Shri Rawatpura Sarkar University, Raipur

Examination Scheme & Syllabus

For

Bachelor of Technology

In

Computer Science & Engineering

Semester-IV

(Effective from the session: 2022-23)

SHRI RAWATPURA SARKAR UNIVERSITY, RAIPUR, CHHATTISGARH

FACULTY OF ENGINEERING

Four Years B.TECH Programme

Scheme of Teaching and Examination

B.TECH Fourth Semester

Computer Science Engineering

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	EBT04401	Discrete Structures	4	1	-	5	30	70	100	3 Hrs.
2	EBT04402	Computer Network	3	1	-	4	30	70	100	3 Hrs.
3	EBT04403	Principles of Programming –II	3	1	-	4	30	70	100	3 Hrs.
4	EBT04404	Operating System	3	1	-	4	30	70	100	3 Hrs.
5	EBT04405	Database Management System	3	1	-	4	30	70	100	3 Hrs.
6	EBT04491	Operating System Lab	-	-	2	1	15	35	50	3 Hrs.
7	EBT04492	Principles of Programming Lab	-	-	2	1	15	35	50	3 Hrs.
8	EBT04493	Database Management System Lab	-	-	2	1	15	35	50	3 Hrs.
Total Contact hr. per week: 32			**Total Credit: 24**				**Grand Total Marks:**		**650**	

Course Title	Discrete Structure
Course Code	EBT04402
Semester	**4th Semester**

Course Credit	**L**	**T**	**P**	**TC**	
	4	**1**	**-**	**5**	

Prerequisites	To introduce a number of discrete mathematical structures found to be serving as tools in the development of theoretical computer science.
Course Objectives	1. Use mathematically correct terminology and notation. 2. Construct correct direct and indirect proofs. 3. Use division into cases in a proof. 4. Use counterexamples. 5. Apply logical reasoning to solve a variety of problems.
Course Contents	**UNIT- I** MATHEMATICAL LOGIC & BOOLEAN ALGEBRA:Basic concept of mathematical logic, Statements, Connectives, Conditional and biconditional statements, Logical equivalence, Logical implication & quantifiers, Basic concept of Boolean Algebra. **UNIT-II** SET THEORY, RELATIONS, FUNCTIONS: Basic concept of set theory, Relations, Properties of relation in a set, Equivalence relation, Composition of relations, Partial order & total order relations, Lattices & Hassediagram, introduction to function, Inverse, Identity, Injective, Surjective & Bijective functions, Composition of functions and some special functions. UNIT-III ALGEBRAIC STRUCTURES:Groups, Subgroups, Cosets, Lagrange's theorem, Isomorphism, Automorphism, Homomorphism, Codes & group codes, Rings , Integral Domain

	UNIT-IV GRAPH THEORY: Introduction to graph theory, Walks, Paths & Circuits, Types of graphs, Shortest path problems, Eulerian and Hamiltonian graphs, Basic concept of tree: spanning tree, minimum spanning tree, search tree, rooted binary tree, Cut sets, Network flow, Matrix representation of graphs. **UNIT-V** COMBINATORICS:Permutation and combination, Pigeon-hole principle, Mathematical induction, Principle of Inclusion and Exclusion, Generating function, Recurrence relation.
Course Outcomes	1. Able to apply mathematical logic and Boolean algebra in switching circuits & logic circuits. 2. Familiar with set theory, relation and functions. 3. Familiar with algebraic structures, graph theory and combinatory. 4. Able to solve problems in various fields in computer science, specially networking.
Text Books	1. Elements of discrete mathematics by C.L. Liu, Tata McGraw-Hill, publications. 2. Discrete Mathematical structures, by Bernard Kolman, Robert C. Busby and Sharon Cutler Ross, Pearson Education.
Reference Books	1. Discrete mathematics for computer scientists and mathematicians, by J.L. Mott, A. Kandel and T.P. Baker, Prentice Hall of India. 2. Discrete Mathematical Structures with applications to computer science, by J.P. Tremblay and R. Manohar, Tata McGraw- Hill.

Course Title	Computer Network				
Course Code	EBT04402				
Semester	**4ᵗʰ Semester**				
Course Credit	**L**	**T**	**P**	**T C**	
	3	**1**	**-**	**4**	
Prerequisites	Networking				
Course Objectives	1. To develop an understanding of computer networking basics. 2. To develop an understanding of different components of computer networks, various protocols, modern technologies and their applications.				
Course Contents	UNIT - I INTRODUCTION: Network applications, network hardware, network software, reference models: OSI, TCP/IP, Internet, Connection oriented network - X.25, frame relay. THE PHYSICAL LAYER: Theoretical basis for communication, guided transmission media, wireless transmission, the public switched telephone networks, mobile telephone system. UNIT - II THE DATA LINK LAYER: Design issues, error detection and correction, elementary data link protocols, sliding window protocols, example data link protocols - HDLC, the data link layer in the internet. THE MEDIUM ACCESS SUBLAYER: Channel allocations problem, multiple access protocols, Ethernet, Data Link Layer switching, Wireless LAN, Broadband Wireless, Bluetooth. UNIT - III THE NETWORK LAYER: Network layer design issues, routing algorithms, Congestion control algorithms, Internetworking, the network layer in the internet (IPv4 and IPv6), Quality of Service. UNIT – IV THE TRANSPORT LAYER: Transport service, elements of transport protocol, Simple Transport Protocol, Internet transport layer protocols: UDP and TCP. UNIT - V THE APPLICATION LAYER: Domain name system, electronic mail, World Wide Web: architectural overview, dynamic web document and http. APPLICATION LAYER PROTOCOLS: Simple Network Management Protocol, File Transfer Protocol, Simple Mail Transfer Protocol, Telnet.				
Course Outcomes	1. Recognize the technological trends of Computer Networking. 2. Discuss the key technological components of the Network. 3. Evaluate the challenges in building networks and solutions to those.				

Text Books	1. A. S. Tanenbaum (2003), Computer Networks, 4th edition, Pearson Education/ PHI, New Delhi, India. 2. W. Stallings – "Data and Computer Communications (5th Ed.)" – PHI/ Pearson Education 3. Zheng & Akhtar, Network for Computer Scientists & Engineers, OUP 4. Black, Data & Computer Communication, PHI 5. Miller, data Communication & Network, Vikas
Reference Books	1. Behrouz A. Forouzan (2006), Data communication and Networking, 4th Edition, Mc Graw-Hill, India. 2. Kurose, Ross (2010), Computer Networking: A top down approach, Pearson Education, India. 3. Leon, Garica, Widjaja – "Communication Networks" – TMH 4. Walrand – "Communication Networks" – TMH. 4. Comer – "Internetworking with TCP/IP, vol. 1, 2, 3 (4th Ed.)" – Pearson Education/PHI

Course Title	**Principles of Programming –II**				
Course Code	EBT04403				
Semester	4ᵗʰ Semester				
Course Credit	**L**	**T**	**P**	**T C**	
	3	**1**	**-**	**4**	
Prerequisites	Programming concept of C++ and Java				
Course Objectives	1. To understand and describe syntax and semantics of programming languages. 2. To understand data, data types, and basic statements. 3. To understand call-return architecture and ways of implementing them. 4. To understand object-orientation, concurrency, and event handling in programming Languages. 5. To develop programs in non-procedural programming paradigms.				

Course Contents	**Unit- I** Introduction: Study of principles of programming paradigms like imperative, functional, object-oriented and logic programming. Syntax and semantics of programming languages: Syntax and semi-formal semantic specification using attribute grammar. **Unit- II** Imperative Programming: Location, Reference and expressions, Assignment and Control, Data types, Blocks, Procedures, Modules. Object-oriented programming: Classes, Objects, Abstraction, Encapsulation, Inheritance and software reuse. **Unit- III.** Object- Orientation, Concurrency, and Event Handling: Object – Orientation, Design Issues for OOP Languages, Implementation of Object, Oriented Constructs, Concurrency, Semaphores, Monitors, Message Passing, Threads, Statement Level Concurrency, Exception Handling, Event Handling. **UNIT IV:** JAVA BASICS: Review of Object oriented concepts, History of Java, Java buzzwords, JVM architecture, Data types, Variables, Scope and life time of variables, arrays, operators, control statements, type conversion and casting, simple java program, constructors, methods, Static block, Static Data, Static Method String and String Buffer Classes, Using Java API Document. **Unit- V** INHERITANCE AND POLYMORPHISM: Basic concepts, Types of inheritance, Member access rules, Usage of this and Super key word, Method Overloading, Method overriding, Abstract classes, Dynamic method dispatch, Usage of final keyword. PACKAGES AND INTERFACES: Defining package, Access protection, importing packages, Defining and Implementing interfaces, and Extending interfaces. I / O STREAMS: Concepts of streams, Stream classes-Byte and Character stream, Reading console Input and Writing Console output, File Handling.
Course Outcomes	1. Describe syntax and semantics of programming languages. 2. Explain data, data types, and basic statements of programming languages. 3. Design and implement subprogram constructs, Apply object - oriented, concurrency, and event. 4. Handling programming constructs. 5. Understand and adopt new programming languages.
Text Books	1.Robert W. Sebesta, "Concepts of Programming Languages", Tenth Edition, Addison Wesley,2012. 2. Programming Langugaes, Principles & Paradigms, 2ed, Allen B Tucker, Robert E Noonan,TMH.
Reference Books	1. Programming Languages: Concepts and Constructs by Ravi Sethi, Pearson Education. 2. Programming Language Concepts by Carlo Ghezzi and Mehdi Jazayeri, John Wiley & Sons. 3. Programming Languages: Paradigm and Practices by Doris Appleby and J. J. Vandekopple, McGraw Hill. 4. Concepts of Programming Languages by Robert W. Sebesta, Pearson Education.

Course Title	Operating System				
Course Code	EBT04404				
Semester	4ᵗʰ Semester				
Course Credit	**L**	**T**	**P**	**T C**	
	3	**1**	**-**	**4**	
Prerequisites	Operating System				
Course Objectives	1. Installing and configuring different operating systems 2. Testing, evaluating, and troubleshooting technical issues and glitches in the operating system 3. Manage security of devices and network 4. Backup data from the system 5. Analyse compatibility of operating systems for different computer applications and software 6. Implement system recovery methods				
Course Contents	**UNIT- I** INTRODUCTION: Operation System objective and function, The Evolution of operating Systems, Batch, interactive, time sharing and real time systems, Protection. Operating System Structure, System Components, operating system service, System structure. Distributed Computing, The Key Architecture Trend; Parallel Computation, Input-Output Trends. **UNIT-II** CONCURRENT PROCESSES: Process concept: Introduction, Definitions of "Process", Process States, Process State Transitions, The process Control Block, Operations on Processes, Suspend and Resume, Interrupt Processing. Mutual Exclusion, the Producer / Consumer problem, the critical section problem, Semaphores, Classical problems in concurrency, inter process communication. Asynchronous Concurrent Process: introduction, parallel Processing. **UNIT- III** DEAD LOCKS: System model, Deadlock characterization. Prevention, Avoidance and Detection, Recovery from deadlock, combined approach				

	UNIT-IV MEMORY MANAGEMENT: Base machine, resident Monitor, multiprogramming with fixed partition, Multiprogramming with variable partitions, Paging, Segmentation, paged - segmentation, virtual Memory concepts, **UNIT-V** I/O MANAGEMENT & ISK SCHEDULING:I/O device and the organization of the I/O function, I/O Buffering ,Disk I/O, Operating system Design issues. File system: File Concepts – File organization and Access mechanism, File Directories, File sharing, Implementation issues. Case studies: UNIX system.
Course Outcomes	1. To learn what is operating system and how it makes computers work 2. To know how operating system manages complexity through appropriate abstraction of CPU, memory, files. 3. To get knowledge about different components of operating system like Process Management, Concurrency.
Text Books	1. Operating System concepts by Silberscatz A and Peterson, J.L, PE- LPE. 2. Operating System Design & Implementation by Tanenbaum, A.S., PHI. 3. Operating system concepts Galvin by Silberscatz, John Weiley& Sons
Reference Books	1. Operating System in Depth Design and Programming by Thomas Doeppner, Wiley India 2. Operating System Concept & Design, Milenkovic M, McGraw Hill. 3. Operation System, Stalling William, Maxwell MCMillan International Editions

Course Title	Database Management System
Course Code	EBT04405
Semester	**4ᵗʰ Semester**

Course Credit	**L**	**T**	**P**	**T C**	
	3	**1**	**-**	**4**	

Prerequisites	Database , SQL
Course Objectives	1. To teach the basic database concepts, applications, data models, schemas and instances. 2. To familiarize Entity Relationship model for a database. 3. To demonstrate the use of constraints and relational algebra operations. 4. To describe the basics of SQL and construct queries using SQL. 5. To emphasize the importance of normalization in databases. 6. To demonstrate the basic concepts of transaction processing and concurrency control.
Course Contents	UNIT - I INTRODUCTION: Introduction and applications of DBMS, Purpose of data base, Data, Independence, Database System architecture- Levels, Mappings, Database, users and DBA. DATABASE DESIGN: Database Design Process, ER Diagrams - Entities, Attributes, Relationships, Constraints, keys, extended ER features, Generalization, Specialization, Aggregation, Conceptual design with the E-Rmodel. UNIT - II THE RELATIONAL MODEL: Introduction to the relational model, Integrity constraints over relations, Enforcing integrity constraints, Querying relational data, Logical database design: E-R to relational, Introduction to views, Destroying/altering tables and views. RELATIONAL ALGEBRA AND CALCULUS: Preliminaries, relational algebra operators, relational calculus - Tuple and domain relational calculus, expressive power of algebra and calculus. UNIT - III SQL: Basics of SQL, DDL, DML,DCL, structure – creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, IN operator, Functions - aggregate functions, Built-in functions – numeric, date, string functions, set operations, sub-queries, correlated sub-queries, Use of group by, having, order by, join and its types, Exist, Any, All , view and its types. transaction control commands – Commit, Rollback, Save point, cursors, stored procedures,Triggers.

	UNIT - IV SCHEMA REFINEMENT AND NORMAL FORMS: Introduction to schema refinement, functional dependencies, reasoning about FDs. Normal forms: 1NF, 2NF, 3NF, BCNF, properties of decompositions, normalization, schema refinement in database design, case studies. UNIT – V TRANSACTIONS MANAGEMENT: Transaction concept, transaction state, implementation of atomicity and durability, concurrent executions, Serializability, recoverability, implementation of isolation, transaction definition in SQL, testing for Serializability. CONCURRENCY CONTROL AND RECOVERY SYSTEM: Concurrency control, lock based protocols, time-stamp based protocols, validation based protocols, multiple granularity. Recovery system - failure classification, storage structure, recovery and atomicity, log- based recovery, shadow paging, buffer management, failure with loss of non-volatile storage, advanced recovery techniques, remote backup systems
Course Outcomes	1. Use the basic concepts of Database Systems in Database design 2. Apply SQL queries to interact with Database 3. Design a Database using ER Modelling 4. Apply normalization on database design to eliminate anomalies 5. Analyze database transactions and can control them by applying ACID properties.
Text Books	1. Raghurama Krishnan, Johannes Gehrke , Database Management Systems, 3rd edition, Tata McGraw Hill, New Delhi,India. 2. Elmasri Navate, Fundamentals of Database Systems, Pearson Education,India.
Reference Books	3. Abraham Silberschatz, Henry F. Korth, S. Sudarshan (2005), Database System Concepts, 5th edition, McGraw-Hill, New Delhi,India. 4. Peter Rob, Carlos Coronel (2009), Database Systems Design, Implementation and Management, 7thedition.

Course Title	Operating System Lab
Course Code	EBT04491
Semester	4th Semester

Course Credit	L	T	P	T C	
	3	1	-	4	

Prerequisites	Operating System

Course Objectives	1. To learn Unix commands and shell programming. 2. To implement various CPU Scheduling Algorithms. 3. To implement Process Creation and Inter Process Communication. 4. To implement Deadlock Avoidance and Deadlock Detection Algorithms. 5. To implement Page Replacement Algorithms. 6. To implement File Organization and File Allocation Strategies.

Course Contents	1. Write C programs to implement the various CPU Scheduling Algorithms
	 2. Implementation of Semaphores
	 3. Implementation of Shared memory and IPC
	 4. Bankers Algorithm for Deadlock Avoidance
	 5. Implementation of Deadlock Detection Algorithm
	 6. Write C program to implement Threading & Synchronization Applications
	 7. Implementation of the following Memory Allocation Methods for fixed partition
	     a. First Fit b) Worst Fit c) Best Fit
	 8. Implementation of Paging Technique of Memory Management
	 9. Implementation of the following Page Replacement Algorithms
	     a. FIFO b) LRU c) LFU
	 10. Implementation of the various File Organization Techniques
	 11. Implementation of the following File Allocation Strategies

Course Outcomes	1. Compare the performance of various CPU Scheduling Algorithms 2. Implement Deadlock avoidance and Detection Algorithms 3. Implement Semaphores 4. Create processes and implement IPC 5. Analyze the performance of the various Page Replacement Algorithms 6. Implement File Organization and File Allocation Strategies
Text Books	1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley 2. Advanced programming in the Unix environment, W.R.Stevens, Pearson education.
Reference Books	1. Operating Systems – Internals and Design Principles, William Stallings, Fifth Edition–2005, Pearson Education/PHI 2. Operating System - A Design Approach-Crowley, TMH. 3. Modern Operating Systems, Andrew S Tanenbaum, 2nd edition, Pearson/PHI

Course Title	**Principles of Programming Lab**				
Course Code	**EBT04492**				
Semester	**4ᵗʰ Semester**				
Course Credit	**L**	**T**	**P**	**T C**	
	3	**1**	**-**	**4**	
Prerequisites	C++ , Java				
Course Objectives	1. To learn about data type, arguments in programming. 2. To learn about interface concept. 3. To know about exception handling . 4. To know about c++ and java programming .4.				
Course Contents	1. To write a C++ program to illustrate the static variable functionality using sum of a Fibonacci series as an example. 2. To write a C++ program to demonstrate default arguments with a simple example. 3. To write a C++ program to illustrate the operator overloading concept using Matrix addition as an example. 4. To write a C++ program to illustrate the single inheritance. 5. To write a C++ program to illustrate hybrid inheritance concept using student database creation as an example. 6. To write a C++ program to illustrate virtual function implementation 7. To write a C++ program to illustrate exception handling concept using stack operation as an example. 8. To write a C++ program to illustrate exception handling concept using queue operation as an example. 9. To write a program to demonstrate typecasting in java. 10. To write a program to demonstrate method overloading in java. 11. To write a java program to illustrate the dynamic memory dispatch and method overriding concept with a simple example. 12. To write a java program to demonstrate the package concept using a simple example. 13. To write a java program to illustrate the interfaces concept. 14. To write a java program to multithreading concept. 15. To write a java program to implement java applet concept .				

Course Outcomes	1. Describe syntax and semantics of programming languages. 2. Explain data, data types, and basic statements of programming languages. 3. Design and implement subprogram constructs, Apply object - oriented, concurrency, and event. 4. Handling programming constructs. 5. Understand and adopt new programming languages.
Text Books	1.Robert W. Sebesta, "Concepts of Programming Languages", Tenth Edition, Addison Wesley,2012. 2. Programming Langugaes, Principles & Paradigms, 2ed, Allen B Tucker, Robert E Noonan,TMH.
Reference Books	1. Programming Languages: Concepts and Constructs by Ravi Sethi, Pearson Education. 2. Programming Language Concepts by Carlo Ghezzi and Mehdi Jazayeri, John Wiley & Sons. 3. Programming Languages: Paradigm and Practices by Doris Appleby and J. J. Vandekopple, McGraw Hill. 4. Concepts of Programming Languages by Robert W. Sebesta, Pearson Education.

Course Title	Database Management System Lab			
Course Code	**EBT04493**			
Semester	**4th Semester**			
Course Credit	**L**	**T**	**P**	**TC**
	3	**1**	**-**	**4**
Prerequisites	SQL			
Course Objectives	1.To implement the basic database concepts, applications. 2.To demonstrate the use of constraints in dabtabase. 3.To describe the basics of SQL and construct queries using SQL. 4.To emphasize the importance of normalization in databases.			
Course Contents	1. Design a Database and create required tables. For e.g. Bank, College Database 2. Apply the constraints like Primary Key , Foreign key, NOT NULL to the tables. 3. Write a sql statement for implementing ALTER,UPDATE and DELETE 4. Write the queries to implement the joins 5. Write the query for implementing the following functions: MAX(),MIN(),AVG(),COUNT() 6. Write the query to implement the concept of Intergrity constrains 7. Write the query to create the views 8. Perform the queries for triggers 9. Perform the following operation for demonstrating the insertion , updation and deletion using the referential integrity constraints. 10. Write the query for creating the users and their role			
Course Outcomes	1.Use the basic concepts of Database Systems in Database design . 2.Apply SQL queries to interact with Database. 3.Design a Database using SQL Commands. 4.Apply normalization on database design to eliminate anomalies.			
Text Books	1.Raghurama Krishnan, Johannes Gehrke , Database Management Systems, 3rd edition, Tata McGraw Hill, New Delhi,India. 2.Elmasri Navate, Fundamentals of Database Systems, Pearson Education,India.			
Reference Books	1.Abraham Silberschatz, Henry F. Korth, S. Sudarshan (2005), Database System Concepts, 5th edition, McGraw-Hill, New Delhi,India. 2.Peter Rob, Carlos Coronel (2009), Database Systems Design, Implementation and Management, 7thedition.			