, etc. Demonstrate innovation and entrepreneurial mindset through practical work and exposure to startup environments.
Credit requirements	144 Credits

Semester 5th									
Course Code	Course Title	Course Type							
			L	T	P	Credits	Int	Ext	Total
BIT5300	Java Programming	Core	4	0	0	4	30	70	100
BIT5301	Computer Graphics	Core	4	0	0	4	30	70	100
BIT5302	Java Programming Lab	Core	0	0	4	2	30	70	100
BIT5303	Computer Graphics Lab	Core	0	0	4	2	30	70	100
IKS0002	Indian Education	Value Added Course	2	0	0	2	30	70	100
BIT5304	Internship	Skill Based	0	0	0	4	30	70	100
BIT5305	Basics of Mobile App development	Vocational Course	2	0	0	2	30	70	100
BIT5306	Basics of Mobile App development Lab	Vocational Course	0	0	4	2	30	70	100
BIT5307	Digital Marketing	MIN	2	0	0	2	30	70	100
Total			14	0	12	24	240	560	800

Semester 6 th									
Course Code	Course Title	Course Type							
			L	T	P	Credits	Int	Ext	Total
BIT6350	Machine Learning	Core	3	0	0	3	30	70	100
BIT6351	Cloud Computing	Core	4	0	0	4	30	70	100
BIT6352	Data Communication	Core	4	0	0	4	30	70	100
BIT6353	Machine Learning Lab	Core	0	0	2	1	30	70	100
BIT6354	Major Project	Technical Skill	0	0	8	4	30	70	100
BIT6355	Search Engine Optimization	Ability Enhancement Course	2	0	0	2	30	70	100
BIT6356	Media and digital communication	Ability Enhancement Course	2	0	0	2	30	70	100
Discipline Elective- II (Any one of the following)									
BIT6357	Data Warehouse and Data Mining	Disciplinary Electives-II	4	0	0	4	30	70	100
BIT6358	Data Science								
BIT6359	Ethical Hacking								
Total			19	0	10	24	210	490	700
Grand Total			108	0	72	144			

SEMESTER I

Course Title: Programming Using C	L	T	P	Cr.
Course Code: BIT1100	3	0	0	3

Total Hours: :45

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Understand the fundamentals of C programming including data types, operators, and control structures.
2. Develop modular programs using functions, arrays, pointers, and structures.
3. Apply file handling techniques for data storage and retrieval.
4. Debug, test, and optimize C programs using problem-solving skills.

Course Content**UNIT I** **14 hours**

Basics of 'C' Language: History, Structure of a C program, Data types, Constants and variables, Operators and Expressions, I/O functions: Formatted & Unformatted Input/Output.

Control constructs: If, If-else, nested if-else, else-if ladder, switch, goto, for, while, do... while, jumps in loops: break and continue.

UNIT II **16 hours**

Preprocessor: #define, #include, #undef, #conditional compilation directives (#if, #else, #elif, #endif, #ifdef and #ifndef), Storage classes, Header files (stdio.h, ctype.h, string.h, math.h, stdlib.h, time.h); Type casting, Type conversion, Scope Rules: Local and Global variables Functions: library functions, user defined functions, scope rule of functions, Parameter passing: call by value and call by reference, calling functions with Arrays, Recursion: Basic concepts, Design examples (Tower of Hanoi)

UNIT III **16 hours**

Arrays: Creating and using One dimensional and two-dimensional arrays
Strings: Introduction to strings, declaring and initializing string variables, reading and writing strings, string handling functions
Pointers: & and * operators, Declaring and initializing pointers, Pointer expression, Pointer assignments, Pointer arithmetic. The dynamic memory allocation functions – malloc and calloc, Pointer vs Arrays, Passing Array to functions, Arrays of pointers, and Functions with variable number of arguments.

UNIT IV **14 hours**

Structures: Basics of Structures, declaring a structure, referencing structure

elements, Array of structures, passing structures to functions.

Unions: Declaration, Uses; Enumerated data types.

File Handling: Introduction, creating a data file, opening and closing a data file, file Pointers, file accessing functions (fopen, fclose, putc, getc, fprintf); args and arg; File opening modes: Text mode, Binary mode.

Transaction Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning. Interactive lectures.

Suggested Reading:

- Kanetkar, Y. (2018). *Let us C*. BPB publications.
- Hanly, J. R., & Koffman, E. B. (2007). *Problem solving and program design in C*. Pearson Education India.
- Salaria, R.S. *Test Your Skills in C*, Salaria Publications, New Delhi.
- Byron S. Gottfried, *Programming in C*, McGraw Hills Publishers, New York.

Course Title: Fundamentals of Computer and IT	L	T	P	Cr.
Course Code: BIT1101	3	0	0	3

Total Hours: :45

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Classify binary, hexadecimal and octal number system and their arithmetic operations.
2. Analyze the concept of computer devices and recognition of the basic terms used in computer programming.
3. Identify and learn the details of the components of a personal computer system.
4. Demonstrate the functions of computer programming languages.

Course Content

UNIT I

6 hours

Computer Appreciation: Introduction to computers, characteristics of computer; History of computers; Classification of computers on size: (Micro, Mini, Mainframe and supercomputers), Working Principles, Generations; Applications of computers; commonly used terms– Hardware, Software, Firmware.

Basic Computer Organization: Block diagram of computer system, input unit, Processing Unit and Output Unit; Description of Computer input devices: Keyboard, Mouse, Trackball, Pen, Touch screens, Scanner, Digital Camera; Output devices: Monitors, Printers, Plotters.

UNIT II

6 hours

Computer Memory: Representation of information: BIT, BYTE, Memory, Memory size; Units of measurement of storage; Main memory: Storage evaluation criteria, main memory organization, RAM, ROM, PROM, EPROM; Secondary storage devices: Sequential Access Memory, Direct Access Memory Magnetic Tapes, Magnetic disks, Optical disks: CD, DVD; Memory storage devices: Flash Drive, Memory card; Types of software: System and Application software; Programming Languages: Generation of Languages; Translators Interpreters, Compilers, Assemblers and their comparison.

UNIT III

9 hours

Word Processing Package: Opening, saving and closing an existing document; renaming and deleting files; Using styles and templates: Introduction to templates and styles; applying, modifying and creating new (custom) styles; using a template to create a document, creating a template, editing a template, organizing templates, examples of style use, changing document views,

moving quickly through a document, working with text: select, cut, copy, paste, find and replace, inserting. special characters, setting tab stops and indents, checking spelling and Grammar, Autocorrect, Using built-in language tools, word completion, Auto text. Formatting text: Using Styles, formatting paragraphs, formatting characters, auto-formatting, creating lists. Formatting pages: Using layout methods, creating headers and footers, numbering pages, changing page margins, adding comments to a document, creating a table of contents, creating indexes and bibliographies, printing a document, using mail merge, tracking changes to a document, using fields, linking to another part of a document, using master documents, Creating fill-in forms.

UNIT IV

9hours

Spreadsheet Package: Introduction to Spreadsheets, sheets and cells; Opening and saving spreadsheet files. Working with sheets: inserting new sheet, deleting and renaming sheets, viewing a spreadsheet: freezing rows and columns, splitting screen Entering data: cell referencing, formatting cells, entering numbers, entering numbers as text, entering formulae, entering date and time, deactivating automatic changes.

Speeding up data entry: using fill tool, fill series, defining fill series, validating cell contents, formatting data: formatting text, numbers, cells, Auto formatting cells and sheets, defining new auto format, using conditional formatting, Hiding and showing data, sorting records, printing a spreadsheet document: using print ranges, page formats, inserting page breaks, headers and footers; Working with Graphs and Charts: Creating Embedded Chart, formatting chart: Changing chart types, adding Titles, Legends and Gridlines, Printing Charts;

Transaction Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning. Interactive lectures.

Suggested Readings:

- *Sinha P.K. and Sinha P. (2002), Foundations of Computing, First Edition, BPB.*
- *Sanders D.H. (1988), Computers Today, Fourth Edition, McGraw Hill.*
- *Rajaraman V. (1996), Fundamentals of Computers, Second Edition, Prentice Hall of India, New Delhi.*
- *Jain Satish (1999), Information Technology, Paperback Edition, BPB.*

Course Title: Fundamentals of Math	L	T	P	Cr.
Course Code: BIT1102	4	0	0	4

Total Hours: :60

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Have a clear understanding of mathematical functions.
2. Develop an in-depth knowledge of mathematical theories.
3. Develop skills to get employment IT and Analysis field.
4. Solve first order linear and non-linear differential equation and linear differential equations of higher order using various techniques.

Course Content

UNIT I 15 hours

Relations: Types of relations: reflexive, symmetric, transitive and equivalence relations. Functions: One to one and onto functions.

UNIT II 15 hours

Set Theory: Introduction, Sets and Elements, Subsets, Venn Diagrams, Set Operations, Algebra of Sets, Duality, Finite Sets, Counting Principle.

UNIT III 15hours

Matrices: Types of Matrices (Row, column, square, rectangular, identity, zero, diagonal etc), addition, subtraction, multiplication, transpose of a matrix. Symmetric matrix and skew symmetric matrix, minors and cofactors.

UNIT IV 15 hours

Determinants: Definition and notation of determinants, Expansion of determinants (2x2,3x3), Determinant of the identity matrix and triangular matrix.

Transactional Mode

Lecture Method, E-Team Teaching, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, and Collaborative Learning.

Suggested Readings

- *Mathematics for Class 12" by NCERT*
- *Epp, S. S. (2010). Discrete mathematics with applications. Cengage learning.*
- *Biggs, N. L. (2002). Discrete mathematics. Oxford University Press*
- *Ross, K. A., & Wright, C. R. (1985). Discrete Mathematics. Prentice-Hall, Inc.*

Course Title: Programming in C Lab	L	T	P	Cr.
Course Code: BIT1103	0	0	2	1

Total Hours: :30**Course Learning Outcomes:**

After the completion of the course the learner will be able to

1. Identify the difference between the top-down and bottom-up approach.
2. Develop a given program using the basic elements like control statements.
3. Implement the Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.
4. Analyze an algorithmic solution for a given problem.

Course Content

1. Write a program to display your name.
2. Write another program to print a message with an inputted name.
3. Write a program to add two numbers.
4. Write a program to find the square of a given number
5. Write a program to calculate the average of three real numbers.
6. Write a program to find ascii value of a character
7. Write a program to find the size of int, float, double and char
8. Write a program to compute quotient and remainder
9. Write a program to accept the values of two variables.
10. Write a program using various unformatted input functions
11. Write a program to find area of rectangle and print the result using unformatted output functions
12. Write a program to find the larger of two numbers.
13. Write a program to find greater of three numbers using nested if.
14. Write a program to find whether the given number is even or odd.
15. Write a program to generate multiplication table using for loop
16. Write a program to generate multiplication table using while loop
17. Write a program to make a simple calculator using switch...case
18. Write a program to find whether the given number is a prime number.
19. Write a program using function to find the largest of three numbers
20. Write a program using a function to print the first 20 numbers and its squares.
21. Write a program to find the factorial of a given number.
22. Write a program to print the sum of two matrices
23. Write a program to find the length of a string
24. Write a program to copy string using strcpy()
25. Write a program to compare a string

26. Write a program to reverse a string
27. Write a program to check whether entered string is palindrome or not.
28. Write a program to check whether entered number is Armstrong or not.
29. Write a program to check prime numbers from a user entered range.
30. Write a program to multiply two numbers using pointers.
31. Write a program to display address of variable using pointers
32. Write a program to show the memory occupied by structure and union.
33. Write a program to create student i-card using a structure
34. Write a program to read data from a file from a file
35. Write a program to save employee details in a file using file handling

Course Title: Fundamentals of Computer and IT lab	L	T	P	Cr.
Course Code: BIT1104	0	0	2	1

Total Hours: :30

Course Learning Outcomes: After the completion of the course the learner will be able to

1. Compose, format and edit a word document.
2. Edit and forward email messages (with or without attachments).
3. Utilize the MS PowerPoint with custom animation and slide orientation.
4. Perform coding in different programs with practical knowledge.

Course Content

1.Formatting experiments:

- a. Change font styles, sizes, and colors.
- b. Apply different text formatting options like bold, italic, underline, and strikethrough.
- c. Adjust paragraph alignment (left, center, right, justified).
- d. Apply various heading styles and create a table of contents.

2.Table experiments:

- a. Create a table in Microsoft Word or Excel.
- b. Adjust column widths and row heights.
- c. Apply different table styles and formatting options.
- d. Merge or split cells.
- e. Sort and filter table data.

3.Formula and calculation experiments:

- a. Use formulas and functions in Microsoft Excel to perform calculations.
- b. Experiment with different mathematical operations (+, -, *, /).
- c. Create complex formulas with multiple functions and cell references.
- d. Utilize built-in functions like SUM, AVERAGE, MAX, MIN, VLOOKUP etc.

4.Collaboration experiments:

- a. Share a document using Microsoft Word, Excel, or PowerPoint.
- b. Collaborate with others in real-time on a shared document.
- c. Track changes made by different users and review or accept/reject them.
- d. Use comments and annotations to provide feedback or ask questions.

5.Presentation experiments:

- a. Create engaging presentations in Microsoft PowerPoint.
- b. Experiment with different slide layouts and designs.
- c. Add transitions and animations to enhance the presentation.

- d. Insert multimedia elements like images, videos, and audio.
- e. Practice presenting using the built-in Presenter View.

6. Mail merge experiments:

- a. Use Microsoft Word's mail merge feature to create personalized documents (e.g., letters, envelopes, labels).
 - b. Connect to a data source (e.g., Excel spreadsheet, Outlook contacts) and merge the data into the document.
- 7.** Experiment with different merge fields and formatting options.

Course Title: Introduction to Web Technologies I	L	T	P	Cr.
Course Code: BCA1105	0	0	4	2

Total Hours: :60

Course Learning Outcomes: After the completion of the course the learner will be able to

1. Describe the Internet, its architecture, services and protocol.
2. Implement a simple search engine.
3. Implement a web crawler.
4. Use JavaScript technologies to make a website highly responsive, more efficient and user friendly

Course Contents

- Create simple Forms in HTML5 and demonstrate the use of various form elements like input box, text area, submit and radio buttons etc.
- Demonstrate the use of Links, Lists and Tables in HTML5. You should be able to link separate pages and create named links within a document, using them to build a “table of contents”.
- Demonstrate the use of cascading style sheets (CSS) (inline, internal and external) to specify various aspects of style, such as colours and text fonts and sizes, in HTML5 document.
- Create an html file to implement the concept of document object model, different operations and event handling using JavaScript.
- Demonstrate the use of various selectors, filters and event handling in jQuery.
- Demonstrate the use of AJAX to retrieve and manipulate the web page content.
- Demonstrate the use of GET and POST methods of AJAX.
- Setup of development server like Xampp in windows. Create database and tables in My SQL.
- Create a web page to show use of all data types in PHP.
- Fetch and display data from My SQL table in a web page using PHP
- Implement Regular Expression, Array, Math, Date functions in PHP.
- Handling database queries with PHP & MYSQL.
- Working with files using PHP.
- Write a program to manage the sessions & cookies using PHP.
- Write an angular jsprogram which displays your name, college name and age.

Course Title: Internet Tools and its Applications	L	T	P	Cr.
Course Code: BCA1106	3	0	0	3

Total Hours: 45

Course Learning Outcomes: After the completion of the course the learner will be able to

1. These subject covers computer concepts and internet skills.
2. It also uses a software suite which includes Emails, Internet Protocols, Search Engine, Introduction of Intranet and Extranet.

UNIT-I

10 Hours

Introduction: Internet and its working, Business use of Internet, Services offered by Internet, Evaluation of Internet, Internet Service Provider (ISP), Windows environment for dial up networking (connecting to Internet), Audio on Internet, Internet Addressing (DNS) and IP addresses).

UNIT-II

11 Hours

E-Mail: Introduction, Advantage and Disadvantage, Structure of an e-mail message, working of e-mail (sending and receiving messages), Managing e-mail (creating new folder, deleting messages, forwarding messages, filtering messages), Implementation of Outlook Express.

Internet Protocol - Introduction, File transfer protocol (FTP), Gopher, Telnet, other protocols like HTTP and TCP/IP.

UNIT-III

12 Hours

WWW: Introduction, Working of WWW, Web browsing (opening, viewing, saving, printing a web page and bookmark), Web designing using HTML, DHTML with programming techniques.

UNIT-IV

12 Hours

Search Engine: About search engine, Component of search engine, working of search engine, Difference between search engine and web directory.

Intranet and Extranet - Introduction, Application of Intranet, Business value of Intranet, working of Intranet, Role of Extranet, working of Extranet, Difference between Intranet and Extranet.

Transactional Mode

Lecture Method, E-Team Teaching, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, and Collaborative Learning.

Suggested Reading:

- *Keith Sutherland, 'Understanding the Internet', 1st Edn., Butterworth Heinemann, 2000.*
- *S.K. Bansal, 'Internet and Web Designing', 1st Edn., APH Publishing Corporation, 2013.*
- *Behrouz A. Forouzan, 'Data Communications and Networking', 4th Edn., Tata McGraw Hill, 2006.*
- *Paul, 'Multicasting on the Internet and Its Applications', 1st Edn., Springer, eBook, 1998.*

Course Title: E-commerce	L	T	P	Cr.
Course Code: BCA1107	3	0	0	3

Total Hours: :45

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Discuss about the basic concepts and technologies used in the field of E Commerce and Governance.
2. Apply their knowledge of various Electronic Payment Systems in practical scenarios.
3. Analyze and differentiate between various Governance Process Models.
4. Evaluate Internet trading relationships, including Business-to Consumer (B2C), Business-to-Business (B2B), and Intra-
5. organizational dynamics.

Course Content

UNIT I

12 hours

Introduction to e-commerce: History of e-commerce, e-business models B2B, B2C, C2C, C2B, legal; environment of e-commerce, ethical issues, electronic data interchange, value chain and supply chain, advantages and disadvantages of e-commerce. Electronic Payment Systems: Credit cards, debit cards, smart cards, e-credit accounts, e-money, Marketing on the web, marketing strategies, advertising on the web, customer service and support, introduction to m-commerce, case study: e-commerce in passenger air transport.

UNIT II

10 hours

E-Government, theoretical background of e-governance, issues in e-governance applications, evolution of e-governance, its scope and content, benefits and reasons for the introduction of e-governance, e-governance models- broadcasting, critical flow, comparative analysis, mobilization and lobbying, interactive services / G2C2G.

UNIT III

11 hours

E-readiness, e-government readiness, E- Framework, step & issues, application of data warehousing and data mining in e-government, Case studies: NICNET-role of nationwide networking in e-governance, e-seva.

UNIT IV

12 hours

E-Government systems security: Challenges and approach to e-government security, security concern in e-commerce, security for server computers,

communication channel security, security for client computers.

Transaction Mode Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Winn, J. K., & Wright, B. (2000). *The law of electronic commerce*. Wolters Kluwer.
- United States. White House Office. (1997). *A framework for global electronic commerce*. White House.
- Andrea, G. (Ed.). (2002). *Development Centre Studies Electronic*
- *Commerce for Development*. OECD Publishing.

Course Title: Human Values and Professional Ethics	L	T	P	Cr.
Course Code: VAC0002	2	0	0	2

Total Hours: :30

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Develop an understanding of core human values and their role in decision-making.
2. Demonstrate ethical behavior in personal and professional environments.
3. Analyze the impact of ethical practices on societal and organizational well-being.
4. Cultivate a responsible attitude towards sustainability and social justice.

Course Content

UNIT-1

Hours 7

Understanding the need, basic guidelines, content and process for Value Education, Self-Exploration-what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT-2

Hours 8

Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha, Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya.

UNIT-3

Hours 8

Understanding harmony in the Family- the basic unit of human interaction , Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship, Understanding the meaning of Vishwas; Difference between intention and competence, Understanding the meaning of Samman, Difference between respect and

differentiation; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha)- from family to world family!.

UNIT-4

Hours 7

Understanding the harmony in the Nature, Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature, Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence.

Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in Professional Ethics: a) Ability to utilize the professional competence for augmenting universal human order, b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models, Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order: a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers, b) At the level of society: as mutually enriching institutions and organizations.

Transaction Mode Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning

Suggested Reading:

- *R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.*
- *Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA*
- *E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.*
- *Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991*
- *Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome’s report, Universe Books.*
- *A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.*
- *P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.*
- *A N Tripathy, 2003, Human Values, New Age International Publishers.*

- *SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.*
- *E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers , Oxford University Press*
- *M Govindrajan, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.*
- *B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.*
- *B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.*

Course Title: Communication Skills I	L	T	P	Cr.
Course Code: BCA1108	2	0	0	2

Total Hours: 30

Course Learning Outcomes:

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

1. Formulate an outline for effective Organizational Communication.
2. Summarize the information, ideas, concepts and opinions from a variety of sources.
3. Attain the competence in oral, written, and visual communication.
4. Learn the correct practices about the strategies of Effective Business writing.

Course Content

UNIT-I

7hours

Communication: Objectives & Process of Communication, Essential components of the Process of Communication, Importance and Objectives of Communication. Differences between general and technical communication. Types of Communication (Extra-personal, Intrapersonal, Interpersonal, Organizational & Mass communications).

UNIT-II

8hours

Basic Grammar: Parts of Speech, Articles, Tenses, Active\ passive voice, Auxiliaries and modals.

UNIT-III

8hours

Verbal & Non-verbal Communication: Listening, Speaking, Reading and Writing. Verbal and Non-verbal Communication.

Overcoming Communication Barriers: Identifying common communication barriers, Strategies for overcoming barriers

UNIT-IV

7hours

Listening Skills: Active Listening, Importance of active listening, Giving and receiving feedback.

Transaction Mode Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning

Suggested Reading:

- *English Online, Mohanraj & Mohanrah, Orient Longman.*

- *The Good Grammar Book* Swan M & Catherine Walter, Oxford.
- *English Grammar Composition and Effective Business Communication*, Pink and Thomas, S Chand.
- *Business Communication*, Meenakshi Raman & Sangeeta Sharma, Oxford.
- *Oxford Business English Dictionary*, Oxford.
- *Technical Communication: Principles and Practice*, Meenakshi Raman & Sangeeta Sharma, Oxford.
- *Developing Communication Skills*, Krishna Mohan & Meera Benarji, MacMilan Pub.
- *Personality development and soft skill*, Baran Mitra, Oxford.

SEMESTER II

Course Title: Programming using C++	L	T	P	Cr.
Course Code: BCA2150	3	0	0	3

Total Hours: :45

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Discuss about the programming techniques to solve problems or errors in the C++ programming language.
2. Attain the conceptual knowledge of array and string.
3. Describe the constructor and class member function.
4. Analyze the inheritance with the understanding of early binding and late binding.

Course Content**UNIT I****10 hours**

Introduction to Object Oriented Programming Concepts: Object, Class, Encapsulation, Data hiding, Inheritance and Polymorphism; analysis and design of system using object-oriented approach.

C++ Basics: Token, keywords, Identifiers, Basic data types, user defined and derived data types, symbolic constants, declaration of variables, dynamic initialization of variables, reference variables, operators in C++, I/O streams, Control structures.

Classes and Objects: Specifying a class, defining data members and member functions, private and public member functions, member function definition inside/outside the class declaration, scope resolution operator, nesting of member functions, creating and declaring objects, accessing class data members, accessing member functions, static data members and member functions.

UNIT II**10 hours**

Constructors and destructors: Introduction, default constructors, parameterized constructors, multiple constructors in a class, copy constructors, dynamic constructors; Destructors: Definition and use.

Functions in C++: Function prototyping, pass by value, pass by reference, inline functions, default arguments, const arguments, function overloading, Friend functions, Objects as function arguments, friendly functions, and returning objects

Arrays and Strings: creating and manipulating arrays within a class, arrays of objects, creating and manipulating String Objects, Accessing Characters in strings.

UNIT III**10 hours**

Extending Classes using Inheritance: Introduction, base class, derived class, defining derived classes, visibility modes: private, public, protected; single inheritance: privately derived, publicly derived; making a protected member inheritable, access control to private and protected members by member functions of a derived class, multilevel inheritance, virtual base classes, abstract classes, nesting of classes.

Pointers, Virtual Functions and polymorphism: virtual and pure virtual functions, function overloading, operator overloading.

UNIT IV**15 hours**

Console I/O Operations: C++ Stream Classes, Unformatted I/O functions-put(), get(), getline(), write(), Formatting with ios class functions and flags, Manipulators.

Files and Streams: Text and binary streams, The stream class hierarchy, Processing files, declaring files, opening files using open() function or constructor function, closing files, String I/O, Sequential and random Access, File updation.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Balagurusamy, E., Balagurusamy, E., & Balagurusamy, E. (2001). *Object oriented programming with C++*. Tata McGraw-Hill Publishing Company.
- Pohl, I. (1993). *Object-oriented programming using C++*. Benjamin-Cummings Publishing Co., Inc.
- Dewhurst, S. C., & Stark, K. T. (1989). *Programming in C++*. Prentice- Hall, Inc.
- Lafore, R. (1997). *Object-oriented programming in C++*. Pearson Education.

Course Title: Operating Systems	L	T	P	Cr
Course Code: BCA2151	3	0	0	3

Total Hours: 45

Course Learning Outcomes: After the completion of the course the learner will be able to

1. Describe the fundamental concepts of Operating System.
2. Solve the various types of Scheduling Algorithms for better utilization of external memory.
3. Attain the knowledge about deadlock detection algorithms.
4. Demonstrate the components and aspects of concurrency management.

Course Content

UNIT I

10 hours

Fundamentals of Operating system: Introduction to Operating system, Functions of an operating system. Operating system as a resource manager. Structure of operating system (Role of kernel and Shell). Views of the operating system. Evolution and types of operating systems.

Process & Thread Management: Program vs. Process; PCB, State transition diagram, Scheduling Queues, Types of schedulers, Concept of Thread, Benefits, Types of threads, Process synchronization.

CPU Scheduling: Need of CPU scheduling, CPU I/O Burst Cycle, Preemptive vs. Non-pre-emptive scheduling, Different scheduling criteria, scheduling algorithms (FCFS, SJF, Round-Robin, Multilevel Queue).

UNIT II

15 hours

Memory Management: Introduction, address binding, relocation, loading, linking, memory sharing and protection; Paging and segmentation; Virtual memory: basic concepts of demand paging, page replacement algorithms.

UNIT III

10 hours

I/O Device Management: I/O devices and controllers, device drivers; disk storage. File Management: Basic concepts, file operations, access methods, directory structures and management, remote file systems; file protection.

UNIT IV

10 hours

Advanced Operating systems: Introduction to Distributed Operating system, Characteristics, & Synchronization; Introduction Multiprocessor Operating system, architecture, Issues,

Communication, & Synchronization; Introduction Multiprocessor Operating system, Architecture, Structure, Synchronization & Scheduling; Introduction to Real-Time Operating System, Characteristics, Structure & Scheduling. Case study of Linux operating system.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Tanenbaum, A. (2009). *Modern operating systems*. Pearson Education, Inc.,
- Coffman, E. G., & Denning, P. J. (1973). *Operating systems theory* (Vol. 973). Englewood Cliffs, NJ: prentice-Hall.
- Madnick, S. E., & Donovan, J. J. (1974). *Operating systems* (Vol. 197, No. 4). New York: McGraw-Hill.
- Deitel, H. M. (1990). *An introduction to operating systems*. Addison-
- Wesley Longman Publishing Co., Inc..

Course Title: System Analysis & Design	L	T	P	Cr.
Course Code: BIT2152	4	0	0	4

Total Hours: :60**Course Learning Outcomes:**

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

1. Understand the stages of System Development Life Cycle (SDLC).
2. Analyze system requirements using tools like DFD and flowcharts.
3. Perform feasibility studies and cost-benefit analysis.
4. Design efficient, secure, and user-friendly information systems.

Course Content**Unit I****15 Hours**

Basic Concept of Systems the System: Definition and Concepts; Elements of a System: Input, Output Processor, Control, Feedback, Environment, Boundaries and Interface; Characteristics of a System; Types of systems - Physical and Abstract System, Open and Closed Systems, Man-made Systems; Information and its categories Information System and System Analyst Information systems: TPS, OAS, MIS, DSS, ESS; System Analyst: Role and need of system analyst, System Analyst as an agent of change.

Unit II**15 Hours**

System Development Life Cycle Introduction to SDLC, Various phases: study, analysis, design, development, testing, implementation, maintenance; System documentation: Types of documentation and their importance.

System Planning and Information Gathering

Initial Investigations, Identification of user needs, Project Identification and Selection; Needs of Information Gathering, Determination of requirements, Information gathering tools: interviews, group communication, questionnaires, presentations and site visits. Feasibility Study

Definition, Importance of feasibility study, Types of feasibility study, System selection plan and proposal, Prototyping, Cost-Benefit Analysis: Tools and Techniques.

Unit III**15 Hours**

Tools for System Analysis Data Flow Diagram (DFD), Logical and Physical DFDs, Developing DFD; System Flowcharts and Structured charts, Structured English, Decision trees and Decision tables.

System Design

Module specifications, Module Coupling and cohesion, Top-down and bottom-up design; Logical and Physical design, Structured design.

Input and Output

Input design: Input data, Input media and devices; Output design; Form Design: Classification of forms, Requirements of Form design.

Unit IV

15 Hours

System Implementation and Maintenance Need of System Testing, Types of System Testing, Quality Assurance; System Conversion, Conversion methods, procedures and controls, System evaluation and performance, Maintenance activities and issues.

System Security and Audit System Security, Security Threats, Risk Analysis, Control measures, System Audit, Disaster Recovery Planning

Suggested Readings:

- *Elias m. Awad: System Analysis and Design*
- *Perry Edwards: System Analysis & design Mc Graw Hill*

Course Title: Programming using C++ Lab	L	T	P	Cr.
Course Code: BIT2153	0	0	2	1

Total Hours :30

Course Learning Outcomes: After the completion of the course the learner will be able to

1. After the completion of the course the learner will be able to
2. Classify the object-oriented concepts and their implementation.
3. Use the concepts of array and string using C++.
4. Implement a given program solved by C++.
5. Grasp the concept of implementing the constructors with classes.

Course Content

1. Write a program to print
1
12
123
1234
12345
2. Write a program to find whether the number is even, odd.
3. Write a program to find the greatest out of three numbers.
4. Write a program to find whether the number is palindrome or not.
5. Write a program to print prime number Series.
6. Write a program to find the reverse of a number.
7. Write a program to find the factorial of a number.
8. Write a program to implement switch case in C++.
9. Write a program to implement for loop, while loop and do-while loop in C++.
10. Write a program to enter a record of 50 students.
11. Write a program to implement call by value.
12. Write a program to show call by reference in C++.
13. Write a program to create structure in C++.
14. Write a program to find the area of circle, rectangle and polygon by using structure.
15. Write a program to create classes in C++.
16. Write a program that uses a class where the member functions are defined inside a class.
17. Write a program to demonstrate the use of static data members.
18. Write a program to demonstrate the use of keyword const data members.
19. Write a program using constructors in C++.
20. Write a program using destructors in C++.

21. Write a program using multiple constructors in C++.
22. Write a program using the Copy constructor in C++.
23. Write a program to demonstrate the single inheritance.
24. Write a program to demonstrate the multilevel inheritance.
25. Write a program to demonstrate the multiple inheritances.
26. Write a program showing hierarchical inheritance in C++.
27. Write a program to implement function overloading.
28. Write a program to demonstrate the overloading of binary arithmetic operators.
29. Write a program showing operator overloading in C++.
30. Write a program to demonstrate the use of function templates.
31. Write a program to demonstrate the use of class templates.
32. Write a program showing Exception handling in C++.
33. Write a program to read and write data from a file in C++.
34. Write a program to demonstrate the reading and writing of mixed types of data.
35. Write a program to demonstrate the reading and writing of object.

Course Title: Operating System Lab	L	T	P	Cr.
Course Code: BIT2154	0	0	2	1

Total Hours:30

Course Learning Outcomes: After the completion of the course the learner will be able to

1. Get expertise on the Unix OS platform.
2. Develop and debug C programs created on UNIX platforms.
3. Install the standard libraries of the Operating System.
4. Classify Shell Programming in Linux.

Course Content

1. Write down the Steps to Install Linux Operating System.
2. Write down the Steps to Install XP Operating System.
3. Write and explain the File Related commands.
4. Write and explain the Directory Related commands.
5. Write and explain the Process and status information commands.
6. Write and explain the Text related commands.
7. Write and explain the command to set the File Permissions.
8. Write a shell Program for Numerical Calculations in Linux.
9. Write a shell program to create a table in Linux.
10. Write a shell program to identify Even and Odd Number in Linux.

Course Title: Introduction to Web technologies – II	L	T	P	Cr.
Course Code: BCA2155	0	0	4	2

Total Hours: :60

Course Learning Outcomes: After the completion of the course the learner will be able to

1. Students are able to develop a dynamic webpage by the use of java script and DHTML.
2. Students will be able to write a well-formed / valid XML document.
3. Students will be able to connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.
4. Students will be able to write a server-side java application called Servlet to catch form data sent from client, process it and store it on database.
5. Students will be able to write a server-side java application called JSP to catch form data sent from client and store it on database.

Course Content

1. Create a simple webpage using HTML.
2. Use frames to Include Images and Videos.
3. Add a Cascading Style sheet for designing the web page.
4. Design a dynamic web page with validation using JavaScript.
5. Design an HTML having a text box and four buttons viz Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate javascript function should be called to display
6. Factorial of that number Fibonacci series up to that number Prime numbers up to that number. Is it palindrome or not
7. Write java script programs to demonstrate
8. Math Object with at least five methods.
9. String Object with at least five methods.
10. Array Object with at least five methods.
11. Date Object with at least five methods.
12. Write JavaScript programs on Event Handling
13. Validation of registration form
14. Open a Window from the current window
15. Change color of background at each click of button or refresh of a page
16. Display calendar for the month and year selected from combo box
17. On Mouse over even
18. Write a java program to connect to a database server using JDBC and

insert 10 student's information of user choice in to student table.

19. Write a java program to display all records in the student table.
20. Develop a simple Servlet to display Welcome to Servlet.
21. Develop a Servlet to validate user name and password with the data stored in Servlet configuration file. Display authorized user if she/he is authorized else display unauthorized user.
22. Develop a Servlet to validate user name and password stored in database. Display authorized user if she/he is authorized else display unauthorized user.
23. Write a Servlet program to store student details sent from registration form in to database table.
24. Write JSP Program to store student information sent from registration page into database table.
25. Develop a program to validate username and password that are stored in Database table using JSP.
26. Write appropriate JSP pages to insert, update and delete data in student table in a single application with proper linking of JSP pages and session management.

Suggested Readings

- Chris Bates, *"Web Programming-Building Internet Applications"*, 2nd ed., Wiley Publishers, 2006.
- Diet eland Nieto, *"Internet and World Wide Web-How to Program"*, 4th ed., PHI/ Pearson Education Asia, 2007.
- Hans Bergsten, *"Java Server Pages"*, 1st ed., O'REILLY Publications, 2000.
- Jennifer Niederst, Robbins, *"Learning Web Design"*, 3rd ed., SPD O'REILLY Publications, 10.
- Firuza Aibara, *"HTML for Beginners"*, 2nd ed., SPD O'REILLY Publications, 2010.
- . Marty Hall, *"Core Servlets and Java Server Pages"*, 1st ed., Prentice Hall PTR, 2000.
- *The complete Reference Java 2 Fifth Edition* by Patrick Naughton and Herbert Schildt. TMH

Course Title: Multilingual Typing and Stenography	L	T	P	Cr.
Course Code: BIT2156	0	0	6	3

Total Hours: :90

1. Introduction to Hindi Fonts, Matra and sentences
2. Basic training in Hindi Typing: Home Row Keys practice, Practice of Shift+ Home row letters, Practice upper row letters, Practice Shift+ upper row letters.
3. Introduction to English Fonts. Basic Typing Techniques.
4. Home Row Keys.
5. Finger Exercises.
6. Typing Drills.
7. English and Hindi Shorthand.
8. Phraseography
9. Transcription
- 10.Speed Building

Course Title: Human Resource Management	L	T	P	Cr.
Course Code: BIT2157	3	0	0	3

Total Hours: :45

Course Learning Outcomes: After the completion of the course the learner will be able to

1. Understand the significance of HRM, distinguish it from Personnel Management (PM), and identify HR challenges.
2. Apply HRM principles to practical situations such as recruitment, selection, and induction.
3. Analyze performance appraisal methods and training programs.
4. Evaluate the effectiveness of HR policies like promotion and transfer. Develop HR strategies and procedures.

Course Content

UNIT I

12 hours

Introduction to HRM: Definition and Concept of HRM and Personnel Management, Difference between PM and HRM, Importance of HRM, Activities and Functions of HRM, Challenges before HRM, HRD, HRP, Concept of Recruitment –Sources of Recruitment.

UNIT II

12 hours

Performance Appraisal, Training and Development: Meaning and Definition-Need- Objective –Importance of Training, Training Method – Evaluation of Training Program, Concept and Objective Performance Appraisal-Process of Performance Appraisal Method –Uses and Limitation of Performance Appraisal, Promotion and Demotion Policy, Transfer Policy.

UNIT III

11 hours

Method of Wage Payment – Employee Remuneration Factors Determining the Level of Remuneration-Profit Sharing –Fringe Benefit Nature of E- HRM, E-HR Activity, E-Recruitment, E-Selection, E-Learning, E- Compensation.

UNIT IV

10 hours

Grievance and Discipline: Meaning, Definition and Nature of Grievance Procedure-Grievance Machinery. Definition of Discipline-Aim and Objective of Discipline. Principle of Discipline.

Transactional Mode:

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Reading:

- *Fundamentals of Human Resource Management by David A. DeCenzo, Stephen P. Robbins, and Susan L. Verhulst.*
- *Effective Human Resource Management: A Global Analysis by Edward Lawler, John Boudreau, and Susan Albers Mohrman.*
- *Human Resource Management: Gaining a Competitive Advantage by Raymond Noe, John Hollenbeck, Barry Gerhart, and Patrick Wright*

Course Title: Environmental Education	L	T	P	Cr.
Course Code: VAC0001	2	0	0	2

Total Hours: 30

Course Learning Outcomes: After the completion of the course the learner will be able to

1. Acquire the basic knowledge of Environment study.
2. Attain the information about the ecosystem and its functioning.
3. Discuss the role of individuals in prevention of pollution.
4. Elaborate the role of information technology in the environment and human health.

Course Content

UNIT-I

8 hours

The Multidisciplinary nature of environmental studies Definition, scope and importance, Need for public awareness.

Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems.

Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people.

Water resources: Use and over-Utilization of surface and ground water, floods, drought, conflicts and water, dams-benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources.

Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

UNIT-II

7 hours

E-Concept of an ecosystem: Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids.

Biodiversity and its conservation: Introduction – Definition: genetic, species and ecosystem diversity, Bio-geographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, India as a mega-diversity nation.

UNIT-III**7 hours**

Environmental Pollution Definition: Causes, effects and control measures of:
 a. Air pollution b. Water pollution c. Soil pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards, ill-effects of fireworks, Solid waste Management: Causes, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution, Disaster management: floods, earthquake, cyclone and landslides.

UNIT-IV**8 hours**

Social Issues and the Environment: From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people; its problems and concerns, Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Wasteland reclamation, Consumerism and waste products, Environment Protection Act, Air (Presentation and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation.

Human Population and the Environment: Population growth, variation among nations, Population explosion – Family Welfare Programme, Environment and human health, Human Rights, Value Education, HIV / AIDS, Women and Child Welfare

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Agarwal K.C. (2001). *Environment Biology*, Nidi Publ. Ltd. Bikaner.
- Jadhav H & Bhosale (1995). *Environment Protection and Laws*, Himalaya Pub House, Delhi.
- Rao M. N. & Datta A.K. (1987). *Waste Water, Treatment Oxford & IBH*
- Publ. Co. Pvt. Ltd.

Course Title: Communication Skills - II	L	T	P	Cr.
Course Code: BIT2158	2	0	0	2

Total Hours: 30

Course Learning Outcomes: After the completion of the course the learner will be able to

1. Formulate an outline for effective Organizational Communication.
2. Summarize the information, ideas, concepts and opinions from a variety of sources.
3. Attain the competence in oral, written, and visual communication.
4. Learn the correct practices about the strategies of Effective Business writing.

Course Content

UNIT-I **6hours**

Writing Skills: Formal & Informal writings, report writing, creative writing. Composition, Resume Writing, Cover letters.

UNIT-II **9hours**

Business Letter Writing, Persuasive Letters, Job Applications and Official Correspondence, E-Mail, Precise writing.

UNIT-III **7hours**

Basic Writing and Reading Skills: Principles of Effective Writing, Writing Emails, Letters, and Memos. This involves clarity, concision, and proper tone to convey messages effectively in professional settings.

UNIT-IV **8hours**

Writing: Biographical writing about one place or person, Free writing on any topics (my favorite place/hobbies/school life etc.), Sentence Completion, Autobiographical writing (about one's leisure time activities, hometown etc.).

Transaction Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Kumar, S., & Lata, P. (2011). *Communication skills*. Oxford University Press.
- Training, M. T. D. (2012). *Effective communication skills*. Bookboon.
- Hargie, O. (Ed.). (1986). *The handbook of communication skills* (p. 37). London: Croom Helm.

SEMESTER III

Course Title: Data Structures	L	T	P	Cr.
Course Code: BIT3200	3	0	0	3

Total Hours: 45

Course Learning Outcomes: After the completion of the course the learner will be able to

1. Apply appropriate constructs of Programming language, coding standards for application development.
2. Select appropriate data structures for problem solving and programming
3. Identify appropriate searching and/or sorting techniques for a wide range of problems and data types.
4. Differentiate between various types of data structures.

Course Content**Unit-I****10 hours**

Introduction to Data Structures: Algorithms and Flowcharts, Basics Analysis on Algorithm, Complexity of Algorithm, Introduction and Definition of Data Structure, Classification of Data, Arrays, Various types of Data Structure, Static and Dynamic Memory Allocation, Function, Recursion.

Arrays, Pointers and Strings: Introduction to Arrays, Definition, One Dimensional Array and Multi-Dimensional Arrays, Pointer, Pointer to Structure, various Programs for Array and Pointer. Strings. Introduction to Strings, Definition, Library Functions of Strings.

UNIT-II**15 hours**

Stacks and Queue: Introduction to Stack, Definition, Stack Implementation, Operations of Stack, Applications of Stack and Multiple Stacks. Implementation of Multiple Stack Queues, Introduction to Queue, Definition, Queue Implementation, Operations of Queue, Circular Queue, De-queue and Priority Queue.

UNIT-III**10 hours**

Linked Lists and Trees: Introduction, Representation and Operations of Linked Lists, Singly Linked List, Doubly Linked List, Circular Linked List, and Circular Doubly Linked List.

Trees: Introduction to Tree, Tree Terminology Binary Tree, Binary Search Tree, Strictly Binary Tree, Complete Binary Tree, Tree Traversal, Threaded Binary Tree, AVL Tree B Tree, B+ Tree.

UNIT-IV**10 hours**

Graphs, Searching, Sorting and Hashing Graphs: Introduction,

Representation to Graphs, Graph Traversals Shortest Path Algorithms. Searching and Sorting: Searching, Types of Searching, Sorting, Types of sorting like quick sort, bubble sort, merge sort, selection sort.

Hashing: Hash Function, Types of Hash Functions, Collision, Collision Resolution Technique (CRT), Perfect Hashing

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *Hubbard, J. R. (2007). [Introduction to] Schaum's Outline of Data Structures with Java. McGraw-Hill.*
- *Horowitz, E., & Sahni, S. (1976). Fundamentals of data structures (Vol. 1982). Potomac, MD: Computer science press.*
- *Wirth, N. (1985). Algorithms & data structures. Prentice-Hall, Inc..*
- *Tarjan, R. E. (1983). Data structures and network algorithms. Society for Industrial and Applied Mathematics.*

Course Title: Database Management System	L	T	P	Cr.
Course Code: BIT3201	3	0	0	3

Total Hours: 45

Course Learning Outcomes: After the completion of the course the learner will be able to

1. Identify the difference about database systems from the file systems
2. by enumerating their features.
3. Acknowledge the role of the database administrator.
4. Retain the knowledge about physical and logical database designs.
5. Learn about three level architecture of database system.
6. Converts an Entity-Relationship diagram to Relational Schema.

Course Content

UNIT I

10 hours

Introduction of DBMS: Data Modeling for a Database, three level Architecture of DBMS, Components of a DBMS. Introduction to Data Models: Hierarchical, Network and Relational Model, Comparison of Network, Hierarchical and Relational Model, Entity Relationship Model.

UNIT II

15 hours

Relational Database: Relational Algebra and Calculus, Fundamentals, DDL, DML, DCL, PL/SQL Concepts, Cursors, Stored Procedures, Stored Functions, Database Triggers.

UNIT III

10 hours

Introduction to Normalization: First, Second, Third Normal Forms, Dependency Preservation, Boyce-Codd Normal Form, Multi-valued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form, Domain-key normal form (DKNF).

UNIT IV

10 hours

Database Recovery: Concurrency Management, Database Security, Integrity and Control. Structure of a Distributed Database, Design of Distributed Databases

Transactional Mode

Video based Teaching, Collaborative Teaching, Cooperative Teaching; Case based Teaching and power point presentation.

Suggested Readings

- Ramakrishnan, R., Gehrke, J., & Gehrke, J. (2003). *Database management systems* (Vol. 3). New York: McGraw-Hill.
- Korth F. Henry. *Database System Concepts*, McGraw Hill.
- Lu, G. (1999). *Multimedia database management systems*. Boston: Artech House.
- Date, C. J. (1975). *An introduction to database systems*. Pearson Education India.

Course Title: Computer System Architecture	L	T	P	Cr.
Course Code: BIT3202	4	0	0	4

Total Hours: 45

Course Learning Outcomes: After the completion of the course the learner will be able to

1. Knowledge about the architecture of the central processing unit.
2. Attain the knowledge of memory hierarchy.
3. Exemplify various data transfer modes.
4. Use the appropriate tools to design, verify and test the architecture of microprocessors.

Course Content

UNIT I

15 hours

Computer System Organization: CPU Organization, Instruction Execution (instruction cycle, types of instructions), RISC v/s CISC, Design Principles for Modern Computers, Instruction level parallelism. Processor level parallelism. Primary memory: Memory addresses, Byte Ordering, Error-correcting codes, Cache memory. Secondary memory: Memory hierarchy, SCSI disk, RAID.

UNIT II

10 hours

Instruction Set Architecture: Instruction formats, expanding opcodes, types of addressing modes, data transfer and manipulation instructions, Program control (status-bit conditions, conditional branch instructions, program interrupt, types of interrupts).

UNIT III

10 hours

Register Transfer Language: Register Transfer, Bus and memory transfer, Arithmetic micro-operations, Logic micro-operations, shift micro-operations, Arithmetic logic shift unit Microprogrammed control, control word, control memory (concepts only).

UNIT IV

10 hours

Input-output Organization- I/O interfaces (I/O bus and interface modules, I/O versus memory bus, isolated versus memory-mapped I/O). Asynchronous Data transfer (strobe control, handshaking), modes of transfer (programmed I/O, interrupt-initiated I/O, software considerations), direct memory access.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *Mano, M. M. (1993). Computer system architecture. Prentice-Hall, Inc.*
- *Balch, M. (2003). Complete digital design: a comprehensive guide to digital electronics and computer system architecture. McGraw-Hill Education.*
- *Parhami, B. (2005). Computer architecture. Oxford University Press, New York, NY, USA.*

Course Title: Data Structure Lab	L	T	P	Cr.
Course Code: BIT3203	0	0	2	1

Total Hours: 30

Course Learning Outcomes: After the completion of the course the learner will be able to

1. Apply appropriate constructs of Programming language, coding standards for application development
2. Select appropriate data structures for problem solving and programming
3. Identify appropriate searching and/or sorting techniques for a wide range of problems and data types.
4. Differentiate between various types of data structures.

Course Content

1. Write a program to insert an element into an array
2. Write a program to delete an element from an array.
3. Write a program to implement linear search algorithm
4. Write a program to implement binary search algorithm
5. Write a program to implement a bubble sort algorithm.
6. Write a program to implement a selection sort algorithm.
7. Write a program to implement PUSH operation in stacks.
8. Write a program to implement POP operation in stacks.
9. Write a program to implement Queues.
10. Write a program to insert an element in the beginning of the link list.
11. Write a program to insert an element in the middle of the link list.
12. Write a program to insert an element in the end of the link list.
13. Write a program to delete an element from the beginning of the link list.
14. Write a program to delete an element from the end of the link list.
15. Write a program for implementation of a graph.
16. Write a program for implementation of binary search trees.

Course Title: Database Management System Lab	L	T	P	Cr.
Course Code: BIT3204	0	0	2	1

Total Hours 30

Course Learning Outcomes: After the completion of the course the learner will be able to

1. Solve the query of database using SQL DML / DDL commands.
2. Enforce integrity constraints on a database.
3. Apply the basic concepts of Database Systems and Applications.
4. Design a commercial relational database system (Oracle, My SQL) by writing SQL using the system.
5. Analyze and Select storage and recovery techniques of database system.

Course Content

1. Introduction to DBMS & SQL.
2. To implement Various DDL comment.
3. Implement the DML commands.
4. Study of Various types of data Constraints and implementation.
5. Study of all types of operators.
6. Implement the concept of Set Operators.
7. Explore select clauses -order by, having etc.
8. Implement the concept of Inbuilt Function.
9. Implement the concept of Joins,
10. Implement the concept of views.
11. Implement the concept of Indexes

Course Title: Multimedia and its Applications	L	T	P	Cr.
Course Code: BIT3205	2	0	0	2

Total Hours:30

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Understand the basic concepts of multimedia, including text, audio, video, animation, and graphics.
2. Apply multimedia tools and techniques to create interactive presentations and digital content.
3. Demonstrate knowledge of multimedia file formats, data compression, and storage techniques.
4. Develop simple multimedia applications using authoring tools and multimedia software.

Course Content

UNIT- I

5 Hours

Definition - Classification - Multimedia application -Multimedia Hardware - Multimedia software - CDROM - DVD.

UNIT-II

5 Hours

Multimedia Audio: Digital medium - Digital audio technology - sound cards - recording - editing - MP3 - MIDI fundamentals - Working with MIDI - audio file formats - adding sound to Multimedia project.

UNIT-III

10 Hours

Multimedia Text: Text in Multimedia -Multimedia graphics: coloring - digital imaging fundamentals - development and editing - file formats - scanning and digital photography.

UNIT-IV

10 Hours

Multimedia Animation: Computer animation fundamentals - Kinematics - morphing - animation s/w tools and techniques. Multimedia Video: How video works - broadcast video standards - digital video fundamentals – digital video production and editing techniques - file formats.

Multimedia Project: stages of project - Multimedia skills - design concept - authoring - planning and costing –Multimedia Team. Multimedia-looking towards Future: Digital Communication and New Media, Interactive Television, Digital Broadcasting, Digital Radio, Multimedia Conferencing.

Transactional Mode:

Video Based Teaching, Panel Discussion, Case Based Teaching, Brain Storming, Demonstration, Peer Teaching.

Suggested Reading

- *S.Gokul, "Multimedia Magic", BPB Publications, 2nd Edition.*
- *Tay Vaughen , "Multimedia Making it Work", TMH, 6th Edition.*
- *Kiran Thakrar, Prabhat k.andleigh, "Multimedia System Design", Prentice Hall India.*
- *Malay k Pakhira, "Computer graphics, Multimedia and Animation", Prentice Hall India,2nd Edition.*

Course Title: Multimedia and its Applications Lab	L	T	P	Cr.
Course Code: BCA3206	0	0	4	2

Total Hours:60

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Identify and utilize various tools for multimedia processing.
2. Design the images with appropriate tools from the toolbox.
3. Apply practical knowledge to create image animations.
4. Implement the experiments with graphics and text information.

Course Content

1. Procedure to create an animation to represent the growing moon.
2. Procedure to create an animation to indicate a wall bouncing on steps.
3. Procedure to simulate movement of a cloud.
4. Procedure to draw the fan blades and to give proper animation.
5. Procedure to display the background given through your name.
6. Procedure to create an animation with the following features: WEL COME Letter should appear one by one. The fill Color of the text should change to a different Color after the display of full word.
7. Procedure to simulate a ball hitting another ball.
8. Procedure to create an animated cursor using STARTDRAG ("SS", TRUE); MOUSE. HIDE ();
9. Procedure to design a visiting card containing at least one graphic and text information.
10. Procedure to take a photographic image. Give the title for the image and put the border. Write your names. Write the institution and place.
11. Procedure to prepare a cover page for the book in your subject area. Plan your own design.
12. Selecting your own background for organization.
13. Picture so that it gives an elegant look.
14. Procedure to picture preferably on a plain background of a color of your Choice-Positioning Includes rotation and scaling.
15. Procedure to remove the arrows and text from the given photographic image.
16. Procedure to type a word and apply the effects shadow embossed.
17. Procedure to use appropriate tools(s) from the toolbox: cut the

object from three files, organize them in a single file and apply feather effects.

18. Procedure to display the background given through your name using a mask.
19. Procedure to make anyone of one of the parrots black and white in a given picture.
20. Procedure to change a circle into a square using flash.

Course Title: Principles of Management	L	T	P	Cr.
Course Code: BIT3207	3	0	0	3

Total Hours: 45

Learning Outcomes:

1. Understand the fundamental principles and functions of management in organizational contexts.
2. Apply management practices to plan, organize, lead, and control effectively.
3. Analyze real-world business scenarios to develop problem-solving and decision-making skills.
4. Demonstrate the ability to manage resources and foster teamwork for achieving organizational goals.

Course Content

Unit -I

Hours 15

Forms of Business Organizations and Ownership: Sole Proprietorship, Partnership, Joint Stock Company, Public & Private undertakings, Government Companies. Management: Meaning & Definition of Management, Nature, Scope and its various functions. Evolution of management thoughts: classical and new classical systems, contingency approaches, Scientific management.

Unit – II

Hours 15

Planning: nature, purpose and functions, types of plans, Management by Objective (MBO), steps in planning. Decision Making: Meaning, Steps in Decision Making, Techniques of Decision Making. Strategic planning – concepts, process, importance and limitations; Growth strategies- Internal and external.

Unit – III

Hours 15

Organizing: Concept, formal and informal organizations, task force, bases of departmentation, different forms of organizational structures, avoiding organizational inflexibility. Teamwork – meaning, types and stages of team building.

Concept of staffing– Recruitment and Selection.

Motivation – concept, importance and theories.

Unit- IV

Hours 15

Authority: definition, types, responsibility and accountability, delegation, decentralization v/s centralization, determinants of effective decentralization. Line and staff authority.

Control: function, process and types of control, nature, process, significance and span of control. Direct control v/s preventive control. Trends and challenges of management in global scenario, emerging issues in management: Introduction to Total Quality Management (TQM), Just in Time (JIT).

Suggested Textbooks:

Principles and practices of management: L. M. PRASAD (S. Chand publishers)
Essentials of Management: Koontz H. & Weihrich H. (Tata Mc Graw Hill Publishers)

Suggested Reference books

Management: Stephen Robbins (Pearson publishers)

Course Title: Computer Networks	L	T	P	Cr.
Course Code: BIT3208	4	0	0	4

Total Hours:45**Learning Outcomes:**

On the completion of the course the students will be able to

1. Get knowledge about the layers of the OSI model and TCP/IP.
2. Compare and identify various network topologies.
3. Identify the types of application process protocols.
4. Discuss the various data link layer and network protocols.
5. Classify the working of the Internet.

Course Content**UNIT I****12 hours**

Data communications concepts: Digital and analog parallel and serial synchronous and asynchronous, simplex, half duplex, full duplex, multiplexing.

Communication channels: Wired transmissions: Telephone lines, leased lines, switch line, coaxial cables, base band, and broadband, optical fiber transmission.

UNIT II**10 hours**

Wireless transmission: Microwave transmission, infrared transmission, laser transmission, radio transmission, and satellite transmission, Communication switching techniques; Circuit switching, message switching, packet switching.

UNIT III**13 hours**

Network reference models: Network topologies, OSI references model, TCP/IP reference model, comparison of OSI and TCI reference model. Data link layer design issue: Services provided to the network layer, framing, error control, flow control, HDLC, SDLC, data link layer in the internet (SLIP, PPP).

UNIT IV**10 hours**

MAC sub layer: CSMA/CD, IEEE standards, FDM, TDM, CDMA.

The Network Layer: Design Issues,

Routing Algorithms: Optimality principled, shortest path routing, Concept of Internet Working.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Tanenbaum, A. S. (2002). *Computer networks*. Pearson Education India.
- Peterson, L. L., & Davie, B. S. (2007). *Computer networks: a systems approach*. Elsevier.
- Kiesler, S. (1986). *The hidden messages in computer networks* (pp. 46- 47). Harvard Business Review Case Services.

Course Title: Soft Skills and Personality Development	L	T	P	Cr.
Course Code: BCA3209	2	0	0	2

Total Hours:30

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Student will get Effective Communication Skills.
2. Develop good Interpersonal Skills and Teamwork in students.
3. Personal and Professional Development.

Course Content

UNIT-I 8 hours

Intra, inter-personal and group communication skills. Gestures, postures, Proxemies, Kinesics. Listening to Lectures, Discussions, Talk Shows, News Programs.

UNIT-II 7 hours

Conflict Resolution and Negotiation: Managing Conflicts through Effective Communication and Negotiation Techniques. Active listening, remaining calm, and finding mutually beneficial solutions.

UNIT-III 8 hours

Assertiveness and Empathy: Developing Assertiveness Skills and Practicing Empathy in Communication. Expressing oneself confidently while respecting others' perspectives and feelings.

UNIT-IV 8 hours

Group Discussions and Team Communication: Effective Participation in Group Discussions and Team Communication Strategies. Active listening, clear expression of ideas, and collaboration to achieve common goals.

Suggested Reading:

- Meena K and V. Ayothi (2013) *A Book on Development of Soft Skills*
- Alex K. (2012) *Soft Skills-Know Yourself & Know the World*
- Sofi, Naseer and Prof. Sunita Kumari. *Introduction to Phonetics and Grammar*, Narendera Publishing House. 2023

Semester-IV

Course Title: Artificial Intelligence	L	T	P	Cr.
Course Code: BIT4250	3	0	0	3

Total Hours: :45

Learning Outcomes: After completion of this course, the learner will be able to:

1. Identify problems that are amenable to solution by specific AI methods
2. Represent knowledge in Prolog and write code for drawing inferences.
3. Identify appropriate AI technique for the problem at hand
4. Compare strengths and weaknesses of different artificial Intelligence techniques.

Course Content**UNIT I****10 hours**

Introduction: Introduction to artificial intelligence, background and applications, Turing test, rational agents, intelligent agents, structure, behavior and environment of intelligent agents.

UNIT II**12 hours**

Knowledge Representation: Propositional logic, first order predicate logic, resolution principle, unification, semantic nets, conceptual dependencies, frames, scripts, production rules, conceptual graphs.

UNIT III**13 hours**

Problem Solving and Searching Techniques: Problem characteristics, production systems, control strategies, breadth first search, depth first search, hill climbing and its variations, heuristics search techniques: best first search, A* algorithm, constraint satisfaction problem, means- end analysis. Ethics in AI, Fairness in AI, Legal perspective

UNIT IV**10 hours**

Game Playing: introduction to game playing, min-max and alpha-beta pruning algorithms.
Prolog Programming: Introduction to Programming in Logic (PROLOG), Lists, Operators, basic Input and Output.

Transactional modes

Project based learning, Team Teaching, Flipped teaching, Open talk, Collaborative Teaching, Case Analysis, Panel Discussions, Group Discussions. Suggested Readings.

- *Winston, P. H. (1992). Artificial intelligence. Addison-Wesley Longman*

Publishing Co., Inc.. Winston, P. H. (1984). Artificial intelligence. Addison-Wesley Longman Publishing Co., Inc..

- *Boden, M. A. (Ed.). (1996). Artificial intelligence. Elsevier.*
- *Hunt, E. B. (2014). Artificial intelligence. Academic Press.*

Course Title: Programming using Python	L	T	P	Cr.
Course Code: BIT4251	3	0	0	3

Total Hours: 45

Learning Outcomes: After completion of this course, the learner will be able to:

1. Understand the variables, expressions and statements.
2. Apply conditional and looping constructs.
3. Design and import functions in python programming.
4. Learn Graphical User Interface using python.

Course Content

Unit I 12 Hours

A quick revision of the basics of python: Python operators, conditional statements ((If, If-else, If-elif-else, Nested-if etc.) and loop control statements (for, while, Nested loops, Break, Continue, Pass statements). Functions and File handling. Concept of Modularization, Importance of modules in python, importing modules, Built in modules (ex: Numpy).

Unit II 10 Hours

Overview of NumPy: introduction to array computing and its advantages. Basic array operations: arithmetic operations, broadcasting Indexing and slicing: accessing and modifying array elements. Creating multidimensional arrays: understanding dimensions and axes.

Unit III 11 Hours

Introduction to Matplotlib: Overview of data visualization and importance of Matplotlib. Basics of Matplotlib: plot interface, creating line plots, scatter plots. Customizing plots: labels, colors, markers Plotting categorical data: bar plots, pie charts. Plotting quantitative data: histograms, box plots.

Unit IV 12 Hours

Overview of SQL: Structured Query Language for managing relational databases. Basic SQL commands: CREATE TABLE, INSERT INTO, SELECT, UPDATE, DELETE. Establishing database connection with python, creating databases and tables. Performing basic CRUD operations: inserting, querying, updating, and deleting data.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *Python Crash Course" by Eric Matthes*
- *"Automate the Boring Stuff with Python" by Al Sweigart*
- *"Fluent Python" by Luciano Ramalho*
- *"Python Cookbook" by David Beazley and Brian K. Jones*
- *"Effective Python: 90 Specific Ways to Write Better Python" by Brett Slatkin*

Course Title: Software Engineering	L	T	P	Cr.
Course Code: BIT4252	4	0	0	4

Total Hours:60

Learning Outcomes: After completion of this course, the learner will be able to:

1. Figure out the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction and deployment.
2. Review the techniques of software lifecycle.
3. Perform the various testing techniques.
4. Prepare the Documentation of Software Requirement Analysis (SRS).

Course Content

UNIT I

14 hours

Software: Characteristics, Components, Applications Software Process Models: Waterfall, Spiral, Prototyping, Fourth Generation Techniques, Concepts of Project Management, Role of Metrics & Measurements.

UNIT II

16 hours

S/W Project Planning: Objectives, Decomposition techniques: S/W Sizing, Problem based estimation, Process based estimation Cost Estimation Models: COCOMO Model, the S/W Equation.

UNIT III

14 hours

System Analysis: Principles of Structured Analysis, Requirement analysis, DFD, Entity Relationship diagram, Data dictionary.

S/W Design: Objectives, Principles, Concepts, Design methodologies: Data design, Architectural design, procedural design, Object oriented concepts

UNIT IV

16 hours

Testing fundamentals: Objectives, principles, testability, Test cases: White box & Black box testing.

Testing strategies: verification & validation, unit test, integration testing, validation testing, system testing.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Pressman S Roger (1992). *Software Engineering, A Practitioner's Approach, Third Edition, McGraw Hill.*

- *Fairley E.R. (1985). Software Engineering Concepts, Mc Graw Hill.*
- *Jalota Pankaj (1992). An Integrated Approach to Software Engineering, Narosa Publishing House.*

Course Title: Artificial Intelligence Lab	L	T	P	Cr.
Course Code: BIT4253	0	0	4	2

Total Hours: :60

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Demonstrate proficiency in programming logic and problem-solving by successfully implementing various Prolog programs, such as calculating the sum of two numbers and finding the maximum of two numbers.
2. Understand recursive programming techniques through the implementation of Prolog programs, including factorial calculation and generating Fibonacci series.
3. Apply mathematical concepts in programming by successfully implementing Prolog programs, such as calculating the greatest common divisor (GCD) of two numbers and raising a number to a given power.
4. Develop proficiency in working with lists and manipulating them using Prolog predicates, as demonstrated in programs such as checking membership of an element in a list and appending lists together.

Course Content

1. Write a prolog program to calculate the sum of two numbers.
2. Write a Prolog program to implement max (X, Y, M) so that M is the maximum of two numbers X and Y.
3. Write a program in PROLOG to implement factorial (N, F) where F represents the factorial of a number N.
4. Write a program in PROLOG to implement generate fib (N, T) where T represents the Nth term of the Fibonacci series.
5. Write a Prolog program to implement GCD of two numbers.
6. Write a Prolog program to implement power (Num, Pow, Ans): where Num is raised to the power Pow to get Ans.
7. Prolog program to implement multi (N1, N2, R): where N1 and N2 denotes the numbers to be multiplied and R represents the result.
8. Write a Prolog program to implement memb (X, L): to check whether X is a member of L or not.
9. Write a Prolog program to implement conc (L1, L2, L3) where L2 is the list to be appended with L1 to get the resulting list L3.
10. Write a Prolog program to implement reverse (L, R) where List L is original and List R is reversed list.
11. Write a program in PROLOG to implement palindrome (L) which checks whether a list L is a palindrome or not.
12. Write a Prolog program to implement sum list (L, S) so that S is the sum of a given list L. Write a Prolog program to implement two predicates even

length(List) and odd length(List) so that they are true if their argument is a list of even or odd length respectively.

13. Write a Prolog program to implement nth_element (N, L, X) where N is the desired position, L is a list and X represents the Nth element of L.

14. Write a Prolog program to implement maxlist(L, M) so that M is the maximum number in the list.

15. Write a prolog program to implement insert_nth (I, N, L, R) that inserts an item I into the Nth position of list L to generate a list R.

16. Write a Prolog program to implement delete_nth (N, L, R) that removes the element on Nth position from a list L to generate a list R.

17. Write a program in PROLOG to implement merge (L1, L2, L3) where L1 is first ordered list and L2 is second ordered list and L3 represents the merged list.

Course Title: Programming using Python Lab	L	T	P	Cr.
Course Code: BCA4254	0	0	2	1

Total Hours:30**Course Learning Outcomes:**

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

1. Write, Test and Debug Python Programs.
2. Implement Conditionals and Loops for Python Programs.
3. Use functions and represent Compound data using Lists.
4. Implement the basic conditional and looping constructs.

Course Content

Program 1: Print “Hello” world

Program 2: Add numbers and concatenate strings

Program 3: Input from user

Program 4: loops

Program 5: if-else - conditional checking

Program 6: Functions

Program 7: Math library

Program 8: Strings

Program 9: Exceptional handling

Program 10: Random numbers/string

Program 11: Demo of data structure – list

Program 12: Demo of data structure - dictionary

Program 13: Demo of data structure – tuple

Program 14: Command line argument

Course Title: Minor Project	L	T	P	Cr.
Course Code: BIT4255	0	0	8	4

Total Hours-120**Course Description:**

The Minor Project course in BSc (IT) provides students with the opportunity to apply their knowledge and skills acquired during their program to a practical project. The course allows students to work on a smaller-scale project under the guidance of faculty members to gain practical experience in software development, problem-solving, and project management.

Course Title: INDIAN KNOWLEDGE SYSTEM	L	T	P	Cr.
Course Code: IKS0012	2	0	0	2

Total Hours: 30**Learning Outcome:**

1. It aimed to instill in students a sense of rootedness and pride in India, along with an appreciation for its rich, diverse, ancient, and modern culture, knowledge systems, and traditions.
2. This course helps students understand the rich scientific and technological heritage of the country.
3. This course emphasizes and promotes the Indian concept of multidisciplinary learning systems, integrating them with modern science.
4. The course will underscore the importance of intellectual property rights in safeguarding Indian knowledge.

Course Content**Unit-I****7 Hours**

Ancient philosophy of Knowledge: Vedas, Vedangas, sutras – Gurukul parampara

Unit-II**8 Hours**

Astronomy in India: The Beginnings of Indian Astronomy - The Early Historical Period-The Siddhāntic Era - The Kerala School - Aryabhatta - Varahamihira- Bhaskara I – Brahamagupta- Bhaskara II – Brief notes on Astronomical instruments

Unit-III**8 Hours**

Chemistry in India: Early Chemical Techniques, Atomism in Vaiśeṣika - Rishi Kanad- Nagarjuna- Al-Bīrūnī, Vāgbhaṭa- Sushruta- Carak Metallurgy in India - Definition, Metallurgy in Harappan Civilization, Metallurgy of Gold- Copper- Zinc- Bronze - Iron and steel.

Unit-IV**7 Hours**

Developments in Mathematics: Number systems- Geometry- works of Pingala- Baudhayana- Jaina Mahavira-Sridharacharya – Madhava Siddhantas and Calender systems

Transactional Mode

Seminars, Group discussion, Team teaching, Focused group discussion, Assignments, Project-based learning, Simulations, reflection and Self-assessment

Suggested Readings

1. *A Concise History of Science in India – Bose, Sen & Subbarayappa- INSA Publications*
2. *Encyclopedia of Classical Indian Sciences- Roddam Narasimha, Universities Press*
3. *NCERT Modules of KPTI*

Course Title: Acquiring Business Communication-ABC	L	T	P	Cr.
Course Code: BIT4256	2	0	0	2

Total Hours: :30

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. To improve the communicative competence of learners
2. To help learners use language effectively in academic /work contexts
3. To build on students' English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts.
4. To develop learners' ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals.
5. To use language efficiently in expressing their opinions via various media.

Course Content

UNIT-I

8hours

Business Communication: Writing Business Reports and Proposals, Conducting Effective Business Meetings, Public Speaking, and Presentation Skills.

UNIT-II

7hours

Presentation Skills: Elements of effective presentation, structure of presentation, external factors and content, Seminar, Speeches, Lectures.

UNIT-III

8hours

Group Discussion: Structure of GD, Moderator led and other GDs, Strategies in GD, Team work body language, Mock GD, Problem solving, Reflective thinking, Critical thinking, Negotiation skills.

UNIT-IV

7hours

Effective Communication Skills: Handling Questions and Answers, Preparing for Q&A Sessions, and Responding Confidently to Questions. Strategies to anticipate and respond to queries, think critically on your feet, and deliver clear, concise, and confident responses, ultimately enhancing professional and public speaking skills.

Suggested Reading:

- *Managing Soft Skills for Personality Development – edited by B.N.Ghosh, McGraw Hill India, 2012.*

- *English and Soft Skills – S.P.Dhanavel, Orient Blackswan India, 2010.*
- *The Definitive Book of Body Language. Pease, Allan and Barbara Pease. Manjul Publishing House*
- *Basic Business Communication: Skills for Empowering the Internet Generation: Lesikar, Raymond V and Marie E. Flatley. Tata McGraw-Hill Publishing Company Ltd...*
- *Louder than Words, Joe Nevarro, Harper Collins Publishers.*
- *Motivation Book (You Can Win) By – Shiv Khera, MacMillan India Ltd.*

Course Title: Theory of Computation	L	T	P	Cr.
Course Code: BIT4257	4	0	0	4

Total Hours: 60

Learning Outcomes: After completion of this course, the learner will be able to:

1. Recognize and comprehend formal reasoning languages.
2. Use basic concepts of formal languages of finite automata techniques
3. Design different types of Finite Automata and Machines as Acceptor, Verifier and Translator.
4. Analyze Context Free languages, Expression and Grammars.

Course Content

UNIT I

15 hours

Introduction: Basic Terminology: Alphabet, Formal Language and operations on formal languages, Examples of formal languages.

Finite automata: Concept of Basic Machines, Properties and Limitations of Finite State Machines, Deterministic Finite Automata (DFA), Non-Deterministic Finite Automata (NFA), Equivalence of DFA and NDFA, Non-Deterministic Finite automata with Λ -Transitions.

UNIT II

15 hours

Regular expression: Regular Languages and Regular Expressions, Kleene's Theorem. Arden's Method.

Properties of Regular sets: The Pumping Lemma for Regular sets, Application of the Pumping Lemma, Closure Properties of Regular Sets, Myhill- Nerode Theorem and Minimization of Finite Automata, Minimization Algorithm.

Finite Automata with output: Moore and Mealy Machines. Equivalence of Moore and Mealy Machines.

UNIT III

15 hours

Context Free Grammars: Examples and Definitions, Derivation trees and ambiguity, An Unambiguous CFG for Algebraic Expressions. Regular Grammar, simplified forms and Normal forms: Removal of useless symbols and unit production, Removal of Λ -moves, Chomsky Normal Form (CNF), Greibach Normal Form (GNF).

Pushdown Automata: Introduction and Definition of Push-Down Automaton, Applications of Push down Automata

UNIT IV

15 hour

Turing Machines: Definitions and Examples, Deterministic and Non-Deterministic Turing Machines, Unsolvable Problems: A Non-recursive Language and an Unsolvable Problem, PCP Problem and MPCP Problem. More

General Languages and Grammars: Recursively Enumerable and Recursive Languages,

Unrestricted grammars, Context sensitive Language and grammar. Relation between languages of classes, Choms hierarchies of grammars.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Sipser, M. (1996). *Introduction to the Theory of Computation*. ACM Sigact News, 27(1), 27-29.
- Kozen, D. C. (2006). *Theory of computation (Vol. 121)*. Heidelberg: Springer.
- Martin, J. C. (2022). *Introduction to Languages and the Theory of Computation*.

Course Title: Big Data	L	T	P	Cr.
Course Code: BIT4258	4	0	0	4

Total Hours: : 60

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Discuss the building blocks of Big Data.
2. Articulate the programming aspects of cloud computing.
3. Represent the analytical aspects of Big Data.
4. Knowledge about the recent research trends related to Hadoop File System, Map Reduce and Google File System etc.

Course Content

UNIT I

15 hours

Introduction to Big Data: Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis Vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re- Sampling - Statistical Inference - Prediction Error

UNIT II

15 hours

Mining Data Streams: Introduction to Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real Time Analytics Platform (RTAP) Applications – Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

UNIT III

15 hours

Hadoop Environment: History of Hadoop- The Hadoop Distributed File System – Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Hadoop file systems- Java interfaces to HDFS- Basics-Developing a Map Reduce Application- How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features - Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation – Hadoop Configuration- Security in Hadoop

UNIT IV

15 hours

Data Analysis Systems and Visualization: Link Analysis – Page Rank - Efficient Computation of Page Rank- Topic-Sensitive Page Rank – Link Spam- Recommendation Systems- A Model for Recommendation Systems- Content-

Based Recommendations - Collaborative Filtering- Dimensionality Reduction- Visualizations - Visual data analysis techniques-interaction techniques- Systems and applications.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *Chris Eaton, (2012). Dirk derooet al., Understanding Big data, McGraw Hill.*
- *Tom White, (2012). HADOOP: The definitive Guide, O Reilly.*
- *Hurwitz, J., Nugent, A., Halper, F., & Kaufman, M. (2013). Big data for dummies (Vol. 336). Hoboken, NJ: John Wiley & Sons.*

Course Title: Internet of Things	L	T	P	Cr.
Course Code: BIT4259	4	0	0	4

Total Hours:60

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Understand the various concepts, terminologies and architecture of IoT systems.
2. Use sensors and actuators for design of IoT.
3. Understand and apply various protocols for design of IoT systems
4. Use various techniques of data storage and analytics in IoT

Course Content

UNIT I

15 hours

Fundamentals of IoT: Introduction, Definitions & Characteristics of IoT, IoT Architectures, Physical & Logical Design of IoT, Enabling Technologies in IoT, History of IoT, About Things in IoT, The Identifiers in IoT, About the Internet in IoT, IoT frameworks, IoT and M2M.

UNIT II

15 hours

Sensors Networks: Definition, Types of Sensors, Types of Actuators, Examples and Working, IoT Development Boards: Arduino IDE and Board Types, RaspberriPi Development Kit, RFID Principles and components, Wireless Sensor Networks: History and Context, the node, Connecting nodes, Networking Nodes, WSN and IoT.

UNIT III

15 hours

Wireless Technologies for IoT: WPAN Technologies for IoT: IEEE 802.15.4, Zigbee, HART, NFC, Z-Wave, BLE, Bacnet, Modbus. IP Based Protocols for IoT IPv6, 6LowPAN, RPL, REST, AMPQ, CoAP, MQTT. Edge connectivity and protocols

UNIT IV

15 hours

Data Handling & Analytics: Introduction, Big Data, Types of data, Characteristics of Big data, Data handling Technologies, Flow of data, Data acquisition, Data Storage, Introduction to Hadoop. Introduction to data Analytics, Types of Data analytics, Local Analytics, Cloud analytics and applications.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Reading:

- *Hakima Chaouchi, — “The Internet of Things Connecting Objects to the Web” ISBN : 978-1- 84821-140-7, Wiley Publications*
- *Olivier Hersent, David Boswarthick, and Omar Elloumi, — “The Internet of Things: Key Applications and Protocols”, Wiley Publications*
- *Vijay Madisetti and Arshdeep Bahga, — “Internet of Things (A Hands-on-Approach)”, 1st Edition, VPT, 2014.*

SEMESTER V

Course Title: Programming using Java	L	T	P	Cr.
Course Code: BCA4250	4	0	0	4

Total Hours:60

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Solve the computational problems using basic statements like if-else, control structures, array, and strings.
2. Knowledge about the user requirements for software functionality in Java programming language.
3. Apply basic principles of creating Java applications with Applet programming.
4. Develop a given program using the basic elements like Control and Conditional statements.

Course Content**UNIT-I****15 hours**

Introduction to Java: Introduction to java, Java History, Java Features; How Java Differs from C and C++; Comments in java, Java Program Structure, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, Programming Style, Java and Internet, Java and World Wide Web, Web Browsers, Hardware and Software Requirements; Java Support Systems, Java Environment. Java Tokens; Java Statements.

UNIT II**15 hours**

Constants, Variables and Data Types: Introduction; Constants, Variables, Data Types, Introduction to Operators, Expressions, Operator Precedence. Decision Making, Branching and Looping: Decision making and branching Statements, Looping Statements, labeled loops, Jumping Statements.

UNIT III**15 hours**

Classes, Objects and Methods: Introduction, defining a Class, Data member, member function, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods, Arrays, Strings, Vectors: Arrays, Jagged Arrays, Strings, String functions: Vectors, Wrapper Classes, Inheritance: Extending a Class, Overriding Methods, Final Variables and Methods, Final Classes, Finalizer Methods, Abstract Methods and Classes, Visibility Control.

UNIT IV**15 hours**

Interfaces: Introduction, Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables, Implementing

Multiple Inheritance using Interfaces.

Packages: Introduction; System Packages, Using System Packages, Naming Conventions, Creating Packages, accessing a Package, using a Package, adding a Class to a Package, Hiding Classes.

Managing Errors and Exceptions: Introduction; Types of Errors; Exceptions, Exception Handling using Try, Catch and Finally block: Throwing Our Own Exceptions, Using Exceptions for Debugging.

Applet Programming: Introduction; How Applets Differ from Applications; Applet Life Cycle; Creating an Executable Applet.

Transactional Mode:

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Li, Y. (2022). *Computer Software Java Programming Optimization Design*. In *International Conference on Frontier Computing* (pp. 1086- 1092). Springer, Singapore.
- Liang, Y. D. (2003). *Introduction to Java programming*. Pearson Education India.
- Liang, Y. D. (2018). *Introduction to Java programming and data structures*. Pearson Education.
- Kavka, C. (2003, October). *Introduction to JAVA*. In *Second Workshop on Distributed Laboratory Instrumentation Systems, ICTP, Trieste, Italy*.

Course Title: Computer Graphics	L	T	P	Cr.
Course Code: BIT5301	4	0	0	4

Total Hours: 60

Learning Outcomes: After completion of this course, the learner will be able to:

1. Describe Standard raster and vector scan devices as well as Graphical Input and output devices.
2. Implement algorithms for drawing basic primitives such as line circle and ellipse.
3. Implement algorithms for line clipping and polygon clipping and filing.
4. Implement a 3D object representation scheme and carry out 2D and 3D Transformation, 3D projections.

Course Content

UNIT I

15 Hours

Introduction: Introduction to Graphics systems, Basic elements of Computer graphics, Applications of computer graphics Overview of Graphics Systems: Video Display Devices, Cathode Ray Tube, CRT monitors, Flat panel displays: Plasma Panel display, Thin-film electroluminescent displays, LED, Liquid Crystal Displays (LCD), Raster Scan Systems, Random Scan Systems.

UNIT II

15 Hours

Drawing and clipping primitives: Raster scan line, circle and ellipse drawing algorithms, Polygon filling, line clipping and polygon clipping algorithms. Filled area primitives, character generation, Antialiasing.

UNIT II

15 Hours

Transformation and Viewing: 2D and 3D Geometric Transformations, 2D and 3D Viewing Transformations (Projections- Parallel and Perspective), Vanishing points.

UNIT IV

15 Hours

Geometric Modeling: Polygon Mesh Representation, Cubic Polynomial curves (Hermite and Bezier). Visible Surface determination and Surface Rendering: Z-buffer algorithm, List-priority algorithm and area subdivision algorithm for visible surface determination. Illumination and shading models, RGB color model and Basics of Computer Animation.

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Hearn, D., Baker, M. P., & Baker, M. P. (2004). *Computer graphics with OpenGL* (Vol. 3). Upper Saddle River, NJ: Pearson Prentice Hall.
- Foley, J. D., Van Dam, A., Feiner, S. K., Hughes, J. F., & Phillips, R. L. (1994). *Introduction to computer graphics* (Vol. 55). Reading: Addison-Wesley.
- Shirley, P., Ashikhmin, M., & Marschner, S. (2009). *Fundamentals of computer graphics*. AK Peters/CRC Press.
- Foley, J. D., Van, F. D., Van Dam, A., Feiner, S. K., Hughes, J. F., &
- Hughes, J. (1996). *Computer graphics: principles and practice* (Vol. 12110). Addison-Wesley Professional.

Course Title: Programming using Java Lab	L	T	P	Cr.
Course Code: BIT5302	0	0	4	2

Total Hours: 60

Learning Outcomes: After completion of this course, the learner will be able to:

1. Discuss about the concepts of object-oriented programming.
2. Test the performance of Exception handling and multi-threading.
3. Implementing and Debugging the Java programs.
4. Develop an Applet code using Java Programming.

Course Content

1. Introduction to JAVA, Class, Object, Package, Applet.
2. Write a Java program which does the creation of Class and object.
3. Usage of import statement and package declaration in java programs.
4. Declaring variables of various data types and their effect by changing the access modifiers like private, public, protected, default.
5. Write a program which makes use of Comparison Operators.
6. Write programs which make use of Arithmetic Operators.
7. Write a program which makes use of Logical Operators.
8. Write a program which makes use of control Statement like if, while, do while.
9. Write Java programs, which make use of Statements like Try, catch, finally.
10. Write a Java program, which makes use of control Statements like Try, catch, finally, throw, and throws.
11. Write code snippets which make usage of Method Overloading, Using super, this, super (), this () in Java Programs.
12. Write code snippets which make usage of method Overriding.
13. Write code snippets which make Applet.
14. Write code snippets which make usage of recursion.
15. Write code snippets which make usage of Thread.
16. Write code snippets which make usage of Thread Synchronization.
17. Write code snippets which make usage of String Methods.
18. Write code snippets which make usage of Swing Package.

Course Title: Computer Graphics Lab	L	T	P	Cr.
Course Code: BIT5303	0	0	4	2

Total Hours: :60

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Apply mathematics and logic to develop Computer programs for elementary graphic operations
2. Implement the Flood Fill Algorithm.
3. Develop scientific and strategic approach to solve complex problems in the domain of Computer Graphics
4. Develop the competency to understand the concepts related to Computer Vision and Virtual reality

Course Content

1. Write a program to plot a pixel.
2. Write a Program to Draw a Line.
3. Write a Program to Draw a Circle.
4. Write a program to draw an ellipse.
5. Write a program to draw arc.
6. Write a program to illustrate the functions setfillstyle(), setcolor(), setbkcolor(), floodfill() using inbuilt functions
7. Write a program to draw a HUT using various inbuilt functions.
8. Write a program to draw a line by using a direct method algorithm.
9. Program to Implement DDA Line Algorithm.
10. Draw a Line Using 'Bresenham's Line Algorithm'.
11. Draw a Circle Using 'Bresenham's Circle Drawing Algorithm'.
12. Write a program to draw a Circle by using the Polynomial Method.
13. Write a Program for Flood Fill Algorithms.
14. Write a program to implement 2D Translation.
15. Write a program to implement 2D Scaling.
16. Write a program to implement 2D Rotation about origin Mini Project: - Moving Car

Course Title: Indian Education	L	T	P	Cr.
Course Code: IKS0002	2	0	0	2

Total Hours: :30

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Understand development of education and their historical importance in India.
2. To know about the education system in ancient era, buddha era their relation and knowledge.
3. To understand the commission for development of education, committee and their importance.
4. To understand the problems about education.

Unit-I

7 Hours

Education in Vedic Period, Buddhist period and its characteristics and importance of present time. Education system in medieval period its importance, main education center and important factors.

Unit-II

8 Hours

Education in colonial period charter act 1813, Oriental accidental education controversy Macaulays Minutes, wood dispatch Hunter commission, Gokhale's bill, sadler commission, Vardha Scheme of Education and Sargent plan.

Unit-III

8 Hours

University education commission (1948-49), Secondary education commission (1952-53), education commission (1964-66), National policy of education (1986) Revised Policy of Education, University education commission (1948-49), Secondary education commission (1952-53), education commission (1964-66), National policy of education (1986) Revised Policy of Education (1992) and their importance.

Unit-IV

7 Hours

Universalization of Primary education Vocationalisation of Secondary Education, Student peace and balance in education occasion.

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Aggarwal, J.C., *Landmarks in the History of Modern Indian Education*. Vikas

Publishing House

- *Mitra, S.K., Education in Ancient India, Asha Jyoti Book Sellers*
- *Mukherjee, S.N., History of Education in India: Modern Period, Acharya Book Depot*
- *Keay, F.E., Indian Education in Ancient and Later Times, Oxford University Press*
- *Sharma, R.A., Development of Educational System in India, R. Lall Book Depot*

Course Title: Internship Training	L	T	P	Cr.
Course Code: BIT5304	0	0	0	4

Course Description:

The Internship Training program in BSc (IT) provides students with a hands-on learning experience by working in real-world industry settings. It aims to bridge the gap between academic knowledge and practical application, allowing students to gain valuable industry exposure, apply their skills, and develop a deeper understanding of their chosen field.

Course Title: Basics of Mobile App development	L	T	P	Cr.
Course Code: BIT5305	2	0	0	2

Total Hours: 30

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Identify various concepts of mobile programming that make it unique from programming for other platforms, Critique mobile applications on their design pros and cons.
2. Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces.
3. Program mobile applications for the Android operating system that use basic and advanced phone features.
4. Deploy applications to the Android marketplace for distribution.

Course Content

UNIT – I

8 Hours

Introduction to Android: The Android Platform, Android SDK, Eclipse Installation, Android Installation, building your First Android application, Understanding Anatomy of Android Application, Android Manifest file.

UNIT – II

7 Hours

Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.

UNIT – III

8 Hours

Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.

Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.

UNIT – IV

7 Hours

Using Common Android APIs: Using Android Data and Storage APIs, managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Reading:

- T1. Lauren Darcey and Shane Conder, *“Android Wireless Application Development”*, Pearson Education, 2nd ed. (2011)
- R1. Reto Meier, *“Professional Android 2 Application Development”*, Wiley India Pvt Ltd
- R2. Mark L Murphy, *“Beginning Android”*, Wiley India Pvt Ltd
- R3. *Android Application Development All in one for Dummies* by Barry Burd, Edition:

Course Title: Basics of Android App Development Lab	L	T	P	Cr.
Course Code: BCA5306	2	0	0	2

Total Hours: :30**List of Experiments:**

1. Installation of Android studio.
2. Development Of Hello World Application.
3. Create an application that takes the name from a text box and shows hello message along with the name entered in text box, when the user clicks the OK button.
4. Create a screen that has input boxes for User Name, Password, Address, Gender (radio buttons for male and female), Age (numeric), Date of Birth (Date Picket), State (Spinner) and a Submit button. On clicking the submit button, print all the data below the Submit Button (use any layout).
5. Design an android application to create page using Intent and one Button and pass the Values from one Activity to second Activity.
6. Design an android application Send SMS using Intent.
7. Create an android application using Fragments.
8. Design an android application Using Radio button.
9. Design an android application for menu.
10. Create a user registration application that stores the user details in a database table.

Course Title: Digital Marketing	L	T	P	Cr.
Course Code: BIT5307	2	0	0	2

Total Hours: :30

Learning Outcomes: After completion of this course, the learner will be able to:

1. Understanding the digital marketing concepts and its usefulness in business.
2. Planning steps for digital marketing strategy and successfully executing it.
3. Applying Search Engine Optimization techniques (SEO) and Search Engine Marketing (SEM) to maximize reach and enhance engagement of users.
4. Analyzing web using analytics tools and gaining insights to various tools for Social.

Course Content

UNIT-I

8 hours

Digital Marketing Basics: Digital Marketing meaning and its importance, Traditional vs Digital Marketing, Benefits of Digital Marketing, Internet Marketing basics, Digital Marketing channels, Types of Business models, Digital Marketing strategies (P.O.E.M framework), Inbound and Outbound marketing, Digital Transformation model, 4Cs of Digital Marketing.

UNIT-II

7 hours

Social Media Marketing – Introduction, Social Media marketing strategies, Overview of Social media platforms – Instagram, Snapchat, Facebook, Mobile, Twitter, Content Planning and Strategy, Influential marketing, Content marketing, Digital Marketing campaign.

UNIT-III

8 hours

Search Engine Optimization – Introduction to SEO, On-Page and OffPage Optimization, Role of Keywords in SEO, Organic vs Non-Organic SEO, Blogging as marketing strategy, Types of Blogs. Search Engine Marketing – Introduction to Paid marketing, Google Adwords, Types of campaigns and Campaign creation.

UNIT-IV

7 hour

Tools for SMM and Marketing communication – Overview of Buffer, Hoot suite, Canva, Trello and Hot jar. Web Analytics: Meaning, Purpose and process, Types, Tools for analytics – Google analytics, Audience analytics, Acquisition analytics, Behavior analytics, Conversion analytics.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *Rajan Gupta, Supriya Madan, "Digital Marketing", BPB Publication, 1st Edition, 2022*
- *Seema Gupta, "Digital Marketing", McGraw Hill, 2nd Edition, 2018.*
- *Puneet Singh Bhatia, "Fundamentals of Digital Marketing", Pearson, 2nd Edition, 2020. Web Sources*
- *https://josephscollege.ac.in/lms/Uploads/pdf/material/DigitalMarketing_Notes.pdf*
- *<https://www.digitalmarketer.com/digitalmarketing/assets/pdf/ultimate-guide-to-digital-marketing.pdf>*

SEMESTER VI

Course Title: Machine Learning	L	T	P	Cr.
Course Code: BIT6350	3	0	0	3

Total Hours: :45

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Describe the basic concepts of Bayesian Decision Theory.
2. Examine the Machine Intelligence and its applications
3. Implement The working of perceptron learning algorithm, criterion and Windrow-Hoff learning algorithm.

Course Content**UNIT I****14 hours**

Overview and Introduction to Bayes Decision Theory: Machine intelligence and applications, pattern recognition concepts classification, regression, feature selection, supervised learning class conditional probability distributions, Examples of classifiers bayes optimal classifier and error, learning classification approaches.

UNIT II**16 hours**

Linear machines: General and linear discriminates, decision regions, single layer neural network, linear separability, general gradient descent, perceptron learning algorithm, mean square criterion and widrow-Hoff learning algorithm; multi-Layer Perceptron's: two-layers universal approximates, back propagation learning, on-line, off-line error surface, important parameters.

UNIT III**16 hours**

Learning decision trees: Inference model, general domains, symbolic decision trees, consistency, learning trees from training examples entropy, mutual information, ID3 algorithm criterion, C4.5 algorithm continuous test nodes, confidence, pruning, learning with incomplete data Instance-based Learning: Nearest neighbor classification, k-nearest neighbor, nearest neighbor error probability.

UNIT IV**14 hours**

Machine learning concepts and limitations: Learning theory, formal model of the learnable, sample complexity, learning in zero-bayes and realizable case, VC-dimension, fundamental algorithm independent concepts, hypothesis class, target class, inductive bias, Occam's razor, empirical risk, limitations of inference machines, approximation and estimation errors, Tradeoffs.

Transaction Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning. Interactive lectures.

Suggested Reading:

- Alpaydin, E. (2020), Introduction to machine learning, MIT press.
- Jordan, M. I, & Mitchell, T. M, (2015). Machine learning: Trends, perspectives, and prospects Science, 349(6245), 255-260.
- Mitchell, T. M., & Mitchell, T. M, (1997), Machine learning (Vol. 1, No. 9). New York: McGraw-hill.
- Bishop, C. M, & Nasrabadi, N. M, (2006), Pattern recognition and machine learning (Vol. 4, No. 4, p. 738), New York: Springer

Course Title: Cloud Computing	L	T	P	Cr.
Course Code: BIT6351	4	0	0	4

Total Hours: :60

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Gain insight about basic technology behind the Cloud.
2. Comprehend the Cloud computing applications.
3. Learn the models and services of cloud technology.
4. Accessing the cloud and system testing.
5. Understand the financial considerations and benefits of adopting cloud services.

Course Content

UNIT I 15 hours

Introduction to Cloud Computing, History and Evolution of Cloud Computing, Types of clouds, Private Public and hybrid clouds, Cloud Computing architecture, Cloud computing infrastructure, Merits of Cloud computing.

UNIT II 15 hours

Cloud computing delivery models and services (IaaS, PaaS, SaaS), obstacles for cloud technology, Cloud vulnerabilities, Cloud challenges, Practical applications of cloud computing.

UNIT III 15 hours

Web-based business services, Delivering Business Processes from the Cloud: Business process examples, Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud, Efficient Steps for migrating to cloud.

UNIT IV 15 hours

Assessing the Cloud: software Evaluation, System Testing, Seasonal or peak loading, Cost cutting and cost-benefit analysis, selecting the right scalable application, Considerations for selecting cloud solution.

Transaction Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning. Interactive lectures.

Suggested Readings:

- Sinha P.K. and Sinha P. (2002), *Foundations of Computing, First Edition, BPB.*
- Sanders D.H. (1988), *Computers Today, Fourth Edition, McGraw Hill.*

- *Rajaraman V. (1996), Fundamentals of Computers, Second Edition, Prentice Hall of India, New Delhi.*
- *Jain Satish (1999), Information Technology, Paperback Edition, BPB.*

Course Title: Data Communication	L	T	P	Cr.
Course Code: BIT6352	4	0	0	4

Total Hours: :60

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Get knowledge about the layers of the OSI model and TCP/IP.
2. Compare and identify various network topologies.
3. Identify the types of application process protocols.
4. Discuss the various data link layer and network protocols.

Course Content

UNIT I

15 hours

Internet Basics Internet: Growth, Architecture, Accessing, Internet Service Providers (ISP), Internet Addressing System: IP Address, DNS, URL; World Wide Web (WWW): Web Servers, Web Browsers, Search Engine; Concept of Intranet & Extranet.

UNIT II

15 hours

Network Models Design Issues of the Layer, Protocol Hierarchy, ISO-OSI Reference Model: Functions of each Layer, Various Terminology used in Computer Network, Connection-Oriented & Connectionless Services, Internet (TCP/IP) Reference Model, Comparison of ISO-OSI and TCP/IP Model

UNIT III

15hours

Basics of Computer Network Computer Network: Definition, Goals, Structure; Broadcast and Point-To Point Networks; Network Topology and their various Types; Types of Networks: LAN, MAN, WAN; Server Based LANs & Peer-to-Peer LANs; Communications Types: Synchronous, Asynchronous; Modes of Communication: Simplex, Half Duplex, Full Duplex; Protocols and Standards.

UNIT IV

15 hours

Routing Algorithms: Optimality principled, shortest path routing, Concept of Internet Working. Overview of DNS protocol; overview of WWW & HTTP protocol.

Transactional Mode

Lecture Method, E-Team Teaching, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, and Collaborative Learning.

Suggested Readings

- *Mathematics for Class 12" by NCERT*
- *Epp, S. S. (2010). Discrete mathematics with applications. Cengage learning.*
- *Biggs, N. L. (2002). Discrete mathematics. Oxford University Press*
- *Ross, K. A., & Wright, C. R. (1985). Discrete Mathematics. Prentice-Hall, Inc.*

Course Title:	Machine Learning Lab	L	T	P	Cr.
Course Code:	BIT6353	0	0	2	1

Total Hours: :30

Course Learning Outcomes: After the completion of the course the learner will be able to

1. Implement machine learning algorithms using Python and relevant libraries.
2. Apply data preprocessing techniques to prepare real-world datasets.
3. Develop supervised and unsupervised learning models for classification and clustering tasks.
4. Evaluate model performance using appropriate validation and accuracy metrics.
5. Demonstrate the ability to solve real-world problems using machine learning techniques and tools.

Course Content

1. Introduction to Python and ML Libraries (NumPy, pandas, matplotlib)
2. Data Preprocessing and Cleaning Techniques
3. Linear Regression for Predictive Analysis
4. Logistic Regression for Binary Classification
5. Decision Tree Classifier Implementation
6. K-Nearest Neighbors (KNN) Algorithm
7. Naive Bayes Classifier for Text Classification
8. Support Vector Machine (SVM) for Classification Tasks
9. K-Means Clustering for Unsupervised Learning
10. Hierarchical Clustering and Dendrograms
11. Principal Component Analysis (PCA) for Dimensionality Reduction
12. Model Evaluation: Confusion Matrix, Accuracy, Precision, Recall, F1-Score
13. Cross-Validation Techniques (K-Fold, Stratified)
14. Ensemble Learning: Random Forest Classifier
15. Mini Project: Apply ML Algorithm on a Real-World Dataset (e.g., Titanic, Iris, Diabetes)

Course Title: Major Project	L	T	P	Cr.
Course Code: BIT6354	0	0	8	4

Total Hours:120

Course Content

Learning Outcomes: After completion of this course, the learner will be able to:

1. Update oneself with all the latest changes in the technological world.
2. Become master in one's specialized technology.
3. Analyze and understand the environment of the organization.
4. Develop to cognizance of the importance of management principles

Course Content

1. Starting of Major Project (Feasibility Study, Requirement Analysis, Design)

Course Title: Search Engine Optimization	L	T	P	Cr.
Couse Code: BIT6355	2	0	0	2

Total Hours:30

Course Learning Outcomes: After the completion of the course the learner will be able to

1. These subject covers computer concepts and internet skills.
2. It also uses a software suite which includes Emails, Internet Protocols, Search Engine, Introduction of Intranet and Extranet.

UNIT-I**8 Hours**

Introduction to SEO and Search Engines: Basics of SEO, History and evolution of search engines, how search engines work (crawling, indexing, ranking), Types of search engines (crawler-based, human-powered), SERP (Search Engine Results Page) anatomy, White Hat vs Black Hat SEO, Importance and benefits of SEO in digital marketing.

UNIT-II**7 Hours**

On-Page SEO: Keyword research and analysis, Keyword placement (titles, meta tags, headings, URLs), Content optimization (quality, relevancy, readability), HTML tags: Title, Meta Description, Header tags, Alt tags, Internal linking strategies, URL structure and SEO-friendly URLs, Mobile optimization and page speed, Schema Markup and Structured Data

UNIT-III**8 Hours**

Off-Page SEO and Link Building: Backlinks: types and importance, Link building strategies (guest blogging, outreach, broken link building), social media and SEO, Domain Authority and Page Authority, Local SEO (Google My Business, local citations, NAP consistency), Online Reputation Management (ORM), SEO tools for off-page analysis (Ahrefs, SEMrush, Moz)

UNIT-IV**7 Hours**

Technical SEO and SEO Analytics; Robots.txt and XML sitemap, Canonical tags and duplicate content, Redirects: 301, 302, HTTPS and SSL impact on SEO, Core Web Vitals and Page Experience, Google Search Console and Bing Webmaster Tools, Google Analytics for SEO performance tracking, SEO audit and reporting

Transactional Mode

Lecture Method, E-Team Teaching, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, and Collaborative Learning.

Suggested Reading:

- Keith Sutherland, 'Understanding the Internet', 1st Edn., Butterworth

Heinemann, 2000.

- *S.K. Bansal, 'Internet and Web Designing', 1st Edn., APH Publishing Corporation, 2013.*
- *Behrouz A. Forouzan, 'Data Communications and Networking', 4th Edn., Tata McGraw Hill, 2006.*
- *Paul, 'Multicasting on the Internet and Its Applications', 1st Edn., Springer, eBook, 1998.*

Course Title: Media and digital communication	L	T	P	Cr.
Course Code: BIT6356	2	0	0	2

Total Hours: :30

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Understand core concepts and models of media and communication.
2. Analyze the impact of digital technologies on communication practices.
3. Create and manage digital content for various media platforms.
4. Evaluate the role of social media in shaping public opinion and culture.
5. Apply ethical, legal, and regulatory principles in digital communication.

Course Content

UNIT I

8 hours

Introduction to Media and Communication: Definition and scope of communication, Evolution of media: from traditional to digital, Forms of communication: verbal, non-verbal, visual, written, Models of communication (Shannon-Weaver, Lasswell, Berlo, etc.), Mass communication and its characteristics, Role and functions of media in society, Media literacy and media ethics

UNIT II

7 hours

Digital Media and Technology: Overview of digital media platforms (social media, blogs, podcasts, OTT, etc.), Convergence of media and technology, Characteristics of digital communication, Web 2.0 and the rise of participatory media, Algorithms, content curation, and personalization, Digital content creation: formats and tools (text, video, audio, infographics), Introduction to multimedia storytelling

UNIT III

7 hours

Social media and Online Communication: History and growth of social media, Platforms and their communication styles (Facebook, Instagram, Twitter/X, LinkedIn, etc.), Digital identity and online persona, Influence of social media on public opinion and behavior, Hashtag activism and social media movements, Ethics and challenges in online communication (trolling, misinformation, privacy), Social media management and engagement strategies

UNIT IV

8 hours

Media Policy, Regulation, and Future Trends: Media laws and regulatory frameworks (with reference to India or relevant country), Copyright and intellectual property in digital media, Freedom of expression vs regulation, Cyber laws and digital rights, Data privacy and surveillance issues, Artificial Intelligence and its role in media, Future of digital communication: VR, AR, metaverse, AI-generated content

Transaction Mode: Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- **McQuail's Mass Communication Theory** – Denis McQuail
- **Understanding Media: The Extensions of Man** – Marshall McLuhan
- **The Media and Modernity** – John B. Thompson
- **Convergence Culture: Where Old and New Media Collide** – Henry Jenkins
- **Digital Media and Society: An Introduction** – Adrian Athique

Course Title: Data Warehouse and Data Mining	L	T	P	Cr.
Course Code: BIT6357	4	0	0	4

Total Hours: :60

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Identify the scope and necessity of Data Mining & Warehousing for the society.
2. Describe the designing of Data Warehousing so that it can be able to solve the root problems.
3. Remove redundancy and incomplete data from the dataset using data preprocessing methods.
4. Develop a data mining application for data analysis using various tools.

Course Content

UNIT-1

15 Hours

Introduction: What is Data Mining, Data Mining Functionalities, Classification of Data Mining Systems, and Major Issues in Data Mining. Data Preprocessing: Needs Preprocessing, Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.

UNIT-2

15 Hours

Data Warehouse and OLAP Technology: Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture and Implementation, from Data Warehousing to Data Mining. Frequent Patterns, Associations Rules: Basic Concepts, Efficient and Scalable Frequent Itemset Mining Methods, Mining various kinds of Association Rules.

UNIT-3

15 Hours

Classification and Prediction: Introduction, Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, and Rule based Classification, Classification by Back Propagation, Support Vector Machines, Prediction, Accuracy and Error Measures.

UNIT-4

15 Hours

Cluster Analysis: Introduction, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, and Grid Based Methods; Model Based Clustering Methods, Outlier Analysis.

Transaction Mode Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning

Suggested Reading:

- Dunham Margaret H, Sridhar S. (2008). Data mining: Introductory and Advanced Topics, Pearson Education.
- Humphires H. D. (2009). Data Warehousing: Architecture and Implementation Pearson Education.
- AnahoryM.(2008). Data Warehousing in the Real World. Pearson Education.

Course Title: Data Science	L	T	P	Cr.
Course Code: BIT6358	4	0	0	4

Total Hours: :60

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Understand the fundamentals of data science, its tools, and Python programming.
2. Perform data cleaning, transformation, and visualization using appropriate libraries.
3. Apply statistical techniques and machine learning algorithms to real-world data.
4. Analyze and interpret data-driven insights for informed decision-making.
5. Demonstrate awareness of big data technologies, applications, and ethical issues in data science.

Course Content

UNIT-I

15 hours

Introduction to Data Science and Python: Introduction to Data Science: Definition, scope, and applications, Data Science process and lifecycle, Tools and technologies in Data Science, Basics of Python programming for data analysis, Data types, loops, functions, lists, dictionaries, NumPy and pandas for data manipulation, Reading and writing data (CSV, Excel, JSON)

UNIT-II

15 hours

Data Wrangling and Visualization: Data preprocessing: handling missing data, duplicates, and outliers, Data transformation: scaling, encoding, normalization, Exploratory Data Analysis (EDA) techniques, Data visualization with matplotlib and seaborn, Data summarization and descriptive statistics, Feature selection and dimensionality reduction (PCA)

UNIT-III

15 hours

Statistical Analysis and Machine Learning: Introduction to probability and statistics-Mean, median, mode, variance, standard deviation, Probability distributions and hypothesis testing, Introduction to Machine Learning-Supervised vs Unsupervised Learning, Algorithms: Linear Regression, Logistic Regression, K-Means, Decision Trees, Model evaluation: accuracy, confusion matrix, precision, recall, F1-score, Use of scikit-learn for ML model building

UNIT-IV

15 hours

Big Data, Applications, and Tools: Introduction to Big Data and Hadoop ecosystem, Data storage systems: SQL vs NoSQL databases, Basics of cloud platforms for data science (AWS, GCP, Azure), Introduction to deep learning and neural networks, Applications of Data Science: Healthcare, Finance, E-commerce, social media, Ethical considerations in data science and AI

Transaction Mode Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning

Suggested Reading:

- **“Python for Data Analysis”** by Wes McKinney
- **“Data Science from Scratch”** by Joel Grus
- **“Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow”** by Aurélien Géron
- **“An Introduction to Statistical Learning”** by Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani
- **“Think Stats: Probability and Statistics for Programmers”** by Allen B. Downey
- **“The Elements of Statistical Learning”** by Trevor Hastie, Robert Tibshirani, and Jerome Friedman

Course Title: Ethical Hacking	L	T	P	Cr.
Course Code: BIT6359	4	0	0	4

Total Hours:60

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Evaluate new Hacking Methodology.
2. Install hacking software on a closed network environment.
3. Exemplify security techniques used to protect system and user data.
4. Get knowledge about report writing and mitigation.

Course Content

UNIT I 15 hours

Introduction to Ethical Hacking: Hacking Methodology, Process of Malicious Hacking, Foot printing and Scanning: Foot printing, Scanning. Enumeration: Enumeration. System Hacking and Trojans: System Hacking, Trojans and Black Box Vs White Box Techniques.

UNIT II 15 hours

Hacking Methodology: Denial of Service, Sniffers, Session Hijacking and Hacking Web Servers: Session Hijacking, Hacking Web Servers. Web Application Vulnerabilities and Web Techniques Based Password Cracking: Web Application Vulnerabilities, Web Based Password Cracking Techniques

UNIT III 15 hours

Web and Network Hacking: SQL Injection, Hacking Wireless Networking, Viruses, Worms and Physical Security: Viruses and Worms, Physical Security. Linux Hacking: Linux Hacking. Evading IDS and Firewalls: Evading IDS and Firewalls

UNIT IV 15 hours

Report writing & Mitigation: Introduction to Report Writing & Mitigation, requirements for low level reporting & high-level reporting of Penetration testing results, Demonstration of vulnerabilities and Mitigation of issues identified including tracking

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Balagurusamy, E., Balagurusamy, E., & Balagurusamy, E. (2001). *Object oriented programming with C++*. Tata McGraw-Hill Publishing Company.

- *Pohl, I. (1993). Object-oriented programming using C++. Benjamin-Cummings Publishing Co., Inc.*
- *Dewhurst, S. C., & Stark, K. T. (1989). Programming in C++. Prentice- Hall, Inc.*
- *Lafore, R. (1997). Object-oriented programming in C++. Pearson Education.*