



# Department of Computer Science & Engineering

## MATs University

Aarang, Raipur (C.G.)

### Syllabus Scheme of B. Tech.



#### IV Semester

S. No.	Code	Subject	Periods per Week			Scheme of Marks		Total Credit
			L	T	P	ESE	IM	
1.	BT420	Discrete Structures	3	0	-	70	30	3
2.	BT421	Data Structures	4	0	-	70	30	4
3.	BT422	Operating System	4	0	-	70	30	4
4.	BT423	Object Oriented Programming with C++	4	0	-	70	30	4
5.	BT424	Database Management System	4	0	-	70	30	4
6.	<b>BT425x</b>	<b>Open Elective – I</b>	3	0	-	70	30	3
7.	BT426	Data Structures Lab	-	-	2	30	20	1
8.	BT427	Object Oriented Programming Using C++ Lab	-	-	2	30	20	1
9.	BT428	Database Management System Lab	-	-	2	30	20	1
10.	BT429	GUI (Graphical User Interface) Lab	-	-	2	30	20	1
<b>Total</b>			<b>22</b>	<b>0</b>	<b>8</b>	<b>540</b>	<b>260</b>	<b>26</b>

L – Lecture, T – Tutorial, ESE – End Semester Examination,  
P – Practical, IM – Internal Marks (Include Class Test & Teacher’s Assessments)

#### Open Elective – I

Subject Code	Subject Name
<b>BT4251</b>	Principle of Management
<b>BT4252</b>	Supply Chain Management
<b>BT4253</b>	Engineering Economics & Financial Accounting
<b>BT4254</b>	Knowledge Entrepreneurship
<b>BT4255</b>	Technology Management



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**DISCRETE STRUCTURES (BT420)**

**Course Objective:**

1. To study discrete mathematical structures as tools in the development of theoretical computer science.
2. To study how discrete structures actually helped computer engineers to solve problems occurred in the development of programming languages.

**UNIT – I SET THEORY, RELATIONS & FUNCTIONS**

Basic concept of set theory, Combination of sets, Finite and Infinite sets, Uncountable infinite sets, Principles of inclusion and exclusion, multi-sets. Introduction to Relations and Functions, Properties of Binary Relation, Equivalence relation and partitions, Partial ordering and total ordering, lattices, Chains and anti-chains, Functions & composition of function, pigeonhole Principle, Mathematical induction.

**UNIT – II COMBINATORICS**

Introduction to discrete numeric functions and generating functions, Manipulation of Numeric functions, asymptotic behavior of numeric function, combinatorial problems, Introduction to recurrence relation and recursive algorithm, Linear recurrence relations with constant coefficients, Homogeneous solutions, Particular solutions, Total solution, Solution by method of generating functions.

**UNIT – III MATHEMATICAL LOGIC & BOOLEAN ALGEBRA**

Basic concept of mathematical logic, statements, connectives, conditional & biconditional statements, logical equivalence logical implication & quantifiers. Introduction to Boolean algebra, Lattices and Algebraic systems, Principles of Duality, Relation between Algebraic system and Lattices, Distributive and Complemented lattices, Boolean lattices and Boolean algebra, Uniqueness of finite Boolean algebra's, application of Boolean algebra in switching circuits and logic circuits.

**UNIT – IV ALGEBRAIC STRUCTURES**

Introduction to groups and rings, Subgroups, Generators and Evaluation of powers, Cosets and Lagrange's theorem, Permutation Groups and Burnside's theorem, Codes and Group codes, Isomorphism and Automorphism, Homomorphism and Normal subgroups, Rings, Internal Domains and fields, Ring homomorphism, Polynomial Rings and Cyclic codes.

**UNIT – V GRAPH THEORY**

Introduction to graph theory, Walks, Paths & Circuits, Types of graphs, Eulerian and Hamiltonian graphs, Basic concept of tree, spanning tree, search tree, rooted tree, binary tree, Cut sets, Network flow, Matrix representation of graphs.

**Text Books:**

1. Discrete Mathematical Structure, Dr. H. K. Pathak
2. Discrete Mathematical Structure, Swapan Kumar Sarkar
3. Discrete Mathematical Structure, Tremblay & Manohar

**Reference Books:**

1. Element of Discrete Mathematics, C. L. Liu
2. Discrete Mathematics and its Application, Rosen, TMH
3. Graph Theory, N. Deo

**Course Outcome:**

After completion of the course study, students will be

1. Able to apply mathematical logic and Boolean algebra in switching circuits & logic circuits.
2. Familiar with set theory, relation and functions related to theoretical computer science.
3. Familiar with algebraic structures, graph theory and combinatorics.
4. Able to solve problems in various fields in computer science.



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#### DATA STRUCTURES (BT421)

##### Course Objective:

1. To understand the data organization and basic concepts of data structure.
2. To study the classifications of data structures.
3. To study the memory representation of all types of data structures.
4. To implement the all kinds of data structures.

##### UNIT – I INTRODUCTION TO DATA STRUCTURES

Basic Terminology, Elementary Data Organization, Arrays: Array Definition, Representation and Analysis, Single and Multidimensional Arrays, Address calculation, Application of Arrays, Arrays as Parameters, Sparse Matrices Representation and its transpose algorithm, Recursion: Definition, Recursive process, Recursion in C, Example of Recursion, Tower of Hanoi Problem, Simulating Recursion, Backtracking Recursive algorithms, Principles of Recursion, Tail recursion, Removal of recursion.

##### UNIT – II STACKS AND QUEUES

Stacks: Array Representation and Implementation of Stack, Operations on Stacks (Push & Pop), Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack. Queues: Array representation and implementation of queues, Operations on Queue (Create, Add, Delete, Full and Empty), Circular queues, DEQUES and Priority Queues.

##### UNIT – III LINKED LIST

Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion in Linked Lists, Doubly linked list, Linked List in Array, Polynomial representation and addition, Generalized linked list, Garbage Collection and Compaction, Linked Representation of Stack and Queues.

##### UNIT – IV SEARCHING, SORTING AND HASHING

Searching: Sequential Search, Binary Search, comparison and analysis. Sorting: Insertion Sort, Bubble Sort, Quick Sort, Selection Sort, Merge Sort, Heap Sort, Maxima & Minima Heap, Time Complexity and Memory Requirements, Hashing: Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation.

##### UNIT – V GRAPHS & TREES

Terminology & Representations, Graphs & Multi-graphs, Directed Graphs, Sequential Representations of Graphs, Adjacency Matrices, Path Matrix, Warshall's Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees, Topological Sorting, Trees: Basic terminology, Binary Trees, Binary tree representation, Algebraic Expressions, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees, Traversing Threaded Binary trees, Huffman Algorithm. Binary Search Trees: Binary Search Tree (BST), Insertion and Deletion in BST. File Structures: Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, Indexing and Hashing Comparisons.

##### Text Books:

1. Data Structures using C, A. M. Tenenbaum, Prentice Hall.
2. Data Structures, Seymour Lipschutz, Schaum's Outlines, McGraw – Hill Education India Pvt. Ltd.

##### Reference Books:

1. Fundamentals of Data Structures in C, Horowitz, Sahni, Anderson Freed, University Press.
2. Data Structures and Program Design in C, Robert Kruse, CI Tondo, Pearson Education India.
3. Data Structures and Algorithm Analysis in C, Mak Allen Weiss, Pearson Education India.

##### Course Outcome:

After completion of the course study, students will be able to

1. Have a comprehensive knowledge of the data structures and algorithms.
2. Understand the importance of data and identify the data requirements for an application.
3. Have in depth understanding and practical experience of algorithmic design and implementation.
4. Understand the issues involved in algorithm complexity and performance.



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OPERATING SYSTEM (BT422)



#### Course Objective:

1. To study the fundamental concepts related to operating systems.
2. To study and apply concepts related concurrency control of asynchronous processes, deadlocks, memory management, processor and disk scheduling, parallel processing, and file system organization.

#### UNIT – I INTRODUCTION

Operation System Overview: Objectives, Services and Functions, System Components, Operating System Structure, Evolution of Operating Systems: Batch, Interactive, Multi-Programming, Time Sharing and Real Time Systems, Distributed Computing, Key Architecture Trends, Parallel Computation, Input-Output Trends, Operating system Design issues.

#### UNIT – II PROCESS MANAGEMENT

Process concept: Introduction, Process States, Process State Transitions, Process Control Block, Process Scheduling, Operations on Processes, Interrupt Handling, Inter Process Communication, Process Synchronization: Introduction, Mutual Exclusion, Producer/Consumer Problem, Critical section problem, Semaphores, Classical problems in concurrency, Asynchronous Concurrent Process: Introduction, Parallel Processing, Control Structure for indicating Parallelism, CPU scheduling: Concepts, Performance Criteria, Scheduling Algorithms: FCFS, SJF, Priority, RR, Algorithm evaluation, Multiprocessor Scheduling.

#### UNIT – III DEADLOCKS

System Model, Deadlock Characterization, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlocks, Combined Approach.

#### UNIT – IV MEMORY MANAGEMENT

Base Machine, Resident Monitor, Multiprogramming with Fixed Partition, Multiprogramming with Variable Partitions, Paging, Thrashing, Segmentation, Paged - Segmentation, Segmented Paging, Virtual Memory Concepts: Demand Paging, Performance, Page Replacement Algorithms, Allocation of frames,, Cache memory organization impact on performance.

#### UNIT – V I/O MANAGEMENT & DISK SCHEDULING

I/O Device and the organization of the I/O function, I/O Buffering, Disk I/O, File system: Concepts of File, File organization and Access mechanism, File Directories, File sharing, Implementation issues. Case Studies: UNIX system, A Virtual Machine Operating Systems.

#### Text Books:

1. Operating System concepts, Silberschatz, Galvin, Gagne, Wiley Publication.
2. Operating System Concepts, James L. Peterson, Abraham Silberschatz, Addison Wesley Publication.

#### Reference Books:

1. Operating System Design and Implementation, Andrew S. Tanenbaum, PHI.
2. Operating Systems, H. M. Deitel, Paul J. Deitel, David R. Choffnes.
3. Operating Systems, J. Archer Harris, John Cordani, Schaum's Outline, McGraw Hill Education.
4. Operating Systems: Internals 7 Design Principles, William Stallings, Pearson Education.

#### Course Outcome:

After completion of the course study, students will be able to

1. Analyze the structure of Operating System and basic architectural components involved in Operating System design.
2. Analyze and design the applications to run in an Operating System.
3. Analyze the various device and resource management techniques.
4. Understand the Mutual exclusion, Deadlock detection and agreement protocols.
5. Interpret the mechanisms adopted for file sharing in distributed applications.



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**OBJECT ORIENTED PROGRAMMING WITH C++ (BT423)**

**Course Objective:**

1. To learn the object-oriented programming concepts using C++.
2. To design and implement C++ programs with the concept of OOP.
3. To understand implementation issues related to object-oriented techniques.
4. To learn how to build good quality software using object-oriented programming technique.

**UNIT-I INTRODUCTION TO OOP AND C++**

Concept of Object Oriented Programming, Procedural programming Vs. Object oriented programming (OOP), Features and Benefits of OOPs, Object Oriented Languages, Introduction to C++: C++ Compiler, Basic Structure of C++ Program, Data Types, Keywords, Operators and Expressions, Control Structure, Loops, Arrays, Structures, Functions.

**UNIT-II CLASSES & OBJECT**

Introduction to Class, Class Object Creation, Access of Class Members, Scope of Class and its member, Nested Class, Data hiding & Encapsulation, Friend function, Array within a class, Array of Object as Function Argument, Function Returning Object, Static Member.

**UNIT-III CONSTRUCTORS AND DESTRUCTORS**

Constructor function, Parameterized multiple constructor, Default constructor, Copy constructor, Constant and Class, Data conversion between objects of different Classes, Destructor function, Polymorphism, Function overloading, Operator overloading.

**UNIT- IV INHERITANCE, POINTER & VIRTUAL FUNCTION**

Define derived classes, Single Inheritance, Multilevel Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Pointers to objects, this pointer, Pointers to derived Class, Virtual function, Pure Virtual function, Abstract Classes.

**UNIT-V FILE I/O & TEMPLATES**

Files Streams, Opening & Closing a file, read() & write() functions, Detecting end-of-file, seekp(), seekg(), tellg(), tellp() function, Introduction to Templates & Exception, Creating and Handling Templates and Exception in OOPS, Standard templates Library.

**Text Books:**

1. Object Oriented Programming in C++, Robert Lafore, CourseSams Publishing.
2. Object Oriented Programming with C++, E. Balagurusamy, McGraw Hill Education.

**Reference Books:**

1. The Complete Reference C++, Herbert Schildt, McGraw Hill Education.
2. Let Us C++, Yashavant Kanetkar, BPB Publication.
3. Programming with C++, John R. Hubbard, Schaum's Outlines, McGraw Hill Education.
4. Programming with C++, D. Ravichandran, McGraw Hill Education.

**Course Outcome:**

After completion of the course study, students will be able to

1. Design and develop a C++ program with concept of Object Oriented Programming.
2. Make an application/project using C++.



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**DATABASE MANAGEMENT SYSTEM (BT424)**

**Course Objective:**

1. To study the basic concept of Database Management System.
2. To construct simple and moderately advanced database queries using Structured Query Language (SQL).
3. To study data representation technique and database normalization.
4. To understand database concepts, including the structure and operation of the relational data model.
5. To understand the role of a database management system and its users in an organization.

**UNIT I – INTRODUCTION TO DATA BASE**

File System Vs. Database System, Advantages of DBMS, DBMS Applications, View of Data, Data Abstraction, Schema and Instances, DBMS Architecture and Data Independence, Data Models: Entity- Relationship Model, Relational Data Model, Other Models, Enhanced E-R Modeling, Specialization and Generalization, Database Users and Administrator. Record Storage and Primary File Organizations: Introduction, Secondary Storage Devices, Buffering of Blocks, Structure of Files: Types of Single Level ordered indexes, Multilevel indexes, Dynamics Multilevel indexes using B-trees and B+- Trees.

**UNIT II – RELATIONAL DATA MODEL**

Relational data model: Concept, Constraints and its types, Relational Algebra: Unary and Binary Operations (select, project, rename, union, intersection, minus, join & division etc.), Relational Calculus: Tuple Relational Calculus, Domain Relational Calculus, SQL: DDL, DML, DCL, DQL etc., Defining different constraints on a table, Defining & Dropping integrity constraints in the alter table command, View, Index.

**UNIT III – DATABASE DESIGN**

Functional Dependencies: Informal design guidelines for relation schemes, Functional Dependencies, Inference Rule, Equivalence Set, Minimal Set, Normalization: 1NF, 2NF, 3NF, BCNF, Problem related with normal forms & solutions, Multivalued & Join Dependencies, 4NF & 5NF.

**UNIT IV – QUERY & TRANSACTION PROCESSING**

Query Processing: Query processing stages, Query interpretation, Query execution plan, Table scans, Fill factor, Multiple index access, Methods for join tables scans, Structure of a query optimizer. Transaction Processing: Types of failures, ACID Property, Schedules and Recoverability, Serializability & its Types, Levels of Transaction Consistency, Deadlocks, Nested transaction, Transaction benchmarking.

**UNIT V – CRASH RECOVERY**

Failure classification, Different type of Recovery techniques & their comparative analysis, Deferred update, Immediate update, Shadow paging, Check points, On-line backup during Database updates, Concurrency Control: Different type of concurrency control techniques & their comparative analysis, Locking techniques, Time- stamp ordering, Multi-version techniques, Optimistic techniques, Multiple granularity.

**Text Books:**

1. Database System Concepts, A. Silberschatz, Henry F. Korth & S. Sudarshan, McGraw Hill Education.
2. Fundamentals of Database Systems, Ramez Elmasri, Shamkant B. Navathe, Pearson Education.

**Reference Books:**

1. Introduction to Database Systems, C. J. Date, Addison Wesley Publication Company.
2. Fundamentals of Relational Databases, Ramon A., Pauline K. Cushman, Schaum's Outlines, McGraw Hill.
3. Principles of Database Systems, Jeffrey D. Ullman, Galgotia Publications.

**Course Outcome:**

After completion of the course study, students will be able to

1. Explain relational database theory, RDMBS and relational data model.
2. Implement queries by using SQL.
3. Write relational algebra expressions for queries.
4. Familiar with the basic issues of transaction, its processing and concurrency control.





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**DATA STRUCTURES LAB (BT426)**

- 1 Write a program to perform following operations in one dimensional array:
  - a. Insertion
  - b. Deletion
  - c. Searching (Linear & Binary)
- 2 Write a program to implement push and pop operations in a stack.
- 3 Write a program to convert infix to postfix expression using stack.
- 4 Write a program to perform following operations in a linear queue:
  - a. Addition
  - b. Deletion
  - c. Traversing
- 5 Write a program to perform following operations on circular queue:
  - a. Addition
  - b. Deletion
  - c. Traversing
- 6 Write a program to perform following operations on double ended queue:
  - a. Addition
  - b. Deletion
  - c. Traversing
5. Write a program to perform following operation on single link list
  - a. Creation
  - b. Inversion
  - c. Deletion
- 7 Write a program to perform following operation on doubly linked list:
  - a. Creation
  - b. Insertion
  - c. Deletion
- 8 Write a program to implement polynomial in linked list and perform following:
  - a. Polynomial arithmetic
  - b. Evaluation of polynomial
- 9 Write programs to implement linked stack and linked queue.
- 10 Write programs to perform Insertion, Selection, and Bubble Sort.
- 11 Write a program to perform quick sort.
- 12 Write a program to perform merge sort.
- 13 Write a program to perform heap sort.
- 14 Write a program to create a Binary search tree and perform following operations:
  - a. Insertion
  - b. Deletion
  - c. Traversal.
- 15 Write a program for traversal of graph (B.F.S, D.F.S)

**List of Equipment/ Machine Required**

PCs, Turbo C/C++ compiler

**References:**

1. Data Structures using C, A. M. Tenenbaum, Prentice Hall.
2. Data Structures, Seymour Lipschutz, Schaum's Outlines, McGraw – Hill Education India Pvt. Ltd.
3. Fundamentals of Data Structures in C, Horowitz, Sahni, Anderson Freed, University Press.
4. Data Structures and Program Design in C, Robert Kruse, CI Tondo, Pearson Education India.
5. Data Structures and Algorithm Analysis in C, Mak Allen Weiss, Pearson Education India.



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**OBJECT ORIENTED PROGRAMMING USING C++ LAB (BT427)**

- 1 Write a program to check whether a given number is Prime or not.
- 2 Write a program to read number and to display the largest value between two, three or four numbers by using switch-Case statements.
- 3 Write a program to find sum of first natural numbers :  $sum = 1+2+3+4+\dots+100$  by using
  - a. for loop
  - b. while loop
  - c. do-while loop
- 4 Write a program to find sum of the following series using function:  
 $Sum = x - (x)^3/3! + (x)^5/5! - \dots + (x)^n/n!$
- 5 Write a program to read the elements of two matrices & to perform the matrix multiplication.
- 6 Write a program to swap the contents of two variable by using
  - a. call by value
  - b. Call by reference
- 7 Write a program to perform the following arithmetic operations on complex numbers using structure
  - a. Addition of the two complex numbers
  - b. Subtraction of two complex numbers
  - c. Multiplication of two complex numbers
  - d. Division of two complex numbers
- 8 Write an object oriented program (OOP) using C++ to exchange the private data members of two different functions using friend functions.
- 9 Write an OOP using C++ to count how many times a particular member function of a class is called by:
  - a. A particular object
  - b. Any objects
- 10 Write an OOP using C++ to define a constructor for a "Date" class that initializes the Date objects with initial values. In case initial values are not provided, it should initialize the objects with default values.
- 11 Write an OOP using C++ to overload:
  - a. + Operator
  - b. = operator
- 12 Write a C++ program to demonstrate how ambiguity is avoided using scope resolution operator in the following:
  - a. Single Inheritance
  - b. Multiple Inheritance
- 13 Write a C++ Program to demonstrate function overloading for swapping of two variables of the various data types (integer, floating point number and character type).
- 14 Write a C++ program to access the private data of a class by non-member function through friend function where the friend function is declared:
  - a. in the location of public category
  - b. in the location of private category
  - c. within the scope of a class definition itself
  - d. defined with inline code subtraction
- 15 Write a C++ program to demonstrate how a pure virtual function is defined, declared and invoked from the object of derived class through the pointer of the base class.
- 16 Write a C++ program to open a file and count the number of characters, number of vowels and number of newline characters present in the file.
- 17 Write a program to copy the contents of one text file to another and display both the files using a text Menu.





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- 18 Create a database of 10 students. The database should contain the name, marks of 5 subjects, aggregate marks, aggregate percentage and division according to the following conditions:
- Percentage greater or equal to 60 – First division
  - Percentage between 50 and less than 60 – Second division
  - Percentage between 40 and less than 50 – Third division
  - Percentage below 40 – Improvement required
- Display the above database of every student in a tabulated form. Implement the above program using Structures, Text-Menu and File I/O operations.
- 19 Write an OOP using a class template to read any five parameterized data type such as float and integer, and print the average.
- 20 Write a program for sorting of numbers with Bubble Sort using template function.
- 21 Write a C++ program to read two numbers and find the division of these two numbers using exception handling.
- 22 Write a C++ program to create a function which take a parameter, if the value of parameter is  $> 0$  then throw integer type, if parameter is  $= 0$ , then throw character type, if parameter is  $< 0$  then throws float type exception but for all design use only one catch block.
- 23 Write a C++ program for invoking, for that generate & handle exception.

#### List of Equipment/ Machine Required

PCs, Turbo C++ compiler

#### References:

1. Programming with C++, D. Ravichandran, McGraw Hill Education.
2. Object Oriented Programming with C++, E. Balagurusamy, McGraw Hill Education.
3. Mastering C++, K. R. Venugopal, McGraw Hill Education.
4. The Complete Reference C++, Herbert Schildt, McGraw Hill Education.
5. Object Oriented Programming in C++, Robert Lafore, CourseSams Publishing.
6. Let Us C++, Yashavant Kanetkar, BPB Publication.



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**DATABASE MANAGEMENT SYSTEM LAB (BT428)**

1. Creating and renaming tables.
2. Data constraints (Primary key, Foreign key, Not Null), Data insertion into a table.
3. Viewing data from tables.
4. Filtering table data.
5. Creating table from another table.
6. Inserting data into a table from another table.
7. Delete, alter, and update operations.
8. Grouping data, aggregate functions
9. Oracle functions (mathematical, character functions)
10. Sub-queries.
11. Set operations.
12. Joins.
13. PL/SQL (Anonymous block, control structure)
14. PL/SQL (Procedures)
15. Triggers
16. Cursors

**Note:** Student can consider the schema of student relation or employee relation for implementing above commands.

**References:**

1. SQL & PL/SQL, Ivan Bayross, SPD.
2. Database Design Fundamentals, Rische, PHI.
3. Principles of Database Systems”, 2nd Edn., Ullman, J.O, Galgotia Publications.
4. Introduction to Database Systems, C.J.Date, Pearson Education.
5. Fundamentals of Database Systems, Elmasri & Navathe, Pearson Education.



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**GUI (GRAPHICAL USER INTERFACE) LAB (BT429)**

1. Gambas/ .NET/ Other Integrated Development Environment (IDE): An introduction, New Project Window, Property Window, Project Explorer Window, Watch Window etc.  
Design an identity card containing information regarding students such as Name, Roll No., Address, Class/ Semester, Date of Birth, Blood Group, Phone No., etc. Add an Exit Button.
2. Develop an application to calculate Interest. It should accept rate of interest, period for calculation of interest (years), amount on which interest is to be calculated (Rs.). After clicking on compute, investment amount (Principal + Interest) should be displayed in separate text box. Add Exit button and proper text box controls and labels to be used. Provide two options simple interest, compound interest. Provide Picture and Radio Button control.
3. Design a Simple Calculator to implement addition, subtraction, multiplication, division, and remainder operations on two given numbers (include validation of input & proper message).
4. Create a form using check box & option box to give effect for fonts such as bold, italic, underline, strike through respectively for the text entered in the Rich Text Box (add status bar control).
5. Create a form to access drive list, directory list, and files within a directory of the computer you are using (use tree structure, menus & toolbars).
6. Design a form for demonstration of print method (Error code, Error message display). Use print control box. Log the status of each message in a log file.
7. Demonstrate use of Date Environment; add tables and queries, place fields on form, report etc. Generate single table report & two table grouped report outputs.
8. Design a program to display regional languages of different states in India. Take many names of states of India in one list box control and other text box control should display their languages e. g. Maharashtra – Marathi etc.
9. CASE STUDY (Design and develop one of the following three case studies):
  - a. Create a Scientific Calculator (add minimum 15 functions).
  - b. Develop a program for Online Examination system, which includes database and recordkeeping facility.
  - c. Develop a program for Payroll System, which can handle database as well as can print the pay slips of employees. In this system provide a Login Window, which will accept the User Name and Password. After verifying the user information, the user should get the access to Payroll System.
10. Create a Simple Notepad application, which contains Menus, Rich Text Box, Common Dialog box, formatted text using Toolbar, and Replace text, Windows (Tile / Cascade), Status bar and scroll bar.
11. Modify the practical No. 7 to add following buttons: FIND, ADD, DELETE, UPDATE, and CANCEL. Give proper code to perform the activity described by these buttons.
12. Display the Table Data using Data Control/ADODC. Add Find, Delete, Update, and Cancel Buttons on the form.
13. Display the data from two different tables having common keys using Visual data manager. Use Flex Grid control to display data.
14. Use Active –X control in the form which is created in previous practical.

**List of Equipments / Machine/ Software Required:**

Dual Core of Core –I3 Computing System.  
Gambas/Visual Studio  
Database (PostgreSQL/ MySQL/others ...)

**Reference:**

1. A Beginners Guide to Gambas – John W Rittinghouse



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#### PRINCIPLE OF MANAGEMENT (BT4251)

##### Course Objective:

1. To study strategic management in business operations.
2. To study management, quality management, marketing management, and project management.
3. Identify relevant challenges and application area of human resource management.

##### UNIT – I DEFINITION AND NATURE OF MANAGEMENT

Concept of Management, Management as Process, Management as Group, Management as Discipline, Nature and Characteristics of Management, Importance of Management, Management and Administration, Functions of Manager in the Information Age: Information Age, Roles of Manager, Science Theory and Practice of Management: Henry Fayol's Principles of Management, Managerial objectives and Role, Social Responsibilities of Business.

##### UNIT – II PLANNING AND DECISION MAKING

Concept and Nature of Planning, Significance of Planning, Steps in Planning, Organizing: Process and Significance of Organizing, Staffing: Systems Approach to Staffing, Directing: Concept and Nature of Direction, Controlling: Concept and Nature of Control, Process of Controlling.

##### UNIT – III MOTIVATION

Concept and Nature of Motivation, Need and Significance of Motivation, Theories of Motivation (Maslow's, Herzberg), Leadership: Definition and Nature of Leadership, Types of Leaders, Qualities of A Good Leader, Styles of Leadership, Group and Team Working: Concept and Nature of Group, Stages of Team Development.

##### UNIT – IV MARKETING MANAGEMENT

Marketing Environment, Marketing and Selling, Marketing Mix, Advertising: Role and Functions Of Advertising, Sales Promotion: Merits, Demerits, Techniques, Financial Management: Introduction to Book Keeping and Financial Statements, Break Even Analysis.

##### UNIT – V PRODUCTIVITY AND TQM

Production Planning and Control, Emerging Trends in Management: Challenge of Globalization, WTO, Outsourcing: Nature and Scope of Outsourcing, Business Process Outsourcing, IT in Management.

##### Text Books:

1. Principles of Management, Ankur Chhabra, Sun India's publications
2. Principles of Management, Govindrajana M, & Natrajan, S, Prentice Hall of India, N. Delhi, 2005
3. Organizational Behavior, Luthans Fred TMH, New Delhi

##### Reference Books:

1. Principles of Management and administration, Koontz and O'Donnell, Prentice Hall of India.
2. The Practice of Management, Peter F Drucker, Allied Publications.
3. Fundamental of Management, Robbins, S. P. 3rd edition, PHI, N. Delhi, 2005
4. Management Concepts and Strategies, Chandan J. S, Vikas Publication, N. Delhi, 2006
5. An Introduction to accountancy, S.N. Maheshwari, Vikas Publication, N Delhi.

##### Course Outcome:

After completion of the course study, students will be able to

1. Discuss and communicate the management evolution and how it will affect future managers.
2. Perform different kind of managerial tasks like planning, organizing, leading, and controlling.
3. Explain how organizations adapt to an uncertain environment and identify the techniques that managers use to influence and control the internal environment.



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**SUPPLY CHAIN MANAGEMENT (BT4252)**

**Course Objective:**

1. To have knowledge of supply chain management.
2. To learn the applicability of supply chain management in any business/organization.

**UNIT – I INTRODUCTION**

Supply Chain Management (SCM), Importance of Supply Chain Management, Supply Chain Management Today and Tomorrow, The Supply Chain Management Pipeline, Objectives of the Supply Chain Management, Supply Chain Principles/ Methodology and Solutions: Supply Chain Principles, Methodology of a Supply Chain Management project-solutions, Expected results/ benefits, Opportunity areas (examples), Characteristics of Firms/ Organizations and Service Providers.

**UNIT – II SUPPLY CHAIN DRIVERS AND METRICS**

Drivers of Supply Chain Performance, Framework for Structuring Drivers, Facilities, Inventory, Transportation, Information, Sourcing, Pricing, Obstacles to Achieving Fit.

**UNIT – III APPLICATIONS**

Where the technique has been applied, how can be SCM applied to an organization? Types of firms/ Organizations, where SCM can be applied, Duration and Implementation cost of Supply Chain Management, Conditions for implementation, European Organizations supporting the implementation of the method.

**UNIT – IV IMPLEMENTATION PROCEDURE**

Steps-actions/ phases: Implementing a competitive approach to Warehousing and Distribution Partial techniques and tools included in each step, related software.

**UNIT – V INFORMATION TECHNOLOGY IN A SUPPLY CHAIN**

The Role of IT in a Supply Chain, The Supply Chain IT Framework, Customer Relationship Management, Internal Supply Chain Management, Supplier Relationship Management, The Transaction Management Foundation, The Future of IT in the Supply Chain, Risk Management in IT, Supply Chain IT in Practice , Summary of Learning Objectives.

**Text Book:**

1. Supply Chain Management: Strategy, Planning, and Operation, Sunil Chopra and Peter Meindel, Prentice Hall of India.

**Reference Books:**

1. Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies, Second Edition, David Simchi-Levi, Philip Kaminsky, and Edith Simchi-Levi, McGraw-Hill/Irwin, New York, 2003.
2. Introduction to Supply Chain Management, Robert Handfield & Ernest Nichols, Prentice hall.

**Course Outcome:**

After completion of the course study, students will be able to

1. Know how Supply chain management is essential to company success and customer satisfaction.
2. Apply SCM knowledge and capabilities to support medical missions, conduct disaster relief operations, and handle other types of emergencies.



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**ENGINEERING ECONOMICS AND FINANCIAL ACCOUNTING (BT4253)**

**Course Objective:**

1. To introduce the theory of engineering economics, demand and supply analysis.
2. To understand the project financial procedures
3. To study the concepts of financial accounting.

**UNIT – I INTRODUCTION**

Managerial Economics, Relationship With Other Disciplines, Firms: Types, Objective And Goals, Managerial Decisions And Decision Analysis.

**UNIT – II DEMAND AND SUPPLY ANALYSIS**

Demand, Types of Demand, Determinants of Demand, Demand Function, Demand Elasticity, Demand Forecasting, Supply: Determinants of Supply, Supply Function, Supply Elasticity.

**UNIT – III PRODUCTION FUNCTION AND COST ANALYSIS**

Production Function, Returns of Scale, Production Optimization, Least Cost Output, Isoquants, Managerial uses of Production Function. Cost Concepts: Cost Function, Types of Cost, Determinants of Cost, Short Run and Long Run Cost Curves, Cost Output Decision, Estimation of Cost.

**UNIT –IV PRICING**

Determinants of Price, Pricing under Different Objectives and different Market Structures, Price Discrimination, Pricing Methods in Practice, Role of Government in Pricing Control.

**UNIT – V FINANCIAL ACCOUNTING (ELEMENTARY TREATMENT):**

Balance Sheet & related concepts, profit & loss statements and related concepts, Financial Ratio Analysis, Cash Flow Analysis, Funds Flow Analysis, Comparative Financial Statements, Analysis & Interpretation of Financial Statements. Investments, Risks And Return Evaluation Of Investment Decision, Average Rate Of Return, Payback Period, Net Present Value, Internal Rate Of Return.

**Text Books:**

1. Managerial Economics; Applications, Strategy and Tactics, McGuigan, Moyer and Harris, Thomson South Western, 10th Edition, 2005.
2. Fundamentals of Financial Management, Prasanna Chandra, Tata Mcgraw Hill Publishing Ltd., 4th edition, 2005.

**Reference Books:**

1. Economics, Samuelson Paul A. and Nordhaus W.D., Tata Mcgraw Hill Publishing Company Limited, New Delhi, 2004.
2. Basic Financial Accounting for Management, Paresh Shah, Oxford University Press, New Delhi, 2007.
3. Managerial Economics in a global economy, Salvatore Dominick, Thomson South Western, 4th Edition, 2001.

**Course Outcome:**

After completion of the course study, students will be able to

1. Explain theory of engineering economics, demand and supply concept and application area of it.
2. Analyze the project in terms of financial procedures and accounting.





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**KNOWLEDGE ENTREPRENEURSHIP (BT4254)**

**Course Objective:**

1. To study about entrepreneurship.
2. To learn how to start a business/venture with attractive business opportunities.
3. To learn how to create functional plans, from where to get finance for business setup.
4. To learn business management.

**UNIT – I ENTREPRENEURSHIP**

Concept, Knowledge and Skills Requirement, Characteristic of successful Entrepreneurs, Role of Entrepreneurship in Economic Development, Entrepreneurship Process, Factors Impacting Emergence of Entrepreneurship, Managerial Vs. Entrepreneurial Approach And Emergence Of Entrepreneurship.

**UNIT – II STARTING THE VENTURE**

Generating Business Idea: Sources of new ideas, methods of generating ideas, creative problem solving, Opportunity Recognition, Environmental Scanning, Competitor and Industry Analysis, Feasibility Study-Market Feasibility, Technical/Operational Feasibility, Financial Feasibility, Drawing Business Plan, Preparing Project Report, Presenting Business Plan to Investors.

**UNIT – III FUNCTIONAL PLANS**

Marketing Plan , marketing research for the new venture, steps in preparing marketing plan, contingency planning, organizational plan, form of ownership, designing organization structure, Job Design, Manpower Planning, Financial Plan, Cash Budget, Working Capital, Performa Income Statement Performa Cash Flow, Perform Balance Sheet, Break Even Analysis.

**UNIT – IV SOURCES OF FINANCE**

Debt or Equity Financing, Commercial Banks, Venture Capital, Financial Institutions Supporting Entrepreneurs, Legal Issues , Intellectual Property Rights: Patents, Trade Marks, Copy Rights, Trade Secrets, Licensing, Franchising

**UNIT – V BUSINESS MANAGEMENT FOR ENTREPRENEURS**

The Core Group and the Employees, The Board : The Board in Practice ,The Board Work in the New Business, The Main Tasks of the Board ,The Useful Effect of the Board ,The Director's Fee .

**Text Book:**

1. Knowledge Based Entrepreneurship, John Heeboll, Copenhagen University SCIENCE and KU-HUM/DTU Summer School 2007.

**Reference Book:**

1. Knowledge-Driven Entrepreneurship: The Key to Social and Economic Transformation, Thomas Andersson, Piero Formica, Martin G. Curley, Springer Science & Business Media, 01-Dec-2009.

**Course Outcome:**

After completion of the course study, students will be able to

1. Have idea of entrepreneurship.
2. Start a venture with attractive business opportunities.
3. Create functional plans and execute these plans with proper financial support from investors.
4. Manage business efficiently.



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**TECHNOLOGY MANAGEMENT (BT4255)**

**Course Objective:**

1. To study about technology market and associated industry.
2. To learn the development of a new product with proper management.
3. To study about innovation in the field of technology.

**UNIT – I THE EVOLUTION OF TECHNOLOGY, MARKETS, AND INDUSTRY**

Technology and Industry Evolution, Evolution of Markets: Innovation Adoption, Diffusion, Market Growth, New Product Entry, and Competitor Responses.

**UNIT – II THE DEVELOPMENT AND INTRODUCTION OF NEW PRODUCTS**

Understanding Customer Needs, Product Development as a Problem Solving Process, Managing the ‘Unmanageable’ of Sustained Product Innovation.

**UNIT – III THE MANAGEMENT AND ORGANIZATION OF INNOVATION**

Rival Interpretations of Balancing Exploration and Exploitation: Simultaneous or Sequential? , R&D Project Selection and Portfolio Management: A review of the past, a description of the present, and a sketch of the future, managing the innovative performance of technical professionals.

**UNIT – IV TECHNOLOGY STRATEGY**

The Economics and Strategy of Standards and Standardization, Intellectual Property and Innovation, Orchestrating Appropriability: Towards an endogenous view of capturing value from innovation investments, Individual Collaborations, Strategic Alliances and Innovation: Insights from the Biotechnology Industry.

**UNIT – V WHO INNOVATES**

Technology Based Entrepreneurship, knowledge spillover, Entrepreneurship and Innovation in large and small firms, Financing of Innovation, the contribution of public entities to Innovation and Technological Changes.

**Text Book:**

1. Handbook of Technology and Innovation Management, Scott Shane, Case Western Reserve University, A John Wiley and Sons, Ltd., Publication.

**Reference Book:**

1. Forecasting and Management of Technology, Alan L. Porter, Scott W. Cunningham, Jerry Banks, A. Thomas Roper, Thomas W. Mason, Frederick A. Rossini , John Wiley & Sons.

**Course Outcome:**

After completion of the course study, students will be able to

1. Explain the concept of technology management with its application areas.
2. Develop a new product with the proper management.
3. Apply innovative ideas in technology invention.