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THE NATIONAL COLLEGE BASAVANAGUDI, BENGALURU- 560 004 [AUTONOMOUS] Website: www.ncbgudi.com NAAC Accredited 'B++' Grade

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Curriculum Structure for Bachelor of Computer Applications -BCA and Open Elective Courses in Computer Science

NATIONAL EDUCATION POLICY -2020(NEP-2020)

Academic Year 2021-22

Preamble

Computer Application (CA) has been evolving as an important branch of science andtechnology in last two decade and it has carved out a space for itself like computer scienceand engineering. Computer application spans theory and more application and it requiresthinkingboth in abstracttermsandin concrete terms.

The ever -evolving discipline of computer application has strong connections to other disciplines. Many problems in science, engineering, health care, business, and other areas can be solved effectively with computers and its applications, but finding a solution requires both computer science expertise and knowledge of the particular application domain.

Computer science has a wide range of specialties. These include Computer Architecture, Software Systems, Graphics, Artificial Intelligence, Mathematical and Statistical Analysis, Data Science, Computational Science, and Software Engineering.

Universities and other HEIs introduced programmes of computer application. Information Technology is growing rapidly. Increasing applications of computers in almost all areas of human endeavour has led to vibrant industries with concurrent rapid change in technology. Unlike other basic disciplines, developing core competency in this discipline that can be reasonably stable becomes a challenge.

In India, it was initially introduced at the Master (postgraduate) level as MCA and M.Tech. Later on, engineering programmes such as B.Tech and B.E in Computer Science & Engineering and in Information Technology were introduced in various engineering College/Institutions to cater to the growing demand for trained engineering manpower in IT industries. Parallelly, BCA, B.Sc and M.Sc programmes with specialisation in Computer Science were introduced to train manpower in this highly demanding area.

BCA and BCA (Hons) are aimed at undergraduate level training facilitating multiple career paths. Students so graduated, can take up postgraduate programmes in CS or MCA leading to research as well as R&D, can be employable at IT industries, or can pursue a teaching profession or can adopt a business management career. BCA and BCA (Hons) aims at laying a strong foundation of computer application at an early stage of the career. There are several employment opportunities and after successful completion of BCA, graduating students can fetch employment directly in companies as programmer, Web Developer, Software Engineer, Network Administrator, Data Scientist, or AI/ML personnel.

The Program outcomes in BCA are aimed at allowing flexibility and innovation in design and development of course content, in method of imparting training, in teaching learning process and in assessment procedures of the learning outcomes. The emphasis in BCA courses, in outcome-based curriculum framework, help students learn solving problems, accomplishing IT tasks, and expressing creativity, both individually and collaboratively. The proposed framework will help Students learn programming techniques and the syntax of one or more programming languages.

All students must, therefore, have access to a computer with a modern programming language installed. The computer science framework does not prescribe a specific language. The teacher and students will decide which modern programming languages students will learn. More importantly, students will learn to adapt to changes in programming languages and learn new languages as they are developed.

The present Curriculum Framework for BCA degrees is intended to facilitate the students to achieve the following.

- To develop an understanding and knowledge of the basic theory of Computer Science and Information Technology with good foundation on theory, systems and applications such as algorithms, data structures, data handling, data communication and computation
- To develop the ability to use this knowledge to analyse new situations in the application domain
- To acquire necessary and state-of-the-art skills to take up industry challenges. The objectives and outcomes are carefully designed to suit to the above-mentioned purpose.
- The ability to synthesize the acquired knowledge, understanding and experience for a better and improved comprehension of the real-life problems

- To learn skills and tools like mathematics, statistics and electronics to find the solution, interpret the results and make predictions for the future developments
- To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems and evaluate

The objectives of the Programme are:

- 1. The primary objective of this program is to provide a foundation of computing principles and business practices for effectively using/managing information systems and enterprise software
- 2. It helps students analyze the requirements for system development and exposes students to business software and information systems
- 3. This course provides students with options to specialize in legacy application software, system software or mobile applications
- 4. To produce outstanding IT professionals who can apply the theoretical knowledge into practice in the real world and develop standalone live projects themselves
- 5. To provide opportunity for the study of modern methods of information processing and its applications.
- To develop among students the programming techniques and the problem- solving skills through programming
- To prepare students who wish to go on to further studies in computer science and related subjects.
- 8. To acquaint students to Work effectively with a range of current, standard, Office Productivity software applications

Program Outcomes: BCA (3 Years) Degree

- Discipline knowledge: Acquiring knowledge on basics of Computer Science and ability to apply to design principles in the development of solutions for problems of varying complexity
- 2. Problem Solving: Improved reasoning with strong mathematical ability to Identify, formulate and analyze problems related to computer science and exhibiting a sound knowledge on data structures and algorithms.
- **3. Design and Development of Solutions:** Ability to design and development of algorithmic solutions to real world problems and acquiring a minimum knowledge on statistics and optimization problems. Establishing excellent skills in applying various design strategies for solving complex problems.
- **4. Programming a computer:** Exhibiting strong skills required to program a computer for various issues and problems of day-to-day applications with thorough knowledge on programming languages of various levels.
- **5. Application Systems Knowledge:** Possessing a sound knowledge on computer application software and ability to design and develop app for applicative problems.
- 6. Modern Tool Usage: Identify, select and use a modern scientific and IT tool or technique for modeling, prediction, data analysis and solving problems in the area of Computer Science and making them mobile based application software.
- **7. Communication:** Must have a reasonably good communication knowledge both in oral and writing.
- **8. Project Management:** Practicing of existing projects and becoming independent to launch own project by identifying a gap in solutions.
- 9. Ethics on Profession, Environment and Society: Exhibiting professional ethics to maintain the integrality in a working environment and also have concern on societal impacts due to computer-based solutions for problems.
- **10.** Lifelong Learning: Should become an independent learner. So, learn to learn ability.

11. Motivation to take up Higher Studies: Inspiration to continue educations towards advanced studies on Computer Science.

Additional Program Outcomes: BCA Degree (Hons)

The Bachelor of Computer Application (BCA (Hons)) program enables students to attain following additional attributes besides the afore-mentioned attributes, by the time of graduation:

- 1. Apply standard Software Engineering practices and strategies in real -time software project development.
- Design and develop computer programs/computer -based systems in the areas related to AI, algorithms, networking, web design, cloud computing, IoT and data analytics.
- 3. Acquaint with the contemporary trends in industrial/research settings and thereby innovate novel solutions to existing problems.
- 4. The ability to apply the knowledge and understanding noted above to the analysis of a given information handling problem.
- 5. The ability to work independently on a substantial software project and as an effective team member.

BCA Course Matrix - NEP -2020

		BCA Sem	este	er I					
Part	Code	Course(Subject)	Hours / Week				Credits		
			L	Т	Р	Exam	IA	Total	
	BC1-T1	Discrete Structure	3	-	-	60	40	100	3
	BC1-T2	Programming in C	3	-	-	60	40	100	3
Part-1	BC1-T3	Database Management System	3	-	-	60	40	100	3
	BC1-P1	LAB: C Programming	-	-	4	25	25	50	2
	BC1-P2	LAB: Database Management System	-	-	4	25	25	50	2
Part-2	GE1-CS1	Open Elective	3	-	-	60	40	100	3
	BC1-LK1	Kannada-I	3	1	-	60	40	100	3
Part-3	BC1-Lx1	English-I/Hindi-I/Sanskrit-I	3	1	-	60	40	100	3
	-	AbilityEnhancementCompulsory Course	-	-	-	-	-	-	-
	SB1-DF	Digital Fluency	1	-	2	50	50	100	2
Part-4	VB2-HW	Health & Wellness	-	-	2	-	25	25	1
	VB2-XX-1	NCC-1/ NSS-1/ R& R-1/ Cultural-1	-	-	2	-	25	25	1
Per Week : Lecture-Tutorial-Practical-Exam-IA-Total-Credits			19	2	14	460	390	850	26

	DCA Semester II									
DUA Semester n										
Part	Code	Course(Subject)	Но	urs / W	eek	Marks			Credits	
			L	Т	Р	Exam	IA	Total		
	BC2-T4	Computer Architecture	3	-	-	60	40	100	3	
	BC2-T5	Data Structures using C	3	-	-	60	40	100	3	
Part-1	BC2-T6	Object Oriented Concepts using JAVA		-	-	60	40	100	3	
	BC2-P4	Data StructureLab	-	-	4	25	25	50	2	
	BC2-P5	JAVA Lab	-	-	4	25	25	50	2	
Part-2	GE2-CS2	Open Elective	3	-	-	60	40	100	3	
	BC2-LK2	Kannada-II	3	1	-	60	40	100	3	
Part-3	BC2-Lx2	English-II/Hindi-II/Sanskrit-II	3	1	-	60	40	100	3	
	AE1-ES	Environmental Studies	2	-	-	30	20	50	2	
	-	SkillEnhancementCourses- Skillbased	-	-	-	-	-	-	-	
Part-4	VB1-YO	Yoga	-	-	2	-	25	25	1	
	VB1-SP-1	Sports-1	-	-	2	-	25	25	1	
Per Week	: Lecture-Tu	torial-Practical-Exam-IA-Total-Credits	20	2	12	440	360	800	26	

		BCA Seme	este	r III						
Part	Code	Course(Subject)	Hours / Week				Credits			
			L	Т	Р	Exam IA Total				
	BC3-T7	Operating Systems	3	-	-	60	40	100	3	
	BC3-T8	Computer Networks		-	-	60	40	100	3	
Part-1	ВСЗ-Т9	Python Programming	3	-	-	60	40	100	3	
	BC3-P7	Computer Networks Lab	-	-	4	25	25	50	2	
	BC3-P8	Python Programming Lab	-	-	4	25	25	50	2	
Part-2	GE3-CS3	Open Elective	3	-	-	60	40	100	3	
	BC3-LK3	Kannada-III	3	1	-	60	40	100	3	
Part-3	BC3-Lx3	English-III/Hindi-III/Sanskrit-III	3	1	-	60	40	100	3	
	-	AbilityEnhancement Compulsory Course	-	-	-	-	-	-	-	
	SB2-AI	Artificial Intelligence	1	-	2	25	25	50	2	
Part-4	VB1-SP-2	Sports-2	-	-	2	-	25	25	1	
	VB2-XX-2	NCC-2/ NSS-2/ R& R-2/ Cultural-2	-	-	2	-	25	25	1	
Per Week	: Lecture-Tu	torial-Practical-Exam-IA-Total-Credits	19	2	14	435	365	800	26	

	BCA Semester IV										
Part	Code	Course(Subject)	Но	urs / W	eek	Marks			Credits		
			L	Т	Р	Exam	IA	Total			
	BC4-T10	Software Engineering	3	-	-	60	40	100	3		
	BC4-T11	Artificial Intelligence	3	-	-	60	40	100	3		
Part-1	BC4-T12	Internet Technologies	3	-	-	60	40	100	3		
	BC4-P10	Artificial Intelligence Lab	-	-	4	25	25	50	2		
	BC4-P11	Internet Technologies Lab	-	-	4	25	25	50	2		
Part-2	GE4-CS4	Open Elective	3	-	-	60	40	100	3		
	BC4-LK4	Kannada-IV	3	1	-	60	40	100	3		
Part-3	BC4-Lx4	English-IV/Hindi-IV/Sanskrit-IV	3	1	-	60	40	100	3		
	AE2-IC	Constitution of India	2	-	-	30	20	50	2		
	-	SkillEnhancementCourses- Skillbased	-	-	-	-	-	-	-		
Part-4	VB1-SP-3	Sports-3	-	-	2	-	25	25	1		
	VB2-XX-3	NCC-3/ NSS-3/ R& R-3/ Cultural-3	-	-	2	-	25	25	1		
Per Week	: Lecture-Tu	torial-Practical-Exam-IA-Total-Credits	20	2	12	440	360	800	26		

	BCA Semester V									
Part	Code	Course(Subject)	Hours / Week			Marks			Credits	
			L	Т	Р	Exam	IA	Total		
	BC5-T13	Design and Analysis of Algorithm	3		-	60	40	100	3	
	BC5-T14	Data Analytics	3	-	-	60	40	100	3	
Part-1	BC5-T15	Web Programming	3	-	-	60	40	100	3	
	BC5-P13	Data Analytics Lab	-	-	4	25	25	50	2	
	BC5-P14	Web Programming Lab	-	-	4	25	25	50	2	
Part-2	VC1-CS1	Vocational Course 1	3	-	-	60	40	100	3	
	BC5-Ex	Elective 1	3	-	-	60	40	100	3	
	SB2-CY	Cyber Security	1	-	2	25	25	50	2	
Part-4	VB1-SP-4	Sports-4	-	-	2	-	25	25	1	
	VB2-XX-4	NCC-4/ NSS-4/ R& R-4/ Cultural-4	-	-	2	-	25	25	1	
Per Week	: Lecture-Tu	torial-Practical-Exam-IA-Total-Credits	16	-	14	375	325	700	23	

BCA Semester VI										
Part	Code	Course(Subject)	Но	urs / W	eek	Marks			Credits	
			L	Т	Р	Exam	IA	Total		
	BC6-T16	Theory of Computation	3	-	-	60	40	100	3	
	BC6-T17	Machine Learning	3	-	-	60	40	100	3	
Part-1	BC6-T18	Mobile Application Development	3	-	-	60	40	100	3	
	BC6-P16	Machine Learning Lab	-	-	4	25	25	50	2	
	BC6-P17	Mobile Application Development Lab	-	-	4	25	25	50	2	
	VC2-CS2	Vocational Course 2	3	-	-	60	40	100	3	
Part-2	BC6-Ex	Elective 2	3	-	-	60	40	100	3	
	IS-1	Internship	4	Week	s	25	25	50	2	
	SB4-PC	Professional Communication	1	-	2	25	25	50	2	
Part-4	VB1-SP-5	Sports-5	-	-	2	-	25	25	1	
	VB2-XX-5	NCC-5/ NSS-5/ R& R-5/ Cultural-5	-	-	2	-	25	25	1	
Per Week	: Lecture-Tu	torial-Practical-Exam-IA-Total-Credits	16	-	14	400	350	750	25	

BCA Semester VII										
Part	Code	Course(Subject)	Но	urs / W	eek		Marks		Credits	
			L	Т	Р	Exam	IA	Total		
	BC7-T19	Cloud Computing	3	-	-	60	40	100	3	
Part-1	BC7-T20	Internet of Things	3	-	-	60	40	100	3	
	BC7-P19	Cloud Computing Lab	-	-	4	25	25	50	2	
	BC7-P20	Internet of Things Lab	-	-	4	25	25	50	2	
	VC3-CS3	Vocational Course 3		-	-	60	40	100	3	
Part-2	BC7-Ex	Elective 3	3	-	-	60	40	100	3	
	7BCARM	Research Methodology	3	-	-	60	40	100	3	
Per Week	: Lecture-Tu	torial-Practical-Exam-IA-Total-Credits	15	-	8	350	250	600	19	
		BCA Seme	ster	VIII						
Part	Code	Course(Subject)	Но	urs / W	eek		Marks		Credits	
			L	Т	Р	Exam	IA	Total		
	BC8-T21	Block Chain Technologies	3	-	-	60	40	100	3	
Part-1	BC8-T22	Cryptography and System Security	3	-	-	60	40	100	3	
	BC8-P21	Block Chain Technologies Lab	-	-	4	25	25	50	2	
	VC-CS-4T	LAB: Project	3	-	-	60	40	100	3	

Part-2 BC7-Ex Elective 4		3	-	-	60	40	
	8BCARP	Research Project	-	-	12	140	60
Per Week	: Lecture-Tu	torial-Practical-Exam-IA-Total-Credits	12	-	16	405	245

	BCA - SEMWISE CREDITS									
Year	Sem	Credits	Min. Credits	Total Credits						
Voor 1	SEM I	26	-	-						
rear 1	SEM II	26	48	52						
V	SEM III	26	-	-						
rear Z	SEM IV	26	96	104						
Voor 2	SEM V	23	-	-						
rear 5	SEM VI	25	140	152						
Voor	SEM VII	19	-	-						
real 4	SEM VIII	20	180	191						

 Discipline Core 1 Theory

Title: DISCRETE STRUCTURES

Fotal No. of Teaching Hours: 42		No. of Hours per Week : 3					
Internal Marks : 40	Exar	n Marks : 60	Credits:3				

Pedagogy:Classrooms lecture, Problem Solving , Case studies, Group discussion, Seminar & field work etc.,

Course Description:This is an introductory course in discrete mathematics. The goal of this course is to introduce students to ideas and techniques from discrete mathematics that are widely used in science and engineering. This course teaches the students techniques in how to think logically and mathematically and apply these techniques in solving problems. To achieve this goal, students will learn logic and proof, sets, functions, as well as algorithms and mathematical reasoning. Key topics involving relations, graphs, trees, and formal languages and computability are covered in this course.

Course Objectives:

- Be able to draw and interpret Venn diagrams of set relations and operations and use Venn diagrams to solve problems.
- Recognize when set theory is applicable to real-life situations, solve real-life problems, and communicate real-life problems and solutions to others.
- Introduce concepts of mathematical logic for analyzing propositions and proving theorems.
- Use sets for solving applied problems, and use the properties of set operations algebraically.
- Work with relations and investigate their properties.
- Investigate functions as relations and their properties.
- Introduce basic concepts of graphs, digraphs and trees.

Course Outcomes (Cos):

- Analyze logical propositions via truth tables.
- Prove mathematical theorems using mathematical induction.
- Understand sets and perform operations and algebra on sets.
- Determine properties of relations, identify equivalence, sketch relations.
- Identify functions and determine their properties.
- Define graphs, digraphs and trees, and identify their main properties.
- Evaluate combinations and permutations on sets.

Unit-I:	14	Hours
Set Theory and Logic: Fundamentals of Set theory, Set Operations and	the Laws of Set	Theory,
Counting and Venn Diagrams, Cartesian Products and Rela	tions,Functions-	One-to-
One,OntoFunctions,FunctionCompositionandInverseFunctions. Funda	mentals of	Logic,
Propositional		Logic,
LogicalConnectivesandTruthTables,LogicEquivalence,PredicatesandQuant	ifiers, Rules	of
Inference.		
Unit-II:	14	Hours
Counting and Relations: Basics of counting, Pigeonhole Princip	le, Permutation	n and
Combinations, Binomialcoefficients. Recurrence relations, Modeling wit	th recurrence rel	ations
with examples of Fibonacci numbersand the tower of Hanoi problem	n. Divide and Co	onquer
relations with examples (no theorems). Matrices: Definition, order of a m	atrix, types of ma	itrices,
operations on matrices, determinant of a matrix, inverse of	famatrix,rankofar	natrix,
applications of matrices to solve system of linear equations. Definition and type	sofrelations,	

Represent ingrelations using matrices and digraphs.

Unit-III:

14 Hours

GraphTheory:Graphs:Introduction,Representing

Graphs, GraphIsomorphism, Operationsongraphs. Trees: Introduction, Applications of Trees, Tree Traversal, Spanning Trees,

MinimumSpanningTrees,Prim'sandKruskul'sAlgorithms.Connectivity,EulerandHamiltonPaths,Pla narGraphs.Directedgraphs:Fundamentals of Digraphs, Out-degree,in-degree,connectivity, orientation,EulerianandHamiltondirectedgraphs,tournaments.

Text Books:

- 1. RalphP.Grimaldi:DiscreteandCombinatorialMathematics,5thEdition, PearsonEducation,2004.
- 2. C.L.Liu:ElementsofDiscreteMathematics,TataMcGraw-Hill,2000.
- 3. F.Harary: GraphTheory, AdditionWesley, 1969.
- 4. RichardBronson,Schaum'sOutlineofMatrixOperations,McGraw-Hillpublications,2ndEdition,2011

Reference:

- 1. KennethHRosen.DiscreteMathematicsanditsApplications,McGraw-Hillpublications,7th edition,2007.
- 2. J.P.TremblayandR.P.Manohar.DiscreteMathematicalStructureswithapplicationstoCo mputerScience,McGraw HillEd.Inc.1975.
- 3. CharlesGCullen.MatricesandLinearTransformations,DoverPublicationsInc.,SecondEdition,19 90

Course Code : BC1-T2

Discipline Core 2 Theory

Title: Programming in C

Lecture Hrs : 42 **Internal Marks : 40 Exam Marks : 60** Credits:3 **Course Description:** The course provides students to study of C programming language. The course lectures stress the strengths of C, which provides the outcome of writing efficient, maintainable and portable code. Course includes few lab exercises to make sure the student has not only gained the knowledge but can also apply and execute it.

Course Objectives:

To study about algorithms, flowcharts and programs. To solve problems through logical thinking.

Course Outcomes (Cos):

After completing this course satisfactorily, a student will be able to:

- 1. Confidently operate Desktop Computers to carry out computational tasks
- 2. Understand programming languages, number systems, peripheral devices, networking, multimedia and internet concepts
- 3. Read, understand and trace the execution of programs written in C language
- 4. Write the C code for a given problem
- 5. Perform input and output operations using programs in C
- 6. Write programs that perform operations on arrays

Unit-I:

Introduction to C Programming: Overview of C; History and Features of C;Structure of a C Program with Examples; Creating and Executing a C Program; Compilation process inC.

CProgrammingBasicConcepts:CCharacterSet;Ctokens-keywords,identifiers, constants, and variables; Data types; Declaration & initialization ofvariables; Symbolic constants.

Input and output with **C:** Formatted I/0 functions *printf* and scanf, controlstingsandescapesequences,outputspecificationswith*printf*functions;Unformatted I/O functions to read and display single character and a string *-getchar,putchar, gets*and*puts*functions.

Unit-II:

COperators&Expressions:Arithmeticoperators;Relationaloperators;Logical operators; Increment Assignment operators: Decrement operators;Bitwiseoperators;Conditionaloperator;Specialoperators;OperatorPrecedenceandA ssociatively; Evaluation of arithmetic expressions; Type conversion.

ControlStructures: DecisionmakingStatements-

Simpleif, if_else, nested if_else, else_ifladder, Switch Case, goto, break& continue statements; Looping Statements-Entrycontrolledandexitcontrolledstatements, *while, do-while, for* loops, Nested loops.

Unit-III:

DeriveddatatypesinC:Arrays:OneDimensionalarrays-

Declaration, Initialization and Memory representation; Two Dimensional arrays-Declaration, Initialization and Memory representation.

Strings: Declaring & Initializing string variables; String handling functions -strlen, strcmp, *strcpy and strcat*; Character handling functions - *toascii, toupper,tolower,isalpha,isnumeric*etc. **Unit-IV: 10 Hours**

PointersinC: Understandingpointers-Declaringandinitializingpointers, accessingaddressandvalueofvariablesusingpointers;PointersandArrays;PointerArithmetic;Ad vantages and disadvantages of using pointers.

11 Hours

11 Hours

10 Hours

User Defined Functions: Need for user defined functions; Format of C userdefined functions; Components of user defined functions - return type, name, parameter list, function body, return statement and function call; Categories of userdefined functions-Withand without parameters and return type.

Userdefineddatatypes:Structures-

StructureDefinition,AdvantagesofStructure,declaringstructurevariables,accessingstructurem embers,Structuremembersinitialization,comparingstructurevariables,ArrayofStructures;Unio ns-Uniondefinition;differencebetweenStructuresandUnions.

C Preprocessor directives, Macros – Definition, types of Macros, Creating and implementing user defined header files.

Files -File modes, File functions, and File operations, Text and Binary files, Command Line arguments.

Text Books:

- 1. C:TheCompleteReference,ByHerbertSchildt.
- 2. CProgrammingLanguage,ByBrainW.Kernighan
- **3.** Kernighan&Ritchie:TheCProgrammingLanguage(PHI)

Reference:

- 1. P.K.Sinha&PritiSinha:ComputerFundamentals(BPB)
- 2. E.Balaguruswamy:ProgramminginANSIC(TMH)
- 3. Kamthane:ProgrammingwithANSIandTURBOC (PearsonEducation)
- 4. V.Rajaraman:ProgramminginC(PHI EEE)
- 5. S.ByronGottfried:ProgrammingwithC(TMH)
- 6. YashwantKanitkar:LetusC
- 7. P.B.Kottur:ProgramminginC(SapnaBookHouse)

Course Code : BC1-T3

Title : Database Management System

Total No. of Teaching Hours: 42 Internal Marks: 40

No. of Hours per Week : 3 Exam Marks : 60 **Credits:3**

Discipline Core 3 Theory

Pedagogy: Classrooms lecture, Problem Solving, Case studies

Course Description:The course reviews topics such as conceptual data modelling, relational data model, relational query languages, relational database design and transaction processing. It exposes the student to the fundamental concepts and techniques in database use and development. **Course Objectives:**At the end of the course, the students will be able to: • Understand the basic concepts and the applications of database systems. • Master the basics of SQL and construct queries using SQL. • Understand the relational database design principles. • Familiar with the basic issues of transaction processing and concurrency control. • Familiar with database storage structures and access techniques.

Course Outcomes (Cos):

- 1. Have a broad understanding of database concepts and database management system software.
- 2. Have a high-level understanding of major DBMS components and their function.
- 3. Be able to model an application's data requirements using conceptual modeling tools like ER diagrams and design database schemas based on the conceptual model.
- 4. Able to write queries using SQL Server

Unit-I:

Databases and Database Users: Introduction, An example, Characteristics of the Database Approach, Actors on the Scene, Workers behind the Scene, Advantages of Using DBMS Approach, A Brief History of Database Applications, When Not to Use a DBMS.

Database System Concepts and Architecture: Data Models, Schemas, and Instances, Threeschema Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Centralized and Client-Server Architectures.

Unit-II:

Data Modelling Using Entity-Relationship Model:Using High-Level Conceptual Data Models for Database Design, An Example Database Application, Entity Types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types, Refining the ER Design Company Database Diagrams, Naming Conventions and Design. Issues, File organization and storage, secondary storage devices, type of single level ordered index, multi-level indexes, and indexes on multiple keys.

Unit-III:

Relational Model and Relational Algebra: 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, Additional Relational Operations, Examples of Queries in Relational Algebra.

Relational Database Design: Anomalies in a database, functional dependency, and normal forms, lossless join and dependency, BCNF.

Unit-IV:

SQL-SQL Data Definition and Data Types, Specifying Constraints in SQL, Schema Change Statements in SQL, Basic Queries in SQL, More Complex SQL Queries, Insert, Delete and Update Statements in SQL, Specifying Constraints as Assertion and Trigger, Views(Virtual Tables) in SQL, Embedded SQL, Dynamic SQL.

Introduction to transaction processing, Concurrency control techniques, Recovery techniques.

Text Books:

1. Elmasri and Navathe: Fundamentals of Database Systems, 7th Edition, Addison -Wesley, 2016.

2. Silberschatz, Korth and Sudharshan Data base System Concepts, 7th Edition, Tata McGraw Hill,

11 Hours

10 Hours

10 Hours

11 Hours

2019.

Reference:

1. C.J. Date, A. Kannan, S. Swamynatham: An Introduction to Database Systems, 8th Edition, Pearson education, 2009

2. Database Management Systems :Raghu Ramakrishnan and Johannes Gehrke: , 3rd Edition, McGrawHill, 2003

Course Code : BC1-P1 Discipline Core 1 Practical		
Title : Programming in C Lab		
Total No. of Teaching Hours: 42No. of Hours per Week : 4		
Internal Marks : 25 Exam Marks : 25 Credits: 2		
The course is designed to provide a practical exposure to the students. To solve		
problems through C Programs.		
Course Outcomes (Cos):		
Students acquire the knowledge to build the logic and develop a solution for a		
problem statement.		
List of Programs		
WriteandexecuteC programforthefollowing:		
1. toreadradius ofacircleandto findarea andcircumference		
2. toreadthreenumbersandfindtheolggestofthree		
4 to read a number find the sum of the digits reverse the number		
andcheckitforpalindrome		
5. to read numbers from keyboard continuously till the user presses999		
andtofindthesumofonly positivenumbers		
6. to read percentage of marks and to display appropriate		
message(Demonstrationofelse-ifladder		
7. tofindtherootsofquadraticequation		
8. to read marks scored by n students and find the average of		
9 toremoveDunlicateFlementingingle dimensionalArray		
10. toperformadditionandsubtractionofMatrices		
11. tofindfactorial ofanumber		
12. togenerateFibonacciseries		
13. toremoveDuplicateElementinasingledimensionalArray		
14. tofindthelengthof astringwithout usingbuiltinfunction		
15. todemonstratestringfunctions		
16. toread, display and add twom xnmatrices using functions		
17. to read a string and to find the number of alphabets, digits, vowels,		
18. toSwapTwoNumbers usingPointers		
19. to demonstrate student structure to read & display records of nstudents		
20. todemonstratethedifferencebetweenstructure&union.		

Course Code : BC1-P2Discipline Core 2 Practical			
Title : Database Management System Lab			
Total No. of Teaching Hours: 42No. of Hours per Week : 4			
Internal Marks : 25Exam Marks : 25Credits: 2			
Pedagogy:Classrooms lecture, Problem Solving , Case studies, Group discussion, Seminar field work etc.,			
Course Description:			
Advanced topics in database management and programming including client serv			
application development are introduced. Expands knowledge of data modeli concepts and introduces object-oriented data modeling techniques.			
Course Objectives:			
Students will learn the use of Structured Query Language in a variety of application			
and operating system environments. Technologies addressed in this course inclu			
SQL and relational database management systems such as MySQL, and SQL Server.			
Course Outcomes (Cos):			
Have a broad understanding of database concepts and database management syste			
software.			
Have a high-level understanding of major DBMS components and their function.			
Be able to model an application's data requirements using conceptual modeling too			
List of Programs			
PART- A 1. Draw E-R diagram and convert entities and relationships to relation table for a giv scenario.Twoassignmentsshallbecarriedouti.e.consider twodifferentscenarios(bank,college) ConsidertheCompanydatabasewithfollowingSchema EMPLOYEE (FNAME, MINIT, LNAME, SSN, BDATE,ADDRESS,SEX,SALARY, SUPERSSN,DN DEPARTMENT(DNAME,DNUMBER,MGRSSN,MSRSTARTDATE)DEPT_LOCATIONS(DNUMI R, DLOCATION) PROJECT (PNAME, PNUMBER, PLOCATION, DNUM)WORKS ON(ESSN, PNO.HOURS)			
DEPENDENT(ESSN, DEPENDENT_NAME, SEX, BDATE, RELATIONSHIP)			
2. Perform the following:			
Viewing all databases, Creating a Database, Viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table Saving (Commit) and Undoing (rollback)			
 Perform the following: Altering a Table, Dropping/Truncating/Renaming Tables, Backing up / Restoring a 			
 Database. 4. For a given set of relation schemes, create tables and perform the following Simp Queries, Simple Queries with Aggregate functions, Queries withAggregate functio (group by and having clause). 5. Execute the fallowing queries 			
How the resulting salaries if every employee working on the 'Research'Departments given a 10% raise.			
Find the sum of the salaries of all employees of the 'Accounts' department, as well as t			

maximum salary, the minimum salary, and the average salary in this department

 Execute the fallowing queries Retrieve the name of each employee Controlled by Department number 5 (use EXISTS operator). Retrieve the name of each dept and number of employees working in each Department

which has at least 2 employees

- Execute the fallowing queries
 For each project, retrieve the project number, the project name, and the number of
 employee who work on that project.(use GROUP BY)
 Retrieve the name of employees who born in the year 1990's
- 8. For each Department that has more than five employees, retrieve the department number and number of employees who are making salary more than 40000.
- 9. For each project on which more than two employees work, retrieve the project number, project nameand the number of employees who work on that project.
- 10. For a given set of relation tables perform the following: Creating Views (with and without check option), Dropping views, Selecting from a view

PARTB

1. Create the following tables with properly specifying Primary keys, Foreign keys and solve the following queries.

BRANCH (Branchid, Branchname, HOD) STUDENT (USN, Name, Address, Branchid, sem) BOOK (Bookid, Bookname, Authorid, Publisher, Branchid) AUTHOR (Authorid, Authorname, Country, age) BORROW (USN, Bookid, Borrowed_Date)

2. Perform the following:

Viewing all databases, Creating a Database, Viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)

- 3. Execute the following Queries:
 - a. List the details of Students who are all studying in 2nd sem BCA.
 - b. List the students who are not borrowed any books.
- 4. Display the USN, Student name, Branch_name, Book_name, Author_name, Books_Borrowed_ Date of 2nd sem BCA Students who borrowed books.
 - a. Display the number of books written by each Author.
 - b. Display the student details who borrowed more than two books.
 - c. Display the student details who borrowed books of more than one Author.
- 5. Display the Book names in descending order of their names.
 - a. List the details of students who borrowed the books which are all published by the same publisher.
- Consider the following schema: STUDENT (USN, name, date_of_birth, branch, mark1, mark2, mark3, total, GPA)

7. Perform the following:

Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)

- 8. Execute the following queries: Find the GPA score of all the students.
- 9. Find the students who born on a particular year of birth from the date_of_birth column.
 - a. List the students who are studying in a particular branch of study.
 - b. Find the maximum GPA score of the student branch-wise.

Course Code : GE1-CS1

Discipline Core 1 Theory

Open Elective: Journey into Fundamentals and C Programming concepts

Total No. of Teaching Hours: 42 No. of Hours per Week : 3 **Internal Marks : 60 Exam Marks : 40 Credits: 3**

Course Outcomes (Cos):

After completing this course satisfactorily, a student will be able to:

- Confidently operate Desktop Computers to carry out computational tasks
- Understand working of Hardware and Software and the importance of operating • systems
- Understand programming languages, number systems, peripheral devices. networking, multimedia and internet concepts
- Read, understand and trace the execution of programs written in C language •
- Write the C code for a given problem •
- Perform input and output operations using programs in C •
- Write programs that perform operations on arrays

Unit-I:

Fundamentals of Computers: Introduction to Computers -Hardware, software- System software, Application software, Utility software, Operating System; Computer Languages - Machine Level, Assembly Level & High-Level Languages, Translator Programs - Assembler, Interpreter and Compiler; Introduction to Free and Open Source Software, Definition of Computer Virus, Types of Viruses, Use of Antivirus software; Planning a Computer Program –Algorithmand Flowchart with Examples.

Unit-II:

Number System: Decimal Number System, Binary Number System, Octal Number System, Hexadecimal Number System, Number System Conversion: Binary to Decimal Conversion, Decimal to Binary Conversion, Octal to Decimal Conversion, Decimal to Octal Conversion, Hexadecimal to Decimal Conversion, Decimal to Hexadecimal Conversion

Unit-III:

Basics of Operating System: Definition of Operating System Objectives, types, and functions of Operating Systems Working with Windows Operating System: Introduction, The Desktop, Structure of Windows, Windows Explorer, File and Folder Operations, The Search, The Recycle Bin, Configuring the Screen, Adding or Removing New Programs using Control Panel, Applications in windows (Paint, Notepad, WordPad, Calculator)

Unit-IV:

Introduction to C Programming: Over View of C; History and Features of C; Structure of a C Program with Examples; Creating and Executing a C Program; Compilation process in C.

C Programming Basic Concepts: C Character Set; C tokens - keywords, identifiers, constants, and variables; Data types; Declaration & initialization of variables; Symbolic constants.

Input and output with C: Formatted I/O functions - printf and scanf, control stings and escape sequences, output specifications with printf functions; Unformatted I/O functions to read and display single character and a string - getchar, putchar, gets and puts functions.

Unit-V:

C Operators & Expressions: Arithmetic operators; Relational operators; Logical operators; Assignment operators; Increment & Decrement operators; Bitwise operators; Conditional operator; Special operators; Operator Precedence and Associatively; Evaluation of arithmetic expressions; Type conversion.

Control Structures: Decision making Statements - Simple if, if_else, nested if_else, else_if ladder,

10 Hours

8 Hours

6 Hours

10 Hours

8 Hours

Switch-case, goto, break &continue statements; Looping Statements - Entry controlled and Exit controlled statements, while, do-while, for loops, Nested loops.

TextBooks:

- 1. Pradeep K. Sinha and Priti Sinha: Computer Fundamentals (Sixth Edition), BPBPublication
- 2. E.Balgurusamy:ProgramminginANSIC(TMH)

References:

- 1. Kamthane:ProgrammingwithANSIandTURBOC(PearsonEducation)
- 2. V. Rajaraman: Programming in C (PHI EEE)
- 3. S.ByronGottfried:ProgrammingwithC(TMH)
- 4. Kernighan&Ritche:TheCProgrammingLanguage(PHI)
- 5. YashwantKanitkar: Let usC
- 6. P.B.Kottur:ProgramminginC(SapnaBookHouse)

Course Code :BC1-LK1 Discipline Core 1 Theory G¥À£Áå,ÀzÀ,ÀªÀÄAiÀÄ:52 DAvÀjPÀ ¥ÀjÃPÉëAiÀÄ CAPÀUÀ¼ÀÄ:52 CAwªÀÄ ¥ÀjÃPÉëAiÀÄ CAPÀUÀ¼ÀÄ:60 No. of Hours per Week : 4 Credits: 3		
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²Ã¶ðPÉ: ºÉÆ, ÀUÀ£ÀßgÀPÁªÀå ªÀÄvÀÄÛ PÀvÉUÀ¼ÀÄ		
¥ÀzÀåUÀ¼ÀÄ		
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PÀvÉUÀ¼ÀÄ 12UÀAmÉUÀ1/ÀÄ		
 CªÁ£Áw- PÉ.¦.¥ÁÆtðZÁAzÁæ vÉÃd¹é aÅÄÆqÅ® ¹ÃªÉÄð PÉÆ⁻ ÉV⁻ É ªÀÄÄAvÁV-zÉêÁ£ÀÆgÅÄ aÀã°ÀzÉêÁ PÀPÀgÀ£ÀAiÀÄÄUÁ¢-″É,ÀUÀgÀ°À½î gÁªÀÄtÚ @ÃUÀ ªÀÄvÀÄÛ ©ÃUÀzĂPÉÊ-AiÀıÀªÀAvÀavÁÛ® ,Å£ïD¥sï ¹zÀÝ¥Áàf-ªÀÄAdÄ£Áxï ®vÁ 		

Course Code : BC1-Lx1 Discipline Core 2Theory Title : Sanskrit-I

Total No. of Teaching Hours: 52No. of IInternal Marks : 40Exam Marks : 60

No. of Hours per Week : 4 ks : 60 Credits: 3

Course Objectives:Course Objective: The main objective of the course is to impart knowledge in classicallanguage through literature. The study trains learner in appreciating aesthetics. The study of Sanskrit poetry helps the student in sharpening creative abilities in all disciplines.

1	Paper Description	Poetry (Detailed text), Translation or Composition and Mahakavya
2	Text Prescribed	14th canto of Raghuvamsha of Kalidasa or 3rd canto of Kumarasambhava of Kalidasa.
3	Reference Books	Raghuvamsha of Kalidasa by C. Ramanathan, Subhas Publication. Raghuvamsa of Kalidasa by M.R.Kale, MotilalBanarasi Das. Raghuvamsa of Kalidasa, History of Sanskrit Literature, M.K Suryanarayan Rao

Course Code : BC1-Lx1 **Discipline Core 3 Theory** Title : ABILITY ENHANCEMENT COMPULSORY COURSE LANGUAGE (AECC) - L2 - GENERIC ENGLISH **Total No. of Teaching Hours: 52** No. of Hours per Week : 4 **Internal Marks : 40** Exam Marks : 60 Credits: 3 Pedagogy:Classrooms lecture, Problem Solving , Case studies, Group discussion, Seminar & field work etc., **Course Description:** The course is designed for one semester. The syllabus keeps in mind that the learner has to be equipped with technological skills related to the usage of language. It is also designed according to the learner's domain specific requirements. It equips the learner to enhance their creativity and become critical readers thereby helping them to express themselves better. **Course Objectives:** 1. To Acquire Listening, Speaking, Reading and Writing Skills. 2. To acquire skills of creativity to express oneself. 3. To develop their ability to become critical readers. 4. To become aware of different literary devices and genres. 5. To become socially aware. **Course Outcomes (Cos):** 6. 1. Acquire the LSRW (Listening, Speaking, Reading, Writing) skills 7. 2. Obtain the knowledge of literary devices and genres 8. 3. Acquire the skills of creativity to express one's experiences 9. 4. Know how to use digital learning tools **10. 5. Be aware of their social responsibilities** 11. 6. Develop their ability as critical readers and writers PART I-WORK BOOK- IMPRINTS-I Unit-I: Receptive Skills: Reading Skills and Listening Skills13 Hours **Chapter 1**: Comprehension passages (Skimming and Scanning) **Chapter 2:** Data Interpretation – Bar Graph, Pie Chart, Tree Diagram **Chapter 3**: Listening vs. hearing **Types of Listening** Chapter 4: Listening Activities - listening to pre-recorded audios on interviews and conversations. (Classroom Participation Activity) Unit-II: Productive Skills: Speaking Skills and Writing Skills21 Hours Chapter 5: Introducing oneself, Introducing others, Making Requests, Offering help, Congratulating,

Making Enquiries and Seeking permission

Chapter 6: Giving instructions to do a task and to use a device, Giving Directions

Chapter 7: Question Forms, Question Tags

Chapter 8: Subject - Verb Agreement, Derivatives

Part 2 - Course Book -IMPRINTS -118 Hours

Chapter 9: When Free Speech is Truly Free - SundarSarukkai

Chapter 10: Democracy: Langston Hughes

Chapter 11: Farewell Address at Chicago - Barack Obama

Chapter 12: The Unknown Citizen - W. H. Auden

Chapter 13: The Golden Dream - Poorna Chandra Tejaswi

Chapter 14: From a German War Primer - Bertolt Brecht

Course Code : BC2-T4Discipline Core 4 Theory
Title : COMPUTER ARCHITECTURELecture Hours : 42Internal Marks : 40Exam Marks : 60Credits: 3Course Description:This course introduces the principles of computer organization
and the basic architecture concepts. The course emphasizes working and
construction of various logic gates and combinational circuits, Processor working

and its instruction set , memory technology, memory hierarchy and I/O systems **Course Objectives:**

To conceptualize the basics of organizational and architectural of a digital computer. **Course Outcomes (Cos)**:

Be familiar with the history and development of modern computers. Be familiar with Number System and Boolean algebra. Be familiar with Combinational and logic circuits. Be familiar with organization and design of modern computer and its architecture. Be familiar with I/O organization and Memory organization

Unit-I:

11Hours

Number Systems: Binary, Octal, Hexa decimal numbers, base conversion, addition, subtraction of binary numbers, one's and two's complements, positive and negative numbers, character codes ASCII, EBCDIC. Computer Arithmetic: Addition and Subtraction, Multiplication and Division algorithms, Floating-point Arithmetic Operations, Decimal arithmetic operations. Structure of Computers: Computer types, Functional units, Basic operational concepts, Von-Neumann Architecture, Bus Structures, Software, Performance, Multiprocessors and Multicomputer, Digital Logic Circuits: Logic gates, Boolean algebra, Simplification. Combinational Circuits: Half Adder. Full Adder. Map flipflops.Sequentialcircuits:Shiftregisters,Counters,IntegratedCircuits,Mux,Demux,Encoder,D ecoder.Data representation: Fixed and Floating point.

Unit-II:

Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer Instructions and Instruction cycle. Timing and Control, Memory-Reference Instructions, Input-Output and interrupt. Central processing unit: Stack organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Complex Instruction Set Computer (CISC) Reduced Instruction Set Computer (RISC), CISC vs RISC

Unit-III: 10Hours

Register Transfer and Micro-operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logic shift unit. Micro-programmed Control: Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit. Input Output: I/O interface, Programmed IO, Memory Mapped IO, Interrupt Driven IO, DMA. Instruction level parallelism: Instruction level parallelism (ILP)-over coming data hazards, limitations of ILP

Unit-IV:

10Hours

Memory System: Memory Hierarchy, Semiconductor Memories, RAM(Random Access Memory), Read Only Memory (ROM), Types of ROM, Cache Memory, Performance considerations, Virtual memory, Paging, Secondary Storage, RAID. Multiprocessors And Thread level Parallelism: Characteristics of multiprocessors, Multi-Threaded Architecture, Distributed Memory MIMD Architectures, Interconnection structures.

Text Books:

- 1. Mano M Morris, "Computer System Architecture", 3rd edition Pearson India(2019).
- 2. William Stallings, "Computer Organization and Architecture designing for performance", 10th edition, Pearson(2016)

Reference:

3. SubrataGhoshal, "Computer Architecture And Organization", Pearson India(2011).

11Hours

- 4. Andrew S. Tanenbaum" Structured Computer Organization", 5th edition, Pearson Education Inc(2006).
- 5. Carl Hamacher, ZvonksVranesic,SafeaZaky, "Computer Architecture And Organization", 5th edition McGraw Hill New Delhi,India(2002).
- 6. Kai Hwang, "Advanced Computer Architecture Parallelism, Scalability, Programmability", Tata Mcgraw-Hill (2008).

Course Code : BC2-T5

Discipline Core 5 Theory Title : DATA STRUCTURES

Lecture Hours : 42Internal Marks : 40Exam Marks : 60Credits: 3Course Description:Course Description:Data Structure is one of the fundamentalunderstanding of programming and application development.Student is expected to worktowards a sound theoretical understanding of Data Structures and also compliment thesame with hands on implementing experience.

Course Objectives:

To be able to practically implement the data structures like stack, queue, array etc. To understand and implement different searching and sorting techniques.

Course Outcomes (Cos):

- 1. Understand the need for Data Structures when building application.
- 2. Appreciate the need for optimized algorithm.
- 3. Able to walk through insert and delete for different data structures.
- 4. Ability to calculate and measure efficiency of code .
- 5. Improve programming skills.

Unit-I:

Introduction and Overview: Definition, Elementary data organization, Data Structures, data Structures operations, Abstract data types, algorithms complexity, time-space trade off. Preliminaries: Mathematical notations and functions, Algorithmic notations, control structures, Complexity of algorithms, asymptotic notations for complexity of algorithms. Arrays: Definition, Linear arrays, arrays as ADT, Representation of Linear Arrays in Memory,Traversing Linear arrays, Inserting and deleting, Multi-dimensional arrays, Matrices and Sparse matrices

Unit-III:

Linked list: Definition, Representation of Singly Linked List in memory, Traversing a Singly linked list, Searching in a Singly linked list, Memory allocation, Garbage collection, Insertion into a singly linked list, Deletion from a singly linked list; Doubly linked list, Header linked list, Circular linked list. Stacks: Definition, Array representation of stacks, Linked representation of stacks, Stack as ADT, Arithmetic Expressions: Polish Notation, Conversion of infix expression to postfix expression, Evaluation of Post fix expression, Application of Stacks, Recursion, Towers of Hanoi, Implementation of recursive procedures by stack. Queues: Definition, Array representation of queue, Linked list representation of queue, Priority queue, Operations on Queues, Applications of queues.

Unit-III:

Binary Trees: Definitions, Tree Search, Traversal of Binary Tree, Tree Sort, Building a Binary Search Tree, Height Balance: AVL Trees, Contiguous Representation of Binary Trees: Heaps, Lexicographic Search Trees: Tries, External Searching: B-Trees, Applications of Trees. Graphs: Mathematical Back ground, Computer Representation, Graph Traversal, Topological Sorting

Unit-IV:

Searching: Introduction and Notation, Sequential Search, Binary Search, Comparison of Methods. Sorting: Introduction and Notation, Insertion Sort, Selection Sort, Shell Sort, Divide And Conquer, Merge sort for Linked List, Quick sort for Contiguous List. Hashing: Sparse Tables, Choosing a Hash function, Collision Resolution with Open Addressing, Collision Resolution by Chaining.

10Hours

10Hours

11Hours

11Hours

Text Books:

- 1. Seymour Lipschutz, "Data Structures with C", Schaum'soutLines, Tata McGraw Hill, 2011. 2.
- 2. Robert Kruse, C.L.Tondo, Bruce Leung, Shashi Mogalla, "Data Structures and Program Design using C", Pearson Education, 2009.

Reference:

- 7. Mark Allen Weiss," Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, 2013.
- 8. Forouzan, "A Structured Programming Approach using C", 2nd Edition, Cengage LearningIndia, 2008.

Course Code : BC2-T5

Discipline Core 5 Theory

Title : Object Oriented Programming with JAVA

Lecture Hours : 42 Internal Marks : 40 Exam Marks : 60 Credits: 3 Course Description: Java is one of the most popular programming languages used to create Web applications and platforms. It was designed for flexibility, allowing developers to write code that would run on any machine, regardless of architecture or platform. Course Objectives:

Its main objective is to teach the basic concepts and techniques like classes, objects, interfaces, exceptions and libraries of object collections which form the object oriented programming paradigm.

Course Outcomes (Cos):

After completing this course satisfactorily, a student will be able to:

- Understand the features of Java and the architecture of JVM
- Write, compile, and execute Java programs that may include basic data types and control flow constructs and how type casting is done
- Identify classes, objects, members of a class and relationships among them needed for a specific problem and demonstrate the concepts of polymorphism and inheritance
- The students will be able to demonstrate programs based on interfaces and threads and explain the benefits of JAVA's Exceptional handling mechanism compared to other Programming Language
- Write, compile, execute Java programs that include GUIs and event driven programming and alsoprograms based on files

Unit-I:

11Hours

Fundamentals of Object Oriented Programming: Introduction, Object Oriented Paradigm, BasicConcepts of OOP, Benefits and Applications of OOP.

Introduction to Java: Java Features, Java Environment, Simple Java Program, Java ProgramStructure, Java Tokens, Java Statements, Java Virtual Machine.

Java Programming Basics: Constants, Variables, Data Types, Declaration of variables, Givingvalues to the variable, Scope of variables, Symbolic constants, Type casting.

Operators and Expressions: Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operator, Increment and Decrement Operators, Conditional Operator, Special Operators, Mathematical functions.

Using I/O: Byte streams and character streams, predefined streams, reading console input, readingcharacters, strings, writing console output.

Decision Making & Branching: Simple if statement, if..else statement, nesting of if..elsestatement,theelse..if ladder, the Switch statement.

Unit-II

11 Hours

Decision making & Looping -The while statement, the do statement, the for statement. Jumps in loops, Labelled loops.

Class & Objects - Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The 'this' keyword, Overloading Methods, Using Objects as Parameters, Returning Objects, Recursion, Understanding 'static', Introducing 'final ', Using Command-Line Arguments, Varargs : Variable-Length Arguments **Arrays and Strings:** One dimensional arrays, Creating an arrays, Two dimensional arrays, Strings, Vectors, Wrapper classes.

Unit-III

10 Hours

Inheritance - Inheritance Basics, Using 'super', Creating Multilevel hierarchy, Method Overriding, Using Abstract Classes, Using final with Inheritance.

Packages & Interfaces - Packages, Access protection in packages, Importing Packages, Interfaces.

Exception Handling - Exception Handling Fundamentals – Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch clauses, Nested try statements, throw, throws, finally, Java's builtin Exceptions

Unit-IV:

10 Hours

Multithreaded Programming- Introduction, Creating threads, Extending the thread class, stopping & blocking thread, Life cycle of a thread, Using thread methods, Implementing the runnable interface.

Event and GUI programming: The Applet Class, Types of Applets, Applet Basics, Applet Architecture, An Applet Skeleton, Simple Applet Display Methods, Requesting Repaint, The HTML APPLET tag. Event Handling - The delegation event model, Event Classes – ActionEvent, KeyEvent&MouseEvent Classes, Event Listener Interfaces –ActionListener, KeyListener&MouseListener interfaces. Using the Delegation Event Model. Window Fundamentals, Working with Frame Windows, Creating a Frame Window in an Applet. Creating a Windowed Program, Displaying information within a window. Introducing swing – two key swing features, components and containers, the swing packages, a simple swing application, event handling. Exploring Swing- Jlabel, JTextField, JButton, Checkboxes , Radio buttons , Jlist , JComboBox.

TextBooks:

- 1. E Balagurusamy, Programming with Java A Primer, Fourth Edition, Tata McGraw Hill Education Private Limited.
- 2. Herbert Schildt, Java : The Complete Reference, Seventh Edition, McGraw Hill Publication.

Reference:

- 1. Herbert Schildt, Java 2 The Complete Reference, Fifth Edition, McGraw Hill publication.
- 2. Cay S. Horstmann, Core Java Volume I Fundamentals, Prentice Hall.
- 3. Somashekara, M.T., Guru, D.S., Manjunatha, K.S, Object Oriented Programming with Java, EEE Edition, PHI.

	Course Code : BC2-P2 Discipline Core 3 Practical		
	Title : Data Structures Lab Programs		
	No Internal Marka - 25	. of Hours per Week : 4	Credite: 2
	Internal Marks : 25	Exam Marks : 25	creatts: 2
 Course Objectives/Course Description The course is designed to provide a practical exposure to the students. Learning Outcome Upon completion of the course, the students acquire the knowledge to build the logic and develop a solution for a problem statement. NOTE: For all the programs write the output, flowchart and number of basic operations performed. 1. Given {4,7,3,2,1,7,9,0} find the location of 7 using Linear and Binary search and also display its firstoccurrence. 			
2.	Given {5,3,1,6,0,2,4} order the Algorithm	e numbers in ascending order u	sing Bubble Sort
3.	3. Perform the Insertion and Selection Sort on the input {75,8,1,16,48,3,7,0} and display the output indescending order.		
4.	Write a program to insert the elements {61,16,8,27} into singly linked list and delete 8,61,27 from thelist. Display your list after each insertion and deletion.		
5.	5. Write a program to insert the elements {61,16,8,27} into linear queue and delete three elements from thelist. Display your list after each insertion and deletion.		
6.	Write a program to insert th delete 4 elements from the deletion.	e elements {61,16,8,27} into cir list. Display your list after eac	cular queue and h insertion and
7.	Write a program to insert the list and delete 8,61,27from the deletion.	elements {61,16,8,27} into orde ne list. Display your list after ea	red singly linked ch insertion and
8.	Write a program to add 6x3+1	0x2+0x+5 and 4x2+2x+1 using lin	nked list.
9.	9. Write a program to push 5,9,34,17,32 into stack and pop 3 times from the stack, also display the poppednumbers.		
10	10.Write a recursive program to find GCD of 4,6,8.		
11	11.Write a program to inert the elements {5,7,0,6,3,9} into circular queue and delete 6,9&5 from it(usinglinked list implementation).		
12		an infix expression $x^y/(5*z)$ -	⊦2 to its postfix

expression

- 13.Write a program to evaluate a postfix expression 5 3+8 2 *.
- 14.rite a program to create a binary tree with the elements {18,15,40,50,30,17,41} after creation insert 45and 19 into tree and delete 15,17 and 41 from tree. Display the tree on each insertion and deletionoperation
- 15.Write a program to create binary search tree with the elements {2,5,1,3,9,0,6} and perform inorder, preorder and post order traversal.
- 16.Write a program to Sort the following elements using heap sort {9.16,32,8,4,1,5,8,0}
- 17.Given S1={"Flowers"} ; S2={"are beautiful"} I. Find the length of S1 II. Concatenate S1 and S2 III.Extract the substring "low" from S1 IV. Find "are" in S2 and replace it with "is

Course Code : BC2-P2	Discipline Core 4 Practical	
Title : Java Lab		
No. of Hours per Week : 4		
Internal Marks : 25	Exam Marks : 25	Credits: 2

Course Objectives/Course Description

In this hands-on course, students gain extensive experience with Java and its object-oriented features. Students learn to create robust console and GUI applications and store and retrieve data from relational databases. Students will learn how to write, compile and execute Java programs.

Learning Outcome

Upon completion of the course, the students acquire the knowledge to build the suitable logic for solving the problem. Students can create a software application, test, document and prepare a professional looking package for each project.

PART-A

- 1. Program to accept student name and marks in three subjects. Find the total marks, average and grade (depending on the average marks).
- 2. A menu driven program to input two integers & an operator to perform basic arithmetic operations (+ ,-,* and /) using switch case structure.
- 3. Program, which reads two numbers having same number of digits. The program outputs the sum of product of corresponding digits.(Hint Input 327 and 539 output 3x5+2x3+7x9=84)
- 4. Program to input Start and End limits and print all Fibonacci numbers between the ranges.(Use for loop)
- 5. Define a class named Pay with data members String name, double salary, double da, double hra, double pf, double grossSal, double netSal and methods: Pay(String n, double s) Parameterized constructor to initialize the data members, void calculate() to calculate the following salary components, and void display() to display the employee name, salary and all salary components.
 - i. Dearness Allowance = 15% of salary
 - ii. House Rent Allowance = 10% of salary
 - iii. Provident Fund = 12% of salary
 - iv. Gross Salary = Salary + Dearness Allowance + House Rent Allowance Net Salary = Gross Salary - Provident Fund
- 6. Write a main method to create object of the class and call the methods to compute and display the salary details.
- 7. Program to create a class DISTANCE with the data members feet and inches. Use a constructor to read the data and a member function Sum () to add two distances by using objects as method arguments and show the result. (Input and output of inches should be less than 12.)

- 8. Program to check whether the given array is Mirror Inverse or not.
- 9. Program to create a class "Matrix" that would contain integer values having varied numbers of columns for each row. Print row-wise sum.
- 10.Program to extract portion of character string and print extracted string. Assume that 'n' characters extracted starting from mth character position..
- 11. Program to add, remove and display elements of a Vector

PART-B

- 12. Create a class named 'Member' having data members: Name, Age, PhoneNumber, Place and Salary. It also has a method named 'printSalary' which prints the salary of the members. Two classes 'Employee' and 'Manager' inherit the 'Member' class. The 'Employee' and 'Manager' classes have data members 'specialization' and 'department' respectively. Now, assign name, age, phone number, address and salary to an employee and a manager by making an object of both of these classes and print the same.
- 13.Program to implement the following class hierarchy: Student: id, name
 - a. StudentExam (derived from Student): Marks of 3subjects, total marks
 - b. StudentResult (derived from StudentExam) : percentage, grade

Define appropriate methods to accept and calculate grade based on existing criteria and display details of N students

- 14.Program to calculate marks of a student using multiple inheritance implemented through interface. Class Student with data members rollNo, name, String cls and methods to set and put data. Create another class test extended by class Student with data members mark1, mark2, mark3 and methods to set and put data. Create interface sports 33 | P a g e with members sportsWt = 5 and putWt(). Now let the class results extends class test and implements interface sports. Write a Java program to read required data and display details in a neat format.
- 15.Program to create an abstract class named shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Ellipse such that each one of the classes extends the class shape. Each one of the class contains only the method print Area() that print the area of the given shape.
- 16.Create a package to convert temperature in centigrade into Fahrenheit, and one more package to calculate the simple Interest. Implement both package in the Main () by accepting the required inputs for each application.

17.Program that implements a multi-threaded program has three threads. First

thread generates a random integer every second, and if the value is even, second thread computes the square of the number and prints. If the value is odd the third thread will print the value of cube of the number.

- 18. Program to create a window when we press M or m the window displays Good Morning, A or a the window displays Good After Noon E or e the window displays Good Evening, N or n the window displays Good Night
- 19.Program that creates a user interface to perform basic integer operations. The user enters two numbers in the TextFields Num1 and Num2. The result of operations must be displayed in the Result TextField when the "=" button is clicked. Appropriate Exception handling message to be displayed in the Result TextFieldwhen Num1 or Num2 is not an integer or Num2 is Zero when division operation is applied.
- 20.Program to accept the employee name, employee number and basic salary as inputs and find the gross and net salaries on the following conditions
 - a. if Salary <= 20000 D.A is 40% Salary; H.R.A is 10% Salary. P.F 12% of Gross; PT is Rs .100
 - b. if Salary > 20000 D.A is 50% of salary ; H.R.A 15% of salary P.F 12% of Gross ; PT is Rs.150
 - c. Gross = basic salary +D.A +HRA and Net = Gross -PT –PF
- 21.Using the swing components, design the frame for shopping a book that accepts book code, book name, and Price. Calculate the discount on code as follows.

Code	Discount Rate
101	15%
102	20%
103	25%
Any other	5%

Find the discount amount and Net bill amount. Display the bill

Course Code : GE2-CS2 Discipline Core 2 Theory			
Title : Open Elective -E Commerce			
Lecture Hours : 42Internal Marks : 40Exam Marks : 60Credits: 3			
Internal marks riceExamination of the orders of the courseCourse Objectives:This course will introduce students to the fundamental concepts underlying modern computer organization and architecture. Main objective of the course is to familiarize students about hardware design including logic design, basic structure and behavior of the various functional modules of the computer and how they interact to provide the processing needs of the user. The emphasis is on studying Internet, network and ecommerce architecture design and their impact on performance.Course Outcomes: The students will be able to understand the basics of computer hardware and how software interacts with computer hardware; To understand Basics of Internet, network and ecommerce structures & its functions.			
Definition, Characteristics and limitations of computers- Hardware and softwareData and Information: Types of data, Simple Model of computerComputer applications- data processing, information processing, commercial, officeAutomation, industry and engineering, healthcare, education, graphics and multimedia.Unit - II :Network of computersTypes of networks. LAN, intranet and Internet, Internet applications, E-mail browsing andsearching. Search engines. Multimedia applications.			
Unit - III :Internet and Internet application9 HoursIntroduction, Internet evolution, Working of Internet, Use of Internet, Overview of WorldWide Web (Web Server and Client),Introduction to Search engine and Searching the Web,Downloading files, Introduction to Web Browsers, Working with E-mail (creation and useof the same).Unit-IV :Business Information systems			
Introduction, Types of Information needed by Organizations, Uses of computers, Management Structure and their Information needs, Design of an operational information system, System life Cycle, Computer System for Transaction Processing. Unit-V :Electronic Commerce 9 Hours Introduction, Business to Customer E-Commerce, Business to Business E-Commerce, Customer to Customer E-Commerce, Advantages and disadvantages of E-Commerce, E- Commerce System Architecture, Digital Signature, Payment schemes in E-Commerce, Electronic clearing service, Cash Transactions, Payment in C2C, Electronic data interchange.			
 TEXT BOOKS 1. Fundamentals of Computers, Rajaraman .V 2. Introduction to Information Technology, second edition, V.Rajaraman REFERENCES BOOKS 1. Computers for everyone, Vikas UBS 2. Computer Fundamentals, BPB Pub. 			

Course Code :BC2-LK2 Discipline Core 4 Theory G¥À£Áå,ÀzÀ,ÀªÀÄAiÀÄ:52 DAvÀjPÀ ¥ÀjÃPÉëAiÀÄ CAPÀUÀ¼ÀÄ:52 CAwªÀÄ ¥ÀjÃPÉëAiÀÄ CAPÀUÀ¼ÀÄ:60
No. of Hours per Week : 4 Credits: 3
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PÀvÉUÀ¼ÀÄ 12UÀAmÉUÀ¼ÀÄ
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Course Code : BC2-Lx2

Discipline Core 4Theory

Title : Sanskrit-II

Total No. of Teaching Hours: 52No. of Hours per Week : 4Internal Marks : 40Exam Marks : 60Credits: 3Course Objectives: The main objective of the course is to impart knowledge in classical language
through literature. The study trains learner in appreciating aesthetics. The study of Sanskrit poetry
helps the student in sharpening creative abilities in all disciplines.

Course content:

1	Paper Description	Prose(Detailed Text), Translation or	
		Composition Prose	
2	Text Prescribed	Kadambari of Bana	
3	Reference Books	Kadambari of Bana by M.K Surya Narayana Rao, SubhasPublications.Kadambari of Bana. BannajeGovinda Acharya (Kannada Translation).	

Course Code : BC2-Lx2 Dis	cipline Core 6 Th	eory
Title :ABILITY ENHANCEMENT COMPULSORY COURSE LA	ANGUAGE (AECC) - L2 - (GENERIC ENGLISH-II
Total No. of Teaching Hours: 52	No. of Hours per	Week:4
Internal Marks : 40 Exam M	larks : 60	Credits: 3
Pedagogy:Classrooms lecture, Problem Solving , Cas	se studies, Group disc	ussion, Seminar &
field work etc.,		
Course Description: The course is designed for one sem	ester. The syllabus kee	ps in mind that the
learner has to be equipped with technological skills related	to the usage of languag	e. It is also designed
according to the learner's domain specific requirement	s. It equips the learne	r to enhance their
creativity and become critical readers thereby helping them	to express themselves b	oetter.
Course Objectives:		
1. To Acquire Listening, Speaking, Reading and Writir	ıg Skills.	
2. To acquire skills of creativity to express oneself.		
3. To develop their ability to become critical readers.		
4. To become aware of different literary devices and	genres.	
Course Outcomes (Cos):		
1. Acquire the LSRW (Listening, Speaking, Reading, Wri	ting) skills	
2. Obtain the knowledge of literary devices and genres		
3. Acquire the skills of creativity to express one's exper	iences	
4. Know how to use digital learning tools		
5. Be aware of their social responsibilities		
6. Develop their ability as critical readers and writers		
PART I-WORK BOOK- IMPRINTS-I		
Unit-I: Receptive Skills: Reading Skills and Listening S	kills	16 Hours
Chapter 1: Reading Skills - Types of Comprehension, (Global, Factual and In	ferential
Read the passage, Identify the theme and suggest a tit	ile	
Chapter2:Vocabulary Building - Synonyms, anto	nyms, prefixes, suff	īxes, homonym,
homophones and collocations		
Chapter 3: Cloze Test		
(Articles, Preposition, Linkers, Verbs, Adverbs)		
Chapter 4:Listening Skills – types of Listening		
Unit-II: Productive Skills: Speaking Skills and Writing	Skills	15 Hours
Chapter 5:Reported speech		
Chapter 6: Dialogue writing		
Chapter 7 : Verbal and non-verbal communication		
Chapter 8: Introduction to Science writings		
Chapter 9: Introducing the Guest, Welcome speech. Vo	te of thanks	

Part 2- Course Book -IMPRINTS -II

Chapter 10:Britain Does Owe Reparations - Dr. ShashiTharoor
Chapter 11:Celebrity - Brad Paisley
Chapter 12:A Question of English - RamachandraGuha
Chapter 13:Except Richer - Ogden Nash
Chapter 14:Hayavadana-An Excerpt - GirishKarnad

21 Hours