Choice Based Credit System (CBCS)

Name of the Programme (UG): B.E

Syllabus for III - Semester and IV - Semester

With effect from 2017 - 2018

Specialization /Branch: Computer Science and Engineering

Chaitanya Bharathi Institute of Technology (A)
Chaitanya Bharathi (P.O), Gandipet
Hyderabad-500075, Telangana State.

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY(A)
Choice Based Credit System
B.E (Computer Science and Engineering)

SEMESTER – III

S.No	Course Code	Title of the Course	Scheme of Instruction		Scheme of Examination			Credits
			Hours per week		Duration of SEE in Hours	Maximum Marks		
			L/T	P/D		CIE	SEE	
THEORY								
1	16MT C05	Engineering Mathematics –III	3	-	3	30	70	3
2	16CS C03	Data Structures	3	-	3	30	70	3
3	16CS C04	Object Oriented Programming using Java	3	-	3	30	70	3
4	16CS C05	Logic and Switching Theory	3/1	-	3	30	70	4
5	16CS C06	Discrete Structures	3/1	-	3	30	70	4
PRACTICALS								
6	16CS C07	Data Structures Lab	-	3	3	25	50	2
7	16CS C08	Object Oriented Programming Lab Using Java	-	3	3	25	50	2
8	16EG C03	Soft Skills and Employability Enhancement Lab	-	2	2	15	35	1
9	16CS C09	Mini Project-I	-	2	2	50	-	1
TOTAL			**17**	**10**	-	**265**	**485**	**23**

L: Lecture T: Tutorial D: Drawing P: Practical
CIE - Continuous Internal Evaluation SEE - Semester End Examination

Assessment Procedures for Awarding Marks

The distribution of marks is based on CIE by concerned teacher and the Semester end examination shall be as follows:

Course (in terms of credits)	CIE	Semester end Examination (Marks)	Remarks	Duration of Semester End Examination
Three(3) Credits/ Four(4) Credits	30*	70**	Theory Course/ Engg . Graphics	3 Hours
Two(2) Credits	20*	50***	Theory	2 Hours
Two(2) Credits	25	50	Lab Course/Workshop	3 Hours
One(1) Credit	15	35	Lab Course	2 Hours
Two(2) Credits	50	—	Project Seminar/Seminar	----
Six(6) Credits	50	100	Project	Viva-Voce
One(1) Credit	—	50***	Environmental Studies, Professional Ethics and Human values	2 Hours
One(1) Credit	50		Mini Project	-----

CIE: Continuous Internal Evaluation

* Out of 30/20 sessional marks(CIE), 10/5 marks are allotted for slip-tests(Three slips test will be conducted, each of 10/5 marks, best two average is considered) and the remaining marks are based on the average of two tests, weightage for each test is 20/15 marks.

** The question paper will be in two parts, Part-A and Part-B. Part A is for Ten(10) questions and is compulsory, covers the entire syllabus, and carries 20 marks. Part-B carries 50 marks and covers all the units of the syllabus (student has to answer five out of seven questions)

***The question paper will be in two parts, Part-A and Part-B. Part A is for Ten(10) questions and is compulsory, covers the entire syllabus, and carries 15 marks. Part-B carries 35 marks and covers all the units of the syllabus (student has to answer five out of seven questions)

Note:A course that has CIE(sessional marks) but no semester end examination as per scheme, is treated as Pass/Fail for which pass marks are 50% of CIE.

A candidate has earned the credits of a particular course, if he/she secures not less than the minimum marks/ grade as prescribed. Minimum pass marks for theory course is 40% of total marks i.e., CIE plus semester end examinations where as for the lab course/project is 50%.

16MT C05

ENGINEERING MATHEMATICS-III

Instruction	3 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course objectives:

1. To study the expansion of functions in various intervals.
2. To form P.D.E and to find its solution.
3. To solve Wave, Heat & Laplace equations.
4. To learn Differentiation and Integration of complex valued functions.
5. To evaluate Complex Integration.
6. To evaluate Real definite integrals.

Course outcomes: On the successful completion of this course the student will be able to

1. Expand functions in the given intervals.
2. Solve linear and non linear PDEs.
3. Solve one-dimension, two-dimension, Heat steady state equations and also one-dimension wave equation.
4. Solve problems on Analytic functions, Cauchy's theorem and Cauchy's integral formula.
5. Expand functions by using Taylor's and Laurent's series.
6. Solve Real and Complex integrals by using Cauchy Theorems.

UNIT - I

Fourier series: Definition of Periodic, Single valued, finite maxima and minima of functions. Euler's Formulae, Dirichlets Conditions for Fourier expansion, Functions having points of discontinuity, Change of interval, Expansion of odd and even functions, Half-range sine series and cosine series.

UNIT-II:

Partial differential equations: Formation of partial differential equations by eliminating the arbitrary constants or arbitrary functions, solutions of linear partial differential equation of first order by using Lagrange's Method, solution of Non-linear partial differential equations of first order by using standard types, Charpit's Method.

UNIT - III

Applications of Partial differential equations: Solution of partial differential equations by using method of separation of variables, solution of vibration of a stretched string (1D-Wave equation), one dimensional heat equation, Two dimensional heat equation under steady state conditions.

UNIT - IV

Theory of Complex variables: Analytic functions, Cauchy Riemann equations (Cartesian and polar forms), construction of Analytic functions by using Milne-Thomson's method. Harmonic function. Complex line integrals, Cauchy's theorem, Cauchy's Integral formula and its derivatives and problems related to the above theorems.

UNIT - V

Expansion of functions, Singularities & Residues: Taylor's and Laurent's series Expansions (Only statements). Zeros, types of singularities, Residues and Cauchy's Residue theorem, Evaluation of real integrals by Cauchy's residue theorem. Improper real integrals of the type: $\int_{-\infty}^{\infty} f(x)dx$ Where f(x) has no poles on real axis and $\int_0^{2\pi} f(\sin\theta, \cos\theta)d\theta$

Text Books:

1. B.S. Grewal, "Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, 2015.
2. M.D. Raisinghania, "Advanced Differential equations", 7th edition, S Chand publishers, 2013.
3. J. W. Brown and R. V. Churchill, "Complex Variables and Applications", 7th edition, McGraw Hill publishers, 2003.

Suggested Reading:

1. N P Bali and Manish Goyal, "A Text Book of Engineering Mathematics", 9th Edition, Laxmi publishers, 2016.
2. Alan Jeffrey, "Mathematics for Engineers and Scientists", 6th Edition, Chapman & Hall/CRC publishers, 2013.
3. A R Vasistha and R K Gupta, "Integral transforms", Krishna prakashan publishers, 2004.
4. R.K.Jain & S.R.K.Iyenger, "Advanced Engineering Mathematics", 3rd edition, Narosa Publications, 2007.

DATA STRUCTURES

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives

1. To teach the importance of structuring the data for easy access and storage.
2. To teach the implementation of various data structures.
3. To acquire skills in using generic principles for data representation and manipulation with a view for efficiency, maintainability and code reuse.
4. To introduce the basic concepts of advanced data structures.

Course Outcomes

1. Understand the importance of abstract data type and implementing the concepts of data structure using abstract data type.
2. Evaluate an algorithm by using algorithmic performance and measures.
3. Distinguish between linear and non-linear data structures and their representations in the memory using array and linked list.
4. Develop applications using Linear and Non-linear data structures.
5. Apply the suitable data structure for a real world problem and think critically for improvement in solutions.
6. Determine the suitability of the standard algorithms: Searching, Sorting and Traversals.

UNIT-I

Algorithm Specification, Performance Analysis and Measurement.

Arrays: The Array as an Abstract Data Type, Polynomial Abstract Data Type, Sparse Matrices, Memory Layout of Array.

Sorting Algorithms: Stability and In Place Properties: Insertion sort, Quick sort, Selection Sort, Merge Sort, Linear Sorting Algorithms: Counting Sort, Bucket Sort.

UNIT-II

Stacks and Queues: The Stack Abstract Data Type, Array representation of Stacks, Applications of Stack: Infix to Postfix, Evaluation of Postfix expression, The Queue Abstract Data type, Array representation of Queue,

Application of Queue: Radix Sort.
Dictionaries: The Dictionary Abstract Datatype, Linear Search and Binary Search, Static Hashing.

UNIT-III
Linked Lists: The List Abstract Datatype, Singly Linked linear Lists, Circular Lists, Linked Stack, Linked Queue, Linked Polynomial, Doubly Linked List.

UNIT-IV
Trees: The Tree Abstract Datatype, Introduction to Binary Trees, Binary Tree Traversal, Operations on Binary Tree-Height, Copy, Threaded Binary Trees and their Representation.
The Priority Queue Abstract datatype, Heap Trees, Heap Sort, Binary Search Tree, Operations on Binary Search Tree-Insert, Delete, Search, Join and Split. AVL Tree: Insert and delete operations on AVL Tree, Splay Trees, B-Trees.

UNIT-V
Graphs: The Graph Abstract Data Type, Representations of Graph, Traversals of Graph-Breadth First Search and Depth First Search, Minimum Cost Spanning Trees (Prim's and Kruskal's Algorithms), Single Source Shortest Path-Dijkstra's Algorithm, All Pairs Shortest Path-Floyd-Warshall's Algorithm, transitive closure.

Text Books:
1. "Fundamentals of data structures in C", Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed 2nd edition.
2. "Data Structures using C", Aaron M tenenbaum, Yedidyah Langsam, Moshe J Augenstein, Pearson Education 7th edition.

Suggested Reading:
1. "Data Structures Using C", E Balagurusamy, Tata Mc-Graw-Hill Education, 2013.
2. "Data Structures and Program Design in C", Robert L Kruse, Bruce P, Leung, Clovis L Tondo, PHI.

16CS C04

OBJECT ORIENTED PROGRAMMING USING JAVA

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. Write, compile and execute Java programs.
2. Understand the role of the Java Virtual Machine in achieving platform independence.
3. Use threads in order to create more efficient Java programs.
4. Write, compile and execute event driven programming using Swing classes.

Course Outcomes:

1. Identify classes, objects, members of a class and the relationships needed to solve a problem.
2. Use interfaces and creating user-defined packages.
3. Utilize exception handling and Multithreading concepts to develop Java programs.
4. Compose programs using the Java Collection API.
5. Design a GUI using GUI components with the integration of event handling.
6. Create files and read from computer files.

UNIT-I

OOP concepts - Data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, classes and objects, Procedural and object oriented programming paradigms.

Java Programming Fundamentals-History of Java, Introducing Data Types and Operators, Program Control Statements, Introducing Classes, Objects and Methods, String handling, Command line arguments .

Inheritance - Inheritance hierarchies, super and subclasses, Member access rules, super keyword, preventing inheritance: final classes and methods, the Object class and its methods.

Polymorphism - method overloading and overriding, abstract classes and methods.

Interfaces - Interfaces vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interface references, extending interfaces.

UNIT-II

Inner classes - uses of inner classes, local inner classes, anonymous inner classes, static inner classes, examples.

Packages - Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages.

Exception handling - Dealing with errors, benefits of exception handling, exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, re throwing exceptions, exception propagation, user defined exception.

UNIT-III

Multithreading - Difference between multiple processes and multiple threads, thread states, creating threads, interrupting threads, threads priorities, synchronizing threads, inter process thread communication.

Collection Framework in Java - Introduction to Java Collection Frame work, Collection hierarchy, List, Set, Map, Iterators, Legacy classes, String Tokeniser.

UNIT-IV

Applets - Inheritance hierarchy for applets, differences between applets and applications, life cycle of an applet, passing parameters to applets, applet security issues.

GUI Programming with Java - The AWT class hierarchy, Introduction to Swing, Swing vs AWT, Hierarchy for Swing components, Containers - JFrame, JApplet, JDialog, JPanel, Overview of some swing components Jbutton, JLabel, JTextField, JTextArea, simple swing applications, Layout managers.

E**vent handling** - Events, Event sources, Event classes, Event Listeners, Relationship between Event sources and Listeners, Delegation event model, handling mouse and key events, Adapter classes.

UNIT-V

Files - streams - Byte stream and Character stream classes, text input/output, binary input/output, File management using File class, Serialization.

Text Books:

1. Herbert Schildt & Dale Skrien, "Java Fundamentals-A Comprehensive Introduction", 2013 Edition, Tata McGraw-Hill.
2. Herbert Schildt, "The Complete Reference Java", 7th Edition, Tata McGraw-Hill 2007.

Suggested Reading:

1. "Java for Programmers", P.J. Deitel and H.M. Deitel, Pearson education (OR) Java: How to Program P.J. Deitel and H.M. Deitel, PHI.
2. "Object Oriented Programming through Java", P. Radha Krishna, Universities Press.
3. "Programming in Java", S. Malhotra and S. Choudhary, Oxford Univ. Press.

LOGIC AND SWITCHING THEORY

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	4

Course Objectives

1. To understand the architecture of basic building blocks, logic gates, Adders, Subtractors and Multipliers other digital devices.
2. To understand the logic of minimization techniques including Quine-Mcclusky method.
3. To analyze and design the Combinational and Sequential circuits.
4. To familiarize the notations of HDL descriptions in VHDL.

Course Outcomes

1. Can familiarize with number systems, simplification of Boolean functions.
2. Be able to manipulate simple Boolean expressions using maps and tabulation method.
3. Realize and Implement logic circuits by using Universal gates.
4. Ability to Design basic digital circuits in Computer Hardware and system.
5. Ability to use high level Hardware Description languages such as VHDL for the design of Combinational and Sequential circuits.
6. Be able to configure registers and counters for different applications.

UNIT-I

Digital Computers and Information: Information representation, Computer Structure. **Number Systems:** Binary Numbers, Octal and Hexadecimal Numbers, Number Ranges.

Arithmetic Operations: Conversion from Decimal to other bases, Binary Addition and Subtraction, BCD Addition.

Alphanumeric Codes: ASCII Character Code, Parity Bit.

Binary Logic and Gates: Binary Logic, Logic Gates.

Boolean Algebra: Basic Identities, Algebraic Manipulation, Complement of a function.

Standard Forms: Miniterms and Maxterms, sum of products and products of sums.

UNIT-ll

Minimization of Switching Functions: Introduction, the map method, minimal functions and their properties, the tabulation procedure, the prime implicant chart.

Nand and NOR Gates: Nand Circuits, Two-level Implementation, Multilevel NAND Circuits, NOR Circuits.

Exclusive or Gates: Odd Function, Parity Generation and Checking.

UNIT - lll

Combinational Logic Design: Combinational Circuits,

Design Topics: Design Hierarchy, Top-Down design, Computer Aided Design, Hardware Description Languages, Logic Synthesis.

Analysis Procedure: Derivation of Boolean Functions, Derivation of the Truth Table, Logic Simulation,

Design Procedure: Decoders, Encoders, Multiplexers, Binary Adders, Adder- Subtractor, Binary Multiplier, HDL Representations - VHDL.

UNIT - IV

Sequential Circuits: Sequential circuit definitions, Latches, Flip Flops, sequential circuit analysis, sequential circuit design, design with D Flip-Flops, designing with JK Flip-Flops, HDL representation for sequential circuits - VHDL.

UNIT - V

Registers and Counters: Registers, Shift registers, Synchronous Binary counters, Ripple counter.

Symmetric functions and Networks: Properties and identification of symmetric functions, Symmetric Networks.

Text Books:

1. M. Moris Mano, Charles R. Kime, Logic and Computer Design Fundamentals, 2nd edition, Pearson Education Asia, 2001.
2. ZVI Kohavi, Switching and Finite Automata Theory, 2nd edition, Tata McGraw Hill, 1995.

Suggested Reading:

1. H.T. Nagle, Introduction to Computer logic, Prentice Hall, 1975.

DISCRETE STRUCTURES

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	4

Course Objectives

1. To introduce Propositional and Predicate Logic to the students.
2. To introduce various proof techniques for validation of arguments.
3. To develop an understanding of counting, functions and relations.
4. To make the students familiar with fundamental notions and applicability of algebraic systems and graph theory.

Course Outcomes

1. Apply Propositional and Predicate logic for a variety of problems in various domains.
2. Understand Set Theory, Venn Diagrams, relations, functions and apply them to Real-world scenarios.
3. Model and solve the real world problems using Generating Functions and Recurrence Relations.
4. To identify the basic properties of graphs and trees and use these concepts to model simple applications.
5. Understand General properties of Algebraic systems and study lattices as partially ordered sets and their applications.
6. Apply the knowledge and skills obtained to investigate and solve a variety of discrete mathematics problems.

UNIT-I

Fundamental Principles of counting: The Rules of Sum and Product, permutations, Combinations, Binomial Theorem.

Introduction to Propositional Calculus: Basic Connectives and Truth tables, **Logical Equivalence:** Laws of Logic, Logical Implication: Rules of Inference.

Predicates: The Use of Quantifiers, Quantifiers, Definitions and the Proofs of Theorems.

Applications

UNIT-II

Sets: Sets and Subsets, Operations on sets and the Laws of Set Theory, Counting and Venn Diagrams.

Relations and Functions: Cartesian Products and Relations, **Functions:** one-one and Onto, Pigeonhole principle, partial ordering relations, POSET, hasse diagrams, Equivalence relations.
Applications

UNIT-III Generating function: Generating Functions, Function of Sequences, Calculating Coefficient of generating function.
Recurrence Relations: The First Order Linear Recurrence Relation, Second Order Linear. Homogenous Recurrence relations with constant coefficients, Non Homogenous Recurence Relations.
Applications

UNIT-IV Introduction to graphs: Graphs and their basic properties - degree, path, cycle, Sub graphs, Complements and Graph Isomorphism, Euler trails and circuits, planar graphs, Hamiltonian paths and cycles, Graph Coloring and Chromatic polynomial.
Trees: Definitions, Properties, Rooted Trees, Spanning Trees, Minimum Cost Spanning trees, The Algorithms of Kruskal's and Prim's.
Applications

UNIT-V Algebraic Structures: Algebraic Systems: Examples and General Properties, Semigroups and Monoids, Groups: Definitions and Examples, Subgroups and Homomorphisms.
Lattices: Lattices as Partially Ordered Sets, Lattices as Algebraic Systems.
Applications

Text books:

1. Ralph P. Grimaldi, "Discrete and Combinatorial Mathematics", An Applied Introduction, 4th edition, Pearson Education, 2003.
2. R.K.Bisht,H.S.Dhami, "Discrete Mathematics", Oxford University Press, Published in 2015.

Suggested Reading:

1. Kenneth H. Rosen, "Discrete Mathematics and its Applications", 7th edition, Tata McGraw-Hill, 2005.
2. J.P. Tremblay, R.Manohar, "Discrete Mathematical Structures with Applications to Computer Science", TATA McGraw-Hill Edition,1995.
3. Joe L.Mott, Abraham Kandel, Theodore P. Baker, "Discrete Mathematics for Computer Scientists & mathematicians", 2nd Edition , PHI ,1986.
4. David D.Railey, KennyA.Hunt, "Computational Thinking for the modern problem solving", CRC Press, 2014.

16CS C07

DATA STRUCTURES LAB

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
CIE	25 Marks
Credits	2

Course Objectives:

1. Design and construct simple programs by using the concepts of structures as abstract data type.
2. To have a broad idea about how to use pointers in the implement of data structures.
3. To enhance programming skills while improving their practical knowledge in data structures.
4. To strengthen the practical ability to apply suitable data structure for real time applications.

Course Outcomes:

1. Implement the abstract data type and reusability of a particular data structure.
2. Implement linear data structures such as stacks, queues using array and linked list.
3. Understand and implements non-linear data structures such as trees, graphs.
4. Implement various kinds of searching, sorting and traversal techniques and know when to choose which technique.
5. Understanding and implementing hashing techniques.
6. Decide a suitable data structure and algorithm to solve a real world problem.

List of Experiments:

1. Implementation of Merge Sort and Quick Sort.
2. Implementation of Static Hashing (Use Linear probing for collision resolution).
3. Program to Convert given Infix Expression to Postfix and Evaluation of Postfix.
4. Implementation of Radix Sort.
5. Implementation of Insert, Delete and Search operations on Single Linked List & Circular Single Linked List.
6. Implementation of Stack and Queue using linked lists.
7. Implementation of Binary Tree and following operations on Binary Trees- Preorder, Postorder, Inorder and Level order traversals,

making a Copy of a Binary Tree, Find the Height of a Binary Tree.

8. Implementation of Heap Sort.
9. Implementation of Insert, Delete and Search operations on Binary Search Trees.
10. Implementation of Breadth First Search and Depth First Search on graph.
11. Implementation of Dijkstra's Algorithm and Floyd-Warshall's Algorithm.

Text Books

1. C Programming Language, Brian W Kernighan, Dennis Ritchie, 2nd Edition, PH PTR.
2. Understanding and Using C Pointers, Richard M Reese, O`Reily , 2013.

16CS C08

OBJECT ORIENTED PROGRAMMING LAB USING JAVA

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
CIE	25 Marks
Credits	2

Course Objectives:

1. Cover the basics of creating Java programming, Multi-threading, Exception handling etc.
2. To expose GUI programming.

Course Outcomes:

1. Design interfaces and packages.
2. Compose program for implementation of multithreading concepts.
3. Develop program using Collection Framework.
4. Develop small GUIs using GUI components with the integration of event handling.
5. Handle I/O Streams from various sources.
6. Write programs using the Java Concepts.

List of Experiments:

1. A program to illustrate the concept of class with constructors, methods and access levels.
2. A program to illustrate the concept of inheritance and polymorphism.
3. A program to illustrate the usage of abstract, final and static classes and methods.
4. A program to illustrate the concept of multi-threading and thread synchronization.
5. A program to illustrate the concept of strings and stringtokenizer.
6. A program using ArrayList and LinkedLIst and iterator classes.
7. A program using TreeSet, HashSet and LinkedHashSet.
8. A program using Map Classes.
9. A program using Enumeration and Comparator Interfaces.
10. An application involving GUI with different controls, menus, Scrollbar and Event handling.
11. A program to implement Applet.
12. A program to illustrate the usage of all I/O Streams.
13. A program to illustrate the usage of Serialization.
14. Case Study using GUI and Threads.

Suggested Reading:

1. Herbert Schildt, java Fundamentals, Indian Edition, McGraw hill 2013.
2. Wigglesworth and Mcmillan, Java Programming: Advanced Topics, 3rd Edition, Cenage learning 2013.

16EG CO3

SOFT SKILLS AND EMPLOYABILITY ENHANCEMENT LAB

Instruction	2 hours per week
Duration of Semester End Examination	2 Hours
Semester End Examination	35 Marks
Continuous Internal Evaluation	15 Marks
Credits	1

Course Objectives: To help the students

1. Participate in group discussions and case studies with confidence and to make effective presentations. Also to learn the art of communication.
2. With- resume packaging, preparing and facing interviews.
3. Build an impressive personality through effective time management & goal setting, self confidence and assertiveness.
4. Understand what constitutes proper grooming and etiquette in a professional environment. Also to understand academic ethics and value systems.
5. To understand the elements of research and hone their soft skills through a live, mini project.

Course Outcomes: The students will be able to

1. Be effective communicators and participate in group discussions and case studies with confidence. Also be able to make presentations in a professional context.
2. Write resumes, prepare and face interviews confidently.
3. Be assertive and set short term and long term goals. Also learn to mange time effectively and deal with stress.
4. Make the transition smoothly from Campus to Corporate. Also use media with etiquette and know what academic ethics are.
5. To do a live, mini project by collecting and analyzing data and making oral and written presentation of the same.

Exercise 1

Group Discussion and Case studies: Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence.

Elements of effective presentation, Structure of presentation, Presentation tools, Body language,

Creating an effective PPT.

Exercise 2

Interview Skills: Resume writing, structure and presentation, planning, defining the career objective, projecting ones strengths and skill-sets.

Interview Skills: concept and process, pre-interview planning, opening strategies, answering strategies, mock interviews.

Exercise 3

Personality Development: Effective Time Management, setting realistic goals, self confidence and assertiveness, stress management, moral values.

Exercise 4

Corporate Culture: Grooming and etiquette, communication media etiquette.

Academic ethics and integrity.

Exercise 5

Mini Project: General/Technical. Research, developing a questionnaire, data collection, analysis, written report and project seminar.

Suggested Reading:

1. Dr. Shalini Verma, "Body Language- Your Success Mantra", S Chand, 2006.
2. Ramesh, Gopalswamy, and Mahadevan Ramesh, "The ACE of Soft Skills", New Delhi: Pearson, 2010.
3. Covey and Stephen R, "The Habits of Highly Effective People", New York: Free Press, 1989.

16CS C09

MINI PROJECT-I

Instruction	2 Hours per week
Duration of Semester End Examination	-
Semester End Examination	-
CIE	50 Marks
Credits	1

The students are required to carry out mini projects in any of the areas such as Programming and Problem Solving, Object Oriented Programming through JAVA. etc.

Students are required to submit a report on the mini project at the end of the semester

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B.E (Computer Science and Engineering)

SEMESTER – IV

S.No	Course Code	Title of the Course	Scheme of Instruction		Scheme of Examination			Credits
			Hours per week		Duration of SEE in Hours	Maximum Marks		
			L/T	P/D		CIE	SEE	
THEORY								
1	16CS C10	Data Base Management Syetems	3	-	3	30	70	3
2	16CS C11	Web Technologies	3	-	3	30	70	3
3	16CS C12	Computer Architecture and Micro Processors	3/1	-	3	30	70	4
4	16CS C13	Probability and Statistics Using R	3	-	3	30	70	3
5	16CS E01/02/0316	ELECTIVE - I	3	-	3	30	70	3
6	16MB C01	Engineering Economics and Accountancy	3	-	3	30	70	3
PRACTICALS								
7	16CS C14	Data Base Management Systems Lab	-	3	3	25	50	2
8	16CS C15	Web Technologies Lab	-	3	3	25	50	2
9	16CS C16	CA and MP Lab	-	3	3	25	50	2
TOTAL			**19**	**9**	**-**	**255**	**570**	**25**

ELECTIVE-I

S.No.	Course Code	Title of the Course
1	16CS E01	Linux Programming and Scripting Languages
2	16CS E02	Principle of Programming Languages
3	16CS E03	Shell Scripting

L: Lecture T: Tutorial D: Drawing P: Practical
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One(1) Credit	15	35	Lab Course	2 Hours
Two(2) Credits	50	—	Project Seminar/Seminar	----
Six(6) Credits	50	100	Project	Viva-Voce
One(1) Credit	—	50***	Environmental Studies, Professional Ethics and Human values	2 Hours
One(1) Credit	50		Mini Project	-----

CIE: Continuous Internal Evaluation

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** The question paper will be in two parts, Part-A and Part-B. Part A is for Ten(10) questions and is compulsory, covers the entire syllabus, and carries 20 marks. Part-B carries 50 marks and covers all the units of the syllabus (student has to answer five out of seven questions)

***The question paper will be in two parts, Part-A and Part-B. Part A is for Ten(10) questions and is compulsory, covers the entire syllabus, and carries 15 marks. Part-B carries 35 marks and covers all the units of the syllabus (student has to answer five out of seven questions)

Note:A course that has CIE(sessional marks) but no semester end examination as per scheme, is treated as Pass/Fail for which pass marks are 50% of CIE.

A candidate has earned the credits of a particular course, if he/she secures not less than the minimum marks/ grade as prescribed. Minimum pass marks for theory course is 40% of total marks i.e., CIE plus semester end examinations where as for the lab course/project is 50%.

16CS C10

DATA BASE MANAGEMENT SYSTEMS

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To get familiar with fundamental concepts of database management which includes database design, database languages, and database-system implementation.
2. To get familiar with data storage techniques and indexing.
3. To impart knowledge in transaction Management, concurrency control techniques and recovery techniques.

Course Outcomes:

On the successful completion of this course the student will be able to

1. Develop the knowledge of fundamental concepts of database management and Designing a database using ER modeling approach.
2. Implement storage of data, indexing, and hashing.
3. Apply the knowledge about transaction management, concurrency control and recovery of database systems.

UNIT-I

Introduction : Database System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Specialty Databases, Data Storage and Querying, Database Users and Administrators Database System Architecture, Application Architectures.

Database Design and E-R Model: Overview of the Design Process, Data Models, The E-R Model, Constraints, E-R Diagrams, E-R Design Issues, Extended E-R Features, Reduction to Relation Schemas, Other Aspects of Database Design.

UNIT-II

Relational Model: Structure of Relational Databases, Database Schema, Keys, Relational Algebra, Fundamental Operations, Additional Relational Algebra Operations, Extended Relational Algebra Operations.

Structured Query Language: Overview - SQL Data Types, Basic Structure of SQL Queries, Modification of the Database (DML), Set Operations, Aggregate Functions, Data Definition Language, Integrity

Constraints, Null Values, Nested Sub queries, Views, Join Expression. Triggers, Index Definition, Procedures and Functions, JDBC, ODBC, Embedded SQL.

UNIT-III

Relational Database Design: Undesirable Properties in Relational Database Design, Functional Dependencies, Basic Definitions, Trivial and Nontrivial Dependencies, Closure of Set of Functional Dependencies, Closure of Set of Attributes, Irreducible Set of Functional Dependencies, Non-loss Decomposition and Functional Dependencies, Normalization - 1NF, 2NF, and 3NF, Dependency Preservation, BCNF, Comparison of BCNF and 3NF, Multi-valued Dependencies and 4NF, Join Dependencies and 5NF.

Indexing: Overview of Indexes, Properties of Indexes, Tree-Structured Indexing, Indexed Sequential Access Method (ISAM), B+ Tree Index Files, Bitmap Indices.

UNIT-IV

Hashing: Static Hashing, Dynamic Hashing - Extendible Hashing, Linear Hashing.

Transaction Management and Concurrency Control: Transaction Concept - ACID Properties, States of Transaction, Implementation of Atomicity and Durability, Concurrent Executions - Serializability, Recoverability, Lock-Based Protocols, Timestamp-Based Protocols, Validation-Based Protocols, Multiple Granularities.

UNIT-V

Deadlocks: Deadlock Prevention, Deadlock Detection, Performance of Lock-Based Concurrency Control, Specialized Locking Techniques - Dynamic Databases and the Phantom Problem.

Recovery System: Failure Classification, Storage Structure, Recovery and Atomicity, Log-Based Recovery, Buffer Management, Failure with Loss of Nonvolatile Storage, ARIES Recovery Method, Remote Backup Systems.

Text Books:

1. Abraham Silberschatz, Henry F Korth, S Sudarshan, "Database System Concepts", Sixth Edition, McGraw-Hill International Edition, 2011.
2. Date CJ, Kannan A, Swamynathan S, "An Introduction to Database Systems", 8th Edition, Pearson Education, 2006.

Suggested Reading:

1. Raghu Ramakrishnan, JohnnesGehrke, "Database Management Systems", Third Edition, McGraw Hill, 2003.
2. Ramez Elmasri, Durvasul V L N Somayazulu, Shamkant B Navathe, Shyam K Gupta, "Fundamentals of Database Systems", Fourth Edition, Pearson Education, 2006.

WEB TECHNOLOGIES

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To acquire knowledge of XHTML, CSS and XML to develop web applications
2. Ability to develop web application using PHP.
3. Ability to develop dynamic web content using Java Servlets and JSP.
4. To understand JDBC connections.
5. To understand the design and development process of a complete web application.
6. To understand the concepts of Ruby and Rails.

Course Outcomes: Students will be able to

1. Develop sites using XHTML using CSS and XML.
2. Develop form processing using java scripts.
3. Develop Dynamic web site using PHP applications.
4. Develop Dynamic web content using Java Servlets and JSP.
5. Develop JDBC connections and implement a complete Dynamic web application.

UNIT - I

Fundamentals Introduction to the Internet, WWW Browsers, Web Servers, URL, MIME, HTTPS.

Introduction XHTML : Evolution XHTML,Basic Syntax Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists Tables, Forms, Cascading Style Sheets.

Introduction to XML : Introduction,Uses of XML,The Syntax of XML,XML Document Structure,Namespaces,XML Schemas,Displaying Raw XML Documents, Displaying XML Documents with CSS, XSLT Style Sheets.

UNIT-II

JavaScript : Overview of JavaScript, Object Orientation and JavaScript, General Syntactic Characteristics, Primitives, Operations, and Expressions, Screen Output and Keyboard Input, Control Statements,

Object Creation and Modification. Arrays, Functions, An Example, Constructors, Pattern Matching Using Regular Expressions, Errors in Scripts.

JavaScript : The JavaScript Execution Environment, The Document Object Model, Element Access in Java Script, Events and Event Handling, Handling Events from Body Elements, Handling Events from Button Elements, Handling Events from Text Box and Password Elements, The DOM 2 Event Model, The canvas Element . The navigator Object, DOM Tree Traversal and Modification

Dynamic Documents with JavaScript : Introduction, Positioning Elements, Moving Elements, Element Visibility, Changing Colors and Fonts, Dynamic Content, Stacking Elements, Locating the Mouse Cursor, Reacting to a Mouse Click, Slow Movement of Elements, Dragging and Dropping Elements

UNIT - III

Introduction to PHP : Overview of PHP, General Syntactic Characteristics, Primitives, Operations, and Expressions, Output, Control Statements. Arrays, Functions, Pattern Matching, Form Handling, Cookies, Session Tracking.

UNIT - IV

J2EE Platform: Enterprise Architecture Styles, Containers and Technologies

Servlet: introduction of Servlet, Servlet Life cycle, Request and Responses.

JSP: Introduction to JSP, Directives, Scripting Elements, Standard Objects,

JSP Tag extensions: Tag extensions, A simple Tag Anatomy of a Tag extension, Writing Tag Extensions, Form Handling, Cookies, Session Tracking .

UNIT - V

Database Access through the Web : Relational Databases, An Introduction to the Structured Query Language, Architectures for Database Access, The MySQL Database System, Database Access with PHP and MySQL, Database Access with JDBC and MySQL .Connecting to a MySQL Database using servlet and jsp.

Text Books:

1. Internet & World Wide Web How to program - M. Deitel, P.J. Deitel, A. B. Goldberg, 3rd Pearson Education.
2. Programming the World Wide Web -Robert W. Sebesta, 4th Pearson Education .

Suggested Reading:

1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech.
2. Jdbc 4.2 Servlet 3.1 & Jsp 2.3 Includes Jsf 2.2 & Design Patterns Black Book Santosh Kumar K Dreamtech.

16CS C12

COMPUTER ARCHITECTURE AND MICRO PROCESSORS

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	4

Course Objectives

1. To understand the operation, interaction, communication among the functional units of a Computer System.
2. To understand the concrete representation of data at the machine level and how computations are performed at the machine level.
3. To understand the advantage of instruction level parallelism and pipelining for high performance processor design.
4. To learn the architecture and addressing modes of 8086 processor.
5. To understand instruction set of 8086, interrupts and to learn programming in 8086.
6. To understand the functionality and interfacing of various peripheral devices with 8086 processor.

Course Outcomes

1. Ability to understand the merits and pitfalls in computer performance measurements.
2. Achieve Technical knowledge on the advantage of instruction level parallelism and pipelining for high performance processor design.
3. Identify the basic elements and functions of 8086 microprocessors.
4. Understand the instruction set of 8086 and use them to write assembly language programs.
5. Demonstrate fundamental understanding on the operation between the microprocessor and its interfacing devices.
6. Ability to write complex programs involving interface with various peripheral devices.

Prerequisites: Digital Electronics and Logic Design

UNIT-I

Basic Structure of Computers: Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Software, Performance, Multiprocessors and Multi-computers.

Basic Processing Unit: Fundamental concepts, Execution of a complete instruction, Multiple- Bus organization, Hardwired control,

Microprogrammed control.
Arithmetic: Addition and Subtraction of Signed numbers, Design of fast adders, Multiplication of positive numbers, Signed-Operand Multiplication, Integer Division.

UNIT-II
The Memory System: Cache Memories, Performance considerations, Virtual Memories, Memory Management requirements, Secondary Storage.
Pipelining: Basic concepts, Data hazards, Instruction hazards, Influence on instruction sets, Datapath and control considerations, Superscalar operation, Performance considerations.

UNIT-III
8086 Architecture: CPU Architecture, Internal operation, Machine language instructions Addressing modes, Instruction formats, Instruction execution timing.
Assembler Language Programming: Instruction format, Data transfer instructions.
Arithmetic instructions: binary arithmetic, packed BCD arithmetic, unpacked BCD arithmetic.

UNIT-IV
Assembler Language Programming: Branch instructions, Loop instructions, NOP and HLT, Flag manipulation instructions, Logical instructions, Shift and Rotate instructions, Directives and Operators.
Modular Programming: Linking and Relocation, Stacks, Procedures, Interrupts and Interrupt routines, Macros.
Byte and String Manipulation: String instructions, REP prefix.

UNIT-V
I/O Programming: Fundamental I/O considerations, Programmed I/O, Interrupt I/O, Block transfers and DMA.
I/O Interfaces: Serial Communication Interface: 8251A Programmable Communication Interface, Parallel Communication: 8255A Programmable Peripheral Interface, A/D and D/A example.
Programmable Timers and Event Counters: 8254 Programmable Interval Timer, Interval timer application to A/D, DMA Controllers.

Text Books:
1. Carl Hamacher, ZvonkoVranesic, SafwatZaky, "Computer Organization", 5th Edition,McGraw Hill Education Edition 2011.
2. Yu-chengLiu, Glenn A.Gibson, "Microcomputer Systems: The 8086/8088 Family", 2nd Edition, PHI Learning 2011.

Suggested Reading:

1. M. M. Mano, "Computer System Architecture", 3rd edition, Prentice Hall, 1994.
2. William Stallings, "Computer Organisation and Architecture, Design for Performance", Pearson, 9th Edition, 2013.
3. Douglas Hall. "Microprocessor and Interfacing programming and Hardware", Tata Mc Graw Hill, Revised 2nd Edition,2007.
4. Brey B.Brey, "The Intel Microprocessor, 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Pro-Processors-Architecture, Programming and interfacing", 4th Edition, Prentice Hall, 1993.

16CS C13

PROBABILITY AND STATISTICS USING R

Instruction3 Hours per week	
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To introduce the basic R operations and concepts and to have a deep understanding about data description.
2. To study the discrete/continuous random variables and multivariate distributions.
3. To introduce the concept on sampling distributions which leads to inferential statistics.
4. To give a brief idea about point and interval estimation, hypothesis testing, and introductions to selected topics in applied statistics.

Course Outcomes: Student will be able to

1. Know the fundamentals of probability and statistics.
2. Understand and interpret different types of data.
3. Apply statistical tools on data sets.
4. Understand and use the R tool for statistical analysis.
5. Evaluate various testing on data.
6. Apply the concepts of statistics to real-life datasets and analyze using R.

UNIT-I

Introduction to R: Software preparation, Basic R operations and concepts

Data Description: Types of Data, Features of Data Distributions, Descriptive Statistics, Exploratory Data Analysis, Multivariate Data and Data Frames, Comparing Populations.

UNIT-II

Probability: Sample Spaces, Events, Model Assignment, Properties of Probability, Counting Methods, Conditional Probability, Independent Events, Bayes' Rule, Random Variables.

Discrete Distributions: Discrete Random Variables, The Discrete Uniform Distribution, The Binomial Distribution, Expectation and Moment Generating Functions, The Empirical Distribution, Other Discrete Distributions, Functions of Discrete Random Variables.

UNIT-III

Continuous Distributions: Continuous Random Variables, The

Continuous Uniform Distribution, The Normal Distribution, Functions of Continuous Random Variables, Other Continuous Distributions.
Multivariate Distributions: Joint and Marginal Probability Distributions, Joint and Marginal Expectation, Conditional Distributions, Independent Random Variables, Exchangeable Random Variables, The Bivariate Normal Distribution, Bivariate Transformations of Random Variables, Remarks for the Multivariate Case, The Multinomial Distribution.

UNIT-IV
Sampling Distributions: Simple Random Samples, Sampling from a Normal Distribution, The Central Limit Theorem, Sampling Distributions of Two-Sample Statistics, Simulated Sampling Distributions.
Estimation: Point Estimation, Confidence Intervals for Means, Confidence Intervals for Differences of Means, Confidence Intervals for Proportions, Confidence Intervals for Variances, Fitting Distributions, Sample Size and Margin of Error.
Hypothesis Testing: Introduction, Tests for Proportions, One Sample Tests for Means and Variances, Two-Sample Tests for Means and Variances, Other Hypothesis Tests, Analysis of Variance, Sample Size and Power.

UNIT-V
Simple Linear Regression: Basic Philosophy, Estimation, Model Utility and Inference, Residual Analysis, Other Diagnostic Tools.
Multiple Linear Regression: The Multiple Linear Regression Model, Estimation and Prediction, Model Utility and Inference, Polynomial Regression, Interaction, Qualitative Explanatory Variables, Partial F Statistic, Residual Analysis and Diagnostic Tools.
Categorical Data Analysis, Nonparametric Statistics, Time Series

Text Books:
1. Introduction to Probability and Statistics Using R by G. Jay Kerns, 1st Edition, IPSUR, Publications - 2010.
2. Introduction to Probability with R (Chapman & Hall/CRC Texts in Statistical Science) Hardcover - 12 Feb 2008.

Suggested Reading:
1. Daniel Adler and Duncan Murdoch. rgl: 3D visualization device system (OpenGL), 2009. R package version 0.87. Available from: http://CRAN.R-project.org/package=rgl.
2. Agresti and B. A. Coull. Approximate is better than "exact" for interval estimation of binomial proportions. The American Statistician, 52:119-126, 1998.
3. Alan Agresti. Categorical Data Analysis. Wiley, 2002. 223

16MB C01

ENGINEERING ECONOMICS AND ACCOUNTANCY

Instruction	3 hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
Continuous Internal Evaluation	30 Marks
Credits	3

Course Objectives: The Objectives of the course are:

1. to introduce managerial economics and demonstrate its importance in managerial decision making.
2. to develop an understanding of demand and relevance of its forecasting in the business.
3. to provide the basics of market structure and the concept of equilibrium in different market structures.
4. to examine the economic analysis of production process, types of inputs and to explain different costs and their relationship with the output.
5. to understand the importance of project evaluation in achieving a firm's objective.
6. to explain the concept of Accountancy and provided knowledge on preparation and analysis of Final accounts.

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

1. apply fundamental knowledge of Managerial economics concepts and tools.
2. understand various aspects of demand analysis and forecasting.
3. understand price determination for different markets.
4. study production theory and analyze various costs & benefits involved in it so as to make best use of resources available.
5. analyze different opportunities and come out with best feasible capital investment decision.s
6. apply accountancy concepts and conventions, Final accounts and financial analysis.

UNIT-I:

Introduction to Managerial Economics

Introduction to Economics and its evolution - Managerial Economics - its scope, importance, Its usefulness to engineers - Basic concepts of Managerial economics.

UNIT-II:

Demand Analysis

Demand Analysis - Concept of demand, determinants, Law of demand, its assumptions, Elasticity of demand, price, income and cross elasticity, Demand Forecasting - Types of Market structures. (Simple numerical problems).

UNIT-III:

Production and Cost Analysis

Theory of Production, Firm and Industry, Production function, input-out relations - laws of returns, internal and external economies of scale. Cost Analysis: Cost concepts, fixed and variable costs, explicit and implicit costs, out of pocket costs and imputed costs, Opportunity cost, Cost output relationship, Break-even analysis. (Theory and problems).

UNIT-IV:

Accountancy

Book-keeping, principles and significance of double entry book keeping, Journal, Subsidiary books, Ledger accounts, Trial Balance concept and preparation of Final Accounts with simple adjustments.

UNIT-V:

Capital Budgeting

Introduction to capital budgeting, Methods: traditional and discounted cash flow methods. Introduction to Working capital management. (Numerical problems).

Text Books:

1. Mehta P.L., "Managerial Economics - Analysis, Problems and Cases", Sultan Chand & Son's Educational publishers, 2013.
2. Maheswari S.N. "Introduction to Accountancy", Vikas Publishing House, 2013.
3. Panday I.M. "Financial Management", Vikas Publishing House, 11th edition, 2015.

Suggested Readings:

1. Varshney and KL Maheswari, Managerial Economics, Sultan Chand, 2014.
2. M.Kasi Reddy and S.Saraswathi, Managerial Economics and Financial Accounting, Prentice Hall of India Pvt Ltd, 2007.
3. A.R.Aryasri, Managerial Economics and Financial Analysis, McGraw-Hill, 2013.

16CS E01

LINUX PROGRAMMING AND SCRIPTING LANGUAGES

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To understand Linux operating system and its environment.
2. To study about the principles of scripting languages.
3. To study scripting languages such as PERL, PyQt, Python and Bash.
4. To build applications in Linux environment using scripting languages.

Course Outcomes: At the end of the course students will be able to

1. Understand the structure and environment of Linux operating system.
2. Understand the features of scripting languages.
3. Develop applications in Linux environment.
4. Create and run scripts using Perl/TCL/Python.
5. Write shell scripts for the automation of system administration.

UNIT-I

Linux Basics: Setting up Environment, parts of Linux operating system, advantages of Linux, commands, Linux users and groups, Permissions for file, directory and users, searching a file & directory, zipping and unzipping concepts.

UNIT-II

Linux Networking: Introduction to networking in Linux, Network basics and tools, File Transfer protocol in Linux, Network File System, Domain Name Services, Dynamic Host Configuration Protocol and Network Information Services.

UNIT-III

Perl Scripting: Introduction to Perl, advantages and working environment of PERL, variables, Strings, Statements, Subroutines, Files, Packages and Modules, Object-Oriented PERL .

UNIT-IV

PyQt: Introduction, Major Classes, Using Qt Designer, Signals and Slots, Layout management, Basic Widgets, QDialog Class, QMessage Box, Multiple document Interfaces, Drag and Drop, Database handling, Drawing API, Brushstyle Constants, QClipboard, QPixmap class.

UNIT-V

Introduction to Python, Using the Python Interpreter, More Control Flow Tools, Data Structures, Modules, Input and Output, Errors and Exceptions, Classes, Brief Tour of the Standard Library.

Suggested Reading:

1. M N Rao "Fundamentals of Open Source Software", PHI Learning Private Limited, 2015.
2. Instructor reference material.
3. Python Tutorial Release 3.2.3 by Guido van Rossum, and Fred L. Drake, Jr., editor, 2012.
4. Practical Programming in Tcl and Tk by Brent Welch , Updated for Tcl 7.4 and Tk 4.0.
5. Teach Yourself Perl 5 in 21 days by David Till.
6. Red Hat Enterprise Linux 4: System Administration Guide Copyright 2005 Red Hat, Inc.

16CS E02

PRINCIPLES OF PROGRAMMING LANGUAGES

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To provide an introduction to formalisms for specifying syntax and semantics of programming languages.
2. To provide an exposure to core concepts and principles in contemporary programming languages.
3. To analyse and optimize the complexity of the programming languages.
4. To explore the concept of concurrent and parallel programming.

Course Outcomes: On the successful completion of this course the student will be able to

1. program in different language paradigms and evaluate their relative benefits.
2. Gains knowledge of, and ability to use, language features in current programming languages.
3. Develop algorithms for problem solving.
4. Identify and describe semantic issues associated with variable binding, scoping rules, parameter passing, and exception handling.
5. Understand the design issues of object-oriented and functional languages.
6. familiarity with using logic languages.

UNIT-I

The Role of programming Languages: Towards Higher-level Languages, Programming Paradigms , Criteria for good language design and Language implementation.

Language Description : Expression notation, Abstract syntax tree, Context free Grammars.

UNIT-II

Structured Programming : Need for Structured programming, Design considerations, Handling special cases in loops, Programming with invariants, Control flow in C.

Types - Role of Types, Basic Types, Arrays, Records, Unions, Sets,

Pointers, Types and Error Checking.
Procedure Invocation: Introduction to Procedures, parameter passing methods, Scope Rules for Names, Nested Scopes, Activation Records.

UNIT-III
Object-Oriented Programming -Object, Object -oriented thinking , **Classes and Objects:** Defining classes and Member functions, Arrays, Static Members, Friend Functions. Constructors and Destructors: Type of Constructors, Dynamic Initialization of Objects, Destructors.
C++ operator overloading: Fundamentals, restrictions, overloading unary / binary operators, overloading ++ and --, Manipulation of Strings. C++ **Inheritance:** Defining derived classes, Types of Inheritance, Virtual Base class, Abstract Class, Nesting of classes.

UNIT-IV
C++ Templates: Introduction, class templates, member function template, overloading template functions., Objects in Smalltalk.
Functional Programming: Introduction to LISP, Exploring a List, Functions as First-class values, ML: types, function, List manipulation, Exception Handling in ML, Storage allocation for lists.

UNIT-V
Logic Programming: Computing with relations, Introduction to Prolog, Data structures in Prolog, Programming techniques, Control in Prolog, Cuts.
Concurrent Programming: Parallelism in Hardware, Liveness properties, Synchronization, Concurrency in Ada.

Suggested Reading:
1. Ravi Sethi, "Programming Languages", II Ed., Pearson Education asia, 2001.
2. Robert Lafore "Object-Oriented Programming in C++ " 4th Edition Sams Publishing, 2002.
3. Robert W. Sebesta, "Concepts of Programming languages", 7th Edition., Pearson Education.

SHELL SCRIPTING

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. Understanding of the shell structure and its environment of Unix/Linux.
2. Learning the key features and fundamentals of bash environment.
3. Carrying out arithmetic operations in a shell script.
4. Creating interactive scripts incorporating various control constructs.
5. Understanding and implementing various functions.
6. Pattern matching and text processing using the tools.

Course Outcomes: At the end of the course, students will be able to:

1. Understand the basics of Linux shell scripting.
2. Familiarize with basic commands and text filtering tools.
3. Write shell scripts for automation to save and create utilities.
4. Start up a system and customize a Linux system using scripts.
5. Control administrative tasks such as Linux user management, system monitoring etc.
6. Identify patterns using Linux/Unix tools.

UNIT-I

Introduction to Linux shell and Scripting: Structure of Linux OS, Shell Scripting: Comparison of shells, tasks done by shell, working in shell, Learning basic Linux commands, compilers Vs. interpreters, when not to use scripts, Linux File system.

Process basics: ps, process management, process management tools-top, iostat and vmstat; at, crontab.

Text Processing and Filters: Text filtering tools, I/O redirection, Pattern matching with the vim editor, grep.

UNIT-II

Working with Commands: Learning shell interpretation of commands, command separators, logical operators.

Exploring Expressions and Variables: Environment variables, Read-only variables, command line arguments (special variables, set and shift, getopt), default parameters, working with arrays.

UNIT-III

Shell scripting: Interactive Shell scripts-reading user input, <<, >> operator, File handling, debugging.

Arithmetic operations in shell scripts: Using a command declare for arithmetic, let command for arithmetic expr; binary, octal and hex arithmetic operations, floating-point arithmetic.

UNIT-IV

Decision making in scripts: exit status of commands, test command, conditional constructs, single menus with select; Looping constructs; piping the output of a loop to a Linux command, running loops in the background, IFS and loops.

Functions: Introduction to functions, passing arguments, sharing of data, declaration of local variables, returning information from functions, running functions in the background, creating a library of functions.

UNIT-V

System startup and Customizing Linux System: System startup, inittab, and run levels, user initialization scripts.

Pattern matching: Basics of regular expressions, sed and awk.

Text Books:

1. Ganesh Sanjiv Naik, Learning Linux Shell Scripting, Packt Publishing, 2015. Open Source Community.
2. Sumithaba Das "Unix Concepts and Applications", 4th Edition, TMH, 2006.
3. Randal K Michael, "Mastering UNIX Shell Scripting", Wiley Publications, 2003.
4. N.B. Venkateswarlu, "Advanced Shell Programming", 1st Edition, BPB Publisher, 2010.

16CS C14

DATA BASE MANAGEMENT SYSTEMS LAB

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
CIE	25 Marks
Credits	2

Course Objectives:

1. To get familiar with the concepts of structured query language.
2. To understand about programming language/ structured query language (PL/SQL).
3. To get familiar with generation of form and open database connectivity.

Course Outcomes: On the successful completion of this course the student will be able to

1. Develop the query statements with the help of structured query language.
2. Write code by using the concepts of SQL and PL/SQL.
3. Design GUI using forms and implement database connectivity.

Lab Activity:

SQL

1. Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.
2. Queries using operators in SQL.
3. Queries to Retrieve and Change Data: Select, Insert, Delete, and Update.
4. Queries using Group By, Order By, and Having Clauses.
5. Queries on Controlling Data: Commit, Rollback, and Save point.
6. Queries to Build Report in SQL *PLUS.
7. Queries for Creating, Dropping and Altering Tables, Views and Constraints.
8. Queries on Joins and Correlated Sub-Queries.
9. Queries on Working with Index, Sequence, Synonym, Controlling Access, and Locking Rows for Update, Creating Password and Security features.

PL/SQL

10. Demonstrate PL/SQL Code using Basic Variable, Anchored Declarations, and Assignment Operation.
11. Demonstrate PL/SQL Code using Bind and Substitution Variables.
12. Demonstration of Printing in PL/SQL.
13. Demonstrate PL/SQL Code using SQL and Control Structures in PL/SQL.
14. Demonstrate PL/SQL Code using Cursors, Exceptions and Composite Data Types.
15. Demonstrate PL/SQL Code using Procedures, Functions, and Packages.

FORMS

16. Implementation of PL/SQL Code for Creation of forms for Information Systems such as Student Information System, Employee Information System etc.
17. Demonstration of database connectivity.

Note: The creation of sample database for the purpose of the experiments is expected to be pre-decided by the instructor.

Suggested Reading:

1. Oracle: The Complete Reference by Oracle Press.
2. Nilesh Shah, "Database Systems Using Oracle", PHI, 2007.
3. Rick F Van der Lans, "Introduction to SQL", Fourth Edition, Pearson Education, 2007.

WEB TECHNOLOGIES LAB

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
CIE	25 Marks
Credits	2

Course Objectives:

1. To acquire knowledge of XHTML, Java Script and XML to develop web applications.
2. Ability to develop dynamic web content using Java Servlets and JSP.
3. To understand JDBC connections and Java Mail API.
4. To understand the design and development process of a complete web application Course.

Course Outcomes: On the successful completion of this course the student will be able to

1. Students will be able to develop static web sites using XHTML and Java Scripts.
2. To implement XML and XSLT for web applications.
3. Develop Dynamic web content using Java Servlets and JSP.
4. Use JDBC and web content using PHP.
5. Handle Sessions and use servlet filters in web applications.
6. Develop a dynamic web application using all the technologies learnt in the course.

List of experiments:

1. Installation of web server and configuration of server and browser.
2. Create a web site using XHTML and CSS.
3. Demonstration of XML and XSLT.
4. Creation of dynamic content in a web site using JavaScript.
5. Form validation using JavaScript.
6. Creation of dynamic content in a web site using PHP.
7. Implementation of session tracking using PHP.
8. Creation of dynamic content in a web site using servlet and JSP.
9. Implementation of session tracking using servlet and JSP.
10. Database access through the web.
11. Develop a case study using PHP and MySQL.

Creation of dynamic web site using all the above topics.

Text Books:

1. Internet & World Wide Web How to program - M. Deitel, P.J. Deitel, A. B. Goldberg 3rd Pearson Education
2. Programming the World Wide Web -Robert W. Sebesta, 4th Pearson Education

16CS C16

COMPUTER ARCHITECTURE AND MICRO PROCESSORS LAB

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
CIE	25 Marks
Credits	2

Course Objectives:

1. To become familiar with the architecture and Instruction set of 8086 microprocessor.
2. To provide practical hands on experience with Assembly Language Programming.
3. To provide solid foundation on interfacing the external devices to the processor according to the user requirements to create novel products and solutions for the real time problems.

Course Outcomes: On the successful completion of this course the student will be able to

1. Describe the architecture and comprehend the instruction set of 8086.
2. Understand and apply the principles of Assembly Language Programming in developing microprocessor based applications.
3. Get familiarized with different assembly language software tools.
4. Work with standard microprocessor interfaces to know how a processor will communicate with the External world.

Prerequisites:

Digital Electronics and Logic Design, Computer Architecture.

List of Experiments:

1. Tutorials with 8086 kit / MASM software tool.
2. Fixed-point multiplication and division.
3. Floating-point multiplication and division.
4. Sorting hexadecimal array.
5. Code conversion from hexadecimal to decimal.
6. Sum of set of BCD numbers.
7. Searching.
8. Display a string of characters using 8279.
9. Interfacing traffic light controller using 8255.
10. Interfacing seven-segment LED using 8255.
11. Interfacing stepper motor using 8255.
12. Interfacing 8253 counter.

13. D/A conversion using 8255.
14. A/D conversion using 8255.

Suggested Reading:

1. Yu-cheng Liu, Glenn A.Gibson, "Microcomputer Systems: The 8086/8088 Family", 2nd Edition, PHI Learning 2011.
2. Douglas Hall. "Microprocessor and Interfacing programming and Hardware", Tata Mc Graw Hill, Revised 2nd Edition, 2007.
3. Brey B. Brey, "The Intel Microprocessor, 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Pro-Processors-Architecture, Programming and interfacing", 4th Edition, Prentice Hall, 1993.