KOLHAN UNIVERSITY
Chaibasa, Jharkhand, India

Syllabus for
Four Year Undergraduate Programme (FYUGP)
of

Bachelor of Science in Information Technology (B.Sc. IT)

Semester - 3

With Effect From
Academic Year 2022 - 2023

As Per Revised Curriculum and Credit Framework for the FYUGP under the provisions of NEP - 2020

B.Sc.I.T.CourseStructureF.Y.U..P.(Semester -III)

Sem	Paper Code	PaperTitle	L-T-P	Credits	Contact Hours
III	AEC-3	Language and Communication Skills:MIL-2,Modern Indian Lang. TRL)		2	
	SEC-3	SkillEnhancementCourse-3		3	
	MDC-3	Multi-disciplinaryCourse-3		3	
	MN-1B (Theory)	Logical Organization of Computer	4-0-0	4	60
	MJ-4(Theory)	Database Management System	3-0-0	3	45
	MJ-5(Theory)	Object Oriented Programming through C++	3-0-0	3	45
	MJ(Practical-3)	DBMS and C++ Lab	0-0-2	2	60
		TotalCredits		20	

MN-1B:Logical Organization of Computer		
4 Credits	**60 Class Hours**	**Semester III.**

OBJECTIVES:

Describe performance evaluation of computers, computer architecture and organization, computer arithmetic, Memory and CPU design.

Course Outcomes:
After the completion of this course, students will be able to:
- Understand the Truth Table.
- Identify the number of variables and their simplification importance.
- Understand different circuits for the implementation of Boolean equations.
- Describe performance evaluation of computers, computer architecture and organization, computer arithmetic, Memory and CPU design.

Detailed Syllabus:

Unit-1	**Data Representation**: **(8 Classes)** Data Types, Number System, Complements, Subtraction of Unsigned Numbers, Fixed-Point Representation, Floating-Point Representation, Other Binary Codes, Other Decimal Codes, Error Detection Code.
Unit-2	**Digital Logic Circuits**: **(10 Classes)** Digital Computers, Logic Gates, Boolean algebra, Complement of a Function, Map Simplification, Product-of-sum simplification, Combinational Circuits, Half Adder, Full Adder, Flip-Flops.
Unit-3	**Digital Components**: **(12 Classes)** Integrated Circuits, Decoders, Encoders, Multiplexers, Registers, Register with parallel load, Shift Registers, Bidirectional Shift register with parallel load, Binary Counters, Binary counter with parallel load
Unit-4	**Central Processing Unit**: **(15 Classes)** Introduction, General Register Organization, Stack Organization, Register Stack, Memory Stack, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Program Interrupt, Types of Interrupts, Reduced Instruction Set Computer (RISC).
Unit-5	**Memory Organization:** **(15 Classes)** Memory Hierarchy, Main Memory, RAM and ROM Chips, Memory Address Map, Memory Connection to CPU, Auxiliary Memory, Magnetic Disks and Tape, Associative Memory. Hardware Organization, Read/Write Operation, Cache Memory, Associative Mapping, Direct Mapping, Set-Associative Mapping, Virtual Memory, Address Space and Memory Space, Address Mapping Using Pages, Associative Memory Page Table, Page Replacement, Memory Management Hardware.

Text Books:
- Mano M., "Computer System Architecture", Prentice Hall of India, New Delhi, 1995.
- Ram. B., "Computer Fundamentals: Architecture and Organization", 3rd Edition, New Age International Publication, New Delhi, 2000

MJ–4 (Th): Data Base Management System		
3 Credit	45 Class Hours	Semester III.

Objective:
- Provide an introduction to the management of database systems.
- Understand the fundamentals of relational systems including data models, database architectures, and database manipulations**.**
- To understand how to create a database. To know about the manipulate a database using SQL

Course Outcomes: At the end of the course, students will be able to:
- Design a database for a given set of requirements.
- Use SQL.
- Apply normalization techniques on given database. Improve the database design by normalization.

Detailed Syllabus:

Unit 1 5 classes	**Databases and Database Users**: Introduction, An example, Characteristics of the Database Approach, Advantages of Using DBMS Approach, A Brief History of Database Applications, Components of Database. **Database System Concepts and Architecture**: Data Models, Schemas, and Instances, Three-schema Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Centralized and Client-Server Architectures.
Unit 2 8 classes	**Entity-Relationship(ER) Model** Entity Types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types, Refining the ER Design for the Sample Database, ER Diagrams, Naming Conventions and Design Issues
Unit 3 10 classes	**Relational Model**: Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations, Transactions and Dealing with Constraint Violations, Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from SET Theory, Binary Relational Operations: JOIN and DIVISION **Relational-Database Design:** Pitfalls in Relational-Database Design, Functional Dependencies, Decomposition, Desirable Properties of Decomposition, First Normal Form, Second Normal Form, Third normal Form, Boyce-Codd Normal Form, Fourth Normal Form.
Unit 4 12 classes	**Structured Query Language (SQL)**: Introduction, SQL Environment, Classification of SQL Statements, Data Types, Operators, Integrity Constraints, Data Definition–Creating a Database, Creating a Table, Changing a Table Definition, Removing a Table, Granting and Revoking Privileges to Users. **Data Manipulation**: Inserting, Updating & Deleting Data from database, Simple Queries, More Complex SQL Queries, Aggregate Functions, Order by Clause, Group by Clause, Having Clause, Joins, Sub Queries.
Unit 5 10 classes	**Transactions and Concurrency Control:** Transaction Concept, Transaction State, Desirable Properties of Transactions, Concurrent Executions, Serializability, Recoverability, Lock-Based Protocols, Timestamp-Based Protocols and Deadlock Handling.

Text Books:
1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, *"Database System Concepts"*, 7th Edition, Tata McGraw Hill, 2019
2. Elmasri and Navathe, "*Fundamentals of Database Systems"*, 7th Edition, Addison -Wesley, 2016

MJ–5(Th): Object Oriented Programming through C++		
3Credit	**45Class Hours**	**Semester-III.**

Objectives:
- To learn basic concepts of OOPS.
- Creating C++ programs.
- Understand expressions and control structures.

Course Outcomes:

After the completion of this course, students will be able to:
- Understand properties of OOPS.
- Learn the use of constructor and destructor.
- Understand file management.

Detailed Syllabus:

Unit 1 10 classes	**Introduction to Object Oriented Programming:** Basic concept of OOP, Comparison of Procedural Programming and OOP, Benefits of OOP, C++ compilation, Abstraction, Encapsulation, Inheritance, Polymorphism, Difference between C and C++.Tokens , Keywords, C++ identifiers; Variables and Constants: Integer, character and symbolic constants; Dynamic initialization of variables, Reference variables, Basic data types in C++ ,Operators, Types of operators in C++, Precedence and associativity of operators, Manipulators.
Unit 2 5classes	**Decision and Control Structures** if statement, if-else statement, switch statement, Loop: while, do-while, for; Jump statements: break, continue, go to.
Unit 3 10classes	**Introduction to Classes and Objects** Classes in C++, class declaration, declaring objects, Defining Member functions, Inline member function, Array of objects, Objects as function argument, Static data member and member function, Friend function and friend class. Constructors and Destructors Default constructor, Parameterized constructor, Copy constructor and its use, Destructors, Constraints on constructors and destructors, Dynamic initialization of objects.
Unit 4 10classes	**Operator Overloading:** Arguments and return value; overloading unary and binary operators: arithmetic operators, manipulation of strings using operators; Type conversions. Virtual Functions and Polymorphism, Categorization of polymorphism techniques: Compile time polymorphism, Run time polymorphism.
Unit 5 10classes	**File Handling:** File classes, Opening and Closing a file, File modes, Manipulation of file pointers, Functions for I/O operations. Arrays, pointers, structures, unions.

Text Books:
- E.Balagurusamy: Object oriented programming with C++
- K.R.Venugopal: Mastering C++
- Bjarne Stroustrup: The C++ programming language.

MJ–3(Pr): PRACTICAL For MJ-4 & MJ-5		
2Credit	**30Classes (60 Hours)**	**Semester III**

List of Programs as Assignments for MJ-4:

1. Create a table **Employee** with the following fields:
   (Employee_Id, First_Name, Last_Name, Hire_Date, Job_Id, Salary, Mgr_Id, Department_Id)
   Use appropriate data type and perform following task-
   - Add a new field 'Address Char(10)'.
   - Modify the size of Address column to 20.
   - Insert any 5 records into the table.
   - Display the structure of Employee table.
   - List out details of all employees.
   - Remove the field 'Address' from the table.
   - Change the name of the table from Employee to KU_Emp

2. Create an Emp table with the following fields:
   (EmpNo, EmpName, Job, Basic, DA, HRA, PF, GrossPay, NetPay)
   (Calculate DA as 30% of Basic and HRA as 40% of Basic and PF as 12.5% of Basic)

   - Insert Five Records in the following fields (EmpNo, EmpName, Job, Basic)
   - Calculate DA, HRA, PF, GrossPay (Basic+DA+HRA) and NetPay (GrossPay-PF) of all employees.
   - Display all records.
   - If NetPay is less than <Rs. 10,000 add Rs. 1200 as special allowances.
   - Delete all 'Clerks' having Basic 5000 or less.

3. Create a table named Library with appropriate data type of following structure:
   (Book_id, Title, Author, Subject, Publisher, Quantity, Price, Student_id)
   Apply following constraints on the field

   - Book_id must be Primary Key
   - Title must be Unique
   - Quantity should be more than 100
   - Price should be between Rs. 10 and Rs. 5000

   ❖ View all the constraints from the data dictionary
   ❖ Add Foreign Key constraints to Student_id column which references to Student(Student_id).
     [Create Student(Roll, Name, Book_id(PK)) before adding the Foreign Key constraints]
   ❖ Describe the structure of the table.
   ❖ Insert records to verify the constraints.

4. Create Teacher table with the following fields(Name, DeptNo, Date_of_joining, DeptName, Location, Salary)

   - Insert five records
   - Give Increment of 25% salary for Mathematics Department .
   - Perform Rollback command
   - Give Increment of 15% salary for Commerce Department
   - Perform commit command

5. A company wishes to maintain a database to automate its operations. Company is divided into certain departments and each department consists of employees. The following two tables describes the automation schemas: Dept (deptno, dname, loc) Emp (empno, ename, job, mgr, hiredate, sal, comm, deptno)

   - Create above tables with appropriate data types
   - Insert details of three departments and details of 5 employees.
   - List the employee name and salary, whose experience is greater than 10 years.
   - Display unique jobs from the table.
   - Display employees of department no. 20 and 30 who have salary between 20000 and 30000.

6. Consider the table Dept (deptno, dname, loc) Emp (empno, ename, job, mgr, hiredate, sal, comm, deptno) created earlier, write following query:

   - Display the manager who is having maximum number of employees working under him?
   - List the names of employees, who take highest salary in their departments.
   - Create a view Emp_Dept , which contains Employee name, job, salary and department name.

List of Programs as Assignments for MJ-5:

   - Write a C++ Program to display Names, Roll No., and grades of 3 students who have appeared in the examination. Declare the class of name, Roll No. and grade. Create an array of class objects. Read and display the contents of the array.
   - Write a C++ program to declare Struct. Initialize and display contents of member variables.
   - Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.
   - Given that an EMPLOYEE class contains following members: data members: Employee number, Employee name, Basic, DA, IT, Net Salary and print data members.
   - Write a C++ program to read the data of N employee and compute Net salary of each employee (DA=52% of Basic and Income Tax (IT) =30% of the gross salary).
   - Write a C++ to illustrate the concepts of console I/O operations.
   - Write a C++ program to use scope resolution operator. Display the various values of the same variables declared at different scope levels.
   - Write a C++ program to allocate memory using new operator.
   - Write a C++ program to create multilevel inheritance. (Hint: Classes A1, A2, A.
   - Write a C++ program to use pointer for both base and derived classes and call the member function. Use Virtual keyword.