RCMAS
RAJAGIRI COLLEGE OF MANAGEMENT & APPLIED SCIENCES
A CMI Institution

RAJAGIRI COLLEGE
OF MANAGEMENT & APPLIED SCIENCES

Rajagiri Valley P O, Kakkanad - 682 039
Affiliated to Mahatma Gandhi University, Kottayam

0484 2955270, 9048899926, 9846875467 *www.rajagiricollege.edu.in, office@rajagiricollege.edu.in*

Programme File

Department of Computer Science

LEARN
SERVE
EXCEL

Index

1. Department Profile

About the Department

The Department of Computer Science started modestly in 2011 with just four members, initially catering to the BCA program's teaching needs. It has since expanded into a comprehensive department, now equipped with modern laboratories for both undergraduate and postgraduate studies, ensuring efficient and effective theoretical and practical sessions.

The department offers six add-on courses to further enrich students' knowledge and skills. It also hosts an annual IT festival named Dextra, which features a variety of technology-related events. Regular workshops on robotics, artificial intelligence, and other advanced topics are conducted to keep students updated with the latest technological trends. Additionally, the department participates in numerous CSR activities to promote social responsibility among students.

To strengthen the link between academic learning and industry practices, the department organizes industrial interaction programs and supports students in undertaking real- time projects. The department has also signed several Memorandums of Understanding (MoUs) with leading tech companies and organizations to facilitate internships, research collaborations, and knowledge exchange.

In 2024, the department was elevated to a postgraduate level with the introduction of the M.Sc. Artificial Intelligence course.

1.1 Department Vision

To be renowned itself as a reputed body in IT and IT integrated education and research aimed towards betterment of the society.

1.2 Department Mission

Provide quality education to acquire leadership qualities and computing skills to meet industry standards with research-oriented development by inculcating ethical responsibilities.

2. Programmes Offered By the Department

- Bachelor of Computer Applications

Details of Programme offered by the department

Programme name: BCA

Courses offered:

- Core courses : Computer Application
- Complementary Courses : Mathematics and Statistics
- Common courses : English
- Open course : Any course offered by the college other than core course
- Choice based courses : Elective course
- Project : Two Projects; One Main and One Mini Projects

The programme contains 28 core courses, 5 complementary courses, 2 common courses, 1 open course, 1 choice-based course and 2 projects.

Course curriculum:

Choice Based Credit System (CBCS- UG)

Programme Objectives

The Bachelor of Computer Applications (BCA) program aims to provide a solid foundation in computer science, focusing on programming, data structures, algorithms, and database management. It develops technical proficiency in multiple programming languages, web technologies, and software development. The program emphasizes practical experience through labs, projects, and internships, enhancing problem-solving skills and analytical thinking. Ethical principles, effective communication, and professional standards are integral, fostering integrity and

responsibility. The curriculum encourages lifelong learning, adaptability to emerging technologies, and interdisciplinary knowledge, preparing students for diverse IT careers and contributions to society.

Course Objectives

The Bachelor of Computer Applications (BCA) program aims to equip students with a robust foundation in computer science and its applications.

By the end of semester 2 students will be developing proficiency in programming languages like C, Java, and Python, and understand data structures, algorithms, and database management. The curriculum emphasizes hands-on experience through labs, projects, and internships, ensuring practical application of theoretical knowledge.

By the end of semester 4 students will learn web programming concepts, software engineering principles, and operating systems, gaining skills to design, develop, and manage software projects. Analytical skills and problem-solving abilities are enhanced, preparing students to tackle complex computing challenges. Ethical principles, professional standards, and effective communication skills are emphasized to instill integrity and responsibility.

By the end of semester 6, students will be introduced to mobile application development, cybersecurity, and cloud computing, providing a comprehensive understanding of contemporary IT environments. Interdisciplinary integration and global awareness are promoted, enabling students to apply computing solutions across various fields and appreciate cultural diversity. A capstone project consolidates their learning, showcasing their ability to work in teams and manage projects effectively.

RAJAGIRI VALLEY P.O., KAKKANAD, KOCHI - 682 039
Ph: 0484-2955270
Email: principal@rajagiricollege.edu.in
www.rajagiricollege.edu.in

2.1 PO (Programme outcome) –

PO1: Domain Knowledge: Our graduates will be able to apply knowledge with practicality and conceptual clarity.

PO2: Reflective response to socio-ethical issues: Our graduates will be able to identify and solve socio-ethical challenges.

PO3: Entrepreneurship: Our graduates are influenced to invent and build their firm.

PO4: Problem-solving: Our graduates can evaluate and solve complex situations by acquired knowledge.

PO5: Decision making: Our graduates will apply critical thinking and logical reasoning to assess the potential outcomes of different choices.

PO6: Communication: Our graduates can make use of effective communication skills for interaction in personal and professional environments.

PO7: Creative thinking: Our graduates will develop an ability to think creatively

Programme Specific Outcomes (PSO) – BCA

PSO1: Our graduates are able to understand the various parts of a computer.

PSO2: Our graduates are able to apply mathematical knowledge, algorithmic concepts and various programming languages to solve problems logically.

PSO3: Our graduates are able to design and create software to address real world issues which satisfies industrial demands.

3. Programme Structure

3.1 Programme details at a glance

Programme Duration	**6 Semesters**
Total Credits required for successful completion of the Programme	120
Credits required from Common Course I	8
Credits required from Core course (including Project) and Complementary courses	109
Credits required from Open course	3
Minimum attendance required	75%

Programme Structure details:

Semester	Title with course code	Hrs/ week	credit	Internal mark	External mark	Total mark
I	Common Course - English	5	4	20	80	100
	Complementary Course - Mathematics	4	4	20	80	100
	Complementary Course - Mathematics	4	4	20	80	100
	Core Course - Computer	4	4	20	80	100
	Core Course - Computer	4	3	20	80	100
	Core Course - Computer	**4**	2	20	80	100
II	Common Course - English	5	4	20	80	100
	Complementary Course - Mathematics	4	4	20	80	100
	Core Course - Computer	4	3	20	80	100
	Core Course - Computer	4	4	20	80	100
	Core Course - Computer	3	4	20	80	100
	Core Course - Computer	**5**	2	20	80	100
	Complementary Course – Mathematics	4	4	20	80	100

III	Core Course - Computer	4	4	20	80	100
	Core Course - Computer	3	4	20	80	100
	Core Course - Computer	4	4	20	80	100
	Core Course - Computer	4	3	20	80	100
	Core Course - Computer	**6**	2	20	80	100
IV	Complementary Course - Mathematics	4	4	20	80	100
	Core Course - Computer	4	4	20	80	100
	Core Course - Computer	4	4	20	80	100
	Core Course - Computer	4	4	20	80	100
	Core Course - Computer	3	3	20	80	100
	Core Course - Computer	**6**	2	20	80	100
V	Core Course - Computer	3	4	20	80	100
	Core Course - Computer	4	4	20	80	100
	Core Course - Computer	3	3	20	80	100
	Core Course -Open Course	4	3	20	80	100
	Core Course - Computer	**5**	2	20	80	100
	Core Course - Computer	**6**	2	20	80	100
VI	Core Course - Computer	4	4	20	80	100
	Core Course - Computer	4	4	20	80	100
	Core Course - Elective	4	4	20	80	100
	Core Course - Computer	**6**	2	100	-	100
	Core Course - Computer	**7**	3	20	80	100
	Core Course - Computer		1	-	100	100

3.2 Courses in details at a glance:

Common Course: English

Semester	Title with Course Code	Hrs./ week	Credit	Internal Mark	External Mark	Total Mark
I	English-I	5	4	20	80	100
II	English-II	5	4	20	80	100

Core Course: Computer

Semester	Title with Course Code	Hrs./week	Credit	Internal Mark	External Mark	Total Mark
I	CA1CRT01 - Computer Fundamentals And Digital Principles	4	4	20	80	100
	CA1CRT02- Methodology of Programming and C Language	4	3	20	80	100
	CA1CRP01- Software LabI (Core)	4	2	20	80	100
II	CA2CRT03 -Data Base Management	4	3	20	80	100
	CA2CRT04- Computer Organization and Architecture	4	4	20	80	100
	CA2CRT05-Object Oriented programming using C++	3	4	20	80	100
	CA2CRP02- Software Lab- II	5	2	20	80	100
	CA3CRT06 - Computer Graphics	4	4	20	80	100
	CA3CRT07-	3	4	20	80	100

III	Microprocessor and PCHardware					
	CA3CRT08-Operating Systems	4	4	20	80	100
	CA3CRT09-Data Structure using C++	4	3	20	80	100
	CA3CRP03-Software Lab III	6	2	20	80	100
IV	CA4CRT10-Design and Analysis of Algorithms	4	4	20	80	100
	CA4CRT11-System Analysis & Software Engineering	4	4	20	80	100
	CA4CRT12-Linux Administration	4	4	20	80	100
	CA4CRT13-Web Programming usingPHP	3	3	20	80	100
	CA4CRP04-Software Lab IV	6	2	20	80	100
	CA5CRT14-Computer Networks	3	4	20	80	100

V	CA5CRT15-IT and Environment	4	4	20	80	100
	CA5CRT16-Java Programming usingLinux	3	3	20	80	100
	CA5OPT-- Open Course	4	3	20	80	100
	CA5CRP05 - Software-Lab V	5	2	20	80	100
	CA5CRP06-Software Development Lab I (Mini Project in PHP)	6	2	20	80	100
VI	CA6CRT17 - Cloud Computing	4	4	20	80	100
	CA6CRT18-Mobile Application development - Android	4	4	20	80	100
	CA6PET-- - Elective	4	4	20	80	100
	CA6CRP07 – SoftwareLab VI & Seminar	6	2	100	-	100
	CA6CRP08 - Software Development Lab	7	3	20	80	100

	II(Main Project)					
	CA6VVT01-Viva Voce		1	-	100	100

Complimentary Course: Mathematics and Statistics

Semester	Title with Course Code	Hrs./ week	Credit	Internal Mark	External Mark	Total Mark
I	Mathematics	4	4	20	80	100
II	Basic Statistics	4	4	20	80	100
III	Discrete Mathematics	4	4	20	80	100
	Advanced Statistical Methods	4	4	20	80	100
IV	Operational Research	4	4	20	80	100

4. Course Plan in Detail

4.1 Semester I

Common Course: English

Course Code	EN1CCT01					
Course Title	English- Fine Tune Your English					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	1					
Course Type	Common Course					
Credit	4	Hrs/Week	5	Total Hours	90	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Define strategic difference between spoken and written language.				R	PO6
CO2	Illustrate adequate linguistic competence to communicate in accurate English.				U	PSO2
CO3	Appraise grammar as a tool in devising appropriate oral and written discourse in real life or specific contexts.				E	PO6
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

This course provides a comprehensive study of English sentence structure and word classes. Topics include effective sentence construction, various types of clauses, and the use of verbs, adverbs, pronouns, and articles, aimed at enhancing grammatical proficiency and writing skills

Detailed Syllabus

Section A: The Sentence and its Structure

Chapter One: How to Write Effective Sentences

Chapter Two: Phrases—What are They?

Chapter Three: The Noun Clauses

Chapter Four: The Adverb Clause

Chapter Five: "If All the Trees Were Bread and Cheese"

Chapter Six: The Relative Clause

Chapter Seven: How Clauses are conjoined

Section B: Word-Classes and Related Topics

Chapter Eight: Understanding the Verb

Chapter Nine: Understanding Auxiliary Verbs

Chapter Ten: Understanding Adverbs

Chapter Eleven: Understanding Pronouns

Chapter Twelve: The Reflexive Pronoun

Chapter Thirteen: The Articles I

Chapter Fourteen: The Articles Ii

Chapter Fifteen: The Adjective

Chapter Sixteen: Phrasal Verbs

Chapter Seventeen: Mind Your Prepositions

Section C: To Err Is Human

Chapter Eighteen: Concord

Chapter Twenty: Errors, Common and Uncommon

Chapter Twenty-One: False Witnesses

Section D: The World of Words

Chapter Thirty-Two: Word Formation

Chapter Thirty-Three: Using the Specific Word

Chapter Thirty-Seven: Body Vocabulary

Section G: Tense and Related Topics

Chapter Forty-Seven: 'Presentness' and Present Tenses

Chapter Forty-Eight: The 'Presentness' Of a Past Action

Chapter Forty-Nine: Futurity in English

Chapter Fifty: Passivisation

Section H: Idiomatic Language

Chapter Fifty-One: 'Animal' Expressions

Chapter Fifty-Two: Idiomatic Phrases

Section I: Interrogatives and Negatives

Chapter Fifty-Five: Negatives

Chapter Fifty-Six: How to Frame Questions

Chapter Fifty-Seven: What's what?

Chapter Fifty-Eight: The Question Tag

Section J: Conversational English

Chapter Sixty-Two: Is John There Please?

Section K: Miscellaneous and General Topics

Chapter Seventy-Three: Letter Writing

In addition, there will be an essay question on a general topic.

Core Text:

Fine-tune Your English by Dr Mathew Joseph. Orient Blackswan and Mahatma Gandhi University.

Complementary Course: Discrete Mathematics – I

Course Code	MM1CMT03					
Course Title	Discrete Mathematics - I					
Department	Computer Science					
Programme	Bachelor of Computer Applications					
Semester	1					
Course Type	Complementary Course					
Credit	4	Hrs/Week	4	Total Hours	72	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Understand sets and set operations, functions, countable & uncountablesets, Division Algorithm, Congruence relation & Cryptology				U	PO1
CO2	Understand relations and the concept of equivalence & partial order relationsand Lattices, Logical statements, Rule of inference & arguments				U	PO1
CO3	Solve problems in Discrete Mathematics related to above topics.				Ap	PO4
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

This course covers foundational topics in discrete mathematics, including propositional logic, set theory, functions, sequences, and summations. It also explores

number theory, cryptosystems, and the properties and representations of relations.

Detailed Syllabus

Module 1: Logic (18 hrs.) Propositional Logic, Propositional Equivalence, Predicates andQuantifiers and Rules of Inference Chapter 1 (Sections 1.1, 1.2, 1.3 and 1.5only)

Module II: Basic Structures (15 hrs.) Sets, Set Operations, Functions, Sequences and Summations Chapter 2 (Sections 2.1, 2.2, 2.3 and 2.4)

Module III: Number Theory and Cryptosystem (20 hrs) The Integers and Division, Primes and Greatest Common Divisors, Applications of Number Theory. Chapter 3(Sections 3.4, 3.5 and 3.7 Only)

Module IV: Relations (19 hrs) Relations and Their Properties, Representing Relations,Eqivalence Relations, Partial Orderings. Chapter 7 (Sections 7.1, 7.3, 7.5 and 7.6) 140

Syllabus Textbooks

Kenneth H Rosen; Discrete Mathematics and Its Applications; 6th Edition; Tata McGraw-Hill Publishing Company Limited.

References

1.Clifford Stien, Robert L Drysdale, KennethBogart ; Discrete Mathematics for Computer Scientists; Pearson Education; Dorling Kindersley India Pvt. Ltd

2. Kenneth A Ross; Charles R.B. Wright; Discrete Mathematics; Pearson Education; Dorling Kindersley India Pvt.Ltd.

3. Ralph P. Grimaldi, B.V.Ramana; Discrete and Combinatorial Mathematics; Pearson Education; Dorling Kindersley India Pvt. Ltd.

4.Richard Johnsonbaugh; Discrete Mathematics; Pearson Education; Dorling Kindersley India Pvt.Ltd 5. Winfried Karl Grassman, Jean-Paul Tremblay; Logic and Discrete Mathematics A Computer Science Perspective; Pearson Education; Dorling Kindersley India Pvt. Ltd.

Complimentary Course: Basic Statistics and Introduction Probability Theory

Course Code	ST1CMT31				
Course Title	Basic Statistics and Introductory Probability Theory				
Department	Computer Science				
Programme	Bachelor of Computer Application				
Semester	1				
Course Type	Complementary Course				
Credit	4	Hrs/Week	4	Total Hours	72

CO No.	Expected Course Outcomes Upon completion of this course students will be able to:	Cognitive Level	PO, PSO No.
CO1	Apply core statistical techniques, including univariate & bivariate data analysis, to extract meaningful insights from data.	Ap	PSO2
CO2	Analyse the application of statistics in various fields and critically evaluate its role in informing real-world decisions.	An	PO5
CO3	Explain the fundamental concepts of probability theory and its applications, discussing the tools and techniques used to solve probability problems	E	PSO2

Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create

RAJAGIRI VALLEY P.O., KAKKANAD, KOCHI - 682 039
Ph: 0484-2955270
Email: principal@rajagiricollege.edu.in
www.rajagiricollege.edu.in

Course Description

This course introduces basic statistics and introductory probability theory. Topics include data collection and sampling methods, graphical data representation, measuresof central tendency and dispersion, bivariate data analysis, fundamental probability concepts, and the study of random variables and their distributions.

Detailed Syllabus

BRIDGE COURSE (This topic is for internal evaluation only. Quick review and giveinternal assessment of these topics. Not included in the external examination) (5 Hours)

Introduction to Statistics, Population and Sample, Collection of Data, Census and Sampling, Methods of Sampling Simple Random Sampling (with and without replacement) stratified sampling systematic sampling (Method only), Types of data quantitative, qualitative, Classification and Tabulation, Diagrammatic representation -Bar diagram, Pie diagram (12 Hours)

Module I (12 Hours)

Graphical representation histogram; frequency polygon; frequency curve; ogives andstem and leaf chart. Measures of Central Tendency -Mean, Median, Mode, Quantile points-quartiles, Percentiles, Deciles. Measures of Dispersion - Range, Quartile Deviation, Mean Deviation, Standard Deviation, Coefficient of Variation. Box Plot.

Module II (13 Hours)

Introduction to bivariate data, Scatter Diagram, Curve Fitting by the Method of LeastSquares (without proof) Fitting of Straight Lines, Exponential Curve, Power Curve, Linear Correlation Covariance Method (formula only) and simple problems, Linear Regression-Regression Equations identification of regression 99 lines and properties.

Module III (15 Hours)

Probability Concepts Random Experiment, Sample Space, Events, Probability Measure, Approaches to Probability- Classical, Statistical and Axiomatic, Addition Theorem (up to 3 events) Conditional Probability, Independence of events, Multiplication theorem (up to 3 events), Total Probability Law, Bayes Theorem and its applications.

Module IV (15 Hours)

Random variables and distribution functions Random variables, probability density (mass) function, distribution function- properties, expectation of a discrete and continuous random variables-properties (without proof) mean and standard deviationof different probability density function, moment generating function, important properties (without proof).

Core Reference

1. S.P. Gupta: Statistical Methods (Sultan Chand & Sons Delhi).

2. S.C. Gupta and V.K.Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand and Sons.

3. B.L. Agarwal: Basic Statistics, New Age International (p) Ltd. Additional

References

1. Parimal Mukhopadhyay: Mathematical Statistics, New Central Book Agency (p) Ltd, Calcutta

2. Murthy M.N.: Sampling theory and Methods, Statistical Publishing Society, Calcutta.

Core Course: Computer Fundamentals and Digital Principles

Course Code	CA1CRT01					
Course Title	Computer Fundamentals and Digital Principles					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	1					
Course Type	Core					
Credit	4	Hrs/Week	4	Total Hours	72	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Explain the different parts of computer and various number systems.				U	PSO1
CO2	Simplify Boolean expressions using Logic gates and K map				An	PSO1
CO3	Understand Sequential and Combinational Logic circuits				U	PSO1
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

This course provides an in-depth understanding of computer systems, including hardware, software, operating systems, and networking. It also covers number systems, Boolean algebra, logic gates, and both sequential and combinational logic circuits.

RAJAGIRI VALLEY P.O., KAKKANAD, KOCHI - 682 039
Ph: 0484-2955270
Email: principal@rajagiricollege.edu.in
www.rajagiricollege.edu.in

Detailed Syllabus

Unit-1: (12 hrs.)

Introduction: Functional units of a computer system, Different types of computers, Computer Software and Hardware, Types of software-System software and Application programme. Characteristics of computers. Input devices – Keyboard, Mouse, Optical inputdevices, Output devices – Monitors and Printers.

Unit-2:(10hrs.)

Introduction to Operating Systems and Networking: Definition of an Operating System - Different types of PC Operating Systems. Computer Networks-categories of networks - LAN, WAN, MAN. The Internet - Working of Internet - Major Features of Internet.

Unit-3:(12hrs.)

Number Systems: Base or radix, Positional number system, Popular number systems (Decimal, Binary, Octal and Hexadecimal), Conversion-From one number system to another, Concept of binary addition and subtraction, Complements in binary number systems,1s Complement, 2s Complement and their applications, Signed magnitude form,BCD numbers- concept and addition.

Unit-4:(20hrs.)

Boolean Algebra and Gate Networks: Logic gates- AND, OR, NOT, NAND and NOR Truth tables and graphical representation, Basic laws of Boolean Algebra, Simplification of Expressions, De Morgans theorems, Dual expressions, Canonical expressions, Min terms and Max terms, SOP and POS expressions, Simplification of expression using K-MAP (up to 4 variables), Representation of simplified expressions using NAND/NOR Gates, Don't care conditions, XOR and its applications, parity generator and checker.

Unit-5:(18hrs.)

Sequential and Combinational Logic. Flip flops- Latch, Clocked, RS, JK, T, D and Master slave, Adders-Half adder, Full adder(need and circuit diagram), Encoders, Decodes, Multiplexers and Demultiplexers(working of each with diagram), Analog to digital and digital to analog converters (Diagram and working principle), : Concept of Registers, ShiftRegisters.

Book of study:

1. Peter Nortons- Introduction to Computers, Sixth Edition, Published by Tata McGraw Hill

2. P.K Sinha & Priti Sinha - Computer Fundamentals, Fourth Edition, BPB Publications.

3,.M Morris Mano-Digital Logic and Computer design, Fourth Edition, Prentice Hall.

Reference Text:

1.Thomas C Bartee- Digital computer Fundamentals, Sixth Edition, TATA McGraw HillEdition

2.Thomas L Floyd- Digital Fundamentals, Ninth edition, PEARSON Prentice Hall.

3.Malvino & Leach- Digital Principles and Applications, Sixth Edition, Tata McGraw Hill,2006.

Core Course: Methodology of Programming and C Language

Course Code	CA1CRT02					
Course Title	Methodology of Programming and C Language					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	1					
Course Type	Core					
Credit	3	Hrs/Week	4	Total Hours	72	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Understand the basic and general concepts of computers and programming.				U	PSO1
CO2	Understand the concepts of different datatypes, control structures and arrays				U	PSO2
CO3	Explain the concepts functions, different user-defined datatypes and analyze program flexibility using dynamic memory allocation				U	PSO2
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

This course introduces programming fundamentals, including algorithms, flowcharts, and control structures, and delves into the C language's syntax, data types,

operators, and I/O functions. It covers arrays, pointers, functions, recursion, and advanced topics like structures, unions, and dynamic memory allocation, providing a comprehensive foundation in C programming.

Detailed Syllabus

Unit 1 (12 hrs.)

Introduction to programming, Classification of computer languages, Language translators (Assembler, Compiler, Interpreter), Linker, Characteristics of a good programming language, Factors for selecting a language, Subprogram, Purpose of program planning, Algorithm, Flowchart, Pseudocode, Control structures (sequence, selection, Iteration), Testing and Debugging.

Unit 2 (12 hrs.)

C Character Set, Delimiters, Types of Tokens, C Keywords, Identifiers, Constants, Variables, Rules for defining variables, Data types, C data types, Declaring and initialization of variables, Type modifiers, Type conversion, Operators and Expressions- Properties of operators, Priority of operators, Comma and conditional operator, Arithmetic operators, Relational operators, Assignment operators and expressions, Logical Operators, Bitwise operators.

Unit 3 (15 hrs.)

Input and Output in C – Formatted functions, unformatted functions, commonly used library functions, Decision Statements If, if-else, nested if-else, if-else-if ladder, break, continue, goto, switch, nested switch, switch case and nested if. Loop control- for loops, nested for loops, while loops, do while loop.

Unit 4(15 hrs.)

Array, initialization, array terminology, characteristics of an array, one dimensional array and operations, two dimensional arrays and operations. Strings and standard functions, Pointers, Features of Pointer, Pointer and address, Pointer declaration, void

wild constant pointers, Arithmetic operations with pointers, pointer and arrays, pointers and two- dimensional arrays.

Unit 5 (18 hrs.)

Basics of a function, function definition, return statement, Types of functions, call by value and reference. Recursion -Types of recursions, Rules for recursive function, direct and indirect recursion, recursion vs iterations, Advantages and disadvantages of recursion. Storage class, Structure and union, Features of structures, Declaration and initialization of structures, array of structures, Pointer to structure, structure and functions, typedef, bitfields, enumerated data types, Union, Dynamic memory allocation, memory models, memory allocation functions.

Book Of Study:

1. Ashok Kamthane - Programming in C, Third Edition, Pearson Education

2. P K Sinha & Priti Sinha - Computer Fundamentals, Fourth Edition, BPB Publications.

Reference Text

1. E. Balaguruswamy -Programming in ANSI C, Seventh Edition, McGraw Hill Education.

2. Byron Gotfried - Programming with C, Second Edition, Schaums Outline series. McGraw Hill.

4.2 Semester II

Common Course: Issues That Matter

Course Code	EN2CCT03				
Course Title	Issues That Matter				
Department	Computer Science				
Programme	Bachelor of Computer Application				
Semester	2				
Course Type	Common Course				
Credit	4	Hrs/Week	5	Total Hours	90

CO No.	Expected Course Outcomes Upon completion of this course students will be able to:	Cognitive Level	PO, PSO No.
CO1	Demonstrate an understanding of national and global issues of contemporary significance.	U	PSO1
CO2	Evaluate the social and environmental structure of the world economy.	E	PSO2
CO3	Identify the role of government in providing public facilities and regulating economic disparities.	Ap	PO7

Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create

Course Description

This course explores significant literary works that address profound social and political issues. Through diverse readings from authors like Kenzaburo Oe, Salman Rushdie, and Toni Morrison, students will engage with themes of war, censorship, cultural identity, and environmental concerns.

Detailed Syllabus

Module 1 (18hours)

1.The Unsurrendered People - Kenzaburo Oe

2.The Old Prison – Judith Wright

3.War– Luigi Pirandello

Module 2 (18hours)

4.Persuasions on the Power of the Word - Salman Rushdie Peril - Toni Morrison

5.The Burning of the Books- Bertolt Brecht

6.The Censors – Luisa Valenzuela

Module 3 (18hours)

7."The Poisoned Bread" – Bandhumadhav

8."A Westward Trip" –Zitkala-Sa

9."The Pot Maker" – Temsula Ao

Module 4 (18hours)

10.Does it Matter – Richard Leakey

11.On Killing a Tree - Gieve Patel

12.Hagar: A Story of a Woman and Water (Gift in Green [chapter 2]) – Sarah Joseph

Module 5 (18hours)

13.Understanding Refugeeism: An Introduction to Tibetan Refugees in India

14.Refugee Blues – W. H. Auden

15.The Child Goes to the Camp (from Palestine's Children)– Ghassan Kanafani

Core Text

ISSUES THAT MATTER

Complementary Course: Discrete Mathematics - II

Course Code	MM2CMT03					
Course Title	Discrete Mathematics - II					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	2					
Course Type	Complementary Course					
Credit	4	Hrs/Week	4	Total Hours	72	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Understand Graphs, Graph models, graph isomorphism, connected graph, Euler & Hamiltonian circuits, Trees & its applications.				U	PO1
CO2	Explain the concept of matrices and Boolean Algebra and their related properties and applications				U	PO1
CO3	Solve problems in Discrete Mathematics related to above topics.				Ap	PSO2
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

This course delves into key areas of discrete mathematics, focusing on graph theory, tree structures, Boolean algebra, and matrix theory. It covers graph models, tree

applications, Boolean functions, and various matrix properties and operations, including the Cayley-Hamilton theorem and solving linear equations.

Detailed Syllabus

Module I: Graphs (18 hrs)

Graphs and Graph Models, Graph Terminology and Special types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths.

Text 1 Chapter 8 (Sections 8.1, 8.2, 8.3, 8.4 and 8.5 only)

Module II: Trees (17 hrs)

Introduction to Trees, Application of Trees, Tree Traversal, and Spanning Trees. Text 1 Chapter 9 (Sections 9.1, 9.2, 9.3 and 9.4 only)

Module III: Boolean Algebra (17 hrs)

Boolean Function, Representing Boolean Functions and Logic Gates Text 1 Chapter 10 (Sections 10.1, 10.2 and 10.3 only).

Module IV: Matrices (20 hrs)

Definitions and examples of Symmetric, Skew-symmetric, Conjugate, Hermitian, Skew Hermitian matrices. Rank of Matrix, Determination of rank by Row Canonical form and Normal form, Linear Equations, Solution of non-homogenous equations using Augmented matrix and by Cramer's Rule, Homogenous Equations, Characteristic Equation, Characteristic roots and Characteristic vectors of matrix, Cayley Hamilton theorem and applications.

Syllabus Textbooks

1. Kenneth H Rosen; Discrete Mathematics and Its Applications; 6th Edition; Tata Mc Graw-Hill Publishing Company Limited.

2. Frank Ayres Jr: Matrices, Schaum's Outline Series, TMH Edition.

References

1. Clifford Stien, Robert L Drysdale, Kenneth Bogart; Discrete Mathematics for Computer Scientists; Pearson Education; Dorling Kindersley India Pvt. Ltd

2. Kenneth A Ross; Charles R.B. Wright; Discrete Mathematics; Pearson Education; Dorling Kindersley India Pvt.Ltd

3. Ralph P. Grimaldi, B.V. Ramana; Discrete and Combinatorial Mathematics; Pearson Education; Dorling Kindersley India Pvt. Ltd

4.Richard Johnsonbaugh; Discrete Mathematics; Pearson Education; Dorling Kindersley India Pvt. Ltd 5. Winfried Karl Grassman, Jean-Paul Tremblay; Logic and Discrete Mathematics A Computer Science Perspective; Pearson Education; Dorling Kindersley India Pvt. Ltd.

Core Course: Database Management System

Course Code	CA2CRT03					
Course Title	Data Base Management Systems					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	2					
Course Type	Core					
Credit	3	Hrs/Week	4	Total Hours	72	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Demonstrate the basic elements of a relational database management system				Ap	PSO2
CO2	Identify the data models for relevant problems.				R	PSO3
CO3	Design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries.				Ap	PSO2
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

This course covers the fundamentals of database systems, including DBMS architecture, data models, relational databases, and SQL. It explores ER modeling, normalization, indexing, transaction processing, and database security, providing a comprehensive understanding of how to design, manage, and secure databases.

Detailed Syllabus

Unit 1: Introduction (12 hrs.)

Characteristics of the Database Approach – Database users: DBA, Database Designers, End users – Advantages of using the DBMS Approach – Data models, Schemas, and Instances – Three- Schema Architecture and Data Independence.

DBMS Languages: DDL, DML – The Database System Environment: DBMS Component Modules.

Unit 2: Relational Model (16 hrs.)

Entity Relationship Modeling: Introduction –Entity Types, Entity Sets, Attributes and Keys – Relationship Types, Relationship Sets, Roles, and Structural Constraints – Weak Entity Types – Notation for ER diagrams – Sample ER diagrams. Relational Model concepts: Domains, Attributes, Tuples, and Relations – Characteristics of Relations – Relational Model Constraints and Relational Database Schemas: Domain Constraints, Key Constraints, Relational Database Schemas, Entity Integrity, Referential Integrity, and Foreign Keys.

Unit 3: SQL (14 hrs.)

Data Types – Data Definition commands : CREATE , ALTER ,DROP - Adding constraints in SQL – Basic SQL Queries : INSERT, SELECT, DELETE, UPDATE - Substring comparison using LIKE operator, BETWEEN operator – Ordering of rows – SQL set operations UNION, EXCEPT, INTERSECT – Complex Queries : Comparison involving NULL and Three-valued logic ,Nested queries , EXISTS and

UNIQUE functions, Renaming of attributes and Joining of tables, Aggregate functions, Grouping – Managing Views.

Unit 4: Normalization and Indexing Structures for Files (15 hrs.)

Normalization: Informal Design Guidelines for Relational Schemas –Functional Dependencies – Normal forms: First Normal Form, Second Normal Form, Third Normal Form – General Definitions of Second and Third Normal Forms –BCNF.

Indexing Structures for files: -Types of Single-Level Ordered Indexes: Primary Indexes, Clustering Indexes, and Secondary Indexes.

Unit 5: Transaction Processing and Database Security (15 hrs.)

Transaction Processing: Introduction to Transaction Processing - Transaction and System Concepts – Desirable properties of Transactions. Database Security and Authorization: Types of Security – Control measures – Database Security and DBA – Access Control, User Accounts, and Database Audits –Access Control based on Granting and Revoking Privileges.

Books of study:

1.Ramez Elmasri and Shamkant B. Bavathe - DATABASE SYSTEMS, Sixth Edition, Pearson Education.

References:

1.C.J Date- An Introduction to Database Systems, Eighth edition, Pearson Education,2003

2. Reghu Ramakrishnan and Johannes Gehrke- Database Management Systems, Third edition, Mc Graw Hill International Edition.

3.Dipin Desai, An Introduction to Database Systems, First Edition, Galgoria Publications.

Core Course: Computer Organization and Architecture

Course Code	CA2CRT04					
Course Title	Computer Organization and Architecture					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	2					
Course Type	Core					
Credit	4	Hrs/Week	4	Total Hours	72	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Explain the fundamental organization and architecture of computer system.				U	PSO1
CO2	Explain CPU architecture, instruction execution stages and addressing mode, memory organization and mapping techniques				U	PSO1
CO3	Illustrate the concept of pipelining and parallel processing.				U	PSO1
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

This course explores the fundamental concepts of computer organization, including CPU architecture, memory organization, and parallel processing. It covers instruction cycles, addressing modes, memory hierarchies, pipeline design, and vector

processing, providing a detailed understanding of how computers are structured and operate.

Detailed Syllabus

Unit 1: (12 hrs.)

Basic computer organization and design Operational concepts, Instruction codes, Computer Registers, Computer Instructions, Memory locations and addresses, Instruction cycle, Timing and control, Bus organization.

Unit 2: (15 hrs.)

Central Processing Unit: General Register Organization, Stack Organization, Addressing modes, Instruction Classification, Program control.

Unit 3: (16 hrs.)

Memory Organization Memory Hierarchy, Main Memory, Organization of RAM, SRAM, DRAM, Read Only Memory- ROM-PROM, EROM, EEPROM, Auxiliary memory, Cache memory, Virtual Memory, Memory mapping Techniques.

Unit 4: (15 hrs.)

Parallel Computer Structures:

Introduction to parallel processing, Pipeline computers, Multiprocessing systems, Architectural classification scheme-SISD, SIMD, MISD, MIMD.

Unit 5: (14 hrs.)

Pipelining and Vector processing: Introduction to pipelining, Instruction and Arithmetic pipelines (design) Vector processing, Array Processors.

Book of study:

1. M. Morris Mano-Computer Systems Architecture, Third Edition, Pearson Education.

2. Kai Hwang and F a Briggs-Computer Architecture and parallel processing, McGraw Hills,1990.

Reference

1. Carl Hamacher -Computer Organization, Fifth Edition, Tata McGraw Hill.

2. John P Hayes -Computer Architecture & Organization–Mc Graw Hill

3. William Stallings-Computer Organization and Architecture, Seventh Edition, Pearson Education.

Core Course: Object Oriented Programming Using C++

Course Code	CA2CRT05					
Course Title	Object Oriented Programming using C++					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	2					
Course Type	Core					
Credit	4	Hrs/Week	3	Total Hours	54	

CO No.	Expected Course Outcomes Upon completion of this course students will be able to:	Cognitive Level	PO, PSO No.
CO1	Understand the basic concepts and principles of Object-Oriented Programming and the portable programming language C++.	U	PSO2
CO2	Understand how to allocate and deallocate resources to objects of the class using the concepts constructors and destructors	U	PSO2
CO3	Understand how to reduce time and resources through code reuse using the concept of Inheritance and also how to increase program flexibility through the concept of Polymorphism	U	PSO2

Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create

Course Description

This course introduces object-oriented programming principles and C++ language basics, covering classes, objects, constructors, destructors, operator overloading, inheritance, polymorphism, and file handling. It emphasizes practical applications and the benefits of OOP in software development.

Detailed Syllabus

Unit 1: (10 hrs.)

Principles of Object Oriented Programming, Beginning with C++ Procedure Oriented Programming-Object Oriented Programming-Basic concepts of object-oriented programming- Benefits of OOP- Applications of OOP-A simple C++program-Structure of C++ program- C++ data types- Symbolic constants- Reference by variables-Operators in C++- Operator precedence- Control structures- Function in C++ - The main function, Function prototyping- Call by reference- Return by reference- Inline function- Default arguments- Function overloading.

Unit 2: (10 hrs.)

Classes and Objects: Specifying a class- Defining member functions- Nesting of member functions - Private member functions - Arrays within a class - Memory allocation for objects-Static data members - Static member functions -Arrays of objects - objects as function arguments -Friendly functions- Returning Objects.

Unit 3: (12 hrs.)

Constructers and Destructors, Overloading, Constructors- Default constructor-Parameterized Constructor-Copy constructor- Multiple constructors- Constructors with default arguments- Dynamic Constructor-Destructors- Operator overloading-Unary and Binary operator overloading- Overloading using friends- Rules for overloading- Type conversion.

RAJAGIRI VALLEY P.O., KAKKANAD, KOCHI - 682 039
Ph: 0484-2955270
Email: principal@rajagiricollege.edu.in
www.rajagiricollege.edu.in

Unit 4: (10 hrs.)

Inheritance: Inheritance - Defining derived classes-Visibility Modes-Single, Multilevel, Multiple, Hierarchical and Hybrid inheritance- Virtual base classes- Abstract classes- Constructors in derived classes- Nesting of classes.

Unit 5: (12 hrs.)

Pointers, Virtual Functions and Polymorphism, Working with Files: Pointers- Pointers to objects, this pointer-Pointers to derived classes- Virtual functions- Pure virtual functions- File Stream classes, Opening and closing a file- File opening modes- File pointers and their manipulations- Sequential input and output operations.

Book of Study:

1. E. Balagurusamy - Object Oriented Programming with C++, Fifth edition, Tata McGraw Education Hill, 2011.

Reference:

1. Ashok N. Kamthane, Object oriented Programming with ANSI & Turbo C++, First Edition, Pearson India

2. Robert Lafore, Object Oriented Programming in Turbo C++, First Edition, Galgotia Publications.

3. D Ravichandran, Programming with C++, Second edition, Tata McGraw- Hill.

4.3 Semester III

Complementary Course: Advanced Statistical Methods

Course Code	ST3CMT32					
Course Title	Advanced Statistical Methods					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	3					
Course Type	Complementary Course					
Credit	4	Hrs/Week	4	Total Hours	72	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Analyze real-world scenarios and select appropriate probability distributions to model them.				An	PSO1
CO2	Explain the fundamental concepts of statistical inference and its applications in drawing conclusions from data.				E	PSO1
CO3	Critically evaluate hypothesis testing methods, including their terminology, and effectively apply them to solve real-world problems.				E	PSO1
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

This course explores advanced statistical methods, covering theoretical distributions, sampling distributions, parameter estimation, and hypothesis testing. Topics include discrete and continuous distributions, properties of estimators, and various statistical tests such as Z, t, and Chi-Square tests.

Detailed Syllabus

Module I Theoretical distributions. (16Hours)

Discrete distribution (Uniform, Bernoulli, Binomial and Poisson), mean, variance, moment generating functions and fitting of data. Continuous distribution- Uniform and normal distribution-important properties (without proof) of the distribution (mean, variance, moments, mgf, M.D. and Q.D Area under the normal curve-related problems.

Module II Sampling Distributions. (16 Hours)

definition, Statistic, Parameter, Standard Error, Sampling Distributions of Mean of the sample from Normal population and distribution of Variance (form alone), statement of the form of the distributions 2, t and F (without derivation), properties, Inter relationships.

Module III Estimation of parameters. (20Hours)

Point Estimation and Interval estimation, properties of Point Estimation- Unbiasedness, Efficiency; Consistency; Sufficiency, Methods of estimation-method of moments and method of maximum likelihood. Interval Estimation for Mean, Variance of normal population and Proportion of binomial population.

Module IV Testing of hypotheses. (20 Hours)

Statistical hypotheses, Simple and composite hypotheses. Null and Alternate hypothesis, Two types of errors, Critical Region, Size of the 102 test, Significance level

P value, Power, Large Sample test Z test-,t test Chi-Square test-goodness of fit, test of independence.

References:

1. S.C. Gupta and V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand and Sons.

2. S.C Gupta: Fundamentals of Mathematical Statistics, Sultan Chand and Sons.

3. V.K. Rohatgi: An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern.

Core Course: Computer Graphics

Course Code	CA3CRT06					
Course Title	Computer Graphics					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	3					
Course Type	Core					
Credit	4	Hrs/Week	4	Total Hours	72	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Explain the working of Display systems and learn the algorithms for generating basic primitives.				U	PSO2
CO2	Understand two-dimensional transformations with clipping techniques and three-dimensional concepts.				U	PSO2
CO3	Identify the computer animation techniques and motion specifications.				Ap	PSO2
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

This course introduces the fundamentals of computer graphics, including graphics systems, display devices, and graphics software. It covers line and circle drawing

algorithms, 2D geometric transformations, 2D viewing and clipping operations, 3D objects representations, and the basics of computer animation.

Detailed Syllabus

Unit 1: (12 hrs.)

Introduction: A survey of Computer Graphics, overview of graphics systems-Video display devices- Refresh CRT, Raster-Scan and Random-Scan Displays, Colour CRT Monitors, DVST, Flat-Panel Displays, Raster Scan systems, Random scan systems, Input devices, Hard copy devices, Graphics software.

Unit 2: (14 hrs.)

Output primitives: Line drawing algorithms: DDA algorithm, Bresenham's line algorithm, Circle generating algorithm- Midpoint circle algorithm, Character generation.

Unit 3: (18 hrs.)

2D geometric Transformations: Basic transformations: Translation, Rotation, Scaling; Other Transformations-Reflection and shear, Matrix representation and homogenous coordinates, Composite transformation, Interactive picture construction Techniques. Two-dimensional viewing: viewing pipeline, window and viewport, window to viewport transformation. Clipping operations- Point clipping, Line clipping: - Cohen Sutherland line clipping, Polygon clipping: - Sutherland- Hodgeman polygon clipping, Text Clipping.

Unit 4: (14 hrs.)

Three-dimensional concepts: Three-dimensional display methods, three-dimensional object representations- Polygon surfaces, Sweep representations, Constructive solid geometry methods, octrees and quadtrees.

Unit 5 (14 Hrs)

Computer Animation: Design of animation sequences, raster animations, computer animation languages, key-frame systems, morphing, motion specifications.

Book of study:

1. Donald D. Hearn & M. Pauline Baker, Computer Graphics C Version, Second Edition, PHI Pvt.Ltd.

References:

1. Newman W M & R F Sproul, Principles of Interactive Computer Graphics, Second Edition Mc- Graw Hill Publishers.

2. Plastock R & Xiang Z, Theory and problems of computer Graphics, Second Edition Schaum Series, McGraw Hill Publishers.

Core Course: Microprocessors and PC Hardware

Course Code	CA3CRT07					
Course Title	Microprocessor and PC Hardware					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	3					
Course Type	Core					
Credit	4	Hrs/Week	3	Total Hours	54	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Understand architecture, pin diagram and instruction set of 8085 Microprocessor				U	PSO1
CO2	Outline the components and operations of Hard disk and motherboard				U	PSO1
CO3	Identify different types of physical memory				Ap	PSO1
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

This course explores the evolution and architecture of microprocessors, focusing on the Intel 8085, including its instruction set and interrupts. It covers the components

and selection criteria of motherboards, hard disk operations, installation, and different types of memory modules and their functionalities.

Detailed Syllabus

Unit1: (10 hrs.)

Introduction: Evolution of microprocessors. Introduction to the concept of 8085 microprocessor: Intel 8085 introduction, Architecture, Pin diagram, Instruction cycle, Timing diagrams, Interrupts of Intel 8085.

Unit 2: (10 hrs.)

Instruction Set of Intel 8085: Introduction, Instruction and data format, addressing modes, Status flags, Intel 8085 instruction set.

Unit3: (12 hrs.)

Motherboard: Components of motherboard – expansion slots, Processor socket, coprocessor, memory modules, BIOS and CMOS, chipset. Super I/O chip, ROM BIOS, System buses- Processor Buses, Memory buses, I/O Bus (ISA, PCI Local Bus, AGP, USB), Motherboard selection criteria.

Unit4: (10 hrs.)

Hard disk: Hard Disk drive, Definitions, Hard Disk operations, Disk formatting, Basic hard disk drive components, Hard disk features, Hard disk drive installation procedure, FAT Disk, VFAT, FAT 32, NTFS.

Unit5: (12 hrs.)

Types of memory: Physical Memory, Memory modules: - SIMMs, DIMMs, RIMMs, Brief study of conventional base memory, Upper memory area, High memory area, Extended memory, Expanded memory.

Book of study:

1.B Ram -Fundamentals of microprocessors and microcontrollers, Seventh revised edition, Dhanpat Rai

2. Manahar Lotia and Pradeep Nair- All about motherboard, First edition, 2005, BPB Publications.

3. Manahar Lotia and Pradeep Nair- Modern all about Hard Disk Drive, First edition, BPB publications., Publications.

References:

1. Scott Mueller - Upgrading and repairing PCs, 18th Edition, Pearson.

2. R S. Gaonkar- Microprocessor Architecture, Programming and applications with 8085, Sixth Edition, PENRAM International Publishing.

Core Course: Operating Systems

Course Code	CA3CRT08					
Course Title	Operating Systems					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	3					
Course Type	Core					
Credit	4	Hrs/Week	4	Total Hours	72	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Develop a comprehensive understanding of functions of operating system				U	PSO1
CO2	Illustrate the various Process Scheduling algorithms and solutions to avoid deadlock.				U	PSO2
CO3	Explain the concepts of memory management and file management				U	PSO2
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

This course provides a comprehensive overview of operating systems, covering their definition, functions, and evolution. It delves into process management, synchronization, deadlocks, memory management, virtual memory, and file system

implementation, offering insights into essential concepts and strategies for efficient system operation.

Detailed Syllabus

Unit 1: (10 hrs.)

Introduction: OS Definition, Functions, Evolution of OS, OS Structure Operating System Operations, Operating System Services, User Operating System Interface, System Calls, Types of System Calls.

Unit 2: (14 hrs.)

Process: Basic Concepts, Process Scheduling, Operations on Processes, Inter process communication, Process Scheduling - Scheduling Criteria, Scheduling Algorithms, Multiple Processor Scheduling.

Unit 3: (18 hrs.)

Process Coordination: Synchronization - The Critical Section problem, Semaphores, Classic Problems of Synchronization, Monitors. Deadlocks: System Model, Deadlock Characterization, Methods of handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

Unit 4: (16 hrs.)

Memory Management: Memory Management Strategies - Swapping, Contiguous memory allocation, Paging, Segmentation. Virtual Memory Management- Demand paging, Page Replacement.

Unit 5: (14 hrs.)

Storage Management: File System: - File Concept, Access Methods, Directory structure. Implementing File Systems: -File System Structure, Allocation Methods, Free Space Management, Disk Scheduling.

RAJAGIRI VALLEY P.O., KAKKANAD, KOCHI - 682 039
Ph: 0484-2955270
Email: principal@rajagiricollege.edu.in
www.rajagiricollege.edu.in

Book of study:

1. Abraham Silberschatz, Peter Galvin and Greg Gagne - Operating System Principles, Seventh Edition, John Wiley

2. William Stallings - Operating Systems, Sixth Edition, Prentice Hall of India, Pearson

Reference:

1. Milan Kovic - Operating Systems, 2ndEdition, (TMH).

Core Course: Data Structure Using C++

Course Code	CA3CRT09					
Course Title	Data Structure using C++					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	3					
Course Type	Core					
Credit	3	Hrs/Week	4	Total Hours	72	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Recall the concept of arrays and implement different types of data structures like Stack and queue using arrays				R	PO1
CO2	Make use of the data structure Linked list to solve various problems				Ap	PSO2
CO3	Analyze the data structure Tree and how various data structures are organized in physical memory				An	PSO2
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

This course covers foundational data structures and their implementation in C++, including arrays, stacks, queues, linked lists, trees, and file structures. It emphasizes

hands-on learning through examples and applications, preparing students to efficiently organize and manipulate data in software development.

Detailed Syllabus

Unit 1 (12 hrs.)

Concept of Structured data - Data structure definition, Different types and classification of data structures, Arrays – Memory allocation and implementation of arrays in memory, array operations, Applications - sparse matrix representation and operations, polynomials representation and addition, Concept of search and sort – linear search, binary search, selection sort, insertion sort, quick sort.

Unit 2 (12 hrs.)

Stacks – Concepts, organization and operations on stacks using arrays (static), examples, Applications -Conversion of infix to postfix and infix to prefix, postfix evaluation, subprogram calls and execution, Multiple stacks representation. Queues - Concepts, organization and operations on queues, examples. Circular queue – limitations of linear queue, organization and operations on circular queue. Double ended queue, Priority queue.

Unit 3 (18 hrs.)

Linked list: Concept of dynamic data structures, linked list, types of linked list, linked list using pointers, insertion and deletion examples, circular linked list, doubly linked lists Applications- linked stacks and queues, memory management basic concepts, garbage collection.

Unit 4 (15)

Trees - Concept of recursion, trees, tree terminology, binary trees, representation of binary trees, strictly binary trees, complete binary tree, extended binary trees, creation and operations on binary tree, binary search trees, Creation of binary search tree, tree traversing methods – examples, binary tree representation of expressions.

Unit 5 (15)

File - Definition, Operations on file (sequential), File organizations - sequential, indexed sequential, random files, linked organization, inverted files, cellular partitioning, hashing– hash tables, hashing functions, collisions, collision resolving methods.

Books of study:

1. G.S Baluja - Data Structures Through C++ (A Practical Approach), Second Edition-2004, Danapat Rai & Co.

2. Ellis Horowitz and Sartaj Sahni - Fundamentals of Data Structures in C++, Second

Edition, Galgotia Publications.

References:

1.Seymour Lipschutz, Theory and Problems of Data Structures, Schaums Outline Series,2006, McGraw Hill

2.Yedidyah Langgsam, Moshe Augustein, Aaron M Tenenbaum- Data structures using C and C++, Second Edition, Prentice Hall.

4.3 Semester IV

Complementary Course: Operations Research

Course Code	MM4CMT03					
Course Title	Operations Research					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	4					
Course Type	Complementary Course					
Credit	4	Hrs/Week	4	Total Hours	72	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Understand the concepts of O.R. and different methods of solving linear programming problems.				U	PO1
CO2	Apply the concept of Linear programming in solving Transportation & Assignment problems.				Ap	PSO2
CO3	Apply different principles in Game Theory problems				Ap	PSO2
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

RAJAGIRI VALLEY P.O., KAKKANAD, KOCHI - 682 039
Ph: 0484-2955270
Email: principal@rajagiricollege.edu.in
www.rajagiricollege.edu.in

Course Description

This course introduces operations research, focusing on linear programming, transportation and assignment problems, and game theory. It covers the formulation and solution of linear programming problems using the simplex method, various methods for transportation and assignment problems, and strategies for solving two-person zero-sum games.

Detailed Syllabus

Module I: Basics of O.R. (10hrs)

The nature and uses of O.R- math concepts and approaches of O.R- models in O.R.

Module II: Linear programming problems (25 hrs)

Mathematical formulation of a L.P.P., General linear programming problems, solution of a L.P.P, graphical method for solving a L.P.P. Simplex Method: Stack and surplus variables- reduction of any feasible solution to a basic feasible solution. Unbounded solution. Optimality conditions- artificial variable techniques- Big M method.

Module III: Transportation & assignment Problems (20 hrs)

Transportation model- solution by simplex method- northwest corner rule, lowest cost entry method, Vogel method, MODI method, degeneracy, assignment problems.

Module IV: Game Theory (17 hrs)

Two persons zero sum games, pure and mixed strategy with saddle point, solution of pure strategy games, solution of mixed strategy problems by arithmetic method.

Principle of dominance.

Textbook:

Belly E Gillet – Introduction to Operations Research (A Computer Oriented Arithmetic Approach) (Tata McGraw Hill).

Reference Books:

1.V.K Kapoor – Operations Research

2.Kanti Swarup, P.K Gupta and Man Mohan – Operations Research, Sultan Chand&Sons

3.K.V Mital and C. Mohan – Optimization Methods in Operations Research and System Analysis 144

4.J. K Sharma – Operations Research Theory and Applications, Macmillan

5.B. N. Mishra, B. K. Mishra – Optimization Linear Programming and Books.

Core Course: Design and Analysis of Algorithms

Course Code	CA4CRT10					
Course Title	Design and Analysis of Algorithms					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	4					
Course Type	Core					
Credit	4	Hrs/Week	4	Total Hours	72	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Analyze the performance of the algorithms by finding Time and space complexity				An	PSO2
CO2	Apply classic algorithm design methods like Divide and Conquer, Dynamic Programming, Greedy method for problem solving				Ap	PSO2
CO3	Understand backtracking technique and Basic traversal and search techniques of graphs				U	PSO2
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

This course delves into algorithm design techniques and analysis, covering divide and conquer strategies, greedy algorithms, dynamic programming, and basic traversal

techniques. Students learn to analyse algorithm performance in terms of time and space complexity and apply these principles to solve a variety of problems efficiently.

Detailed Syllabus

Unit 1: (12 hrs.)

Introduction, Definition of Algorithm, Algorithm design techniques, Algorithm Analysis, performance analysis - space complexity, time complexity, Best, Worst, And average case complexity.

Unit 2 (14 hrs.)

Divide and Conquer General method, Binary search, finding the maximum and minimum, merge sort, quick sort, performance measurement of quick sort, Selection, Strassen's matrix multiplication.

Unit 3 (18 hrs.)

Greedy Algorithm General Characteristics of greedy algorithms, Problem solving using Greedy Algorithm - Knapsack problem, Minimum Spanning trees (Kruskal's algorithm, Prim's algorithm).

Unit 4: (16 hrs.)

Dynamic programming the general method, multistage graphs, all-pairs shortest path, Single source shortest path, 0/1 Knapsack problem, Traveling Salesperson problem.

Unit 5: (12 hrs)

Basic traversal and search techniques - BFS and traversal, DFS and traversal, Bi-connected components and DFS, Backtracking General method, 8-queens problem, Sum of subsets problem, Graph colouring, Hamiltonian.

Book of study:

1.Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekharan, Computer algorithms/C++, Second Edition, Universities Press.

References:

1. Anany Levitin- Introduction to design and analysis of algorithms, Third Edition, Addison Wesley Low price edition.

2. Richard Neapolitan & Kumar's Naimipour, Foundation of Algorithms using C++ Pseudocode, Third edition, Jones and Bartlett Publishers.

Core Course: System Analysis and Software Engineering

Course Code	CA4CRT11					
Course Title	System Analysis and Software Engineering					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	4					
Course Type	Core					
Credit	4	Hrs/Week	4	Total Hours	72	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Illustrate the concepts of Information System, Organization charts and System development lifecycle				U	PSO1
CO2	Utilize the concepts of Software Engineering, Requirement Engineering and various software lifecycle models to estimate the size and cost of a software				Ap	PSO2
CO3	Explain the various aspects of software designing and testing .				E	PSO2
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

This course covers the fundamentals of system analysis and software engineering, including information systems concepts, software development life cycle (SDLC),

software engineering principles, requirements analysis and specification, software design, reliability, and testing. Students learn various methodologies and techniques essential for developing reliable and efficient software systems.

Detailed Syllabus

Unit 1: (12 hrs.)

Information systems concepts, Business information systems; Describing the business organization –organization chart, organization function list; information system levels - operational, lower, middle, top management; SDLC Life cycle activities- life cycle flow chart, task, management review, baseline specifications, role of system analyst.

Unit 2: (14 hrs.)

Introduction to Software Engineering - Definition, Program Vs Software, and Software process, Software Characteristics, Brief introduction about product and process, Software process and product matrices. Software life cycle models, Definition, Waterfall model, Increment process models- Iterative, RAD, Evolutionary process models-Prototyping, Spiral. Selection of a life cycle model.

Unit 3: (18 hrs.)

Software Requirement Analysis and Specification Requirements Engineering type of requirements, Feasibility Studies, Requirement Elicitation – Use Case, DFD, Data Dictionaries, Various steps for requirement analysis, Requirement documentation, Requirement validation, an example to illustrate the various stages in Requirement analysis. Project planning-Size estimation, cost estimation, the constructive cost model (COCOMO).

Unit 4: (14 hrs.)

Software Design - Definition, Various types, Objectives and importance of Design phase, Modularity, Strategy of design, Function oriented design, IEEE recommended practice for software design descriptions. Steps to Analyze and Design Objected Oriented System. Software Reliability Definition, McCall software quality model, Capability Maturity Model.

Unit 5: (14 hrs.)

Software Testing : What is testing?, Test, Test case and Test Suit, Verification and Validation, Alpha, beta and acceptance testing, functional testing, techniques to design test cases, boundary value analysis, Equivalence class testing, decision table based testing, cause effect graphing technique, Structural testing path testing, Graph matrices, Data flow testing; Levels of testing Unit testing, integration testing, system testing, validation testing.

Book of Study:

1. Marvin Gore & John Stubbe -Elements Of System Analysis, Fourth Edition, Galgotia Book Source.

2. K K Aggarwal, Yogesh Singh - Software Engineering, Third Edition, New Age International Publications.

References:

1. Roger S Pressman - Software Engineering: A Practitioner's Approach, Sixth Edition, McGraw-Hill Higher Education.

2. Ian Sommerville - Software Engineering, Seventh Edition, Pearson Education.

3. Pankaj Jalote - An Integrated approach to Software Engineering, Second Edition, Narosa Publishing Company.

Core Course: Linux Administration

Course Code	CA4CRT12					
Course Title	Linux Administration					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	4					
Course Type	Core					
Credit	4	Hrs/Week	4	Total Hours	72	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Understand the architecture of Linux and implement the basic commands using vi editor.				U	PSO2
CO2	Apply the concepts of shell programming.				Ap	PSO2
CO3	Summarize the role of system administrator and understanding various servers.				U	PSO2
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

This course equips students with the essential skills for Linux system administration, covering Linux overview, file system navigation, process management, shell programming, system administration tasks, and server configurations. Through hands- on learning, students gain proficiency in managing user accounts, file systems, system performance monitoring, and configuring various servers.

Detailed Syllabus

Unit-1 (12 hrs.)

Overview of Linux : What is Linux, Linux's root in Unix, Common Linux Features, advantage of Linux, Overview of Unix and Linux architectures, Linux files system, hardware requirements for Linux, Linux standard directories. Commands for files and directories cd, ls, cp, rm, mkdir, rmdir, pwd, file, more, less, Creating and viewing files using cat, file comparisons.

Unit 2 (15 hrs.)

Essential Linux commands: Processes in Linux, process fundamentals, connecting processes with pipes, redirecting input/output, Background processing, managing multiple processes, process scheduling – (at, batch), nohup command, kill, ps, who, find, sort, touch, file, file processing commands - wc, cut, paste etc Mathematical commands - expr, factor etc. Creating and editing files with vi editor.

Unit 3 (15 hrs.)

Shell programming - Basics of shell programming, various types of shell available in Linux, comparisons between various shells, shell programming in bash. Conditional and looping statements, case statement, parameter passing and arguments, Shell variables, system shell variables, shell keywords, Creating Shell programs for automating system tasks.

Unit-4 (18 hrs.)

System administration - Common administrative tasks, identifying administrative files configuration and log files, Role of system administrator, managing user accounts- adding & deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disabling of user's accounts, creating and mounting file system, checking and monitoring system performance - file security & Permissions, becoming super user using su. Getting system information with uname, host name, disk partitions & sizes, users, kernel, installing and removing packages with rpm command.

Unit-5: (12 hrs.)

Simple filter commands: pr, head, tail, cut, sort, uniq, tr - Filter using regular expression grep, egrep, sed Understanding various Servers: DHCP, DNS, Squid, Apache, Telnet, FTP, Samba.

Book of study:

1.Cristopher Negus - Red Hat Linux Bible, Wiley Dreamtech India 2005 edition.

2.Yeswant Kanethkar - UNIX Shell Programming, First edition, BPB.

References:

1.Official Red Hat Linux Users guide by Redhat, Wiley Dreamtech India

2.Graham Glass & King Ables - UNIX for programmers and users, Third Edition, Pearson Education.

3.Neil Mathew & Richard Stones - Beginning Linux Programming, Fourth edition, Wiley Dreamtech India.

Core Course: Web Programming Using Php

Course Code	CA4CRT13					
Course Title	Web Programming using PHP					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	4					
Course Type	Core					
Credit	3	Hrs/Week	3	Total Hours	54	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Explain the concept of WWW, HTML and static website				U	PSO1
CO2	Apply the concepts of CSS and JavaScript to make website more interactive				Ap	PSO2
CO3	Build a dynamic website using PHP and MySQL				Ap	PSO2
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

This course introduces students to web programming essentials, covering HTML, CSS, JavaScript, PHP, and MySQL. Topics include form handling, server-side scripting, database connectivity, and dynamic content generation, providing students with the skills to develop interactive web applications.

Detailed Syllabus

Unit 1 (8 hrs.)

Introduction to web, WWW architecture, Fundamentals of HTML, text formatting tags, marquee, inserting images, links, lists, creating tables, frames, working with form elements.

Unit 2 (10 hrs.)

CSS introduction, <link> and <style> elements, CSS properties, Controlling Fonts, Text formatting, Text- pseudo classes, Selectors, Links, Backgrounds, lists Introduction to Java Script, Java Script variables, operators, decision control statements, looping, functions, arrays, events, popup boxes-alert, prompt, conform box, built-in objects, writing JavaScript, form validation

Unit 3 (10 hrs.)

Introduction to PHP, server-side scripting, role of web server software, php comments, variables, echo and print, PHP operators, data types, branching statements, loops, arrays

Unit 4 (12 hrs.)

PHP functions, PHP form, Passing information between pages, $_GET, $_POST, $_REQUEST. String functions, include and require, session and cookie management, error handling in PHP, Object Oriented Programming using PHP

Unit 5 (14 hrs.)

Introduction to MySQL, datatypes, SQL commands-CREATE, UPDATE, INSERT, DELETE, SELECT, PHP functions for MySQL connectivity and operation- MySQL connect, mysql_select_db, mysql_query, mysql_fetch_row, mysql_fetch_array, mysql_result, mysql_list_fields, mysql_num_fields, insertion, updation and deletion of data using PHP, displaying data from MySQL in webpage.

Book of Study:

1.Dave W Mercer, Allan Kent, Steven D Nowicki, David Mercer, Dan Squier, Wankyu Choi -"Beginning PHP", Wiley Publishing, Inc

2.Ivan Bayross - "HTML, DHTML, JavaScript, Pearl & CGI", Fourth Revised Edition, BPB Publication.

3."Programming PHP", Rasmus Lerdorf and Kevin Tatore, Shroff Publishers & Distributors Pvt. Ltd

4."Beginning PHP", Dave W Mercer, Allan Kent, Steven D Nowicki, David Mercer, DanSquier, Wankyu Choi, Wiley Publishing, Inc.

4.5 Semester V

Core Course: Computer Networks

Course Code	CA5CRT14					
Course Title	Computer Networks					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	5					
Course Type	Core					
Credit	4	Hrs/Week	3	Total Hours	54	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Explain about signals, various network models, multiplexing, transmission media and switching				U	PSO1
CO2	Explain about various protocols in error control, flow control and multiple access.				U	PSO2
CO3	Illustrate about various networking devices, IP Addressing, protocols and cryptography.				U	PSO1
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

This course provides a comprehensive understanding of computer networks, covering topics such as data transmission, network models (OSI and TCP/IP),

bandwidth utilization, transmission media, switching techniques, data link layer protocols, multiple access protocols, network and transport layers, and application layer protocols. Students also explore network security concepts including common threats, firewalls, and cryptography, gaining insights into the fundamentals of modern networking technologies.

Detailed Syllabus

Unit 1: (10 hrs.)

Introduction to Networks, Data and signals-analog and digital, periodic analog signals, digital signals, bit rate, baud rate, bandwidth. Transmission impairments-attenuation, distortion and noise. Data communication protocols and standards, Network models - OSI model-layers and their functions. TCP/IP protocol suite.

Unit 2: (10 hrs.)

Bandwidth utilization Multiplexing: FDM, TDM, spread spectrum. Transmission Media- guided media and unguided media. Switching: message, Circuit and packet switched networks, datagram networks, virtual- circuit networks.

Unit 3: (12 hrs.)

Data link layer: Error Detection and Correction, Framing, flow and error control, Protocols – Noiseless channels (Simplest, Stop and Wait) and Noisy channels (Stop and Wait and Piggy Backing). Multiple Access Protocols. Random Access-ALOHA, CSMA. Wired LANs-IEEE standards, wireless LANs-Bluetooth, Cellular Telephony

Unit 4: (12 hrs.)

Network layer and Transport layer: Repeaters, Bridges, Gateways and routers. Logical addressing – IPV4 and IPV6 addressing, Internet protocol - IPV4 and IPV6. Connectionless and Connection Oriented Services: UDP and TCP. Congestion Control, Quality of Service.

Unit 5: (10 hrs.)

Application layer: HTTP, FTP, SMTP, DNS. Network security: Common Threats-Firewalls (advantages and disadvantages), Cryptography.

Book of study:

1.B. A. Forouzan - Data communication and Networking, Fourth edition-, TMH

2. Andrew S Tanenbaum - Computer Networks, Fourth Edition, Prentice Hall of India.

Core Course: IT and Environment

Course Code	CA5CRT15					
Course Title	IT and Environment					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	5					
Course Type	Core					
Credit	4	Hrs/Week	4	Total Hours	72	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Understanding the multidisciplinary nature of environmental studies and the role of IT in society.				U	PSO2
CO2	Understand the impact of E-learning, concepts of E-waste and green computing.				U	PSO2
CO3	Understand the nature and need for human rights and its issues and solutions.				U	PO2
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

Explore the multidisciplinary realm of environmental studies, covering natural resources, ecosystems, biodiversity, pollution, disaster management, social issues, and environmental legislation. Delve into IT's role in education, society, and human rights, along with concerns like digital divide, cyber ethics, and e-waste management.

Detailed Syllabus

Unit 1: (18 hrs.)

Multidisciplinary nature of environmental studies: Definition, scope and importance, Need for public awareness. (2 hrs) Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems. a) Forest resources: Use and over- exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c)Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies. f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles. (10hrs)

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids., Introduction, types, characteristic features, structure and function of the given ecosystem: - Forest ecosystem (6 hrs)

Unit 2: (26 hrs)

Biodiversity and its conservation: Introduction, Biogeographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values., India as a mega-diversity nation, Hot-sports of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India (8 hrs).

Environmental Pollution: Definition, Causes, effects and control measures of: - Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear hazards, Solid waste Management: Causes, effects and control measures of urban and industrial wastes., Role of an individual in prevention of pollution, Pollution case studies, Disaster management: floods, earthquake, cyclone and landslides. (8 hrs)

Social Issues and the Environment :Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people: its problems and concerns, Case studies, Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion , nuclear accidents and holocaust, Case studies, Consumerism and waste products, Environment Protection Act , Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness. (10hrs)

Unit 3: (10 hrs.)

Internet as a knowledge repository, academic search techniques, creating cyber presence. Academic websites, open access initiatives, opens access publishing models, Introduction to use of IT in teaching and learning -educational software, Academic services– INFLIBNET, NPTEL, NICNET, BRNET. (10hrs)

Unit 4: (10 hrs.)

IT & Society- issues and concerns- digital divide, IT & development, the free software movement, IT industry: new opportunities and new threats, software piracy, cyber ethics, cybercrime, cyber threats, cyber security, privacy issues, cyber laws, cyber addictions, information overload, health issues- guide lines for proper usage of computers, internet and mobile phones. e-wastes and green computing, impact of IT on language & culture-localization issues- Unicode- IT and regional languages, Green Computing Concept. (10hrs)

Unit 5: (8 hrs.)

Human Rights– An Introduction to Human Rights, Meaning, concept and development, Three Generations of Human Rights (Civil and Political Rights; Economic, Social and Cultural Rights). Human Rights and United Nations – contributions, main human rights related organs - UNESCO, UNICEF, WHO, ILO, Declarations for women and children, Universal Declaration of Human Rights. Human Rights in India – Fundamental rights and Indian Constitution, Rights for children and women, Scheduled Castes, Scheduled Tribes, Other Backward Castes and Minorities Environment and Human Rights - Right to Clean Environment and Public Safety: Issues of Industrial Pollution, Prevention, Rehabilitation and Safety Aspect of New Technologies such as Chemical and Nuclear Technologies, Issues of Waste Disposal, Protection of Environment Conservation of natural resources and human rights: Reports, Case studies and policy formulation. Conservation issues of western ghats- mention Gadgil committee report, Kasthurirengan report. Over exploitation of ground water resources, marine fisheries, sand mining etc. (8 Hrs)

Internal: Field study

•Visit to a local area to document environmental grassland/ hill /mountain

•Visit a local polluted site – Urban/Rural/Industrial/Agricultural Study of common plants, insects, birds etc

•Study of simple ecosystem-pond, river, hill slopes, etc (Field work Equal to 5 lecture hours)

References:

11.“Technology in Action” Alan Evans, Kendall Martin, Mary Anne Poatsy, Pearson

12.Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (Ref)

13.Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (Ref)

14.Wanger K.D., 1998 Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p (Ref)

15.M-Magazine, R-Reference TB- Text Book.

Core Course: Java Programming Using Linux

Course Code	CA5CRT16					
Course Title	Java Programming using Linux					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	5					
Course Type	Core					
Credit	3	Hrs/Week	3	Total Hours	54	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Define java tokens, statements, loops and Object-oriented features in java				R	PSO1
CO2	Apply the concepts of packages, threads, exceptions, events, applets and swings				Ap	PSO2
CO3	Make use of JDBC drivers and functions to establish database connection and execute SQL operations				Ap	PSO2
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

Dive into the fundamentals of Java programming within a Linux environment, covering object-oriented concepts, class definitions, inheritance, exception handling,

multithreading, event handling, Swing components, applet fundamentals, graphics, and JDBC architecture for database connectivity.

Detailed Syllabus

Unit 1 (10 hrs.)

Concepts of Object-oriented programming, Benefits of OOP, Features of java. Java environment, java tokens, Constant, variables, data types, operators, Control Statements- branching statements, looping statements, jump statements, labeled loops.

Unit 2 (10 hrs.)

Defining a Class, Fields declaration, Method declaration, Creating object, Accessing class members, method overloading, Constructors, constructor overloading, super keyword, static Members, Inheritance, overriding methods, dynamic method dispatch, final (variables, methods and classes), abstract methods and classes, interfaces, visibility control.

Unit 3 (12 hrs.)

Arrays- One dimensional arrays, declaration, creation, initialization of arrays, two dimensional arrays, String class. Packages: - java API packages overview (lang, util, io, awt, swing, applet), user defined packages-creating packages, using packages Exception Handling Techniques-try-catch-throw-throws-finally -Multithreading-creation of multithreaded program-Thread Class-Runnable interface, Thread life cycle.

Unit 4 (10 hrs.)

Event Handling-Delegation Event Model-Event Classes-Sources of Events-Event Listeners-Event classes- Swing- architecture, components of swing- JLabel, JButton, JCheckBox, JRadioButton, JList, JComboBox, JTextField, JText Area, JPanel, JFrame, Layout Managers (Flow Layout, Grid Layout, Card Layout, Border Layout, Box Layout, Null Layout).

RAJAGIRI VALLEY P.O., KAKKANAD, KOCHI - 682 039
Ph: 0484-2955270
Email: principal@rajagiricollege.edu.in
www.rajagiricollege.edu.in

Unit 5 (10 hrs.)

Applet Fundamentals -applet tag, applet life cycle, passing parameters to applets. Working with graphics -Line, Rectangle, Oval, Arc, colour setting. JDBC architecture- JDBC connection, JDBC statement object, JDBC drivers.

Book of study:

1.E. Balagurusamy- Programming with Java, Third Edition, McGraw Hill Companies.

2.K. Somasundaram - PROGRAMMING IN JAVA2, First Edition, Jaico Publishing House.

Reference:

1.Patrick Naughton - Java2 the Complete Reference, Seventh Edition:

2.Cay S Horstmann & Gary Cornell - Core Java Volume 1- Fundamentals, Eighth edition.

3.Java 6 Programming Black Book 2007 Edition, Dreamtech press.

Open Course: Brand Management

Course Code	BA5OPT22					
Course Title	Brand Management					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	5					
Course Type	Core					
Credit	3	Hrs/Week	4	Total Hours	72	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Explain fundamental concept and significance of brands in the market.				U	PO5
CO2	Analyse the process of Brand Building				An	PO3
CO3	Develop strategies for successful brand portfolio management.				C	PO5
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

This course delves into the fundamentals of brand management, focusing on the concepts and processes of brand building and its importance to organizations. Students will learn to develop and implement effective brand portfolio strategies, covering key areas such as brand identity, promotion, logo design, brand positioning, equity, and extensions.

Detailed Syllabus

Module I

Product- Meaning and Definition, Types of product.

Brand- Meaning and Definition, Importance of branding, process of branding, circular process, Types of Brands.

Module II

Brand Identity- Meaning and Definition,

Brand Name- Attributes of a brand name, Brand name protection. Promoting your Brand-Objectives, different media.

Module III

Logo- Meaning and Definition.

Logo design- Do's & Don'ts ingredients. Word mark, Brand mark, Trademark. Tag line- Meaning and Definition, Functions.

Module IV

Brand positioning- Concept, advantages, process.

Brand Equity- Meaning& Definition, advantages, factors contributing to brand equity, measurement of brand equity.

Module V

Brand extension- Meaning, advantages. Brand licensing- Meaning and benefits. Co-branding-Meaning and benefits.

References:

1. Brand Management-Moorthi, Vikas Publications.

2. Brand Management- Harsh V Verma, Excel Books.

3. Marketing Management- Philip Kotler, Jha& Koshy Pearson Education.

4.6 Semester VI

Core Course: Cloud Computing

Course Code	CA6CRT17					
Course Title	Cloud Computing					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	6					
Course Type	Core					
Credit	4	Hrs/Week	4	Total Hours	72	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Understand the architecture of cloud computing and its types.				U	PSO2
CO2	Explain the taxonomy of virtualization with different technologies				U	PSO2
CO3	Understand the concepts for data-intensive computing and cloud computing platforms in industries.				U	PSO2
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

Delve into the world of cloud computing with topics ranging from historical developments to modern architectures. Explore virtualization, cloud computing

architecture, and platforms like Aneka, along with industry examples like Amazon Web Services, Google AppEngine, and Microsoft Azure, covering a spectrum of applications from scientific to business and consumer domains.

Detailed Syllabus

Unit 1: (14 hrs.)

Introduction: Cloud Computing at a Glance, Historical Developments, Building Cloud Computing Environments, Computing Platforms and Technologies, Principles of Parallel and Distributed Computing: Eras of Computing, Parallel vs. Distributed Computing, Elements of Parallel Computing, Elements of Distributed Computing.

Unit 2: (14 hrs.)

Virtualization: Introduction, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples.

Unit 3: (14 hrs.)

Cloud Computing Architecture: Introduction, Cloud Reference Model, Types of Clouds, Economics of the Cloud, Open Challenges.

Unit 4: (16 hrs.)

Aneka: Cloud Application Platform: Framework Overview, Anatomy of the Aneka Container, Building Aneka Clouds, Cloud Programming and Management, Data Intensive Computing: Map-Reduce Programming - What is Data-Intensive Computing? Technologies for Data-Intensive Computing, Aneka MapReduce Programming.

Unit 5: (16 hrs.)

Cloud Platforms in Industry: Amazon Web Services, Google AppEngine, Microsoft Azure, Cloud Applications: Scientific Applications, Business and Consumer Applications.

Book of Study:

1. Rajkumar Buyya, Christian Vecchiola, S ThamaraiSelvi- Mastering Cloud Computing, Tata McGraw Hill Publications.

References:

1. Kumar Saurabha, "Cloud Computing "Wiley Publication Krutz, Vines "Cloud Security".

Wiley Publication.

2. A Srinivasan & J. Suresh "Cloud Computing: A Practical Approach for learning and Implementation ", First edition, Pearson.

Core Course: Mobile Application Development-Android

Course Code	CA6CRT18					
Course Title	Mobile Application development- Android					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	6					
Course Type	Core					
Credit	4	Hrs/Week	4	Total Hours	144	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Understand the fundamentals of Android studio, Activity lifecycle, multimedia and other services.				U	PSO1
CO2	Compare the various user interface layouts in android				U	PSO2
CO3	Understand data interchange formats like JSON, XML and the role of Google Play Services to develop applications.				U	PSO2
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

Dive into the world of Android app development, covering everything from basic UI design to advanced features like activity management, multimedia integration, SQLite database handling, telephony, messaging, and JSON/XML parsing. Explore Google

Play services, location services, and maps integration for comprehensive mobile app development.

Detailed Syllabus

Unit 1 (10 hrs.)

Introduction to Android, Android Versions, Android Activity, Android Features and Architecture, Java JDK, Android SDK, Android Development Tools, Android Virtual Devices, Emulators, Dalvik Virtual Machine, Layouts – Linear, Absolute, Frame, Relative and Table.

Unit 2 (16 hrs.)

Android User Interface- Fundamental UI design, User interface with View- Text View, Buttons, Image Button, Edit Text, Check Box, Toggle Button, Radio Button and Radio Group, Progress Bar, Autocomplete Text View, Spinner, List View, Grid View, Image View, Scroll View, Custom Toast Alert and Time and Date Picker.

Unit 3 (14 hrs.)

Activity - Introduction, Intent, Intent filter, Activity Life Cycle, Broadcast Life Cycle, Services, multimedia-Android System Architecture, Play Audio and Video, Text to Speech.

Unit 4 (16 hrs.)

SQLite Database in Android- Introduction to SQLite Database, Creation and Connection of the Database, extracting values from Cursors, Transactions, Telephoning and Messaging-SMS Telephony, Sending SMS, Receiving SMS, Wi-Fi Activity.

Unit 5 (16 hrs.)

Introduction to JSON and XML, Use of JSON, Syntax and Rule of JSON, JSON Name, JSON Values, JSON Objects, JSON Arrays, Parsing JSON and XML. Google Play services, Location services, Maps

Book of Study:

1.Prasanna Kumar Dixit - ANDROID, Vikas Publishing House.

2.Anubhav Pradhan, Anil Deshpande, Composing Mobile Apps using Android, Wiley India Pvt.Ltd,2014.

References:

1. Kevin Grant and Chris Haseman, Beginning Android Programming – Develop and Design, Pearson.

Core Course: Data Mining

Course Code	CA6PET01					
Course Title	Data Mining					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	6					
Course Type	Core					
Credit	4	Hrs/Week	4	Total Hours	72	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Define data mining functionalities and types of data mining				R	PSO2
CO2	Explain data warehouse architecture, multidimensional cube model and OLAP operations				U	PSO2
CO3	Examine classification, prediction and clustering algorithms				An	PSO2
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

Delve into the world of data mining with a comprehensive exploration of its functionalities, including association, classification, prediction, and cluster analysis. Learn about data warehousing, OLAP technology, efficient mining methods, and handling complex data types like spatial, multimedia, and text data.

RAJAGIRI VALLEY P.O., KAKKANAD, KOCHI - 682 039
Ph: 0484-2955270
Email: principal@rajagiricollege.edu.in
www.rajagiricollege.edu.in

Detailed Syllabus

Unit 1: (12 hrs.)

Introduction Data Mining, Data Warehouse, Transactional Databases, Data Mining Functionalities Characterization and Discrimination, Mining frequent patterns, Association and correlation, Classification and Prediction, Cluster Analysis, Classification of Data Mining Systems, Data Mining Task Primitive, Integration of Data Mining systems, Major issues in Data Mining, Data integration and transformation, Data reduction, Data discretization.

Unit 2: (12 hrs.)

Data Warehouse and OLAP technology Data Warehouse, Multidimensional data Model, Data warehouse architecture, Data Warehouse implementation, OLAP, Data Warehouse and data mining.

Unit 3: (18 hrs.)

Association Rules and Classification Concepts Efficient and Scalable Frequent item set Mining methods, mining various kind of association rules, from association mining to Co-relation analysis, Classification and prediction, Issues, Classification by Decision tree induction, Bayesian Classification, Rule-based classification, Support Vector Machines, Learning from your neighbours, Prediction.

Unit 4: (18 hrs.)

Cluster Analysis Definition, Types of data in cluster analysis, A categorization major Clustering methods- Partitioning methods, K-means and k-medoids, from k-medoids to CLARANS, Hierarchical methods, Density based methods.

Unit 5: (12 hrs.)

Mining Complex Data Spatial Data Mining, Multimedia Data Mining, Text Mining and Mining WWW.

Book of study:

1. Jiawei Han and Micheline Kamber - Data Mining - Concepts and Techniques, Second Edition, Elsevier, 2006

Reference:

1. Witten and Frank - Data Mining Practical Machine Learning Tools and Techniques, Second Edition, Elsevier, 2005

2. Soman, Divakar and Ajay, Data Mining Theory and Practice, PHI, 2006

3.Margaret H Dunham- Data Mining –Introductory and Advanced Topics, Fourth Edition, Person 2006.

4.7 Practical Details

For practical examinations total marks for external evaluation is 80 for internal evaluation is 20.

Components	Internal Marks
Attendance	5
Practical Exam (Internal)	10
Record	5
Total	20

Semester I

Core Course: Software Lab I

Course Code	CA1CRP01				
Course Title	Software Lab I				
Department	Computer Science				
Programme	Bachelor of Computer Application				
Semester	1				
Course Type	Core				
Credit	2	Hrs/Week	4	Total Hours	72

CO No.	Expected Course Outcomes Upon completion of this course students will be able to:	Cognitive Level	PO, PSO No.
CO1	Create structured programs based on the concepts of decision-making statements and loop controls statements.	C	PSO2
CO2	Create programs based on arrays and pointers	C	PSO2
CO3	Create programs based on functions, user-defined datatypes and dynamic memory allocation.	C	PSO2

Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create

Course Description

This course offers hands-on experience in C programming, focusing on using printf() and scanf() functions, decision and loop control statements, arrays, strings, pointers, functions, structures, unions, and dynamic memory allocation through practical exercises and coding assignments.

Detailed Syllabus

1. Programs to familiarize printf() and scanf() functions.

2. Programs Based on Decision statements, break, goto, continue, switch and Loop controls statements.

3. Programs Based on One dimensional and two-dimensional arrays.

4. Programs on Strings and string handling functions.

5. Programs based on Pointers, operations on pointers, Arrays & Pointers.

6. Programs based on functions, Call by value, Call by reference, Recursion.

7. Programs based on structure and union, array of structures, Pointer to structure, structure and functions

8. Simple programs using pointers and malloc().

Scheme of Evaluation for software lab I external is as follows:

Division of Marks (Practical - 3 hours External)

First program from part 1& 2 - 25 marks

1. Flowchart - 5 marks

2. Logic – 10 marks

3. Successful compilation – 5 marks

4.Result – 5 marks

Second program should be based on advanced concepts, part 3 to part 8 - 35 marks

1.Logic – 20 marks

2.Successful compilation – 10 marks

3.Result – 5 marks) Viva Voce - 10 marks

Lab Record (minimum of 25 Programs) - 10 marks Total Marks - 80 marks.

Semester II

Core Course: Software Lab II

Course Code	CA2CRP02					
Course Title	Software Lab- II					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	2					
Course Type	Core					
Credit	2	Hrs/Week	5	Total Hours	90	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Construct a normalised database with the help of constraints				Ap	PSO2
CO2	Apply the basic operations and functions to the database.				Ap	PSO2
CO3	Apply Object Oriented concepts in C++ programming.				Ap	PSO2
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

This course provides practical experience with SQL commands for data definition, manipulation, and control, as well as complex queries and view management. It also includes hands-on programming in C++ focusing on function overloading, operator overloading, constructors, and inheritance.

Detailed Syllabus

I. SQL Commands (2 hrs. per week)

1.Data definition commands - CREATE, ALTER, DROP, Adding Constraints Primary key, foreign key, unique key, check, not null.

2.Basic SQL queries INSERT, SELECT, DELETE, UPDATE, Using multiple tables, ordering of rows using ORDER BY option, Set operations using UNION, EXCEPT, INTERSECT, Substring Comparison using LIKE operator, BETWEEN operator.

3. Complex Queries Nested Queries, EXISTS and UNIQUE/DISTINCT functions, NULL values, Renaming of attributes and Joining of tables, Aggregate functions and grouping.

4.Managing views, Simple stored procedures.

5.Data Control commands - Access Control and Privilege commands.

II.Object Oriented Programming using C++ (3 hrs. per week)

1.Programs based on default arguments, function overloading.

2.Programs based on array of objects, friend functions, passing objects as arguments to function.

3.Programs based on operator overloading (binary, unary) using member functions and friend functions.

4.Programs based on constructors, different types of constructors.

5.Programs based on inheritance, different types of inheritance.

Scheme of Evaluation for software lab II external is as follows:

(There will be two questions; the first from DBMS and second from C++) Division of Marks (Practical - 3 hours External)

First program - questions from DBMS - 25 marks

1.Logic – 10 marks

2.Successful compilation – 8 marks

3.Result – 7 marks

Second program – questions from Object Oriented Programming using C++ - 35 marks

1.Logic – 20 marks

2.Successful compilation –10 marks

3.Result – 5 marks Viva Voce - 10 marks Lab Record - 10 marks

(DBMS -Minimum of 10 Programs C++ -Minimum: of 15 Programs)

Total Marks - 80 marks.

Semester III

Core Course: Software Lab III

Course Code	CA3CRP03				
Course Title	Software Lab III				
Department	Computer Science				
Programme	Bachelor of Computer Application				
Semester	3				
Course Type	Core				
Credit	2	Hrs/Week	6	Total Hours	108

CO No.	Expected Course Outcomes Upon completion of this course students will be able to:	Cognitive Level	PO, PSO No.
CO1	Utilize the operations and applications of array to implement various data structures like stack and queue.	Ap	PSO2
CO2	Build programs to implement linked list and its types	Ap	PSO2
CO3	Apply linked list for the creation and traversal of binary search trees	Ap	PSO2
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create			

Course Description

This course provides practical experience in implementing fundamental data structures and algorithms in C++, including array operations, sorting, searching,

sparse matrix manipulation, stack operations, and queue implementations. Through hands-on exercises, students gain proficiency in algorithmic problem-solving and data structure implementation.

Detailed Syllabus

Module I

Array – Insertion, Deletion, Polynomial addition using arrays Sort – Selection, Insertion, Quick

Search – Linear search, Binary search

Sparse matrix – Sparse form representation, transpose and addition using the sparse form

Module II

Stack - Implementation using arrays (linear stack), Infix to postfix conversion, Postfix evaluation

Queue – Implementation using arrays (linear queue), Implementation of circular queue

Module III

Singly linked list – Implementation using dynamic memory allocation techniques, arrange the list based on the ascending or descending order of the information field, concatenate two linked lists, interchange any two nodes in a list, Implementation of circular list, Implementation of linked stacks and queues.

Doubly linked list – Implementation of doubly linked list, Implementation of circular doubly linked list.

Module IV

Creation of binary search trees, Insertion and deletion of nodes, Tree traversals.

Scheme of Evaluation for software lab III external is as follows:

(There will be two questions)

Division of Marks (Practical - 3 hours External)

First program - questions from module 1 & II - 25 marks

1. Logic – 10 marks

2. Successful compilation – 8 marks

3.Result – 7 marks

Second program – questions from module III & IV - 35 mark

1.Logic – 20 marks

2.Successful compilation –10 marks

3.Result – 5 marks Viva Voce - 10 marks Lab Record - 10 marks

(Minimum of 25 Programs)

Total Marks - 80 marks.

Semester IV

Core Courses: Software Lab IV

Course Code	CA4CRP04				
Course Title	Software Lab IV				
Department	Computer Science				
Programme	Bachelor of Computer Application				
Semester	4				
Course Type	Core				
Credit	2	Hrs/Week	6	Total Hours	108

CO No.	Expected Course Outcomes Upon completion of this course students will be able to:	Cognitive Level	PO, PSO No.
CO1	Apply Linux commands to develop shell programs.	Ap	PSO2
CO2	Make use of the concepts of HTML, CSS, and JavaScript in PHP programs.	Ap	PSO2
CO3	Build dynamic website using PHP.	C	PSO3

Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create

Course Description

This lab-based course offers hands-on training in two key areas: Linux administration and web programming using PHP. Students engage with Linux commands, file system operations, process management, and shell scripting, while also developing

web applications with HTML, JavaScript, PHP, and MySQL, gaining practical skills in both system administration and web development.

Detailed Syllabus

I. Linux (2 hrs. per week)

1.Getting started Command

2.The Linux Architecture and command usage – Commands, General purpose utilities.

3.The File system –Commands

4.Process related commands

5.Handling ordinary files, Basic file attributes

6 The vi editor

7.Simple Filters, Filters using regular expressions-use of grep command

8.Introduction to shell concept and writing shell script

9.Introduction to shell concept and writing shell script, Essential Shell Programming

10.User management, monitoring system performance, disk usage etc.

II. Web Programming using PHP (4 hrs. per week)

1.Creating programs based on HTML.

2.Creating Java script-based programs.

3.Creating simple programs based on PHP

4.Programs using PHP functions

5.Programs based on MY SQL.

Scheme of Evaluation for software lab IV external is as follows:

(There will be two questions; the first from LINUX and second from PHP)

Division of Marks (Practical - 3 hours External)

First program - questions from LINUX - 25 marks

1.Logic – 10 marks

2.Successful compilation – 8 marks

3.Result – 7 marks

Second program – questions from PHP - 35 marks

1.Logic – 15 marks

2.Successful compilation –15 marks

3.Result – 5 marks Viva Voce - 10 marks Lab Record - 10 marks

(LINUX -Minimum of 10 Programs PHP -Minimum of 15 Programs)

Total Marks - 80 marks.

Semester V

Core Course: Software Lab V

Course Code	CA5CRP05					
Course Title	Software Lab V					
Department	Computer Science					
Programme	Bachelor of Computer Application					
Semester	5					
Course Type	Core					
Credit	2	Hrs/Week	5	Total Hours	90	
CO No.	**Expected Course Outcomes** Upon completion of this course students will be able to:				**Cognitive Level**	**PO, PSO No.**
CO1	Apply OOP concepts to implement basic java programs				Ap	PSO1
CO2	Apply the advanced concepts of java like applets, swings, and thread and manage them in various events.				Ap	PSO2
CO3	Examine the dataflow between JSP pages and database using JDBC drivers				An	PSO2
Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create						

Course Description

Engage in hands-on learning with Java programming by developing applets, JDBC connections, and Swing-based applications. Utilize classes and keyboard input to

explore method overloading, method overriding, inheritance, abstract classes, interfaces, packages, exception handling, and multithreading.

Detailed Syllabus

Part I. Applet, JDBC connection and swing based Programs

Part II (using class and read inputs from keyboard)

Java Programs: Method Overloading- Method Overriding-inheritance-abstract class, interfaces- packages- Exception Handling-Multithreading

Scheme of Evaluation for software lab V external is as follows:

(There will be two questions; the first from Part I and second from Part II) Division of Marks (Practical - 3 hours External)

First program - questions from Part I - 25 marks

1.Logic – 10 marks

2.Successful compilation – 8 marks

3.Result – 7 marks

Second program – questions from Part II - 35 marks

1.Logic – 20 marks

2.Successful compilation –10 marks

3.Result – 5 marks Viva Voce - 10 marks

Lab Record - 10 marks (Minimum of 25 Programs)

Total Marks - 80 marks

Semester V

Core Course: Software Development Lab I (Mini Project)

Course Code	CA5CRP06				
Course Title	Software Development Lab I (Mini Project in PHP)				
Department	Computer Science				
Programme	Bachelor of Computer Application				
Semester	5				
Course Type	Core				
Credit	2	Hrs/Week	6	Total Hours	108

CO No.	Expected Course Outcomes Upon completion of this course students will be able to:	Cognitive Level	PO, PSO No.
CO1	Identify the chosen area of technology for project development	Ap	PO1
CO2	Develop effective communication skills for presenting project related activities	C	PSO2
CO3	Contribute as an individual or in a team in developing technical projects.	C	PSO3

Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create

Course Description

Gain practical experience in software development through a mini-project, fostering confidence in designing complete applications based on software engineering

principles. Evaluation includes project demonstration, presentation, viva, and modification, conducted under faculty guidance within the college lab.

Detailed Syllabus

Mini project can be a small complete application project, to make the student confident in designing a system based on Software engineering course. The internal and external evaluation is to be done with the project demonstration and presentation, viva and modification. It must be done in the college lab under the guidance of a faculty.

Scheme of Evaluation for Software Development Lab I external is as follows:

Division of Marks (Software Development Lab I)

Project demonstration and Presentation - 25 marks Modification - 15 marks

Viva Voce - 15 marks

Project report with proper content and binding - 25 marks

Total Marks - 80 marks

Semester VI

Core Course: Software Development Lab II (Main Project)

Course Code	CA6CRP08				
Course Title	Software Development Lab II (Main Project)				
Department	Computer Science				
Programme	Bachelor of Computer Application				
Semester	6				
Course Type	Core				
Credit	3	Hrs/Week	7	Total Hours	126

CO No.	Expected Course Outcomes Upon completion of this course students will be able to:	Cognitive Level	PO, PSO No.
CO1	Identify the real-world problems and evaluate its feasibility	Ap	PO2
CO2	Choose the correct software engineering model to design the system for the identified problem	E	PO5
CO3	Create the application by implementing a new package	C	PSO3

Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create

Course Description

Engage in an individual project focused on current industry needs, utilizing the latest tools and languages. Develop a comprehensive project report and undergo evaluation

through project demonstration, viva, and submission of the final report for internal assessment.

Detailed Syllabus

Individual project.

The project topic shall be chosen from areas of current day interest using latest packages/ languages running on appropriate platforms (Except the tools used in software development I), so that the student can be trained to meet the requirements of the industry. A project report should be submitted in hard bound complete in all aspects. For internal evaluation, the progress of the student shall be systematically assessed through various stages of evaluation at periodic intervals.

Scheme of Evaluation for Software Development Lab II external is as follows: Division of Marks (Software Development Lab II)

Project demonstration and Presentation - 40 marks

Viva related to project - 20 marks

Project report with proper content and binding -20 marks

Total Marks - 80marks

Core Course: Software Lab VI & Seminar

Course Code	CA6CRP07				
Course Title	Software Lab VI & Seminar				
Department	Computer Science				
Programme	Bachelor of Computer Application				
Semester	6				
Course Type	Core				
Credit	2	Hrs/Week	6	Total Hours	36

CO No.	Expected Course Outcomes Upon completion of this course students will be able to:	Cognitive Level	PO, PSO No.
CO1	Identify a topic from the wide variety of recent technologies in IT industry	Ap	PO1
CO2	Utilize the literature review to produce summary of the topic.	Ap	PSO1
CO3	Develop presentation and communication skills to interact in a public forum.	C	PO6

Cognitive Level: R- Remember, U-Understanding, Ap-Apply, An-Analyze, E-Evaluate, C-Create

Course Description

Engage in current topics within Computer Science/Information Technology through individual seminar presentations. Each student selects a contemporary theme, prepares a presentation, submits a comprehensive technical report, and conducts an

interactive session. Internal evaluation includes assessment of presentation quality, discussion engagement, and thorough documentation.

Detailed Syllabus

VIVA VOCE (Core)

Credit :1

Scheme of Evaluation of Viva voce (core) for External is as follows:

Each student should attend a course viva voce based on syllabus from semester I to semester IV.

Total Marks – 100 marks

5. Assessment and Evaluation

For Projects:

- Marks of external evaluation: 80
- Marks of internal evaluation: 20

Components of Internal Evaluation of Project	Marks
Coding and debugging	5
Knowledge	5
Punctuality	5
Report	5
Total	20

Components of External Evaluation of Project	Marks
Project demonstration & presentation	40
Explanation of Subject areas related to project	20
Project report and documentation	20
Total	80

For Seminars:

Components of Internal Evaluation of Seminar	Marks
Discussion	30
Documentation	10
Presentation	40
Seminar Report (Binded)	20
Total	100

For other subjects:

The evaluation of each paper shall contain two parts:

- Internal or In-Semester Assessment (ISA)
- External or End-Semester

Assessment (ESA) The internal to external assessment ratio shall be 1:4.

Both internal and external marks are to be rounded to the next integer. All papers (theory& practical), grades are given on a 7-point scale based on the total percentage of marks, (ISA+ESA) as given below:

Percentage of Marks	**Grade**	**Grade Point**
95 and above	S Outstanding	10
85 to below 95	A+ Excellent	9
75 to below 85	A Very Good	8
65 to below 75	B+ Good	7
55 to below 65	B Above Average	6
45 to below 55	C Satisfactory	5
35 to below 45	D Pass	4
Below 35	F Failure	0
	Ab Absent	0

Credit Point and Credit PointAverage Credit Point (CP) of a paper is calculated using the formula:

- CP = C × GP, where C is the Credit and GP is the Grade point.

Semester Grade Point Average (SGPA) of a Semester is calculated using the formula:

SGPA = TCP/TC, where TCP is the Total Credit Point of that semester.

Cumulative Grade Point Average (CGPA) is calculated using the formula: CGPA =TCP/TC, where TCP is the Total Credit Point of that programme.

Grade Point Average (GPA) of different category of courses viz. Common Course I, Common Course II, Complementary Course I, Complementary Course II, Vocational course, Core Course is calculated using the formula:

GPA = TCP/TC, where TCP is the Total Credit Point of a category of course and TC isthe total credit of that category of course. Grades for the different courses, semesters andoverall programme are given based on the corresponding CPA as shown below:

GPA	**Grade**
9.5 and above	S Outstanding
8.5 to below 9.5	A+ Excellent
7.5 to below 8.5	A Very Good
6.5 to below 7.5	B+ Good
5.5 to below 6.5	B Above Average
4.5 to below 5.5	C Satisfactory
3.5 to below 4.5	D Pass
Below 3.5	F Failure

Marks Distribution for External and Internal Evaluations

The external theory examination of all semesters shall be conducted by the University at the end of each semester. Internal evaluation is to be done by continuous assessment.

For all courses without practical, the total marks of external examination is 80 and total marksof internal evaluation is 20.

Marks distribution for external and internal assessments and the components for internalevaluation with their marks are shown below:

For all Courses without Practical

- Marks of external Examination: 80
- Marks of internal evaluation: 20

Components of Internal Evaluation of Theory	Marks
Attendance	5
Assignment/Seminar/Viva	5
Test Papers (2 x 5=10)	10
Total	20

Attendance Evaluation for all Papers

Percentage of Attendance	Marks
90 and above	5
85 -89	4
80-84	3
76-79	2
75	1

Assignments are to be done from 1st to 6th Semesters.

At least one assignment should be done in each semester for all courses

Seminar/Viva: A student shall present a main seminar in the 6th semester and appear for Viva-voce at the end of 6th semester.

Internal Assessment

Test Papers Two test papers are to be conducted each semester for each course. The evaluations of all components are to be published and are to be acknowledged by the candidates. All documents of internal assessments are to be kept in the college for one year and shall be made available for verification by the University. The responsibility ofevaluating the internal assessment is vested in the teacher(s), who teach the course.

External Examination

- The external theory examination of all semesters shall be conducted by the Univesty at the end of each semester.
- Students having a minimum of 75% average attendance for all the courses only
  can register for the examination.
- All students are to do a mini project in the 5th semester and main project in the 6th semester in the area of core course. Mini project can be done individually or in groups (not more than five students) for all subjects which may be carried out inor outside the campus.
- Main project has to be done individually.
- External Project evaluation and Viva / Presentation is compulsory for all subjectsand will be conducted at the end of the programme.

Pattern of Questions

Questions shall be set to assess knowledge acquired, standard and application of knowledge, application of knowledge in new situations, critical evaluation of knowledge and the ability to synthesize knowledge. The question setter shall ensure

that questions covering all skills are set. She/he shall also submit a detailed scheme of evaluation along with the question paper. A question paper shall be a judicious mix of short answer type, short essay type /problem solving type and long essay type question.

RAJAGIRI VALLEY P.O., KAKKANAD, KOCHI - 682 039
Ph: 0484-2955270
Email: principal@rajagiricollege.edu.in
www.rajagiricollege.edu.in