RTMNU B.E. SCHEME OF EXAMINATION 2021-22

Scheme of Teaching & Examination of Bachelor of Engineering IV Semester B.E. (Computer Science and Engineering)

Sr. No.	Course Code	Category	Course Name	Hours/ Week			Credits	Maximum Marks				
								Theory		Practical		Total
				L	T	P		Internal	University	Internal	University	
1	BECSE401T	Basic sciences	Discrete Mathematics and Graph Theory	3	0	0	3.00	30	70	-	-	100
2	BECSE402T	Professional core courses	Data Structure and Program Design	3	1	0	4.00	30	70	-	-	100
3	BECSE402P	Professional core courses	Data Structure and Program Design Lab	0	0	2	1.00	-	-	25	25	50
4	BECSE403T	Professional core courses	Database Managements Systems	3	0	0	3.00	30	70	-	-	100
5	BECSE403P	Professional core courses	Database Managements Systems Lab	0	0	2	1.00	-	-	25	25	50
6	BECSE404T	Professional core courses	Computer Networks	3	0	0	3.00	30	70			100
7	BECSE405T	Professional core courses	Theory of Computation	3	1	0	4.00	30	70	-	-	100
8	BECSE406T	Professional core courses	System Programming	3	0	0	3.00	30	70			100
9	BECSE407P	Professional core courses	Computer Workshop-II (Python)	0	0	2	1.00	-	-	25	25	50
10	BECSE408	Project-CS	Internship	0	0	2	1.00	-	-	50	-	50
Total				**18**	**2**	**8**	**24.00**	180	420	**125**	75	800

Dr. S. V. Sonekar
Chairman

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE
SEMESTER: FOURTH (C.B.C.S.)
BRANCH: COMPUTER SCIENCE AND ENGINEERING

Subject : Discrete Mathematics and Graph Theory Subject Code : BECSE401T

Load	Credit	Total Marks	Internal Marks	University Marks	Total
03 Hrs (Theory)	03	100	30	70	100

Aim: To develop background in modern computer science, in particular logic, relations, combinatorics and graph theory so that students can better understand the algorithms.

Pre Requisites:

1. Basic concepts of logic, matrices and combinatorics.
2. Higher secondary school mathematics through trigonometry.

Course Objectives:

1. A primary objective is to provide a bridge for the student from lower-division mathematics courses to upper-division mathematics.
2. Obtain skills and logical perspectives in introductory (core) courses that prepare them for subsequent courses.
3. Develop proficiency with the techniques of mathematics and/or computer science, the ability to evaluate logical arguments, and the ability to apply mathematical methodologies to solving real world problems.

Course Outcomes:

After completing the course, the students will be able to

1. Apply graph theory models of data structures and state machines to solve problems of connectivity and constraint satisfaction.
2. Gain an introduction into how mathematical models for engineering are designed, analyzed and implemented in industry and organizations.
3. Reason mathematically about basic data types and structures (such as numbers, sets, graphs, and trees) used in computer algorithms and systems; distinguish rigorous definitions and conclusions from merely plausible ones.
4. Analyze real world scenarios to recognize when Logic, sets, functions are appropriate, formulate problems about the scenarios, creatively model these scenarios (using technology, if appropriate) in

order to solve the problems using multiple approaches.

5. Apply knowledge of mathematics, physics and modern computing tools to scientific and engineering problems.

6. Apply their knowledge in life-long learning.

Unit 1: Set Theory, Relations and Functions **(08 Hrs)**

Sets: Review of propositions and logical operations, Principle of mathematical induction, Review of sets, Types and operations on sets.

Relations: Ordered pairs and n-tuples, Types of relations, Composite relation, Transitive closure of a relation, Partially ordered set, Hasse diagrams.

Functions: Definition, Composition of functions, Types of functions, Characteristics function and its properties.

Unit 2: Fuzzy Set and Fuzzy Logic **(07 Hrs)**

Fuzzy sets and systems, Crisp set, Operations and combinations on Fuzzy sets, Relation between Crisp set and Fuzzy set, Fuzzy relations, Overview of Fuzzy logic and classical logic.

Unit 3: Group Theory and Ring Theory **(07 Hrs)**

Binary operation, Algebraic structure, Groupoid, Semigroup, Monoid, Group, Subgroup, Normal subgroup (Only definitions and examples), Ring, Commutative ring, Ring with unity, Zero divisor, Integral domain, Field (Only definitions and simple examples).

Unit 4: Graph Theory **(07 Hrs)**

Basic concepts of graph theory, Digraphs, Basic definitions, Matrix representation of graphs, Subgraphs and quotient graphs, Isomorphic graphs, Paths and circuits, Reachability and connectedness, Node base, Euler's path & Hamilton's path, Tree, Binary tree, Undirected tree, Spanning tree, Weighted graphs (Only definitions and examples), Minimal spanning tree by Prim's algorithm & Kruskal's algorithm, Representation of algebraic expressions by Venn diagram and binary tree.

Unit 5: Combinatorics **(07 Hrs)**

Permutations and combinations, Pigeonhole principle with simple applications, Recurrence relations (Concept and definition only), Generating functions, Solution of recurrence relations using generating functions.

Text/ Reference Books

(1) Discrete Mathematical Structures (PHI), B. Kolman, R. Busby, S. Ross.

(2) Discrete Mathematical Structures with Applications to Computer Science (TMH), Tremblay and Manohar.

(3) Fuzzy Sets Uncertainty and Information, George, J. Klir, Tina A. Folger.

(4) Discrete Mathematics for Computer Scientists & Mathematicians, J. Mott, A. Kandel, T. Baker.

(5) Discrete Mathematics, S. Lipschutz.

(6) Neural network and Fuzzy systems (PHI), Bart Kosko.

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FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE
SEMESTER: FOURTH (C.B.C.S.)
BRANCH: COMPUTER SCIENCE AND ENGINEERING

Subject : Data Structure and Program Design Subject Code : BECSE402T

Load	Credit	Total Marks	Internal Marks	University Marks	Total
03 Hrs (Theory) 01 Hr (Tutorial)	04	100	30	70	100

Aim : To understand the implementation of various data structures and algorithms.

Prerequisite(s): C Language

Course Objective/Learning Objective:

1	To introduce the fundamental concept of data structures and to emphasize the importance of data structures in developing and implementing efficient algorithms.
2	To implement data structure Algorithms by using C/C++ Language.
3	To select an appropriate data structure to solve real world problem and compare alternative implementations of data structures with respect to performance.
4	To acquire knowledge on Searching and Sorting techniques.

Course Outcome:
At the end of this course Student are able to:

CO1	Analyze the complexity of algorithms and sorting techniques.
CO2	Apply the concept of stack and queues to solve real world problem.
CO3	Describe and implement linked list operation.
CO4	Demonstrate different methods for traversing trees.
CO5	Utilize the concepts of graphs to build solution. Design and implement searching techniques and hashing function

UNIT I: **(08 Hrs)**

Introduction to algorithm: General concepts of data structures, Types of Data Structure with its properties and Operations, Time and space analysis of algorithms, Big oh, theta, and omega notations, Average, best and worst case analysis.

Sorting and Searching Techniques: Selection sort, insertion sort, heap sort, shell sort, linear and binary search.

UNIT II: **(07 Hrs)**

Stack & Queue: Representation of Stack & queue using array, Application of stacks, Conversion from infix to postfix and prefix expressions, Evaluation of postfix expression using stacks, Linear Queues, Circular Queues, and Priority Queues.

UNIT III: **(07 Hrs)**

Linked List: Representation of ordered list using array and its operation, Linked Lists, Singly linked list, Implementation of linked list using static and dynamic memory allocation, operations on linked list, polynomial representations using linked list, circular linked list, doubly linked list.

UNIT IV: **(07 Hrs)**

Trees: General and binary trees, Representations and traversals of trees, Threaded Binary Trees, Binary search trees, the concept of balancing, AVL Trees, B-Trees, B+ Trees.

UNIT V: **(07 Hrs)**

Graphs: Representation of Graph, Matrix Representation of Graph, List Representation of Graph, Directed Graphs(Digraphs), Breadth first search and Depth first search, spanning trees.

Hashing: Hash tables, hash functions, hashing techniques, Collision resolution techniques, overflow handling.

Textbooks:

- Classical Data Structure, D. Samanta, Prentice Hall of India.
- Data Structures using C, Aaron M. Tanenbaum, Pearson Education.
- Data Structure with C, Seymour Lipschutz, Tata Mcgraw Hill.

References:

- Ellis Horowitz, Sartaj Sahni & Susan Anderson-Freed, Fundamentals of Data Structures in C, Second Edition, Universities Press.
- An Introduction to Data Structures and Applications, Jean-Paul Tremblay, Paul G. Sorenson, P. G. Sorenson, Tata McGraw Hill Publication.
- Data Structures using C and C++, Y. Langsam, Pearson Education.
- Algorithms in a Nutshell, George H & Garry, O'reilly Publication.
- Data Structure and Algorithms using Python, Rance D. Necaise, John Wiley Publication.

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SEMESTER: FOURTH (C.B.C.S)

BRANCH: COMPUTER SCIENCE AND ENGINEERING

Subject : Data Structure and Program Design Subject Code : BECSE402P

Load	Credit	Total Marks	Internal Marks	University Marks	Total
02 Hrs (Practical)	01	50	25	25	50

- Ten Practicals based on syllabus. Course coordinator should make sure that all units will be covered in their list. No study experiment should be included in the list.

Textbooks:

- Classical Data Structure, D. Samanta, Prentice Hall of India.
- Data Structure with C, Seymour Lipschutz, Tata Mcgraw Hill.
- Data Structures using C, Aaron M. Tanenbaum, Pearson Education.

References:

- An Introduction to Data Structures and Applications, Jean-Paul Tremblay, Paul G. Sorenson, P. G. Sorenson, Tata McGraw Hill Publication.
- Data Structures using C and C++, Y. Langsam, Pearson Education.
- Algorithms in a Nutshell, George H & Garry, O'reilly Publication.
- Data Structure and Algorithms using Python, Rance D. Necaise, John Wiley Publication.

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FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: FOURTH (C.B.C.S)

BRANCH: COMPUTER SCIENCE AND ENGINEERING

Subject: Database Management Systems **Subject Code:** BECSE403T

Load	Credit	Total Marks	Internal Marks	University Marks	Total
03 Hrs (Theory)	03	100	30	70	100

Aim: To understand and implement the concepts of databases in order to gain the proficiency at application level.

Prerequisite(s): Basic concept of file processing and fundamentals of operating systems.

Course Objective/Learning Objective:

1	To understand general idea of database management systems.
2	To develop skills to design databases using data modeling and design techniques.
3	To develop skills to implement real life applications which involve database handling.
4	Demonstrate an understanding of career opportunities in subject areas of designing, storage techniques, data handling and managing techniques

Course Outcome:

At the end of this course Student are able to:

CO1	**Understand** basic database concepts and data modeling techniques used in database design.
CO2	**Study** the concept of functional dependency and **Perform** the calculus with **Design** database by using different normalization technique.
CO3	**Study** query processing and **Perform** optimization on query processing.
CO4	**Understand** the concept of transaction processing and different recovery technique used in RDBMS.
CO5	**Study** and **Implement** advanced databases which are used real time system.

UNIT I: **(07 Hrs)**

Introduction to database systems: Approaches to building a database, Three-schema architecture of a database, Challenges in building a DBMS, DBMS Architecture-Various components of a DBMS, Types of data models.

UNIT II: **(08 Hrs)**

Relational Data Model: Concept of relations, Schema-instance distinction, Keys, referential integrity and foreign keys, Relational algebra operators, Tuple relation calculus, Domain relational

calculus. **Physical and logical hierarchy:** Concept of index, B-trees, hash index, function index, bitmap index. Concepts of Functional dependency, Normalization (1NF,2NF,3NF,BCNF, etc).

UNIT III: **(07 Hrs)**

Query Processing and Optimization: Query Processing and Optimization process, measures of query cost estimation in query optimization, pipelining and Materialization, Structure of query evaluation plans.

UNIT IV: **(07 Hrs)**

Transactions: Transaction concepts, properties of transactions, Serializability of transactions, Testing for serializability, System recovery, Two-Phase Commit protocol, Recovery and Atomicity, Log based recovery, concurrent executions of transactions, Locking mechanism, solution to concurrency related problems, deadlock, two-phase locking protocol, Isolation.

UNIT V: **(07 Hrs)**

Recovery System and advanced databases: Failure classification, recovery and atomicity, log based recovery, checkpoints, buffer management, advanced recovery techniques, Web databases, Distributed databases, Data warehousing, Data mining, Data Security, NOSQL databases.

Textbooks:

- Database System Concepts by Avi Silberschatz, Henry F. Korth, S. Sudarshan, Tata McGraw Hill, Fifth Edition.
- Fundamentals of Database Systems – Elmasiri and Navathe, Addison Wesley, 2000.
- An introduction to Database Systems, C J Date, A. Kannan, S. Swamynathan –Eight Edition.

Reference books:

- Database Management Systems - by Raghu Ramakrishnan and Johannes Gehrke, Tata McGraw Hill Publication, Third Edition.
- Introduction to Database Management Systems by Kahate, Pearson Education.

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FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: FOURTH (C.B.C.S)

BRANCH: COMPUTER SCIENCE AND ENGINEERING

Subject : Database Management Systems Subject Code : BECSE403P

Load	Credit	Total Marks	Internal Marks	University Marks	Total
02 Hrs (Practical)	01	50	25	25	50

- Ten Practicals based on syllabus. Course coordinator should make sure that all units will be covered in their list. No study experiment should be included in the list.

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FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: FOURTH (C.B.C.S.)

BRANCH: COMPUTER SCIENCE & ENGINEERING

Subject: Computer Networks **Subject Code:** BECSE404T

Load	Credits	Total Marks	Internal Marks	University Marks	Total
03 Hrs (Theory)	03	100	30	70	100

Aim: To understand networking concepts and various protocols used in Computer Network.

Prerequisite(s): Basics of data communication, networking concepts and computer architecture.

Course Objectives:

1	To study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model.
2	To study the fundamentals and basics of Physical layer, and will apply them in real time applications.
3	To study data link layer concepts, design issues, and protocols.
4	To Gain core knowledge of Network layer routing protocols and IP addressing.
5	To study process-to-process communication and Congestion control mechanism.
6	To study about domain name, Application layer and network management.

Course Outcomes:

At the end of this course Student are able to:

CO1	Describe the functions of each layer in OSI model along with basic networking concepts.
CO2	Explain physical layer functionality and its working along with transmission media with real time applications.
CO3	Describe the functions of data link layer and explain the protocols used in data link layer.
CO4	Classify the routing protocols and analyze how to map IP addresses. Identify the issues related to transport layer, congestion control
CO5	Describe Quality of Service, DNS, Application layer protocols & Network security issues.

Unit I: **(07 Hrs)**

Introduction to Data Communication:

Data Communication Components, Data Representation, data flow (Simplex, Half-Duplex and Full-Duplex mode), Network Criteria, Type of connection, physical topology, Categories of Network (LAN, MAN, WAN,PAN), study of OSI reference model.

Unit II: **(07 Hrs)**

Physical Layer and Media:

Analog and digital Data, Analog and digital signals, TRANSMISSION MODES: Serial and Parallel transmission, Asynchronous and Synchronous Transmission. COMMUNICATION MEDIA: guided media and unguided.

Unit III: **(07 Hrs)**

Data Link Layer:

Types of errors, framing (character and bit stuffing), Protocols: for noiseless channels (Simplex, Stop and wait), for noisy channels (Stop and wait ARQ, Go back-N ARQ, Selective repeat ARQ), Point-to-Point (PPP), Multiple Access Protocol: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, CSMA/CA.

Unit IV: **(07 Hrs)**

Network Layer:

IPv4 Addresses, IP addressing Methods with sub-netting and super-netting, **Routing Protocols**: Distance Vector, Link State, Path Vector.

Transport Layer:

Duties of transport layer, Process-to-process delivery, Congestion control: Data Traffic, Congestion control Category (Open loop, closed loop),

Unit V: **(08 Hrs)**

Quality of Service: Introduction to QoS, Techniques to improve QoS: Leaky bucket algorithm, Token bucket algorithm. **Application Layer:** Domain Name System, Functions of Network management system, Voice over IP, Firewall

Text Books:

- B. A. Forouzan – "Data Communications and Networking (3rd Ed.) " – TMH
- A. S. Tanenbaum – "Computer Networks (4th Ed.)" – Pearson Education/PHI
- W. Stallings – "Data and Computer Communications (8th Ed.)" – PHI/ Pearson Education

Reference Books:

- Kurose and Rose – "Computer Networking -A top down approach featuring the internet" – Pearson Education
- Introduction to Data Communications and Networking by Wayne Tomasi-Pearson Edition
- Comer – "Internetworking with TCP/IP, vol. 1, 2, 3(4th Ed.)" – Pearson Education/PHI

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FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: FOURTH (C.B.C.S)

BRANCH: COMPUTER SCIENCE AND ENGINEERING

Subject : Theory of Computation **Subject Code:** BECSE405T

Load	Credit	Total Marks	Internal Marks	University Marks	Total
03 Hrs (Theory) 01 Hr (Tutorial)	04	100	30	70	100

Aim: The main motivation behind developing Theory of Computation was to develop methods to describe and analyze the dynamic behavior of discrete systems.

Prerequisite(s): Basics of Discrete Mathematics

Course Objective/Learning Objective:

1	To discuss the Chomsky classification of formal language with discussion on grammar and automata for regular, context-free, context sensitive and unrestricted language.
2	Understand the basic properties of Turing machines and computing with Turing machines.
3	To discuss the notion of decidability.
4	To compute Ackerman function and analyze recursively and non-recursively enumerable language

Course Outcome:

At the end of this course Student are able to:

CO1	Design finite automata and its minimization along with Moore and Mealy machines.
CO2	pply regular expression and create grammar for the same.
CO3	al with context free grammar and various normal forms of CFGs.
CO4	eate Push Down Automata for the given CFG and inter-conversion of the same.
CO5	eate Turning Machine for the grammar and Deal with Recursive and Recursively Enumerable Languages.

UNIT I: **(08 Hrs)**

Finite Automata (FA): Basic Terminology and Definitions, Chomsky hierarchy, Deterministic Finite Automata , language of a DFA. Nondeterministic Finite Automata, Equivalence of Deterministic and Non-deterministic Finite Automata, Applications of Finite Automata, Finite Automata with Epsilon Transitions, Eliminating Epsilon transitions, Minimization of Deterministic Finite Automata, Finite automata with output (Moore and Mealy machines) and Inter conversion.

UNIT II: **(07 Hrs)**

Regular Grammars (RG): Definition, regular grammars and FA, Conversion. Proving languages to be non-regular, Pumping lemma, applications, Closure properties of regular languages.

Regular Expressions (RE): Introduction, Identities of Regular Expressions, Finite Automata and Regular Expressions, Converting from DFA's to Regular Expressions, Converting Regular Expressions to Automata, applications of Regular Expressions.

UNIT III: **(07 Hrs)**

Context Free Grammar (CFG): Definition, Parse Tress, Derivation Trees, Rightmost and Leftmost derivations of Strings and Conversions. Ambiguity in CFGs, Minimization of CFGs, Normal forms for CFG, Pumping Lemma for CFLs.

Unit –IV: **(07 Hrs)**

Push down Automata (PDA): Definition, Model, Non-determinism, acceptance by two methods and their equivalence, conversion of PDA to CFG, CFG to PDAs, closure and decision properties of CFLs.

UNIT V: **(07 Hrs)**

Turing Machines (TM) : Formal definition and behavior, Languages of a TM, TM as acceptor, TM as transducers, Variations of TM, Linear Bounded Automata, TM as computer of function. Properties of recursive and recursively enumerable languages, Recursively enumerable set, Undesirability, Decidability and solvability, Post correspondence Problem, Primitive recursive functions, Ackerman function

Textbooks:

- John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Introduction to Automata Theory Languages and Computation, 3rd edition, Pearson Education.
- Michael Sipser, Introduction to the Theory of Computation, 3rd edition, Cengage Learning.
- Peter Linz,An Introduction to Formal Languages and Automata, 5th Edition, Malloy, Inc.

- Vivek Kulkarni, Theory of Computation, Oxford University Press, ISBN-13: 978-0-19-808458-7.
- Theory of Computation - O.G. Kakde ,University Science Press

Reference books:

- K. L. P Mishra, N. Chandrashekaran , Theory of Computer Science-Automata Languages and Computation, 2nd edition, Prentice Hall of India, India.
- John C Martin, Introduction to languages and the Theory of Computation, TMH
- Daniel I.A. Cohen, John Wiley, Introduction to Computer Theory.
- P.K. Srimani, Nasir S, A Text book on Automata Theory, Cambridge University Press.
- Kamala Krithivasan, Rama R, Introduction to Formal languages Automata Theory and Computation Pearson.

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FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: FOURTH (C.B.C.S.)

BRANCH: COMPUTER SCIENCE AND ENGINEERING

Subject : System Programming Subject Code: BECSE406T

Load	Credit	Total Marks	Internal Marks	University Marks	Total
03 Hrs. (Theory)	03	100	30	70	100

Aim: To understand about system programs and device drivers.

Prerequisite(s): Data Structures, Theoretical computer science, Operating system, Computer Architecture

Course Objective/Learning Objective:

1	To acquire knowledge about various system software programs
2	To understand the design of Assembler
3	To understand concept and design of microprocessor and various types of loaders
4	To understand the working of Compiler, Interpreter and various types of device drivers.

Course Outcome: -

After learning the course, the students should be able to:

CO1	Identify the relevance of different system programs.
CO2	Describe the various data structures and passes of assembler design.
CO3	Identify the need for different features and designing of macros
CO4	Distinguish different loaders and linkers and their contribution in developing efficient user applications.
CO5	Grab the concepts of phases of compiler, LEX and YACC

Unit I: **(08 Hrs)**

Introduction to Systems Programming

Introduction of Components of System Software: - Assemblers, Loaders, Macros, Compilers, and Formal Systems. Operating System, computer language, Machine Architecture IBM 360/370, Instruction Formats, Data Formats, System Software Development, Recent Trends in Software Development, Levels of System Software, computer languages: Machine language, assembly language.

Unit II: Assembler **(07 Hrs)**

Elements of Assembly language programming, Data base for assembler design, Types of Assemblers, design of two-pass assembler and single pass assembler.

Unit III: Macro and Macro Processors **(07 Hrs)**

Introduction, Macro Definition and Call, Macro Expansion, Functions of a Macro Processor, Basic Tasks of a Macro Processor, Features of macro, Design Issues of Macro Processor, design of macro processor

Unit IV: Linker and Loader **(07 Hrs)**

Introduction, Task of Loader, Relocation and Linking concepts, Compile-and-Go Loaders, General Loader Schemes, Absolute Loaders, Relocating Loaders, design of direct linking loader. Linker's v/s Loaders

Unit V: Compiler, Interpreters, Debuggers & Device Driver **(07 Hrs)**

Compilers: Basic compilers function, Phases of compilers, Lexical Analysis- Role of Finite State Automata in Lexical Analysis, Design of Lexical analyzer, data structures used,Syntax Analysis- Role of Context Free Grammar in Syntax analysis Study of LEX & YACC. Benefits of Interpretation, Overview of Interpretation, The Java Language Environment, Java Virtual Machine, Types of Errors, Debugging Procedures, Comparative study between device drivers for UNIX & Windows

Text Books: -

Sr. No.	Title	Author	Publication
1	System Programming	J. J. Donovan	Tata McGraw-Hill Education
2	System Programming	D M Dhamdhere	McGraw Hill Publication
3	System Software	Santanu Chattopadhyay	Prentice - Hall India,2007
4	UNIX programming Tools LEX and YACC	Levine, Mason and Brown	O'Reilly

Reference Books: -

Sr. No.	Title	Author	Publication
1	System Software – An Introduction to Systems Programming	Leland L. Beck	Pearson Education Asia, 2000
2	Principles of Compiler Design	Aho and Ullman	Pearson Education
3	System Programming and Compiler Construction	R.K. Maurya & A. Godbole	Kindle Edition
4	System Programming	Srimanta Pal	OXFORD Publication

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FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: FOURTH (C.B.C.S)

BRANCH: COMPUTER SCIENCE AND ENGINEERING

Subject: Computer Workshop-II-Lab **Subject Code:** BECSE407P

Load	Credits	Total Marks	Internal Marks	University Marks	Total
02 Hrs (Practical)	01	50	25	25	50

Aim: To implement the concepts of python programming

Prerequisite(s): C programming and basics of object oriented programming

Course Objectives:

1	To implement various concepts of python programming
2	To gain hands on experience on organizing python codes using object oriented programming concepts

Course Outcomes:

At the end of this course Student are able to:

CO1	Declare python operators, numeric data types and string operations
CO2	Implement tuple, conditional blocks and loops in python
CO3	Apply functions, modules, and packages using python
CO4	Handle exceptions, sorting algorithms and various data structures
CO5	Implement various file operations using python and Implement concepts of object oriented programming and python database connectivity

UNIT I:

Origin of Python, Python versions, Features of Python, Installation and Working with Python, Identifiers, Keywords, Understanding Python variables , Python basic Operator ,Declaring and using Numeric data types: int, float, complex Using string data type and string operations

UNIT II:

Defining list and list slicing ,Use of Tuple, frozenset, map, dictionary, Non data type, Math functions, Conditional blocks using if, else and else if, Simple for loops in python, for loop using ranges, string, list and dictionaries ,Use of while loops in python, Loop manipulation using pass, continue, break and else.

UNIT III:

Organizing python codes using functions, Organizing python projects into modules ,Importing own module as well as external modules Understanding ,Packages Powerful Lamda function in python ,Programming using functions, modules and external packages,

UNIT IV:

Handling Exceptions, try catch block, Finally Block, Possible combination of try catch and finally block, Regular expression, Search Algorithms, Sorting Algorithms, Link List, Stack, Queues, Dequeues Hash Tables.

UNIT V:

Reading config files in python,Writing log files in python, Understanding read functions, read(), readline() and readlines(),Understanding write functions, write() and writelines, Manipulating file pointer using seek Programming using file operations

Classes and Object-Oriented Programming, Abstract Data Types and Classes, Inheritance, Encapsulation and Information Hiding, Graphical User interface, Networking in Python, Python database connectivity,

Books Recommended:

Text Books:

- 'Head-First Python' (2nd Edition) by Paul Barry, O'Reilly Publications

Reference Books:

- John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India
- R. Nageswara Rao, "Core Python Programming", Dreamtech
- Wesley J. Chun. "Core Python Programming - Second Edition", Prentice Hall

Note:

1. There should be at the most two practicals per unit.
2. Minimum ten practical's have to be performed based on above syllabus.
3. Do not include study experiment.

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FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: FOURTH (C.B.C.S)

BRANCH: COMPUTER SCIENCE AND ENGINEERING

Subject : Internship Subject Code : BECSE408

Load	Credit	Total Marks	Internal Marks	University Marks	Total
02 Hrs (Practical)	01	50	50	-	50

- Student should have to undergo minimum internship of two to four weeks. After completion of the internship report of the same should be submitted to the department. Minimum one month internship is desirable

Dr. S. V. Sonekar
Chairman