Shri Rawatpura Sarkar University, Raipur

Examination Scheme & Syllabus

For

Bachelor of Technology

In

Computer Science & Engineering

Semester-V

(Effective from the session: 2022-23)
Department of Computer Science & Engineering

SHRI RAWATPURA SARKAR UNIVERSITY, RAIPUR, CHHATTISGARH
FACULTY OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

B.Tech – CSE – 5th Semester

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2022-2023)

S.No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			Sem End Exam Duration (Hrs)
			L	T	P		Continuous Evaluation	Sem End Exam	Total	
1	EBT04501	Analysis & Design of Algorithm	4	1	-	5	30	70	100	3 Hrs.
2	EBT04502	Principles of Programming – III	3	1	-	4	30	70	100	3 Hrs.
3	EBT04503	Theory of Computation	3	1	-	4	30	70	100	3 Hrs.
4	EBT04504	Unix and Shell Programming	3	1	-	4	30	70	100	3 Hrs.
5	EBT04505	Computer System Architecture	3	1	-	4	30	70	100	3 Hrs.
6	EBT04591	Principles of Programming – III Lab	-	-	2	1	15	35	50	3 Hrs.
7	EBT04592	Unix and Shell Programming Lab	-	-	2	1	15	35	50	3 Hrs.
8	EBT04593	Soft Skills Lab	-	-	2	1	15	35	50	3 Hrs.
Total Contact hr. per week: 26			**Total Credit: 24**				**195**	**455**	**650**	

Course Title	Analysis & Design of Algorithm				
Course Code	EBT04501				
Semester	**5th Semester**				
Course Credit	**L**	**T**	**P**	**TC**	
	4	**1**	**-**	**5**	
Prerequisites	Data Structures and Algorithms				
Course Objectives	1. To introduce and implement various techniques for designing algorithms and advanced data structures. 2. To learn space and time complexity analysis of algorithms.				
Course Contents	**Unit- I** Reasoning About Algorithms: P, NP, NP-completeness, Reductions, Complexity analysis. Graph Algorithms: Strongly-connected components, Kosaraju's algorithm 1 and 2, Applications. Greedy Techniques: Local versus Global optimality, Interval scheduling, Exchange arguments. **Unit- II** Divide-and-Conquer: Optimality, Recursive algorithms, Divide-and-Conquer recurrences, The Master Theorem and applications, Non-uniform recurrences. **Unit- III** Dynamic Programming: Reusing sub-computations (Sequence alignment, Bellman-Ford algorithm), Precomputing (Floyd-Warshall algorithm, Johnson's algorithm), Combinatorial problems. (Knapsack) **Unit- IV** Linear Programming: Canonical and standard forms, Feasibility and optimization, Simplex algorithm. Approximation Algorithms: Relative approximations, PAS and FPAS scheduling. **Unit- V** Randomized Algorithms: Random guess (Quick select), Random guess with high confidence (Karger's min-cut algorithm), Storing associative data (Hashing), Error bounds.				
Course Outcomes	1. Ability to choose and implement appropriate algorithm design techniques for solving problems. 2. Impact the performance of programs. 3. Ability to analyze the worst-case and average-case behaviour of algorithms in terms of time and memory requirements.				

Text Books	T. H. CORMEN, C. E. LEISERSON, R.L. RIVEST, C. STEIN (2009), Introduction to Algorithms, MIT Press, 3rd Edition
Reference Books	J. KLEINBERG, E. TARDOS (2005), Algorithm Design, Pearson Education, 1st Edition.

Course Title	**Principles of Programming _ III**
Course Code	EBT04502
Semester	**5th Semester**
Course Credit	<table><tr><td>**L**</td><td>**T**</td><td>**P**</td><td>**TC**</td></tr><tr><td>**3**</td><td>**1**</td><td>**-**</td><td>**4**</td></tr></table>
Prerequisites	Java, Python
Course Objectives	1. To teach principles of object oriented programming paradigm including abstraction, encapsulation, inheritance and polymorphism. 2. To impart fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc. 3. To inculcate concepts of inheritance to create new classes from existing one & Design the classes needed given a problem specification; 4. To familiarize the concepts of packages and interfaces. 5. To facilitate students in handling exceptions. 6. To demonstrate the concept of event handling used in GUI.
Course Contents	**Unit- I** Basics of Java Programming, EXCEPTION HANDLING: Exception types, Usage of Try, Catch, Throw, Throws and Finally keywords, Built-in Exceptions, Creating own Exception classes. MULTI THREADING: Concepts of Thread, Thread life cycle, creating threads using Thread class and Runnable interface, Synchronization, Thread priorities, Inter Thread communication. **Unit-II** AWT CONTROLS: The AWT class hierarchy, user interface components-Labels, Button, Text Components, Check Box, Check Box Group, Choice, List Box, Panels – Scroll Pane, Menu, Scroll Bar. Working with Frame class, Colour, Fonts and layout managers. EVENT HANDLING: Events, Event sources, Event Listeners, Event Delegation Model (EDM), Handling Mouse and Keyboard Events, Adapter classes, Inner classes. **Unit- III** SWINGS: Introduction to Swings, Hierarchy of swing components. Containers, Top level containers - JFrame, JWindow, JDialog, JPanel, JButton, JToggleButton, JCheckBox, JRadioButton, JLabel,JTextField, JTextArea, JList, JComboBox, JScrollPane.APPLETS: Life cycle of an Applet, Differences between Applets and Applications, Developing applets, simple applet. **Unit- IV** Introduction to Python and Computer Programming, Data Types, Variables, Basic Input-Output Operations, Basic Operators, Boolean Values, Conditional Execution, Loops, Lists and List Processing, Logical and Bitwise Operations , Functions, Tuples, Dictionaries, and Data Processing

	Unit- V Modules, Packages, String and List Methods, and Exceptions, The Object-Oriented Approach: Classes, Methods, Objects, and the Standard Objective Features; Exception Handling, and Working with Files.
Course Outcomes	At the end of the course students will be able to: 1. Analyze the necessity for Object Oriented Programming paradigm over structured programming and become familiar with the fundamental concepts in OOP like encapsulation, Inheritance and Polymorphism 2. Design and develop java programs, analyze, and interpret object oriented data and report results. 3. Design an object oriented system, AWT components and multithreaded processes as per needs and specifications. 4. Plan their career in java based technologies like python etc
Text Books	1. Herbert Scheldt (2010), The complete reference, 7th edition, Tata Mc graw Hill, New Delhi.
Reference Books	1.Head First Java, O'rielly publications 2. T. Budd (2009), An Introduction to Object Oriented Programming, 3rd edition, PearsonEducation, India. 3. J. Nino, F. A. Hosch (2002), An Introduction to programming and OO design using Java, John Wiley & sons, New Jersey. 4. Y. Daniel Liang (2010), Introduction to Java programming, 7th edition, Pearson education, India.

Course Title	Theory of Computation				
Course Code	EBT04503				
Semester	**5th Semester**				
Course Credit	**L**	**T**	**P**	**TC**	
	3	**1**	**-**	**4**	
Prerequisites	Maths for Computing				
Course Objectives	The student will have ability to: 1.To learn about computability techniques 2.To learn about advanced computational complexity models				
Course Contents	Unit- I Computability: Review of Turing Machine, NP and NP-completeness, Diagonalization, view of PDAs, 2DFAs, FAs as restricted TMs, and related theorems. Tape reduction, and robustness of the model. Encoding and Enumeration of Turing Machines, Undecidability. Rice-Myhill-Shapiro theorem. Relativisation. Unit-II Decision Trees and Communication Complexity: Certificate Complexity, Randomized Decision Trees, Lower bounds on Randomized Complexity, Some techniques for decision tree lower bounds, Comparison trees, and sorting lower bounds, Yao's MinMax Lemma, Definition of communication complexity, Lower bound methods, Overview of other communication models, Applications of communication complexity. Unit- III Time Complexity: Time as a resource, Linear Speedup theorem, Crossing sequences and their applications, Hierarchy theorems. P vs NP. Time Complexity classes and their relationships. Notion of completeness, reductions. Cook-Levin Theorem. Ladner's theorem. Relativization Barrier: Baker-Gill-Solovay theorem. Unit- IV Space Complexity: Space as a resource. PSPACE, L and NL. Reachability Problem, Completeness results. Savitch's theorem, Inductive Counting to show the Immerman-Szelepcsenyi theorem. Reachability problems, Expander Graphs, SL=L Unit- V Complexity of Counting & Randomization: Counting problems, Theory of #P-completeness. The complexity classes PP, ParityP, BPP, RP, BPP are in P/poly, Toda's				

	theorem.
Course Outcomes	1.To be able to distinguish between computable and uncomputable problems 2. Gaining in-depth understanding of advanced complexity models
Text Books	1.D. Kozen (2013), Automata and Computability, Springer 2.D. Kozen (2006), Theory of Computation, Springer 3. S. Arora and B. Barak (2009), Complexity Theory: A Modern Approach, Cambridge University Press
Reference Books	1. Sipser, M., (2013), Introduction to the Theory of Computation, Cengage Learning 2. Hopcroft,J. E., Motwani, R., and Ullman, J. D., (2007), Introduction to Automata Theory, Languages, and Computation, Pearson

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B.Tech – CSE – 5th Semester

Course Title	Unix and Shell Programming				
Course Code	EBT04504				
Semester	**5th Semester**				
Course Credit	**L**	**T**	**P**	**T C**	
	3	**1**	**-**	**4**	
Prerequisites	Unix Operating System and commands				
Course Objectives	The student will have ability to: 1. Understand the UNIX operating system and its memory management, input/output. processing, internal and external commands. 2. Learn the File Systems and Process Management of UNIX. 3. Learn and explore the use of operating system utilities such as text editors. 4. Understand Shell Scripting and Shell Programming.				
Course Contents	UNIT–I Overview of UNIX: What is UNIX Operating System? Architecture, Kernel & Shell, Installation Process, Features, Internal And External Commands, Basic Commands: cal, date, echo, bc, script, passwd, PATH, who, uname, pwd, cd, mkdir, rmdir etc. Command Structure, Shell Script & Shell Programming, UNIX Server. UNIT–II File System: Definition of File System, Boot Block, Super Block, Inode. File creations and its related commands cat, cp, rm, mv, more, file, ls, wc, pg, cmp, comm, diff. Zipping & unzipping files, gzip, tar, zip, df, du, mount, umount, etc. The vi editor. File Permissions with chgrp & chmod. Process Control: Viewing a Process, Command to display Process, Process Attributes, Process States, Process Fields, ps Commands options, Handling Jobs, Foreground & Background Jobs. UNIT–III Redirection & Pipes: Standard I/O Streams, Redirection & Pipes, Command Execution, Command-Line Editing, Quotes. Filters: Filters, Concatenating, Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Ordering a File. Regular Expressions: Atoms, operators, grep, sed, awk etc. UNIT–IV System Security: Physical Security, Boot level security (GRUB), Controlling System Access, Restricted Shells, File Access Commands, Access Control List(ACLs), Restricting Root Access, Monitoring & Securing Super User Access.				

Course Outcomes	Upon completion of the subject, students will be able to:
	1. Identify and use UNIX utilities to create and manage simple file processing operations,
	2. Organize directory structures with appropriate security.
	3. Effectively use the UNIX system.
	4. Monitor system performance and lean the shell scripts.
	5. Use the shell scripts in designing a programs for engineering problems.
Text Books	1.Yashavant P. Kanetkar "Unix Shell Programming", BPB Publications.
	2. Venkatesh Murthy, "Introduction to Unix &Shell", Pearson Edu.
	3. Forouzan, "Unix & Shell Programming", Cengage Learning.
Reference Books	1.Sumitab Das,"Unix Concept & Application", TMH.
	2.Venkateshwavle,"Linux Programming Tools Unveil`ed", BS Publication.
	3.Richard Peterson,"Unix Complete Reference",TMH.

Course Title	Computer System Architecture				
Course Code	**EBT04505**				
Semester	**5ᵗʰ Semester**				
Course Credit	**L**	**T**	**P**	**TC**	
	3	**1**	**-**	**4**	
Prerequisites	Computer architeture				
Course Objectives	The student will have ability to: 1. To understand aspects of computer architecture and program performance. 2. To provide essential understanding of different subsystems of modern computer system and design aspects these subsystems. 3.To introduce hands-on experience of computer architecture design and performance enhancement.				
Course Contents	Unit I: Processor Basics CPU Organization, Fundamental and features, Data Representation - Basic formats, Fixed and Floating point representation, Instruction Sets, Formats, Types and Programming Considerations, Addressing modes. Unit II: Datapath Design Fixed-Point Arithmetic Multiplication Algorithms: Hardware algorithm, Booth Multiplication algorithm, Division algorithms: Hardware algorithm, Divide overflow algorithm, Combinational ALU and Sequential ALU, Floating point arithmetic operations. Unit III: Control Design Basic Concepts, Hardwired control, Microprogrammed Control, CPU control unit and Multiplier control unit, Pipeline Control: Instruction Pipelines, Pipeline performance, Superscalar Processing. Unit IV: Memory Organization Memory device characteristics, RAM technology and Serial access memories technology, Multilevel memory systems, Address translation and Memory allocation systems, Cache memory: Features, address mapping. Unit V: System Organization Communication Method: Basic concepts, Bus Control, Programmed I/O , DMA, Interrupts and IO Processors, Parallel Processing: Processor-level Parallelism, Multiprocessor and Fault tolerance system.				

Course Outcomes	Upon completion of the subject, students will be able to: 1.Identify basic components and design of a computer, including CPU, memories, and input/output units. 2.Identify issues involved in the instruction execution and various stages of instruction life stage 3. Identify issues related to performance improvement
Text Books	1.Computer Architecture and organization – John P Hayes, McGraw Hill Publication 2. Computer Organizations and Design- P. Pal Chaudhari, Prentice-Hall of India
Reference Books	1.Computer System Architecture - M. Morris Mano, PHI. 2.Computer Organization and Architecture- William Stallings, Prentice-Hall of India 3.Architecture of Computer Hardware and System Software: An Information Technology Approach, 3rd Edition (Illustrated) – Iry Englander, John Wiley & Sons Inc 4.Structured Computer Organization Andrew S Tanenbaum, Prentice-Hall of India 5. Computer Systems Organization & Architecture – John D Carpinelli, Addison-Wesley

Course Title	Principles of Programming –III Lab				
Course Code	EBT04591				
Semester	**5ᵗʰ Semester**				
Course Credit	**L**	**T**	**P**	**TC**	
	-	**-**	**2**	**1**	
Prerequisites	Programming				
Course Objectives	The student will have ability to: 1. To write programs for solving real world problems using java collection frame work. 2. To write multithreaded programs. 3. To write GUI programs using swing controls in Java. 4. To introduce java compiler and eclipse platform. 5. To impart hands on experience with java programming.				
Course Contents	1. b) Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked. 2. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero. 3. Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number. 4. Write a java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes). 5. Implement the above program with database instead of a text file. 6. Write a java program that takes tab separated data 51-54 (one record per line) from a text file and inserts them into a database 7. A) Create a list and perform the following methods 1) insert() 2) remove() 3) append() 4) len() 5) pop() 6)clear() 8. Create a dictionary and apply the following methods 1) Print the dictionary items 2) access items 3) useget() 4)change values 5) use len() 9. Write a python program to add two numbers. 10. Write a python program to find largest number among three numbers. 11. Write a program to create a menu with the following options 1. TO PERFORM				

	ADDITITON 2. TO PERFORM SUBSTRACTION 3. TO PERFORM MULTIPICATION 4. TO PERFORM DIVISION Accepts users input and perform the operation accordingly. Use functions with arguments. 12. Demonstrate a python code to implement abnormal termination? 13. Write a python program to open and write "hello world" into a file? 14. Demonstrate a python code to print try, except and finally block statements 15. Write a python program to display a particular month of a year using calendar module.
Course Outcomes	1. Able to write programs using abstract classes. 2. Able to write multithreaded programs. 3. Able to write GUI programs using swing controls in Java. 4. Write, test, and debug simple Python programs. 5. Implement Python programs with conditionals and loops. 6. Develop Python programs step-wise by defining functions and calling them. 7. Use Python lists, tuples, dictionaries for representing compound data. 8. Read and write data from/to files in Python.
Text Books	1. Concepts of Programming Languages Robert. W. Sebesta 10/E, Pearson Education. 2. Programming Language Design Concepts, D. A. Watt, Wiley Dreamtech, 2007.
Reference Books	1. Programming Languages, 2nd Edition, A.B. Tucker, R. E. Noonan, TMH. 2. Programming Languages, K. C. Louden, 2nd Edition, Thomson, 2003

Course Title	Unix & Shell Programming Lab				
Course Code	EBT04592				
Semester	**5ᵗʰ Semester**				
Course Credit	**L**	**T**	**P**	**TC**	
	-	**-**	**2**	**1**	
Prerequisites	Unix Command on Ubuntu				
Course Objectives	The student will have ability to: 1. To understand basic UNIX shell programming. 2. To learn the fundamentals of shell scripting/programming 3. To familiarize students with the Unix environment. 4. To familiarize students with basic Unix shell script programming.				
Course Contents	1. Execution of various file/directory handling commands. 2. Simple shell script for basic arithmetic and logical calculations. 3. Shell scripts to check various attributes of files and directories. 4. Shell scripts to perform various operations on given strings. 5. Shell scripts to explore system variables such as PATH, HOME etc. 6. Shell scripts to check and list attributes of processes. 7. Execution of various system administrative commands. 8. Use seed instruction to process /etc/password file. 9. Write a shell script to display list of users currently logged in. 10. Write a shell script to delete all the temporary files. 11. Write a shell script to search an element from an array using binary searching. 12. Write script to print the message "Hello" on the Console. 13. Write script to perform following basic math operation as : i) Take input from keyboard ii) Take input as command line parameter 14. Write script to display current date, time, username and current directory. 15. Write shell script to show various system configurations like: a) Currently				

	logged user and his long name b) Current shell c) Your home directory
Course Outcomes	Upon completion of the subject, students will be able to: 1. The students will be able to apply for basic knowledge about UNIX system. 2. The students will be able to learn the fundamentals of shell scripting/programming 3. The students will be able to familiarize students with the Unix environment. 4. The students will be able to familiarize students with basic Unix shell script programming.
Text Books	1. UNIX and shell Programming, Behrouz A. Forouzan, Richard F, Gilberg, Thomson. **2.** Your UNIX the ultimate guide, Sumitabha Das, TMH. 2nd Edition. References. 3. UNIX for programmers and users, 3rd edition, Graham Glass, King Ables, Pearson education.
Reference Books	4. UNIX programming environment, Kernighan and Pike, PHI, Pearson Education. 5. The Complete Reference UNIX, Rosen, Host, Klee, Farber, Rosinski, Second Edition, TMH. 6.Unix Shell programming, Yashwanth Kanitkar, 1stEdition, BPB Publisher.

Course Title	Soft Skills Lab				
Course Code	EBT04593				
Semester	5th Semester				
Course Credit	L	T	P	TC	
	-	-	2	1	
Prerequisites					
Course Objectives	The student will have ability to: 1. To encourage the all round development of students by focusing on soft skills. 2. To make the engineering students aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice. 3. To develop and nurture the soft skills of the students through individual and group activities. 4. To expose students to right attitudinal and behavioral aspects and to build the same through activities				
Course Contents	Unit I Self-Development Introduction to soft skills, Self-Management: Self-Evaluation, Self-Discipline, Self-Criticism, SelfAwareness, Self-Esteem, Positive Thinking, Perceptions and Attitudes, Values and Belief Systems, Personal success factors, Handling failure, Knowing Yourself, identifying one's strengths and weaknesses, SWOT analysis, Johari's Window, Career Planning & Goal setting, prioritization, Managing self – emotions, ego, pride, stress; Personality development. Unit II Communication Skills Significance of Communication- types, barriers of communication, effective communication, Verbal and non-verbal Communication, Speaking Skills – Importance of speaking effectively, speech process, message, audience, speech. Style, feedback, conversation and oral skills, fluency and self expression, body language phonetics and spoken English, speaking techniques, word stress, correct stress patterns, voice quality, correct tone, types of tones, positive image projection techniques, Public Speaking, Group discussion, Listening Skills: Virtues of Listening, Barriers and filters, Fundamentals of Good Listening, Reading Skills: Comprehension, reading research papers, Communication in a Digital World. Unit III Language and Writing Skills Vocabulary: One - Word Substitutes, Words often				

	Confused - Pairs of Words, Synonyms and Antonyms, Foreign Phrases, Phrasal verbs derived from the dynamic verbs, Business Writing: Note Making, Letter writing, Writing Formal Letters. Technical Report Writing, Memo, Notices/Circulars Agenda and Minutes of a Meeting, E-Mail, Essay writing. Employment Communication: Job Application, Preparation of CV and Resume writing. Presentation skills: Professional Presentation, Nature of Oral Presentation, Planning a Presentation, Preparing the Presentation, Delivering the Presentation Unit IV Leadership and Team Building Introduction, Leader and Leadership, Leadership Traits, Culture and Leadership: Salient Features of Corporate Culture, Leadership Styles, Leadership Trends, Team Building: Team Development Stages, Types of Teams: Cross-functional Team, Problem-solving Team, Inter- personal relations: Types of feelings, steps to deal with complex feelings. Assertiveness and Confidence building. Types of Conflict and resolutions. Emotions, emotional empathy and emotional intelligence.
Course Outcomes	On completion of the course, student will be able to– 1. Effectively communicate through verbal/oral communication and improve the listening skills. 2. Write precise briefs or reports and technical documents. 3. Actively participate in group discussion / meetings / interviews and prepare & deliver presentations. 4. Become more effective individual through goal/target setting, self motivation and practicing creative thinking. 5. Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.
Text Books	1.Gajendra Singh Chauhan, Sangeeta Sharma: Soft Skills – An Integrated Approach to Maximize Personality, WILEY INDIA, ISBN:13:9788126556397.
Reference Books	1.Indrajit Bhattacharya, ―An Approach to Communication Skills‖, Delhi, Dhanpat Rai, 2008. 2. Simon Sweeney, ―English for Business Communication‖, Cambridge University Press, ISBN 13:978-0521754507. 3. Sanjay Kumar and Pushpa Lata, ―Communication Skills‖, Oxford University Press, ISBN 10:9780199457069. 4. Atkinson and Hilgard's, ―Introduction to Psychology‖, 14th Edition, Geoffrey Loftus, ISBN-10:0155050699 © 2003