IIMTU-NEPIMPLEMENTATION
Year-I / Semester-I

Programme: Certificate Class: BCA		Year: I Semester: I
Credits Theory: 3 Cr	**Subject: English communication**	
Course Code: **NHU-111**	**Title: English Communication**	

Course Objectives:
CO1: It aims to improve English communication skills i.e., Listening, speaking, reading, & writing.
CO2: To develop potential skills to deal confidently in English with diverse situations in the external world.
CO3: To work in a collaborative manner & communicate effectively in English.
CO4: To get exposure to various activities related to English Communication which will enable the learners to take initiative, solve problems, and demonstrate a positive work ethics.

Nature of Paper: AECC

Minimum Passing Marks/Credits: 40% Marks

L: 3
T: 0
P: 0 (In Hours/Week)
Theory - 1 Hr. = 1 Credit

Unit	Contents	No. of Lectures Allotted
I	English Communication skills: listening skills, speaking skills, reading skills, writing skills. Starting and sustaining a conversation. Process of Communication, Essential of effective Communication, Barriers to Communication, Role of Communication	8
II	Public Speech, Delivering skills, Group discussion, Communication in seminars, Conferences and Committees Parts of Speech- Noun, Pronoun, Adjective, Verb, Adverb, Conjunction, Preposition, Interjection, Articles, Common errors in English	8
III	Presentation: Features, Styles, Use of visual aids, Creating a Dynamic Presentation, Presentation and interaction, Telephonic conversation & Basic Etiquette. Non-Verbal Communication: Meaning, Types and Importance. Listening: Difference between Listening and Hearing	8
IV	Word Skills-Synonyms, Antonyms, Words often Confused, Idioms, Phrases, Phrasal Verbs	8
V	Drafting of Notices, Agendas, Minutes, Job Application letter, CV, Business Correspondence, Essentials of Effective Business Correspondence, Types and Structure of Business Letter.	8

Text Books:	
- English Grammar and Composition by Wren & Martin - Effective Communication and Soft Skills by Nitin Bhatnagar - The ACE of Soft Skills: Attitude, Communication and Etiquette for Success by Gopalaswamy Ramesh and Mahadevan Ramesh	
Reference - English Grammar in Use by Raymond Murphy - English **Grammar Composition and Usage by J.C. Nesfield**	
Evaluation/Assessment Methodology	
	Max. Marks 50
1) Class tasks/ Sessional Examination 2) Presentations /Seminar/Attendance 3) Assignments/TA	15
4) Research Project Report Seminar On Research Project Report	Nil
5) ESE	35
Total:	50
Prerequisites for the course: NIL	
Course Learning Outcome CO1: To get knowledge about communication skills. CO2: To understand about use of grammar. CO3: To understand about presentation. CO4: To get information about how to face interview and public. CO5: To get knowledge about telephonic conversation & etiquette.	

IIMTU-NEP IMPLEMENTATION
Year-I / Semester-I

Programme: Certificate	Year: I
Class: BCA	Semester: I
Credits Theory:4Cr	**Subject:** Mathematics-I
Course Code: BCA-NEP-104	**Title:** Mathematics-I

Course Objectives:

CO1: Compute the rank and inverse of a matrix and solve system of linear equations.

CO2: Computation of Limits of Various Types of Functions, Continuity over an Interval, to find Intermediate Value Theorem and type of Discontinuities.

CO3: Understand the Derivatives, Chain Rule, Derivatives of Composite Functions, Logarithmic Differentiation, Successive Differentiation.

CO4: Use of different theorems like Rolle's Theorem, Mean Value Theorem, Leibnitz Theorem, Partial Differentiation, Euler's Theorem.

CO5: Understanding of Integral as Limit of Sum, Riemann Sum, Fundamental Theorem of Calculus, Indefinite Integrals, Methods of Integration Substitution.

Nature of Paper: DSE

Minimum Passing Marks/Credits: 40% Marks

L:4
T:0
P:0(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	**Determinants:** Definition, Minors, Cofactors, Properties of Determinants, **Matrices**: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, Cramer's Rule, Rank of Matrix, Eigen Vectors of a Matrix, Cayley-Hamilton Theorem (without proof)	8
II	**Limits & Continuity**: Limit at a Point, Properties of Limit, Computation of Limits of Various Types of Functions, Continuity at a Point, Continuity Over an Interval, Intermediate Value Theorem, Type of Discontinuities.	8
III	**Differentiation:** Derivative, Derivatives of Sum, Differences, Product & quotients, Chain Rule, Derivatives of Composite Functions, Logarithmic Differentiation, Successive Differentiation.	8
IV	**Application of Differentiation:** Rolle's Theorem, Mean Value Theorem, Expansion of Functions (Maclaurin's & Taylor's), Indeterminate Forms, L' Hospitals Rule, Maxima & Minima, Leibnitz Theorem, Partial Differentiation, Euler's Theorem.	8
V	**Integration:** Integral as Limit of Sum, Riemann Sum, Fundamental Theorem of Calculus, Indefinite Integrals, Methods of Integration Substitution, By Parts, Partial Fractions, Integration of Algebraic and Transcendental Functions, Definite Integral, Simple Problems of Line Integral.	8

Text Books:

1. Babu Ram, "*Engineering Mathematics*", Pearson Education

BOS

2. H.K. Dass, "*Advanced Engineering Mathematics*", S. Chand & Company	
Reference	
1. Erwin Kreyszig, "*Advanced Engineering Mathematics*", John Wiley & Sons.	
2. B. S. Grewal, "*Elementary Engineering Mathematics*", Khanna Publishers	
Evaluation/Assessment Methodology	
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100
Prerequisites for the course: NIL	

Course Learning Outcomes:

CO1: Compute the rank and inverse of a matrix and solve system of linear equations.

CO2: Computation of Limits of Various Types of Functions, Continuity over an Interval, to find Intermediate Value Theorem and type of Discontinuities.

CO3: Understand the Derivatives, Chain Rule, Derivatives of Composite Functions, Logarithmic Differentiation, Successive Differentiation.

CO4: Use of different theorems like Rolle's Theorem, Mean Value Theorem, Leibnitz Theorem, Partial Differentiation, Euler's Theorem.

CO5: Understanding of Integral as Limit of Sum, Riemann Sum, Fundamental Theorem of Calculus, Indefinite Integrals, Methods of Integration Substitution.

IIMTU-NEPIMPLEMENTATION
Year-I / Semester-I

Programme: Certificate		**Year: I**	
Class: BCA		**Semester: I**	
Credits Theory:4Cr	**Subject:** Discrete Mathematics		
Course Code: BCA-NEP-104	**Title:** Discrete Mathematics		

Course Objectives:

CO1: Identify and prove properties of Algebraic Structures like Groups, Rings and Fields. Formulate and solve recurrences and recursive functions.

CO2: Apply the concept of combinatorics to solve basic problems in discrete mathematics.

CO3: Use mathematical and logical notation to define and formally reason about basic discrete structures such as Sets, Relations and Functions.

CO4: Apply mathematical arguments using logical connectives and quantifiers to check the

CO5: Validity of an argument through truth tables and propositional and predicate logic.

Nature of Paper: Discipline Specific Elective

Minimum Passing Marks/Credits: 40% Marks

L:4
T:0
P:0 (In Hours/Week)
Theory-1 Hr.=1Credit
Practical-2 Hrs.=1Credit (4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	**Set Theory:** Introduction, Size of sets and Cardinals, Venn diagrams, Combination of sets, Multi sets, ordered pairs and Set Identities. **Functions:** Definition, Types of functions, Operations on functions, recursively defined functions. **Relation:** Definition, Operations on relations, Composite relations, Properties of relations, Equality of relations, Partial order relation.	8
II	**Posets, Hasse Diagram and Lattices:** Introduction, Partial ordered sets, Combination of Partial ordered sets, Hasse diagram, Introduction on flattices, Properties of lattices– Bounded, Complemented, Modular and Complete lattice. **Boolean Algebra:** Introduction, Axioms and Theorems of Boolean algebra, Boolean functions. Simplification of Boolean functions, Karnaugh maps, Logic gates.	8
III	**Predicate Logic:** Theory of Predicates, First order predicate, Predicate formulas, Quantifiers, Inference theory of predicate logic. **Propositional:** Propositions, Truth tables, Tautology, Contradiction, Algebra of Propositions, Theory of Inference and Natural Detection.	8
IV	**Algebraic Structures:** Introduction to algebraic Structures and properties. Types of algebraic structures: Semi group, Monoid, Group, Abelian group and Properties of group. Subgroup, Cyclic group, Cosets, Permutation groups, Homomorphism and Isomorphism of groups. **Rings and Fields:** Definition and elementary properties of Rings and Fields.	8

V	**Natural Numbers:** Introduction, Piano's axioms, Mathematical Induction, Strong Induction and Induction with Nonzero Base cases. **Recurrence Relation & Generating functions:** Introduction and properties of Generating Functions. Simple Recurrence relation with constant coefficients and Linear recurrence relation without constant coefficients. Methods of solving recurrences. **Combinatorics:** Introduction, Counting techniques and Pigeonhole principle, Polya's Counting theorem.	8

Text Book:
1. Kenneth H. Rosen, "Discrete Mathematics and Its Applications", Mc Graw Hill, 2006.
2. B. Kolman, R.C. Bus by and S. Cross", Discrete Mathematics Structures", Prentice Hall, 2004.

Reference Book:
1. R.P. Girimaldi, "Discrete and Combinatorial Mathematics", Addison Wesley, 2004.
2. Y.N. Singh, "Discrete Mathematical Structures", Wiley-India, First edition,2010.

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report Seminar On Research Project Report	10
5) ESE	75
Total:	100

Prerequisites for the course: NIL

Course Learning Outcomes:
CO1: Able to identify the properties of functions and relations.
CO2: Able to understand the concepts of sets and perform operations.
CO3: Able to verify the correctness of an argument using truth tables.
CO4: Able to solve problem using counting techniques and combinatorics.
CO5: Able to analyze preposition and predicate logics.

IIMTU-NEP IMPLEMENTATION
Year - I/ Semester- I

Programme:UG Class:BCA		Year: I Semester:I
Credits Theory: 0 Practical: 2	**Subject:Fundamental of Computer and IT LAB**	
Course Code: BCA-NEP-106P	**Title:Fundamental of Computer and IT LAB**	
Course Objectives: CO1: Understand Computer Fundamentals – hardware and Software CO2: Understand computer networks CO3: Study Office automation tools CO4: Email and search engines		
Nature of Paper: Core		
Minimum Passing Marks/Credits:50% Marks		
L:0 T:0 P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)		

Unit	Contents	No. of Lectures Allotted
I	Identify the internal and external hardware/peripheral components	2
II	Identify the internal and external hardware/peripheral components	2
III	Prepare and print Bio-data with a covering letter using word processor.	2
IV	Calculation of Total mark, grade based on boundary conditions for n number of students using Spread sheet.	2
V	Preparation of presentation (with transition and animations, insertion of scanned images and internet contents)	2
VI	Email id creation, sending and receiving of email with attachments.	2
VII	Demonstrate how to create email-id and uploading and downloading files.	2
VIII	Identify various operating system file management commands (create, copy, move, delete and rename folders and files)	2

Evaluation/Assessment Methodology	
	Max. Marks:50
1) Class tasks/ Sessional Examination 2) Presentations /Seminar 3) Assignments 4) Research Project Report/Seminar On Research Project Report	25
5) ESE	25
Total:	50

CourseLearning Outcomes: Student will be able to:
CO1: Converse in basic computer terminology
CO2: Formulate opinions about the impact of computers on society
CO3: Possess the knowledge of basic hardware peripherals

IIMTU-NEP IMPLEMENTATION
Year-I / Semester-I

Programme: Certificate	Year: I
Class: BCA	Semester: I
Credits Theory:4Cr	**Subject:** Mathematics-I
Course Code: BCA-NEP-104	**Title:** Mathematics-I

Course Objectives:
CO1: Compute the rank and inverse of a matrix and solve system of linear equations.
CO2: Computation of Limits of Various Types of Functions, Continuity over an Interval, to find Intermediate Value Theorem and type of Discontinuities.
CO3: Understand the Derivatives, Chain Rule, Derivatives of Composite Functions, Logarithmic Differentiation, Successive Differentiation.
CO4: Use of different theorems like Rolle's Theorem, Mean Value Theorem, Leibnitz Theorem, Partial Differentiation, Euler's Theorem.
CO5: Understanding of Integral as Limit of Sum, Riemann Sum, Fundamental Theorem of Calculus, Indefinite Integrals, Methods of Integration Substitution.

Nature of Paper: DSE

Minimum Passing Marks/Credits: 40% Marks

L:4
T:0
P:0(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	**Determinants:** Definition, Minors, Cofactors, Properties of Determinants, **Matrices**: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, Cramer's Rule, Rank of Matrix, Eigen Vectors of a Matrix, Cayley-Hamilton Theorem (without proof)	8
II	**Limits & Continuity**: Limit at a Point, Properties of Limit, Computation of Limits of Various Types of Functions, Continuity at a Point, Continuity Over an Interval, Intermediate Value Theorem, Type of Discontinuities.	8
III	**Differentiation:** Derivative, Derivatives of Sum, Differences, Product & quotients, Chain Rule, Derivatives of Composite Functions, Logarithmic Differentiation, Successive Differentiation.	8
IV	**Application of Differentiation:** Rolle's Theorem, Mean Value Theorem, Expansion of Functions (Maclaurin's & Taylor's), Indeterminate Forms, L' Hospitals Rule, Maxima & Minima, Leibnitz Theorem, Partial Differentiation, Euler's Theorem.	8
V	**Integration:** Integral as Limit of Sum, Riemann Sum, Fundamental Theorem of Calculus, Indefinite Integrals, Methods of Integration Substitution, By Parts, Partial Fractions, Integration of Algebraic and Transcendental Functions, Definite Integral, Simple Problems of Line Integral.	8

Text Books:
1. Babu Ram, "*Engineering Mathematics*", Pearson Education
2. H.K. Dass, "*Advanced Engineering Mathematics*", S. Chand & Company

Reference
1. Erwin Kreyszig, "*Advanced Engineering Mathematics*", John Wiley & Sons.
2. B. S. Grewal, "*Elementary Engineering Mathematics*", Khanna Publishers

Evaluation/Assessment Methodology	
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100

Prerequisites for the course: NIL

Course Learning Outcomes:

CO1: Compute the rank and inverse of a matrix and solve system of linear equations.

CO2: Computation of Limits of Various Types of Functions, Continuity over an Interval, to find Intermediate Value Theorem and type of Discontinuities.

CO3: Understand the Derivatives, Chain Rule, Derivatives of Composite Functions, Logarithmic Differentiation, Successive Differentiation.

CO4: Use of different theorems like Rolle's Theorem, Mean Value Theorem, Leibnitz Theorem, Partial Differentiation, Euler's Theorem.

CO5: Understanding of Integral as Limit of Sum, Riemann Sum, Fundamental Theorem of Calculus, Indefinite Integrals, Methods of Integration Substitution.

IIMTU-NEP IMPLEMENTATION
Year-I / Semester-I

Programme: Certificate		Year: I	
Class:BCA		Semester: I	
Credits Theory:4Cr	**Subject:**Fundamentals of Computers and IT		
Course Code: BCA-NEP-102	**Title:** Fundamentals of Computers and IT		

Course Objectives:

CO1: Demonstrate the use of mathematical software and solve simple mathematical problems.

CO2: Explain the needs of hardware and software required for a computation task.

CO3: State typical provisions of cyber law that govern the proper usage of Internet and computing resources.

CO4: Explain the working of important application software and their use to perform any engineering activity.

CO5: Demonstrate the use of Operating system commands and shell script.

Nature of Paper: Core

Minimum Passing Marks/Credits: 40% Marks

L:4
T:0
P:0 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	**Introduction to Computers:** Introduction, Characteristics of Computers, Block Diagram of Computer, Generations, Types of Computers and Their Features, Types of Programming Languages, Types of Memory, RAM, ROM, Secondary Storage Devices (FD, CD, HD, Pen drive), Input and Output Devices.	8
II	**Number Systems:** Introduction to Binary, Octal, Decimal, Hexadecimal Number Systems, Conversion, Simple Addition, Subtraction, Multiplication and division. **Algorithm and Flowcharts:** Definition, Characteristics, Advantages and Disadvantages, Symbols of Flow Chart.	8
III	**Operating System and Services:** Types of Operating System, Features of Operating System, Functions and Services of Operating System. DOS – History, Files and Directories, Internal and External Commands, Batch Files. Windows - History, Icons, Files and Folders, Control Panel, Task Bar, Desktop.	8
IV	**Office Tools:** Basic Concepts, Uses. **Word:** Menu Bar, Menus, Submenus, Tool Bar, Tools, Customizing Toolbar, Hiding Toolbar, Creating and Saving Documents, Working with an Existing Document, Auto Text, Auto Complete and Auto Correct; Formatting a Document, Word Art, Using Tables and Columns-Table Creation and Modification Giving Stress to Auto-Fit, Auto-Format; Object Linking and Embedding, Inserting and Sizing Graphics, Hyperlink, Envelopes & Label Creation, Grammar & Spell Check, Previewing and Printing Documents, Mail Merge.	8

	Excel: Creating a Simple Spreadsheet, Editing a Spreadsheet, Working with Functions and Formula, Formatting Worksheets, Creating Charts, Inserting and Formatting Data in a Worksheet, Working with an Existing Data List, Auto Fill, Fill Series and Auto- complete Options, Formatting Cells; Sorting & Filtering Data, Conditional Formatting, Interlinking Worksheets and Files, Setting Filters and Performing Calculations on Filtered Data etc.	
V	**Power Point:**Creating and Viewing Presentations, Editing a Presentation, Editing Master Slides, Inserting, Sorting, Hiding and Deleting Slides, Inserting Pictures, Creating Tables, Slide Layouts, Adding Transition and Animation Effect, Hyper Linking Slides & Files. **Internet and its Applications:** Introduction, Usage, Browser, Websites, Protocol, Domain Name, IP address,E-Mail, TELNET, FTP, World Wide Web, Portal, Blogging, E-Learning and wiki, Social Networking	8

Text Books:

1. P.K. Sinha, "*Fundamental of Computers",*BPB Publications.
2. Stephen W. Sagman & Gail Taylor, *"MS-Office 2000For Windows*", Peachpit Press.

Reference

1. V.Rajaraman, "*Fundamental of Computers*", Prentice-Hall of India.

Evaluation/Assessment Methodology	
	Max. Marks- 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report Seminar On Research Project Report	10
5) ESE	75
Total:	100

Prerequisites for the course:NIL

Course Learning Outcomes:

CO 1: Demonstrate the use of mathematical software and solve simple mathematical problems.
CO 2: Explain the needs of hardware and software required for a computation task.
CO 3: State typical provisions of cyber law that govern the proper usage of Internet and computing resources.
CO 4: Explain the working of important application software and their use to perform any engineering activity.
CO 5: Demonstrate the use of Operating system commands and shell script.

IIMTU-NEP IMPLEMENTATION
Year-I / Semester-I

Program:UG	Year: I
Class: BCA	Semester: I
Credits: Practical: 2	**Subject: Problem-Solving using C Lab**
Course Code: **BCA-NEP-105P**	**Title: Problem-Solving using C Lab**

Course Objectives:

CO 1: Students will be able to learn the basics of programming language and Fundamental concepts of C Language.

CO2: Students will be able to learn and understand Concepts of basic programming with Conditional and Iterative Control statements.

CO3: Students will be familiar with the concept of Arrays, Pointers, Functions, categories of function, and recursion.

CO4: Students will be able to develop a Program with Structure; learn Union and Complete String Operations.

CO5: Students will be familiar with File handling programs to perform read-write operations.

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks

L:0
T:0
P:4 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	Write a program to display "hello world" in C.	02
II	Write a program to find the largest and smallest among three entered numbers and also display whether the identified largest/smallest number is even or odd.	02
III	Write a program to check whether the entered year is a leap year or not (a year is a leap if it is divisible by 4 and divisible by 100 or 400.)	
IV	Write a program to read a string and check for palindrome without using string-related functions (a string is a palindrome if its half is mirror by itself.	02
V	Write a program to find the biggest among three numbers using a pointer.	02
VI	Create a structure named company which has a name, address, phone, and as member variables. Read the name of the company, its address, phone, and no Of Employee. Finally display these members' values.	02
VII	The BCT class and display the details from the function.	02
VIII	Write a program to show programming examples with unions and structures.	02

Reference / Text Books:

- ❖ The C Programming Language" by Brian W. Kernighan and Dennis M. Ritchie.
- ❖ C Programming: A Modern Approach" by K. N. King.

Evaluation/Assessment Methodology	
	Max. Marks:50
1) Class tasks/ Sessional Examination 2) Presentations /Seminar 3) Assignments 4) Research Project Report Seminar On Research Project Report	25
5) ESE	25
Total:	50

Course Learning Outcomes:

CO1: Students will be able to develop programs based on fundamental concepts of programming in C.

CO2: Students will be able to solve problems based on Conditional and Iterative Control Statements.

CO3: Students will be able to learn Complete Programming Concepts of Arrays, Pointers and get familiar with modular programming Concepts of C using Functions.

CO4: Students will be able to learn conceptual programming with String, Structure, and its differentiation with Union.

CO5: Students will be able to perform File handling programs with read and write concepts

IIMTU-NEP IMPLEMENTATION
Year- I / Semester – I

Programme: Certificate	Year: I
Class: BCA	Semester: I

Credits Theory:4Cr Practical:2Cr	**Subject: Problem Solving using C**
Course Code: BCA-NEP-101	**Title: Problem Solving using C**

Course Objectives:

CO 1: Students will be able to learn the basics of programming language and Fundamental concepts of C Language.

CO 2: Students will be able to learn and understand Concepts of basic programming with Conditional and Iterative Control statements.

CO 3: Students will be familiar with concept of Arrays, Pointers, Functions, categories of function and recursion.

CO 4: Students will be able to develop Program with Structure; learn Union and Complete String Operations.

CO 5: Students will be familiar with File handling programs to perform read write operations.

Nature of Paper: Core

Minimum Passing Marks/Credits: 40% Marks

L:0
T:0
P: 4(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit
(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	**Introduction to 'C' Language:** History, C Character Set, Tokens, Keywords, Constants, Identifiers, Variables, Data Types, Comments, Structures of 'C' Program, Introduction to Pre-processor Directives: #include, #define, printf(), scanf(), Declaration, Assignment, Operators, Expressions, Statements, Arithmetic Expressions.	10
II	**Branching and Looping:** Two Way Selection (if, if-else, Nested if-else, cascaded if-else), Switch Statement, Ternary Operator, goto Statement, Loops (for, while, do-while) in C, break and continue Statements, Nested Loops.	10
III	**Arrays**: Types of Arrays, Array Declaration, Array Initialization, Accessing Data from Array, Using Arrays with Functions, Multi-Dimensional Arrays. **Pointers:** Basics, Pointer and Function, Array of Pointers. **Storage Classes:** Automatic, External, Static & Register. **Functions:** Advantages of Functions, declaring a Function, defining a Function, calling a Function, Argument Passing – Call by Value, Call by Reference, Types of Functions, Recursion.	9
IV	**String:** Declaring, Initializing, String Manipulation Functions, String Input and Output Functions, String Pointer, Array of Strings, Passing String to Function.	8

	Structure and Union: Basic of Structures, Structures and Functions, Array of Structures, Pointer to Structure, Union.		
V	**File Handling:** Introduction, File Types- Text, Binary, The File Pointer, Opening a File, Closing a File, Reading and Writing a File, File Handling Functions: fgetc(), fputc(), fputs(), fgets(), fprintf(), fscanf(), fwrite(), fread(), fseek(), ftell(), feof( ) etc.	8

Text Books:
1. E. Balaguruswamy, "*Programming in ANSI C*", Tata Mc.Graw-Hill education.
2. YashwantKanetkar, *"Let us C",* BPB Publications

Reference
1. V Rajaraman, "*Computer Basics and C Programming*", PHI Learning
2. Ashok N. Kamthane, "*Programming in C*", Pearson Education.

Evaluation/Assessment Methodology

	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100

Prerequisites for the course: NIL

Course Learning Outcomes:

CO1: Students will be able to develop programs based on fundamental concepts of programming in C.

CO2: Students will be able to solve problems based on Conditional and Iterative Control

CO3: Statements.

Students will be able to learn Complete Programming Concepts of Arrays, Pointers and get

CO4: familiar with modular programming Concepts of C using Functions.

Students will be able to learn conceptual programming with String, Structure and its

CO5: differentiation with Union.

Students will be able to perform File handling programs with read and write concepts.

IIMTU-NEP IMPLEMENTATION
Year-I / Semester-II

Programme: Certificate	**Year: I**
Class:BCA	**Semester:** II
Credits Theory:4Cr	**Subject:**Optimization Techniques
Course Code: BCA-NEP-204	**Title:**Optimization Techniques

Course Objectives:

CO1: Enumerate the fundamental knowledge of Linear Programming and Dynamic Programming problems.

CO2: Operation research models using optimization techniques based upon the fundamentals of engineering mathematics (minimization and Maximization of objective function).

CO3: The problem formulation by using linear, dynamic programming, game theory and queuing models.

CO4: The stochastic models for discrete and continuous variables to control inventory and simulation of manufacturing models for the production decision making.

CO5: Formulation of mathematical models for quantitative analysis of managerial problems in industry.

Nature of Paper: DSE

Minimum Passing Marks/Credits:40% Marks

L:4
T:0
P:0(In Hours/Week)
Theory - 1 Hr. = 1 Credit

Unit	Contents	No. of Lectures Allotted
I	**LINEAR PROGRAMMING (L.P):** Revised Simplex Method, Duel simplex Method, Sensitivity Analysis **DYNAMIC PROGRAMMING (D.P):**Multistage decision processes. Concepts of sub optimization, Recursive Relation-calculus method, tabular method, LP as a case of D.P.	8
II	**CLASSICAL OPTIMIZATION TECHNIQUES:** Single variable optimization without constraints,ulti variable optimization without constraints, multivariable optimization with constraints –method of Lagrange multipliers, Kuhn-Tucker conditions. **NUMERICAL METHODS FOR OPTIMIZATION:** Nelder Mead's Simplex search method, Gradient of a function, Steepest descent method,Newton's method.	8
III	**MODERN METHODS OF OPTIMIZATION:** **GENETIC ALGORITHM (GA):** Differences and similarities between conventional and evolutionary algorithms, working principle, Genetic Operators- reproduction, crossover, mutation **GENETIC PROGRAMMING (GP):** Principles of genetic programming, terminal sets, functional sets, differences between GA & GP, Random population generation. Fuzzy Systems: Fuzzy set Theory, Optimization of Fuzzy systems	8

IV	**QUEUING THEORY**	8
	Queuing Model, poison and exponential distributions -Queues with combined arrivals and departures-random and series queues.	
V	**INTEGER PROGRAMMING:**	8
	Graphical Representation, Gomory's Cutting Plane Method, Balas' Algorithm for Zero–One Programming, Branch-and-Bound Method.	
	APPLICATIONS OF OPTIMIZATION IN DESIGN AND MANUFACTURING SYSTEMS:	
	Formulation of model- optimization of path synthesis of a four-bar mechanism, minimization of weight of a cantilever beam, general optimization model of a machining process, optimization of arc welding parameters, and general procedure in optimizing machining operations sequence.	

Text Books:
1. J. K. Sharma, "Operations Research", Macmillan, 5th Edition, 2012.
2. R. Pannerselvan, "Operations Research", 2nd Edition, PHI Publications, 2006.

Reference
1. A. M. Natarajan, P. Balasubramani, A. Tamilarasi, "Operations Research", Pearson Education, 2013.
2. Maurice Saseini, ArhurYaspan, Lawrence Friedman, "Operations Research: Methods & Problems",1st Edition, 1959.

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100

Prerequisites for the course: *Problem Solving using C*

Course Learning Outcomes:
CO1: Identify appropriate optimization method to solve complex problems involved in various industries.
CO2: Demonstrate the optimized material distribution schedule using transportation model to minimize total distribution cost.
CO3: Find the appropriate algorithm for allocation of resources to optimize the process of assignment. Apply the knowledge of game theory concepts to articulate real-world competitive situations
CO4: toidentify strategic decisions to counter the consequences.
Develop a suitable queuing system to control important performance measures dynamically.
CO5:

IIMTU-NEP IMPLEMENTATION
Year-I / Semester-II

Programme: Certificate	**Year: I**	
Class:BCA	**Semester:** II	

Credits Theory:4Cr Practical:2Cr	**Subject:**Data Structure Algorithms using C
Course Code: BCA-NEP-201	**Title:**Data Structure Algorithms using C

Course Objectives:

CO1: Demonstrate familiarity with major algorithms and data structures.

CO2: Analyze performance of algorithms and choose the appropriate data structure and algorithm design method for a specified application.

CO3: Determine which algorithm or data structure to use in different scenarios and be familiar with writing recursive methods.

CO4: Demonstrate understanding of the abstract properties of various data structures such as stacks, queues, lists, trees and graphs and Use various data structures effectively in application programs.

CO5: Demonstrate understanding of various sorting algorithms, including bubble sort, insertion sort, selection sort, heap sort and quick sort.

Nature of Paper: Core

Minimum Passing Marks/Credits: 40% Marks

L:4
T:0
P:0(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	**Introduction:** Basic Terminology, Data Structures, Classification of Data Structures, Data Structure Operations, Complexity. **Array:** Definition, Declaration, Initialization of Array, Accessing Elements of Array, Multidimensional Arrays, Sparse Matrix, Lower and Upper Triangular Matrices, Vector, Memory Representation of Array- Row Major and Column Major, Address Calculation of Array, Insertion and Deletion on Array	8
II	**Linked List:** Introduction, Dynamic Memory Allocation, Singly Linked Lists, Operations on Linked List Such as Traversal, Insertion, Deletion and Searching, Use of Headers, Introduction to Circularly Linked Lists and Doubly Linked Lists, Two-Way Lists.	8
III	**Stacks and Queues:** Introduction and Primitive Operations on Stack, Stack Applications; Infix, Postfix, Prefix Expressions; Evaluation of Postfix Expression; Conversion among Prefix, Infix and Postfix; Recursion; Introduction and Primitive Operation on Queues, Deques, Priority Queues, Applications of Queue.	8
IV	**Trees:** Introduction and Basic Terminology; Tree Representations as Array &Linked List, Recursive algorithms for Tree Operations such as Insertion, Deletion, Traversal;Traversal of Binary Trees; Application of Binary Trees; Binary Search Tree (BST), Insertion and Deletion in BST, B-Tree.	8

V	**Searching & Sorting Techniques:** Bubble Sort, Insertion sort, Selection sort, Merge Sort, Heap Sort, Linear Search, Binary Search and Hashing.	8

Text Books:
1. Tenenbaum**, "***Data Structures Using C***", **Pearson Education.
2. Samir Kumar Bandyopadhyay, K. N. Dey, "*Data Structures Using C",* Pearson Education.
3. Lipschutz (Schaum's Series), "*Data Structure with C",* Tata McGraw Hill Education

Reference
1. Robert Kruse, C. L.Tondo, "*Data Structures and Program Design in C*" , Pearson Education.
2. E. Horowitz, S. Sahni& D. Mehta, "*Fundamentals of Data Structures*", Galgotia Publications.
3. R. S. Salaria, "*Data Structures & Algorithms*", Khanna Book Publishing Co. (P) Ltd.

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100

Prerequisites for the course: *Problem Solving using C*

Course Learning Outcomes:
CO1: Demonstrate familiarity with major algorithms and data structures.
CO2: Analyze performance of algorithms and choose the appropriate data structure and algorithm design method for a specified application.
CO3: Determine which algorithm or data structure to use in different scenarios and be familiar with writing recursive methods.
CO4: Demonstrate understanding of the abstract properties of various data structures such as stacks, queues, lists, trees and graphs and Use various data structures effectively in application programs.
CO5: Demonstrate understanding of various sorting algorithms, including bubble sort, insertion sort, selection sort, heap sort and quick sort.

IIMTU-NEP IMPLEMENTATION
Year-I / Semester-II

Programme: Certificate		Year: I	
Class:BCA		Semester: II	
Credits Theory:4Cr		Subject:DATA BASE MANAGEMENT SYSTEM	
Course Code: BCA-NEP-202		Title:DATA BASE MANAGEMENT SYSTEM	

Course Objectives:

CO 1: Explain the concept of features of a database system and its application and compare various types of data models.

CO 2: Describe the E-R Models and Relational Database.

CO 3: Explain the concept of SQL Commands, relational algebra, tuple calculus and domain calculus.

CO 4: Explain the need of normalization and normalize a given relation to the desired normal form.

CO 5: Analyze the different approaches of transaction processing and concurrency control.

Nature of Paper: CORE

Minimum Passing Marks/Credits:40% Marks

L:4
T:0
P:0(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	**Introduction:** Overview, Database System vs File System, Database System Concept and Architecture, Data Model Schema and Instances, Data Independence and Database Language and Interfaces, Data Definitions Language, DML, Overall Database Structure. Data Modelling Using the Entity Relationship Model: ER Model Concepts, Notation for ER Diagram, Mapping Constraints, Keys, Concepts of Super Key, Candidate Key, Primary Key, Generalization, Aggregation, Reduction of an ER Diagrams to Tables, Extended ER Model, Relationship of Higher Degree.	8
II	**Relational data Model and Language:** Relational Data Model Concepts, Integrity Constraints, Entity Integrity, Referential Integrity, Keys Constraints, Domain Constraints, Relational Algebra, Relational Calculus, Tuple and Domain Calculus. Introduction to SQL: Characteristics of SQL, Advantage of SQL. SQL Data Type and Literals. Types of SQL Commands. SQL Operators and their Procedure. Tables, Views and Indexes. Queries and Sub Queries. Aggregate Functions. Insert, Update and Delete Operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL SQL.	8
III	**Data Base Design & Normalization:** Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependence, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.	8
IV	**Transaction Processing Concept:** Transaction System, Testing of Serializability, Serializability of Schedules, Conflict & View Serializable	8

	Schedule, Recoverability, Recovery from Transaction Failures, Log Based Recovery, Checkpoints, Deadlock Handling. Distributed Database: Distributed Data Storage, Concurrency Control, Directory System	
V	**Concurrency Control Techniques:** Concurrency Control, Locking Techniques for Concurrency Control, Time Stamping Protocols for Concurrency Control, Validation Based Protocol, Multiple Granularity, Multi Version Schemes, Recovery with Concurrent Transaction, Case Study of Oracle	8

Text Books:
1. Korth, Silbertz, Sudarshan," Database Concepts", McGraw Hill.
2. Date C J, "An Introduction to Database Systems", Addision Wesley.
3. Elmasri, Navathe, "Fundamentals of Database Systems", Addision Wesley.
4. O'Neil, "Databases", Elsevier Pub

Reference
1. Ramakrishnan, "Database Management Systems", McGraw Hill.
2. Leon & Leon, "Database Management Systems", Vikas Publishing House.
3. Bipin C. Desai, "An Introduction to Database Systems", Gagotia Publications.
4. Majumdar& Bhattacharya, "Database Management System", McGraw Hill.

Evaluation/Assessment Methodology	
	Max. Marks100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100

Prerequisites for the course: SQL

Course Learning Outcomes:
CO1: Describe the features of a database system and its application and compare various types of data models.
CO2: Construct an ER Model for a given problem and transform it into a relation database schema.
CO3: Formulate solution to a query problem using SQL Commands, relational algebra, tuple calculus and domain calculus.
CO4: Explain the need of normalization and normalize a given relation to the desired normal form.
CO5: Explain different approaches of transaction processing and concurrency control.

Programme:Certificate		Year:I	
Class:BCA		**Semester**: II	
Credits Theory:3Cr		**Subject:** Environment and Ecology	
Course Code: NHU-112		**Title:**Environment and Ecology	
CourseObjectives:			
CO1:	Creating the awareness about environmental problems among people		
CO2:	Imparting basic knowledge about the environment and its allied problems.		
CO3:	Developing an attitude of concern for the environment.		
CO4:	Motivating public to participate in environment protection and environment improvement.		
CO5:	Grasp the significance and issues related to ecosystems, biodiversity and natural resources.		
Nature of Paper: AECC			
Minimum Passing Marks/Credits: 40% Marks			
L:3 T:0 P:0(In Hours/Week) Theory-1Hr.=1Credit			

Unit	Contents	No. ofLectures Allotted
I	**The Multidisciplinary Nature Of Environmental Studies:** Definition, Scope and Importance, Need for Public Awareness.	8
II	**Natural Resources:** Renewable And Non-Renewable Resources; **Natural Resources and Associated Problems: -** A. Forest Resources: Use and Over-Exploitation, Deforestation, Case Studies. Timber Extraction, Mining, Dams and Their Effects on Forests and Tribal People. B. Water Resources: Use and Over-Utilization of Surface and Ground Water, Floods, Drought, Conflicts Over Water, Dams-Benefits and Problems. C. Mineral Resources: Use and Exploitation, Environmental Effects of Extracting and Using Mineral Resources, Case Studies. D. Food Resources: World Food Problems, Changes Caused By Agriculture and Overgrazing, Effects of Modern Agriculture, Fertilizer-Pesticide Problems, Water Logging, Salinity, Case Studies. E. Energy Resources: Growing Energy Needs, Renewable and Non renewable Energy Sources, Use of Alternate Energy Sources, Case Studies F. Land Resources: Land as a Resource, Land Degradation, Man Induced Landslides, Soil Erosion and Desertification. G. Role of an Individual In Conservation Of Natural Resources; Equitable Use of Resources for Sustainable Lifestyles	8
III	**Ecosystems:** Concept of an Ecosystem; Structure and Function of an Ecosystem; Producers, Consumers and Decomposers; Energy Flow in the Ecosystem; Ecological Succession; Food Chains, Food Webs and Ecological Pyramids;	8

		Introduction, Types, Characteristic Features, Structure And Function of the Following Ecosystem: - A) Forest Ecosystem B) Grassland Ecosystem C) Desert Ecosystem D) Aquatic Ecosystems (Ponds, Streams, Lakes, Rivers, Oceans, Estuaries)	
IV	**Biodiversity and Its Conservation:** Introduction – Definition: Genetic, Species and Ecosystem Diversity; Biogeographical Classification of India; Value of Biodiversity: Consumptive Use, Productive Use, Social, Ethical, and Aesthetic and Option Values; Biodiversity at Global, National and Local Levels; India as a Mega-Diversity Nation; Hot-Sports of Biodiversity; Threats to Biodiversity: Habitat Loss, Poaching of Wildlife, Man-Wildlife Conflicts; Endangered and Endemic Species of India; Conservation of Biodiversity: In-Situ and Ex-Situ Conservation of Biodiversity.	8
V	**Environmental Pollution:** Definition, Causes, Effects and Control Measures of Air Pollution, Water Pollution, Soil Pollution, Marine Pollution, Noise Pollution, Thermal Pollution, Nuclear Pollution; Solid Waste Management: Causes, Effects and Control Measures of Urban and Industrial Wastes; Role of an Individual in Prevention of Pollution; Pollution Case Studies; Disaster Management: Floods, Earthquake, Cyclone and Landslides.	8

Text Books:
1. A. Basak, "*Environmental Studies*", Pearson Education.
2. Anil Kumar De, "*Environmental Studies*", New Age International

Reference:
1. J. P. Sharma, "*Environmental Studies*", University Science Press.

Evaluation/Assessment Methodology	
	Max. Marks 50
1. Class tasks/SessionalExamination	15
2. Presentations /Seminar	
3. Assignments	
4. Research Project Report/Seminar On Research Project Report	
5. ESE	35
Total:	50

Prerequisites for the course:

Course Learning Outcomes:
CO1: Student will be able to recognize the physical and biological components of earth's system.
CO2: Student will be able to examine all environmental issues.
CO3: Student will be able to do independent research on human interaction with the environment.
CO4: Student will be able to develop and attitude of concern for the environment.
CO5: Student will be able to motivate public to participate in environmental protection

IIMTU-NEP IMPLEMENTATION
Year-I / Semester-II

Programme: Certificate **Class:**BCA		**Year: I** **Semester:** II	
Credits Theory: 4Cr	**Subject:**Mathematics-II		
Course Code: BCA-NEP-204	**Title:**Mathematics-II		

Course Objectives:

CO 1: Apply mathematical concepts and principles to perform computations.

CO 2: Apply mathematics to solve problems.

CO 3: Create, use and analyze graphical representations of mathematical relationships.

CO 4: Communicate mathematical knowledge and understanding.

CO 5: Apply technology tools to solve problems.

Nature of Paper: DSE

Minimum Passing Marks/Credits: 40% Marks

L:4
T:0
P:0(In Hours/Week)
Theory - 1 Hr. = 1 Credit

Unit	Contents	No. of Lectures Allotted
I	**Differential Equations:** Linear differential equations of nth order with constant coefficients, Complementary function and Particular integral, Simultaneous linear differential equations, Solution of second order differential equations by changing dependent & independent variables, Normal form, Method of variation of parameters, Applications (without derivation).	8
II	**Series Solution and Special Functions:** Series solution of second order ordinary differential equations with variable coefficient (Frobenius method), Bessel and Legendre equations and their series solutions, Properties of Bessel function and Legendre polynomials.	8
III	**Laplace Transform:** Laplace transform, Existence theorem, Laplace transforms of derivatives and integrals, Initial and final value theorems, Unit step function, Dirac- delta function, Laplace transform of periodic function, Inverse Laplace transform, Convolution theorem, Application to solve simple linear and simultaneous differential equations.	8
IV	**Fourier Series**: Euler's Formulae, Functions having arbitrary periods, Periodic functions, Fourier series of period 2π, Change of interval, Even and odd functions, Half range sine and cosine series	8
V	**Partial Differential Equations:** Solution of first order partial differential equations by Lagrange's method, Solution of second order linear partial differential equations with constant coefficients, Classification of second order partial differential equations, Method of separation of variables for solving partial differential equations, Solution of one and two dimensional wave and heat conduction equations, Laplace equation in two dimension, Equation of transmission lines	8

Text Books:

1. E. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons
2. B. V. Ramana, "Higher Engineering Mathematics", Tata Mc Graw- Hill Publishing Company Ltd
3. R.K. Jain & S.R.K. Iyenger, "Advance Engineering Mathematics", Narosa Publishing House.

Reference:

1. H. K. Dass, "Introduction to Engineering Mathematics", S. Chand, New Delhi
2. R. Wylie, "Advanced Engineering Mathematics", McGraw-Hill.

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100

Prerequisites for the course: MATHEMATICS-I

Course Learning Outcomes:

CO 1: Apply mathematical concepts and principles to perform computations.
CO 2: Apply mathematics to solve problems.
CO 3: Create, use and analyze graphical representations of mathematical relationships.
CO 4: Communicate mathematical knowledge and understanding.
CO 5: Apply technology tools to solve problems.

IIMTU-NEP IMPLEMENTATION
Year-I / Semester-II

Programme:UG **Class:**BCA		Year: I Semester:II
Credits Theory: 0 Practical: 2	**Subject:Data Structure and algorithm using C Lab**	
Course Code: **BCA-NEP-205P**	**Title:Data Structure and algorithm using C Lab**	

Course Objectives:

CO1: To Understand and Implement basic Data Structure using C

CO2: To apply Linear an Non Linear Data Structure in Problem Solving.

CO3: To Implement Searching and Sorting Algorithm.

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks

L:0

T:0

P:4(In Hours/Week)

Theory - 1 Hr. = 1 Credit

Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	Basic of Data Structure Programs- Looping, Data Manipulation, array.	2
II	Program using Structures and dynamic Memory allocations.	2
III	Array Implementation of Stacks and queues	2
IV	Linked List Implementation of Stacks and Queues	2
V	Application of Stacks and Queues	2
VI	Implementation of Trees, Tree Traversals	2
VII	Implementation of Binary Search Trees	2
VIII	Implementation of Linear search and Binary Search	2
IX	Implementation of Insertion Sort, Bubble Sort, Quick Sort and Merge Sort.	2

Evaluation/Assessment Methodology		
		Max. Marks:50
1) Class tasks/ Sessional Examination 2) Presentations /Seminar 3) Assignments 4) Research Project Report/Seminar On Research Project Report		25
5) ESE		25
Total:		50

CourseLearning Outcomes:

Student will be able to:

CO1: Write basic and advanced Program in C using Linear and Non-Linear Data Structure.

CO2: Implement Data Structure using C.

CO3: Choose appropriate Sorting Algorithm for an application and implement it in a modularized way.

CO4: Linear data structures and their applications such as Stacks, Queues and Lists and Non-Linear Data Structures and their Applications such as Trees.

IIMTU-NEP IMPLEMENTATION
Year-I / Semester-II

Programme: UG	Year: I
Class: BCA	Semester: II
Credits Theory: 0 Practical: 2	**Subject: Data Base Management System Lab**
Course Code: **BCA-NEP-206P**	**Title: Data Base Management System Lab**

Course Objectives:
To learn the student should be made to:
CO1: Foundation knowledge in database concepts, technology and practice to groom students into well-informed database application developers.
CO2: Be familiarized with a query language
CO3: Have hands on experience on DDL Commands
CO4: Have a good understanding of DML Commands and DCL commands
CO5: Familiarize advanced SQL queries and exposed to different applications

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks

L:0
T:0
P:4 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	Creation of a database and writing SQL queries to retrieve information from the database.	2
II	Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.	2
III	Perform the following: a. Viewing all databases, creating a Database, Viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting b. Records in a Table, Saving (Commit) and Undoing (rollback).	2
IV	Perform the following: a. Altering a Table, Dropping/Truncating/Renaming Tables, backing up / restoring a Database.	2
V	For a given set of relation schemes, create tables and perform the following Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregate functions (group by and having clause), Queries involving- Date Functions, String Functions, Math Functions Join Queries- Inner Join, Outer Join Subqueries- With IN clause, With EXISTS clause.	2
VI	For a given set of relation tables perform the following a. Creating Views (with and without check option), Dropping views, Selecting from view.	2

VII	Write a Pl/SQL program using FOR loop to insert ten rows into a database table.	2
VIII	Given the table EMPLOYEE (EmpNo, Name, Salary, Designation, DeptID) write a cursor to select the five highest paid employees from the table.	2

Reference / Text Books:

1. Fundamentals of Database System By Elmasari & Navathe, 7th Edition, 2018, Pearson Education.
2. Database System Concepts by Silberschatz, Korth & Sudarshan, 6th Edition, 2019, McGraw-Hill Education.

Evaluation/Assessment Methodology	
	Max. Marks:50
1) Class tasks/ Sessional Examination	25
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	
Seminar On Research Project Report	
5) ESE	25
Total:	50

Course Learning Outcomes:

Student will be able to:

CO1: Design and implement a database schema for a given problem-domain

CO2: Populate and query a database

CO3: Create and maintain tables using PL/SQL.

IIMTU-NEP IMPLEMENTATION
Year- II / Semester –III

Programme: Diploma **Class:**BCA		**Year: II** **Semester: III**
Credits Theory:4Cr	**Subject:**Operating System	
Course Code: BCA-NEP-302	**Title:**Operating System	

Course Objectives:

CO1: To understand the services provided by and the design of an operating system.

CO2: To understand the structure and organization of the file system.

CO3: To understand what a process is and how processes are synchronized and scheduled.

CO4: To understand different approaches to memory management.

CO5: Students should be able to use system calls for managing processes, memory and the file system.

Nature of Paper: Core

Minimum Passing Marks/Credits: 40% Marks

L:4
T:0
P:0(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	**INTRODUCTION: -** Operating System Overview-Basic Elements, Instruction Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview, objectives and functions, Evolution of Operating System, Types of Operating Systems.	12
II	**PROCESSES: -**Process States, Process Description and Process Control Block. Processes and Threads, Types of Threads, Multicore and Multithreading, Scheduling Types of Scheduling, Scheduling algorithms.	12
III	**CONCURRENCY AND SCHEDULING:-** Principles of Concurrency-Mutual Exclusion, Semaphores, Monitors, Readers/Writers problem. Deadlocks-prevention, avoidance, detection, Banker's Algorithm.	12
IV	**MEMORY MANAGEMENT:** - Memory management requirements, Partitioning, Paging and Segmentation, Virtual memory - Hardware and control structures, Page fault, Page replacement algorithms, operating system software, Linux memory management, Windows memory management.	12
V	**INPUT/OUTPUT AND FILE SYSTEMS: -** I/O management and disk scheduling – I/O devices, organization of I/O functions; OS design issues, I/O buffering, disk scheduling, Disk cache. File management – Organization, Directories, File sharing, and Record blocking, secondary storage management.	12

Text Books:

1. Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley
2. Andrew S. Tanenbaum, "Modern Operating System", PHI Learning
3. Tanenbaum/Woodhaull "Operating System Design and Implementation", Pearson Publication

BOS

Reference
1. 4. Harvey M Dietel, "An Introduction to Operating System", Pearson Education
2. Flynn, "Understanding Operating System", Cengage.
3. D M Dhamdhere, "Operating Systems : A Concept basedApproach", McGraw Hill.
4. Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Education".

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Evaluation/Assessment Methodology

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	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100

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Prerequisites for the course: NIL

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Course Learning Outcomes:

C01: Describe the important computer system resources and the role of operating system in their management policies and algorithms.

CO2: Understand the process management policies and scheduling of processes by CPU

CO3: Evaluate the requirement for process synchronization and coordination handled by operating system

CO4: Describe and analyze the memory management and its allocation policies.

CO5: Identify use and evaluate the storage management policies with respect to different storage management technologies.

IIMTU-NEP IMPLEMENTATION
Year- II / Semester –III

Programme: Diploma **Class:BCA**	**Year: II** **Semester: III**
Credits Theory:4Cr Practical:2Cr	**Subject:** Communication Skill & Personality Development
Course Code: BCA-NEP-303	**Title:** Communication Skill & Personality Development

Course Objectives:
CO1:   To understand the concept, process and importance of communication.
CO2:   To develop skills of effective communication both written and oral.
CO3:   To help acquaint with application of communication skills in the world of business.
CO4:   To understand the concept of personality and personality development and its significance.
CO5:   To understand and develop various traits required for personality development.

Nature of Paper: AECC

Minimum Passing Marks/Credits: 40% Marks

L:3
T:0
P:0(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	**Introduction to Communication** Meaning and Definition, Process, Functions, Objectives, Importance, Essentials ofGood Communication, Communication Barriers, Overcoming Communication Barriers.	8
II	**Written Communication:** Need and functions of business letters, Planning and layout of business letters, Advantages and limitations of written communication. **Oral Communication:** Meaning, nature and scope, Principles of Effective Oral Communication, Techniques of Effective Speech, The Art of Listening, Principles of Good Listening, Advantages and Limitations of Oral Communication.	8
III	**Personality Development:** The concept of personality, Dimensions of personality, Term personality development, Significance. **Attitude and Motivation:** Attitude, Concept, Significance, Factors affecting attitudes, Positive attitude, Advantages, Negative attitude, Disadvantages, Ways to develop positive attitude, Difference between Personalities having Positive and Negative Attitude, Concept of motivation, Significance, Internal and external motives, Importance of self-motivation, Factors leading to demotivation.	8
IV	**Self-Esteem:**Term self-esteem, Symptoms, Advantages, Do's and Don'ts to develop positive self-esteem, Low self-esteem, Symptoms, Personality having low self-esteem, Positive and negative self-esteem. **Interpersonal Relationships**: Interpersonal relationships, Teaming, Developing positive personality, Analysis of strengths and weaknesses.	8

| V | **Goal-Setting:** Concept of goal-setting, Importance of goals, Dream Vs goal, Why goal-setting fails- SMART (Specific, Measurable, Achievable, Realistic, Time-bound) goals, Art of Prioritisation, Do's and Don'ts about goals.
Essential soft skills Assertiveness - Lateral thinking - Work ethics, Good manners and etiquettes Concept, significance. | 8 |

Text Books:
1. Cloninger, S.C., "Theories of Personality: Understanding Person", Pearson, New York, 2008, 5th edition.
2. Luthans F, "Organizational Behaviour", McGraw Hill, New York, 2005, 12th edition.
3. Barron, R.A. & Brian D, "Social Psychology", Prentice Hall of India, 1998, 8th edition.

Reference
3. Adler R.B., Rodman G. & Hutchinson C.C., "Understanding Human Communication", Oxford University Press: New York, 2011.

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	
Seminar On Research Project Report	
5) ESE	35
Total:	50

Prerequisites for the course: *Problem Solving using C*

Course Learning Outcomes:
CO1: Identify different concept of Personality
CO2: Able to Compare and contrast different personal grooming pertains.
CO3: Able to explore communication beyond language.
CO4: Able to manage oneself while communicating.
CO5: Able to acquire good communication skills and develop confidence.

IIMTU-NEP IMPLEMENTATION
Year- II / Semester –III

Programme:DIPLOMA **Class:**BCA	**Year: II** **Semester: III**
Credits Theory:4Cr	**Subject:**Computer System Architecture
Course Code: BCA-NEP-304	**Title:**Computer System Architecture

Course Objectives:
CO1: To learn the concepts regarding microprocessor with 8 bit. To learn the concepts regarding
CO2: Microprocessor with 16 bit. To understand the basic idea of the internal architecture and register configuration of respective devices.
CO3: To understand the programming techniques of with the help of Assembly Language Programming.
CO4: To understand the basic concept of parallel computing.
CO5: To understand significance of pipelining and parallelism, so that the devices used to perform

Nature of Paper: DISCIPLINE SPECIFIC ELECTIVE

Minimum Passing Marks/Credits: 40% Marks

L:4
T:0
P:0(In Hours/Week)
Theory - 1 Hr. = 1 Credit

Unit	Contents	No. of Lectures Allotted
I	Basic Computer Organization and Design: Instructions and Instruction Codes, Computer Registers, Timing and Control, Instruction Cycle, Register Transfer and Micro Operations-Registration Transfer Language, Register Transfer Instructions, Bus and Memory Transfer Instructions, Arithmetic and Logic Micro-Operations, Shift Micro-Operations, Arithmetic Logic Shift Unit; Memory-Reference Instructions, Input-Output and Interrupts, Complete Computer Description, Design of Basic Computer, Design of Accumulator Logic.	8
II	**Central Processing Unit:** General Register Organization, Stacks Organization, Instruction Formats, Addressing Modes, RISC, CISC, Parallel Processing, Pipelining, Instruction and Arithmetic Pipeline, Vector Processing, Matrix Multiplication, Array Processors.	8
III	**Computer Arithmetic:** Addition, Subtraction Algorithms; Multiplication Algorithms: Shift and Add Algorithms, Booth's Algorithm; Divisor Algorithms, Floating Point Representations, Arithmetic Operations on Floating-Point Numbers, Decimal Arithmetic Operations.	8
IV	**Input-Output Organization:** Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Mode of Transfer, Priority Interrupts, Direct Memory Address (DMA), Input/ Output Processor (IOP), Serial Communication.	8
V	**Memory Organization:** Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware	8
Text Books: 1. Morris Manno, "Computer System Architecture", Pearson Education.		

2. W. Stallings, "Computer Organisation And Architecture", Pearson Education.

Reference
1. Rao, "Prospective in Computer Architecture" , Prentice Hall of India
2. John P. Hayes, "Computer Architecture and Organization", McGraw-Hill

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100

Prerequisites for the course:NIL

Course Learning Outcomes:

CO1: For a microprocessor system, student should be able to deal with the internalarchitecture of 8 bits and 16-bit microprocessor to analyze the working operation and to know the pin configuration for the respective microprocessor. A student should be goodenough to deal with interrupts internally or externally.

CO2: He/she should be able to understand the basic concepts of Assembly languageprogramming. For a particular data instruction set, student should be having a clear ideaof solving machine language programs using kit. He/she shall be having an idea totackle with counter delays and subroutines.

CO3: He/she should be able to know the concept of pipelining and parallelism in uniprocessor system for hazard detection. Understand the basic concept of Parallel computing.
A student should have a basic idea of job levels that are governed by an organization on priority basis. He/she should know the Pipeline scheduling theory.

CO4: For good networking, a student should be able to draw SIMD interconnections and FFTor a butterfly method system for collision prevention and vector dispatching.

CO5: He/sheshould be able to make Cube Interconnection Network, Shuffle-Exchange and OmegaNetwork.

IIMTU-NEPIMPLEMENTATION
Year- II / Semester –III

Programme:Diploma Class: BCA	Year: II Semester: III
Credits Theory:4Cr	**Subject:** Data Analytics
Course Code: BCA-NEP-304	**Title:**Data Analytics

Course Objectives:
CO1:   Understand item sets, Clustering, frame works & Visualizations.
CO2:   Apply R tool for developing and evaluating real time applications.
CO3:   Implement various Data streams.
CO4:   Understand and apply Data Analysis Techniques.
CO5:   Describe the life cycle phases of Data Analytics through discovery, planning andbuilding.

Nature of Paper: Discipline Specific Elective

Minimum Passing Marks/Credits:40% Marks

L:4
T:0
P:0(In Hours/Week)
Theory-1Hr.=1Credit

Unit	Contents	No. ofLectures Allotted
I	**Introduction to Data Analytics**: Sources and nature of data, classification ofdata (structured, semi-structured, unstructured), characteristics of data,introduction to Big Data platform, need of data analytics, evolution of analytic scalability, analytic process and tools, analysis vs reporting, modern data analytic tools, applications of data analytics. **Data Analytics Lifecycle**: Need, key roles for successful analytic projects, various phases of data analytics lifecycle – discovery, data preparation, model planning, model building, communicating results, operationalization	8
II	**Data Analysis:** Regression modeling, multivariate analysis, Bayesian modeling, inference and Bayesian networks, support vector and kernel methods, analysis of time series: linear systems analysis & nonlinear dynamics, rule induction, Neural Networks: Learning and generalization, competitive learning, principal component analysis and neural networks, fuzzy logic: extracting fuzzy modelsfrom data, fuzzy decision trees, stochastic search methods.	8
III	**Mining Data Streams:** Introduction to streams concepts, stream data model and architecture, stream computing, sampling data in a stream, filtering streams, counting distinct elements in a stream, estimating moments, counting oneness in a window, decaying window, Real-time Analytics Platform (RTAP)applications, Case studies – Real time sentiment analysis, stock market predictions.	8

IV	**Frequent Itemset and Clustering:** Mining frequent itemsets, market based modelling, Apriori algorithm, handling large data sets in main memory, limitedpass algorithm, counting frequent itemsets in a stream, Clustering techniques:hierarchical, K-means, clustering high dimensional data, CLIQUE andProCLUS, frequent pattern-based clustering methods, clustering in non-Euclidean space, clustering for streams and parallelism.	8
V	**Frame Works and Visualization**: Map Reduce, Hadoop, Pig, Hive, HBase, MapR, Sharding, NoSQL Databases, S3, Hadoop Distributed File Systems,Visualization: visual data analysis techniques, interaction techniques, systems and applications.	8

Text Book:
1. John Garrett, "Data Analytics for IT Networks: Developing Innovative Use Cases", Pearson Education.
2. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging
3. Business Intelligence and Analytic Trends for Today's Businesses", Wiley.

Reference Book:
1. Pete Warden, "Big Data Glossary", O'Reilly.
2. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons.

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks /Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project	10
Report	
Seminar On Research Project Report	75
5) ESE	
Total:	100

Prerequisites for the course: NIL

Course Learning Outcomes:

CO1:   Able to Perform data gathering of large data from a range of data sources.

CO1:   Able to Critically analyse existing Big Data datasets and implementations, taking practicality, and usefulness metrics into consideration.

CO3:   Able to perform the role of statistics in the analysis of large of datasets.

CO4:   Able to apply advanced knowledge of statistical data analytics as applied to large data sets.

CO5:   Employ advanced statistical analytical skills to test assumptions, and to generate and present new information and insights from large datasets.

IIMTU-NEP IMPLEMENTATION
Year- II / Semester –III

Programme:UG		Year: II
Class: BCA		Semester:III
Credits Theory: 0 Practical: 2	**Subject: OOPS USING JAVA LAB**	
Course Code: **BCA-NEP-305P**	**Title:OOPS USING JAVA LAB**	
Course Objectives: CO1: To write GUI programs using swing in java. CO2: To write programs implementing OOPS concepts. CO3: To write programs based on real world problems using java collection frame work..		
Nature of Paper: Core		
Minimum Passing Marks/Credits: 50% Marks		
L:0 T:0 P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)		

Unit	Contents	No. of Lectures Allotted
I	Write a program to enter a number from user and print the odd numbers between 1 to that number.	2
II	Write a Program to find perimeter of square if area is entered by user.	2
III	Write a program to handle Array indexOutofBounds exception.	2
IV	Write a Java program to copy an array by iterating the array.	2
V	Write a program to demonstrate a divide by zero program exception.	2
VI	Write a Java program to get the character at the given index within the String.	2
VII	Write a program to find the sum of each row of a matrix.	2
VIII	Write a program to find area of rectangle using parameterized constructor.	2

Reference / Text Books:
1. Patrick Naughton and Herbertz Schildt, "Java-2 The Complete Reference", Mc. Graw Hill.
2. Balaguruswamy, "Programming with Java: A Primer", Tata McGraw Hill Education.

Evaluation/Assessment Methodology	
	Max. Marks:50
1) Class tasks/ Sessional Examination 2) Presentations /Seminar 3) Assignments 4) Research Project Report/Seminar On Research Project Report	25
5) ESE	25
Total:	50

Course Learning Outcomes: Student will be able to:
CO1: Write programs based on real world problems using java collection frame work...
CO2::Write GUI programs using swing in java.
CO3: Implement OOPS concepts.

IIMTU-NEP IMPLEMENTATION
Year- II / Semester –III

Programme: Diploma		Year: II
Class:BCA		Semester: III
Credits Theory:4Cr		**Subject:**Object Oriented Programming Using Java
Course Code: BCA-NEP-301		**Title:**Object Oriented Programming Using Java

Course Objectives:

CO 1:   Able to understand the use of OOPs concepts.
CO 2:   Able to solve real world problems using OOP techniques.
CO 3:   Able to understand the use of abstraction.
CO 4:   Able to understand the use of Packages and Interface in java.
CO 5:   Able to develop and understand exception handling, multithreaded applications with synchronization.

Nature of Paper: Core

Minimum Passing Marks/Credits: 40% Marks

L:4
T:0
P:0(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction to OOPs and Java: OOPs Concepts, Top-Down Approach and Bottom Up Approach, Introduction to Java, History of Java, Features of Java, Byte Code, JVM, JRE, JDK, JIT, Java Applications, Character Set, Identifiers, Literals, Comments, Keyword, Data Type, Operators, Conditional Statements, Looping Statements, ArrayDeclaration, Creation, Initialization, String Handling- Predefined Functions in String, String Methods, Vectors, Command-Line Arguments.	12
II	Classes, Objects and Methods: Object Class, Defining Class, Adding Variables, Adding Methods, Creating Objects, Constructors, Types of Constructors, this & static keyword, Garbage Collection, Inheritance, Types of Inheritance, Creating Multilevel Hierarchy, Method Over Loading & Overriding, Dynamic Method Dispatching, final keyword, Abstract Class.	12
III	Interfaces and Packages: Defining Interfaces, Extending and Implementing Interfaces, Defining Packages, Access Protection, Importing Packages, Exception Handling: Exception Types, Multiple Catch Clauses, Nested Try Statements, Throw, Throws, Finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses. Multithreaded Programming: Thread Life Cycle, Creating Threads, Thread Methods, Thread Priority	12
IV	Managing I/O Files: Introduction, Streams, Stream Classes, File Class, Creation of Files, Reading and Writing to File, Buffering Files, Random Access Files, Interactive I/O. GUI Programming: GUIComponents, AWT, Swings, Event Handling.	12
V	Introduction to Applet Programming: Introduction to Applet, Applet	12

| | Architecture, Applet Life Cycle, Applet Class, Applet Tag, Applet Methods, Running the Applet. JDBC: Accessing Databases With Java Database Connectivity | |

Text Books:
1. Patrick Naughton and Herbertz Schildt, "Java-2 The Complete Reference", McGraw Hill.
2. Ivor Horton, "Beginning Java-2", Wiley Publishing.
3. Bala guru swamy, "Programming with Java: A Primer", Tata McGraw Hill Education.

Reference
1. Horetmann Cay and Cornell Gary, "Core Java Volume – I", Pearson Education.
2. Horetmann Cay and Cornell Gary, "Core JavaTM 2, Volume II – Advanced Features", Pearson Education.

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100
Prerequisites for the course: NIL	

Course Learning Outcomes:
CO 1:   Able to understand the use of OOPs concepts.
CO 2:   Able to solve real world problems using OOP techniques.
CO 3:   Able to understand the use of abstraction.
CO 4:   Able to understand the use of Packages and Interface in java.
CO 5:   Able to develop and understand exception handling, multithreaded applications with synchronization.

IIMTU-NEP IMPLEMENTATION
Year- II / Semester –III

Programme:UG **Class: BCA**		Year: II Semester:III
Credits Theory: 0 Practical: 2	**Subject:Operating System Lab**	
Course Code: **BCA-NEP-306P**	**Title:Operating System Lab**	
Course Objectives: CO1: To Implement the paging Technique using C program CO2: To implement various Page Replacement Algorithms. CO3: To implement CPU Scheduling Algorithms and memory management algorithms.		
Nature of Paper: Core		
Minimum Passing Marks/Credits: 50% Marks		
L:0 T:0 P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)		

Unit	Contents	No. of Lectures Allotted
I	Write C programs to implement the various Page Replacement Algorithms	2
II	Write C programs to demonstrate various process related concepts.	2
III	Write C programs to implement the various CPU Scheduling Algorithms	2
IV	Write C programs to simulate CPU scheduling algorithms: FCFS, SJF, and Round Robin.	2
V	Implement the following File Allocation Strategies using C programs	2
VI	Write C programs to simulate solutions to Classical Process Synchronization Problems.	2
VII	Write C programs for the implementation of various disk scheduling algorithms	2
VIII	Write a C program to simulate Bankers Algorithm for Deadlock Avoidance.	2

Reference / Text Books:
1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne (2006), Operating System Principles, 7 the edition, Wiley India Private Limited, New Delhi.

Evaluation/Assessment Methodology	
	Max. Marks:50
1) Class tasks/ Sessional Examination 2) Presentations /Seminar 3) Assignments 4) Research Project Report Seminar On Research Project Report	25
5) ESE	25
Total:	50

Course Learning Outcomes:
Student will be able to:
CO1: Identify the performance of various page replacement algorithms.
CO2: Develop algorithm for deadlock
CO3: Choose the best CPU scheduling algorithm for a given problem instance.

IIMTU-NEP IMPLEMENTATION
Year- II / Semester –IV

Programme: Diploma	Year: II
Class: BCA	Semester: IV
Credits Theory:4Cr	Subject: Software Engineering
Course Code: BCA-NEP-401	Title: Software Engineering

Course Objectives:

CO 1:   Select and implement different software development process models.
CO 2:   Extract and analyze software requirements specifications for different projects. Develop
CO 3:   some basic level of software architecture/design.
CO 4:   Define the basic concepts and importance of Software project management concepts like cost
CO 5:   estimation, scheduling and reviewing the progress.
            Apply different testing and debugging techniques and analyzing their effectiveness.

Nature of Paper: Core

Minimum Passing Marks/Credits: 40% Marks

L:4
T:0
P:0(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	Introduction: Software- Characteristics and Applications, Software Engineering, Software Engineering Layers, Software Process Framework, CMM, Software Quality Attribute and Metrics, Software Development Life Cycle, Software Process Models: Water Fall Model, Prototyping Model, RAD Model, Spiral Model, Evolutionary Models, Component-based Development Model.	10
II	Software Requirements Engineering and Analysis Modeling: Software Requirements, Requirement Engineering Process, Elicitation Requirements, Analysis and Negotiating Requirements, Requirement Specification, System Modeling, Requirements Validation, Requirement Management, Creating a Software Requirements Specification Document, IEEE Standards for SRS, Feasibility Study, Elements of Analysis Model, Data Modeling- ER Diagram, Information Modeling- DFD, Behavioral Modeling, Control Specification, Process Specification, Data Dictionary, Software Quality Framework, Quality Metrics for Analysis Model.	10
III	Software Design and Implementation: Design Process, Principles, and Design Concepts-Abstraction, Architecture, Refinement, Modularity, Data Structure, Information Hiding, Functional Independence, Cohesion, Coupling; Design Documentation, Design Strategies-Top Down and Bottom Up Design; Design ModelData Design Elements, Architectural Design, User Interface Design, Component-Level Design, Deployment-Level Design, Implementation Issues and Programming Support Environment, Quality Metrics for Design Model and Source Code	10
IV	Software Testing: Verification, Validation, Testing Objectives, Unit Testing, Integration Testing, Validation Testing, System Testing, Acceptance Testing,	10

	Regression Testing, Test Characteristics, White Box Testing, Basic Path Testing, Control Structure Testing, Black Box Testing, Test Plan, Test Case Design, Quality Metrics for Testing.	
V	Software Maintenance: Nature and Need of Maintenance, Types of Maintenance (Perceptive, Preventive, Adoptive, Corrective), Cost of Maintenance, Evolution of Software, Software Maintenance Process, Software Maintenance Techniques- Reverse Engineering, Reengineering; Factors affecting Software Maintenance, Key Issues in Maintenance, Software Configuration Management, Version and Release Control, Change Control, Configuration Audit, Metrics for Maintenance.	10

Text Books:
1. Roger S. Pressman, "Software Engineering: A Practitioner's Approach", Addison Wesley
2. Pankaj Jalote, "An Integrated Approach to Software Engineering", Springer

Reference:
1. K. K. Aggarwal & Yogesh Singh "Software Engineering", New Age International.
2. I. Sommerville, "Software Engineering", Pearson Education.
3. James Peter, W. Pedrycz, "Software Engineering: An Engineering Approach", John Wiley & Sons.
4. Subramanian Chandramouli, SaikatDutt, ChandramouliSeetharaman, B. G Geetha, "Software Engineering", Pearson Education India

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100

Prerequisites for the course: NIL

Course Learning Outcomes:
CO 1:   Select and implement different software development process models.
CO 2:   Extract and analyze software requirements specifications for different projects.
CO 3:   Develop some basic level of software architecture/design.
CO 4:   Define the basic concepts and importance of Software project management concepts like cost estimation, scheduling and reviewing the progress.
CO 5:   Apply different testing and debugging techniques and analyzing their effectiveness.

IIMTU-NEP IMPLEMENTATION
Year- II / Semester –IV

Programme: Diploma	Year: II	
Class: BCA	Semester: IV	
Credits Theory:4Cr	Subject: Data Mining	
Course Code: BCA-NEP-404	Title: Data Mining	

Course Objectives:

CO1: To introduce students to basic applications, concepts, and techniques of data mining.

CO2: To develop skills for using recent data mining software to solve practical problems in a variety of disciplines.

CO3: To extract knowledge from data repository for data analysis, frequent pattern, classification and prediction.

CO4: Understand and implement classical models and algorithms in data warehouses and data mining

CO5: Master data mining techniques in various applications like social, scientific and environmental context.

Nature of Paper: DSE

Minimum Passing Marks/Credits: 40% Marks

L:4
T:0
P:0(In Hours/Week)
Theory - 1 Hr. = 1 Credit

Unit	Contents	No. of Lectures Allotted
I	**Introduction:** Data Mining - Overview, Motivation, Definition & Functionalities, Major issues in Data Mining, Integration of Data Mining System with Data Warehouse System. **Data Preprocessing**: Descriptive Data Summarization, Data Cleaning-Missing Values, Noisy Data, Data Integration and Transformation, Data Reduction-Data Cube Aggregation, Attribute Subset Selection, Dimensionality Reduction, Numerosity Reduction, Discretization and Concept Hierarchy.	10
II	**Association Rules:** Introduction, Frequent Itemsets, Closed Itemsets, Methods to Discover Association Rules, Apriori Algorithm, Multilevel Association Rule Mining, and Rule Evaluation Metrics.	10
III	**Classification and Prediction:** Classification Techniques-Decision Tree, Rule-Based Classification, Bayesian Classification, k-Nearest-Neighbor Classifier, Linear Regression, Accuracy and Error Measures.	10
IV	**Cluster Analysis:** Introduction, Types of Data, Partitioning Methods- k-Means and k-Medoids, Hierarchical Clustering- Chameleon, Density Based Methods-DBSCAN, OPTICS. Grid Based Methods- STING, Model Based Methods-Neural Network Approach, Outlier Analysis.	10
V	**Recent Trends and Applications:** Web Mining, Spatial Data Mining, Text Mining, Multimedia Data Mining, Applications of data mining in finance, business, social networks.	10

Text Books:

1. Jiawei Han, Jian Pei, Micheline Kamber, *"Data Mining: Concepts and Techniques"*, Elsevier

Reference
1. Margaret H. Dunham, "*Data Mining: Introductory and Advanced Topics",* Pearson Education.
2. Arun K. Pujari, *"Data Mining Techniques"*, Universities Press
3. Pieter Adriaans & Dolf Zantinge, *"Data Mining"*, Pearson Education

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100

Prerequisites for the course: NIL

Course Learning Outcomes:
CO1: Understand the functionality of the various data mining and data warehousing component.
CO2: Appreciate the strengths and limitations of various data mining and data warehousing models.
CO3: Explain the analyzing techniques of various data
CO4: Describe different methodologies used in data mining and data ware housing.
CO5: Compare different approaches of data ware housing and data mining with various technologies.

IIMTU-NEP IMPLEMENTATION
Year- II / Semester –IV

Programme: Certificate/Diploma/Degree/ UG(R)/PG/Ph.D. Certificate **Class: All UG Classes of IIMT University**	Year: II Semester: IV

Credits Theory- 3Cr	**Subject: Human values and professional ethics**
Course Code Theory UVE-401	**Title:Human values and professional ethics**

Course Objectives:

CO1:   To reinstate the rich cultural legacy and human values of which we are the custodians.

CO2:   To focus on professional ethics which are broader indicators of desirable actions vis-à-vis undesirable actions?

CO3:   To lay down broader guidelines of values and ethics for internal and external stakeholders.

CO4:   To suggest operational guidelines for value-based and ethical practices in the higher educational institutions leading to implementation and monitoring.

CO5:   To indicate the outcomes of creating a value-based and ethical culture in HEIs.

CO6:   To suggest indicative reinforcement programmes for nurturing human values and ethics in HEIs.

Nature of Paper: Core/DSE/SEC/GE/AECC-AECC

Minimum Passing Marks/Credits:20

L:3
T:0
P: 0 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- NA.

Unit	Contents(Theory)	No. of Lectures Allotted
I	Course Introduction - Need, Basic Guidelines, Content and Process for Value Education	6
II	Understanding Harmony in the Human Being - Harmony in Myself	6
III	Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship	6
IV	Understanding Harmony in the Nature and Existence - Whole existence as Co-existence	6
V	Implications of the above Holistic Understanding of Harmony on Professional Ethics.	6

Suggested Readings: For Theory

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

8. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantra Shodh, Amravati.
9. E G Seebauer& Robert L. Berry, 2000, Fundamentals of Ethics for Scientists &Engineers, Oxford UniversityPress
10. M Govindrajran, S Natrajan& V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
11. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
12. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted2008.
13. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.

Evaluation/Assessment Methodology

	Max. Marks
1) Class tasks/ Sessional Examination	10 marks
2) Presentations /Seminar	05 marks
3) Assignments	
4) Research Project Report	
Seminar On Research Project Report	
5) ESE	35
Total:	50

Prerequisites for the course: First year must be clear for appearing in IIIrd/IVth for the study of this Audit/Qualifying course**- for theory**

Second year must be clear for appearing in VIth Sem for the study of this audit/Qualifying Course **- for theory**

Course Learning Outcomes:

CO1: The learning process for holistic development.
CO2: Impeccable governance.
CO3: Effective institutional management.
CO4: Well laid system of rewards and chastisement.
CO5: Institutional climate where 'rights' enjoy and 'wrongs' are discouraged.

IIMTU-NEP IMPLEMENTATION
Year- II / Semester –IV

Programme: Diploma	Year: II
Class: BCA	Semester: IV
Credits Theory:4Cr Practical:2Cr	**Subject:** Numerical Analysis
Course Code: BCA-NEP-404	**Title:** Numerical Analysis

Course Objectives:

CO1: Basic understanding of numerical Algorithms.

CO2: Adequate exposure to learn alternative methods and analyze mathematical problems to determine the suitable numerical techniques.

CO3: Use the concepts of interpolation, eigen value problem techniques for mathematical problems arising in various fields.

CO4: Solve initial value and boundary value problems which have great significance in engineering practice using ordinary and partial differential equations.

CO5: Demonstrate elementary programming language, implementation of algorithms and computer programs to solve mathematical problems.

Nature of Paper: DSE

Minimum Passing Marks/Credits:40% Marks

L:4
T:0
P:0(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	**Introduction:** Numbers representation on a computing machine with particularization to single precision, double precision, quadruple precision and the Intel 86 family of processors. Definitions of numerical rounding error and chopping error, Discussion of major sources of error in numerical analysis	8
II	**Solution of algebraic equations:** Description of: Bijection algorithm and its coding; Method of False Position and its coding; The Secant algorithm and its coding; The Newton-Raphson algorithm and its coding. Brief discussion of the robustness and relative performance of these algorithm. Properties of the fixed point algorithm $x_{n+1} = g(x_n)$ given x_0. Definition of the Lipshitz condition and the notion of a contraction algorithm. - Conditions for convergence of $x_{n+1} = g(x_n)$,Error estimation for algorithm $x_{n+1} = g(x_n)$,General notion of the order of an iterative algorithm, Aitken acceleration and Steffensen's algorithm, Solution of systems of algebraic equations	8
III	**Numerical Interpolation:** Polynomial interpolation. Definition of the Lagrange interpolating polynomial, Interpolation based on the Lagrange interpolating polynomial, Newton interpolation using divided differences, Error analysis underlying polynomial interpolation based on, Rolle's theorem. - The Chebyshev Economization and its optimality, Piecewise linear spline, Subpoint quadratic spline, Construction of the cubic spline,Least-squares data fitting; its use and implementation	8

| IV | **Solution of linear equations:** Concept of Gaussian elimination, the concept of pivoting and a simple illustration of why pivoting is needed, LU factorization of matrices with and without partial/full pivoting, The Choleski factorization, Matrix inversion Iterative methods, The concept of a matrix norm with simple examples, e.g. the Frobenius norm, The Jacobi iteration algorithm, The Gauss-Seidel algorithm, The Gauss-Seidel algorithm with over-relaxation | 8 |
| V | **Numerical calculation of matrix eigenvalues:** Gershgorin's theorem with an example - The Power algorithm, The Inverse Power algorithm, The Jacobi transformation, The Householder transformation, Construction of the Upper Hessenberg matrix, The QR algorithm | 8 |

Text Books:
1. V. A. Patel. Numerical Analysis. Harcourt Brace, College Publishers, 1994.
2. W. Cheney and D. Kincaid. Numerical Mathematics and Computing. Brooks/Cole Publishing Company, 2003.

Reference
1. Numerical Analysis. 9th ed. R.L. Burden and J.D. Faires: Edition Brooks / cole: -73563-538-0-978 .2011136
2. An Introduction to Numerical Analysis. EndreSüli, David F. Mayers Cambridge : -0521810264 - 2003 .0521007941

Evaluation/Assessment Methodology	
Max. Marks 100	
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report Seminar On Research Project Report	10
5) ESE	75
Total:	100

Prerequisites for the course: *Problem Solving using C*

Course Learning Outcomes:
CO1: Discuss robustness and relative performance of different algorithm.
CO2: Able to apply interpolation methods for solving the problems numerically.
CO3: Able to calculate the errors and the rates of convergence.
CO4: Able to evaluate the relationships between different areas of mathematics and the connections between mathematics and other disciplines.
CO5: Able to develop numerical algorithms for the solution of the algebraic eigenvalue problem.

IIMTU-NEP IMPLEMENTATION
Year- II / Semester –IV

Programme: Diploma	Year: II
Class:BCA	Semester: IV
Credits Theory:4Cr	**Subject:** Python Programming
Course Code: BCA-NEP-402	**Title:**Python programming

Course Objectives:

CO1: Understand and use variables.

CO2: Work with common Python data types, like integers, floats, strings as well as pandas Data frames.

CO3: Use basic flow control including for loops and conditionals.

CO4: Read data from text files.

CO5: Obtain basic summary statistics from data files.

Nature of Paper: Core

Minimum Passing Marks/Credits:40% Marks

L:4
T:0
P:0(In Hours/Week)
Theory-1Hr.=1Credit
Practical-2Hrs.=1Credit(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	**Introduction:** Installing Python in Windows/Linux/Mac OS, Using Python interpreter, Execute a Script, Structuring with Indentation, Editors. **Data types and Variables:** Variables, Variables v/s identifiers, Naming convention of variables, Keywords. **Data Structure:** List, Tuples, Sets, Dictionaries	10
II	**Input And Output:**Input function, Input with raw input(),Output with old string format, Python format function **Control Flow:** If/Else Statements, For/while Statements, Range() function, Break and continue statements, Else clauses on Loops.	10
III	**Functions**: Defining Function, Default Argument, Keyword Argument, Arbitrary Arguments List. **File Handling**: Reading from the file, Writing to the file, Methods of file objects. **Error And Expectation:** Syntax Errors, Exceptions, Handling Exceptions (try, except).	10
IV	**Module**: Creating Modules, import a module, Import the names, Executing modules as scripts. **Class Concept:** Class Syntax, Class Objects, Instance Objects, Method Objects, Class and Instance Variables.	10

		Advanced Modules: Regular Expressions, date time - date and time libraries, Dealing with Excel, GUI, Web Scrapping.	10
	V	Advanced Modules: Regular Expressionsϖ date time - date and time libraries. Dealing with Excelϖ GUIϖ Web Scrappingϖ	

Text Books:
1. Python Cook book Author: By David Beazley and Brian K. Jones
2. The Python Book: The Ultimate Guide to Coding with Python by Aaron Asadi (ed.)
3. Functional Programming in Python Author: David Mertz

Reference:
1. Python-(Mark Lutz)
2. Python Training guide (BPB Publications)

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/Sessional Examination	15
2) Presentations/Seminar	
3) Assignments	10
4) Research Project Report	
5) Seminar On Research Project Report	
6) ESE	75
Total:	100

Prerequisites for the course: Data Mining

Course Learning Outcomes:

CO1: The course is designed to provide Basic knowledge of Python.
CO2: Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.
CO3: Express proficiency in the handling of strings and functions.
CO4: Identify the commonly used operations involving file systems and regular expressions.
CO5: Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python.

IIMTU-NEP IMPLEMENTATION
Year- II / Semester -IV

Programme:UG	**Year:**II
Class:BCA	**Semester:**IV
Credits **Theory:** 0 **Practical: 2**	**Subject: Python Programming Lab**
Course Code: **BCA-NEP-406P**	**Title:Python Programming Lab**

Course Objectives:
CO1: To be able to introduce core programming basics and various Operators of Python programming Language.
CO2: To demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries.
CO3: To understand about Functions, Modules and Regular Expressions in Pythonϖ Programming.

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks

L:0
T:0
P:4(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	Write a python script to check whether a given number is even or odd.	1
II	Write a Python script to add two integers values taken from user.	1
III	Write a python script to calculate area of circle where radius is taken from user.	1
IV	Write a program to copy the content of one file to another file.	1
V	Write a Python Program to find the sum of series: 1 + 1/2 + 1/3.	1
VI	Write a program to find the sum of n natural numbers.	1
VII	Write a program to find factorial of a given number.	1
VIII	Write a program to find whether a given number is Armstrong number or not.	1
IX	Write a program takes a number and computes the prime factors of the integer.	1
X	Program to check whether a given number is a palindrome.	1

TextBooks:
1. Pooja Sharma,"Programming in Python",B.P.B. Publications.
2. Mark Summer field, "Programming in Python.
3. A Complete Introduction to the Python Language", Pearson Education.

Reference:
1. Mark Lutz,"Programming Python",O'Reilly Media.
2. Wesley J.Chun,"CorePython Programming", Prentice Hall.
3. Alex Martelli,"Pythonina Nutshell",O' Reilly Media.

Evaluation/Assessment Methodology	
	Max. Marks:50
1) Class tasks/ Sessional Examination 2) Presentations /Seminar 3) Assignments 4) Research Project Report	25
5) ESE	25
Total:	50

Course Learning Outcomes:
CO1: Student should be able to understand the basic concepts of scripting and the contributions of scripting language.
CO2: Ability to explore python data structures like Lists, Tuples, Sets and dictionaries.
CO3: Ability to create practical and contemporary applications using Functions, Modules and Regular Expressions.

IIMTU-NEP IMPLEMENTATION
Year- II / Semester -IV

Programme: UG	Year: II
Class: BCA	Semester: IV
Credits	Subject: Software Engineering Lab
Practical: 2	
Course Code:	Title: Software Engineering Lab
BCA-NEP-405P	

Course Objectives:
Identify ambiguities, inconsistencies and incompleteness from a requirements specification and state functional and non-functional requirement

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks

L:0
T:0
P:4(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	Draw the use case diagram and specify the role of each of the actors. Also state the precondition, post condition and function of each use case	2
II	Preparation of Software Requirement Specification Document, Design Documents and	2
III	Identify the classes. Classify them as weak and strong classes and draw the class diagram.	2
IV	Preparation of Software Configuration Management and Risk Management related documents	2
V	Study and usage of any Design phase CASE tool	2
VI	Prepare a SRS document in line with the IEEE recommended standards.	2
VII	Develop test cases for unit testing and integration testing	2
VIII	Develop test cases for various white box and black box testing techniques.	2
IX	Draw the activity diagram	2
X	Draw the state chart diagram.	

Reference / Text Books:
1. RS Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
2. Pankaj Jalote, Software Engineering, Wiley
3. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
4. K.K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology	
	Max. Marks:50
1) Class tasks/ Sessional Examination 2) Presentations /Seminar 3) Assignments 4) Research Project Report Seminar On Research Project Report	25
5) ESE	25
Total:	50

Course Learning Outcomes:
Student will be able to:
CO1: Draw a class diagram after identifying classes and association among the
CO2: Graphically represent various UML diagrams, and associations among them and identify the logical sequence of activities undergoing in a system, and represent them pictorially
CO3: Able to use modern engineering tools for specification, design, implementation and testing
CO4: Develop test cases for various white box and black box testing techniques.

IIMTU-NEPIMPLEMENTATION
Year- III / Semester –V

Programme: Degree Class: BCA		Year: III Semester: V	
Credits Theory:4Cr	**Subject:** Big Data		
Course Code: BCA-NEP-503	**Title:** Big Data		
Course Objectives:			
CO1:	Demonstrate knowledge of Big Data Analytics concepts and its applications in business.		
CO2:	Demonstrate functions and components of Map Reduce Framework and HDFS.		
CO3:	Develop queries in No SQL environment		
CO4:	Explain process of developing Map Reduce based distributed processing applications.		
CO5:	Explain process of developing applications using HBASE, Pig etc.		
Nature of Paper: Discipline Specific Elective			
Minimum Passing Marks/Credits:40% Marks			
L:4 T:0 P:0(In Hours/Week) Theory-1Hr.=1Credit			

Unit	Contents	No. of Lectures Allotted
I	**Introduction to Big Data**: Types of digital data, history of Big Data innovation, introduction to Big Data platform, drivers for Big Data, Big Data architecture and characteristics, 5 Vs of Big Data, Big Data technology components, Big Data importance and applications, Big Data features – security, compliance, auditing and protection, Big Data privacy and ethics, Big Data Analytics, Challenges of conventional systems, intelligent data analysis, nature of data, analytic processes and tools, analysis vs reporting, modern data analytic tools.	8
II	**Map-Reduce:** Map-Reduce framework and basics, how Map Reduce works,developing a Map Reduce application, unit tests with MR unit, test data and localtests, anatomy of a Map Reduce job run, failures, job scheduling, shuffle and sort, task execution, Map Reduce types, input formats, output formats, Map Reduce features, Real-world Map Reduce.	8
III	**HDFS (Hadoop Distributed File System):** Design of HDFS, HDFS concepts, benefits and challenges, file sizes, block sizes and block abstraction in HDFS, data replication, how does HDFS store, read, and write files, Java interfaces to HDFS, command line interface, Hadoop file system interfaces, data flow, data ingest with Flume and Scoop, Hadoop archives, Hadoop I/O: Compression, serialization, Avroand file-based data structures. Hadoop Environment: Setting up a Hadoop cluster, cluster specification, cluster setup and installation, Hadoop configuration, security in Hadoop,	8
IV	**Hadoop Eco System and YARN:** Hadoop ecosystem components, schedulers, fairand capacity, Hadoop 2.0 New Features – Name Node high availability, HDFS federation, MRv2, YARN, Running MRv1 in YARN. **NoSQL** Databases: Introduction to No SQL Mongo DB: Introduction, data types,	8

		creating, updating and deleing documents, querying, introduction to indexing, capped collections	
V	**Hadoop Eco System Frameworks**: Applications on Big Data using Pig, Hive and HBase. **Pig:** Introduction to PIG, Execution Modes of Pig, Comparison of Pig withDatabases, Grunt, Pig Latin, User Defined Functions, Data Processing operators, **HBase** – Hbase concepts, clients, example, Hbase vs RDBMS, advanced usage, schema design, advance indexing, Zookeeper – how it helps in monitoring a cluster, how to build applications with Zookeeper. IBM Big Data strategy, introduction to Infosphere, BigInsights and Big Sheets, introduction to Big SQL.	8

Text Book:
1. 1.Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging
2. Business Intelligence and Analytic Trends for Today's Businesses", Wiley.
3. Big-Data Black Book, DT Editorial Services, Wiley.

Reference Book:
1. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons
2. Pete Warden, "Big Data Glossary", O'Reilly

<div align="center">Evaluation/Assessment Methodology</div>

	Max. Marks 100
1) Class tasks/Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report/Seminar on Research Project Report	10
5) ESE	75
Total:	100

Prerequisites for the course: NIL

Course Learning Outcomes:
CO1: Able to understand the concept of HDFS and map reduce.
CO2: Able to gather large data from a range of data sources.
CO3: Able to understand the Hadoop ecosystem components
CO4: Able to explain the architecture of pig and hive with different operations.
CO5: Able to understand the importance and challenges of big data.

IIMTU-NEPIMPLEMENTATION
Year- III / Semester –V

Programme: Degree Class: BCA		Year: III Semester: V
Credits Theory:4Cr	**Subject:** Data communication network	
Course Code: BCA-NEP-503	**Title:** Data communication network	
Course Objectives: CO1: To introduce the various types of computer networks. CO2: To explore the various layers of OSI Model. CO3: To introduce UDP and TCP Models. CO4: To identify various application layer protocols. CO5: To demonstrate the TCP/IP and OSI models		
Nature of Paper: DSE		
Minimum Passing Marks/Credits:40% Marks		
L:4 T:0 P:0(In Hours/Week) Theory-1Hr.=1Credit Practical-2Hrs.=1Credit(4Hrs./Week=4Credits)		

Unit	Contents	No. of Lectures Allotted
I	Data Communications: Components – Direction of Data flow – Networks – Components and Categories – Types of Connections – Topologies –Protocols and Standards – ISO / OSI model, Example Networks such as ATM, Frame Relay, Transmission modes, Multiplexing, Transmission Media, Switching, Circuit Switched Networks	10
II	Data link layer: Introduction, Framing, and Error – Detection and Correction – Parity – LRC – CRC Hamming code, Flow and Error Control, , HDLC, Point to Point Protocols. ALOHA, CSMA/CD, LAN – Ethernet IEEE 802.3, IEEE 802.5 – IEEE 802.11, Random access, Controlled access, Channelization.	10
III	Transport Layer: Process to Process Delivery, UDP and TCP protocols, Data Traffic, Congestion, Congestion Control, QoS, Integrated Services,	10
IV	Network layer: Logical Addressing, Internetworking, Address mapping, ICMP, IGMP, Forwarding, Uni-Cast Routing Protocols, Multicast Routing Protocols.	10
V	Application Layer: Domain name space, DNS in internet, electronic mail, SMTP, FTP, WWW, HTTP, SNMP.	10
Text Books: 1. Data Communications and Networking, Behrouz A. Farozan, Fourth Edition TMH, 2006. 2. 2. Computer Networks, Andrew S Tanenbaum, 4thEdition. Pearson Education, PHI.		

Reference:
1. Data communications and Computer Networks, P.C .Gupta, PHI.
2. An Engineering Approach to Computer Networks, S. Keshav, 2ndEdition, Pearson Education.
3. Computer Networking: A Top-Down Approach Featuring the Internet. James Kurose& Keith W. Ross, 3rdEdition, Pearson Education.

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	**100**

Prerequisites for the course: NIL

Course Learning Outcomes:

CO1. Students should understand and explore the basics of Computer Networks and Various Protocols.

CO2. Students will be in a position to administrata a network and flow of information.

CO3. Able to understand the World Wide Web Concepts.

CO4. Able to understand the concepts of network security

CO5. Able to secure device from network issues.

IIMTU-NEP IMPLEMENTATION
Year- III / Semester -V

Programme: Degree		Year: III
Class: BCA		Semester: V
Credits Theory:4Cr	**Subject:**Web Technologies	
Course Code: BCA-NEP-502	**Title:** Web Technologies	

Course Objectives:

CO1: Analyze a web page and identify its elements and attributes.

CO2: Create web pages using XHTML and Cascading Style Sheets.

CO3: Build dynamic web pages using JavaScript (Client-side programming).

CO4: Create XML documents and Schemas.

CO5: To develop an ability to design and implement static and dynamic website.

Nature of Paper: Core

Minimum Passing Marks/Credits: 40% Marks

L:4

T:0

P:0(In Hours/Week)

Theory - 1 Hr. = 1 Credit

Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	**Introduction:** Web Page,Website, Web Browser, Internet Address, Uniform Resource Locator(URL), Web Essentials: Clients, Servers, and Communication; Web Servers-Apache, IIS, Proxy Server,HTTP Request Message-Response Message; Web Hosting,TCP/IP Protocol Suite, Installation and Managing Web-Server: IIS/XAMPP/LAMP, Browser Architecture and Web Site Structure	10
II	**HTML:**Basics of HTML, Formatting and Fonts, Commenting Code, Color, Hyperlink, Lists, Tables, Images, Forms, XHTML, Meta Tags, Character Entities, Frames and Frame Sets, Audio andVideo.	10
III	**Cascading Style Sheets (CSS):** Need for CSS, Introduction to CSS, Basic Syntax and Structure, Using CSS, Background Images, Colors and Properties, Manipulating Texts, Fonts, Borders and Boxes, Margins, Padding, Lists	10
IV	**XML:** Introduction, Features, XML Document Structure, XML Markups-Element Markup, Attribute Markup, Naming Rules, Components, Comments, Document Type Definitions (DTD)– Internal and External DTD, Developing DTD, Well Formed XML Documents, Valid XML Documents, Validating an XML document using a DTD, XML Schema, Displaying XML Documents, XSL and CSS, XML Namespaces, XML DOM, Extensible Style sheet Language Transformations (XSLT).	10
V	**Java Script-**Introduction, Client-Side JavaScript, Server-Side JavaScript, Data Types, JavaScript Objects, Control Structures, Function, Operators, Statements, Document and Its Associated Objects, Events and Event Handlers, JavaScript Security.	10

Text Books:

1. Aravind Shenoy, "*Thinking in HTML*", Packt Publishing.

2. Suehring "*Java Script Step by Step*", Prentice Hall India Learning Private Limited.
3. Behrouz A. Forouzan, "*Data Communication and Networking*", Tata McGraw Hill.

Reference
1. A.S.Tanenbaum, "*Computer Networks*", Pearson Education Asia.
2. Uttam Kumar Roy, "*Web Technologies*", Oxford University Press.
3. Raj Kamal, "*Internet and Web Technologies*", Tata McGraw Hill.

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100

Prerequisites for the course: NIL

Course Learning Outcomes:
CO1   Describe and differentiate different Web Extensions and Web Services.
CO2:   Apply fundamental computer theory to basic programming techniques and fundamental skills to maintain web server services required to host a website.
CO3:   Select and apply markup languages for processing, identifying, and presenting of information in web pages.
CO4:   Use scripting languages and web services to transfer data and add interactive components to web pages.
CO5:   Create and manipulate web media objects using editing software.

IIMTU-NEP IMPLEMENTATION
Year- III / Semester -V

Programme: Degree		Year: III
Class: BCA		Semester: V
Credits Theory: 4Cr	**Subject:Design and analysis of algorithms**	
Course Code: BCA-NEP-501	**Title: Design and analysis of algorithms**	

Course Objectives:

CO1. **Analyze the asymptotic performance of algorithms.**
CO2. **Write rigorous correctness proofs for algorithms.**
CO3. **Apply important algorithmic design paradigms and methods of analysis**
CO4. **Demonstrate a familiarity with major algorithms and data structures.**
CO5. Synthesize efficient algorithms in common engineering design situations

Nature of Paper: CORE

Minimum Passing Marks/Credits: 40% Marks

L:4
T:0
P: 0 (In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1 Credit (4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	**Introduction** Algorithms, Analyzing Algorithms, Complexity of Algorithms, Growth of Functions	8
II	**Algorithm Design Techniques** Divide and Conquer, Greedy Algorithms **Dynamic Programming**: Dijikstra Algorithm, Warshal Algorithm,.	8
III	**Sorting and Searching Techniques:** Elementary sorting techniques–Bubble Sort, InsertionSort, Merge Sort, Advanced Sorting techniques - Heap Sort, Quick Sort, Sorting in Linear Time - Bucket Sort, Radix Sort and Count Sort, Searching Techniques, Comparison of Sorting Algorithms	8
IV	**Advanced data structures**: Basic terminology used with Tree, Binary Trees, Red black trees, B- trees	8
V	**Graphs:** Graph Algorithms–Breadth First Search, Depth First Search and its Applications, Minimum Spanning Trees. **String Processing: String** Matching, KMP Technique	8

BOS

Text Books:	
1. T.H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "*Introduction to Algorithms*", PHI	
Reference	
1. Sarabasse& A.V. Gelder,"*Computer Algorithm – Introduction to Design and Analysis*", Pearson	
Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100
Prerequisites for the course: NIL	

Course Learning Outcomes:

CO 1**:** Able to Analyze worst-case running times of algorithms using asymptotic analysis.

CO 2: Able to describe the divide-and-conquer paradigm.

CO 3: Able to analyze various searching and sorting algorithms.

CO 4: Able to implement various sorting techniques.

CO 5: Able to explain the major graph algorithms and their analyses.

IIMTU-NEP IMPLEMENTATION
Year- III / Semester -V

Programme: Degree	Year: III
Class: BCA	Semester: V

Credits	Subject: ERP
Theory: 4Cr Practical: 2Cr	

Course Code: BCA-NEP-503	Title: ERP

Course Objectives:

CO1: To provide a contemporary and forward-looking on the theory and practice of Enterprise Resource Planning Technology.

CO2: To focus on a strong emphasis upon practice of theory in Applications and Practical oriented approach.

CO3: To train the students to develop the basic understanding of how ERP enriches the business organizations in achieving a multidimensional growth.

CO4: To develop a process driven thinking towards business processes.

CO5: To aim at preparing the students technological competitive and make them ready to self-upgrade with the higher technical skills.

Nature of Paper: DSE

Minimum Passing Marks/Credits: 40% Marks

L:4
T:0
P:0(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	**Introduction to ERP:** Evolution of ERP; what is ERP?, Reasons for the Growth of ERP; Scenario and Justification of ERP in India;. Evaluation of ERP; Various Modules of ERP;. Advantage of ERP.	8
II	**An Overview of Enterprise:** An Overview of Enterprise;. Integrated Management Information; Business Modeling; ERP for Small Business;. ERP for Make to Order Companies;. Business Process Mapping for ERP Module Design;. Hardware Environment and its Selection for ERP Implementation	8
III	**ERP and Related Technologies:** ERP and Related Technologies;. Business Process Reengineering (BPR);. Management Information System (MIS);. Executive Information System (EIS); Decision support System (DSS);. Supply Chain Management (SCM).	8
IV	**ERP Market:** Introduction, SAP AG, Baan Company, Oracle Corporation, People Soft, JD Edwards World Solutions Co, System Software Associates, Inc. (SSA); QAD; A Comparative Assessment and Selection of ERP Packages and Modules.	8
V	**ERP Implementation Lifecycle:** Issues in Implementing ERP Packages;. Pre-evaluation Screening;. Package Evaluation;. Project Planning Phase; Gap Analysis; Reengineering; Configuration;Implementation; Team Training; Testing; Going Live; End-User Training; Post Implementation (Maintenance Mode).	8

Text Books:
1. Daniel E.O' Leary, Enterprise Resource Planning Systems, Cambridge University Press, 2002.
2. Ellen Monk, Bret Wagner, Concepts in Enterprise resource planning, Cengage learning, Third edition, 2009.

Reference
1. Enterprise Resource Planning – Alexis Leon – Second Edition – TMH
2. Manufacturing Resource Planning (MRP II) with Introduction to ERP; SCM; an CRM by Khalid Sheikh, Publisher: McGraw-Hill

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100

Prerequisites for the course: *Problem Solving using C*

Course Learning Outcomes:
CO1: Make basic use of Enterprise software, and its role in integrating business functions
CO2: Analyze the strategic options for ERP identification and adoption.
CO3: Design the ERP implementation strategies.
CO4: Analyze the strategic options for ERP identification and adoption.
CO5: Create reengineered business processes for successful ERP implementation.

IIMTU-NEP IMPLEMENTATION
Year- III / Semester -V

Programme:UG Class:BCA		Year: III Semester:V
Credits Theory: 0 Practical: 2	**Subject: DESIGN AND ANALYSIS OF ALGORITHM LAB**	
Course Code: BCA-NEP-504P	**Title:DESIGN AND ANALYSIS OF ALGORITHM LAB**	
Course Objectives: CO1: Design algorithms using divide and conquer, greedy and dynamic programming CO2: Analyze the performance of merge sort and quick sort algorithms using divide and conquer technique. CO3: Execute sorting algorithms such as sorting, graph related and combinatorial algorithm in a high-level language.		
Nature of Paper: Core		
Minimum Passing Marks/Credits: 50% Marks		
L:0 T:0 P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)		

Unit	Contents	No. of Lectures Allotted
I	Implement linear searching on a set of elements.	2
II	From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.	2
III	Implement 0/1 Knapsack problem using Dynamic Programming	2
IV	Sort a given set of elements using the Quick sort method	2
V	Implement a Merge Sort algorithm to sort a given set of elements.	2
VI	Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm.	2
VII	Implement All-Pairs Shortest Paths Problem using Floyd's algorithm.	2
VIII	Implement N Queen's problem using Back Tracking.	2

Reference / Text Books:
1. T.H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "*Introduction to Algorithms*", PHI

Evaluation/Assessment Methodology	
	Max. Marks:50
1) Class tasks/ Sessional Examination 2) Presentations /Seminar 3) Assignments 4) Research Project Report Seminar On Research Project Report	25
5) ESE	25

| | **Total:** | 50 |

Course Learning Outcomes:

After completing this course, the student will be able to:

CO1: Design an algorithm in a effective manner

CO2: Apply iterative and recursive algorithms.

CO3: Design iterative and recursive algorithm.

IIMTU-NEP IMPLEMENTATION
Year- III / Semester -V

Programme: UG **Class: BCA**		Year: III Semester: V
Credits Practical: 2	**Subject: Web Technologies lab**	
Course Code: BCA-NEP-505P	**Title: Web Technologies lab**	

Course Objectives:
CO1: Develop static web pages using HTML.
CO2: Design dynamic web pages using Javascript and XML.
CO3: Develop Java programs for window/web-based applications.

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks

L:0
T:0
P:4(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	Write HTML/Java scripts to display your CV in navigator, your Institute website, Department Website and Tutorial website for specific subject.	2
II	Write an HTML program to design an entry form of student details and send it to store at database server like SQL, Oracle or MS Access	2
III	Write programs using Java script for Web Page to display browsers information.	2
IV	Write a Java applet to display the Application Program screen i.e. calculator and other.	2
V	Program to illustrate JDBC connectivity	2
VI	Design and implement a simple shopping cart example with session tracking API.	2
VII	Create a style sheet in CSS/ XSL & display the document in internet explorer.	2
VIII	Create MS Access Database, Create on ODBC link.	2

Reference / Text Books:
1. RS Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
2. Pankaj Jalote, Software Engineering, Wiley
3. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
4. K.K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.

Evaluation/Assessment Methodology	
	Max. Marks:50
1) Class tasks/ Sessional Examination 2) Presentations /Seminar 3) Assignments 4) Research Project Report Seminar On Research Project Report	25
5) ESE	25
Total:	50
Course Learning Outcomes: **Student will be able to:** CO1: Write Java programs for window/web-based applications. CO2: Develop static and dynamic web pages using HTML. CO3: Design dynamic web page using server site programming.	

IIMTU-NEP IMPLEMENTATION
Year- III / Semester -VI

Programmed: Degree **Class:BCA**	Year: III Semester: VI
Credits Theory:4Cr Practical: 2Cr	**Subject:**Artificial Intelligence
Course Code: BCA-NEP-602	**Title:** Artificial Intelligence

Course Objectives:

CO1: To understand about Artificial Intelligence,AI tasks and AI problem solving technique.
CO2: To study the concepts Propositional logics , predicate Logic
CO3: To understand the concepts Semantics Net, Partitions Net, Conceptual Dependencies and Scripts
CO4: To understand concepts of Prolog and Implement the Prolog Program
CO5: To learning concepts of Expert system and Learning.

Nature of Paper: CORE

Minimum Passing Marks/Credits: 40% Marks

L:4
T:0
P:0(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	**Introduction**: Introduction to Artificial Intelligence, Task Domains of AI, AI Techniques, Problem formulation, Production systems, Control strategies, Search strategies, Problem characteristics, Production system characteristics, Depth First Search, Breadth First Search, Heuristic Search (Hill Climbing, Best First Search and Problem Reduction).	9
II	**Knowledge Representation**: Approaches, Types and Properties of Knowledge, Propositional Logic, Properties of Statements, Equivalence Law, Inference Laws, First Order Predicate Logic, Properties of Wffs, Representation of Facts in First Order Predicate Logic, Conversion to Clausal Forms, Unification and Resolution, No deductive Inference Methods, Rules.	9
III	**Structured Knowledge Representation**: Semantic Nets, Partitioned Semantic Net, Semantic Net for Wffs and Predicate Logic, Property Inheritance Algorithm, Frame Structures, Conceptual Dependencies and Scripts	9
IV	**Prolog:** Introduction, Facts, Rules, Variables, Operators, Control Structures, Matching, Backtracking, Cuts, Recursion, Lists, Input/output and Streams, Databases, Implementation of All Concepts in Prolog.	9
V	**Expert System**: Need and Justification of Expert System, Representing and Using Domain Specific Knowledge, Knowledge Acquisition, Expert System Shells, Inference Engine, Learning Procedure and Case Study of MYCIN. **Learning**: Introduction, Rote Learning, Learning by Taking Advice, Learning in ProblemSolving, Learning from Example-Induction, Explanation Based learning.	9

Text Books:
1. Elaine Rich & Kevin Knight, *"Artificial Intelligence"*, Tata McGraw Hill.
   Dan W. Patterson,*"Introduction to Artificial Intelligence& Expert Systems"*, PHI.
2. S. K. Sarkar, "*Discrete Mathematics*", S. Chand & Co.

Referential Books
1. Stuart J. Russell &Peter Norvig, "*Artificial Intelligence-A Modern Approach",* Prentice Hall.
2. George F. Luger, "*Artificial Intelligence-Structures and Strategies for Complex Problem Solving*",
   Pearson Education.

Evaluation/Assessment Methodology

	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100

Prerequisites for the course: Artificial Intelligence	

Course Learning Outcomes:
CO 1: Learn about Artificial Intelligence, AI tasks and AI problem solving technique.
CO 2: Learn study the concepts Propositional logics, predicate Logic.
CO 3: Learn the concepts Semantics Net, Partitions Net, Conceptual Dependencies and Scripts
CO 4: Learn concepts of Prolog and Implement the Prolog Program.
CO 5: Learn concepts of Expert system and Learning.

IIMTU-NEPIMPLEMENTATION
Year- III / Semester –VI

Programme:Degree Class:BCA		Year: III Semester:VI
Credits Theory:4Cr	**Subject:** Cyber Security	
Course Code: BCA-NEP-601	**Title:**Cyber Security	

Course Objectives:
CO1: Understand the various tools and methods used in cybercrime.
CO2: Identify risk management processes, risk treatment methods, organization of information security.
CO3: Classify cyber security solutions and information assurance.
CO4: Examine software vulnerabilities and security solutions to reduce the risk of exploitation.
CO5: Analyze the cyber security needs of an organization.

Nature of Paper: Core Course

Minimum Passing Marks/Credits:40% Marks (ISE+ESE)

L:4
T:0
P:0(In Hours/Week)
Theory-1Hr.=1Credit
Practical-2Hrs.=1Credit(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	**Introduction to Ethical Hacking:**Key issues plaguing the information security world, incident management process, and penetration testing, **Footprinting and Reconnaissance:** Various types of footprints, footprints tools, and countermeasures.	10
II	**Scanning Network:** Network scanning techniques and scanning countermeasure.	10
III	**Enumeration & Vulnerability Analysis:** Enumeration techniques and enumeration countermeasure. Vulnerability Analysis using different tools.	10
IV	**System Hacking & Malware Threats:** System Hacking Methodology, Steganography, Steganalysis attacks and covering tracks. Different types of Trojan, Trojan analysis and Trojan countermeasures, working of viruses, Virus analysis, computer worms, malware analysis procedure and communication.	10
V	**Sniffing & Social Engineering:** Packet sniffing techniques , identify theft , and social engineering countermeasure	10

Text Books:
1. 1.K. Kumar," Cyber Laws: Intellectual property & E Commerce, Security",1stEdition, Dominant Publisher,2011.
2. Rodney D. Ryder, "Guide To Cyber Laws", Second Edition, Wadhwa And Company, New Delhi, 2007.
3. Information Security policy &implementation Issues, NIIT, PHI.

Reference
1. Vakul Sharma, "Handbook Of Cyber Laws" Macmillan India Ltd, 2ndEdition, PHI, 2003.
2. Justice Yatindra Singh, "Cyber Laws", Universal Law Publishing, 1stEdition,New Delhi, 2003.

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/Sessional Examination	15
2) Presentations/Seminar	
3) Assignments	10
4) Research Project Report	
Seminar On Research Project Report	
5) ESE	75
Total:	100

Prerequisites for the course :NIL

Course Learning Outcomes:
CO1   Able to analyze and evaluate the cyber security needs of an organization.
CO2   Able to determine and analyze software vulnerabilities and security solutions to reduce the risk of exploitation.
CO3:   Able to measure the performance and troubleshoot cyber security systems.
CO4:   Implement cyber security solutions and use of cyber security, information assurance, and cyber/computer forensics software/tools.
CO5:   Comprehend and execute risk management processes, risk treatment methods, and key risk and performance indicators

IIMTU-NEP IMPLEMENTATION
Year- III / Semester -VI

Programme:Degree Class:BCA		Year:III Semester:VI
Credits Theory:4Cr	**Subject:** Mobile Computing	
Course Code: BCA-NEP-603	**Title:** Mobile Computing	

Course Objectives:
CO1: To understand the basic concepts of mobile computing.
CO2: To learn the basics of mobile data management system.
CO3: To be familiar with the network layer protocols and Ad-Hoc networks.
CO4: To know the basis of transaction and application layer protocols.
CO5: To gain knowledge about different mobile platforms and application development.

Nature of Paper: DSE

Minimum Passing Marks/Credits:40% Marks

L:4
T:0
P:0(In Hours/Week)
Theory - 1 Hr. = 1 Credit

Unit	Contents	No. of Lectures Allotted
I	**Mobile Computing:** Issues in Mobile Computing, Wireless Telephony, Digital Cellular Standards, Bluetooth Technology, Wireless Multiple Access Protocols, Channel Allocation in Cellular Systems. Wireless Application Protocol, WRITE A PROGRAM technology, Mobile Information device, Mobile Computing Applications.	8
II	**Data Management Issues:** Mobility, Wireless Communication and Portability, Data Replication and Replication Schemes, Basic Concept of Multihopping, Adaptive Clustering for Mobile Network, Multicluster Architecture.	8
III	**Location Management:** Location Based Services, Automatically Locating Mobile Uses, Locating and Organizing Services, Issues and Future Directions, Mobile IP, Comparison of TCP and Wireless.	8
IV	**Transaction Management:** Data Dissemination, Cache Consistency, Mobile Transaction Processing, Mobile Database Research Directions, Security Fault Tolerance for Mobile N/W.	8
V	What is Ad-hoc Network? , Problems with Message Routing in Wireless Ad-hoc Mobile Networks, Routing scheme based on signal strength, Link state and Distance Vector routing protocols, Ad-hoc on Demand Distance Vector.	8

Text Books:
1. Shambhu Upadhyaya, Abhijeet Chaudhary, Kevin Kwiat, Mark Weises,"Mobile Computing", Kluwer Academic Publishers.
2. UWE Hansmann, Lothar Merk, Martin-S-Nickious, Thomas Stohe, "Principles of Mobile Computing", Springer International Edition.
3. Wireless and Mobile Networks Architectures, by Yi-Bing Lin & Imrich Chlamtac, John Wiley & Sons, 2001.

Reference	
1. Mobile and Personal Communication systems and services, by Raj Pandya, Prentice Hall of India, 2001.	
2. Wireless Web Development, Ray Rischpater, Springer Publishing, 2000.	
Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100
Prerequisites for the course: *Problem Solving using C*	

Course Learning Outcomes:

CO1: Understand about mobile communication with their different routing algorithms.

CO2: Apply different data backup schemes used in mobile network to store the data.

CO3: Able to explain about location management that is much important for mobile network.

CO4: Build the knowledge of how transactions are done through mobile, different security issues while mobile transaction.

CO5: Appraise different routing protocols used for routing the path like ADDV, DSR, FSR etc.

IIMTU-NEP IMPLEMENTATION
Year- III / Semester -VI

Programme:Degree		Year:III
Class:BCA		Semester: VI
Credits Theory:4Cr	**Subject:**Real Time System	
Course Code: BCA-NEP-603	**Title:**Real Time System	

Course Objectives:

CO1: To study the basic of tasks and scheduling.
CO2: To understand programming languages and databases.
CO3: To analyze real time communication.
CO4: To analyze evaluation techniques and reliability models for Hardware Redundancy.
CO5: To understand clock synchronization.

Nature of Paper: DSE

Minimum Passing Marks/Credits:40% Marks

L:4
T:0
P:0(In Hours/Week)
Theory - 1 Hr. = 1 Credit

Unit	Contents	No. of Lectures Allotted
I	**INTRODUCTION TO TASK SCHEDULING:** Introduction - Issues in Real Time Computing, Structure of a Real Time System, Task classes, Performance Measures for Real time Systems, Task Assignment and Scheduling – Classical uniprocessor scheduling algorithms, RM algorithm with different cases.	8
II	**UNI AND MULTI PROCESSOR SCHEDULING:** Uniprocessor scheduling of IRIS tasks, Task assignment, Utilization balancing – Next fit- Binpacking- Myopic off-line - Focused addressing and bidding- Buddy strategy- Fault Tolerant, Scheduling. -Aperiodic scheduling - Spring algorithm.	8
III	**REAL TIME COMMUNICATION:** Introduction – VTCSMA – PB CSMA- Deterministic collision resolution protocol- DCR for multipacket messages- dynamic planning based- Communication with periodic and aperiodic messages.	8
IV	**REAL TIME DATABASES:** Basic Definition, Real time Vs General purpose databases, Main Memory Databases, Transaction priorities, Transaction Aborts, Concurrency control issues, Disk Scheduling Algorithms, Maintaining Serialization Consistency, Databases for Hard Real Time System.	8
V	**REAL-TIME MODELING AND CASE STUDIES:** Petrinets and applications in real-time modelling, Air traffic controller system – Distributed air defense system.	8

Text Books:

1. Jane W. S. Liu, "Real-time systems", 1st Edition, Prentice Hall, 2000.
2. Philips A. Laplante, "Real-Time System Design and Analysis", 3rd Edition, John Wiley & Sons,2004.

3. C. Siva Ram Murthy, G. Manimaran, "Resource management in real-time systems and networks", PHI, 2009.		

Reference
1. C.M. Krishna, Kang G. Shin, "Real Time Systems", Tata McGraw - Hil, 2010.
2. Giorgio C. Buttazzo , "Hard real-time computing systems: predictable scheduling algorithms and applications" , Springer, 2008.

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100

Prerequisites for the course: *NIL*

Course Learning Outcomes:
CO1: Understand the features and structures of practical Operating System implementations.
CO2: Acquire practical knowledge Real Time Operating Systems used in embedded system.
CO3: Understand the use of multitasking techniques in Real Time Systems
CO4: Compare different scheduling algorithms and the schedule ability criteria.
CO5: Analyze real time systems with regard to keeping time and resource restrictions.

IIMTU-NEP IMPLEMENTATION
Year- III / Semester -VI

Programme:Degree		Year:III
Class:BCA		Semester:VI
Credits Theory:4Cr	**Subject:**E-Commerce	
Course Code: BCA-NEP-603	**Title:**E-Commerce	

Course Objectives:

CO1:	Impart the students with knowledge and understanding of contemporary trendsin e-
CO2:	commerce.
CO3:	Explain electronic system and Internet.
CO4:	Describe the use of e-commerce security.
CO5:	To provide adequate knowledge and understanding about E-Com practices to the students. Understand the usage of planning and marketing for e-commerce.

Nature of Paper: DSE

Minimum Passing Marks/Credits:40% Marks

L:4
T:0
P:0(In Hours/Week)
Theory - 1 Hr. = 1 Credit

Unit	Contents	No. of Lectures Allotted
I	**An introduction to electronic commerce**: What is E-Commerce (Introduction and Definition), Main activities E-Commerce. Goals of E-Commerce, Technical Components of E-Commerce, Functions of E-Commerce, Advantages and disadvantages of E-Commerce, Scope of E-Commerce, Electronic Commerce Applications, Electronic Commerce and Electronic Business(C2C)(C2G;G2G, B2G, B2P, B2A, P2P, B2A, C2A, B2B, B2C)	8
II	**The Internet and WWW:** Evolution of Internet, Domain Names and Internet Organization (.edu, .com, .mil, .gov, .net etc.), Types of Network, Internet Service Provider, World Wide Web, Internet & Extranet, Role of Internet in B2B Application, building own website, Cost, Time, Reach, Registering a Domain Name, Web promotion, Target email, Barter, Exchange, Shopping Bots	8
III	**Internet Security:** Secure Transaction, Computer Monitoring, Privacy on Internet, Corporate Email privacy, Computer Crime(Laws , Types of Crimes), Threats, Attack on Computer System, Software Packages for privacy, Hacking, Computer Virus(How it spreads, Virus problem, virus protection, Encryption and Decryption, Secret key Cryptography, DES, Public Key Encryption, RSA, Authorization and Authentication, Firewall, Digital Signature.	8
IV	**Electronic Data Exchange:** Introduction, Concepts of EDI and Limitation, Applications of EDI, Disadvantages of EDI, EDI model, Electronic Payment System: Introduction, Types of Electronic Payment System, Payment Types, Value Exchange System, Credit Card System, Electronic Fund Transfer, Paperless bill, Modern Payment Cash, Electronic Cash	8
V	**Planning for Electronic Commerce:** Planning Electronic Commerce initiates, Linking objectives to business strategies, Measuring cost objectives, Comparing benefits to Costs, Strategies for developing electronic commerce web sites.	8

BOS

	Internet Marketing; The PROS and CONS of online shopping, The cons of online shopping. Justify an Internet business, Internet marketing techniques, The E-cycle of Internet marketing, Personalization e-commerce.	

Text Books:
1. G.S.V.Murthy, E-Commerce Concepts, Models, Strategies- :- Himalaya Publishing House, 2011.
2. Kamlesh K Bajaj and Debjani Nag, E- Commerce, 2005.

Reference
1. Gray P. Schneider, Electronic commerce, International Student Edition, 2011.
2. E-Commerce, Fundamentals and Applications, Wiley Student Edition,

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100

Prerequisites for the course: Problem Solving using C

Course Learning Outcomes:
CO1: Identify and explain fundamental web site tools including design tools, programming tools, and data processing tools.
CO2: Apply the solutions on finding major electronic payment issues and options.
CO3: Acquire the knowledge of security issues and explain procedures used to protect against security threats.
CO4: Communicate effectively in ways appropriate to the discipline, audience and purpose.
CO5: Implement the corrective measures to management issues underlying e-Commerce issues including organizational structure, strategic planning, goal setting.

IIMTU-NEP IMPLEMENTATION
Year- III / Semester -VI

Programme: UG **Class: BCA**		Year: III Semester:VI
Credits Practical: 2	**Subject:Artificial intelligence lab**	
Course Code: **BCA-NEP-606P**	**Title:Artificial intelligence lab**	

Course Objectives:
CO1: Ability to apply standard practices and methodologies in software development and project management.
CO2: Apply various search algorithms of artificial intelligence.
CO3: Understand the concept of Artificial intelligence.

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks

L:0
T:0
P:4(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)

Unit	Contents	No. of Lectures Allotted
I	Write a program in prolog to implement simple facts and Queries	2
II	Write a program in prolog to implement simple arithmetic	2
III	Write a program in prolog to solve Monkey banana problem	2
IV	Write a program in prolog to solve Tower of Hanoi	2
V	Write a program in prolog to solve 8 Puzzle problems	2
VI	Write a program in prolog to solve 4-Queens problem	2
VII	Write a program in prolog to solve Traveling salesman problem.	2
VIII	Write a program in prolog for Water jug problem	2

Reference / Text Books:
1. Elaine Rich& Kevin Knight, *"Artificial Intelligence"*, Tata McGraw Hill. Dan W. Patterson,*"Introduction to Artificial Intelligence& Expert Systems"*, PHI.

Evaluation/Assessment Methodology	
	Max. Marks:50
1) Class tasks/ Sessional Examination 2) Presentations /Seminar 3) Assignments 4) Research Project Report/Seminar On Research Project Report	25
5) ESE	25
Total:	50

Course Learning Outcomes:
Student will be able to:
CO1: To understand the concept of Artificial intelligence.
CO2: To understand the design principles of pattern recognition with estimation and apply classification technique.
CO3: To apply knowledge representation and reasoning techniques.

IIMTU-NEP IMPLEMENTATION
Year- III / Semester -VI

Programme:UG Class:BCA	Year: III Semester:VI
Credits Practical: 2	**Subject:Cyber Security Lab**
Course Code: BCA-NEP-605P	**Title:Cyber Security Lab**

Course Objectives:
CO1: Provide practical application of cyber security concepts learned in theory.
CO2: Familiarize students with a wide range of security tools and technologies used in the field.
CO3: Emphasize ethical and legal considerations in the field of cyber security.
CO4: Stay updated with the latest trends, threats, and advancements in cyber security.

Nature of Paper: Core

Minimum Passing Marks/Credits: 50% Marks

L:0
T:0
P:4(In Hours/Week)
Theory - 1 Hr. = 1 Credit
Practical- 2 Hrs.=1Credit(4Hrs./Week=2Credits)

Unit	Contents	No. of Lectures Allotted
I	Checklist for reporting cybercrime at Cybercrime Police Station.	2
II	Checklist for reporting cybercrime online.	2
III	Basic checklist, privacy and security settings for popular social media platforms.	2
IV	Checklist for secure net banking.	2
V	Setting and configuring two factor authentications in the Mobile phone.	2
VI	Installation and configuration of computer Anti-virus.	2
VII	Wi-Fi security management in computer and mobile.	2
VIII	Setting and configuring two factor authentications in the Mobile phone.	2

Reference / Text Books:
1. Cyber Crime Impact in the New Millennium, by R. C Mishra, Auther Press. Edition 2010.
2. Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd.
3. Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers.
4. Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd.
5. Fundamentals of Network Security by E. Maiwald, McGraw Hill.

If the course is available as Generic Elective then the students of following departments may opt it.
NA

Evaluation/Assessment Methodology	
	Max. Marks:50
1) Class tasks/ Sessional Examination 2) Presentations /Seminar 3) Assignments 4) Research Project Report Seminar On Research Project Report 5) ESE	25 25
Total:	50

Course Learning Outcomes:

Student will be able to:

CO1: After completion of this module, students would be able to understand the concept of Cyber security and issues and challenges associated with it.

CO2: Students, at the end of this module, should be able to understand the cybercrimes, their nature, legal remedies and as to how report the crimes through available platforms and procedures.

CO3: On completion of this module, students should be able to appreciate various privacy and security concerns on online social media and understand the reporting procedure of inappropriate content, underlying legal aspects and best practices for the use of social media platforms.

CO4: After the completion of this module, students would be able to understand the basic concepts related to E-Commerce and digital payments. They will become familiar with various digital payment modes and related cyber security aspects, RBI guidelines and preventive measures against digital payment frauds.

CO5: Students, after completion of this module will be able to understand the basic security aspects related to Computer and Mobiles. They will be able to use basic tools and technologies to protect their devices.