VEER MADHO SINGH BHANDARI UTTARAKHAND TECHNICAL UNIVERSITY

(Formerly Uttarakhand Technical University, Dehradun Established by Uttarakhand State Govt. wide Act no. 415 of 2005)
Suddhowala, PO-Chandanwadi, Premnagar, Dehradun, Uttarakhand (Website- www.uktech.ac.in)

SYLLABUS

For

Bachelor of Computer Application

Effective from –Session 2024-25

BCA SYLLABUS

Bridge Course must be completed before commencement of BCA 1st Semester												

Sl. No.	Subject Codes	Category	Subject	Periods			Evaluation Scheme					Subject Total	Credit
							Sessional Exam			ESE			
				L	T	P	CT	TA	Total	TE	PE		
1	BCAB 001	BC	Bridge Course in Mathematics	3	0	0	20	0	20	40		60	--

SEMESTER-I												

Sl. No.	Subject Codes	Category	Subject	Periods			Evaluation Scheme					Subject Total	Credit
							Sessional Exam			ESE			
				L	T	P	CT	TA	Total	TE	PE		
1	BCAT 001	PCCT	Programming using 'C'	3	1	0	30	20	50	100		150	4
2	BCAT 002	PCCT	Basic Mathematics	3	1	0	30	20	50	100		150	4
3	BCAT 003	PCCT	Digital Electronics	3	1	0	30	20	50	100		150	4
4	BCAT 004	PCCT	Information Technology Fundamentals	3	1	0	30	20	50	100		150	4
5	BCAP 001	PCCP	Programming using 'C' Lab	0	0	2		25	25	25	25	50	1
6	BCAP 002	PCCP	Information Technology Fundamentals Lab	0	0	2		25	25		25	50	1
7	BCAP 003	AEC	Digital Electronics Lab	0	0	2		25	25		25	50	1
8	BCAP 004	SEC	English Writing Skills	0	0	2			25		25	50	1
9	BCAT 005	VA	Personality Development and Life skills	2	0	0	15	10	25	75		100	2
			Total									**900**	**22**

Abbreviations: L-No. of Lecture hours per week, **T**-No. of Tutorial hours per week, **P**-No. of Practical hours per week, **CT**-Class Test Marks, **TA**-Marks of teacher's assessment including student's class performance and attendance, **PS**-Practical Sessional Marks, **ESE**-End Semester Examination, **TE**- Theory Examination Marks, **PE**- Practical External Examination Marks

1 Hr Lecture	1 Hr Tutorial	2 or 3 Hr Practical
1 Credit	1 Credit	1 Credit

BCA SYLLABUS

Sl. No.	Subject Codes	Category	Subject	Periods			Evaluation Scheme					Subject Total	Credit
							Sessional Exam			ESE			
				L	T	P	CT	TA	Total	TE	PE		
1	BCAT 006	PCCT	Data Structures	3	1	0	30	20	50	100		150	4
2	BCAT 007	PCCT	Computer organization & Architecture	3	1	0	30	20	50	100		150	4
3	BCAT 008	PCCT	Object Oriented Programming using Java	3	1	0	30	20	50	100		150	4
4	BCAT 009	PCCT	Software Engineering	3	1	0	30	20	50	100		150	4
5	BCAP 005	PCCP	Data Structures Lab	0	0	2		25	25		25	50	1
6	BCAP 006	PCCP	Object Oriented Programming using Java Lab	0	0	2		25	25		25	50	1
7	BCAP 007	PCCP	Software Engineering Lab	0	0	2		25	25		25	50	1
8	BCAP 008	AEC	Office Automation	0	0	2		25	25		25	50	1
9	BCAT 010	VA	Environmental Studies	2	0	0	15	10	25	75		100	2
10			Internship-I*	*Students must complete one work based vocational course after the second semester during the summer vacation of the first year (As mentioned in the scheme of the Third Semester). Vocational course will be held for 4 weeks after the end of the second semester and its evaluation will be conducted in the third semester										
			Total									**900**	**22**
11													

Abbreviations: L-No. of Lecture hours per week, **T**-No. of Tutorial hours per week, **P**-No. of Practical hours per week, **CT**- Class Test Marks, **TA**-Marks of teacher's assessment including studentss class performance and attendance, **PS**-Practical Sessional Marks, **ESE**-End Semester Examination, **TE**- Theory Examination Marks, **PE**- Practical External Examination Marks

1 Hr Lecture	**1 Hr Tutorial**	**2 or 3 Hr Practical**
1 Credit	**1 Credit**	**1 Credit**

BCA SYLLABUS

				SEMESTER-III									
Sl. No.	Subject Codes	Category	Subject	Periods			Evaluation Scheme					Subject Total	Credit
							Sessional Exam			ESE			
				L	T	P	CT	TA	Total	TE	PE		
1	BCAT 011	PCCT	Python Programming	3	1	0	30	20	50	100		150	4
2	BCAT 012	PCCT	Web Technologies	3	1	0	30	20	50	100		150	4
3	BCAT 013	PCCT	Database Management System	3	1	0	30	20	50	100		150	4
4	BCAT 014	PCCT	Graph Theory	3	1	0	30	20	50	100		150	4
5	BCAP 009	PCCP	Python Programming Lab	0	0	2		25	25		25	50	1
6	BCAP 010	PCCP	Database Management System Lab	0	0	2		25	25		25	50	1
7	BCAP 011	PCCP	Web Technologies Lab	0	0	2		25	25		25	50	1
8	BCAP 012	SI	Internship-I	0	0	2		25	25		25	50	1
	Multidisciplinary Course (Generic Elective) (Choose any One)*												
9		MC	Open Elective offered by other Department/ Programme	2	1	0	30	20	50	75		100	3
10	BCAT 015	VA	Understanding India	2	0	0	15	10	25	75		100	2
			Total									**1000**	**25**

Abbreviations: L-No. of Lecture hours per week, **T**-No. of Tutorial hours per week, **P**-No. of Practical hours per week, **CT**- Class Test Marks, **TA**-Marks of teacher's assessment including studentss class performance and attendance, **PS**-Practical Sessional Marks, **ESE**-End Semester Examination, **TE**- Theory Examination Marks, PE-Practical External Examination Marks

1 Hr Lecture	1 Hr Tutorial	2 or 3 Hr Practical
1 Credit	1 Credit	1 Credit

BCA SYLLABUS

SEMESTER-IV												
Sl. No.	Subject Codes	Category	Subject	Periods			Evaluation Scheme					Subject Total	Credit
							Sessional Exam			ESE			
				L	T	P	CT	TA	Total	TE	PE		
1	BCAT 016	PCCT	Operating Systems	3	1	0	30	20	50	100		150	4
2	BCAT 017	PCCT	Computer Network	3	1	0	30	20	50	100		150	4
3	BCAT 018/BCAT 019/BCAT 020	PCCE	1. Data Science 2. Information Security 3. Modelling and Simulation	3	1	0	30	20	50	100		150	4
4	BCAP 013	PCCP	Operating Systems Lab	0	0	2		25	25		25	50	1
5	BCAP 014	PCCP	Computer Network Lab	0	0	2		25	25		25	50	1
6	BCAP 015	AEC	Critical Thinking	0	0	2		25	25		25	50	1
7	BCAP 016	SEC	R Programming	0	0	2		25	25		25	50	1
Multidisciplinary Course (Generic Elective) (Choose any One)*													
8		MC	Open Elective offered by other Department/ Programme	2	1	0	30	20	50	75		100	3
9	BCAT 021	VA	Human Values	2	0	0	15	10	25	75		100	2
			Internship-II*	*Students must complete one work based vocational course after the fourth semester during the summer vacation of the second year (As mentioned in the scheme of the Third Semester). Vocational course will be held for 4 weeks after the end of the fourth semester and its evaluation will be conducted in the fifth semester										
			Total									**850**	**21**

BCA SYLLABUS

Sl. No.	Subject Codes	Category	Subject	Periods			Evaluation Scheme					Subject Total	Credit
							Sessional Exam			ESE			
				L	T	P	CT	TA	Total	TE	PE		
1	BCAT 022	PCCT	Design and Analysis of Algorithm	3	1	0	30	20	50	100		150	4
2	BCAT 023	PCCT	Compiler Design	3	1	0	30	20	50	100		150	4
3	BCAT 024/BCAT025/ BCAT026	PCCE	1. Artificial Intelligence 2. Cloud Computing 3. Image Processing	3	1	0	30	20	50	100		150	4
4	BCAT 027	PCCT	Computer Graphics	3	1	0	30	20	50	100		150	4
5	BCAP 017	PCCP	Design and Analysis of Algorithm Lab	0	0	2		25	25		25	50	1
6	BCAP 018	PCCP	Compiler Design Lab	0	0	2		25	25		25	50	1
7	BCAP 019	PCCP	Computer Graphics Lab	0	0	2		25	25		25	50	1
8	BCAP 020	SI	Internship-II	0	0	2		25	25		25	50	1
	Multidisciplinary Course (Generic Elective) (Choose any One)*												
9		MC	MOOC Course*	3	0	0	-	-	-	-	-		3
			Total									**800**	**23**

*The students can learn these courses/ technologies through self-paced MOOC courses or through regular courses offered by the institute during the summer break on a fast-track mode. The broad guidelines for undertaking MOOC courses are as follows:

1. MOOC Course should be done from SWAYAM/NPTEL as per the guidelines of UGC.
2. For securing the credits, the student is required to complete the assessment of the course and to provide the certificate of the course done from SWAYAM/NPTEL.
3. The fees (if any) for the registration and/or assessment of the MOOC course must be borne by the student only.
4. If the student secures more than 4 credits for the MOOC Course even then 3 credits shall be considered for this subject and the grade/marks provided by assessing authority shall be transferred to the university by the institution where the student is studying. The University's Examination Division shall take the result of the MOOC course on record and the final result must accommodate the results received from such MOOC courses. The student must submit the result of such papers to their respective institution. All the results for the MOOC courses may be submitted before the completion of other requirements including credits requirement.

Sl. No.	Subject Codes	Category	Subject	Periods			Evaluation Scheme					Subject Total	Credit
							Sessional Exam			ESE			
				L	T	P	CT	TA	Total	TE	PE		
1	BCAT 028	PCCT	.Net Framework and Technologies	3	1	0	30	20	50	100		150	4
2	BCAT 029/BCAT 030/BCAT 031	PCCE	1. Machine learning 2. Web Security 3. Mobile Application and Development	3	1	0	30	20	50	100		150	4
3	BCAP 021	PCCP	.Net Framework and Technologies Lab	0	0	2		25	25		25	50	1
4	BCAP 022	PCCP	Seminar	0	0	2					50		1
5	BCAP 023	PRJ	Major Project	0	0	18			100		200	300	9
6	BCAP 024	SEC	Data Visualization and Analytics	0	0	2		25	25		25	50	1
7	BCAT 032	VA	Self-Employment and Entrepreneurship Development	2	0	0	15	10	25	75	-	100	2
			Total									**800**	**22**

SEMESTER-VI

BCA SYLLABUS

Course Code: BCAB 001   **L T P**

Course Name: Bridge Course in Mathematics   **3 0 0**

 Aim: To build mathematical aptitude of the students for understanding the basic concepts of core courses of mathematics of the programme

UNIT-I Algebra: Partial fractions, Arithmetic Progression and Geometric Progression, Matrices and Determinants, Inverse Matrix.

UNIT-II Permutation and Combination, method of induction, Binomial Theorem for positive integral index and any index (without proof), Exponential and logarithmic series.

UNIT-III Geometry: Locus, Cartesian Coordinate system, Distance Formula, Section Formula, Slope of straight line various forms, Angle between lines, pair of straight line , parabola, ellipse and hyperbola.

UNIT IV Statistics: Frequency Distribution, Measures of Central tendency, Mean, Mode, Median, Geometric mean, Harmonic mean, Inter Quartile Range, Mean Deviation, Standard deviation.

BCA SYLLABUS

Programming using 'C' (BCAT 001)

L:T:P:3:1:0   **CREDITS-4**

Course obejectives: 'C' programming language helps to build a strong foundation for computer programming. This course will help to solve beginner level problems such as mathematical operations, string processing, data structure and data structure related processing, with the help of basic concepts, control flow structures, and principles of C. This course is basically designed to create a base to develop foundation skills of procedure - oriented programming.

Course Outcomes:

1 - Develop C program using input - output functions and arithmetic expressions

2 - Develop C program involving branching and looping statements

3 - Implement Arrays and structures using C programs

4 - Develop C program using user-defined functions

5 - Write C program using pointer

UNIT-I

C basics: C character set, Identifiers and keywords, Data types, constants, variables and arrays, declarations, expressions statements, symbolic constants, compound statements, arithmetic operators, unary operators, relational and logical operators, assignment operators, conditional operators, bit operators.

UNIT-II

Decision Control Structures: If Statement, If-else statement, Nested if (), If () ladder, Switch, case statement, Iterative statements: For loop, While loop, Do-while () loop, Conditional statements: Break, Continue, Storage Classes, Array: Declaration of an Array, Initialization of Array, Types of Array: Single Dimension Array, Two, Dimensional Array, Address Calculation of an Element of a 2-D Array

UNIT-III

Functions: Library Functions, User Defined Functions, Function Declaration, Prototype Declaration, Types of Arguments: Actual Arguments, Formal Arguments, Function Definition, Passing Arrays as Parameters, Methods to Call a Function: Call by Value, Call by Reference.

UNIT-IV

Pointers: Declaration of Pointer Variables, Pointer Arithmetic, Returning Multiple Output Values through a Function Strings.

UNIT-V

Structures, Unions, Array of Structures, Enumerations, File Handling: Opening a File, Closing a File, File, Opening Modes, Reading from and Writing to a File, Copying Content of an Existing File to another, Command Line Arguments, argc and argv Parameters, Pre-processor Directives.

Suggested Books:

1. E.Balagurusamy, "Programming in ANSI C", TMH

2. Peter Norton's, "Introduction to Computers", TMH

3. Yashwant Kanetkar, "Let us C", BPB

BCA SYLLABUS

Basic Mathematics (BCAT 002)

L:T:P:3:1:0   **CREDITS-4**

Course Objective: The objective of the "Mathematical Foundations of Computer Science" course is to introduce students to the mathematical concepts and techniques that underpin various areas of computer science. The course aims to help students develop a strong foundation in mathematical reasoning and problem-solving skills that are essential for understanding algorithms, data structures, and theoretical aspects of computer science.

Course Outcome: By the end of this course, students should be able to:

1. Understand fundamental mathematical concepts and their applications in computer science.

2. Analyze algorithms and data structures using mathematical techniques.

3. Formulate and solve problems in computer science using mathematical modeling.

4. Apply mathematical reasoning to analyze the efficiency and correctness of algorithms.

 5. Gain a deeper appreciation of the theoretical underpinnings of computer science.

Unit 1 Mathematical Logic Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Predicates, Predicative Logic, Statement Functions, Variables and Quantifiers

Unit 2 Set Theory Sets: Operations on Sets, Principle of Inclusion-Exclusion, Relations: Properties, Operations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering, Hasse Diagrams

Unit 3 Functions Bijective, Composition, Inverse, Permutation, and Recursive Functions, Lattice and its Properties, Algebraic Structures: Algebraic Systems, Properties, Semi Groups and Monoids, Group, Subgroup and Abelian Group, Homomorphism, Isomorphism.

Unit 4 Combinatorics Basis of Counting, Permutations, Permutations with Repetitions, Circular and Restricted Permutations, Combinations, Restricted Combinations, Binomial and Multinomial Coefficients and Theorems

Unit 5 Number Theory Properties of Integers, Division Theorem, Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic, Fermat's and Euler's Theorems

Recommended Books:

1. Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGraw Hill.

2. Elements of Discrete Mathematics-A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3rd Edition, Tata McGraw Hill.

DIGITAL ELECTRONICS (BCAT 003)

L:T:P:3:1:0   **Credits 4**

Course Objectives:

- To present a problem oriented introductory knowledge of Digital circuits and its applications.
- • To focus on the study of electronic circuits.

Course Outcomes: Upon the completion of the course, the student will be able to:

1 Apply concepts of Digital Binary Systm and implementation of Gates.

2 Analyze and design of Combinational logic circuits.

3 Analyze and design of Sequential logic circuits with their applications.

4 Implement the Design procedure of Synchronous & Asynchronous Sequential Circuits.

5 Apply the concept of Digital Logic Families with circuit implementation.

UNIT I Digital System And Binary Numbers: Number System and its arithmetic Signed binary numbers, Logic simplification and combinational logic design: Binary codes, code conversion, review of Boolean algebra and Demorgans theorem, SOP & POS forms, Canonical forms, Karnaugh maps method up to five variable, Don't care conditions, POS simplification, NAND and NOR implementation, Quine McClusky method (Tabular method).

UNIT II Combinational Logic: MSI devices like Magnitude comparator, Multiplexers, Demultiplexers, Decoders, Encoders. Multiplexed display, half and full adders, subtractors, serial and parallel adders, BCD adder

UNIT III Sequential Logic And Its Applications: Storage elements: latches & flip flops, Characteristic Equations of Flip Flops, Flip Flop Conversion, Shift Registers, Ripple Counters, Synchronous Counters, Other Counters: Johnson & Ring Counter.

UNIT IV Synchronous & Asynchronous Sequential Circuits: Analysis of clocked sequential circuits with state machine designing, State reduction and assignments, Design procedure. Analysis procedure of Asynchronous sequential circuits, circuit with latches, Design procedure, Reduction of state and flow table, Race-free state assignment, Hazards.

UNIT V Memory & Programmable Logic Devices: Digital Logic Families: DTL, DCTL, TTL, ECL & CMOS etc., Fan Out, Fan in, Noise Margin; RAM, ROM, PLA, PAL; Circuits of Logic Families, Interfacing of Digital Logic Families, Circuit Implementation using ROM, PLA and PAL

Text Books: 1. M. Morris Mano and M. D. Ciletti, "Digital Design", Pearson Education.

2. Digital Circuits and Design, S. Salivahanan, Oxford University Press

3. David J. Comer, "Digital Logic & State Machine Design", Oxford University Press.

4. RP Jain, "Modern Digital Electronics", McGraw Hill Publication.

5. A. Anand Kumar, "Fundamental of Digital Circuits," PHI 4th edition, 2018.

6. D.V. Hall, "Digital Circuits and Systems," McGraw Hill, 1989.

BCA SYLLABUS

Information Technology Fundamentals (BCAT 004)

L:T:P:3:1:0   **CREDITS-4**

Course Objectives: The main objective is to introduce IT in a simple language to all undergraduate students, regardless of their specialization. It will help them to pursue specialized programs leading to technical and professional careers and certifications in the IT industry. The focus of the subject is on introducing skills relating to IT basics, computer applications, programming, interactive medias, Internet basics etc.

Course Outcomes: At the end of this course, student should be able to

(a) Understand basic concepts and terminology of information technology.

(b) Have a basic understanding of personal computers and their operations.

(c) Be able to identify issues related to information security.

Unit I: Introduction to Computers: Introduction, Definition, .Characteristics of computer, Evolution of Computer, Block Diagram Of a computer, Generations of Computer, Classification Of Computers, Applications of Computer, Capabilities and limitations of computer.

Unit II: Basic Computer Organization: Role of I/O devices in a computer system. Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch Screen, Output Units: Monitors and its types. Printers: Impact Printers and its types. Non Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers.

Unit III: Storage Fundamentals: Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAM ROM, PROM, EPROM, EEPROM. Secondary Storage: Magnetic Tapes, Magnetic Disks. Cartridge tape, hard disks, Floppy disks Optical Disks, Compact Disks, Zip Drive, Flash Drives.

Unit IV: Software: Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. Application S/W and its types: Word Processing, Spread Sheets Presentation, Graphics, DBMS s/w.

Unit V: Computer Arithmetic: Binary, Binary Arithmetic, Number System: Positional & Non Positional, Binary, Octal, Decimal, Hexadecimal, Converting from one number system to another , Converting from one number system to another , Converting from one number system to another.

Unit VI: Business Data Processing: Introduction, data storage hierarchy, Method of organizing data, File Types, File Organization, File Utilities.

Text Books: 1. Computer Fundamentals by P.K.Sinha

Programming using C Lab (BCAP 001)

L:T:P:0:0:2   **CREDITS-1**

OBJECTIVES

1. To introduce students to the basic knowledge of programming fundamentals of C language.

2. To impart writing skill of C programming to the students and solving problems.

3. To impart the concepts like looping, array, functions, pointers, file, structure.

LIST OF PROGRAMS

1. Find the area of a Triangle.

1. Find greatest among 3 numbers

2. Perform the arithmetic expression using mswitch statement

3. Find the factorial of a given number

4. Generate all prime numbers up to nth number.

5. Print Fibonacci series .

6. Find odd and prime no.

7. Find total of even integers

8.   Print product of two matrices 28

9. Concatenate two strings without using libraryfunctions

10. Print the elements of array using pointers

11. Find factorial of a given number using function.
12. Find total mark of n students

BCA SYLLABUS

Information Technology Fundamentals Lab (BCAP-002)

L:T:P:0:0:2   **CREDITS-1**

1. Various Components of Computer

2. Internal And External DOS Commands

3. Windows Operating System

4. MS Word

5. MS Excel

6. MS Power Point

7. Web Browser And E-mail

BCA SYLLABUS

Digital Electronics Lab (BCAP 003)

L:T:P:0:0:2   **CREDITS-1**

1.Verification of the truth tables of TTL gates.

2. Verify the NAND and NOR gates as universal logic gates.

3. Design and verification of the truth tables of Half and Full adder circuits.

4. Design and verification of the truth tables of Half and Full subtractor circuits.

5. Verification of the truth table of the Multiplexer.

6. Verification of the truth table of the De-Multiplexer.

7. Design and test of an S-R flip-flop using NOR/NAND gates.

8. Verify the truth table of a J-K flip-flop

9. Verify the truth table of a D flip-flop

10. Operate the counters.

11. Design of 4-bit shift register (shift right).

12. Design of modulo-4 counter using J K flip flop.

BCA SYLLABUS

English Writing Skills (BCAP 004)

L:T:P:0:0:2   **CREDITS-1**

Course Objectives:

° Learn Basics of Communication.

° Learn and develop the skills of writing, speaking, reading and listening.

° Know telephonic conversation skills, Interview skills and Group Discussion basics.

° Gain the knowledge and develop personality , soft skills ,presentation skills.

° To develop reading skills.

Course Outcomes:

° Inculcate Process of Communication and identify barriers in communication.

° Demonstrate the competency in English language through understandability and practice in four skills of language such as writing, speaking, reading and listening.

° Develop skills for working in team and individually.

° Inculcate soft skills and develop personality through participation in group discussion, mock interview, group and individual presentation

° Practice reading skills in English language specific to eminent Indian Authors.

UNIT-I

The Process of Communication: Communication, the Process of Communication, Barriers of Communication, Different Types of Communication, Characteristics and Conventions of Conversation, Conversational Problems of Second/Foreign Language Users, Difference Between Conversation and Other Speech Events

UNIT- II

Telephone Techniques: Speaking and Listening, Conference Calls, Vocabulary Building, Writing, Grammar and Usage, Pronunciation, Job Applications and Interviews: Reading, Curriculum Vitae, Preparing for an Interview, Listening and Speaking in the Interviews Group

Discussions: Group-Discussion, Study Skills, Language Focus, Speaking.

UNIT- III

Soft Skills Practice, Personality Development, Participating in Group Discussion and Job Interviews, Time Management Presentation Skills, Leadership Skills, Assertiveness, Lateral Thinking, Team Work and Interpersonal Skills, Emotional Intelligence, Self-Confidence and Courage, Attitude.

UNIT- IV

Speaking Skills and Presentation: Presentation Design and Delivery. Monologue Dialogue, Group Discussion. Effective Communication/ Mis-Communication. Interview, Public Speech. Effective Writing, Report Writing, Resume, Circular, Notice and letter Writing.

UNIT- V

Importance of English as a vehicle of Spoken and written Communication. Close Reading Comprehension Summary Paraphrasing Analysis and Interpretation. Translation (from Indian language to English and vice-versa). Introduction to Articles of eminent Indian authors. Short Stories of eminent Indian authors.

References:

° Darer. Shankar-Communication Skills in English Language

° Dr. Uremia Rai and S.M.Rai- Business Communication

° B. K. Das- an Introduction to Professional English and Soft Skills

° Barun K. Mitra- Personality Development and Soft Skills

° Shashikumar and Dhameja-Spoken English

° Raymond Williams- English Grammar

° Wren and Martin -English Grammar and Composition

° Justin Seeley -Designing Presentation

° Laura Bergelles- Public Speaking Foundations

° M.a.K. Halliday- Spoken and Written Language

° B Balasubriamaniam-Phonetics for Indian Students

° R C Sharma- Business Correspondence

° Dowel Jones- the Handbook of English Phonetics

° Merriam Webster - Guide to Business Correspondence.

° Ashish Singh - How to Communicate Effectively

BCA SYLLABUS

Personality Development and Life skills (BCAT 005)

L:T:P:2:0:0   **CREDITS-2**

Objective of the Course:

The objective of the course is to bring about personality development with regard to the different behavioural dimensions that have far reaching significance in different situations. Personality development and life skills are the collective exposure of personal character traits of an individual which can be his thought pattern, feelings, and emotional exuberance. Psychology treats personality development as an ongoing and dynamic process which is largely impacted by the atmosphere. The evaluating factors of personality are openness to experience, extra version, agreeableness, and conscientiousness.

Syllabus

Module	Segments	Hours
1	**Introduction to Personality Development:** Introduction, Life skills Vs Other skills, The concept of life skills, Use of core skills in daily life, Story of Hunter and Pigeons, Life skill used by the characters. Factors Influencing / Shaping Personality: Introduction, Physical and social factors influence / shaping personality, Psychological and Philosophical factors influencing / shaping personality. Self Awareness : Introduction, Dimensions of self awareness, Self awareness through activity, Self realisation and self exploration through SWOT analysis.	12

2	**Empathy:** Introduction, Empathy, sympathy and altruism, Importance of empathising with others. Critical and Creative Thinking: Introduction, Critical thinking, Creative thinking, Characteristics of a creative person.	8
3	**Communication Skills – 1:** Introduction, Understanding basics of communication, Different ways of communication, Components of effective communication. Communication Skills – 2: Introduction, Common barriers to effective communication, Different type of barriers of communication, How to communicate tactfully. Decision making and Problem solving: Introduction, Decision making skills, Problem solving, Practicing decision making and problem solving. Coping with Stress and Emotions: Introduction, Understanding stress and its impact, Stress management techniques, Understanding emotions and feelings.	16
4	**Change Your Mind Set :** Introduction, What is mindset, How to change your mindset. Time Management: Introduction, Essentials of time management, Time wasters, Principles of time management. Sociability: Social Skills Etiquettes & Manners: Introduction, Types of etiquettes, Manners, How to improve your skills.	12

5	**Importance of Group / Team Work:** Introduction, Types and characteristics of groups, Importance of groups, Characteristics of a mature group, Types and characteristics of a team, importance of team, Characteristics of a team. Interview Skills: Introduction, Curriculum Vitae, The interview, Mock interview evaluation. Career Counselling: Introduction, Career counselling and counsellor, Need for career counselling, Benefits of career counselling.	12

BCA SYLLABUS

Data Structures (BCAT 006)

L:T:P:3:1:0   **CREDITS-4**

Course obejectives: 'C' programming language helps to build a strong foundation for computer programming. This course will help to solve beginner level problems such as mathematical operations, string processing, data structure and data structure related processing, with the help of basic concepts, control flow structures, and principles of C. This course is basically designed to create a base to develop foundation skills of procedure - oriented programming.

Course Outcomes:

1 - Develop C program using input - output functions and arithmetic expressions

2 - Develop C program involving branching and looping statements

3 - Implement Arrays and structures using C programs

4 - Develop C program using user-defined functions

5 - Write C program using pointer

UNIT-I

C basics: C character set, Identifiers and keywords, Data types, constants, variables and arrays, declarations, expressions statements, symbolic constants, compound statements, arithmetic operators, unary operators, relational and logical operators, assignment operators, conditional operators, bit operators.

UNIT-II

Decision Control Structures: If Statement, If-else statement, Nested if (), If () ladder, Switch, case statement, Iterative statements: For loop, While loop, Do-while () loop, Conditional statements: Break, Continue, Storage Classes, Array: Declaration of an Array, Initialization of Array, Types of Array: Single Dimension Array, Two, Dimensional Array, Address Calculation of an Element of a 2-D Array

UNIT-III

Functions: Library Functions, User Defined Functions, Function Declaration, Prototype Declaration, Types of Arguments: Actual Arguments, Formal Arguments, Function Definition, Passing Arrays as Parameters, Methods to Call a Function: Call by Value, Call by Reference.

UNIT-IV

Pointers: Declaration of Pointer Variables, Pointer Arithmetic, Returning Multiple Output Values through a Function Strings.

UNIT-V

Structures, Unions, Array of Structures, Enumerations, File Handling: Opening a File, Closing a File, File, Opening Modes, Reading from and Writing to a File, Copying Content of an Existing File to another, Command Line Arguments, argc and argv Parameters, Pre-processor Directives.

Suggested Books:

1. E.Balagurusamy, "Programming in ANSI C", TMH

2. Peter Norton's, "Introduction to Computers", TMH

3. Yashwant Kanetkar, "Let us C", BPB

BCA SYLLABUS

Computer Organization & Architecture (BCAT 007)

L:T:P:3:1:0   **CREDITS-4**

COURSE OBJECTIVES:

1. To impart basic concepts of computer architecture and organization,

2. To explain key skills of constructing cost-effective computer systems.

3. To familiarize the basic CPU organization.

4. To help students in understanding various memory devices.

5. To facilitate students in learning IO communication

COURSE OUTCOMES: At the end of the course students will be able to:

1. Identify various components of computer and their interconnection

2. Identify basic components and design of the CPU: the ALU and control unit.

3. Compare and select various Memory devices as per requirement.

4. Compare various types of IO mapping techniques

5. Critique the performance issues of cache memory and virtual memory

UNIT - I STRUCTURE OF COMPUTERS: Computer types, Functional units, Basic operational concepts, VonNeumann Architecture, Bus Structures, Software, Performance, Multiprocessors and Multicomputer, Data representation, Fixed and Floating point, Error detection and correction codes. COMPUTER ARITHMETIC: Addition and Subtraction, Multiplication and Division algorithms, Floating-point Arithmetic Operations, Decimal arithmetic operations.

UNIT - II BASIC COMPUTER ORGANIZATION AND DESIGN: Instruction codes, Computer Registers, Computer Instructions and Instruction cycle. Timing and Control, Memory-Reference Instructions, Input-Output and interrupt. Central processing unit: Stack organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Complex Instruction Set Computer (CISC) Reduced Instruction Set Computer (RISC), CISC vs RISC

UNIT- III REGISTER TRANSFER AND MICRO-OPERATIONS: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logic shift unit. MICRO-PROGRAMMED CONTROL: Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit.

UNIT - IV MEMORY SYSTEM: Memory Hierarchy, Semiconductor Memories, RAM(Random Access Memory), Read Only Memory (ROM), Types of ROM, Cache Memory, Performance considerations, Virtual memory, Paging, Secondary Storage, RAID.

UNIT – V INPUT OUTPUT: I/O interface, Programmed IO, Memory Mapped IO, Interrupt Driven IO, DMA. MULTIPROCESSORS: Characteristics of multiprocessors, Interconnection structures, Inter Processor Arbitration, Inter processor Communication and Synchronization, Cache Coherence.

TEXT BOOKS:

1. M. Moris Mano (2006), Computer System Architecture, 3rd edition, Pearson/PHI, India.

REFERENCE BOOKS:

1. Carl Hamacher, Zvonks Vranesic, SafeaZaky (2002), Computer Organization, 5th edition, McGraw Hill, New Delhi, India.

2. William Stallings (2010), Computer Organization and Architecture- designing for performance, 8th edition, Prentice Hall, New Jersy.

3. Anrew S. Tanenbaum (2006), Structured Computer Organization, 5th edition, Pearson Education Inc,

4. John P. Hayes (1998), Computer Architecture and Organization, 3rd edition, Tata McGrawHill

BCA SYLLABUS

Object Oriented Programming using Java (BCAT 008)

L:T:P:3:1:0   CREDITS-4

Learning Objectives:

• This subject will help to improve the analytical skills of object oriented programming

• Overall development of problem solving and critical analysis

• Formal introduction to Java programming language

Learning Outcome: On successful completion of this course, the student should be able to:

 • Show competence in the use of the Java programming language in the development of small to medium-sized application programs that demonstrate professionally acceptable coding and performance standard

• Understand the basic principles of the object-oriented programming • Demonstrate an introductory understanding of graphical user interfaces, multithreaded programing, and event-driven programming.

UNIT 1- Introduction to Java : Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java.

UNIT 2- Objects and Classes : Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, StringBuffer, File, this reference

UNIT 3- Inheritance and Polymorphism : Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package.

UNIT 4: Event and GUI programming : Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing.

UNIT 5- I/O programming : Text and Binary I/O, Binary I/O classes, Object I/O, Random Access Files.

UNIT 6- Multithreading in java : Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try-catch-finally, Collections in java, Introduction to JavaBeans and Network Programming.

Reference Books:

1 Introduction to Java Programming (Comprehensive Version), Daniel Liang, Seventh Edition, Pearson.

2 Programming in Java, Sachin Malhotra & Saurabh Chaudhary, Oxford University Press.

3 Murach's Beginning Java 2, Doug Lowe, Joel Murach and Andrea Steelman, SPD.

4 Core Java Volume-I Fundamentals, Eight Edition, Horstmann & Cornell, Pearson Education.

5 The Complete Reference, Java 2 (Fourth Edition), Herbert Schild, TMH.

6 Java Programming, D. S. Malik, Cengage Learning.

BCA SYLLABUS

SOFTWARE ENGINEERING (BCAT 009)

L:T:P:3:1:0   **CREDITS-4**

Course Objectives

☐ The aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.

☐ Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams

Course Outcomes

☐ Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).

☐ Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.

☐ Will have experience and/or awareness of testing problems and will be able to develop a simple testing report

UNIT - I

Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths.

A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, personal and team process models.

Process models: The waterfall model, incremental process models, evolutionary process models, the unified process.

UNIT - II

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.

Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

System models: Context models, behavioral models, data models, object models, structured methods.

UNIT - III

Design Engineering: Design process and design quality, design concepts, the design model. Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams,sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

UNIT - IV

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging.

Product metrics: Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

UNIT - V

Metrics for Process and Products: Software measurement, metrics for software quality.

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan.

Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition.

2. Software Engineering- Sommerville, 7th edition, Pearson Education.

3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

REFERENCE BOOKS:

1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.

2. Software Engineering principles and practice- Waman S Jawadekar, The Mc Graw-Hill Companies.

3. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

BCA SYLLABUS

Data Structures LAB (BCAP 005)

L:T:P:0:0:2   **CREDITS-1**

Objectives:

- To write and execute programs in C
- To solve problems using data structures such as arrays, linked lists, stacks, queues.
- To write and execute programs in C,to solve problems using data structures such as trees, graphs, hash tables and search trees.
- To write and execute write programs in c to implement various sorting and searching methods.

Outcomes:

- to identify the appropriate data structure for given problem.
- to design programs for solving problems using different data structures.
- solve problems using trees, graphs and hash tables addressing various issues.
- to effectively use compilers includes library functions, debuggers and trouble shooting.

LIST OF EXPERIMENTS

1. Write a menu driven C program to implement stack using one dimensional array. Perform the

operations on the stack (i) Push (ii) Pop (iii) Is empty (iv) Is full (v) Display.

2. Write a menu driven C program to implement queue using one dimensional array. Perform the

operations on the Queue (i) Insertion (ii) Deletion (iii) Is empty (iv) Is full (v) Display.

3. Write a C program to perform i) Infix to postfix conversion ii) Postfix evaluation

4. Write a menu driven C program to implement the following searching operations: (i) Linear Search (ii) Binary Search

5. Write a menu driven C program to implement a singly linked list and perform the following operations on it:

(i) Insertion a. at the beginning b. at the end c. after a specified node.

(ii) Deletion a. at the beginning b. at the end c. a specified node.

(iii) Display the linked list.

(iv) Search an element in the list

6. Write a menu driven C program to perform polynomial addition using linked list.

7. Write a menu driven C program to implement stack using Singly Linked list. Perform the operations on the stack (i) Push (ii) Pop (iii) Is empty (iv) Is full (v) Display.

8. Write a menu driven C program to implement Queue using Singly Linked list. Perform the operations on the Queue (i) Insertion (ii) Deletion (iii) Is empty (iv) Is full (v) Display

9. Write a menu driven program to perform (i) Bubble Sort (ii) Insertion Sort (iii) Selection Sort (iv) Quick Sort. (v) Merge Sort.

10. Write a menu driven C program to implement a binary tree using linked list and perform the following operations on it i) Insert a new node. ii) Delete a specified node. iii) Search a specified node.

11. Write a menu driven C program to implement a binary tree and perform the following traversals on it iv) In-order v) Pre order. vi) Post-order

12. Write a menu driven C program to perform the following operations on a directed graph (i) DFS (ii) BFS (iii) Display (using Adjacency Matrix).

13. Write a menu driven C program to implement circular queue using arrays.

14. Write a menu driven C program to implement DEQUEUE using arrays.

15. Write a program to implement sparse matrix transpose

16. Write a menu driven C program to implement a doubly linked list and perform the following operations on it: (i) Insertion (at the beginning, at the end, after a specified node). (ii) Deletion (at the beginning, end of a specified node). (iii) Display (Forward and Backward).

17. Implement a queue and reverse the order of the queue using (i) Two additional stacks (ii) One additional queue

18. Implement a singly linked list and perform the following 65 (i) Remove all duplicate elements

from the list (iii) Make a copy of the given list (i) Remove the first and last occurrence of the given element from the list

19. Write a program to create a binary tree and determine the following

I.The number of nodes in the tree

II.The sum of contents of all nodes in the tree

III.The depth of the tree

20. Write a program to implement linear search and binary search

BCA SYLLABUS

Object Oriented Programming Using Java Lab(BCAP-006)

L:T:P:0:0:2 **CREDITS-1**

Lab Objectives:

☐ To prepare students to become familiar with the Standard Java technologies of J2SE

☐ To prepare students to excel in Object Oriented programming and to succeed as a Java Developer through global rigorous education.

☐ To provide Students with a solid foundation in OOP fundamentals required to solve programming problems and also to learn Advanced Java topics like J2ME, J2EE, JSP, JavaScript

☐ To train Students with good OOP programming breadth so as to comprehend, analyze, design and create novel products and solutions for the real life problems.

☐ To inculcate in students professional and ethical attitude, multidisciplinary approach and an ability to relate java programming issues to broader application context.

☐ To provide student with an academic environment aware of excellence, written ethical codes and guidelines and lifelong learning needed for a successful professional career.

Lab Outcomes:

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

☐ Able to analyze the necessity for Object Oriented Programming paradigm and over structured programming and become familiar with the fundamental concepts in OOP.

☐ Demonstrate an ability to design and develop java programs, analyze, and interpret object oriented data and report results.

☐ Demonstrate an ability to design an object oriented system, AWT components or multithreaded process as per needs and specifications.

☐ Demonstrate an ability to visualize and work on laboratory and multidisciplinary tasks like console and windows applications both for standalone and Applets programs

List of experiments:

1 Program to define a structure of a basic JAVA program

2 Program to define the data types, variable, operators, arrays and control structures.

3 Program to define class and constructors. Demonstrate constructors.

4 Program to define class, methods and objects. Demonstrate method overloading.

5 Program to define inheritance and show method overriding.

6 Program to demonstrate Packages.

7 Program to demonstrate Exception Handling.

8 Program to demonstrate Multithreading.

9 Program to demonstrate I/O operations.

10 Program to demonstrate Network Programming.

11 Program to demonstrate Applet structure and event handling.

12 Program to demonstrate Layout managers.

BCA SYLLABUS

SOFTWARE ENGINEERING LAB(BCAP-007)

L:T:P:0:0:2   **CREDITS-1**

Course Objectives:

☐ To understand the software engineering methodologies involved in the phases for project development.

☐ To gain knowledge about open source tools used for implementing software engineering methods.

☐ To exercise developing product-startupsimplementing software engineering methods.

☐ Open source Tools: StarUML / UMLGraph / Topcased

List of Experiments

Do the following 8 exercises for any two projects given in the list of sample projects or any other projects:

1. Development of problem statement.

2. Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents.

3. Preparation of Software Configuration Management and Risk Management related documents.

4. Study and usage of any Design phase CASE tool

5. Performing the Design by using any Design phase CASE tools.

6. Develop test cases for unit testing and integration testing

7. Develop test cases for various white box and black box testing techniques.

Sample Projects:

1. Passport automation System

2. Book Bank

3. Online Exam Registration

4. Stock Maintenance System

5. Online course reservation system

6. E-ticketing

7. Software Personnel Management System

8. Credit Card Processing

9. E-book management System.

10. Recruitment system

BCA SYLLABUS

Office Automation (BCAP 008)

L:T:P:0:0:2   **CREDITS-1**

Course Objective: The objective of an Office Automation course is to provide students with the necessary skills and knowledge to effectively use various computer software applications and technologies for streamlining and enhancing office tasks and processes. The course aims to equip students with practical abilities to automate routine office functions, improve efficiency, and facilitate communication and collaboration within an office environment.

Course Outcome: By the end of this course, students should be able to:

1. Effectively use office automation tools for document creation, presentation, and data analysis.

2. Apply advanced features of office software to optimize office tasks and workflows.

3. Demonstrate effective communication and collaboration skills using office automation tools.

Unit 1 Introduction to Office Automation

Overview of office automation and its benefits, Office Suite applications and their features. Ethical and Legal Considerations in Office Automation

Unit 2 Word Processing and Spreadsheets

Word processing: Formatting, Styles, Mail Merge, Spreadsheets: Formulas, Functions, Charts. Styles, Templates, and Document Automation, Collaboration Tools: Track Changes and Comments

Unit 3 Presentation Tools and Email Management

Creating and delivering presentations, Email and Calendaring: Managing emails and appointments.

Unit 4 Database Management and Workflow Automation

Database management: Creating and querying databases, Document collaboration and version control, Workflow automation using macros and scripts.

Unit 5 Streamlining Workflows and Future Trends

Making Tasks Easier: Workflow Automation, Looking Ahead: Modern Trends in Office Automation, Adapting to New Technologies, Enhancing Efficiency in the Digital Age

Recommended Books:

1. "Microsoft Office 365 & Office 2019: Introductory" by Misty E. Vermaat.

2. "Office 2019 All-in-One for Dummies" by Peter Weverka.

BCA SYLLABUS

Environmental Studies (BCAT 010)

L:T:P:2:0:0   **CREDITS-2**

Course Objective: The course aims to provide participants with a comprehensive understanding of the natural world and the intricate relationships between humans and their environment. The course seeks to raise environmental awareness, foster a sense of responsibility towards the planet, and empower individuals to make informed decisions for sustainable living.

Course Outcome: By the end of this course, students should be able to:

1. Develop a deep understanding of environmental concepts, ecosystems, and biodiversity.

2. Implement sustainable practices for responsible resource management and waste reduction.

3. Analyse the interconnectedness of species and ecosystems within the natural world.

4. Evaluate and address environmental issues such as climate change and habitat destruction.

5. Cultivate a sense of environmental responsibility and engage in ethical decision-making for sustainable living.

Unit 1 Understanding of Environment

Definition, scope and importance of Environment, Multidisciplinary nature of Environmental Sciences, Understanding of Ecology and Ecosystems, Ecological Succession and Ecosystem Services, Energy flow in an Ecosystem; Food Chain, Food Web and Ecological Pyramids, Human interaction with its Environment

Unit 2 Natural Resources and Biodiversity Conservation

Basic concept, types and values of Natural Resources, Resource Consumption, Restoration and Conservation Practices and Sustainable Development, Concept, values and distribution of Biodiversity and its linkages with culture, health and people, Threats to Biodiversity and Biodiversity conservation

Unit 3 Global Environmental issues

Environmental Pollution and Waste Management, Climate Change, Green House Effect and Global Warming, Radiations, Nuclear and Technological Hazards, Population Growth, Disaster, Pandemic and Human Health Risks

Unit 4 Environment and Society

Origin and Evolution of Human; Social, Cultural and Religious Structure and values of Environment, Traditional Wisdom, Indigenous/traditional Communities and Livelihood Security ,Industrial Society, Modernization and Adaptations to Natural and Anthropogenic variations, Environmental Movements, Environmental Ethics and Legislations, Connecting human society with conservation and management of water, energy, biodiversity, culture and heritage and waste management

Recommended Books:

1. Erach Bharucha, Environmental Studies. 2004.UGC and BVIEER Pune

2. Singh, J.S., Singh, S.P. and Gupta, S.R.2014. Ecology, Environmental Science and recourse Conservation. Anamaya Publishers

PYTHON PROGRAMMING (BCAT-011)

L:T:P:3:1:0   **CREDITS-4**

Course Objectives:

☐ Learn Syntax and Semantics and create Functions in Python.

☐ Handle Strings and Files in Python.

☐ Understand Lists, Dictionaries and Regular expressions in Python.

☐ Implement Object Oriented Programming concepts in Python.

☐ Build Web Services and introduction to Network and Database Programming in Python.

Course Outcomes:

☐ Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.

☐ Demonstrate proficiency in handling Strings and File Systems.

☐ Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.

☐ Interpret the concepts of Object-Oriented Programming as used in Python.

☐ Implement exemplary applications related to Network Programming, Web Services and Databases in Python.

UNIT - I

Python Basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types

Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules

Sequences - Strings, Lists, and Tuples, Mapping and Set Types

UNIT - II

FILES: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Related Modules

Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management,

*Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, *Creating Exceptions, Why Exceptions (Now)?, Why Exceptions at All?, Exceptions and the sys Module, Related Modules

Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules

UNIT - III

Regular Expressions: Introduction, Special Symbols and Characters, Res and Python

Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Globa lnterpreter Lock, Thread Module, Threading Module, Related Modules

UNIT - IV

GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs

WEB Programming: Introduction, Wed Surfing with Python, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application Advanced CGI, Web (HTTP) Servers

UNIT - V

Database Programming: Introduction, Python Database Application Programmer's Interface (DB-API),,Object Relational Managers (ORMs), Related Modules

TEXT BOOK:

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.

REFERENCE BOOKS:

1. Think Python, Allen Downey, Green Tea Press

2. Introduction to Python, Kenneth A. Lambert, Cengage

3. Python Programming: A Modern Approach, Vamsi Kurama, Pearson

4. Learning Python, Mark Lutz, O'Really

WEB TECHNOLOGIES (BCAT 012)

L:T:P:3:1:0   **CREDITS-4**

COURSE OBJECTIVES:

1. To teach students the basics of server side scripting using PHP

2. To explain web application development procedures

3. To impart servlet technology for writing business logic

4. To facilitate students to connect to databases using JDBC

5. To familiarize various concepts of application development using JSP

COURSE OUTCOMES:

Upon completion of this course, students will be able to:

1. Create web pages using PHP

2. Identify the difference between the HTML PHP and XML documents.

3. Identify the engineering structural design of XML and parse tree

4. Analyze the difference between and PHP and XML.

5. Understand the concept of JAVA SCRIPTS.

6. Identify the difference between the JSP and Servlet.

7. Design web application using MVC architecture

8. Understand the JSP and Servlet concepts.

9. Apply JDBC and ODBC technologies to create database connectivity

UNIT – I

Web Design Principles, Basics in Web Design,Introduction to HTML, Elements of HTML

UNIT – II

Client side Scripting: Introduction to JavaScript: JavaScript language – declaring variables, scope of variables functions, event handlers (on click, on submit etc.), Document Object Model, Form validations. Simple AJAX applications.

UNIT – III

XML: Introduction to XML, Defining XML tags, their attributes and values, Document type definition, XML Schemas, Document Object model, XHTML Parsing XML Data - DOM and

SAX parsers in java

UNIT – IV

Introduction to Servlets: Common Gateway Interface (CGI), Lifecycle of a Servlets, deploying a Servlets, The Servlets API, Reading Servlets parameters, Reading initialization parameters, Handling Http Request & Responses, Using Cookies and sessions, connecting to a database using JDBC.

UNIT – V

Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session tracking, connecting to database in JSP.

TEXT BOOKS:

1. Web Technologies, Uttam K Roy, Oxford University Press

2. The Complete Reference PHP – Steven Holzner, Tata McGraw-Hill

REFERENCE BOOKS:

1. Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dremtech

2. Java Server Pages – Hans Bergsten, SPD O'Reilly

3. Java Script, D.Flanagan, O'Reilly, SPD.

4. Beginning Web Programming-Jon Duckett WROX.

5. Programming world wide web, R.W. Sebesta. Fourth Edition, Pearson.

6. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson.

BCA SYLLABUS

Database Management System(BCAT 013)

L:T:P:3:1:0   **CREDITS-4**

Course Objective: The objective of this course is to provide students with a comprehensive understanding of database management systems (DBMS) and their role in modern information management. The course aims to develop students' skills in designing, querying, and managing relational databases.

Course Outcome: By the end of this course, students should be able to:

1. Understand the concepts and principles of database management systems.

2. Design and create relational databases using SQL.

3. Query and manipulate data using SQL commands.

4. Apply normalization techniques to ensure data integrity.

5. Understand the principles of database administration and security.

Unit 1 Introduction to Database Management System

Overview of database systems and their components, Data models: hierarchical, network, relational, and object-oriented, Relational database concepts: tables, tuples, attributes, keys, etc.

Unit 2 Entity-Relationship Diagrams and Normalization

Entity-Relationship (ER) modeling, Functional dependencies and normalization, Normal forms:1NF, 2NF, 3NF, BCNF.

Unit 3 Query Languages and Transactions

SQL fundamentals: SELECT, INSERT, UPDATE, DELETE, Joins and subqueries, ACID properties and transaction management.

Unit 4 Indexing and Concurrency Control

Indexing techniques: B-trees, hash indexes, etc., Concurrency control methods: locking, timestamping, etc., Database recovery and backup strategies.

Recommended Books:

1. "Database System Concepts" by Abraham Silberschatz, Henry F. Korth, and S. Sudarshan.

2. "SQL Performance Explained" by Markus Winand.

BCA SYLLABUS

Graph Theory(BCAT014)

L:T:P:3:1:0   **CREDITS-4**

Course Objective: The objective of this course is to introduce students to the concepts and algorithms of graph theory and their applications in various domains. The course aims to develop students' skills in analysing and solving problems related to graphs and networks.

Course Outcome: By the end of this course, students should be able to:

1. Understand the fundamentals of graph theory and its terminology.

2. Analyze and represent problems using graph models.

3. Apply graph algorithms to solve problems such as shortest paths, minimum spanning trees, and network flows.

4. Apply graph theory concepts to solve real-world problems in different domains.

5. Understand the applications of graph theory in computer science, operations research, and other fields.

Unit 1 Introduction to Graph Theory

Basic concepts: Graphs, Vertices, Edges, Types of graphs: Directed, Undirected, Weighted, etc.,Graph representation: Adjacency matrix, Adjacency list.

Unit 2 Graph Traversal and Shortest Paths

Breadth-First Search (BFS) and Depth-First Search (DFS), Dijkstra's algorithm for single-source shortest path, Bellman-Ford algorithm for single-source shortest path.

Unit 3 Spanning Trees and Connectivity

Minimum Spanning Tree (MST) algorithms: Prim's, Kruskal's, Connected components and Strongly Connected Components (SCC).

Unit 4 Network Flows and Matching

Maximum Flow and Minimum Cut problem, Bipartite matching and applications, Applications of graph theory in various fields.

Unit 5 Graph Algorithms

Topological sorting, Eulerian and Hamiltonian cycles, Traveling Salesman Problem (TSP),

Introduction to NP-completeness.

Recommended Books:

1. "Introduction to Graph Theory" by Douglas B. West.

2. "Graph Theory and Its Applications" by Jonathan L. Grossand Jay Yellen

BCA SYLLABUS

PYTHON PROGRAMMING LAB (BCAP-009)

L:T:P:0:0:2   **CREDITS-1**

List of Experiments:

1. Write a program to demonstrate different number data types in Python.

2. Write a program to perform different Arithmetic Operations on numbers in Python.

3. Write a program to create, concatenate and print a string and accessing sub-string from a given string.

4. Write a python script to print the current date in the following format "Sun May 29 02:26:23 IST 2017"

5. Write a program to create, append, and remove lists in python.

6. Write a program to demonstrate working with tuples in python.

7. Write a program to demonstrate working with dictionaries in python.

8. Write a python program to find largest of three numbers.

9. Write a Python program to convert temperatures to and from Celsius, Fahrenheit.
[Formula : c/5 = f-32/9]

10. Write a Python program to construct the following pattern, using a nested for loop

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11. Write a Python script that prints prime numbers less than 20.

12. Write a python program to find factorial of a number using Recursion.

13. Write a program that accepts the lengths of three sides of a triangle as inputs. The program output should indicate whether or not the triangle is a right triangle (Recall from the Pythagorean Theorem that in a right triangle, the square of one side equals the sum of the squares of the other two sides).

14. Write a python program to define a module to find Fibonacci Numbers and import the module to another program.

15. Write a python program to define a module and import a specific function in that module to another program.

16. Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.

17. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.

18. Write a Python class to convert an integer to a roman numeral.

19. Write a Python class to implement pow(x, n)

20. Write a Python class to reverse a string word by word.

BCA SYLLABUS

Database Management System Lab (BCAP 010)

L:T:P:0:0:2   **CREDITS-1**

Objectives:

Students will have the ability to:

• Keep abreast of current developments to continue their own professional development.

• To engage themselves in lifelong learning of Database management systems theories and technologies this enables them to purse higher studies.

• To interact professionally with colleagues or clients located abroad and the ability to overcome challenges that arises from geographic distance, cultural differences, and multiple languages in the context of computing.

• Develop team spirit, effective work habits, and professional attitude in written and oral forms, towards the development of database applications

Outcomes:

Students will be able to demonstrate their skills

☐ In drawing the ER, EER, and UML Diagrams.

☐ In analyzing the business requirements and producing a viable model for the implementation of the database.

☐ In converting the entity-relationship diagrams into relational tables.

☐ To develop appropriate Databases to a given problem that integrates ethical,social, legal, and economic concerns.

LIST OF EXPERIMENTS

1. Implementation of DDL commands of SQL with suitable examples

• Create table • Alter table • Drop Table

2. Implementation of DML commands of SQL with suitable examples •

Insert • Update • Delete

3. Implementation of different types of function with suitable examples

• Number function • Aggregate Function • Character Function • Conversion Function • Date Function

4. Implementation of different types of operators in SQL

● Arithmetic Operators ● Logical Operators ● Comparison Operator ● Special Operator ● Set Operation

5. Implementation of different types of Joins

● Inner Join ● Outer Join ● Natural Join etc..

6. Study and Implementation of

 ● Group By & having clause ● Order by clause ● Indexing

7. Study & Implementation of

● Sub queries ● Views

8 Study & Implementation of different types of constraints.

9 Study & Implementation of Database Backup & Recovery commands. Study & Implementation of Rollback, Commit, Savepoint.

10 ● Creating Database /Table Space

 ● Managing Users: Create User, Delete User ● Managing roles:-Grant, Revoke.

11 Study & Implementation of PL/SQL.

12 Study & Implementation of SQL Triggers.

BCA SYLLABUS

Web Technologies Lab (BCAP 011)

L:T:P:0:0:2   **CREDITS-1**

Experiment 1 (HTML Page)

(a) Create a webpage with HTML describing your department. Use paragraph and list tags.

(b) Apply various colors to suitably distinguish key words. Also apply font styling like italics, underline and two other fonts to words you find appropriate. Also use header tags.

(c) Create links on the words e.g. "Wi-Fi" and "LAN" to link them to Wikipedia pages.

(d) Insert an image and create a link such that clicking on image takes user to other page.

(e) Change the background color of the page. At the bottom create a link to take user to the top of the page.

Experiment 2 (Tables)

(a) Create a table to show your class time-table.

(b) Use tables to provide layout to your HTML page describing your university infrastructure.

(c) Use <span> and <div> tags to provide a layout to the above page instead of a table layout.

(d) Use frames such that page is divided into 3 frames 20% on left to show contents of pages, 60% in center to show body of page, remaining on right to show remarks.

(e) Embed Audio and Video into your HTML web page.

Experiment 3 (CSS)

(a) Apply in-line CSS to change colors of certain text portion, bold, underline and italics certain words in your HTML web page. Also change background color of each paragraph using inline CSS.

(b) Write all the above styling in CSS in different file (.css) and link it to your webpage such that changes made in CSS file are immediately reflected on the page. Group paragraphs into single class and add styling information to the class in CSS.

(c) Create a simple form to submit user input like his name, age, address and favorite subject, movie and singer.

(d) Add few form elements such as radio buttons, check boxes and password field. Add a submit button at last.

Experiment 4 (JavaScript)

(a) Create a form similar to the one in previous experiment. Put validation checks on values entered by the user using JavaScript (such as age should be a value between 1 and 150).

(b) Write a JavaScript program to display information box as soon as page loads.

(c) Write a JavaScript program to change background color after 5 seconds of page load.

(d) Write a JavaScript program to dynamically bold, italic and underline words and phrases based on user actions.

(e) Write a JavaScript program to display a hidden div (e.g. showing stats of a player when user clicks on his name).

Experiment 5(Servlets)

(a) create user registration web Application.

(b) At the server end, write code to retrieve contents of request object and show them to the user. Match user input password with predefined password and show "Valid User" or "Invalid User" .

(c) A web Application name as input and on submit it should show hello <name>. it show start time at the right top corner of the page and provide a logout button. On clicking logout button should goto logout page shows Thank you <name> with duration of usage.

(d) A web application that takes name and age from html page. If age less than 18 it should show

Hello <name> You are not authorized to visit the site. Otherwise welcome <name> to website.

Experiment 6 (JSP)

(a) Create a simple JSP page, preferably for the form in experiment 3. Embed JSP in HTML page itself.

(b) Separate the JSP and HTML coding in different files and link them together. Add data to request object

(c) At the server end, write code to retrieve contents of request object and show them to the

user. Match user input password with predefined password and show "Valid User" or "Invalid

User" .

(d) Modify the above program use XML file instead of database.

(e) Modify the above program to use AJAX to show the result on same page.

BCA SYLLABUS

INTERNSHIP -I (BCAP 012)

L:T:P:0:0:2 **CREDITS-1**

ABOUT INTERNSHIP

It is an organized method or activity of enhancing and improving engineering students' skill sets and knowledge, which boosts their performance and consequently helps them meet their career objectives. Industrial Training is essential in developing the practical and professional skills required for an Engineer and an aid to prospective employment.

OBJECTIVES OF INTERNSHIP:

1. The main objective of the internship to expose the students to the actual working environment and enhance their knowledge and skill from what they have learned in college.

2. Another purpose of this program is to enhance the good qualities of integrity, responsibility, and self confidence. Students must follow all ethical values and good working practices.

3. It is also to help the students with the safety practices and regulations inside the industry and to instils the spirit of teamwork and good relationship between students and employees.

COURSE OUTCOMES: At the end of internship , the students will be able to

 1. Understand organizational issues and their impact on the organization and employees.

 2. Identify industrial problems and suggest possible solutions.

 3. Relate, apply and adapt relevant knowledge, concepts and theories within an industrial organization, practice and ethics.

4. Apply technical knowledge in an industry to solve real world problems.

5. Demonstrate effective group communication, presentation, self-management, and report writing skills.

Understanding India (BCAT-015)

L:T:P:2:0:0   **CREDITS-2**

Course Objectives:This course is designed:

☐ To expose the students to our social, economic and cultural heritage

Course Learning Outcomes: On successful completion of this course, the student will be able to have a knowledge regarding

1. Contemporary India with its historical perspective

2. Constitutional obligations: fundamental rights and duties.

3. Indian knowledge systems (IKS)

4. India's struggle for freedom

Course Outlines:

Background of India's culture, Growth and development of Indian education and literature, Leaders of India's freedom struggle, Geographical features of India, The people of India, Indian Constitution, Political ideas, An overview of Indian economy, A brief introduction of life and ideas of Acharya Vinoba Bhave.

Course Content:

Unit I: Background of India's culture:

1. Harappan civilisation and Vedic age

2. Buddhism, Jainism, Sanatan (Hinduism) and Islam

Unit II: Growth and development of Indian Education and literature:

1. Bharat's Natyashastra, Kalidas, Panini, Patanjali

2. Taxila, Nalanda, Vishwa Bharati, BHU, AMU, IIT, IISC, AIIMS

Unit III: Leaders of India's freedom struggle:

1. Mahatma Gandhi

2. Jawaharlal Nehru

3. Subhash Chandra Bose

4. Freedom fighters of Jharkhand (TilkaManjhi, Sidho-Kanho, Birsa Munda &Jatra

Bhagat)

Unit IV: Geographical features of India

1. India on the map of world and its neighbouring countries

2. Physical features of India including mountain, plateau, plain, coast, island,

vegetation, rivers, soils, and climate

Unit V:The People of India: Racial diversities, Population, its growth, distribution, Migration.

Unit VI: Indian Constitution:

1. Preamble

2. Salient features

3. Fundamental rights

4. Fundamental duties

Unit VII: Political ideas:

 Non-violence, Satyagraha and Social Justice

Unit VIII: The Indian Economy: The Indian Economy through the Ages (Agriculture, Industry and Trade-Transport)

Unit IX: Life and ideas of Acharya Vinoba Bhave: A brief introduction

Suggested Readings

1. A. L. Basham, A Cultural History of India, Oxford University Press, 1997

2. A. L. Basham, A Wonder that was India, Rupa, New Delhi, 1994

3. N. R. Ray, An Approach to Indian Art, Publication Bureau, Chandigarh, 1974

4. NayanjotLahiri, Marshaling the Past: Ancient India and its Modern Histories, Permanent Black, 2012

5. R.C. Majumdar (ed.), History and Culture of Indian People (Relevant Volumes and Chapters), Bhartiya Vidya Bhawan, Bombay.

 6. S. C. Ghosh, History of Education in Modern India, 1758-1986, Orient Longman, Hyderabad, 1995

7. Tirthankar Ray, The Economic History of India 1857-1947, OUP, 2006

8. Vijay Joshi and I.M.D. Little, India's Economic Reforms, 1991-2001, OUP, 199

Operating Systems (BCAT 016)

L:T:P:3:1:0   **CREDITS-4**

Course Objectives:

☐ Introduce operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection)

☐ Introduce the issues to be considered in the design and development of operating system

☐ Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix

Course Outcomes:

☐ Will be able to control access to a computer and the files that may be shared

☐ Demonstrate the knowledge of the components of computer and their respective roles in computing.

☐ Ability to recognize and resolve user problems with standard operating environments.

☐ Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.

UNIT - I

Operating System - Introduction, Structures - Simple Batch, Multiprogrammed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls

UNIT - II

Process and CPU Scheduling - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads, and Interposes Communication, Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling.

System call interface for process management-fork, exit, wait, waitpid, exec

UNIT - III

Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors Interprocess Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message

queues, shared memory.

UNIT - IV

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

UNIT - V

File System Interface and Operations -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. Usage of open, create, read, write, close, lseek, stat, ioctl system calls.

TEXT BOOKS:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley

2. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

REFERENCE BOOKS:

1. Operating Systems – Internals and Design Principles Stallings, Fifth Edition–2005, Pearson Education/PHI

2. Operating System A Design Approach- Crowley, TMH.

3. Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI

4. UNIX programming environment, Kernighan and Pike, PHI/ Pearson Education

5. UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.

BCA SYLLABUS

Computer Network (BCAT017)

L:T:P:3:1:0   **CREDITS-4**

COURSE OVERVIEW: The course introduces main concepts of networking; application areas; classification; reference models; transmission environment; technologies; routing algorithms; IP, UDP and TCP protocols; reliable data transferring methods; application protocols; network security; management systems; perspectives of communication networks. The course structure consists of lectures, tutorials, laboratory works in computer classroom and individual work**.**

UNIT - I

INTRODUCTION: Network applications, network hardware, network software, reference models: OSI,TCP/IP, Internet, Connection oriented network - X.25, frame relay.

THE PHY SICAL LAYER: Theoretical basis for communication, guided transmission media, wireless transmission, the public switched telephone networks, mobile telephone system.

UNIT - II

THE DATA LINK LAYER: Design issues, error detection and correction, elementary data link protocols, sliding window protocols, example data link protocols - HDLC, the data link layer in the internet.

THE MEDIUM ACCESS SUBLAYER: Channel allocations problem, multiple access protocols, Ethernet, Data Link Layer switching, Wireless LAN, Broadband Wireless, Bluetooth

UNIT - III

THE NETWORK LAYER: Network layer design issues, routing algorithms, Congestion control algorithms, Internetworking, the network layer in the internet (IPv4 and IPv6), Quality of Service.

UNIT – IV

THE TRANSPORT LAYER: Transport service, elements of transport protocol, Simple Transport Protocol, Internet transport layer protocols: UDP and TCP.

UNIT - V

THE APPLICATION LAYER: Domain name system, electronic mail, World Wide Web: architectural overview, dynamic web document and http.

APPLICATION LAYER PROTOCOLS: Simple Network Management Protocol, File Transfer Protocol, Simple Mail Transfer Protocol, Telnet.

TEXT BOOKS:

1. A. S. Tanenbaum (2003), Computer Networks, 4th edition, Pearson Education/ PHI, New Delhi, India.

REFERENCE BOOKS:

1. Behrouz A. Forouzan (2006), Data communication and Networking, 4th Edition, Mc Graw-Hill, India.

2. Kurose, Ross (2010), Computer Networking: A top down approach, Pearson Education, India**.**

DATA SCIENCE (BCAT 018)

L: T:P:: 3:1:0   **Credits-04**

COURSE OBJECTIVES: The objectives of this course are to

1. Understand the various characteristics of intelligent agents.

2. Learn the different search strategies in AI.

3. Learn to represent knowledge in solving AI problems.

4. Understand the different ways of designing software agents and know about the various applications of AI.

COURSE OUTCOMES: On successful completion of the course, the students will be able to

1. Build intelligent agents for search and games

2. Solve AI problems through programming with Python.

3. Learn optimization and inference algorithms for model learning.

4. Design and develop programs for an agent to learn and act in a structured environment.

5. Possess the ability to apply AI techniques to solve problems of Game Playing, Expert Systems and machine learning.

UNIT – I   Data Science Context

Need for Data Science – Overview of Data Science and its applications, Key concepts: Data, Information, Knowledge, Role of a Data Scientist, Introduction to data ethics and privacy, Data Science Process Business Intelligence and Data Science – Prerequisites for a Data Scientist – Tools and Skills required.

UNIT – II Databases for Data Science

Structured Query Language (SQL): Basic Statistics, Data Munging, Filtering, Joins, Aggregation, Window Functions, Ordered Data, preparing No-SQL: Document Databases, Wide-column Databases and Graphical Databases.

UNIT – III Data Science Methodology

Analytics for Data Science – Examples of Data Analytics – Data Analytics Lifecycle: Data Discovery, Data Preparation, Model Planning, Model Building, Communicate Results.

Major Text Mining Areas – Information Retrieval – Data Mining – Natural Language Processing NLP)

Text analytics tasks: Cleaning and Parsing, Searching, Retrieval, Text Mining, Part-of-Speech Tagging, Stemming, Text Analytics Pipeline.

UNIT – IV: Platform for Data Science

Introduction to R programming language, RStudio setup and environment, Basic data types and data structures in R, Importing and exporting data in R.

Introduction to the dplyr package for data manipulation, Data cleaning and preprocessing techniques using

dplyr, Handling missing data and outliers, Reshaping and transforming data.

UNIT – V Exploratory Data Analysis

Data visualization techniques (box plots, histograms, scatter plots), Correlation and covariance,

Introduction to ggplot2 for data visualization, creating different types of plots: scatter plots, bar plots,

histograms, Customizing and styling plots, Incorporating EDA techniques to derive insights from data.

TEXTBOOKS:

Sanjeev Wagh, Manisha Bhende, Anuradha Thakare, 'Fundamentals of Data Science, CRC Press, 1st Edition, 2022.

REFERENCE BOOK:

1. Avrim Blum, John Hopcroft, Ravindran Kannan, "Foundations of Data Science", Cambridge University Press, First Edition, 2020.

2. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media, 1st Edition, 2015.

3. Ani Adhikari and John DeNero, 'Computational and Inferential Thinking: The Foundations of Data Science', GitBook, 2019.

BCA SYLLABUS

Information Security(BCAT 019)

L: T:P:: 3:1:0   **Credits-04**

Learning Objectives:

☐ Learn fundamentals of cryptography and its application to network security.

☐ Understand network security threats, security services, and countermeasures.

☐ Understand vulnerability analysis of network security.

☐ Acquire background on hash functions; authentication; firewalls; intrusion detection techniques.

☐ Gain hands-on experience with programming and simulation techniques for security protocols.

☐ Obtain background for original research in network security, especially wireless network and MANET security.

☐ Understand the tradeoffs and criteria/concerns for security countermeasure development.

☐ Apply methods for authentication, access control, intrusion detection and prevention.

☐ Identify and mitigate software security vulnerabilities in existing systems.

UNIT-1 Introduction to Information Security

Introduction to Information Security : Attacks, Vulnerability, Security Goals, Security Services and mechanisms

UNIT -2 Cryptographic Techniques

Conventional Cryptographic Techniques : Conventional substitution and transposition ciphers, One-time Pad, Block cipher and Stream Cipher, Steganography,Symmetric and Asymmetric Cryptographic Techniques : DES, AES, RSA algorithms

BCA SYLLABUS

UNIT-3 Authentication and Digital Signatures

Authentication and Digital Signatures : Use of Cryptography for authentication, Secure Hash function, Key management – Kerberos

UNIT-4 Program Security

Nonmalicious Program errors – Buffer overflow, Incomplete mediation, Time-of-check to Time-of- use Errors, Viruses, Trapdoors, Salami attack, Man-in-the- middle attacks, Covert channels

UNIT -5 Security in Networks

Threats in networks, Network Security Controls – Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honeypots, Traffic flow security, Firewalls – Design and Types of Firewalls, Personal Firewalls, IDS, Email Security – PGP,S/MIME

Reference Books:

1. Security in Computing, Fourth Edition, by Charles P. Pfleeger, Pearson Education

2. Cryptography And Network Security Principles And Practice, Fourth or Fifth Edition, William Stallings, Pearson

3. Modern Cryptography: Theory and Practice, by Wenbo Mao, Prentice Hall.

4. Network Security Essentials: Applications and Standards, by William Stallings. Prentice Hall

BCA SYLLABUS

Modelling and Simulation (BCAT 020)

L: T: P:: 3:1:0   **Credits-04**

COURSE OBJECTIVE: Students undergoing this course are expected to

1. Define, describe and apply basic concepts related to modeling and simulation.

2. Use conservation laws and constitutive relationships and other physical relations to model mechanical, electrical and flow systems, and combinations of these.

COURSE OUTCOME: After completion of the course student will be able to

1: Define, describe and apply basic concepts related to modeling and simulation.

2: Construct bond graphs for the type of systems mentioned above, simplify and analyze the bond graph according to causality conflicts.

3: Use conservation laws and constitutive relationships and other physical relations to model mechanical, electrical and flow systems.

4: Find dynamic response and transfer function using various tools for system modeling.

5: Model and simulate mechanical and electrical systems using the computer tools Simulink.

UNIT -1

Introduction to modeling and simulation: Introduction to modeling, Examples of models, modeling of dynamic system, Introduction to simulation, MATLAB as a simulation tool, Bond graph modeling, causality, generation of system equations.

UNIT-2

Bond graph modeling of dynamic system: Methods of drawing bond graph model Mechanical systems & Electrical systems, some basic system models- Mechanical systems, Thermal systems, hydraulic systems, pneumatic systems and electrical systems.

UNIT 3

System models of combined systems: Linearity and non linearity in systems combined rotary and translatory system, electro mechanical system, hydromechanical system.

UNIT-4

Dynamic Response and System Transfer Function: Dynamic response of 1st order system and

2nd order system, performance measures for 2nd order system, system transfer function,

transfer function of 1st and 2nd order system Block diagram algebra,signal flow diagram, state variable formulation, frequency response and bode plots.

UNIT 5

Simulation and simulation applications: Simulation using SIMULINK, examples of simulation problems- simple and the compound pendulum, planner mechanisms, validation and verification of the simulation model, parameter estimation methods, system identifications, introduction to optimization.

Text Books and References:

1. Zeigler B.P. Praehofer. H. and Kim I.G. "Theory of modeling and simulation", 2nd Edition. Academic press 2000.

2. Robert L. Woods, Kent L. Lawrence, "Modeling and simulation of dynamic systems", Person, 1997.

3. Brown, Forbes T. "Engineering System Dynamics", New York, NY: CRC, 2001. ISBN: 9780824706166.

4. Pratab.R " Getting started with MATLAB" Oxford university Press 2009.

BCA SYLLABUS

Operating system lab (BCAP 012)

L: T: P:: 0:0:2   **Credits-01**

List of Experiments:

1. Write C programs to simulate the following CPU Scheduling algorithms

a) FCFS b) SJF c) Round Robin d) priority

2. Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, fcntl, seek, stat, opendir, readdir)

3. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.

4. Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.

5. Write C programs to illustrate the following IPC mechanisms

a) Pipes b) FIFOs c) Message Queues d) Shared Memory

6. Write C programs to simulate the following memory management techniques

a) Paging b) Segmentation

BCA SYLLABUS

COMPUTER NETWORKS LAB (BCAP-013)

L: T: P:: 0:0:2   **Credits-01**

LIST OF PRACTICALS

1. Installation and configuration of NS2 and Qual Net

2. Creating a network: nodes, links and queues, Creating connections, traffic and computing routers
   Insertion of errors and analysis of trace file.

3. Study of basic network command and network configuration commands.

4. Simple project on NS2 – wired, wireless and combination of wired and wireless

5. Implementation of new protocols in NS2

6. Simulation study of pure ALOHA protocol;

7. Simulation study of slotted ALOHA protocol;

8. Simulation study of Token Bus LAN protocol;

9. Simulation study of Token Ring LAN protocol;

10. Simulation study of WAN protocol like Frame Relay, X. 25

11. Study of 802. 11 wireless LAN protocols.

12. Implement the Distance Vector Routing protocol for finding the shortest path.

13. Write a program to connect server with client and passes information from one system to
    another and vice versa that by creating / establishing connection.

BCA SYLLABUS

CRITICAL THINKING (BCAP 014)

L: T: P:: 0:0:2   **Credits-1**

Objectives :The primary objectives of this course are :

1. To enable students / learners to understand the logical connections between ideas.

2. To help them to identify, construct and evaluate arguments.

3. To equip them to detect inconsistencies and common mistakes in reasoning.

4. To enable them to write analytically for academic purpose.

Syllabus :

1. Critical Thinking

a) Importance and process

b) Barriers to critical thinking

2. Argument

a) Difference between an argument and an opinion

b) Types of arguments

c) Valid patters in arguments

3. Fallacies and Biases

a) Types of fallacies

b) Social influences on critical thinking

4. Developing critical thinking skills in the areas of reading, writing, speaking and listening

5. Constructing an academic argument

(a) The role of world choices in building arguments

(b) Hedging

(c) Using evidence to support claims

(d) Integrating evidence with comments

(e) Using quotations, paraphrase and summaries

(f) Avoiding plagiarism

6. Critical review

a) Purpose and structure

Assessment:

Students' performance and progress will be evaluated through classwork sessionals, homeassignments, case studies, practice exercises, group activities, presentations, group discussions and term exams.

Suggested Reading and References:

1. Anderson, Marilyn. Critical Reasoning, Academic Writing and Presentation Skills. New Delhi: Pearson Education, 2010.

2. Booth, W., G.G. Colomb, J.M. Williams. The Craft of Research. Chicago: University of Chicago Press, 2003.

3. Cottrell, Stella. The Study Skills Handbook. London: Macmillan, 1990.

4. Gardner, Peter S. New Directions: Reading Writing and Critical Thinking. Cambridge Academic Writing Collection, 2005.

5. Mayfield, Marlys. Thinking for Yourself : Developing Critical Thinking Skills through Reading and Writing. Eighth Edition. Boston: Wadsworth. Cengage Learning, 2010.

6. Rossenwasser, David, Jill Stephen. Writing Analytically. Sixth Edition. Boston: Wadsworth. Cengage Learning, 2012.

7. Strunk, William, E.B. White. The Elements of Style. Fourth Edition. Penguin Press, 2008.

8. Tharp, Twyla. The Creative Habit: Learn it and Use it for Life. New York: Simon & Schuster, 2003.

9. Warburton, Nigel. Thinking from A to Z. Routledge Study Guide Series. Routledge, 2000.

10. Weston, Anthony. A Rulebook for Arguments. Fourth Edition. Indianapolis, Hackett Publishing Co., 2009.

R PROGRAMMING LAB (BCAP-015)

L:T:P:: 0:02   **Credits-01**

COURSE OBJECTIVES: The objectives of this course are to

1. To study R programming techniques to effectively manipulate and analyze various types of data sets.

2. To figure out data visualization and I/O Interfaces.

3. To create realistic application-level simulations.

COURSE OUTCOMES: On successful completion of the course, the students will be able to

1. Apply R programming and understand different data sets.

2. Analysing the categories, classifications, and operations within R Programming.

3. Analyse and Evaluate data visualization techniques.

4. Analysing the programming of Input/output (I/O) interfaces.

5. Create an application-level simulation using R.

LIST OF EXPERIMENTS

1. Functions in R

2. Vectors and Lists

3. Data Frames

4. Handling Missing Data

5. Manipulating Data with dplyr and tidyr

6. Processing JSON Data

7. APIs

8. Data Visualization

9. Interactive Visualization in R

10. Case Study

BCA SYLLABUS

HUMAN VALUES (BCAT 021)

L:T:P:: 2:0:0   **Credits-02**

UNIT I

Ethics -Definitional aspects; relevance of ethics in society; scope of ethics

UNIT II

The philosophical basis of ethics, considerations on moral philosophy personal and family ethics.

UNIT III

Ethics in publics affairs - Ethical standards for elected representatives of the people; ethics for the

bureaucracy, police and other institutions of coercive authority; basic values in the civil services

such as dispassion ,non –partisanship,moral integrity,objectivity,dedication to public service and

empathy for weaker sections and groups in society,and non-corruptibility.

UNIT IV

Ethics and professions: - ethical values, standard and practices concerning the legal profession, medicine, engineering, etc.

Ethics at the workplace: - cybercrime, plagiarism, sexual misconduct,fraudulent use of institutional

resources, etc.

Text and Reference Books:

1. A Textbook on Professional Ethics and Human Values by R S Naagarazan.

2. A Foundation Course in Human Values and Professional Ethics by R.R. Gaur, R. Sangal, G.P.Bagaria.

3. Human Values And Professional Ethics by Vaishali R Khosla, Kavita Bhagat

BCA SYLLABUS

Design and Analysis of Algorithm (BCAT-022)

L:T:P: 3:1:0   **Credits:4**

Course Objective: The objective of this course is to provide students with a solid foundation in algorithm analysis and design techniques. The course aims to develop students' skills in solving computational problems, analysing algorithm complexity, and designing efficient algorithms.

Course Outcome: By the end of this course, students should be able to:

1. Understand the fundamentals of algorithm analysis and design.

2. Analyse the time and space complexity of algorithms.

3. Apply algorithmic techniques to solve computational problems.

4. Design and implement efficient algorithms for real-world scenarios.

5. Evaluate and compare different algorithmic approaches for problem solving.

Course Content:

Unit 1 : Introduction to Algorithms Basics of algorithms and problem-solving techniques, Asymptotic analysis: Big-O notation, time and space complexity, Algorithm design paradigms.

Unit 2: Sorting and Searching Algorithms Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort, Heap Sort, Linear and Binary Search.

Unit 3 : Divide and Conquer Algorithms Binary search, Merge sort, Closest pair problem, Karatsuba multiplication.

Unit 4: Dynamic Programming and Greedy Algorithms Fibonacci series, Knapsack problem, Dijkstra's algorithm, Prim's algorithm, Huffman coding.

Unit 5: Graph Algorithms and NP-Completeness Depth-First Search (DFS) and Breadth-First Search (BFS), Shortest path algorithms, Introduction to NP-Completeness and the P vs. NP problem.

Text Books:

 1. "Introduction to the Design and Analysis of Algorithms" by Anany Levitin.

2. "Algorithm Design Manual" by Steven S. Skiena

References Book:

1. AnanyLevitin. Introduction to the design and Analysis of Algorithms. Dorling Kindersley (India) Pvt.Ltd. Second edition

2. Gav PAI, Data Structures and Algorithms, Tata McGraw Hill, Jan 2008.

3. Donald E. Knuth. The art of Computer Programming,Volume 1: Fundamental Algorithms.Addison Wesley.

BCA SYLLABUS

Compiler Design (BCAT -023)

L:T:P: 3:1:0   **Credit**s:4

Course Objective: The course aims to provide participants with a comprehensive understanding of compiler construction principles, enabling them to design, implement, and optimize compilers for programming languages.

Course Outcome: By the end of this course, students should be able to:

1. Explain the phases of compilation and their role in transforming source code.

2. Define context-free grammars and construct parse trees.

3. Perform semantic analysis to catch programming errors.

4. Apply optimization techniques to improve code efficiency.

5. Implement code generation for various target architectures.

Course Content:

Unit 1 : Introduction to Compiler Design Introduction to compilers: Role, importance, and phases of compilation. Overview of lexical analysis, syntax analysis, semantic analysis, code generation, and optimization. Compiler architecture and its components.

Unit 2: Syntax Analysis and Parsing Techniques Formal language grammars: Regular, context-free, and context-sensitive grammars. Parsing techniques: Top-down parsing (LL parsing) and bottom-up parsing (LR parsing). Construction of parse trees and abstract syntax trees.

Unit 3: Semantic Analysis and Type Checking Semantic analysis: Role and importance in error detection and correction. Symbol tables: Organization, scope, and management of symbols. Type systems and type checking: Static and dynamic type checking, type inference.

Unit 4: Code Generation and Optimization Intermediate code generation: Three-address code, quadruples, and intermediate representations. Basic block representation and control flow graphs. Code optimization techniques: Constant folding, common subexpression elimination, loop optimization.

 Unit 5: Compiler Design Tools and Debugging Lexical analysis using tools like Lex. Syntax analysis using tools like Yacc (Bison). Debugging techniques for compilers and tools. Hands-on exercises to implement a basic compiler using Lex and Yacc.

Text Books:

 1. "Modern Compiler Implementation in C/Java/ML" by Andrew W. Appel

 2. "Engineering a Compiler" by Keith D. Cooper and Linda Torczon.

References Book:

1. Alfred V. Aho, Jeffrey D. Ullman (2001), Principles of compiler design, Indian student edition, Pearson Education, New Delhi, India.

2. Kenneth C. Louden (1997), Compiler Construction– Principles and Practice, 1st edition, PWS Publishing.

3. K. L. P Mishra, N. Chandrashekaran (2003), Theory of computer science- Automata Languages and computation, 2nd edition, Prentice Hall of India, New Delhi, India.

4. Andrew W. Appel (2004), Modern Compiler Implementation C, Cambridge University Press, UK.

Artificial Intelligence (BCAT-024)

L:T:P: 3:1:0   **Credits:4**

Course Objectives :The course is proposed to teach concepts of Artificial Intelligence. The subject will provide the foundations for AI problem solving techniques and knowledge representation formalisms.

Course Outcomes: On successful completion of the course, students will be able to achieve the following:

1. Ability to identify and formulate appropriate AI methods for solving a problem.

2. Ability to implement AI algorithms.

3. Ability to compare different AI algorithms in terms of design issues, computational complexity, and assumptions.

4. Student will be able to use the concepts of AI for real world problem solving.

5. Visualize the basic use of AI algorithms and their implementations in laboratory.

Course Content:

Unit I: Introduction- Definitions, Intelligent Agents, Problem solving and Search- Uninformed Search, Informed Search, MiniMax Search, Constraint Satisfaction Problem, A*, Best Search, DFS, BFS.

Unit II: Prolog- Introduction to Prolog, Syntax and Meanings of Prolog Programs, Operators and Arithmetic, Prolog for Artificial Intelligence.

Unit III: Knowledge Representation- Introduction, Approaches and Issues in Knowledge Representation, Propositional Logic and Inference, First-Order Logic and Inference, Unification and Resolution, Expert Systems.

Unit IV: Reasoning- Introduction, Types of Reasoning, Probabilistic Reasoning, Probabilistic Graphical Models, Certainty factors and Rule Based Systems, Introduction to Fuzzy Reasoning.

Unit V: Planning and Learning- Introduction to Planning, Types-Conditional, Continuous, Multi-Agent. Introduction to Learning, Categories of Learning, Inductive Learning, Supervised and Unsupervised & Reinforcement Learning, Basic Introduction to Neural Net Learning.

Text Books:

 1. Stuart J. Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", Pearson Education Asia,Third Edition.

2. Elaine Rich, Kevin Knight and ShivashankarB.Nair, "Artificial Intelligence", Tata McGraw-Hill,.

3. Nils J. Nilsson, "Artificial Intelligence - A New Synthesis", Harcourt Asia Pvt. Ltd., Morgan Kaufmann.

Reference Books:

1. Ivan Bratko, "Prolog Programming for Artificial Intelligence", Pearson Education Asia.

2. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", PHI Learning.

Cloud Computing (BCAT-025)

L:T:P: 3:1:0   **Credits 4**

Course Objective: The objective of this course is to provide graduate students with the comprehensive and in-depth knowledge of Cloud Computing concepts, technologies, architecture and applications by introducing and researching state-of-the-art in Cloud Computing fundamental issues, technologies, applications and implementations.

Course Outcome: By the end of this course, students should be able to:

1. Understand the key dimensions of the challenges and benefits of Cloud Computing.

2. Describe the principles of Parallel and Distributed Computing and evolution of cloud computing from existing technologies

3. Implement different types of Virtualization technologies and Service Oriented Architecture systems.

4. Choose among various cloud technologies for implementing applications. 5. Install and use current cloud technologies.

Course Content:

Unit 1: Introduction to Cloud Computing Introduction: Cloud-definition, benefits, usage scenarios, History of Cloud Computing, Cloud Architecture, Types of Clouds, Players in Cloud Computing, issues in Clouds.

Unit 2: Types of Cloud Services and Providers Types of Cloud services, Software as a Service, Platform as a Service, Infrastructure as a Service, Database as a Service, Monitoring as a Service, Communication as services. Service ProvidersGoogle, Amazon, Microsoft Azure, IBM, Sales force. **Unit 3:** Collaborating Using Cloud Services Collaborating Using Cloud Services Email Communication over the Cloud, CRM Management, Project Management, Event Management, Task Management, Calendar, Schedules, Word Processing, Presentation, Spreadsheet, Databases, Desktop, Social Networks and Groupware

Unit 4 Virtualization for Cloud and Cloud Security Virtualization for Cloud Need for Virtualization, Pros and cons of Virtualization, Types of Virtualizations, System VM, Process VM, Virtual Machine monitor, Virtual machine properties, HLL VM, Hypervisors, Xen, KVM, VMWare, Virtual Box, Hyper-V

Unit 5 Future Trends in Mobile Communication Cloud Security: Infrastructure Security- Network level security, Host level security, Application level security, Data security, Authentication in cloud computing, Cloud security challenges.

Text Books:

1. "Cloud Computing: Concepts, Technology & Architecture" by Thomas Erl, Ricardo Puttini, and Zaigham Mahmood

2. "Cloud Computing: A Practical Approach" by Anthony T. Velte, Toby J. Velte, and Robert Elsenpeter.

Reference Books:

1. John Rittinghouse& James Ransome, Cloud Computing, Implementation, Management and Strategy, CRC Press, 2010.

2. 2. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Que Publishing, August 2008.

3. 3. James E Smith, Ravi Nair, Virtual Machines, Morgan Kaufmann Publishers, 2006.

4. 4. Cloud Computing: Concepts, Technology & Architecture by Thomas Erl.

Image Processing (BCAT-026)

L:T:P: 3:1:0   **Credits 4**

Course Objectives: The course objectives are:

1. Provide the student with the fundamentals of digital image processing

2. Give the students a taste of the applications of the theories taught in the subject. This will be achieved through the project and some selected lab sessions.

3. Introduce the students to some advanced topics in digital image processing.

4. Give the students a useful skill base that would allow them to carry out further study should they be interested and to work in the field.

Course Outcomes: Upon Successfully completing the course, the student should:

1. Have an appreciation of the fundamentals of Digital Image Processing including the topics of filtering, transforms and morphology, and image analysis and compression.

2. Be able to implement basic image processing algorithms in MATLAB.

3. Have the skill base necessary to further explore advanced topics of Digital Image Processing.

4. Be in a position to make a positive professional contribution in the field of Digital Image Processing.

5. At the end of the course the student should have a clear impression of the breadth and practical scope of Digital Image Processing and have arrived at a level of understanding that is the foundation for most of the work currently underway in this field.

UNIT 1: Digital image fundamentals & Image Transforms:- Digital Image fundamentals, Sampling and quantization, Relationship between pixels. Image Transforms: 2-D FFT, Properties. Walsh transform, Hadamard Transform, Discrete cosine Transform, Discrete Wavelet Transform.

UNIT 2: Image enhancement (spatial domain) : Introduction, Image Enhancement in Spatial Domain, Enhancement Through Point Operation, Types of Point Operation, Histogram Manipulation, gray level Transformation, local or neighborhood operation, median filter, spatial domain highpass filtering. Image enhancement (Frequency domain): Filtering in Frequency Domain, Obtaining Frequency Domain Filters from Spatial Filters, Generating Filters Directly in the Frequency Domain, Low Pass(smoothing) and High Pass (sharpening) filters in Frequency Domain

UNIT 3: Image Restoration: Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration.

UNIT 4: Image segmentation: Detection of discontinuities. Edge linking and boundary detection, Thresholding, Region oriented segmentation Morphological Image Processing :Dilation and Erosion,

Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, The Hit or Miss Transformation.

UNIT 5: Image Compression: Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Huffman and Arithmetic Coding, Error Free Compression, Lossy Compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000 Standards.

TEXT BOOKS:

1. Digital Image Processing- Rafeal C. Gonzalez, Richard E. Woods, 3rd Edition, Pearson, 2008

2. Digital Image Processing- S Jayaraman, S. Essakkirajan, T. Veerakumar-TMH,2010

REFERENCE BOOKS:

1 Digital Image Processing and analysis-human and computer vision application with using CVIP Tools – Scotte Umbaugh,2nd Ed, CRC Press,2011

2. Introduction to Digital Image Processing with Matlab, Alasdair McAndrew, Thomson Course Technology

3.Fundamentals of Digital Image Processing-A.K. Jain, PHI,1989

4.Digital Image Processing and computer Vision-Somka, Halavac, Boyle - Cengage learning (Indian edition)2008,

5. Digital Image Processing using Matlab, Rafeal C. Gonzalez, Richard E. Woods, Steven L. Eddins, Pearson Education.

BCA SYLLABUS

Computer Graphics(BCAT-027)

L:T:P: 3:1:0   **Credits 4**

Course Objectives: These subject helps students develop problem-solving, communication and research skills in the context of computer graphics, including computer representation, and manipulation and display of pictorial information. It also helps students enhance their skills to design and implement three-dimensional (3D) computer images, such as those used in animated films, virtual reality (VR), data visualization and computer games.

Course Outcomes: On successful completion of the course, students will be able to achieve the following:

 1. Describe the major computer graphics applications.

 2. Explain the operations of graphics hardware systems

 3. Explain the viewing pipeline of generating a raster-scan image

UNIT 1: Introduction, Basic elements of Computer graphics, Applications of Computer Graphics. Graphics Hardware, Video Display Devices, Architecture of Raster and Random scan display devices, Input devices, Hard-copy devices, Graphics software.

UNIT 2: Fundamental Techniques in Graphics, Line Drawing Algorithms: DDA Algorithm, Bresenham's Line algorithm, Circle Generating Algorithms: Midpoint Circle Algorithm. Filled-Area Primitives: Scan-line polygon fill algorithm, Inside-Outside Tests, boundary Fill Algorithm, Flood- Fill algorithm.

UNIT 3: Two- Dimensional Geometric Transformations: Basic Transformations- Translation, Rotation, Scaling. Matrix representations and Homogeneous Coordinates, Composite Transformations. Other Transformations: Reflection, Shearing.

UNIT 4: Two-Dimensional Viewing: The Viewing Pipeline, Clipping operations: Point clipping, Line Clipping: Cohen Sutherland line clipping, Liang- Barsky line clipping, Nicholl-lee-Nicholl line clipping, Polygon Clipping: Sutherland-Hedgeman Polygon Clipping, Weiler-Atherton Polygon Clipping, Curve Clipping, Text Clipping, Exterior Clipping.

UNIT 5: Three-Dimensional Concepts: 3-D display methods: Parallel projection, Perspective projection, Depth cueing, Visible line and surface identification, Surface rendering.

Text books:

1. Computer Graphics C Version, Donald Hearn and M Pauline Baker, Pearson Education, 2nd edition, 2006

2. Introduction to Computer Graphics, J.D. Foley, A.V. Dam, Addison-Wesley Publishing Company, 2nd edition, 1994.

Reference Books:

1. Computer Graphics (Schaums Outline Series), R.A. Plastock et.al., TMH, 2nd edition, 2006

2. Computer Graphics, J.D. Foley, Pearson Education, 2nd edition, 2004

BCA SYLLABUS

Design and Analysis of Algorithm Lab (BCAP-016)

L:T:P: 0:0:2   **Credits 1**

COURSE OBJECTIVES:

1. The principle objective of this course is to build solid foundation in algorithms and their applications.
2. To implement various divide and conquer techniques examples.
3. To implement various Greedy techniques examples.
4. To implement various Dynamic Programming techniques examples.
5. To provide a practical exposure of all algorithms.
6. To understand the importance of algorithm and its complexities.

COURSE OUTCOMES:

1. Students will be able to calculate the time complexity of algorithm.
2. Students will be able to sort the given numbers using various sorting algorithms.
3. Students will be able to write programs for the problems using Divide and Conquer.
4. Students will be able to write programs for the problems using Greedy Method.
5. Students will be able to write programs for the problems using Dynamic programming.
6. Students will be able to write programs for the problems using Backtracking.

EXPERIMENTS

1. Write a program to perform operation count for a given pseudo code.

2. Write a program to perform Bubble sort for any given list of numbers.

3. Write a program to perform Insertion sort for any given list of numbers.

4. Write a program to perform Quick Sort for the given list of integer values.

5. Write a program to find Maximum and Minimum of the given set of integer values.

6. Write a Program to perform Merge Sort on the given two lists of integer values.

7. Write a Program to perform Binary Search for a given set of integer values recursively and nonrecursively.

8. Write a program to find solution for knapsack problem using greedy method.

9. Write a program to find minimum cost spanning tree using Prim's Algorithm.

10. Write a program to find minimum cost spanning tree using Kruskal's Algorithm.

11. Write a program to perform Single source shortest path problem for a given graph.

12. Write a program to find solution for job sequencing with deadlines problem.

13. Write a program for all pairs shortest path problem.

14. Write a program to solve N-QUEENS problem.

15. Write a program to solve Sum of subsets problem for a given set of distinct numbers.

Reference Books:

1. Data Structures and Algorithms by G.A.V. Pai, 2017, TMH.

2. Fundamentals of Computer Algorithms by Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, 2 nd edition, University Press.

BCA SYLLABUS

Compiler Design Lab(BCAP-017)

L:T:P: 0:0:2   **Credits 1**

COURSE OBJECTIVE: This laboratory course is intended to make the students experiment on the basic techniques of compiler construction and tools that can used to perform syntax-directed translation of a highlevel programming language into an executable code. Students will design and implement language processors in C by using tools to automate parts of the implementation process. This will provide deeper insights into the more advanced semantics aspects of programming languages, code generation, machine independent optimizations, dynamic memory allocation, and object orientation.

COURSE OUTCOMES: Upon the completion of Compiler Design practical course, the student will be able to:

1. Understand the working of lex and yacc compiler for debugging of programs.

2. Understand and define the role of lexical analyzer, use of regular expression and transition diagrams.

3. Understand and use Context free grammar, and parse tree construction.

4. Learn & use the new tools and technologies used for designing a compiler.

5. Develop program for solving parser problems.

6. Learn how to write programs that execute faster.

Experiment

1 Design a lexical analyzer for given language and the lexical analyzer should ignore redundant spaces, tabs and new lines. It should also ignore comments. Although the syntax specification states that identifiers can be arbitrarily long, you may restrict the length to some reasonable value. Simulate the same in C language.

2 Write a C program to identify whether a given line is a comment or not.

3 Write a C program to recognize strings under 'a', 'a*b+', 'abb'.

4 Write a C program to check whether a mathematical statement is solvable or not.

5 Write a C program to simulate lexical analyzer for validating operators.

6 Implement the lexical analyzer using JLex, flex or other lexical analyzer generating tools

7 Write a C program for implementing the functionalities of predictive parser for the mini language specified in Note 1.

8 Write a C program for constructing of LL (1) parsing.

9 Write a C program to calculate FIRST of a regular expression.

10 Calculate leading for all The non-terminals of the given grammar

11 Design NFA, DFA, and Conversion of RE to NFA using JFAP simulations tools.

12 Conversion from NFA to DFA, DFA minimization using JFLAP simulation software.

Reference Books:

1. Modern compiler implementation in C, Andrew w.Appel, Revised Edn, Cambridge University Press
2. Principles of Compiler Design. – A.V Aho, J.D Ullman ; Pearson Education.
3. lex&yacc , -John R Levine, Tony Mason, Doug Brown; O'reilly.
4. Compiler Construction,- LOUDEN, Thomson.
5. Engineering a compiler – Cooper& Linda, Elsevier 6. Modern Compiler Design – Dick Grune, Henry E.Bal, Cariel TH Jacobs, Wiley Dreatech

BCA SYLLABUS

Computer Graphics Lab(BCAP-018)

L:T:P: 0:0:2   **Credits 1**

COURSE OBJECTIVES: The main objective is students gain knowledge about multimedia concepts, 2D and 3D Transformations.s

COURSE OUTCOMES:

1 Explain line drawing using programming language.

2 Explain 2D and 3D transformations

3 Demonstrate simple 2D animations using animation software.

4 Prepare simple scenes using image editing software.

5 Explain the linking between web and multimedia.

6 Model a simple multimedia application

EXPERIMENTS:

1. To implement Line, Circle and ellipse attributes

2. To implement line drawing algorithms DDA line algorithm, Bresenham's line algorithm

3. To perform 2D and 3D transformations

4. To perform animation using any Animation software (Create Frame by Frame Animations using multimedia authoring tools)

5. To perform basic operations on image using any image editing software

6. To develop a presentation for a product using techniques like Guide Layer, masking and onionSkin using authoring tools.

7. To create a Jpeg image that demonstrates the various features of an image editing tool.

8. Write a program to perform line clipping.

9. Write a program to implement reflection of a point, line.

10. Write a program to perform shearing on a line.

11. Write a program to implement polygon filling.

12. Write a program to implement transformations in three dimensions.

Text books:

1. Computer Graphics C Version, Donald Hearn and M Pauline Baker, Pearson Education, 2nd edition, 2006

2. Introduction to Computer Graphics, J.D. Foley, A.V. Dam, Addison-Wesley Publishing Company, 2nd edition, 1994.

Reference Books:

1. Computer Graphics (Schaums Outline Series), R.A. Plastock et.al., TMH, 2nd edition, 2006

2. Computer Graphics, J.D. Foley, Pearson Education, 2nd edition, 2004

INTERNSHIP -II (BCAP 019)

L:T:P:0:0:2   **CREDITS-1**

ABOUT INTERNSHIP

It is an organized method or activity of enhancing and improving engineering students' skill sets and knowledge, which boosts their performance and consequently helps them meet their career objectives. Industrial Training is essential in developing the practical and professional skills required for an Engineer and an aid to prospective employment.

OBJECTIVES OF INTERNSHIP:

1. The main objective of the internship to expose the students to the actual working environment and enhance their knowledge and skill from what they have learned in college.

2. Another purpose of this program is to enhance the good qualities of integrity, responsibility, and self confidence. Students must follow all ethical values and good working practices.

3. It is also to help the students with the safety practices and regulations inside the industry and to instils the spirit of teamwork and good relationship between students and employees.

COURSE OUTCOMES: At the end of internship , the students will be able to

 1. Understand organizational issues and their impact on the organization and employees.

 2. Identify industrial problems and suggest possible solutions.

 3. Relate, apply and adapt relevant knowledge, concepts and theories within an industrial organization, practice and ethics.

4. Apply technical knowledge in an industry to solve real world problems.

5. Demonstrate effective group communication, presentation, self-management, and report writing skills.

BCA SYLLABUS

.Net Framework and Technologies (BCAT-028)

L:T:P: 3:1:0   **Credits 4**

Course Objective: The ASP .NET course aims to equip student with a strong foundation in developing dynamic web applications using the ASP .NET framework. Through the course, participants will learn how to design and build interactive web pages, utilizing languages like C# for server-side logic. They will grasp concepts of model-view-controller (MVC) architecture, essential for creating scalable and maintainable web applications.

Course Outcome: By the end of this course, students should be able to:

1. To learn fundamentals of. net framework .

2. To enrich knowledge about Windows Forms, Controls and ASP.NET based applications.

3. To acquire skills to create web-based applications and Reports using .net technologies.

Course Content:

Unit 1: Introduction to .NET Framework and Managed Code Introduction to .NET Framework: Managed Code and the CLR- Intermediate Language, Metadata and JIT Compilation - Automatic Memory Management

Unit 2 Language Concepts, CLR, and Framework Class Library Language Concepts and the CLR: Visual Studio .NET - Using the .NET Framework. The Framework Class Library: NET objects - ASP .NET - .NET web services – Windows Forms

Unit 3: ASP.NET Features and Web Services ASP.NET Features: Change the Home Directory in IIS - Add a Virtual Directory in IIS- Set a Default Document for IIS - Change Log File Properties for IIS - Stop, Start, or Pause a Web Site.

Unit 4 Web Controls and Creating Web Forms Creating Web Controls: Web Controls - HTML Controls, Using Intrinsic Controls, Using Input Validation Controls, Selecting Controls for Applications - Adding web controls to a Page. Creating Web Forms: Server Controls - Types of Server Controls - Adding ASP.NET Code to a Page.

UNIT 5: Advanced Features Using C#: Distributed Application in C#, XML and C#, Unsafe Mode, Graphical Device Interface with C#, CASE Study (Messenger Application)

Text Books:

1. Jeffrey Richter, "Applied Microsoft .NET Framework Programming", (Microsoft)

2. Fergal Grimes, "Microsoft .Net for Programmers", (SPD)

3. Balagurusamy, "Programming with C# ", TMH 4. Wiley," Beginning Visual C# 2008",Wrox

Reference Books:

1. "Professional ASP.NET 4.5 in C# and VB" by Jason N. Gaylord, Christian Wenz, Pranav Rastogi, Todd Miranda, and Scott Hanselman

2. "ASP.NET Core 5 for Beginners" by Jonas Fagerberg

BCA SYLLABUS

Machine learning (BCAT-029)

L:T:P: 3:1:0   **Credits 4**

Course Objective: The course aims at introducing the basic concepts and techniques of machine learning so that a student can apply machine learning techniques to a problem at hand.

Course Outcome: By the end of this course, students should be able to:

1. Differentiate between supervised and unsupervised learning tasks.

2. Differentiate between linear and non-linear classifiers.

3. Describe theoretical basis of SVM

4. Implement various machine learning algorithms learnt in the course.

Course Content:

Unit 1 Introduction to Machine Learning and Types Introduction: Well-Posed learning problems, Basic concepts, Designing a learning system, Issues in machine learning. Types of machine learning: Learning associations, Supervised learning, Unsupervised learning, Reinforcement learning

Unit 2 Decision Tree Learning Decision tree representation, appropriate problems for decision tree learning, Univariate Trees (Classification and Regression), Multivariate Trees, Basic Decision Tree Learning algorithms, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning.

Unit 3 Bayesian Learning Bayes theorem and concept learning, Bayes optimal classifier, Gibb's algorithms, Naive Bayes Classifier, Bayesian belief networks, The EM algorithm.

Unit 4 Artificial Neural Network Neural network representation, Neural Networks as a paradigm for parallel processing, Linear discrimination, pairwise separation, Gradient Descent, Logistic discrimination, Perceptron, Training a perceptron, Multilayer perceptron, Back propagation Algorithm. Recurrent Networks, dynamically modifying network structure.

Unit 5 Genetic Algorithms and Data Mining Techniques Genetic Algorithms: Basic concepts, Hypothesis space search, Genetic programming, Models of evolution and learning, Parallelizing Genetic Algorithms. Data Mining Techniques for Analysis: Classification: Decision tree induction, Bayes classification, Rule-based classification, Support Vector Machines, Classification Using Frequent Patterns, k-Nearest-Neighbour, Fuzzy-set approach Classifier, Clustering: K-Means, k-Medoids, Agglomerative versus Divisive Hierarchical Clustering Distance Measures in Algorithmic Methods, Mean-shift Clustering

Text Books:

1. Mitchell T.M., Machine Learning, McGraw Hill

2. Bishop C., Pattern Recognition and Machine Learning, Springer-Verlag

Reference Books:

1. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, 2nd Edition by Aurélien Géron, Publisher(s): O'Reilly Media, Inc.

2. Rich & Knight, Artificial Intelligence – Tata McGraw Hill, 2nd edition, 1991.

3. 1. DAN.W. Patterson, Introduction to A.I and Expert Systems – PHI, 2007.

4. Russell & Norvig, Artificial Intelligence-A Modern Approach, LPE, Pearson Prentice Hall, 2nd edition, 2005.

BCA SYLLABUS

Web Security (BCAT-30)

L:T:P: 3:1:0   **Credits 4**

Course Objective: This course is geared towards generating and enhancing awareness about cyber security challenges and the concepts of web security and cyber ethics among the students to help them become responsible cyber citizens and participate safely and securely in the rapidly evolving information-age society

Course Outcome: By the end of this course, students should be able to:

1. Remember the broad set of technical, social & political aspects of Web Security.

2. Understand the importance of ethical hacking, its tool and ethical hacking process.

 3. Analyse security principles to system design.

4. Understand the methods for authentication, access control, intrusion detection and prevention in Web Security.

Course Content:

Unit 1 Fundamentals of Cyber Security and Threat Landscape Importance and challenges in Cyber Security, Cyberspace, and Cyber threats, Cyber warfare, CIA Triad, Cyber Terrorism, Cyber Security of Critical Infrastructure

Unit 2 Cyber Attacks and Intrusion Techniques Types of Hackers - Hackers and Crackers, Cyber-Attacks and Vulnerabilities, Malware threats, Sniffing, Gaining Access - Escalating Privileges, Executing Applications, Hiding Files, Covering Tracks. Worms, Trojans, Viruses, Backdoors

Unit 3 Ethical Hacking and Information Security Practices Ethical Hacking Concepts and Scopes, Threats and Attack Vectors, Information Assurance, Threat Modeling, Enterprise Information Security Architecture, Vulnerability Assessment and Penetration Testing

Unit 4 Social Engineering and Insider Threats Types of Social Engineering - Insider Attack - Preventing Insider Threats - Social engineering Targets and Defence Strategies

Unit 5 Legal Framework and Countermeasures in Cyber Security IT Act, Hackers-Attacker-Countermeasures, Web Application Security, Counter Cyber Security Initiatives in India, Cyber Security Incident Handling, Cyber Security Assurance

Text Books:

1. Cyber Security and Cyber Laws Nilakshi Jain Wiley

2. Cyber Security Nina Godbole Wiley

Reference Books:

1. Cyber Security by Nina Godbole Sunit Belapure

2. Cybersecurity - Attack and Defense Strategies: Infrastructure security with Red Team and Blue Team tactics by Yuri Diogenes Cryptography and Network Security by Forouzan

4. The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws by Dafydd Stuttard

BCA SYLLABUS

Mobile Application and Development (BCAT -031)

L:T:P: 3:1:0   **Credits 4**

COURSE OBJECTIVES:

1. To make the student understand the basic concepts of mobile application development, be aware of Characteristics of mobile applications, User-interface design, basics of graphics and multimedia.

2. To gain knowledge about testing and publishing of Android application

COURSE OUTCOMES:

1. To explain the basics of mobile application development

2. Develop Android application with User interface, networking and animation.

3. Use simulator tools to test and publish the application.

COURSE CONTENT

UNIT 1 Mobile Application Development - Mobile Applications and Device Platforms - Alternatives for Building Mobile Apps -Comparing Native vs. Hybrid Applications -The Mobile Application Development Lifecycle-The Mobile Application Front-End-The Mobile Application Back-EndKey Mobile Application Services-What is Android-Android version history-Obtaining the Required Tools-Launching Your First Android Application-Exploring the IDE-Debugging Your Application-Publishing Your Application

UNIT 2 Understanding Activities-Linking Activities Using Intents-Fragments-Displaying Notifications Understanding the Components of a Screen-Adapting to Display Orientation-Managing Changes to Screen Orientation- Utilizing the Action Bar-Creating the User Interface Programmatically Listening for UI Notifications

UNIT 3 Using Basic Views-Using Picker Views -Using List Views to Display Long Lists-Understanding Specialized Fragments - Using Image Views to Display Pictures -Using Menus with ViewsUsing WebView- Saving and Loading User Preferences-Persisting Data to Files-Creating and Using Databases.

UNIT 4 Sharing Data in Android-Creating Your Own Content Providers -Using the Content ProviderSMS Messaging -Sending Email-Displaying Maps- Getting Location Data- Monitoring a Location.

UNIT 5 Consuming Web Services Using HTTP-Consuming JSON Services- Creating Your Own Services - Binding Activities to Services -Understanding Threading . UNIVERSITY OF MADRAS BACHELOR OF COMPUTER APPLICATIONS (B.C.A.) SYLLABUS WITH EFFECT FROM 2020-2021

TEXT BOOK:

1. Jerome DiMarzio, "Beginning Android Programming with Android Studio", 4 thEdition.

REFERENCE BOOKS:

1. Dawn Griffiths, David Griffiths, "Head First Android Development: A Brain-Friendly Guide", 2017.

2. Neil Smyth , "Android Studio 3.0 Development Essentials: Android", 8 th Edition.

3. Pradeep Kothari, "Android Application Development (With Kitkat Support)", Black Book 2014.

.Net Framework and Technologies Lab (BCAP-020)

L:T:P: 0:0:2   **Credits 1**

COURSE OBJECTIVE:

1. The student will gain knowledge in the concepts of the .NET framework as a whole and the technologies that constitute the Framework.
2. The student will gain programming skills in C# both in basic and advanced levels.
3. By building sample applications, the student will get experience and be ready for large-scale projects.

COURSE OUTCOMES:

1. Write, compile and debug programs in C# language.
2. To learn the basics of object oriented programming.
3. To get knowledge of windows programming.
4. To get knowledge on server side programming.
5. To gain knowledge on web services and dynamic link libraries.

Experiments:

1. Develop a C# .NET console application to demonstrate the conditional statements.
2. Develop a C# .NET console application to demonstrate the control statements.
3. Develop an application in C#.NET that demonstrates the windows controls
4. Demonstrate Multithreaded Programming in C#.NET
5. Demonstrate subroutines and functions in C#.NET
6. Develop an application for deploying various built-in functions in VB.NET
7. Develop an MDI application for Employee Pay-roll transactions in VB.NET
8. Construct a console application to demonstrate the OOP Concepts
9. Develop a web application in VB.NET for dynamic Login Processing
10. Develop a Windows application with database connectivity for core-banking transactions.

References Books:

1. "Programming in C#", E. Balagurusamy, 4th Edition, Tata McGraw-Hill, 2017.
2. "Visual Basic.NET", Shirish Chavan, 3rd Edition, Pearson Education, 2009.
3. "ASP.NET and VB.NET Web Programming", Matt J. Crouch, Edition 2012.
4. "Computing with C# and the .NET Framework", Arthur Gittleman, 2nd Edition, Jones & Bartlett Publishers, 2011

Seminar (BCAP-021)

L:T:P: 0:0:2   **Credits 1**

THE OVERVIEW OF PROJECT SEMINAR

The course is accompanied by seminars that introduce new approaches to understand and further elaborate different facets of innovation thinking and to provide participants with practical training as well as ready to use state of the art knowledge. Besides, students will present on a regular basis the development of their business plans of practical oriented innovation projects. At last, students will be asked to defend their developed business plans of projects with consideration of discussed aspects. The aim of this course is to consolidate, expand and exercise theoretical and practical skills for successful implementation of projects from start to finish by developing business plans of innovative projects.

COURSE OUTCOME: On successful completion of this course, the students shall be able to

1. Prepare and develop practically applicable business plan for an innovative project with consideration of addressed issues.

2. Develop the sub-skills required for business plans of innovation projects presentation and group discussions.

3. Acquire the soft skills and interpersonal skills which will help them in their workplace needed for these functions.

4. Develop planning skills of the innovative projects and business ideas in order to improve professional competencies.

5. Make presentation on the topic, answer the queries/questions that come forward, clarify, and supplement if necessary, and submit a report.

The assessment of the Seminar

The activities on the Seminar classes and developed projects are assessed separately. Students form groups of 3-5 members to develop business plan of practical innovative project plan i.e., project. The final grade will be calculated in accordance with the syllabus of this course. Students are expected to develop and gradually improve their business plans of innovation projects with regular presentations of interim results.

Apart from that,

by the end of the course students are supposed to submit their final version of business plans of projects as an essay. The oral defense of group project will be held on the final colloquium.

Major Project (BCAP-022)

L:T:P:: 0:0:12   **Credits-06**

COURSE OBJECTIVES: The objectives of the course are to

1. Develop skills in doing literature survey, technical presentation, and report preparation.

2. Enable project identification and execution of preliminary works on final semester project.

COURSE OUTCOMES: On successful completion of this course, the students shall be able to

1. Discover potential research areas in the field of information technology.

2. Create very precise specifications of the IT solution to be designed.

3. Have introduction to the vast array of literature available about the various research challenges in the field of IT.

4. Use all concepts of IT in creating a solution for a problem.

5. Have a glimpse of real world problems and challenges that need IT-based solutions.

Data Visualization and Analytics (BCAP-023)

L:T:P: 0:0:2   **Credits 1**

Course Objective This course introduces to extend student's knowledge and practice in data analysis and visualization, software, and applications. It provides the board overview of techniques of the visualization process, detailed view of visual perception, the visualized data and the actual visualization, interaction and distorting techniques.

Course Outcome: Upon completion of this course, students should be able to

1. Explain the concept of visualization in the processing and analysis of data.

2. Develop visualization methods and visualization systems using software applications.

3. Perform creative work in the field of visualization.

Course Contents

Unit 1: Introduction to visualization Introduction of visual perception, Visual representation of data" Data Abstraction, Visual Encodings, Use of Color, Percepfual Issues, Information overloads

Unit 2: Creating visual representations Visualization reference model, Visual mapping, Visual analyics, Design of Visualization applications.

Unit 3: Non spatial data visualization Visualization of one, two and multi-dimensional data, Tabular data, quantitative values (scatter plot), Separate, Order, and Align (Bar, staked Bar, dots and line charts), Tree data, Displaying Hierarchical Structures, graph dat4 rules for graph drawing and labeling, text and document data, levels of text representation, visualizations of a single text document, word cloud, flow data Time series data, characteristics of time data, visualization time series data, mapping of time

Unit 4: Spatial Data Visualization Scalar fields, Isocontours (Topographic Terrain Maps), scalar volumes, Direct Volume Rendering(Multidimensional Transfer Functions), Maps (dot, pixel), vector fields Defining Marks and Channels

Unit 5: Software tools and data for visualization The iris data set, The Detroit Data Set, The Breakfast Cereal Data Set, Dow Jones Industrial Average Data Set (time series), MS Python, Matlab, Java, Tableau

Text Books:

1. " Fry, visuar izne.Data- o'Reilly Media,2008

2. Information visualization: perception for Design, 3rd ed. Morgan Kaufmann,2012

Reference Books:

1. Telea, Data Visualization: Principles and Practics. A.K. Peters, Ltd,2007

BCA SYLLABUS

Self-Employment and Entrepreneurship Development (BCAP-032)

L:T:P: 2:0:0   **Credits 1**

Course Objectives: A Generic Course that is intended to inculcate an integrated personal life skill to the students.

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

1.Communicate the major concepts of entrepreneurship.

2. Understand Entrepreneurial Motivation and Mobility.

3. Innovate, prototypes or ideas by applying theory into practice.

4. Explain process of setting up of service unit/industry.

5. Describe about support institutions and schemes.

Course Content

UNIT 1 Entrepreneurship Meaning and Importance - Evolution of term Entrepreneurship - Factors influencing entrepreneurship (Psychological factors, Social factors, Economic factor, Environmental factors) - Characteristics of an entrepreneur - Types of entrepreneurs- # Rural entrepreneurship, Women entrepreneurship - Intrapreneur.

UNIT 2 Entrepreneurial Motivation and Mobility Entrepreneurial Motivation - Meaning – Motivation Theories – Motivating factors – Achievement Motivation – Entrepreneurial Mobility – Factors influencing Entrepreneurial Mobility – Occupational Mobility – Locational Mobility.

UNIT 3 Creativity, Innovation and Idea Generation Creativity Innovation and entrepreneurship – Creativity Process - Components of Creative Performance – Selecting Business Ideas – Methods of Generating New Ideas – Dynamics of Project Identification.

UNITI 4 Setting Small Enterprises Introduction – Project Identification and Selection – Project Formulation – Project Appraisal – Financing of Enterprise – Ownership Structures.

UNIT 5 hours Support to Entrepreneurs A brief overview of financial institutions in India – NSIC, SIDO, SSIB, SSICS, SISI, DICs, Industrial Estates- Sickness in small Business –causes and consequences, Corrective Measures – Government Policy for Small Scale Enterprises – Growth Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Sub Contracting.

Text Book:

1. Khanka, S S. 'Entrepreneurial Development', S Chand & Company Ltd. New Delhi

2. SatishTaneja, S.L. Gupta, 'ENTREPRENEUR DEVELOPMENT – New Venture Creation', Galgotia Publishing Company, New Delhi.

References Books:

1. Rabindra N. Kanungo "Entrepreneurship and innovation", Sage Publications, New Delhi.

2. Tendon ,C: Environment and Entrepreneur; Cliugh Publications, Allahabad.

3. SinerA David: EntrepreneuralMegabuks; John Wiley and Sons, New York.

4. Srivastava S. B: A Practical Guide to Industrial Entrepreneurs; Sultan Chand and Sons, New Delhi.

5. Prasanna Chandra: Protect Preparation, Appraisal, Implementation; Tata McGraw Hill. New Delhi.