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Problem solving using C

F.Y.B.Sc .(Computer Science) 2023-24 (CBCS – Autonomy 23 Pattern)

Course/ Paper Title	**Problem solving using C**
Course Code	**23SBCS11MM**
Semester	**I**
No. of Credits	**2**
Course Type	**Major (MJ)**

Course Objectives	
1.	To introduce the foundations of computing, programming and problem- solving using computers.
2.	To develop the ability to analyze a problem and devise an algorithm to solve it.
3.	To understand structured programming approaches.
4.	To develop the basic concepts and terminology of programming in general.
5.	To implement algorithms in the 'C' language.
6.	To test, debug and execute programs.

Course Outcome	
1.	Explore algorithmic approaches to problem solving.
2.	Develop modular programs using control structures and arrays in 'C'.

Syllabus		
Unit I	**Problem Solving Aspects**	**06 hours**
	1. Introduction to problem solving using computers. 2. Problem solving steps. 3. Algorithms-definition, characteristics, examples, advantages, limitations. 4. Flowcharts - definition, notations, examples, advantages and limitations, Comparison with algorithms. 5. Compilation process(compilers, interpreters),linking and loading, syntax and semantic errors, testing a program	
Unit II	**'C' Fundamentals**	**07 hours**
	1. History of 'C' Language 2. Application areas. 3. Structure of a 'C' program. 4. 'C' Program development life cycle. 5. Function as building blocks. 6. 'C' tokens 7. Character set, Keywords , Identifiers 8. Variables, Constants (character, integer,float, string, escape sequences, enumeration constant). 9. Data Types (Built-in and user defined data types). 10. Operators, Expressions, types of operators, Operatorprecedence and Order of evaluation. 11. Character input and output. 12. String input and output. 13. Formatted input and output. 14. Introduction to pre-processor	
Unit III	**Control Structures** 1. Decision making structures:-if, if-else, switch and conditionaloperator. 2. Loop control structures:-while, do while, for. 3. Use of break and continue. 4. Nested structures. 5. Unconditional branching (goto statement).	**05 hours**

Unit IV	Functions	06 hours
	1. Concept of function, Advantages of Modular design. 2. Standard library functions. 3. User defined functions:-declaration, definition, function call, parameter passing (by value), returnstatement. 4. Recursive functions. Scope of variables and Storage classes.	
Unit V	**Arrays**	**06 hours**
	1. Concept of array. 2. Types of Arrays – One, Two and Multi-dimensional 3. Array. 4. Array Operations - declaration, initialization,accessing array elements. 5. Memory representation of two-dimensional array(row major and column major) 6. Passing arrays to function. Array applications	

Suggested Readings	
1.	How to Solve it by Computer, R.G. Dromey, Pearson Education.
2.	Problem Solving and Programming Concept, Maureen Sprankle,7th Edition,Pearson Publication.
3.	Problem Solving and Programming Concept, Maureen Sprankle,7th Edition,Pearson Publication.
4.	A Structured Programming Approach Using C, Behrouz A. Forouzan, Richard F. Gilberg, Cengage Learning India
5.	The 'C' programming language, Brian Kernighan, Dennis Ritchie,PHI
6.	Programming in C ,A Practical Approach, Ajay Mittal ,Pearson
7.	Programming with C, B. Gottfried, 3rd edition, Schaum's outline Series, Tata McGraw Hill.
8.	Programming in ANSI C, E. Balagurusamy, 7thEdition, McGrawHill.

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Database Management System

F.Y.B.Sc.(Computer Science) 2023-24 (CBCS – Autonomy 23 Pattern)

Course/ Paper Title	**Database Management System**
Course Code	**23SBCS12MM**
Semester	**I**
No. of Credits	**2**
Course Type	**Major (MJ)**

Course Objectives	
1.	To understand the fundamental concepts of databases.
2.	To understand user requirements and frame it in a data model.
3.	To understand creations, manipulation and querying of data indatabases.

Course Outcome	
1.	Solve real world problems using appropriate set, function, and relational models.
2.	Design E-R Model for given requirements and convert the same into database tables.
3.	Use SQL.

Syllabus		
Unit I	**Introduction to DBMS**	**04 hours**
	1. Introduction 2. File system Vs. DBMS 3. Data independence 4. Structure of DBMS 5. Users of DBMS Advantages of DBMS	
Unit II	**Conceptual Design**	**9 hours**
	1. Overview of DB design process 2. Introduction to data models (E-R model, Relational model, Network model, Hierarchicalmodel) 3. Conceptual design using ER data model (entities, attributes, entity sets, relations,relationship sets) 4. Constraints (Key constraints, Integrity constraints,referential integrity, unique constraint, Null/Not Null constraint, Check constraint, Mapping constraints) 5. Extended features – Specialization, Aggregation, Generalization	
Unit III	**SQL**	**9 hours**
	1. Introduction to query languages 2. Basic structure 3. SQL Commands 4. Basic SQL query with constraints & nested queries 5. Aggregate Operators and functions 6 .SQL mechanisms for joining relations (inner joins,outer join and their types) .Views	
Unit IV	**Relational Database Design**	**08 hours**
	1. Introduction to Relational-Database Design (undesirable properties of a RDB design) 2. Functional Dependency(Basic concepts, F+, Closure of an Attribute set) 3. Concept of normalization, Normal Forms (1NF,2NFand 3NF),Examples 4. Keys Concept	

Suggested Readings	
1.	Database System Concepts, Henry F. Korth, Abraham Silberschatz,
	S.Sudarshan,ISBN:9780071289597,Tata McGraw- Hill Education
2.	Database Management Systems,Raghu Ramakrishnan, ISBN:9780071254342, Mcgraw-hill higher Education
3.	Database Management Systems, Raghu Rama Krishnan and Johannes Gehrke, McGraw- Hill Science/Engineering/Math; 3 edition, ISBN:9780072465631
4.	Database Systems, Shamkant B. Navathe,RamezElmasri,ISBN:9780132144988,PEARSON HIGHER EDUCATION

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Lab Course in C

F.Y.B.Sc.(Computer Science) 2023-24 (CBCS – Autonomy 23 Pattern)

Course/ Paper Title	**Lab Course in C**
Course Code	**23SBCS13MM**
Semester	**I**
No. of Credits	**2**
Course Type	**Major (MJ)**

Course Objectives	
1.	To understand the program development life cycle.
2.	Solve simple computational problems using modular design and basic Features of the 'C' language.
3.	To develop control structure logic
4.	To understand array concepts

Course Outcome	
1.	Devise pseudo codes and flowchart for computational problems.
2.	Write, debug and execute simple programs in 'C'.
3.	Work with control structure using C
4.	Handling basic Concepts

Syllabus		
Unit I	**Assignment 1.**	**2 Session**
	1. Problem Solving using Pseudo code and Flowchart, Simpleprograms, Understanding errors and error handling.	
Unit II	**Assignment 2.**	**2 Session**
	Decision Making Control Structures.	
Unit III	**Assignment 3.**	**2 Session**
	Loop Control Structures	
Unit IV	**Assignment 4.**	**3 Session**
	Functions (User Defined functions, Library functions and Recursion).	
Unit V	**Assignment 5.**	**3 Session**
	Arrays (1-D and 2-D).	

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History of Science and Technology in India

FYBSc (Computer Science)

(CBCS–Autonomy21 Pattern)

Course Offered as	IKS
Course/ Paper Title	**History of Science and Technology in India**
Course Code	**23SBCS11IK**
Semester	I
No. of Credits	2
No of Hours	30

Aims & Objectives of the Course

Sr. No.	Objectives
1.	Understand the origin and growth of mathematics in ancient India.
2.	Assess the growth of engineering in ancient India.
3.	List the contributions of India to the world in the field of Mathematics and other Sciences
4.	To investigate development of various branch of natural sciences in colonial India.
5.	To study the impact of modern science in India upon Indian and their early response

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Describe an account of the ancient Indian astronomy
2.	Discuss the mathematical knowledge of Indian in the ancient period.
3.	Discuss the architectural style flourished in ancient India

Unit I	**Science and Technology- The Beginning**	**04**
	1. Development in different branches of Science in Ancient India: Astronomy, Mathematics, Engineering and Medicine	
Unit II	**Developments in Science and Technology in Medieval India**	**08**
	1. Scientific and Technological Developments in Medieval India; Influence of the Islamic world and Europe; The role of maktabs, madrasas and karkhanas set up. 2. Developments in the fields of Mathematics, Chemistry, Astronomy and Medicine.	
Unit III	**Developments in Science and Technology in Colonial India**	**10**
	1. Early European Scientists in Colonial India- Surveyors, Botanists, Doctors, under the Company‘s Service. 2. Indian Response to new Scientific Knowledge, Science and Technology in Modern India: 3. Development of research organizations like CSIR and DRDO; 4. Establishment of Atomic Energy Commission; Launching of the Space satellites.	
Unit IV	**Prominent scientist of India since beginning and their achievement**	**08**
	1. Mathematics and Astronomy: Baudhayan, Aryabhtatta, Brahmgupta, Bhaskaracharya, Varahamihira, Nagarjuna. 2. Scientists of Modern India: Srinivas Ramanujan, C.V. Raman, Jagdish Chandra Bose, Homi Jehangir Bhabha and Dr. Vikram Sarabhai.	

Suggested Readings	
1	Taher, M., Educational Developments in the Muslim World, Dehli, 1997.
2	Rogers, A., Tuzuk-i-Jahangiri -Or Memoirs Of Jahangir, London, 1914.
3	Agrawala , V.S., India as Known to Panini, Lucknow University, 1953.
4	Cunningham , Alexander , The Ancient Geography o f India. Indological Book House, Varanasi, 1963.
5	Angelo , Josepha., The Dictionary of Space Technology. Frederick Muller Ltd., London, 1982.
6	Krishnan , K.S., The New Era o f Science. Publications Division, Ministry of Information and Broadcasting, Govt, of India, New Delhi, 1957
7	Chatterji , S. Kumar (Ed.), The Cultural Heritage of India. Vol. V. The Ramakrishna MissionInstitute of Culture, Calcutta, 1978

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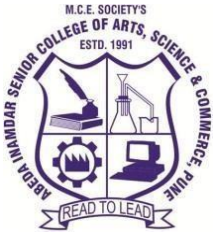
(CBCS – Autonomy 23 Pattern)

Course Offered as	VSC
Course/ Paper Title	Digital Electronics in Computer Science
Course Code	23SBCS11VS
Semester	I
No. of Credits	2
No of Hours	60

Course Objectives	
7.	To understand the logic gates.
8.	To understand De Morgan's Theorem
9.	To understand the logic used in combinational circuit design
10.	To understand the logic used in combinational circuit design

Course Outcome :After completion of this course students will be able	
3.	To simplify Boolean equations using Boolean Laws and K-Map method
4.	To design combinational circuits.
5.	To design combinational circuits.

List of Practical (Minimum 15 Practical to be conducted)	
9.	Study of Number Systems and inter conversion
10.	Study of basic Logic Gates (Verification of Truth tables)
11.	Study of derived Logic Gates (Verification of Truth tables)
12.	Study of De Morgan's Theorem
13.	Study of Binary to Gray & Gray to Binary Converter
14.	Study of Half Adder and Full Adder using Logic Gates.
15.	Study of Universal Adder/Subtractor.
16.	Use of Ex-OR as a 4-bit Parity Checker and Generator.
17.	Study of Decimal to BCD Converter using Gates.
18.	Study of Multiplexer and Demultiplexer (4:1 & 1:4).
19.	Study of RS flip flops using NAND gates
20.	Study of D flip flops using NAND gates
21.	Study of 4- bit ALU
22.	Study of asynchronous Up Counter
23.	Study of asynchronous Down Counter
24.	Study of Decade Counter
25.	Study of 7 Segment Display
26.	Study of Shift Register
27.	Study of R-2R ladder DAC
28.	Study of Flash ADC



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Course/ Paper Title	**Practical course on Database Management System**
Course Code	23SBCS11SE
Semester	**I**
No. of Credits	**2**
Offered As	**SEC**

Aims & Objectives of the Course

Sr. No.	Objectives
1	To basic database concepts
2	Solve simple Structure query language queries
3	Understand basic database management operations.
4	Design E-R Model for given requirements and convert the same into database tables

Sr. No.	Learning Outcome
1	Create database and normalization of databases
2	Write, debug and execute simple programs in 'C'.
3	Create database tables in postgreSQL.

Syllabus

Sr. No	Assignments	No. of Session
1.	**Assignment 1.**	**2**
	To create simple tables with only the primarykey constraint (as a table level constraint & as a field level constraint)(include all data types)	
2.	**Assignment 2.**	3
	To create more than one table, with referential integrity constraint, PK constraint.	
3.	**Assignment 3.**	2
	To create one or more tables with following constraints, in addition to the first twoconstraints (PK & FK) Check constraint Unique constraint Not null constraint	
4.	**Assignment 4.**	3
	To drop a table, alter schema of a table, insert / update / delete records using tablescreated in previous Assignments. (use simple forms of insert / update / delete statements)	
5.	**Assignment 5.**	2
	To query the tables using simple form of select statement Select <field-list> from table [where <condition> order by <field list>] Select <field-list, aggregate functions > from table [where <condition> group by <>having <> order by <>]	
6.	**Assignment 6.**	2
	To query table, using set operations (union,intersect)	

Operating Environment
For DBMS: Operating System: Linux Operating system DBMS: PostgreSQL Language: SQL

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Advanced C

F.Y.B.Sc.(Computer Science) 2023-24 (CBCS – Autonomy 23 Pattern)

Course/ Paper Title	**Advanced C**
Course Code	**23SBCS21MM**
Semester	**II**
No. of Credits	**2**
Course Type	**Major (MJ)**

Course Objectives	
1.	To study advanced concepts of programming using the 'C' language.
2.	To understand code organization with complex data types and structures.
3.	To work with files.

Course Outcome	
1.	Develop modular programs using control structures, pointers, arrays, strings and structures
2.	Design and develop solutions to real world problems using C.

Syllabus		
Unit I	**Pointers**	**10 hours**
	1. Introduction to Pointers. 2. Declaration, definition, initialization, dereferencing. 3. Pointer arithmetic. 4. Relationship between Arrays & Pointers- Pointer toarray, Array of pointers. 5. Multiple indirections (pointer to pointer).Functions and pointers- Passing pointer to function, returning pointer	

	From function, function pointer. 6. Dynamic memory management- Allocation(malloc(), calloc()),Resizing(realloc()), Releasing(free())., 7. Memory leak, dangling pointers. 8. Types of pointers.	
Unit II	**Strings**	**07 hours**
	1. String Literals, string variables, declaration, definition, initialization. 2. Syntax and use of predefined string functions 3. Array of strings. Strings and Pointers Command line arguments.	
Unit III	**Structures And Unions.**	**08 hours**
	1. Concept of structure, definition and initialization,use of type def. 2. Accessing structure members. 3. Nested Structures 4. Arrays of Structures 5. Structures and functions- Passing each member of structure as a separate argument, passing structure by value /address. Pointers and structures. 6. Concept of Union, declaration, definition, accessing union members. 7. Difference between structures and union	
Unit IV	**File Handling**	**05 hours**
	1. Introduction to streams. 2. Types of files .Operations on text files. 3. Standard library input/output functions. 4. Random access to files.	

Suggested Readings	
1.	C: the Complete Reference, Schildt Herbert, 4th edition, McGrawHill
2.	A Structured Programming Approach Using C, Behrouz A. Forouzan,Richard F. Gilberg, Cengage Learning India
3.	The ‘C’ programming language, Brian Kernighan, Dennis Ritchie,PHI
4.	Programming in C ,A Practical Approach, Ajay Mittal ,Pearson
5.	Programming with C, B. Gottfried, 3rd edition, Schaum’s outline Series, Tata McGrawHill.
6.	Programming in ANSI C, E. Balagurusamy, 7thEdition, McGrawHill.

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Relational Database Management System

F.Y.B.Sc.(Computer Science) 2023-24 (CBCS – Autonomy 23 Pattern)

Course/ Paper Title	**Relational Database Management System**
Course Code	**23SBCS22MM**
Semester	**II**
No. of Credits	**2**
Course Type	**Major (MJ)**

Course Objectives	
1.	To teach fundamental concepts of RDBMS(PL/ PgSQL)
2.	To teach database management operations
3.	Be familiar with the basic issues of transaction processing and concurrency control
4.	To teach data security and its importance

Course Outcome	
1.	To design E-R Model for given requirements and convert the same into database tables.
2.	To use database techniques such as SQL & PL/SQL.
3.	To explain transaction Management in relational database System.

Syllabus		
Unit I	**Relational Database Design Using PLSQL**	**09 hours**
	1. Introduction to PLSQL 2. Stored Procedures 3. Stored Functions 4. Handling Errors and Exceptions 5. Cursors 6. Triggers	
Unit II	**Transaction Concepts and concurrency control**	**08 hours**
	1. Introduction and basic concepts of transaction 2. Schedules & concept of Serializability 3. Serializability by lock mechanism 4. Basic timestamp method & Thomas Write Rule. 5. Locks with multiple granularity, dynamic database concurrency (Phantom Problem), Timestamp V/s Locking 6. Deadlock	
Unit III	**Database Integrity and Security Concepts**	**5 hours**
	1. Domain constraints & Referential Integrity 2. Methods for database security i. Discretionary access control method ii. Mandatory access control iii. Role base access control for multilevel security. 3. Use of views in security enforcement. 4. Encryption technique for security. Statistical database security.	
Unit IV	**Crash Recovery**	**05 hours**
	1. Failure classification 2. Recovery concepts 3. Log base recovery techniques (Deferred and Immediateupdate) 4. Checkpoints, Relationship between databasemanager and buffer cache. 5. Recovery with concurrent transactions (Rollback, checkpoints, commit) 6. Database backup and recovery from catastrophic failure	

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Unit V	Other Databases	03 hours
	1. Introduction to Parallel and distributed Databases 2. Introduction to Object Based Databases 3. Other Databases (XML ,NoSQL, Multimedia, Big Data)	

Suggested Readings	
1.	Database System Concepts, By Silberschatz A., Korth H., Sudarshan S., 6th Edition, McGraw Hill Education
2.	Database Management Systems, Raghu Ramakrishnan, Mcgraw-Hill Education
3.	Database Systems, Shamkant B. Navathe, RamezElmasri, PEARSON HIGHER EDUCATION
4.	Fundamentals of Database Systems, By: Elmasri and Navathe, 4th Edition Practical PostgreSQL O'REILLY
5.	Database Management Systems,RaghuRamakrishnan and JohannesGehrke,McGraw- Hill Science/Engineering/Math; 3 edition, ISBN: 9780072465631

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Lab Course in Advanced C

F.Y.B.Sc.(Computer Science) 2023-24 (CBCS – Autonomy 23 Pattern)

Course/ Paper Title	**Lab Course in Advanced C**
Course Code	**23SBCS23MM**
Semester	**II**
No. of Credits	**2**
Course Type	**Major (MJ)**

Course Objectives	
1.	To understand the program development.
2.	Solve advanced computational problems using modular design and advanced Features of the 'C' language.
3.	To develop Structure & union concepts
4.	To understand File concepts

Course Outcome	
1.	Devise the string concepts in details with user defined functions
2.	Write, debug and execute advanced programs in 'C'.
3.	Structure & union using advanced C
4.	Handling basic Concepts

Syllabus		
Unit I	**Assignment 1.**	**3 Session**
	Simple Pointers. 1) Pointer initialization and use of pointers. 2) Pointer Arithmetic	
Unit II	**Assignment 2.**	**2 Session**
	Dynamic Memory Allocation.	
Unit III	**Assignment 3.**	**2 Session**
	String handling using standard library functions	
Unit IV	**Assignment 4.**	**3 Session**
	Structure and Unions.	
Unit V	**Assignment 5.**	**2 Session**
	File Handling	

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Mathematics for Artificial Intelligence -I

F.Y.B.Sc.(Computer Science) 2023-24 (CBCS – Autonomy 23 Pattern)

Course Title	Mathematics for Artificial Intelligence -I		
Course Code: 23SBCS21MNA			**No. of Credits: 2**
Course Type: Minor			**Total Teaching Hours: 30**

Course Objectives	
1.	A student should be able to recall basic facts about mathematics and should be able to display knowledge of conventions such as notations, terminology and recognize basic geometrical figures and graphical displays, and state important facts resulting from their studies.
2.	A student should get a relational understanding of mathematical concepts and concerned structures and should be able to follow the patterns involved, mathematical reasoning
3.	A student should get adequate exposure to global and local concerns that explore many aspects of Mathematical Sciences.
4.	A student must be able to apply their skills and knowledge, that is, translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques to process the information, and draw the relevant conclusion.

Course Outcome	
1.	Students will know the basic concepts, properties, and operations of sets and relations and also analyze the proof techniques by mathematical induction and apply the basic principles of counting, permutations, and combinations for solving various practical problem
2.	Student should be able to define domain, range relation and Matrix representation
3.	Student should be able to apply the fundamental counting principle to real-life situations
4.	Students will be able to apply the logical structure of proofs and work symbolically with connectives and quantifiers to produce logically valid, correct and clear arguments

Syllabus

Syllabus		
Unit I	**Set Theory**	**06 hours**
	1. Set, set representation methods	1
	2. Types of sets: null set, finite set, infinite set, equivalent sets and equal sets, subsets, power sets	2
	3. Operations on sets: union, intersection, complement, difference and symmetric difference	3
Unit II	**Relations**	**06 hours**
	1. Relations, Properties of Binary Relations	2
	2. Digraphs, matrix representation and composition of relations	2
	3. Equivalence relations and Partitions, Partial Ordering Relation	2
Unit III	**Techniques of Counting**	**08 hours**
	1. Basic Counting Principles	2
	2. The Inclusion-Exclusion Principle (Without proof)	2
	3. Permutations and Combinations	2
	4. The Pigeonhole Principle	2
Unit IV	**Logic**	**10 hours**
	1. Propositional Logic, Propositional Equivalences	2
	2. Predicates and Quantifiers	2
	3. Argument in propositional Logic, Validity of an Argument (Direct and Indirect methods),Rules of Inference for Propositional Logic, Building Arguments	4
	4. Mathematical induction	2

Suggested Readings	
1.	Discrete Mathematics and its applications, by Kenneth Rosen, Tata McGraw Hill, Seventh Edition
2.	Discrete Mathematical Structures, by Kolman, Busby, Ross, Prentice Hall, Sixth Edition
3.	Elements of Discrete Mathematics, by C. L. Liu, Tata McGraw Hill.

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Statistics for Data Science-I

F.Y.B.Sc.(Computer Science) 2023-24 (CBCS – Autonomy 23 Pattern)

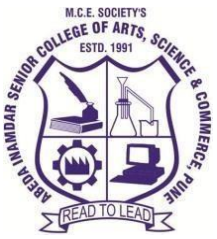
Course Title	**Statistics For Data Science-I**		
Course Code: 23SBCS21MNB			**No. of Credits: 2**
Course Type: Minor			**Total Teaching Hours: 30**

Course Objectives	
1.	A student should be able to recall basic concepts and terminology in Statistics and covers basic tools and methods required for data analysis from their studies.
2.	A student should demonstrate knowledge of probability, standard statistical distributions, and computational techniques.
3.	A student must be able to apply statistical tools and techniques that is, translate information presented verbally into Statistics form, select and use appropriate statistical formulae or techniques to process the information and draw the relevant conclusion.

Course Outcome	
1.	Know the basic concepts, analyze statistical data graphically using frequency distributions and cumulative frequency distributions, analyze data using measures of central tendency, use the basic probability rules, independent andmutually exclusive events, translate real-world problems into probability models, derive the probability density function, calculate probabilities.
2.	Calculate and interpret the correlation between two variables, predicting a particular value of Y for a given value of X and significance of the correlation coefficient.

Syllabus		
Unit I	**Data Condensation and Presentation of Data**	**07 hours**
	1. Definition, importance, scope, and limitations of statistics. 2. Data Condensation: Types of data (Primary and Secondary), attributes and variables, discrete and continuous variables. 3. Graphical Representation: Histogram, Ogive curves, stem and Leaf chart.	1 3 3
Unit II	**Descriptive Statistics**	**10 hours**
	1. Measures of central tendency: Concept of central tendency, requisites of good measures of central tendency. 2. Arithmetic mean, Median and Mode. 3. Partition Values: Quartiles, Box-plot. 4. Measures of dispersion: Range and quartile deviation, variance, And standard deviation.	1 3 3 3 3
Unit III	**Moments, Skewness, and Kurtosis**	**08 hours**
	1. Concept of raw moments, central moments, and the relation between raw and central moments. 2. Measures of skewness: Types of skewness, Pearson's and Bowley's coefficient of skewness, measures of skewness based on moments. 3. Measures of kurtosis: Types of kurtosis, measures of kurtosis based on moments.	2 3 3
Unit IV	**Correlation (For ungrouped data)**	**05 hours**
	1. Concept of bivariate data, scatter diagram, its interpretation, positive correlation, negative correlation, zero correlation. 2. Karl Pearson's coefficient of correlation, properties of the correlation coefficient, interpretation of correlation coefficient, coefficient of determination with interpretation. 3. Spearman's rank correlation coefficient.	2 2 1

Suggested Readings	
1.	Statistical Methods, S.P.Gupta, Sultan Chand and Sons Educational Publishers.
2.	Fundamentals of Statistics, Sixth Revised and Enlarged Edition, S.C. Gupta, Himalaya Publishing House



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F.Y.B.Sc (Computer Science)

(CBCS-Autonomy 23 Pattern)

Course/ Paper Title	**German Language**
Course Code	23ABON21OE
Semester	**II**
No. of Credits	**2(36 Lectures of 50 minutes)**

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To acquire intercultural competency, especially skills of recognizing, describing within German-speaking societies and within one's own
2.	To apply the study of German language and culture to related subjects, and vice versa
3.	To develop environmental literacy and awareness of sustainability

Expected Course Specific Learning Outcomes

Sr. No.	Learning Outcome
1.	One can understand and use familiar, everyday expressions and simple sentence as well as which is directly related to the satisfying of concrete needs
2.	Students can introduce himself/herself and others as well as ask about themselves

Syllabus

Unit No.	Title with Contents	No. of Lectures
Unit I	**Self-Introduction**	**06**
	1. Self-introduction and asking about others 2. Greetings and saying goodbye 3. Alphabets and spelling formation 4. Noun and personal pronoun 5. Numbers till 20 6. Verb 7. WH question	
Unit II	**Vocabulary Skills**	**07**
	1. Vocabulary related to eating and drinking 2. How to order in restaurant (ordering food and paying the bill) 3. Subject and article 4. Talking about hobbies 5. Weekdays,Months and seasons of the year 6. Expressing the negative using "Kein" 7. Conjugation 8. Object and article	
Unit III	**Language interactivity**	**08**

	1. Understand and name the time 2. Ask for items and price 3. Vocabulary related to clothes 4. Shopping for clothes 5. Asking opening and closing times 6. Ask questions about locations 7. Prepositions used to tell the time 8. Talk about family 9. Modal verbs	
UNIT IV	**Socioculture Practice**	**08**
	1. Make appointments, understand and give instructions 2. Colours , ordinal numbers and date 3. My house Vocabulary 4. Prepositions 5. Vocabulary related to school	

Suggested Books	
1.	NETZWERK Deutsch als Fremdsprache A1(Goyal, New Delhi, 2015)
2.	Schulz-Griesbach: Deutsch als Fremdsprache. Grundstufe in einem Band (for Grammar)
Web References	
1.	https://www.goethe.de/en/spr/kup/prf/prf/sd1/ueb.html
2.	https://www.schubert-verlag.de/aufgaben/arbeitsblaetter_a1_z/a1_arbeitsblaetter_index_z.htm

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(CBCS – Autonomy 23 Pattern)

Course Offered as	VSC
Course/ Paper Title	Embedded System
Course Code	23SBCS21VS
Semester	II
No. of Credits	2
No of Hours	60

Sr. No.	Course Objectives
1	To get hands on training for Python Language
2	To study experimentally interfacing of an Arduino
3	To study experimentally interfacing of Raspberry Pi
4	To educate and train students for upcoming technology in IoT.

Sr. No.	Course Outcome
1.	To acquire skills of Python programming for simple applications
2.	To interface various I/O peripherals and sensors to Arduino
3.	To interface various I/O peripherals and sensors to Raspberry Pi
4.	To design and build Raspberry Pi based projects
5.	To design and build IoT based system using Arduino.

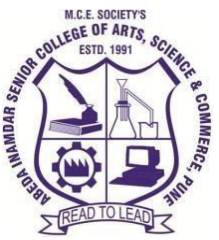
This VSC course consists of 15 experiments. After studying course student can design and develop working models using Arduino and Raspberry Pi.

- **List of Major Equipment/ Instrument with Broad Specifications**
  - i) Raspberry Pi Board
  - ii) Computer System(Latest version)
  - iii) Peripheral Interfacing Trainer kits

List of Practicals (Minimum 15 Practicals to be conducted)	
1.	**Interfacing of LED to Arduino Board.** • Introduction of LED's • Interfacing Circuit Description of LED's • Programming of LED's Interfacing with Arduino Board
2.	**Interfacing of Switch to Arduino Board.** • Introduction of switch • Interfacing Circuit Description of switch • Controlling of LED's by using Switches • Programming of switch Interfacing with Arduino Board
3.	**Interfacing of IR sensor and Buzzer to Arduino Board.** • Introduction of IR sensor and Buzzer • Interfacing Circuit Description of IR sensor • Interfacing Circuit Description of Buzzer • Programming of IR sensor and Buzzer Interfacing with Arduino Board
4.	**Interfacing of LCD to Arduino Board.** • Introduction to 16 x 2 LCD Display • Commands and Library functions of 16 x 2 LCD Display • Interfacing Circuit Description of 16 x 2 LCD • Programming of 16 x 2 LCD
5.	**Interfacing of Motors to Arduino Board.** • Introduction to Motors • Types of Motors used in Embedded System • Programming & Controlling of motors in Embedded System
6.	**To control LED switching using Mobile/Bluetooth Device and Arduino Board.** • Introduction of Bluetooth Module (HC-05) with pin diagram

	• Interfacing Circuit Description of Bluetooth Module (HC-05) • Interfacing Circuit Description of Bluetooth Module (HC-05) • Study of different Apps for Bluetooth Module to install on Mobile • Programming for Interfacing with Arduino Board
7.	**To study and Interfacing of Temperature Sensor to Arduino Board and display value on LCD Display.** • Introduction to Temperature Sensors • Types of Temperature Sensors used in Embedded System • Interfacing Circuit Description of Temperature Sensors • Programming for Interfacing with Arduino Board
8.	**To study and Interfacing of Ultrasonic Sensors** • Introduction to Ultrasonic Sensors and its use in Embedded System • Interfacing Circuit Description of Ultrasonic Sensors • Programming for Interfacing with Arduino Board
9.	**Raspberry Pi** • Introduction to Raspberry Pi • Raspberry Pi Series and Their Different types • Pin Description of Raspberry Pi • Different OS versions
10.	**Interfacing LEDs to Raspberry Pi using GPIO pins** • Interfacing Circuit Description of 1 LED / 2 LEDs / 3 LEDs with Raspberry Pi • Interfacing Circuit Description • Python Programming for Interfacing with Raspberry Pi
11.	**Interfacing a switch connected to the GPIO pins and display status on LED using Raspberry Pi** • Interfacing Circuit Description of 1 switch / 2 switches with Raspberry Pi • Interfacing Circuit Description • Python Programming for Interfacing with Raspberry Pi
12.	**Interfacing temperature Sensor to Raspberry Pi to detect temperature**
13.	**Interfacing Humidity Sensor to Raspberry Pi to detect temperature**
14.	**Interfacing photo sensor to Raspberry Pi to detect light intensity** • Introduction to Photo Sensors & Use of Sensors used in Embedded System • Interfacing Circuit Description • Python Programming for Interfacing with Raspberry Pi

15.	**Interfacing PIR sensor using Raspberry Pi for motion detection** • Introduction to PIR Sensors & use in Embedded System • Working of PIR Sensors & Use in Embedded System • Interfacing Circuit Description • Python Programming for Interfacing with Raspberry Pi
16.	**Interfacing Pi Camera to Raspberry Pi to capture image** • Introduction to Pi Camera • Interfacing Circuit Description • Python Programming for Interfacing with Raspberry Pi
17.	**Case Study :** IoT Project using Arduino and Bluetooth Module for smart home through Android App
18.	**Case Study:** IoT Project using Ultrasonic Sensor HC-SR04 and Arduino to distance calculation using Processing App
19.	**Case Study:** Home automation using Arduino and Bluetooth
20.	**Case Study:** Bluetooth Controlled Car using Arduino
21.	**Case Study:** Automatic Irrigation System using an Arduino
22.	**Case Study:** Water Level indicator using Arduino
23.	**Case Study:** Raspberry Pi-Powered Motion Sensor and Alarm
24.	**Case Study:** Door Lock System using Arduino / Raspberry Pi
25.	**Case Study:** Weather monitoring System using Arduino / Raspberry Pi



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Course/ Paper Title	**Lab Course in Relational Database Management System**
Course Code	23SBCS21SE
Semester	**II**
No. of Credits	**2**
Offered As	**SEC**

Aims & Objectives of the Course

Sr. No.	Objectives
1	To basic relational database concepts
2	Solve simple Structure query language queries
3	Understand relational database management operations.
4	

Sr. No.	Learning Outcome
1	Create database and normalization of databases
2	Write, debug and execute simple programs in 'C'.
3	Create database tables in postgreSQL.

Syllabus

Sr. No	Assignments	No. of Hours
1.	**Assignment 1. Stored Procedure** 1) A Simple Stored Procedure 2) A Stored Procedure with IN, OUT andIN/OUT parameter	**08**
2.	**Assignment 2. Stored Function** 1) A Simple Stored Function 2) A Stored Function that returns 3) A Stored Function recursive	10
3.	**Assignment 3. Cursors** 1) A Simple Cursor 2) A Parameterized Cursor	10
4.	**Assignment 4. Exception Handling** 1) Simple Exception- Raise Debug Level Messages 2) Simple Exception- Raise Notice Level Messages 3) Simple Exception- Raise Exception Level Messages	10
5.	**Assignment 5. Triggers** 1) Before Triggers (insert, update, delete)After Triggers (insert, update, delete)	10

Operating Environment
For DBMS: Operating System: Linux Operating system DBMS: PostgreSQL Language: SQL