

ALVA'S COLLEGE (AUTONOMOUS) MOODUBIDIRE



PERSPECTIVE PLAN 2026-2027

Sundari Anand Alva Campus, Vidyagiri Moodubidire 574227

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Experts Involved in Planning :

1. Mr.Kiran Vati K Asst.Professor St. Aloysius College, (Deemed to be University) Mangalore
2. Mr. Shiva Kumar & Ms. Shruptha Padiwal
3. Mrs. GayathreeKumary & Mrs. Shikha
4. Prof. Neelappa V
5. Dr.Prajna P.S,
6. Nikhil Rai
7. Manish Naik
8. Dr. Ravishankar KV Bangalore
9. Dr. R Ragunathan, Tamil Nadu
10. Mrs. GayathreeKumary
11. Mrs. Shikha
12. Dr. Srilatha rao, Professor, Department of chemistry, Nitte meenakshi Institute technology Bangalore.
13. Dr. Sukanya Mary Principal PPC Evening College, Udupi.
14. Dr. Suma T.R B.O.S Chairman, Mang.University H.O.D Hindi Dept. University College, Hampanakatta, Mangalore.
15. Dr. Mongsatabam Tuleswari Devi Asst. Professor in Manipuri Mayailambi College Yumnam Huidrom, Manipur.
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19. Dr. Sreepada K.S. Professor and Chairperson, Dept. of Applied Zoology, Mangalore University, Mangalagangothri- 575199.
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21. Dr. Shubhakar Anchan PRO Niite Gajria Hospital Karkala
22. Mr. Prashantha Devadiga, Manager H.R. SKF Boilers and Driers Pvt. Ltd. Bannadka Belvai
23. Nagalingappa Pattar
24. Dr Adelaide Saldanha
25. Mr. Adarsh Shenoy
26. Mr. Srivathsa

27. Sandeep, Assistant Professor, Akkamahadevi University, Vijayapura
28. Prof Balasubramnya , Former Professor & Head, KUD
29. Prof Satish Kumar Andinje, Kuvempu University (Optional)
30. Prof Sapna, Chairman, Dept Of MCJ, Mysore University
31. Shrigouri S Joshi, Assistant Professor, Amrita Vishwa Vidyapeetham Mysore
32. CA Umesh Rao
33. Dr. Prakash Pinto
34. Dr. Kushalappa
35. CA Anwesh
36. CA Kirana Kamath
37. Mr. Ganesh Rao CEO, Empowering People, Bangalore
38. Dr. Kushalappa S

About the College

Alva's College is one among the 19 institutions under Alva's Education Foundation, has been established and promoted by Alva's Education Foundation(R) with a vision of serving the community since 1998. Alva's is a unique educational institution that embodies all academic, sports and cultural characters. Alva's facilitates each student in their overall growth to link them closely with the corporate sector, higher education and research, administrative services (public sector), professional courses and entrepreneurship. The college has been awarded graded 'A' in its re-accreditation in the year 2018 by NAAC.

Vision: Moulding a better tomorrow for fostering dynamic excellence in academic, culture and sports.

Mission

1. Providing physical and Intellectual Environment for Quality education.
2. Enhancing Knowledge and integrating skill based Education for Employability

3. Infusing Research ability, scientific temperament and innovations
4. Supporting digitalization of Educational pedagogy
5. Promoting the folk and classical art forms
6. Nurturing sports talents and creating systems for integrated development
7. Working for the inclusion of deprived and alienated-class in the society
8. Promoting human values and National Integration.

Objectives:

1. To sustain the status of ‘Centre of Excellence’ for higher learning
2. To address the needs of infrastructure development and regular maintenance of new and existing facilities
3. Providing quality education by creating, advancing and disseminating knowledge with collective wisdom
4. To achieve excellence through outstanding performance
5. To provide opportunities for the students to think, perform, and communicate in a critical, creative and effective manner.
6. To encourage multidisciplinary research and to respond to the emerging needs of the society
7. To encourage grants or contracts from industries/organizations, which fund research
8. To adopt technology to enhance teaching, learning, and research
9. To enhance academic growth among female students, S/ST students and students with physically challenged
10. To strengthen the skills and employability among female students, S/ST students and students with physically challenged
11. To enhance and promote national consciousness and Human values among staff and students

Formulation Process of the Annual Plan

The annual plan of the college for the Academic year 2026-2027 has been prepared by IQAC with the assistance of the members of IQAC committee, Deans, HODs and Coordinators of UG and PG programmes, convenors of different cells and forums. The entire exercise has been envisioned keeping in view of the quality parameters laid down by NAAC for a holistic up gradation of higher educational Institution. 39 experts from different disciplines and 59 alumni were involved in the planning. The mode of execution shall be mainly through IQAC interventions to be decided from time to time as per resolutions taken in the IQAC committee meetings.

CURRICULAR ASPECTS

New Courses:

New Specialisation Courses

Approved in BOS Meeting held on 3/12/2025 and Academic Council Meeting held on 6/2/2026

BBA Program: Six Specialisation Courses:

1. Marketing Management
2. Financial Management
3. Human Resource Management
4. Health Care Management
5. Logistics and Supply Chain management
6. Facility Management

Course Structure:

Specialisation Courses within the structure of SEP Scheme

Semester	Existing Course (Electives)	New Course (With Electives)
III	Marketing: Retail Management	Logistics and Supply Chain Management: Logistics Management
	HR: Human Resource Development	Facility Management: Fundamentals of Facility Management
	Finance: Working Capital Management	Health Care Management: Health Care and Hospital Environment
IV	Marketing: Advertising and Media Management	Logistics and Supply Chain Management: Supply Chain Management
	HR: Performance and Welfare Management	Facility Management: Facility Management Services
	Finance: Security Analysis & Portfolio Management	Health Care Management: Hospital Medical Records Management

Semester	Existing Course (Core Course)	New Course (as Elective with core Course)
V	One Core Course	Marketing: Consumer Behaviour
		HR: Labour Laws
		Finance: Financial Statement Analysis
		Logistics and Supply Chain Management: Material Management
		Facility Management: Operations and Maintenance
		Health Care Management: Hospital Operations Management
VI	One Core Course	Marketing: Strategic Product, Service and Brand Management
		HR: Industrial Relations
		Finance: Advanced Corporate Financial Management
		Logistics and Supply Chain Management: Port Management

		<i>Facility Management:</i> Project Management
		<i>Health Care Management:</i> Hospital Hazards & Disaster Management
PG Course		
1.	MBA in Health Care Management	<i>4 Semesters</i>

Credits Pattern, Scheme of Examination and Syllabus for Two Years Master of Computer Applications (MCA) Degree Programme (CBCS Semester Scheme).

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

- PEO1:** To provide core theoretical and practical knowledge in the domain of Computer Applications for leading successful career in academia, industries, pursuing higher studies or entrepreneurial endeavors.
- PEO2:** To develop the ability to critically think, analyze and make decisions for offering techno-commercially feasible and socially acceptable solutions to real life problems in the areas of computing.
- PEO3:** To imbibe life-long learning, professional and ethical attitude for embracing global challenges and make positive impact on environment and society.

The Programme Learning Objectives are:

- PL01:** Scientific knowledge: Apply the knowledge of mathematics, science, and engineering fundamentals to the solution of complex scientific/societal/engineering problems.
- PL02:** Problem analysis and Solutions: Identify, formulate, research literature, and analyze complex scientific/societal/engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. Design solutions for complex scientific/societal/engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental

considerations.

PL03: Conduct investigations of complex problems and communication:

Use research- based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. Communicate effectively on complex scientific/societal/engineering activities with the scientific community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PL04: Modern tools usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex scientific/engineering activities with an understanding of the limitations.

PL05: Environment and sustainability: Understand the impact of the professional scientific solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PL06: Ethics and Team Work: Apply ethical principles and commit to professional ethics and responsibilities and norms of the social/scientific practice. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PL07: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and

apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PLO8: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO1: To identify, critically analyze, formulate and develop computer applications by applying knowledge of mathematics, computer science and management in practice.

PSO2: An ability to select modern computing tools and techniques and use them with dexterity and hence to design a computing system to meet desired needs within realistic constraints such as safety, security and applicability.

PSO3: An ability to devise and conduct experiments, interpret data and provide well informed conclusions and hence to understand the impact of system solutions in a contemporary, global, economic, environmental, and societal context for sustainable development.

PSO4: An ability to function professionally with ethical responsibility as an individual as well as in multidisciplinary teams with a positive attitude.

PSO5: An ability to communicate effectively and an ability to appreciate the importance of goal setting and to recognize the need for life-long learning.

Credits Pattern and Scheme of Examination

I SEMESTER M.C.A.								
Course Code	Courses	Theory Hours / Week	Practical Hrs. / Week	Duration of exams (Hours)	Marks & Credits			
					IA	Exam	Total	Credits
HARD CORE								
	Mathematical Foundations Of Computer Science	4L	-	3	30	70	100	4
	Advanced Operating Systems	4L	-	3	30	70	100	4
	Enterprise Java	4L	-	3	30	70	100	4
	Advanced Data Structure and Algorithms	4L	-	3	30	70	100	4
SOFT CORE [Only ONE course shall be selected from the list of courses]								
	Advanced Database Management Systems	4L	-	3	30	70	100	4
	Python Programming	4L	-	3	30	70	100	4
BRIDGE COURSE*								
	Foundations of Information Technology	4L	-	3	30	70	100	-
PRACTICALS [Any two labs shall be selected]								
	Enterprise Java Lab	-	6	3	30	70	100	3
	Advanced Data Structure and Algorithms Lab	-	6	3	30	70	100	3
	Advanced Database Systems Lab	-	6	3	30	70	100	3
	Python Programming Lab	-	6	3	30	70	100	3
TOTAL		20+4*	12	21+3*	210	490	700	26

*Bridge Course: 23MCAB101: Foundation of Information Technology is a non-credit Course to be offered only for non-computer science background students. However, such students have to obtain eligibility both in IA and Final Examination.

II SEMESTER M.C.A.

Course Code	Courses	Theory Hours / Week	Practical Hours/ Week	Duration of exams (Hours)	Marks & Credits			
					IA	Exam	Total	Credits
HARD CORE								
	Machine learning and Data analytics using Python	4L	-	3	30	70	100	4
	Software Engineering	4L	-	3	30	70	100	4
	Data Communications and Computer Networks	4L	-	3	30	70	100	4
SOFTCORE [Any One course shall be selected from the list of courses]								
	Internet of Things	4L	-	3	30	70	100	4
	Advanced Web Technologies	4L	-	3	30	70	100	4
ELECTIVE - I [Within the Department]								
#	Elective - I	3L	-	3	30	70	100	3
PRACTICALS [Two practical shall be selected from the list]								
	Machine learning and Data analytics using Python lab	-	6	3	30	70	100	3
	Data Communications and Computer Networks Lab	-	6	3	30	70	100	3
	Advanced Web Technologies Lab	-	6	3	30	70	100	3
	Internet of Things Lab	-	6	3	30	70	100	3
	Mini Project and Domain Knowledge Seminar	-	6	3	30	70	100	3
TOTAL		19	12	21	210	490	700	25

SECOND SEMESTER ELECTIVE COURSES: ELECTIVE - I

Subject Code	Name of the Elective Course
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	Prompt Engineering
	Object-oriented Analysis & Design
	Mobile Computing
	Cloud Computing
	Principles of Data Science

III SEMESTER M.C.A.

Course Code	Courses	Theory Hours / Week	Practical Hours/ Week	Duration of exams (Hours)	Marks & Credits			
					IA	Exam	Total	Credits
HARD CORE								
	Principles of Cyber Security and Ethical Hacking	4L	-	3	30	70	100	4
	Deep Learning Fundamentals	4L	-	3	30	70	100	4
	Mobile Application Development	4L	-	3	30	70	100	4
SOFT CORE [Only ONE course shall be selected from the list of courses]								
	Image Processing	4L	-	3	30	70	100	4
	Natural Language Processing	4L	-	3	30	70	100	4
ELECTIVE - II [Within the Department]								
#	Elective - II	3L	-	3	30	70	100	3
PRACTICALS [One practical shall be selected from the list]								
	Deep Learning Fundamentals Lab	-	6	3	30	70	100	3
	Mobile Application Development Lab	-	6	3	30	70	100	3
	Image Processing Lab	-	6	3	30	70	100	3
	Natural Language Processing Lab	-	6	3	30	70	100	3
	Blockchain Technologies Lab	-	6	3	30	70	100	3

	Mini Project and Domain Knowledge Seminar	-	6	3	30	70	100	3
Total		19	12	21	210	490	700	25

* The conduction of examination is similar to the practical examination which is evaluated based on the Mini Project Work.

Based on the Selected Elective Course

THIRD SEMESTER ELECTIVE COURSES: ELECTIVE - II

Course Code	Name of the Elective Course
	Blockchain Technologies
	Data Mining and Visualization
	Big Data Analytics
	Introduction to Generative AI
	Distributed Computing

IV SEMESTER MCA							
Course Code	Course	Practical Hours/ Week	Duration of Exam (Hrs)	Marks & Credits			
				IA	Dissertation + Viva Exam	Total	Credits
25MCAP401	Dissertation and Viva-Voce	24	—	100	200 (Dissertation Report : 100 Viva-Voce: 100)	300	12
25MCAE402	Course offered through MOOCS-SWAYAM/NPTEL (Minimum of 8 weeks duration course)					100	02
25MCAE403	Course offered through MOOCS-SWAYAM/NPTEL (Minimum of 8 weeks duration course)					100	02
TOTAL MARKS OF FIRST SEMESTER						700	26
TOTAL MARKS OF SECOND SEMESTER						700	25
TOTAL MARKS OF THIRD SEMESTER						700	25
TOTAL MARKS OF FOURTH SEMESTER						500	16
GRAND TOTAL CREDITS OF ALL THE FOUR SEMESTERS						2600	92

Note:

The dissertation work shall be carried out either in the University, Software Company, R&D Organization or any Institutes of National Importance.

* The MOOCS-SWAYAM/NPTEL course shall be taken by students in online mode offered by SWAYAM/NPTEL course coordinator. The courses can be taken anytime during their Masters' programme and the courses completion certificate shall be obtained before the completion of fourth semester term days.

Note: The dissertation work shall be carried out either in the College, Software Company, R&D Organization or any Institutes of National Importance.

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Hours/Week: 4

I.A. Marks: 30

Credits: 4

Exam. Marks: 70

Course Learning Objectives:

- The primary objective of this course is to provide mathematical background and sufficient experience on various topics of discrete mathematics like logic and proofs, combinatory, graphs, algebraic structures, formal languages and finite state automata.
- Course will extend student's Logical and Mathematical maturity and ability to deal with abstraction and to introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.
- On completion of this course, students should be able to demonstrate their understanding of and apply methods of discrete mathematics in CS to subsequent courses in algorithm design and analysis, automata theory and computability, information systems, computer networks.
- In particular, students should be able to - use logical notation to define fundamental mathematical concepts such as sets, relations, functions and various algebraic structures, reason mathematically using such structures, and evaluate arguments that use such structures.

Course Outcomes: After completing the course, the students will be able to,

- Understand basic probability axioms and rules and the moments of discrete and continuous random variables as well as be familiar with common named discrete and continuous random variables.
- Gain the knowledge of computing and mathematics appropriate to the discipline.
- Know the significance of mathematical foundations, algorithmic principles and computer science.
- Modeling and design of computer based systems in a way that demonstrates.
- Understand the design and development principles in the construction of software systems of varying complexity.
- Write and evaluate a proof or outline the basic structure of and give examples of each proof technique described.
- Recognize Model problems in Computer Science using graphs and trees.

UNIT-I	12Hrs.
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Review of Sets, Propositions, Relations, Functions, Graphs, Introduction to Probability Theory: Sample Space, Random Variables, Probability Distributions, Expected Values, Joint Distributions, Variance, Covariance.

UNIT-II	12Hrs.
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Basic Logic: Propositional Logic: Logical Connectives; Truth Tables; Normal Forms (Conjunctive And Disjunctive); Validity; Predicate Logic; Limitations of Predicate Logic, Universal and Existential Quantification; Modus Ponens and Modus Tollens. Proof Techniques: Notions of Implication, Converse, Inverse, Contrapositive, Negation, and Contradiction; The Structure of Formal Proofs; Direct Proofs; Proof By Counter Example; Proof By Contraposition; Proof By Contradiction;

Mathematical Induction; Strong Induction; Recursive Mathematical Definitions;

UNIT-III

12Hrs.

Theory of Computation: Introduction, Strings and their properties, Formal Languages, Types of Grammars and Languages, Chomsky classification of Languages, Recursive And Recursively Enumerable Sets, Operations, Theory of Automata: Finite State Models, Minimization, Regular sets and Regular Grammars, Pumping Lemma, Closure properties, Applications of Finite automata.

UNIT-IV

12Hrs.

Context Free Languages: Context Free Grammar and Push Down Automata, equivalence of PDA and CFG, Deterministic PDA, Normal forms, Applications of CFG. Turing Machines and Linear Bounded Automata: TM model, Representation and Design of TM, Halting problem, Universal TM and modifications, Linear bounded automata

REFERENCE BOOKS:

1. JD Ullman et al., Introduction to Automata Theory, Languages and Computation, 3rd Edition, Pearson Publication, 2006.
2. CL Liu, Elements of Discrete Mathematics: A Computer Oriented Approach, McGraw- Hill edition, 2013.
3. K. S. Trivedi, Probability and Statistics with Reliability, Queuing and Computer Science Applications, First Edition, Prentice Hall of India. 2008.
4. Schöning, Uwe, Pruim, Randall J, Gems of Theoretical Computer Science, Springer Publications.
5. Hary R Lewis, Christor H Papadimetrion, Elements of the Theory of Computation, Prentice- Hall International, 1998.
6. PHI publication, 2007.

ADVANCED DATA STRUCTURES AND ALGORITHMS

Hours/Week: 4

I.A. Marks: 30

Credits: 4

Exam. Marks: 70

Course Learning Objectives:

- Understand and remember algorithms and its analysis procedure.
- Design and implement various data structures algorithms.
- To introduce various techniques for representation of the data in the real world
- Compute the complexity of various algorithms.

Course Outcomes: After completing the course, the students will be able to,

- Ensure that the student evolves as a competent programmer capable of design, analyze and implement algorithms and data structures for different kinds of problems.
- Expose the student to the algorithm analysis techniques, to the theory of reductions, and to the classification of problems into complexity classes like NP.
- Design and analyze programming problem statements, choose appropriate data structures and algorithms for a specific problem.
- Understand the necessary mathematical abstraction to solve problems, Come up with analysis of efficiency and proofs of correctness.
- Comprehend and select algorithm design approaches in a problem specific manner.
- Come across the importance of graphs and their features for the applications uses.
- Gathering the real strategies searching and sorting techniques.

UNIT-I	12Hrs.
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Review of Basic Data Structures: Arrays, Stack, Queue, Circular Queue, Linked List-Singly Linked List, Doubly Linked List, Circular Linked List. Introduction to Algorithms: Algorithms, Performance Analysis – time complexity and space complexity, O-notation, Omega notation and Theta notation.

UNIT-II	12Hrs.
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Introduction to Nonlinear Data Structures, Search Trees: Trees, Binary trees, Binary Tree Traversal, Applications of Binary Trees, Binary Search Trees- Searching, Insertion and Deletion on Binary Search Trees, Balanced Search Trees- AVL Trees- Insertion and deletion on AVL Trees, Splay Trees - Representation, Insertion and deletion on Splay Trees, Heaps: Representation, Insertion and Deletion on Heaps.

UNIT-III	12Hrs.
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Graphs: Introduction to Graphs, digraphs, Sub-graphs, Paths, Walks,

Graphs Representation, Graph Traversals - Depth-first and breadth-first traversal , Applications of graphs - Minimum Spanning Tree – Prim's and Kruskal's algorithms.

Hashing: Introduction to hashing, Hash Table Representation, Hash Functions, Collision Resolution-Separate Chaining, Open Addressing-Linear Probing, Quadratic Probing, Double Hashing.

UNIT-IV	12Hrs.
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Design Strategies: Divide and Conquer- Binary Search, Merge Sort, Quick sort, Greedy method - Job sequencing with deadlines, Dynamic

Programming – Optimal Binary Search Tree, Backtracking- 8 Queens problem, Introduction to NP-Hard and NP-Completeness.

REFERENCE BOOKS:

- Mark A. Weiss, "Data structures and Algorithm analysis in C++ (Java)", Fourth Edition, PHI, 2013.
- AnanyLevitin, "Introduction to the Design and Analysis of Algorithms" Pearson Education, 2015.
- E. Horowitz, S.Sahni and Dinesh Mehta, "Fundamentals of Data structures in C++", University Press, 2007.

Advanced Operating Systems

Hours/Week: 4

I.A. Marks: 30

Credits: 4

Exam. Marks: 70

Course Learning Objectives:

- Understand the principles and services of operating systems
- Analyze fundamental operating system abstractions like process, threads, files, semaphores and IPC
- Know the benefits of concurrency and synchronization and apply them to write concurrent programs.
- Learn the philosophy behind Unix Operating System along with its architecture.
- Write Shell scripts and Use Unix commands appropriately.

Course Outcomes: After completing the course, the students will be able to,

- Explain the principles and services of operating systems.
- Solve various scheduling and synchronization problems.
- Explain deadlock mechanisms and solve various page replacement problems.

- Summarize the philosophy behind Unix Operating System along with its architecture.
- Develop scripts using shell programming

UNIT-I	12Hrs.
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Introduction to Operating Systems:

System Structure What operating systems do; Computer System Organization; Computer System Architecture; Operating System Operations; Operating System Services; System Calls; Types of System Calls; System Programs;

Operating System Structure :

Virtual Machines; System boot. Overview of Process, Process Concept; Process Scheduling; Operations on Processes; Inter – Process Communication; Multi Threaded Programming; Overview: Multi threading Models.

Process Management Process Scheduling:

Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple Processor Scheduling

UNIT-II	12Hrs.
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Process Synchronization:

The Critical Section Problem: Peterson's Solution; Semaphores; Classical Problems of Synchronization.

Memory Management Memory Management Strategies:

Background, Swapping; Contiguous Memory Allocation; Paging; Segmentation; Virtual Memory Management; Background; Demand Paging; Page Replacement.

UNIT-III	12Hrs.
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The File System:

The File, What's in a File name? The Parent-Child Relationship, The HOME Variable: The Home Directory, pwd, cd, mkdir, rmdir, Absolute Pathnames, Relative Pathnames, The Unix File System. Basic File Attributes: ls options, File Ownership, File Permissions, chmod, Directory Permissions, Changing the File Ownership More File Attributes: File Systems and Inodes, Hard Links, Symbolic Links, The Directory, umask, Modification and Access Times, find. The Shell: The Shell's Interpretive Cycle, Shell Offerings

Pattern Matching :

The Wild-cards, Escaping and Quoting, Redirection: The Three Standard Files, Two Special Files: /dev/null and /dev/tty, pipes, tee: Creating a Tee, Command Substitution.

UNIT-IV	12Hrs.
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The Process :

Process Basics, ps: Process Status, System Processes, Mechanism of Process Creation, Internal and External Commands, Running Jobs in Background, Killing Processes with Signals, Job Control, at and batch, cron.

Essential Shell Programming:

Shell Variables, Environment Variables, Shell Scripts, read, Using Command Line Arguments, exit and exit status of command, The Logical Operators, The if Conditional, using test and to Evaluate Expression, The case Conditional, expr, while: looping, for: looping with a list, set and shift.

TEXTBOOKS:

1. Sumitabha Das: UNIX Concepts and Applications, 4th Edition, Tata McGraw Hill, 2006
2. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: Operating Systems Principles, 8th Edition, Wiley – India

REFERENCE BOOKS

1. UNIX: The Complete Reference: Kenneth Roson et al, Osborne/McGraw Hill, 2000
2. Using UNIX: Steve Montsugu, 2nd Edition, Prentice Hall India, 1999
3. UNIX and Shell Programming: M G Venkatesh Murthy, Pearson Education Asia, 2005
4. Behrouz A Forouzan and Richard F Gilberg

E Books / MOOCs/ NPTEL

1. <https://www.oreilly.com/library/view/learning-the-unix/1565923901/>

ENTERPRISE JAVA

Hours/Week: 4

I.A. Marks: 30

Credits: 4

Exam. Marks: 70

Course Learning Objectives:

- To understand Input/Output using Java and use Class fundamentals, Objects, Methods, Polymorphism
- To understand Inheritance, Abstraction, Package creation and Exceptions handling in Java
- To understand Multithreaded Programming concepts using Java, develop GUI Applications in Java using Swing packages and Event handling
- To understand and use Networking concepts, Distributed computing using RMI, JDBC for Database connectivity and Component development using Java Beans.
- To understand Web application development, Using Servlets, JSP, Spring Boot.

Course Outcomes: After completing the course, the students will be able to,

- Make use of Object-Oriented Programming concepts and Input/Output packages in Java applications.
- Apply abstraction, inheritance, exception handling concepts and package hierarchies to build Java applications.
- Make use of collection classes, multithreaded programming concepts and Swing API to develop Java applications.
- Implement networking concepts, distributed computing using RMI, JDBC for database connectivity, and component development using Java Beans.
- Develop web applications using Servlets, JSP, and Spring Boot.

UNIT-I	12Hrs.
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Introduction to JAVA :

Introducing classes: Class fundamentals; Declaring objects; Assigning object reference variables; Introducing methods; Constructors; The this keyword; Overloading methods; Introducing access control; Understanding

static: Introducing final; introducing nested and inner classes; String class, StringBuilder class.

Stream Classes:

Reading and writing files; Stream classes; Byte Streams (InputStream; OutputStream; FileInputStream; FileOutputStream; DataInputStream, DataOutputStream); Character streams(Reader; Writer, FileReader, FileWriter, BufferedReader, BufferedWriter); Serialization: Serializable, ObjectOutputStream, ObjectInputStream

UNIT-II	12Hrs.
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Object Oriented Fundamentals and Exception Handling Inheritance:

Inheritance basics; Using super; Creating a multilevel hierarchy; Method overriding; Dynamic method dispatch; Using Abstract class; Using final with inheritance, Aggregation.

Packages and Interfaces : Packages; Access protection; Importing packages; Interfaces.

Exception handling :

Exception- handling fundamentals; Exception types; Uncaught exceptions; Using try and catch; Multiple catch clauses; Nested try statements; throw; throws; finally; Java's built-in exceptions; Creating your own exception sub-classes

Multithreaded programming:

Java Thread model; Main thread; Creating a thread; Creating multiple threads; Using isAlive() and join(); Synchronization; Interthread communication.

UNIT-III	12Hrs.
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The Collection Framework, Multithreaded Programming and Event Handling, AWT and Swings: The Collection Framework:

The Collection interfaces: The Collection interface, The List interface, The Set interface; The collection classes: The ArrayList class, The LinkedList class, Vector, Stack, The HashSet class, The LinkedHashSet class.

Event Handling, AWT and Swings :

Event Handling:

Two event handling mechanisms; Delegation event model; Event classes; Sources of events; EventListener interfaces; Using the Delegation Event Model

Swings : JApplet; JFrame; Labels; Text fields; Buttons; Check boxes; RadioButtons; Adapter classes

UNIT-IV	12Hrs.
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JDBC objects: Concept of JDBC; JDBC driver types; JDBC packages; Brief overview of the JDBC process; Database connection; Associating the JDBC/ODBC bridge with the database; Statement objects; ResultSet; Transaction Processing.

Servlets, JSP and Spring Boot :

Servlets :

Background; Life cycle of a Servlet; Simple Servlet; Servlet API; javax.servlet package; Reading Servlet parameter; javax.servlet.http package; Handling HTTP requests and responses; Using Cookies.

Java Server Pages (JSP) :

JSP;JSP tags; Tomcat; Request string; User Sessions; Cookies; Session Objects.

Spring Boot :

What is Spring Boot?, Advantages of Spring Boot, Spring Boot Features, Spring Boot Architecture, Spring Initializer, Creating a Spring Boot Project, Spring Boot Project Components, Spring Boot Database, Spring Boot View

Text Books

- Herbert Schildt: Java: The Complete Reference, 11th Edition, Tata McGraw Hill, 2019
- Java Server Programming Java EE 7 (J2EE 1.7), Black Book, Dreamtech Press, 2014
- Mastering Spring Boot 2.0: Build modern, cloud-native, and distributed systems using Spring Boot, Dinesh Rajput, Packt Publishing Ltd., 2018

Reference Books

- Dr. Donald Doherty and Rick Leinecker: *JavaBeans Unleashed*
- James Goodwill: *Developing Java Servlets*
- Karl Avedal, Danny Ayers: *Professional JSP*
- Steven Holzner: *Java 2 Black Book*
- Ed Roman: *Mastering Enterprise JavaBeans*
- Jim Keogh: *The Complete Reference J2EE*, Tata McGraw Hill, 2008

ADVANCED DATABASE MANAGEMENT SYSTEMS

Hours/Week: 4

I.A. Marks: 30

Credits: 4

Exam. Marks: 70

Course Learning Objectives:

- Basics of NoSQL databases, Relational Databases, Information Retrieval and XML databases.
- The concepts of column databases, distributed database and data warehousing schemes
- Various concepts of MongoDB and types of consistency.
- Advance Databases, Convergent databases and Disruptive Databases.

Course Outcomes: After completing the course, the students will be able to,

CO1: Explore the concepts of NoSQL Databases.

CO2: Understand and use columnar and distributed database patterns.

CO3: Learn to use various Data models for a variety of databases.

CO4: Explore the relationship between Big Data and NoSQL databases

CO5: Work with NoSQL databases to analyze the big data for useful business applications.

CO6: Understands the concept of MongoDB and types of consistency.

CO7: Learn the concepts of Advance Databases, Convergent databases and Disruptive Databases.

UNIT-I	12Hrs.
Database Revolutions- System Architecture- Relational Database- Database Design, Data Storage- Transaction Management- Data warehouse and Data Mining- Information Retrieval, Big Data evolution- CAP Theorem- Birth of NoSQL, Document Database, XML and XML Databases- JSON Document Databases- Graph Databases	

UNIT-II	12Hrs.
Column Databases, Data Warehousing Schemes- Columnar Alternative- Sybase IQ- CStore and Vertica - Column Database Architectures, SSD and In-Memory Databases, In-Memory, Databases- Berkeley Analytics Data Stack and Spark	

UNIT-III	12Hrs.
Distributed Database Patterns, Distributed Relational Databases- Non-relational Distributed Databases- MongoDB - Sharing and Replication- HBase- Cassandra- Consistency Models, Types of Consistency- Consistency MongoDB- HBase Consistency- Cassandra Consistency.	

UNIT-IV	12Hrs.
Data Models and Storage- SQL- NoSQL APIs- Return SQL - Advance Databases PostgreSQL- Riak- CouchDB- NEO4J- Redis- Future Databases— Revolution Revisited- Counter revolutionaries- Oracle HQ- Other Convergent Databases- Disruptive Database Technologies.	

Introduction to MongoDB

What is MongoDB? Why MongoDB? Using JSON, Creating or generating unique key, Support for dynamic queries, Storing binary data, Terms used in RDMS and MongoDB, Data types in MongoDB, MongoDB Query Language: Insert method, Save method, Update method, Remove method, Find method, Dealing with Null values, Count, Limit, Sort, Skip, Arrays, Aggregate Functions.

Reference Books

- Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", Sixth Edition, McGrawHill.

- Guy Harrison, "Next Generation Databases", Apress, 2015.
- Eric Redmond, Jim R Wilson, "Seven Databases in Seven Weeks", LLC. 2018.
- Dan Sullivan, "NoSQL for Mere Mortals", Addison-Wesley, 2015.
- Adam Fowler, "NoSQL for Dummies", John Wiley & Sons, 2015.

PYTHON PROGRAMMING

Hours/Week: 4

I.A. Marks: 30

Credits: 4

Exam. Marks: 70

Course Learning Objectives:

- Understand and apply the fundamental concepts of Python programming
- Develop problem-solving skills and write efficient Python programs
- Demonstrate object-oriented programming principles
- Build basic database-driven and web-based applications

Course Outcomes: After completing the course, the students will be able to,

- Explain basic principles of Python programming language
- Problem solving and programming capability.
- Implement object oriented concepts,
- Implement database and GUI applications.

UNIT-I	12Hrs.
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Introduction to python, the concept of data types; variables, assignments; immutable variables; numerical types; arithmetic operators and expressions; logical operators; ranges; Control statements: if-else, loops; String manipulations: subscript operator, indexing, slicing a string; strings and number System: converting strings to numbers and vice versa. Binary, octal, hexadecimal numbers

UNIT-II	12Hrs.
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Lists, tuples, and dictionaries; basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and Replacing values; traversing dictionaries; Design with functions: hiding redundancy, complexity; arguments and return values; formal vs. actual arguments, named arguments. Recursive functions; Python libraries to handle numerical data

UNIT-III	12Hrs.
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Classes and OOP: classes, objects, attributes and methods; defining classes; design with classes, inheritance, polymorphism, operator overloading, abstract classes; Modules and Packages; Manipulating files and directories, os and sys modules; text files: reading/writing text and Numbers from/to a file; creating and reading a formatted file (csv or tab-separated); Exception handling;

UNIT-IV	12Hrs.
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Python database application programmer's interface (DB- API), connection and cursor objects,

Type objects and constructors, python database adapters. Creating simple web clients, introduction to CGI, CGI module, building CGI applications, python web application frameworks

Reference Books

1. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning,
2. Magnus Lie Hetland, Beginning Python from Novice to Professional, Second Edition.
3. Mark Summerfield, Programming in Python 3 - A Complete Introduction to the Python Language, Second Edition.
4. Y. Daniel Liang, "Introduction to Programming Using Python", Pearson
5. Chun, J Wesley, Core Python Programming, 2nd Edition, Pearson, 2007 Reprint 2010.
6. David Beazley and Brian K. Jones, Python Cookbook, Third Edition, Shroff Publishers & Distributors Pvt. Ltd.
7. Mark Lutz, Learning Python FIFTH EDITION Mark Lutz.
8. Mark Lutz, Programming Python (English) 4th Edition.
9. Testing Python, David Sale, Wiley India (P) Ltd.,

ADVANCED DATABASE MANAGEMENT SYSTEMS LAB

Hours/Week: 6
Credits: 3

I.A. Marks: 30
Exam. Marks: 70

The practical problems shall be based on the theory concepts covered under ADBMS course.

Python Programming Lab

Hours/Week: 6
Credits: 3

I.A. Marks: 30
Exam. Marks: 70

The practical problems shall be based on the theory concepts covered under Python programming course.

Operating Systems Lab

Hours/Week: 6
Credits: 3

I.A. Marks: 30
Exam. Marks: 70

The practical problems shall be based on the theory concepts covered under operating systems course.

Advanced Data Structures and Algorithms Lab

Hours/Week: 6

I.A. Marks: 30

Credits: 3

Exam. Marks: 70

The practical problems shall be based on the theory concepts covered under advanced data structures and algorithm course.

FOUNDATIONS OF INFORMATION TECHNOLOGY

Hours/Week: 4

I.A. Marks: 30

Credits: 4

Exam. Marks: 70

Course Learning Objectives:

- The basic concepts and terminology of Computer and information technology.
- Pursue specialized programs leading to technical and professional skills in computer programming.
- Skills relating to IT basics, computer applications, programming, interactive media.
- The basic data structures like array, linked lists etc. and their applications.

Course Outcomes: After completing the course, the students will be able to,

- Ensure that the student understand the Computer Fundamentals
- Understand the techniques of problem solving using programming language concepts
- Realize the importance of computer concepts and programming
- Recognize the basic data structures and their applications
- Gathering the importance of algorithms for scientific problems.
- Come across the flow design of a computer problem.
- Identical fundamentally realize the needs of the basic details.

UNIT-I	12Hrs.
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Basics of Digital Computers and Digital Computing System: Number systems, Number base conversion, Complements, Binary codes, Binary arithmetic's. Boolean algebra: Definitions, Basic theorems and properties of Boolean algebra, Venn diagram. Fundamentals of Operating System.

UNIT-II	12Hrs.
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Problem Solving Techniques: Introduction, Problem Solving Procedure. Algorithm: Steps involved in algorithm development, Algorithms for simple problems, Flowcharts, Pseudo- code. Introduction to C: Overview of C Program, Basic structure of a C Program. Constants, Variables & Data types: Character Set, Keywords & Identifiers. Control Statements, Functions, Structures and Unions

UNIT-III	12Hrs.
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Data Structure: Types of Data structures, Arrays, Queues, Linked list, Trees, Searching and Sorting Algorithm: Searching – Introduction, Linear search, Binary Search, Sorting - Introduction, bubble sort, Insertion sort, Selection sort, Merge sort. Comparisons of searching and sorting techniques.

UNIT-IV	12Hrs.
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Database System concepts and architecture: Data Models, Schemas, and Instances, Three-schema architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Classification of Database Management Systems. Relational Data Model: Relational Model Concepts, Relational model Constraints and Relational Database Schemas, Update Operations, transactions and Dealing with Constraint Violations. SQL :Data manipulation in DBMS, Data types, SQL commands: Create Table, Inserting data, SELECT, DELETE, UPDATE, ALTER TABLE, DROP TABLE, RENAME, DESCRIBE.

Reference Books

1. E. Balagurusamy, Programming in ANSI C, 7th Edition, Tata McGraw Hill.
2. Introduction to Information Technology ITL education solution Ltd, Second Edition
3. K.R. Venugopal and Sudeep R Prasad, Programming with C, 4th Edition, Tata McGraw- Hill Education.
4. M. Morris Mano, Digital Logic and Computer design, PHI, 2015
5. Thomas L Floyd, Digital Fundamentals, 10th Edition, Pearson, 2011.
6. Ramez Elmasri and Shamkanth B.Navate, Fundamentals of Database Systems, 7th Edition, Pearson Education 2.
7. Horowitz and Shani, Fundamentals of Data Structures in C, Universities Press, 2nd edition, 2008.

Note: *BRIDGE COURSE: Non - Credit course for only **Non - Computer Science Graduates**; [B.Sc. / B.A. / B.Com with Mathematics at 10 + 2 Level or Graduation level] (as per the norms of the concerned University [AICTE - NOTIFICATION]).

MACHINE LEARNING AND DATA ANALYTICS USING PYTHON

Hours/Week: 4

I.A. Marks: 30

Credits: 4

Exam. Marks: 70

Course Learning Objectives:

- Understand foundational concepts in machine learning and data analytics.
- Gain proficiency in Python for data analysis and machine learning tasks.
- Learn and apply various machine learning algorithms and techniques.
- Develop skills in data preprocessing, visualization, and model evaluation.
- Prepare students for industry roles involving data-driven decision making and predictive modeling.

Course Outcomes: After completing the course, the students will be able to,

- Demonstrate an understanding of machine learning concepts and techniques.
- Perform data preprocessing and exploratory data analysis using Python.
- Develop and evaluate machine learning models using Python libraries.
- Apply machine learning algorithms to real-world data problems.
- Integrate data analytics and machine learning models into practical applications

UNIT-I	12Hrs.
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Introduction to Machine Learning and Python:

Introduction to Machine Learning: Definition and importance of machine learning, Types of machine learning: Supervised, unsupervised, and reinforcement learning, Applications of machine learning in various domains.

Python for Data Analysis: Introduction to Python programming, Python libraries for data analysis: NumPy, Pandas, Matplotlib, Data manipulation and visualization using Pandas and Matplotlib.

Data Preprocessing: Data cleaning and transformation, Handling missing values and outliers, Feature scaling and normalization.

UNIT-II	12Hrs.
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Supervised Learning:

Regression: Linear regression, Polynomial regression, Model evaluation metrics: MAE, MSE, RMSE. Classification: Logistic regression, K-Nearest Neighbors (KNN), Decision Trees and **Random Forests**, **Model evaluation metrics:** Accuracy, precision, recall, F1-score, ROC-AUC.

Model Training and Evaluation: Train-test split and cross-validation, Hyper parameter tuning using GridSearchCV, Overfitting and underfitting.

Unsupervised Learning:

Clustering: K-Means clustering, Hierarchical clustering, Evaluation of clustering results.

Dimensionality Reduction: Principal Component Analysis (PCA), Linear Discriminant Analysis (LDA) t-Distributed Stochastic Neighbor Embedding (t-SNE).

Association Rule Learning: Apriori algorithm, Market Basket Analysis, Evaluation metrics for association rules

UNIT-III	12Hrs.
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Advanced Machine Learning Techniques:

Ensemble Methods: Bagging and Boosting, Gradient Boosting Machines (GBM), Extreme Gradient Boosting (XGBoost).

Support Vector Machines (SVM): Linear and non-linear SVM, Kernel trick, Model evaluation and tuning.

Neural Networks and Deep Learning: Introduction to neural networks, Building and training neural networks using TensorFlow and Keras, Convolutional Neural Networks (CNN) and Recurrent Neural Networks (RNN).

UNIT-IV	12Hrs.
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Data Analytics and Real-World Applications:

Exploratory Data Analysis (EDA): Data visualization techniques, Statistical analysis and hypothesis testing, Identifying patterns and insights from data.

Time Series Analysis: Introduction to time series data, Time series forecasting using ARIMA and Prophet, Evaluating time series models.

Integrating Machine Learning Models: Deployment of machine learning models, Building web applications with Flask and Django, Case studies on real-world applications of machine learning.

Text Books:

1. Practical Machine Learning for Data Analysis Using Python Abdulhamit Subasi.
2. Advance Machine Learning with Python by John Hearty.

Reference Books

1. "Python Machine Learning: Machine Learning and Deep Learning with Python, scikit-learn, and Tensor Flow " by Sebastian Raschka and Vahid Mirjalili.
2. "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow" by Aurélien Géron.
3. "Introduction to Machine Learning with Python".

Web links and Video Lectures (e-Resources):

<https://youtu.be/7eh4d6sabA0?si=JWHNJRVS6NhQOPYe>
<https://youtu.be/kqtD5dpn9C8?si=LBep4HWaMFRrAPsD>
<https://youtu.be/4SJ7bEILPlk?si=5LurvizUOuCew1W9>

SOFTWARE ENGINEERING

Hours/Week: 4

I.A. Marks: 30

Credits: 4

Exam. Marks: 70

Course Learning Objectives:

- Be agile software developers with a comprehensive set of skills appropriate to the needs of the dynamic global computing-based society.
- Capable of team and organizational leadership in computing project settings, and have a broad understanding of ethical application of computing-based solutions to societal and organizational problems.
- Acquire skills and knowledge to advance their career, including continually upgrading professional, communication, analytic, and technical skills.
- To understand project scheduling concept and risk management associated to various type of projects.

Course Outcomes: After completing the course, the students will be able to,

- Recognize the software engineering and software process.
- Understand different activities of Software process.
- Realize the concepts of agile methods and software testing.
- Learn the techniques of functional and non-functional requirements.
- Familiar with concepts of detailed and object oriented design.
- Define various software application domains and remember different process model used in software development.
- An ability to apply engineering design to produce solutions that meet specified needs.
- Consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

UNIT-I	12Hrs.
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Introduction: Professional Software Development, Software Engineering Ethics. Case Studies. Software Processes: Models. Process activities. Coping with Change. The Rational Unified Process.

UNIT-II	12Hrs.
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Agile Software Development: Agile methods. Plan-driven and agile development. Extreme programming. Agile project management. Scaling agile methods. Requirements Engineering: Functional and non-functional requirements. The software Requirements Document. Requirements Specification. Requirements Engineering Processes. Requirements Elicitation and Analysis. Requirements validation. Requirements Management, need for SRS, characteristics of SRS, organization of SRS document.

UNIT-III	12Hrs.
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Function Oriented Design: Design Principles, Module-Level Concepts, Design Notation and Specification, Structured Design Methodology, Verification, Metrics. Object- Oriented Design: OO Analysis and OO Design, OO Concepts, Design Concepts, Unified Modeling Language (UML), A Design Methodology, Metrics.

UNIT-IV**12Hrs.**

Software Testing: Development Testing, Test-Driven Development, Release Testing, User Testing. Software Evolution: Evolution Processes. Program Evolution Dynamics. Software Maintenance. Legacy System Management. Project Planning: Software Pricing. Plan- Driven Development. Project Scheduling. Agile Planning. Estimation Techniques. Quality Management: Software Quality. Software Standards. Reviews and Inspections. Software Measurement and Metrics

REFERENCE BOOKS:

1. Ian Sommerville, Software Engineering, 9th Edition, Pearson Education, 2012. (Listed topics from Chapters 1, 2, 3, 4, 5, 7, 8, 9, 24, and 24)
2. Roger S. Pressman, Software Engineering-A Practitioners approach, 7th Edition, Tata McGraw Hill.
3. Pankaj Jalote, An Integrated Approach to Software Engineering, Wiley-India.

DATA COMMUNICATIONS AND COMPUTER NETWORKS

Hours/Week: 4

I.A. Marks: 30

Credits: 4

Exam. Marks: 70

Course Learning Objectives:

- Acquire the computer networking knowledge as well as the existing connectivity technologies and the required infrastructure which comprises the key steps involved in the communication process.
- Identify the key issues for the realization of the LAN/WAN/MAN network architectures and the hybridized existing form in the business environment and enterprise.
- Establish a solid knowledge of the layered approach that makes design, implementation and operation of extensive networks possible. To learn the 7-layer OSI network model (each layer and its responsibilities) and understand the TCP/IP suite of protocols.
- Establish a solid knowledge of the layered approach that makes design, implementation, and operation of extensive networks possible.

Course Outcomes: After completing the course, the students will be able to,

- Understanding the basic communication concepts in real time applications
- Identify the different networking and internetworking devices and their functions within a network
- Familiar with the protocols in DC and CN and their future uses in various applications.

- Know the Importance of ISO - OSI and TCP / IP reference model and functions of each layer.
- Clearly understand the importance of services of all layers.
- Familiar with the architecture of a number of different networks and classifications.
- Gather the importance of all applications protocols and port specifications.

UNIT-I	12Hrs.
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Introduction:

Data Communications, computer Networks

Networks Protocols and Architecture:

OSI: The model, The OSI Layers; TCP/IP Protocol Architecture : The TCP/IP layers

Data Encoding and Communication Interfaces:

Digital Data Digital Signals: None turn to zero (NRZ), Multilevel Binary, Biphase, Modulation Rate, scrambling techniques, Digital Data Analog Signals: Encoding Techniques; Analog Data Digital Signals: Pulse Code Modulation, Asynchronous & Synchronous Transmission; Types of Errors; Error Detection: Parity Check, Cyclic Redundancy Check(CRC): arithmetic modulo, polynomial, digital logic, Error Correction: Block Code Principles.

UNIT-II	12Hrs.
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Data Link Control:

Flow Control: Stop and Wait & Sliding Window Flow Controls; Error Control: Stop and Wait ARQ, GO-Back-N ARQ, Selective-Reject ARQ; High-level Data Link Control: Basic Characteristics, Frame Structure.

Application Layer:

DNS- The Domain Name System: The DNS Name Space, Resource Records, Name Servers; Electronic mail: Architecture and Services, The User Agent, Message Formats: MIME, Message Transfer: SMTP, Final Delivery: POP3, IMAP, HTTP.

The Transport Layer:

The Transport Service: Services Provided to the Upper Layers, Transport Service Primitives, Berkeley Sockets; Elements of Transport Protocols: Addressing, Connection Establishment, Connection Release. The Internet Transport Protocols: UDP: Introduction to UDP, Remote Procedure

Call; The Internet Transport Protocols: TCP: Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header

UNIT-III	12Hrs.
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Network layer:

Network layer design issues: Store and Forward packet Switching, Services Provided to the Transport Layer, Implementation of Connection less Service, Implementation of Connection-Oriented Service, Comparison of Virtual Circuit and Datagram Subnets; Routing algorithms: The Optimality Principal, Shortest Path Routing, Flooding, Distance Vector Routing, Link state Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing

UNIT-IV	12Hrs.
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Congestion Control:

Congestion Control Algorithms: General Principles of Congestion Control, Congestion Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram Subnets, Load Shedding, Jitter Control; Quality of Service: Requirements, Techniques for Achieving Good Quality of Service, Integrated Services, Differentiated Services; Inter-networking: How networks differ, How Networks Can Be Connected, Concatenated Virtual Circuits, Tunneling, Fragmentation, Ipv6.

TEXTBOOKS

- William Stallings: *Data and Computer Communication*, 8th Edition, Pearson Education
- Alberto Leon-Garcia & Indra Widjaja: *Communication Networks – Fundamental Concepts and Key Architectures*, Tata McGraw-Hill, 2000
- Andrew S. Tanenbaum: *Computer Networks*, 4th Edition, Pearson Education Asia, 2008

REFERENCE BOOKS

- Behrouz A. Forouzan: *Data Communications and Networking*, Tata McGraw-Hill
- Achyut S. Godbole: *Data Communications and Networks*, Tata McGraw-Hill

E-Books / MOOCs / NPTEL

- <https://open.umn.edu/opentextbooks/textbooks/353>
- <https://freecomputerbooks.com/An-Introduction-to-Computer-Networks-by-Peter-Dordal.html>
- https://onlinecourses.swayam2http://nptel.ac.in/courses/106105081/.ac.in/cec22_cs05/preview
- <http://nptel.ac.in/courses/106105081/>

INTERNET OF THINGS

Hours/Week: 4

I.A. Marks: 30

Credits: 4

Exam. Marks: 70

Course Learning Objectives:

- Understand the concepts of Internet of Things.
- Analyze basic protocols in wireless sensor network.
- Design IoT applications in different domain and be able to analyze their performance.
- Implement basic IoT applications on embedded platform.

Course Outcomes: After completing the course, the students will be able to,

- Understand IoT applications and Architectures in real world and realize the various IoT Protocols
- Differentiate between the levels of the IoT stack and be familiar with the key technologies
- Interface different sensors to arduinouno and raspberry pi to read the environment data.
- Appreciate the role of big data, cloud computing and data analytics in a typical IoT system
- To provide an overview on the ICT ecosystem and enabling environment
- To provide an understanding of the technologies and the standards relating to the IoT
- To develop skills on IoT technical planning and Identify how IoT differs from traditional data.

UNIT-I	12Hrs.
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Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT –IoT Protocols, IoT communication models, IoT Communication APIs IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle, IoT challenges

UNIT-II	12Hrs.
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IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER

UNIT-III	12Hrs.
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IoT Physical Devices and Endpoints -- Introduction to Arduino, Arduino UNO, Fundamentals of Arduino Programming: Interfacing Sensors and actuators with Arduino Uno. Introduction to Nodemcu, programming with Nodemcu, Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT-IV**12Hrs.**

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs
Webserver – Web server for IoT, Cloud for IoT, Python web application framework, Designing a RESTful web API

REFERENCE BOOKS:

- Arshdeep Bahga and Vijay Madisetti, Internet of Things- A Hands-on Approach, Universities Press, 2015, ISBN: 9788173719547
- Matt Richardson & Shawn Wallace, Getting Started with Raspberry Pi, O'Reilly (SPD), 2014, ISBN: 9789350249759

Advanced Web Technologies

Hours/Week: 4

I.A. Marks: 30

Credits: 4

Exam. Marks: 70

Course Learning Objectives:

1. Demonstrate proficiency in creating responsive and semantic web pages using HTML5, CSS3, and JavaScript.
2. Develop dynamic and interactive web applications using ReactJS and state management techniques.
3. Design and implement secure, scalable, and RESTful APIs using NodeJS and ExpressJS.
4. Integrate frontend and backend systems to build full stack web applications with seamless data exchange
5. Deploy full stack applications on cloud platforms and understand basic concepts of version control and CI/CD pipelines

Course Outcomes: After completing the course, the students will be able to,

1. Demonstrate proficiency in creating responsive and semantic web pages using HTML5, CSS3, and JavaScript.
2. Develop dynamic and interactive web applications using ReactJS and state management techniques.
3. Design and implement secure, scalable, and RESTful APIs using NodeJS and ExpressJS.
4. Integrate frontend and backend systems to build full stack web applications with seamless data exchange
5. Deploy full stack applications on cloud platforms and understand basic concepts of version control and CI/CD pipelines.

UNIT 1

12 Hours

Introduction to Web Development:

- Overview of full stack development
- Web architecture: Client-server model
- Tools and environment setup: VS Code, Node.js, npm, browser developer tools

HTML5 Essentials:

- HTML5 structure and semantic elements
- Forms and input validation
- Multimedia elements: <audio>, <video>, <canvas>
- Accessibility and ARIA roles

Tailwind CSS:

- Introduction to Tailwind CSS
- Installation & Setup
- Core Utility Classes
- Layout, Flexbox & Grid
- Building Essential UI Components

Unit 2 12 Hours

JavaScript Fundamentals:

- ES6+ features: let, const, arrow functions, template literals, destructuring
- DOM manipulation and event handling
- JavaScript promises and async/await
- Introduction to Fetch API for HTTP requests

ReactJS Basics:

- Introduction to ReactJS and its ecosystem
- Setting up a React project with Create React App
- JSX syntax and components (functional and class components)
- Props and state management

Unit 3 12 Hours

Advanced React Concepts:

- Lifecycle methods and React Hooks (useState, useEffect)
- Handling forms and controlled components
- Routing with React Router
- Conditional rendering and list rendering

State Management with Context API :

- Introduction to Context API for global state management
- Creating and consuming context
- Prop drilling vs Context API

Building a React Application:

- Project: Creating a simple React app with features like navigation, forms, and data rendering from APIs
- Styling React components using CSS modules

Unit 4 12 Hours

Introduction to NodeJS:

- NodeJS runtime and architecture
- Setting up a NodeJS project with npm
- Working with built-in modules (e.g., fs, path, http)
- Event-driven programming and asynchronous operations

ExpressJS Basics:

- Setting up an Express server
- Middleware concepts: Built-in and third-party middleware
- Handling routes and query parameters
- Building a RESTful API with Express

Connecting Frontend and Backend:

- Fetching data from backend APIs in React
- Passing data between client and server using JSON
- Handling CORS in Express

Database Integration:

- Overview of databases (MongoDB or other)
- Connecting NodeJS to a database using mongoose or MySQL
- Performing CRUD operations

Deployment and Final Project:

- Deploying the full stack application on platforms like Heroku or Vercel
- Final project:
- Full stack application combining ReactJS frontend and NodeJS/Express backend
- Features: Authentication, data display, and interaction with backend APIs

TEXTBOOKS:

HTML & CSS: Design and Build Websites by Jon Duckett, John Wiley and sons, 2021

Eloquent JavaScript: A Modern Introduction to Programming (3rd Edition) by Marijn Haverbeke, 2018

React - Up & Running: Building Web Applications by Stoyan Stefanov, 2021

Node.js Design Patterns by Mario Casciaro and Luciano Mammino, 2021

Learning Web Development with ExpressJS by Ethan Brown, 2014

E Books / MOOCs/ NPTEL

1. <https://www.coursera.org/specializations/full-stack-react>
2. <https://developer.mozilla.org/en-US/>
3. <https://react.dev/>
4. <https://react.dev/>

Prompt Engineering

Hours/Week: 3

I.A. Marks: 30

Credits: 3

Exam. Marks: 70

Course Objectives:

1. **To introduce the foundational concepts of Prompt Engineering**, including prompt structures, model behavior, tokenization, context windows, and systematic prompt design principles.

2. **To develop the ability to design, evaluate, and refine prompts** using core prompting patterns such as instruction-based prompts, role prompting, few-shot learning, chain-of-thought reasoning, and self-reflective prompts.
3. **To equip learners with skills to ensure safety, robustness, and reliability** of Large Language Model (LLM) outputs by applying guardrails, error analysis, adversarial testing, and bias mitigation techniques.
4. **To enable students to apply domain-specific prompting strategies** across data analysis, business intelligence, creative writing, education, software development, and multimodal contexts.
5. **To provide hands-on experience with OpenAI and Python**, enabling learners to build prompt playbooks, create structured outputs, integrate tools, and develop practical applications using LLMs.

Course Outcomes: At the end of the course student will be able to

1. **Design effective prompts** by applying foundational principles, prompt patterns, and systematic prompt engineering methods for diverse use cases.
2. **Analyze and evaluate LLM responses** using diagnostic techniques, qualitative evaluation, and iterative refinement to improve prompt performance and reliability.
3. **Implement safe and robust prompting practices**, incorporating bias mitigation, guardrail design, and strategies to reduce hallucinations or adversarial vulnerabilities.
4. **Develop domain-specific prompting solutions** for applications in data analysis, education, creativity, software development, and multimodal reasoning scenarios.
5. **Build and deploy practical LLM-based applications** using OpenAI APIs and Python, including structured output generation, prompt playbook creation, and human-in-the-loop collaborative prompting workflows.

UNIT 1

9 Hours

Foundations of Prompt Engineering - What Is Prompt Engineering and Why It Matters, Anatomy of a Prompt: Roles, Instructions, Inputs, Outputs, From Ad-Hoc Queries to Systematic Prompt Design

Models, Tokens, and Context - How Large Language Models Represent and Generate Text, Tokens, Context Windows, and Sampling Behaviour, Strengths, Blind Spots, and Failure Modes

Core Prompt Patterns - Instruction and Role Patterns, Decomposition and Stepwise Reasoning Patterns, Style, Persona, and Format Control Patterns

Few-Shot, Chain-of-Thought, and Self-Reflection - Few-Shot Prompting and In-Context Learning, Chain-of-Thought and Self-Consistency Prompts, Self-Reflection, Critique, and Revision Prompts.

Unit 2

9Hours

Prompt Evaluation and Diagnostics - Designing Prompt Experiments (Conceptual), Human and Hybrid Evaluation Methods, Qualitative Diagnostics and Error Analysis.

Safety, Robustness, and Guardrails - Safety Constraints, Policy Prompts, and Guardrail Design, Reducing Hallucinations and Misleading Confidence, Adversarial Prompts, Jailbreaks, and

Robustness Checks.

Domain-Specific Prompting - Data Analysis and Business Intelligence Prompts, Educational and Training Content Prompts, Creative Writing, Ideation, and Brainstorming Prompts.

Structured Outputs and Tool Use - JSON and Schema-Oriented Prompting (Conceptual), Multi-Step Prompt Flows and State, Prompting with External Tools and Retrieval (Conceptual)

Unit 3

9 Hours

Failure Patterns and Anti-Patterns - Typical Prompt Smells and Anti-Patterns, Debugging Bad Outputs with Diagnostic Prompts, Turning Failures into Prompt Libraries and Checklists

Capstone – Designing a Prompt Playbook - Mapping Use Cases to Prompt Patterns, Building a Minimum Viable Prompt Library, Operationalising Prompt Engineering in Teams.

Prompt Engineering for Data and Code Assistants - Prompts for Data Exploration and Narrative Summaries, Prompts for Code Explanation and Refactoring (Conceptual), Prompting Assistants to Respect Constraints and Style Guides

Multimodal Prompting and Rich Contexts - Prompting with Text Plus Non-Textual Context (Conceptual), Describing Visual or Structured Inputs in Prompts, Designing Prompts for Multimodal Reasoning (Conceptual)

Unit 4

9 Hours

Collaborative Prompting and Human-in-the-Loop - Prompting as Dialogue and Co-Creation, Checklists, Templates, and Shared Prompt Libraries, Reviewing and Revising Prompts in Teams.

Ethics, Bias, and Responsible Prompt Design - Prompting for Inclusive and Respectful Outputs, Recognising and Mitigating Bias via Prompts, Transparency, Disclaimers, and Human Oversight.

Future Directions in Prompt Engineering - From Prompting to Agentic Workflows, Prompt Engineering in Education and Research, Open Challenges and Emerging Patterns.

Practical Prompt Engineering with OpenAI and Python - Setting Up Python, LLM and OpenAI Environment, What is an OpenAI, Understanding OpenAI API Keys, Setting up LLM/ GPT environment and API Keys, Practical LLM / GPT for Text Generation, Practical Demonstration of Generating Creative Text, Similar Word Finder Application, Web applications with interactive data visualizations and machine learning models, Chat Model

TEXTBOOKS:

1. Prompt Engineering - Patterns, Principles, and Practice, Prodigy Printing, 2025.

REFERENCES:

1. Prompt Engineering for LLMs: The Art and Science of Building Large Language Model-Based Applications by John Berryman & Albert Ziegler (2024 / 2025)
2. LM Prompt Engineering for Developers (Packt, 2024)

Object Oriented Analysis & Design

Hours/Week: 3

I.A. Marks: 30

Credits: 3

Exam. Marks: 70

Course Learning Objectives:

Course Learning objectives:

1. Understand the fundamental concepts of object-oriented software development.
2. Apply object-oriented principles such as abstraction, encapsulation, inheritance, and polymorphism in designing software systems.
3. Analyze and model real-world problems using object-oriented analysis techniques.
4. Develop and refine design solutions by applying object-oriented design principles and patterns to meet quality and architectural standards.

Course outcome

1. Understand the fundamentals and evolution of Object-Oriented Software Development.
2. Apply core object-oriented principles to analyze and design software systems.
3. Design reusable and maintainable systems using OO design principles and patterns.
4. Implement, test, and evaluate object-oriented solutions for real-world applications.

Unit -1

9 Hours

Introduction to OOAD : Evolution of software development methodologies, Introduction to Object-Oriented Software

Development, Benefits and limitations of OOAD Comparison with Structured Analysis and Design, Key Concepts: Objects, Classes, Attributes, Methods, Messages, State, and Behaviour.

Unit -2

9 Hours

Object-Oriented Principles: Abstraction and Encapsulation, Inheritance and Generalization, Polymorphism and Dynamic Binding, Object Reuse and Reusability, Aggregation and Composition, Coupling and Cohesion in OO Design

Unit -3

9 Hours

Object-Oriented Analysis: Gathering Requirements from the perspective of OO, Identifying Classes and Objects from problem statements, Responsibility Assignment, Identifying Relationships and Interactions, Class Responsibility

Collaborator (CRC) Cards, Domain Modelling and Object Discovery.

Unit -4

9 Hours

Object-Oriented Design: Principles of good OO Design (GRASP), Design for Change and Reuse, Applying Object Design Patterns (Factory, Singleton, Adapter, Strategy, Observer – Basic Understanding), Layered Architecture and Design Components, Design Metrics and Evaluation.

Implementation and Case Studies: Translating Design to Code – Best Practices, Testing in OO Systems:

Unit Testing, Integration Testing, Common Pitfalls in OOAD, Case Study: University Course Management & Evaluation System, Healthcare Appointment & Prescription System

REFERENCE BOOKS:

1. **Grady Booch** – *Object Oriented Analysis and Design with Applications*, Pearson Education.
2. **Craig Larman** – *Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development*, Pearson.
3. **Ali Bahrami** – *Object Oriented Systems Development*, McGraw Hill.
4. **James Rumbaugh, Michael Blaha** – *Object-Oriented Modeling and Design with UML*, Pearson Education.
5. Grady Booch “Object-Oriented Analysis and Design with Applications” **Erich Gamma et al.** – *Design Patterns: Elements of Reusable Object-Oriented Software*, Addison Wesley.

Web links and Video Lectures (e-Resources):

- <https://refactoring.guru> – Design Patterns explained with examples
- https://sourcecmaking.com/design_patterns – Comprehensive guide to patterns
- <https://martinfowler.com> – Software design and architecture blogs
- <https://www.geeksforgeeks.org> – Object-oriented programming and design tutorials
- <https://www.tutorialspoint.com> – OOAD topics simplified

MOBILE COMPUTING

Hours/Week: 3

I.A. Marks: 30

Credits: 3

Exam. Marks: 70

Course Learning Objectives:

- The computer systems perspective on the converging areas of wireless networking, embedded systems, and software
- To provide an overview of Wireless Communication networks area and its applications in communication engineering.
- The contribution of Wireless Communication networks to overall technological growth.
- Explain the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies used in Wireless Communication Networks.

Course Outcomes: After completing the course, the students will be able to,

CO1 Discuss cellular radio concepts and identify various propagation effects.

- Have knowledge of the mobile system specifications.
- Classify multiple access techniques in mobile communication.
- Outline cellular mobile communication standards and analyze various methodologies to improve the cellular capacity.
- Explain the principles and theories of mobile computing technologies and describe infrastructures and technologies of mobile computing technologies.
- List applications in different domains that mobile computing offers to the public, employees, and businesses.
- Describe the possible future of mobile computing technologies and applications.

UNIT-I	12 Hrs.
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Introduction to Mobile Computing: Applications, A Simplified Reference Model, Wireless Transmission: Frequencies of Radio Transmission, Signals, Antennas, Signal Propagation, Multiplexing, Modulation, Spread Spectrum, Cellular System. Media Access Control: Motivation for a Specialized MAC, SDMA, FDMA, TDMA, CDMA, and Comparisons.

UNIT-II	12 Hrs.
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Telecommunications Systems: GSM-Mobile Services, System Architecture, Radio Interface, Protocol, Security, DECT- System Architecture, Protocol Architecture, Wireless LAN: Infrared V/S Radio Transmission, Infrastructure And Ad-Hoc Networks, IEEE 802.11, HPERLAN, Bluetooth.

UNIT-III	12 Hrs.
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Mobile Network Layer: Mobile IP, Dynamic host configuration protocol, Mobile ad-hoc networks- Routing, Destination sequence distance vector, Dynamic source routing. Mobile Transport Layer: Traditional TCP, classical TCP improvements, TCP over 2.5/3G wireless networks.

UNIT-IV	12 Hrs.
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Support For Mobility: File Systems, World Wide Web, Wireless Application Protocol (WAP)- Architecture, Wireless Datagram Protocol, Transport Layer Security, Wireless Transaction Protocol, Wireless Session Protocol, Wireless Application Environment, Wireless Markup Language (WML), WML Script and WAP 2.0.

REFERENCE BOOKS:

1. Jochen Schiller, Mobile Communications, PHI, Second Edition, 2003.
2. Prasant Kumar Pattnaik, Rajib Mall, Fundamentals of Mobile Computing, PHI Learning Pvt.Ltd, New Delhi, 2012.
3. Dharma Prakash Agarwal, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.
4. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, Principles of Mobile Computing, Springer, 2003.
5. William.C.Y.Lee, Mobile Cellular Telecommunications, Analog and Digital Systems, Second Edition, TataMcGraw Hill Edition, 2006.
6. C.K.Toth, AdHoc Mobile Wireless Networks||, First edition, Pearson Education, 2002.

CLOUD COMPUTING

Hours/Week: 3

I.A. Marks: 30

Credits: 3

Exam. Marks: 70

Course Learning Objectives:

- Characteristics and design principles of grid and cloud computing.
- Security mechanisms in grid and cloud computing applications.
- Designing methodologies of distributed computing and Importance of cloud computing environments.
- The concepts of virtualization and use of cloud service models.

Course Outcomes: After completing the course, the students will be able to,

- Demonstrate in-depth understanding characteristics of grid and cloud computing.
- Demonstrate an in-depth understand of the design principles of grid and cloud computing.
- Illustrate security mechanisms in grid and cloud computing applications.
- Design and demonstrate distributed computing applications.
- Understand the importance of cloud computing environments.
- Understand cloud based data storage, cloud based database solutions and research trends in cloud computing.
- Analyze cloud security issues and applications of Fog computing.

UNIT-I

9 Hrs.

Cloud computing basics: - Cloud computing components- Infrastructure-services- storage applications database services - Deployment models of Cloud- Services offered by Cloud- Benefits and Limitations of Cloud Computing – Issues in Cloud security- Cloud security services and design principles.

UNIT-II

9 Hrs.

Virtualization fundamentals: Virtualization – Enabling technology for cloud computing- Types of Virtualization- Server Virtualization- Desktop Virtualization – Memory Virtualization – Application and Storage Virtualization- Tools and Products available for Virtualization.

UNIT-III

9 Hrs.

SAAS and PAAS: Getting started with SaaS - Understanding the multitenant nature of SaaS solutions- Understanding OpenSaaS Solutions- Understanding Service Oriented Architecture- PaaS- Benefits and Limitations of PaaS. Security as a Service

UNIT-IV

9 Hrs.

IAAS and cloud data storage: - Understanding IaaS- Improving performance through Load balancing- Server Types within IaaS solutions- Utilizing cloud based NAS devices – Understanding Cloud based data storage- Cloud based database solutions- Cloud based block storage.

Cloud Applications and security: Open Source and Commercial Clouds, Cloud Simulators, Research trends in Cloud Computing, Fog Computing and applications, Cloud Security challenges.

REFERENCE BOOKS:

1. R. Buyya, C. Vecchiola, S.T. Selvi, Mastering Cloud Computing, McGraw Hill (India) Pvt Ltd., 2013
2. Kris Jamsa, Cloud Computing: SaaS, PaaS, IaaS, "Virtualization, Business Models, Mobile, Security and more, Jones & Bartlett Learning Company, 2013
3. Ronald L. Krutz, Russell vines, Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Wiley Publishing Inc., 2010.
4. Gautam Shroff, Enterprise Cloud Computing - Technology, Architecture, Applications, Cambridge University Press, 2010
5. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, Cloud Computing: A Practical Approach, Tata McGraw Hill Edition, Fourth Reprint, 2010
6. Ronald L. Krutz, Russell Dean Vines, Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Wiley- India, 2010.
7. Antonopoulos, Nick; Gillam, Lee, Cloud Computing Principles, Systems and Applications, Springer, 2010.
8. G. Reese, Cloud Application Architecture, O'Reilly, 2009.

Principles of Data Science

Hours/Week: 3

I.A. Marks: 30

Credits: 3

Exam. Marks: 70

Course Learning Objectives:

- The probability distributions and density estimations to perform analysis of various kinds of data
- The statistical analysis techniques using Python and R programming languages.
- Expand the knowledge in R and Python to use it for further research.
- The students will be able to carry out data analysis/statistical analysis effectively visualize the data.

Course Outcomes: After completing the course, the students will be able to,

- Understand the fundamentals of data analytics and study the basic concepts of Excel spreadsheet Functions.
- Realize the importance of filtering functions, charts and tables.

- Identify the importance and usage of R package and its features
- Learn the fundamentals of python programming
- Understand the various search methods and visualization techniques.
- Learn to use various techniques for mining data stream and applications using Map Reduce Concepts.

UNIT-I

9Hrs.

Basics of Data Analytics, Applications of Data Analytics, Phases in Data Analytics, Data Definitions and Analysis Techniques, Elements, Variables, and Data categorization, Levels of Measurement, Data Management and Indexing, Introduction to Statistical Learning.

UNIT-II

9Hrs.

Basic analysis techniques, Central Tendency and Dispersion, Probability Distributions, Sampling and Sampling Distribution, Distribution of sample: Mean, population and Variance, Confidence interval estimation, Statistical hypothesis generation and testing, Chi-Square test, t-Test, Analysis of variance, Correlation analysis, Maximum likelihood test, Regression analysis.

UNIT-III

9Hrs.

Data pre-processing techniques, Summarizing and Computing Descriptive Statistics, Handling Missing Data, Hierarchical Indexing, Data Loading, Storage and File formats, Data Wrangling: Clean, Transform, Merge, Plotting and Visualization, Data Aggregation and Group Operation.

UNIT-IV

9Hrs.

Classification techniques: CART, Attribute selection measures, Bayesian Classification, Rule based Classification, Classification by Backpropagation, SVM, Cluster Analysis: K- mean Clustering, Hierarchical Method of Clustering, Density based Methods, Grid Based Methods, Model based Clustering Methods, Association Rules Analysis, Practice and analysis with Python

REFERENCE BOOKS:

1. McKinney, Wes. Python for data analysis: Data wrangling with Pandas, NumPy, and IPython. O'Reilly Media, Inc., 2012, 1st Edition.
2. Samir Madhavan, Mastering Python for Data Science, 2015.

3. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", 2 nd Edition, Elsevier, Reprinted 2008.
4. E. Alpaydin, "Machine Learning", MIT Press, 2010

Data communications and computer networks Lab

Hours/Week: 6

I.A. Marks: 30

Credits: 3

Exam. Marks: 70

The practical problems shall be based on the theory concepts covered under Data communications and computer networks course.

Advanced Web Technologies Lab

Hours/Week: 6

I.A. Marks: 30

Credits: 3

Exam. Marks: 70

The practical problems shall be based on the theory concepts covered under Advanced Web Technologies course.

Machine learning and Data analytics using Python lab

Hours/Week: 6

I.A. Marks: 30

Credits: 3

Exam. Marks: 70

The practical problems shall be based on the theory concepts covered under Machine learning and Data analytics using Python course.

Internet of Things Lab

Hours/Week: 6

I.A. Marks: 30

Credits: 3

Exam. Marks: 70

The practical problems shall be based on the theory concepts covered under Internet of Things course.

Mini Project Lab

Hours/Week: 6

I.A. Marks: 30

Credits: 3

Exam. Marks: 70

The mini project shall be carried out either as a web application, a research-based project, or a mobile application.

Mark Distribution

- **Project Report/Documentation:** 25 Marks
- **System Development/Implementation (Code)/Testing:** 25 Marks
- **Final Presentation and Demonstration:** 10 Marks
- **Viva Voce (Technical Questions):** 10 Marks

QUESTION PAPER PATTERN

Name of the Examination:

Duration: 3 Hrs.

Max. Marks: 70

Section – A: Answer any five questions and each question carries TWO marks.

1. a)
- b)
- c)
- d)
- e)
- f)
- g)

Section – B: Answer all the questions. Each question carries FIFTEEN marks

UNIT-1:	2. OR 3.
UNIT-2:	4. OR 5.
UNIT-3:	6. OR 7.

UNIT-4:	8. OR 9.
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Note: Each question of an UNIT under Section-B may contain multiple sub-questions, summing to fifteen marks.

Introduction of certificate courses. Details as follows:

OBJECTIVES: With the objective of enabling the students to hone the skills required for enhancing their career opportunities, Alva's College (Autonomous), Moodubidire has introduced a number of Certificate Courses. Besides sharpening their skills, these courses are intended to provide the students additional knowledge and expertise that can widen their career prospects. The Certificate Courses are designed in accordance with the requirements of the present competitive world.

Eligibility

Any student who is eligible to pursue a Bachelor Course

Duration

All the Certificate Courses are of minimum 48 hours duration.

Methodology

- Theory < 40 %

Lecture/ICT Modes of Teaching/Seminar

- Practical > 60%

ICT based practical classes/Laboratory based practical classes/Brain Storming

Sessions/Field Visits/Surveys etc.

Evaluation

Formative >50%

Summative < 50

Certification Criteria

- Attendance : 75%
- Minimum 50% of marks in both Formative and Summative assessments

The Performance of the students will be graded in the following manner:

Grade O : Above 90%

Grade A : 75 % to 90%

Grade B : 60% to 75%

Grade C : 50% to 60%

Programme Outcomes:

At the end of a certificate Course a student will be able to:

- Demonstrate a basic level of competency in the chosen field
- Internalize certain skills related to the field of study
- Apply the acquired skills and expertise in real life situations
- Acquire a working knowledge of the ideas and concepts pertaining to the field of study

Details of Certificate courses for UG & PG programmes are mentioned below :

SL.NO	NAME OF THE CERTIFICATE COURSE	Name of the Department
1	Graphic design: photoshop, illustrator & in design Figma	Animation

2	Indian sweets and charts	BHS
3	Speed Typing	Hindi
4	Food preservation and technique	FND
5	Microbial quality control parameters in food industries	Microbiology
6	Vermiculture	Zoology
7	Home garden and hydroponics	Botany
8	Tissue culture techniques	Biotechnology
9	Phytochemical analysis and dye preparation	Bio Chemistry
10	Electrical appliances and repair	Physics
11	3D Printing	Physics
12	Quantitative Aptitude	Maths
13	Preparation of Household chemicals	Chemistry
14	Statistical tools for business decision making	Statistics
15	Web Technology-I Year	BCA
16	AI for everyone-II Year	BCA
17	Event Management	HRD
18	Research Methodology	BBA
19	Career Advancement skill-I Year	B.Com
20	Fundamentals of U.S Direct Tax-II Year	B.Com
21	Diploma in computerized Accounting	B. Com
22	Jewellery Design	Fashion Design
23	Tourism and Management	BA
24	Mural Art	BVA
25	Corporate English Praticce	English
26	Substance use dissuades and interventions	BSW & MSW
27	Theatre performance	BSW
28	Certificate Course in Counselling	MSW
29	Certificate Course in HRM	MSW

- To conduct academic programmes through collaborative mode.
- Academic Audit will be conducted on April 2027
- Academic calendar of events for the year 2026-27 was prepared and got approval from IQAC committee. Details are as follows :



Alva's College (Autonomous) Moodubidire



Academic Calendar 2026-27

ODD SEMESTERS 2026-27

Sl.No	Particulars	Dates
1	Admission to I Sem begins	01.04.2026
2	Last date for admission with penalty	31.08.2026
3	Classes begin for I,III & V Semester	15.06.2026
4	IA Test-I	27.07.2026 to 30.07.2026
5	Independence Day	15.08.2026
6	IA TEST-II	07.09.2026 to 15.09.2026
7	RE - Test	21.09.2026
8	Practical - IA	22.09.2026
9	Last Working Day for Students	03.10.2026
10	End Semester Practical Exams	05.10.2026
11	End Semester Examinations for non- practical batches	12.10.2026 to 30.10.2026
12	End Semester Examinations for practical batches	21.10.2026 to 05.11.2026
13	Announcement of results	16.11.2026
14	Internship	After I, III & V Sem Examination for One Month

EVEN SEMESTERS 2026-27

Sl.No	Particulars	Dates
1	Classes begin for II,IV & VI Semester	01.12.2026
2	IA Test-I	18.01.2027 to 23.01.2027
3	Republic Day	26.01.2027
4	Science Day	27.02.2027
5	Project and Competitions (Commerce,Mgt,BCA,Arts)	01.03.2027 to 05.03.2027
6	IA TEST-II	08.03.2027 to 15.03.2027
7	College Day	20.03.2027
8	Re-Test	22.03.2027
9	Practical- IA	23.03.2027
10	Last Working Day for Students	31.03.2027
11	End Semester Practical Exams	01.04.2027
12	End Semester Examinations for non- practical batches	12.04.2027 to 30.04.2027
13	End Semester Examinations for practical batches	19.04.2027 to 05.05.2027
14	Announcement of results	15.05.2027
15	Internship	After II & IV Sem Examination for One Month
16	College Reopens	15.06.2027



for Admission Enquiry

1. There will be regular stakeholder feedback pertaining to curricular changes and to implement the suggestions advocated.
2. Ensuring the maximum student attendance in the classes through regular monitoring of students by mentors/class coordinators /subject teachers in proactive manner.
3. Ensuring the completion of syllabi in every semester by all teachers through constant monitoring of holding of classes and through the mechanism devised by IQAC.

Teaching –Learning

1. To augment academic infrastructure - ICT enabled classrooms, google classrooms, e-learning resources etc
2. Organising different academic seminar/conferences/workshops/symposiums/ trainings in collaborative mode. Details for the academic year 2025-26 are as follows:
 - ❑ **Internship Plans (Mandatory) as best practice** : 210 post graduate students and 500 undergraduate students will be placed in different 360 agencies to enhance their employability. Internship placement are for 15 to 30 days for UG students and 30 days for PG students.
 - ❑ Research Publications : 32
 - ❑ Study Tour, Camps, Visits : 10

☐ FDPs	: 14	
☐ Research Projects	: Students - 163	
	Staff - 05	
	Department - 11	
☐ Seminars	: Alumni Sponsored National/International Seminar (1+1)	
☐ Workshop		12
☐ Guest talk		52

Infrastructure Upgradation

1. To make elaborate arrangements for the computers in different office, library and IQAC .
2. Effective use of indoor and outdoor sports facilities and cultural facilities

Student Support and Progression

1. To provide career counselling opportunities and guidance to competitive exams
2. To functionalize ED Cell and to implement programmes for the greater interest of the students
3. To mobilise vast alumni community for the up gradation of the college through setting up active alumni units at different departmental levels. Plan of activities with alumnus and to arrange study tours, field visits and industrial visits for students of different departments and streams. Details are as follows:

Alumni contributions (financial / non-financial) :

No. of Activities	Proposed Activities	Amount Expected (in rupees)
32	☐ National Seminar ☐ International Seminar ☐ Guest Talks ☐ Workshop ☐ Webinar ☐ Internships ☐ Placements ☐ Interactions	Rs. 2,07,600-00

4. To formulate and implement different student welfare committees.
5. Implementation of efficient student mentoring in every department
6. Implementation of efficient centralised student counselling mechanism to resolve stress related issues.
7. Details about different forums to enhance skills among students are given below:

Sl. No.	NAME OF THE FORUM	COORDINATOR	DEPARTMENT
1	NCC(Army)	Dhananjaya A.	Political Science
2	NCC(Air wing)	Ashok kumar	Engineering
3	NCC(Navy)	Prasad G R	PUC(Hindi)
4	NSS unit 1	Sudeep	History
5	NSS unit 2	-	
6	Rovers	Balakrishna -	Commerce
7	Rangers	Shilpa Preet hi	Chemistry Botany
8	Youth Red Cross	Sebastian P.J. Bhavya	BC A BC A

9	Mind view	Viveka K.N.	Psychology
10	Sristi(Nature)	Prasadini	FND
11	Management	Praveen Kumar Prajna S.B.	Management Management
12	Commerce	Pooja Kotian Reema Priya D'souza	Commerce Commerce
13	IT	Sowjanya D S Sayed Ansifa sana	Computer science Computer science
14	HRD	Nisha	HRD
15	Tulu	Dr. Yogish Kairodi Dr. Jyothi Rai	Kanna da Kanna da
16	English	M.N Aishwarya Akshatha P.	English English
17	Spatica Socialwork (only for BSWwork)	Pavithra	Social work
18	Dance	Chaithra Rao Bhavyashree G.P	BB A BB A
19	Music	Chaithra Akshatha	BBA Botony
20	Yakshagana	Maithri Dr. Vinayak Bhat	BCA Sanskrit
21	Drama	Harish T.G.	Kannada
22	Fashion Design	Padmapriya & Pavithra	FD
23	Visual Art (Drawing)	Sujith Rai	BVA
24	Animation	Shankar P Kamath Arun kumar	Animation Animation
25	Photography	Akshaya Kumar	Journalism
26	Hospitality	Ashwil Cardoza	Hotel management
27	Readers club	Shyamalatha	Librarian

8. Details of activities of cells for the academic year 2026-27 in order to support and guide students are given below:

Month	Activities of Human Rights Cell	Activities of Anti-Ragging Cell	Activities of Anti-Sexual Harassment Cell	Activities of SC/ST Cell
June - 2026	1. Executive Committee Meeting 2. Orientation to UG students on HR Cell 3. Awareness Talk on Human Rights	1. Executive Committee Meeting 2. Orientation to UG students on AR Cell	1. Executive Committee Meeting 2. Orientation to UG students on ASH Cell	1. Cell Committee Meeting 2. Orientation Programme for UG Students
August - 2026	Workshop on Human Rights (TOT)	Registration of UG Students in the Website	1. Release of Posters and Pamphlets on Anti-Sexual Harassment Cell 2. Awareness about Good Touch and Bad Touch for School Children in Moodubidire Region	Awareness Programme on Government Schemes
September - 2026	1. Orientation to PG students on HR Cell 2. Awareness Talk on Human Rights	Organizing issue based talk for UG Students	1. Orientation to PG students on ASH Cell 2. Awareness Session on – From Fear to Resilience: Addressing the Psycho-Social Impact of Sexual Harassment at Work	-

October - 2026	1. Executive Committee Meeting 2. Human Rights Campaign (Through Multi-Media Approach)	Orientation to PG students on AR Cell	Executive Committee Meeting	-
November - 2026	Workshop on Human Values (TOT)	Executive Committee Meeting	Orientation on POSH in PU Colleges in Moodubidire Region	Cell Committee Meeting
December - 2026	1. Observation of International Human Rights Day 2. Organizing theme based talk	Registration of PG Students in the Website	Orientation on POSH in PU Colleges in Moodubidire Region	1. Programme on Leadership 2. Awareness Programme on Career Opportunities
January - 2027	Executive Committee Meeting	Organizing issue based talk for PG Students	Executive Committee Meeting	Cell Committee Meeting
February - 2027	Organizing issue based talk	Organizing issue based talk for	Orientation on POSH in PU	-
		UG Students	Colleges in Moodubidire Region	
March - 2027	Organizing issue based talk	Organizing issue based talk for PG Students	Orientation on POSH in PU Colleges in Moodubidire Region	-
April - 2027	Executive Committee Meeting	Executive Committee Meeting	Executive Committee Meeting	-
May - 2027	Organizing issue based talk	Organizing issue based talk for UG and PG Students	Evaluation of all the programmes organized by the cell and planning activities for the next academic year	-

Research and Extension Activities

1. Regular meetings of Alva's Research and Innovation Cell to encourage faculty members to create research environment in the campus. Plan of action of the cell is as follows:

S. No.	Activity	Execution	Schedule
1.	Research Publications	Mandatory for all staff members of PG Departments and PhD holders in UG Departments to publish at least one paper in a Scopus-indexed journal every calendar year.	One research paper per staff per calendar year
2.	Department Level Projects	Each PG Department must complete at least one research project per academic year.	One research project per PG Department in the academic year
3.	Monitoring Student Projects	Monitor mandatory research projects carried out by PG students in their III & IV semesters, encouraging publication in Scopus-indexed journals. The best project in each department will be awarded at the end of the year.	Throughout the academic year
4.	Guest Lectures	Organize lectures by eminent researchers on topics such as research methodology, publication ethics, and awareness of research platforms, targeted at students and faculty (stream-wise).	Six sessions per year
5.	Research Internship	Offer research internships for interested external students (UG level) through different PG Departments.	Between odd & even semester
6.	Research and Innovation Exhibition	Showcase completed research projects by students.	End of even semester
7.	Research Club	Facilitate research activities for UG students.	Throughout the academic year
8.	IPR Activities	Provide awareness on intellectual property rights to the faculty members	Two sessions per year

2. To publish college magazine with ISBN book multidisciplinary topics.
3. To conduct yearlong extension programmes in collaborative mode with various stakeholders. Exploring means to devise and undertake interdisciplinary research projects by making use of institutional infrastructure. Plan of research projects for the academic year 2025-26 are

given below:

Research Publications : 32
Research Projects : Students - 163
Staff - 05
Department - 11

Governance, Leadership and Management

1. To create and maintain statutory and non-statutory bodies to deal with wide range of day to day academic and administrative tasks. Details for the year 2026-27 are as follows :

I. IQAC COMMITTEE

Name	Designation	Position
1. Dr. Kurian	Principal	Chairman
2. Dr. Mukambika G S	Department of Social Work	Convener
3. Mr. Narayana Shetty N P	Registrar Evaluation	Member
4. Dr. T K Ravindran	Registrar	Member
5. Dr. Chandrashekar Mayya	Department of Sociology	Member
6. Dr. Yogish Kairodi	Department of Kannada- HoD	Member
7. Dr. Jayadev K	Department of Biotechnology	Member
8. Dr. Sukesh	Department of Botany- Coordinator	Member
9. Dr. Vinayaka Bhat	Department of UG Sanskrit-HoD	Member
10. Dr. Praveen Mugali	Department of Chemistry	Member
11. Dr. S Samshuddin	Department of Chemistry-HoD	Member
12. Dr. Raghavendra Rao	Department of Biotechnology	Member
13. Dr. Archana Prabhat	Department of FSN- Coordinator	Member
14. Mrs. Surekha Rao	Dean Management	Member
15. Mrs. Sandhya K S	Dean Arts	Member
16. Mrs. Shazia Khanum	Department HRD- Coordinator	Member
17. Mrs. Sharmila Kunder	Dean Commerce	Member
18. Mrs. Ramya Rai M	Dean Science	Member
19. Mrs. Ashitha M D	Department of FND-HoD	Member
20. Mr. Ramesh	Department of Computer Science - HoD	Member
21. Mrs. Ashwini	Department HRD	Member
22. Mrs. Shyamalatha	Chief Librarian	Member
Administrative/ Technical Staff		
1. Prof. Balakrishna Shetty	Administrative Officer	
2. Mr. Shantharam Kamath	Finance Officer	
3. Mrs. Poornima	Office Superintendent (UG)	
4. Mrs. Latha	Office Superintendent (PG)	

Management Representative		
Mr. Vivek Alva	Managing Trustee	
Student Representatives		
Kaushik	Students	Members
Veekshitha		
Maneeksha		
Dhanish		
Stake holders/Community Representatives		
Mr. Jayaram Kotian		
Mr. Narayan P.M.		
External Experts		
1. Dr. K R Chandrashekar	Professor and Scientist Ayush Research Center, Yenepoya (Deemed to be University) Deralakatte, Mangalore	
2. Prof. K V Rao	Director of Science Division Pilikula Nisarga Dhama, Mangalore	

II. Planning and Evaluation Committee

Name	Designation	Position
1. Dr. Kurian	Principal	Chairman
2. Prof Blakrishna shetty	A.O	Member secretary
3. Dr. T K Ravindran	Registrar	Member
4. Dr. Narayan Shetty N P	Registrar Evaluation	Member
5. Mrs .Surekha Rao	Dean Management	Member
6. Mrs .Sandhya K S	Dean Arts	Member
7. Mrs .Sharmila	Dean Commerce	Member
8. Mrs Vanitha Prabhu	Dean Computer science	Member
9. Mrs Ramya rai	Dean science	Member
10. Dr. Suresh	Incharge PG Science	Member
11. Dr. S. Samshuddin	Research coordinator	Member
12. Mrs. Vaishali	Student welfare officer	Member
13. Mrs. Poornima	Office Superintendent	Member

III. Students Grievance Redressal Committee:

Name	Designation	Position
1. Dr. Kurian	Principal	Chairman
2. Mr. Ashok K G	Department of Commerce	Convener
3. Ms. Karthika FSN	Department of Food Science	Member
4. Mrs. Shruthi	Department of Computer science	Member
5. Mrs. Vaishali	Student welfare officer	Member

6. Mrs. Shreya	Department of Science	Member
7. Mrs. Sony	Department of Management	Member

IV. ST and SC Cell

Name	Designation	Position
1. Dr. Kurian	Principal	Chairperson
2. Dr. Jayadev K	Department of PG Biotechnology	Convener
3. Dr. Shreenivas	Department of PG Journalism	Member
4. Mr. Mahendra H R	Department of Commerce	Member
5. Mrs. Jayashree	Department of Arts	Member

V. Internal Complaints Committee

Name	Designation	Position
1. Dr. Kurian	Principal	Chairperson
2. Dr.Sapna	Department of Social Work	Convener
3. Mrs. Jayashree Aamarnath shetty	External Member	
4. Mrs. Rajashree Rao	Department of HRD	Member
5. Mrs. Sharmila Kunder	Department of Commerce - HoD	Member
6. Ramesh	Department of Computer Science-HoD	Member
7. Mrs. Pavaithra	Department of Social Work	Member
8. Mrs. Poornima	Office superintendent-UG	member
9. Mrs. Latha	Office superintendent-PG	Member
10. Mrs. Vaishali	Student welfare officer	Member
11. Mr. Mohan	Security officer	Member

VI. Examination Committee

Name	Designation	Position
1. Dr. Kurian	Principal	Chairperson
2. Dr. Narayana Shetty N P	Registrar Evaluation	Convener
3. Dr. Chandrashekara Mayya	Department of Arts-HoD	Member
4. Mr. Ashok K G	Department of Commerce	Member
5. Mr. Shravan Krishnaraj	Department of Hotel Management	Member
6. Mr. Manu D L	Department of Commerce	Member
7. Mr. Muralikrishna	Department of Computer Science	Member
8. Mr. Harish T G	Department of Kannada	Member
9. Mr. Machhendra S Belki	Department of English -HoD	Member
10. Mrs. Chaithra Rao	Department of Management	Member
11. Mrs. Shreya	Department of Science	Member
12. Mrs. Ashwini Kumari	Department of Human Resource-HoD	Member
13. Dr. Sapna	Department of Social Work	Member
14. Mrs. Josvita	Department of Psychology	Member

VII. Admission Committee (UG)

Name	Designation	Position
1. Dr. Kurian	Principal	Chairperson
2. Mr. Shrivathsa	Admission Officer	Convener
3. Mr.Suhas Shetty	Department of Management	Member
4. Mr. Banu Prakash	Department of Commerce	Member
5. Mr. Manu D L	Department of Commerce	Member
6. Mrs. Renita	Department of Commerce	Member
7. Mr. Roopesh	Department of Science	Member
8. Mrs. Madhushree	Department of Science	Member
9. Mrs. Durgaprasanna	Department of Journalism	Member

I. Admission Committee (PG)

Name	Designation	Position
1. Dr. Kurian	Principal	Chairperson
2. Mrs. Rajashree Rao	PG Admission Coordinator	Convener
3. Dr. Rama Bhat	Department of Biotechnology - HoD	Member
4. Ms. Pavitra and Mrs. Deeksha	Department of PG Chemistry	Member
5. Ms. Deekshitha	Department of PG Journalism	Member
6. Ms. Pushpalatha	Department of M.Com General	Member
7. Ms. Manasa Bhat	Department of PG Zoology	Member
8. Ms. Yashasvi	Department of PG FSN	Member
9. Mr. Narayana Sharma	Department of PG Physics	Member
10. Mr. Krishnamurthy	Department of PG Social work	Member
11. Mr. Sathvik	Department of PG English	Member
12. Dr. Keshavachandra	Department of PG Botany	Member
13. Ms. Swathi K B	Department of PG Mathematics	Member
14. Dr. Harshavardhan	Department of PG Journalism	Member
15. Ms. Saman	Department of PG English	Member
16. Mr. Ravichandra	Department of Animation - HOD	Member

II. Student Welfare Committee & Scholarship

Name	Designation	Position
1. Dr. Kurian	Principal	Chairperson
2. Dr. Sapna	Department of social work	Convener
3. Mrs.Divya	Student Welfare Officer	Member
4. Mrs.Vaishali	Student Welfare officer	Member
5. Mrs. Reshma	Department of Chemistry (PG)	Member

III. Human Rights (Executive) Committee

Name	Designation	Position
1. Dr. Kurian	Principal	Chairperson
2. Mr. Krishnamoorthy B	Department of Social Work	Convener
3. Dr. Chandrashekhar Mayya	Department of Sociology	Member
4. Ms. Savitha	Department of History	Member
5. Ms. Pooja Kotian	Department of Commerce	Member
6. Ms. Lavanya	Department of Commerce	Member
7. Ms. Veekshitha V	Student Representative	Member
8. Ms. Chaitra	Student Representative	Member
9. Mr. Sinan	Student Representative	Member
10. Ms. Preethi B H	Student Representative	Member
11. Ms. Rashmi C	Student Representative	Member

IV. Extra-curricular and Co-Curricular activities committee

Name	Designation	Position
1. Dr. Kurian	Principal	Chairperson
2. Dr. Yogish Kairodi	Department of Kannada - HoD	Convener
3. Ms.Sharmila Kunder	Department of Commerce - Dean	Member
4. Mr. Manu D L	Department of Commerce	Member

V. Anti Raging Committee:

Name	Designation	Position
1. Dr. Kurian	Principal	Chairperson
2. Prof. Manu D L	Department of Commerce	Convener
3. Prof.Sandhya	Dean of Arts	Member
4. Mrs.Divya	Student Welfare Officer	Member

VI. Research and innovation Committee

Name	Designation	Position
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1. Dr. Kurian	Principal	Chairperson
2. Dr. S. Samshuddin	Department of Chemistry	Convener
3. Dr. Sukesh	Department of Botany - HoD	Member
4. Dr. Praveen S Mugali	Department of Chemistry - HoD	Member
5. Dr. Raghavendra Bhat B	Department of Biotechnology	Member
6. Dr. Sukanya	Department of Chemistry	Member
7. Dr. Madumala K	Department of Social Work - HoD	Member
8. Dr. Yogish Kairodi	Department of Kannada - HoD	Member
9. Mrs. Akshatha Shetty	Dept of PG Commerce	Member
10. Mrs. Shazia Khanum	Department of PG Human Resource Management – HoD	Representative from ED Cell

VII. Cultural Activities Committee

Name	Designation	Position
1. Dr. Kurian	Principal	Chairperson
2. Dr. Krishnaraja Karaba	Department of Kannada	Convener
3. Ms. Aparna Holla	Department of Sanskrit	Member
4. Ms. Chaitra Rao	Department of Management	Member
5. Mrs. Shreya	Department of Zoology	Member
6. Mrs. Chaya	Department of Commerce	Member

VIII. Entrepreneurship and Incubation Cell

Name	Designation	Position
1. Dr. Kurian	Principal	Chairperson
2. Mrs. Shazia Khanum	Department of PG HRD	Convener
3. Mrs. Rajashree Rao	Department of PG HRD	Member
4. Mr. Ramananda Nayak	Department of Commerce	Member
5. Mrs. Sony	Department of Management	Member
6. Dr. S. Samshuddin	Department of PG Chemistry-HoD	Member

IX. Website management and E content Development

Name	Designation	Position
1. Dr. Kurian	Principal	Chairperson
2. Mr. Harshavardhan	Department of PG Journalism	Convener
3. Mr. Muralikrishna	Department of Computer Science	Member

4. Mrs. Durgaprasanna	Department of Journalism	Member
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X. College Magazine, Literary and Content development Committee

Name	Designation	Position
Dr. Kurian	Principal	Chairperson
1. Mr.Machhendra S Belki	Department of English - HOD	Convener
2. Dr.Dattathreya Hegde	Department of Hindi -HOD	Member
3. Dr.Jyothi Rai	Department of Kannada	Member
4. Mr.Harish T G	Department of Kannada	Member
5. Mr.Ravi Shenoy	Department of English	Member
6. Mrs.Priya Devi	Department of Manipuri	Member
7. Mr.Lakshmeesha	Department of Sanskrit	Member
8. Mr. Sumantha N	Department of English	Member
9. Mrs.Rakshitha	Department of Journalism	Member
10. Student secretary of NSS Forum	Student secretary	Member
11. Student representatives from INNAMU	Student representatives	Member

XI. Certificate course Committee

Name	Designation	Position
Dr. Kurian	Principal	Chairperson
1. Mrs. Sumithra B D	Department of Commerce	Convener
2. Mrs. Jayashree	Department of Political Science	Member
3. Mrs. Crystal Fernandes	PG Mathematics (PG representative)	Member
4. Manasa	Department of Computer Science	Member
5. Mrs. Akshatha	Department of Chemistry	Member

XII. NIRF

Name	Designation	Position
Dr. Kurian	Principal	Chairperson
Dr.Keshava Chandra	Department of Botany	Convener

XIII. AISHE SURVEY

Dr. Kurian	Principal	Chairperson
Mr.Sagar	Department of Computer Application	Convener

XIV. Library Advisory Committee

Name	Designation	Position
Dr. Kurian	Principal	Chairperson

1. Mrs. Shyamalatha	Chief Librarian	Convener
2. Dr. Yogish Kairodi	HoD of Kannada	Member
3. Mrs. Sandhya K S	Dean dept of Humanities	Member
4. Dr. Sukanya	Department of PG Chemistry	Member
5. Mrs. Surekha Rao	HoD of Management	Member
6. Mrs. Sharmila Kundar	HOD of Commerce	Member
7. Mrs. Ramya Rai M	HOD of Science	Member
8. Mr. Prasad Shetty	Department of Journalism	Member
9. Mr. Sourabh	III BSc	Students
10. Mr. Pramod	II MSW	
11. Mr. Aditya Nayak	III BBA	
12. Mr. Sanvith	III BCA	
13. Ms. Varshitha	III BCOM	
14. Ms. Rashmi	III BA	

XV. Placement and Training Committee

Name	Designation	Position
Dr. Kurian	Principal	Chairperson
1. Mr. Sushanth Anil Lobo	Head - training and placements	Convener
2. Ms. Ranjitha R Acharya	Assisitant Training and placement officer	Member
3. Mrs. Sannidhi Jain	Placement Head	Member
4. Mr Suhas Shetty	BBA Placement Coordinator	Member
5. Mr. Muralikrishna	BCA Placement Coordinator	Member
6. Mrs Pavithra	BSc Placement Coordinator	Member
7. Mrs Durgaprasanna	BA Placement Coordinator	Member

XVI. Mini Project

Name	Designation	Position
Dr. Kurian	Principal	Chairperson
1. Mr. Ramesh	Department of Computer Science	Convener
2. Dr. S. Samshuddin	Research Coordinator	Member
3. Mrs. Rakshitha	Department of Arts	Member
4. Mrs. Josvita	Department of Arts	Member
5. Mrs. Shwetha Shetty	Department of Commerce	Member
6. Mrs. Sony	Department of Management	Member
7. Mrs. Vidyashree	Department of Science	Member

XVII. Intellectual property right cell:

Name	Designation	Position
Dr. Kurian	Principal	Chairperson
Dr. Sukesh	Representative from Science Incharge	Convener

XVIII. Finance Committee

Name	Designation	Position
Dr. Kurian	Principal	Chairperson
1. Mr. Shanthram Kamath	Finance Officer	Convener
2. Mr. Shanthram Nayak	Assistant Finance officer	Member
3. Mr. Ramakrishna Shetty	Department of Commerce	Member

XIX. Discipline Committee

Name	Designation	Position
Dr. Kurian	Principal	Chairperson
1. Prof. Sandhya K S	Dean Arts	Convener
2. Dr. Chandrashekhar Mayya	Department of Arts	Member
3. Dr. Jyothi Rai	Department of Kannada	Member

3. Motivating the faculty members to attend and organise FDPs in order to upgrade and update the knowledge of teachers. Details of FDPs planned for the academic year 2026-27 are 15.

Innovation & Best Practices

1. To formulate internship policy and to encourage all the UG and PG departments to formulate syllabus for internship of their students to promote employability among students. Details are as follows :

GUIDELINES FOR THE INTERNSHIP PROGRAMME 2026-27

What is Internship Programme?

An internship is a professional learning experience that offers meaningful, practical work related to a student's field of study or career interest. An internship gives a student the opportunity for career exploration and development, and to learn new skills.

Purpose

An internship gives a student the opportunity for career exploration and development, and to learn new skills.

Objectives

- To gain experience and skills in a particular field.
- To receive an orientation to the organization for which they are interning.
- To develop professional skills.
- To gain exposure to upper management.

Guidelines

a) Eligibility- All undergraduate and postgraduate students of the college are eligible to participate in Internship Programme.

b) Participation in internship programme is mandatory in every semester.

c) Implementation- departmental heads / coordinators should plan and arrange for the internship of the students. Concerned reports and certificates should be kept in the department and soft copy of the same should be sent to internship coordinator - sudheendrashanthi@alvascollege.com .

d) Role of faculties

- Concerned coordinators / Advisors / Mentors should design the syllabus for the internship.
- Concerned coordinators / Advisors / Mentors should identify the right agency/ Organization to the students.
- Concerned coordinators / Advisors / Mentors Must collect consent letter from the parents before the internship.

- Guiding and mentoring related to internship & report & documentation.
- Planning the internship presentation of the students in the department.

e) Role of students

- Applying theoretical knowledge in practical settings.
- Develop professional skills.
- Developing employability skills.
- To enhance the skills of Reporting, documentation and presentation of internship programme.

f) Number of hours of internship

- Each students should complete **160 hours (20Days)** of internship in every semester.

g) Recognition and credits

- Students may earn credit or certificates for participating in and successful completion of internship activities.
- Participation and achievement in Internship will be recorded and acknowledged in student profile.

h) Compliance

- Students must adhere to the college's code of conduct and ethical standard during the Internship activities.
- Any concern or issues arising during Internship activities should be reported to concerned coordinators/ advisors for resolution.

j) Reporting

- Each students should hand over a copy of consolidated reports to the department and a softcopy to sudheendrashanthi@alvascollege.com (including time sheet, Geo tag photos, completion certificate, permission letter copy).
- All the departments must maintain the records of r internship activities in the department.

k) Amendment

- The guidelines may be amended or updated by the college administration, whenever needed with the inputs from relevant stakeholders.
- ☐ To ensure plastic free and tobacco free campus through various means at all times.
- ☐ To promote energy conservation practices like wide use of LED lights, installation of solar panels and crating awareness through campaigns.
