Punyashlok Ahilyadevi Holkar Solapur University, Solapur

NAAC Accredited-2015'B' Grade (CGPA 2.62)

Name of the Faculty: Science and Technology

CHOICE BASED CREDIT SYSTEM

Syllabus : Computer Science and Engineering

Name of the Course: Final Year B.Tech (CSE)

(Syllabus to be implemented from w.e.f. June 2023)

Programme Educational Objectives and Outcomes

A. Program Educational Objectives

1. Graduate will exhibit strong fundamental knowledge and technical skills in the field of ComputerScience & Engineering to pursue successful professional career, higher studies and research.
2. Graduate will exhibit capabilities to understand and resolve various societal issues through theirproblem solving skills.
3. Graduate will be sensitive to ethical, societal and environmental issues as a software engineeringprofessional and be committed to life-long learning.

B. Program Outcomes

Engineering Graduate will be able to –

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex 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.
4. **Conduct investigations of complex problems:** Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities withan understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

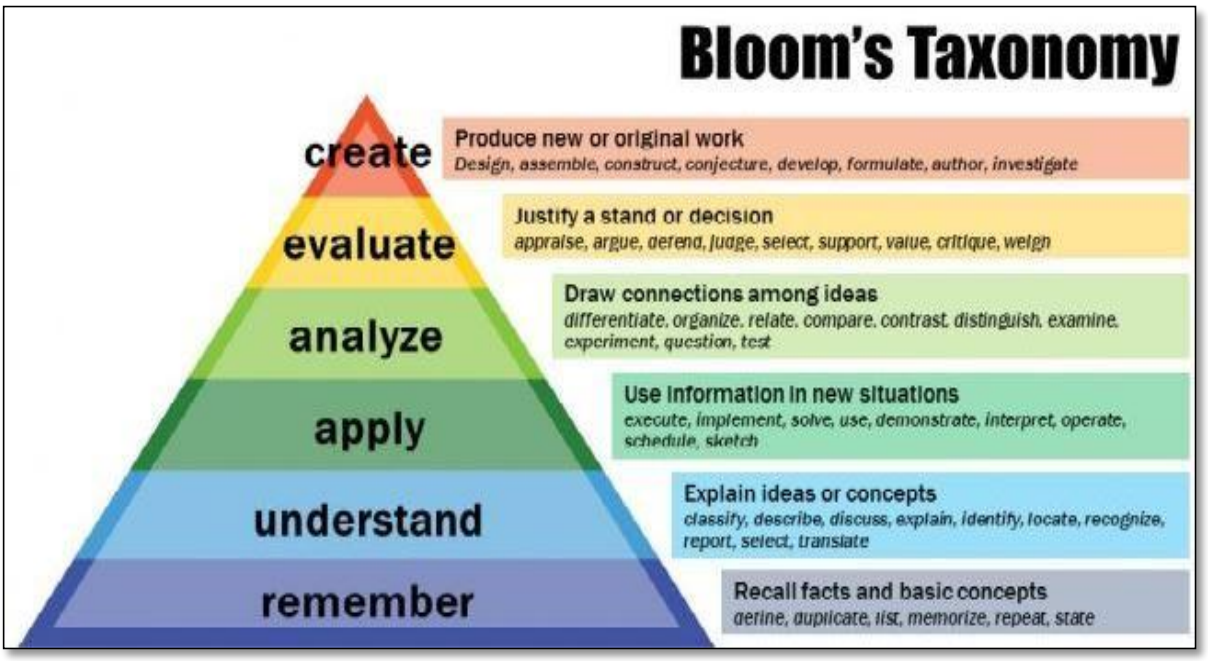
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering 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.
11. **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.
12. **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.

C. Program Specific Outcomes (PSOs)

1. Apply the principles of computational mathematics, computer systems and programming paradigms to solve computational problems.

2. Design and develop application software with functionalities applicable for desktop, web and mobile applications with due consideration of system software constraints.

3. Apply software engineering methods, cutting edge technologie and ICT, using appropriate tools and FOSS alternatives for designing ,developing & testing application software


Bloom's Taxonomy
create
Produce new or original work
Design, assemble, construct, conjecture, develop, formulate, author, investigate
evaluate
Justify a stand or decision
appraise, argue, defend, judge, select, support, value, critique, weigh
analyze
Draw connections among ideas
differentiate, organize, relate, compare, contrast, distinguish, examine, experiment, question, test
apply
Use information in new situations
execute, implement, solve, use, demonstrate, interpret, operate, schedule, sketch
understand
Explain ideas or concepts
classify, describe, discuss, explain, identify, locate, recognize, report, select, translate
remember
Recall facts and basic concepts
define, duplicate, list, memorize, repeat, state

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF SCIENCE AND TECHNOLOGY
Structure of Final Year B.Tech.(CSE) wef. 2023-2024
Semester-I

Course Code	Theory Course Name	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
CS411	Software Testing and Quality Assurance	3	--	--	3	70	30		100
CS412	Compiler Construction	3	--	--	3	70	30		100
CS413	Professional Elective-II	3	--	--	3	70	30		100
CS414	Professional Elective-III	3	--	--	3	70	30		100
CS415	DevOps	2	--	--	2		25		25
SL41	Self Learning (Technical)				1	50			50
	Sub Total	**14**	**0**	**0**	**15**	**330**	**145**		**475**
	Laboratory/Workshop					**ESE**			
						POE			
CS411	Software Testing and Quality Assurance	--	--	2	1			25	25
CS412	Compiler Construction	--	--	2	1			25	25
CS413	Professional Elective-II	--	--	2	1			25	25
CS414	Professional Elective-III	--	--	2	1			25	25
CS415	DevOps	--	--	2	1	50		25	75
CS416	Project Phase-I	--	--	2	1	25		25	50
CS417	Vocational Training	--	--	--	1			25	25
	Sub Total			**12**	**7**	**75**		**175**	**225**
	Grand Total	**14**	**0**	**12**	**23**	**405**	**145**	**175**	**700**

Professional Elective-II		**Professional Elective-III**	
CS413A	Business Intelligence	CS414A	Human Computer Interaction
CS413B	Data Mining	CS414B	Big Data Analytics
CS413C	Distributed Systems	CS414C	Information Retrieval
CS413D	Management Information System		

Self Learning (Technical)	
SL41A	UI or UX Technology
SL41B	Software Licenses and Practices

Note :

1. Batch size for the practical /tutorial shall be of 15 students. On forming the batches, if the strength of remaining students exceeds 7, then a new batch shall be formed.
2. Vocational Training (evaluated at Final Year B.Tech Semester VII) of minimum 15 days shall be completed in any vacation after S.Y. B.Tech Semester IV but before Final Year B.Tech Semester VII& the report shall be submitted and evaluated in Final Year B.Tech. Semester VII.
3. Appropriate Professional Elective II & III Subjects may be added when required.
4. Project group for Final Year B.Tech. (Information Technology) Semester VII and Semester VIII shall not be of more than **five** students.
5. ICA assessment shall be a continuous process based on student's performance in – class tests, assignments, homework, subject seminars, quizzes, laboratory books and their interaction and attendance for theory and lab sessions as applicable.

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF SCIENCE AND TECHNOLOGY
Structure of Final Year B.Tech.(CSE) wef. 2023-2024
Semester-II

Course Code	Theory Course Name	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
SL42-A	Self-Learning Technical (MOOC/Swayam / NPTEL)				4	100*			100*
SL42-B	Self Learning Technical Course offered by institute				4	100*			100*
SL42-C	Apprenticeship/Internship				4	100*			100*
	Sub Total				**4**	**100**			**100**
	Laboratory/Workshop					**ESE** / **POE**			
CS421	Project Phase-II			20	10	100		100	200
	Sub Total			**20**	**10**	**100**			**200**
	Grand Total			**20**	**14**	**200**		**100**	**300**

* Students shall opt for any one of the three courses (i.e. out of CS 421-A, CS 421-B and CS 421-C, students can select any one course for obtaining 4 credits of 100 marks).

Note:

1. Batch size for the practical /tutorial shall be of 15 students. On forming the batches, if the strength of remaining students exceeds 7, then a new batch shall be formed.
2. Appropriate Professional Elective IV Subjects may be added when required.
3. Project group for Final Year B.Tech. (Information Technology) Semester VIII shall not be of more than **five** students.
4. ICA assessment shall be a continuous process based on student's performance in – class tests, assignments, homework, subject seminars, quizzes, laboratory books and their interaction and attendance for theory and lab sessions as applicable
5.

- SL42A - Self Learning Technical Course (MOOC/Swayam/NPTEL):
  ESE 100 Marks, Credits: 4, transferrable from Online Examinations conducted by approved MOOC platform.

- SL42B Self Learning Technical Course offered by institute:
  ESE 100 Marks, Credits: 4, Course shall be designed by the Institute
  Institute level examination to be conducted by institute offering the course.

- SL42C Apprenticeship/Internship (Self Learning):
  - Students shall opt for semester long internship/apprenticeship (minimum 60 days).
  - ESE 100 Marks, Credits: 4 (Oral Examination based on the report of Apprenticeship/Internship)
  - Apprenticeship/Internship may be of the following type:
    1. Offered by industry at their premises.
    2. Offered by industry at the institute campus.
    3. Offered by institute jointly with the industry.

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Final Year B.Tech. (COMPUTER SCIENCE & ENGINEERING)
SEMESTER - I
CS411 : SOFTWARE TESTING & QUALITY ASSURANCE

Teaching Scheme	**Examination Scheme**
Lectures : 3 Hours /Week, 3 Credits	ESE – 70 Marks
Practical : 2 Hours/Week, 1 Credit	ISE – 30 Marks
	ICA – 25 Marks

COURSE OUTCOMES:

At the end of this course, students will be able to

1. Compare the different software testing methods and select the suitable one for a given scenario.
2. Design test strategy & test plan for software testing.
3. Apply different approaches of management, quality assurance and standards for software engineering processes.
4. Demonstrate automated testing tools to test software.

SECTION– I

Unit 1: Fundamentals of Software Testing **(08)**

Introduction, Basics of Software Testing, Approaches to Testing, Testing During Development Life Cycle, Essential of Software Testing, Features of Testing, Misconceptions About Testing, Principles of Software Testing, Test Policy, Strategy, Planning, Process, Challenges in Testing, Test Team Approach, Methods, Defect Classification, Defect, Error, Mistake in Software, Defect Life Cycle, Defect Management Process, Developing Test Strategy, Developing Testing Methodologies, Testing Process, Attitude Towards Testing, Test Methodologies, Skills Required by Tester.

Unit 2: Methods of Testing **(06)**

Software Verification and Validation, Black-Box and White-Box Testing, Static and Dynamic Testing, Black-Box Testing Techniques-Equivalence Partitioning, Data Testing, State Testing, Other Black Box Test Techniques. White-Box Testing Techniques-Data Coverage, Code Coverage, Other White Box Test Techniques.

Unit 3: Levels of Testing **(08)**

Verification and Validation Model, Levels of Testing, Proposal Testing, Requirement Testing, Design Testing, Code Review, Unit Testing, Module Testing, Integration Testing, Big-Bang Testing, Sandwich Testing, System Testing- GUI Testing, Compatibility Testing, Security Testing, Performance Testing, Volume Testing, Stress Testing, Load Testing, Installation Testing, Regression Testing, Smoke Testing, Sanity Testing, Ad hoc Testing, Usability Testing, Acceptance Testing-Alpha Testing, Beta Testing, Gamma Testing.

SECTION II

Unit 4: Test Planning & Documentation **(08)**

Test Planning-The goal of Test Planning, Test Planning Topics, Writing and Tracking Test Cases-The Goal of Test Case Planning, Test Case Planning Overview, Test Case Organization and Tracking, Reporting Bugs- Getting Your Bugs Fixed, Isolating and Reproducing Bugs, Not All Bugs Are Created Equal, Bug-Tracking Systems.

Unit 5: Quality Concepts & Software Quality Assurance **(06)**

Quality Concepts-What is Quality?, Software Quality, The Software Quality Dilemma, Achieving Software Quality, Software Quality Assurance-Background Issues, Elements of Software Quality Assurance, SQA Processes and Product Characteristics, SQA Tasks, Goals and Metrics, Formal Approaches to SQA, Statistical SQA, Software Reliability, The ISO 9000 Quality Standards, CMM, The SQA Plan.

Unit 6: Automated Testing and Testing Tools **(08)**

Introduction, The Benefits of Automation and Tools, Test Tools, Software Test Automation, Random Testing, Realities of Using Test Tools and Automation, Open Source Testing Tools, Case Studies on Testing Tools-Selenium.

Internal Continuous Assessment (ICA):

Assignments:

- Minimum 6 - 8 assignments based on each topic of above syllabus.
- Two assignments on use of Selenium for software testing.

Text books:

1. Software Testing Principles, Techniques and Tools By M G Limaye, Published by Tata McGraw-Hill Education Private Limited, Published 2009, ISBN (13): 978-0-07-013990-9, ISBN (10): 0-07-013990-3 (Chapter 1 & 3)
2. Software Testing, Second Edition By: Ron Patton, Published by SAMS, ISBN-13: 978-0672327988 ISBN-10: 0672327988 (Chapter 2, 4 & 6)
3. Software Engineering: A Practitioner's Approach by Roger S Pressman, 8th Edition,
4. Publisher McGraw Hill (Chapter 5)

Reference books:

1. Software Testing Principle and Practices By Ramesh Desikan, Gopalaswamy Ramesh, Pearson Education, ISBN 978-81-7758-121-8
2. Software Testing Principles and Practices By Naresh Chauhan, Publisher OXFORD UNIVERSITY PRESS-NEW DELHI, ISBN 0-19-806184-6
3. Beautiful Testing: Leading Professionals Reveal How They Improve Software By Adam Goucher, Tim Riley, Publisher O'reilly
4. Foundations of Software Testing By Rex Black, Dorothy Graham, Erik Van Veenendaal, Isabel Evans, Published by Cengage Learning India Pvt Ltd.
5. Lessons Learned in Software Testing by Cem Kaner , James Bach , Bret Pettichord, Publisher Wiley
6. Testing Computer Software Cem Kaner, Jack Falk, Hung Q. Nguyen, Publisher Wiley
7. Selenium Testing Tools Cookbook By Unmesh Gundecha Published by Packt, ISBN: 978-1-84951-574-0
8. Dr. K.V.K.K. Prasad, "Software Testing Tools: Covering WinRunner, Silk Test, LoadRunner, JMeter and TestDirector With Case Studies", Dreamtech Publications ISBN: 10:81-7722-532-4

Reference tutorials:

1. Spoken Tutorials on Selenium Software Testing Framework at http://spokentutorial.org/tutorial-search/?search_foss=Selenium&search_language=English

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Final Year B.Tech. (COMPUTER SCIENCE & ENGINEERING)
SEMESTER - I
CS412 : COMPILER CONSTRUCTION

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hrs/week, 3 Credits	ESE: 70 Marks
Practical : 2 Hrs/week, 1 Credit	ISE: 30 Marks
	ICA : 25 Marks

Introduction:

A compiler translates a program written in a high-level programming language that is suitable for human programmers into the low-level machine language that is required by computers.

Since writing a compiler is a nontrivial task, it is a good idea to split the compilation into several phases with well-defined interfaces. Conceptually, these phases operate in sequence, each phase except first phase taking the output from the previous phase as its input. Each phase is handled by a separate module.

This course provides an in-depth view of translation and optimization process. All phases required for translating a high-level language to machine language is covered in this course including scanning, parsing, intermediate-code generation, machine-code generation, register allocation and code optimization.

Course Prerequisite:

1. Theory of Computation
2. System Programming
3. Programming Language knowledge

Course Outcomes:

At the end of the course, students will be able to

1. Describe language translation and compiler design constructs.
2. Design and develop lexical analyzer and parser.
3. Apply optimization principles for generating code
4. Describe storage allocation strategies for memory allocation

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SECTION-I

Unit 1 - Introduction to Compiling (03)

Introduction, Compilers, Phases of a compiler, Compiler construction tools

Unit 2 - Lexical Analysis (07)

Role of a Lexical analyzer, Input buffering, Specification and recognition of tokens, Finite automata implications, Designing a lexical analyzer generator

Unit 3 - Syntax Analysis (10)

Role of Parser, Writing grammars for context free environments, Top-down parsing, Recursive descent and predictive parsers (LL), Bottom-Up parsing, Operator precedence parsing, LR parsers, SLR parsers, LALR parsers.

Unit 4 - Syntax Directed Translation (08)

Syntax directed definitions, construction of syntax tree, Bottom-up evaluation of S-attributed definitions, L-attributed definitions, Top-down translation of inherited attributes, Bottom-up evaluation of inherited attributes, Analysis of syntax directed definitions.

SECTION-II

Unit 5 - Run Time Environments (05)

Source language issues, storage organization and allocation strategies, Parameter passing, Symbol table organizations and generations, Dynamic storage allocations

Unit 6 - Intermediate Code Generation (07)

Intermediate languages, declarations, Assignment statements, Boolean expressions, case statements Back patching, procedure calls, Back patching, procedure calls

Unit 7 - Code Generation (08)

Issues in design of a code generator and target machine, Run time storage management, Basic blocks and flow graphs, Next use information and simple code generator, Issues of register allocation, Assignment and basic blocks, Code generation from DAG and the dynamic code generation algorithm

Unit 8 - Code Optimization (08)

Sources of optimization, Peephole optimization and basic blocks, loops in flow graphs, Data flow analysis and equations, code improving transformation and aliases, Data flow analysis and algorithms, symbolic debugging of optimized code

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Internal Continuous Assessment (ICA) :

ICA shall consist of minimum 10 practical assignment problems.

1. Generate the grammar for 'C' language.
2. Implement the lexical analyzer for simple 'C' language.
3. Implement the recognizer for given transition diagram.
4. Implement the top-down parsing using recursive decent parsing technique.
5. Implement the shift- reduce parser.
6. Implement the operator precedence parser.
7. Implement the LL(1) parser for the language.
8. Generate the symbol table for language.
9. Generation of 3- address code for language.
10. Implement the code optimization technique on the code produced in 10.
11. Generation of target code for given 3-address code.
12. Use of free open source software to practice the parsing example.

Text Books:

1. Compilers - Principles, Techniques and Tools, A.V. Aho, R. Shethi and J.D. Ullman (Pearson Education)
2. Compiler Construction, Dhamdhere (Mc-Millan)
3. Principles of Complier Design- V.Raghavan (Mc Grawhill Education) (2nd edition)

Reference books:

1. Compiler Construction, Principles & Practice – Ken Louden (Cengage Learning)
2. Compiler Design in C,– Allen I. Holub (PHI / Pearson Education)
3. Compiler Construction: An advance course- Manish Kumar Jha (Dhanpat Rai) (3rd Edition)

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Final Year B.Tech. (COMPUTER SCIENCE & ENGINEERING)
SEMESTER - I
CS413A: PROFESSIONAL ELECTIVE – II : BUSINESS INTELLIGENCE

Teaching Scheme	**Examination Scheme**
Lectures : 3 Hours /week, 3 credits	ESE : 70 Marks
Practical: 2 Hours/Week, 1 Credit	ISE – 30 Marks
	ICA – 25 Marks

COURSE OUTCOME:

At the end of the course, student will be able to

1. Describe the basic components of BI environment.
2. Apply data mining techniques for data analysis.
3. Use ETL and BI tools for the decision support system.
4. Describe various applications of Business Intelligence.

SECTION – I

Unit 1 : Introduction to Business Intelligence (08)

Effective and timely decisions, role of mathematical models, BI architectures, ethics on BI. Introduction to data warehouse, architecture, OLAP

Unit 2 : Decision Support System (07)

Representation of decision making system, evolution of information system, definition and development of decision support system, mathematical models for decision making

Unit 3 : Analysis of Data Mining (08)

Definition and applications of data mining, data mining process, analysis methodologies, data preparation, data validation, data transformation, data reduction, data exploration, Univariate analysis, Bivariate analysis, Multivariate analysis.

SECTION – II

Unit 4 : Machine learning and Data analysis (06)

Regression, simple and multiple regression, validation of regression models, time series, evaluating and analysis of time series, exponential smoothing models, autoregressive models

Unit 5 : Data mining Techniques for BI (08)

Classification and its problems, evaluating classification models, classification trees, Bayesian methods, neural networks, structure of association rules, Apriori algorithm, general association rules, clustering methods, partition methods and hierarchical methods

Unit 6 : Business Intelligence Applications (08)

Marketing models: Relational marketing, Salesforce management, Business case studies, supply chain optimization, optimization models for logistics planning, revenue management system, Logistics business case studies

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Internal Continuous Assessment (ICA) :

ICA Shall be continuous process based on Student's performance in - class tests, assignments, homework, subject seminars, quizzes, laboratory books and their interaction during theory.

Text Book:

1. Business Intelligence Data mining and optimization for Decision making by Carlo Vercellis, ISBN:978-81-265-4188-1, Wiley Publication
2. Data Mining and Business Intelligence by S.K. Shinde and Uddagiri Chandrashekhar

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Reference Books:

1. Data Warehousing in the Real World - Anahory & Murray, Pearson Edt.
2. Data Warehousing Fundamentals - Ponniah [Wiley Publication]

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Final Year B.Tech. (COMPUTER SCIENCE & ENGINEERING)
SEMESTER - I
CS413B : PROFESSIONAL ELECTIVE II : DATA MINING

Teaching Scheme	**Examination Scheme**
Lectures : 3 Hours /Week, 3 Credits	ESE – 70 Marks
Practical : 2 Hours/Week, 1 Credit	ISE – 30 Marks
	ICA – 25 Marks

COURSE OUTCOMES:

At the end of this course, students will be able to

1. Examine the types of the data to be mined for a particular application.
2. Apply preprocessing statistical methods for any given raw data.
3. Select and apply proper data mining algorithms to build analytical applications
4. Comprehend the roles that data mining plays in various fields and manipulate different data mining techniques.
5. Demonstrate and apply a wide range of Clustering, Classification and association rule mining algorithms.

SECTION- I

UNIT 1: Introduction (3)

Why data Mining, What is Data Mining?, Basic data mining tasks, What kind of Data can be mined, What kinds of Patterns can be mined?, technological support for data mining, target applications of data mining, major issues in data mining, KDD process ,Data mining Vs Knowledge Discovery in Databases.

UNIT 2: Data Preprocessing (3)

Need to Preprocess the data, major tasks in Data Preprocessing, Data Cleaning, Data integration, Data Reduction, Data Transformation and Data Dicretization.

UNIT 3: Mining Frequent Patterns, Associations, and Correlations: Basic and advanced Concepts (6)

Basic Concepts, Frequent Itemset Mining Methods, Which Patterns Are Interesting? – Pattern Evaluation Methods, Pattern Mining: A Road Map, Pattern Mining in Multilevel, Multidimensional Space , Constraint-Based Frequent Pattern Mining, Pattern Exploration and Application.

UNIT 4: Classification (8)

Issues in Classification, Statistical-Based Algorithms: Regression, Bayesian Classifiers. Distance Based Algorithms: K -Nearest Neighbors Classifiers, Decision Tree Based Algorithms.

SECTION II

UNIT 5: Cluster Analysis- Basic Concept and Methods (6)

Cluster Analysis : What is Cluster Analysis?, Requirements for Cluster Analysis, Overview of Basic Clustering Methods, **Partitioning Methods**: k-Means, k-Medoids.

Hierarchical Methods : Agglomerative Algorithms and Divisive Clustering, BIRCH: Multiphase Herarchical Clustering Using Clustering Feature Trees, Evaluation of Clustering.

UNIT 6: Association Rules (6)

Introduction, Large Item sets, Basic Algorithms: Apriori Algorithm, Sampling Algorithm, Partitioning Algorithm, Parallel and Distributed Algorithms, Comparing Approaches, Incremental Rules, Advanced association rule-Techniques, Measuring the quality of rules.

UNIT 7: Web Mining **(4)**

Introduction, Web mining: Introduction, web content mining, web usage mining, web structure mining, web crawlers.

UNIT 8: Outlier Detection **(4)**

Outliers and Outlier Analysis, Outlier Detection Methods, Statistical Approaches, Clustering-Based Approaches, Classification-Based Approaches.

Internal Continuous Assessment (ICA) :

Minimum 10 to 12 assignment based on above topics.

Text Books:

1. Margaret H. Dunham, "DATA MINING Introductory and Advanced Topics", PEARSON (Units 4,6)
2. Han, Kamber, Pei, "DATA MINING Concept and Techniques", 3rd Edition,ELSEVIER (Units 1,2,3,5,8)
3. Tan, Vipin Kumar, Steinbach , "Introduction to Data Mining" , PEARSON (Unit 3)
4. G. K. Gupta , \Introduction to Data mining with case studies", PHI, second edition (Unit 7)

Reference Books:

1. Galit Shmueli, Nitin Patel, Peter Bruce, "Data mining For Business intelligence" Wiley Student Edition.
2. M.Berry and G. Linoff, "Mastering Data Mining", Wiley Student Edition

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Final Year B.Tech. (COMPUTER SCIENCE & ENGINEERING)
SEMESTER - I
CS413C : PROFESSIONAL ELECTIVE-II : DISTRIBUTED SYSTEMS

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hours/Week, 3 Credits	ESE: 70 Marks
Practical : 2 Hours/Week, 1 Credit	ISE: 30 Marks
	ICA : 25 Marks

COURSE OUTCOME:

At the end of the course, student will be able to

1. Describe the basics of distributed systems and middleware.
2. Design and simulate distributed system software modules using various methods, strategies, and techniques presented in the course that fulfils requirements for desired properties.
3. Apply principles of distributed systems in a real world setting across multidisciplinary areas.
4. Apply knowledge of Hadoop Distributed File system, its architecture and working for active research at the forefront of these areas.

SECTION – I

Unit 1: Fundamentals (4)

Fundamentals of OS, What is Distributed System? Evolution of Distributed Computing System, Distributed Computing System Models, Distributed Computing Gaining Popularity, Issues in Designing Distributed System, Introduction to Distributed Computing Environment, Protocols for Distributed Systems – FLIP and VMTP

Unit 2: Message Passing (6)

Introduction, Desirable features of Good Message-Passing System, Issues in IPC by Message Passing, Synchronization, Buffering, Message Passing Interface, Multidatagram Messages, Process Addressing, Failure Handling, Group communication, Case Study: RMI, CORBA

Unit 3: Remote Procedure Calls (6)

Introduction, The RPC Model, Transparency of RPC, Implementing RPC mechanism, Stub Generation, RPC Messages, Marshalling Arguments and Results, Server Management, Parameter-Passing Semantics, Call Semantics, Communication Protocols for RPCs, Client-Server Binding, Exception Handling, Security

Unit 4: Synchronization in Distributed Systems (6)

Introduction, Process Migration, Threads, Clock Synchronization, Event Ordering, Election algorithms, Distributed Consensus algorithms

SECTION – II

Unit 5: Distributed Mutual Exclusion (5)

Introduction, Classification of Mutual Exclusion Algorithms, Preliminaries, A simple solution toDistributed Mutual Exclusion, Non-Token-Based Algorithms, Lamport's Algorithm, The Ricart-Agrawala Algorithm, Token-Based Algorithms, Suzuki-Kasami's Broadcast Algorithms

Unit 6: Distributed Deadlock Detection (5)

Introduction, Preliminaries, Deadlock handling strategies in Distributed Systems, Issues in Deadlock Detection and Resolution, Control organizations for distributed deadlock detection, Centralized deadlock detection algorithms, Distributed deadlock detection algorithms, Avoidance andPrevention algorithms, Hierarchical deadlock detection algorithms

Unit 7: Distributed File Systems **(6)**

Introduction, Architecture, Mechanisms for building Distributed File System, Design issues, Log-Structured file systems, Case studies- Google FS

Unit 8: Distributed Shared Memory **(6)**

Introduction, Architecture and Motivation, Algorithms for implementing DSM, Memory Coherence, Coherence Protocols, Design issues, Case studies-Linda

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Text Books:

1. Distributed O.S. Concepts and Design, P.K.Sinha, PHI (Unit 1, 2, 3, 4)
2. Advanced Concepts in Operating Systems, Mukesh Singhal & N.G.Shivaratri, TMH (Unit 5, 6, 7, 8)
3. Distributed Computing, Sunita Mahajan, Seema Shah, OXFORD University Press (Unit 1, Case studies 7, 8)

Reference Books:

1. Distributed System Principles and Paradigms, Andrew S. Tanenbaum, 2nd edition, PHI
2. Distributed Systems, Colouris, 3rd Edition

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Final Year B.Tech. (COMPUTER SCIENCE & ENGINEERING)
SEMESTER - II

CS413D : PROFESSIONAL ELECTIVE-II : MANAGEMENT INFORMATION SYSTEM

Teaching Scheme	**Examination Scheme**
Lectures : 3 Hours /Week, 3 Credits	ESE – 70 Marks
Practical : 2 Hours/Week, 1 Credit	ISE – 30 Marks
	ICA – 25 Marks

COURSE OUTCOME:

1) Student can elaborate basic infrastructure and strategies used in information systems.
2) Student can apply professional ethical codes of conduct as appropriate to industry and organizational environments
3) Students can design information systems using principles of Communication Technologies.
4) Students will be able to develop secure information systems.

SECTION-I

Unit 1 - Information Systems in Global Business Today (09)

The Role of Information Systems in Business Today,
How information systems are transforming business, What is new in information system.
Business Processes and Information systems, Systems for collaboration and social business, Tools and technologies for collaboration and social business

Unit 2 - Information Systems, Organizations, and Strategy (08)

Organizations and it's features, How Information Systems Impact on Organizations, Competitive strategies using information systems, Challenges posed by strategic information systems

Unit 3 - Ethical and Social Issues in Information Systems (08)

Understanding Ethical, Social, political issues raised by information systems, principles for conductin ethical decisions, Contemporary information systems technology. Challenges to the protection individual privacy and intellectual property.

SECTION-II

Unit 4 - IT Infrastructure and Emerging Technologies (08)

IT Infrastructure, Infrastructure Components, Contemporary Hardware Platform Trends, Contemporary Software Platform Trends, Management Issues

Unit 5 - Foundations of Business Intelligence: Databases and Information Management (10)

Organizing Data in a Traditional File Environment, Major Capabilities of Database Management Systems, Using Databases to Improve Business Performance and Decision Making, Managing Data Resources, Telecommunications, the internet, and Wireless Technology: Principles Components of Telecommunications Network & Ket Networking Technologies, Different types of networks, principle technologies and standards for wireless networking, communication, internet access.

Unit 6 - Security Management of Information Technology (09)

Introduction, Tools of Security Management, Internetworked Security Defenses, Encryption, Firewalls, Denial of Service Attacks,, E-mail Monitoring, Other Security Measures, security codes, Security Monitors, Fault Tolerant Systems, and Disaster Recovery, System Control & Audits, Information Systems Controls, Auditing IT Security.

Unit 7 - E-commerce: Digital Markets, Digital Goods (08)

Features of e-commerce. Digital Markets, Digital Goods**,** principles ecommerce business and revenue models, e-commerce transformed marketing, e-commerce business-to-business transaction, Role of M-commerce in business & its applications, issues related building e-commerce.

Text Book:

1. Management Information Systems : Managing the Digital Firm, 15th Edition by Kenneth C. Laudon and Jane Laudon, Pearson Education
2. Management Information Systems: James A O'Brien, George M Marakas, Ramesh Behi. (Tenth Edition), McGraw Hill Publication.

Reference Books:

1. Information Technology for Management: Transforming Organizations in the Digital Economy, Efraim Turban,6th Edition, Wiley Edition
2. Management Information Systems: Shubhalakshmi Joshi, Smita Vaze, Biztantra

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Final Year B.Tech. (COMPUTER SCIENCE & ENGINEERING)
SEMESTER - I

CS414A : PROFESSIONAL ELECTIVE-III : HUMAN COMPUTER INTERACTION

Teaching Scheme	**Examination Scheme**
Lectures : 3 Hours /Week, 3 Credits	ESE – 70 Marks
Practical : 2 Hours/Week, 1 Credit	ISE – 30 Marks
	ICA – 25 Marks

COURSE OBJECTIVES:

1. Know how to analyze and consider user's need in the interaction system
2. Understand various interaction design techniques and models
3. Understand the theory and framework of HCI
4. Understand and analyze the cognitive aspects of human – machine interaction

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COURSE OUTCOME :

At the end of this course, students will be able to

1. To develop good design for human machine interaction system
2. Analyze the user's need in interaction system
3. To design new interaction model to satisfy all types of customers
4. Evaluate the usability and effectiveness of various products
5. To know how to apply interaction techniques for systems

SECTION-I

Unit 1 **(5)**

Introduction, The human, The computer, The interaction, Paradigms, Usability of Interactive Systems, Guidelines, Principles, and Theories.

Unit 2 **(5)**

Design Process - Interaction design basics, HCI in the software process, Design rules, Implementation support, Evaluation techniques, Universal design, User support

Unit 3 **(5)**

Models and Theories0 Cognitive models, Socio-organizational issues and stakeholder requirements, Communication and collaboration models, Task analysis, Dialogue notations and design, Models of the system, Modelling rich interaction

Unit 4 **(6)**

Interaction Styles- Direct Manipulation and Virtual Environments, Menu Selection, Form Filling and Dialog Boxes, Command and Natural Languages, Interaction Devices, Collaboration and Social Media Participation

SECTION-II

Unit 5 **(5)**

Design Issues- Quality of Service, Balancing Function and Fashion, User Documentation and Online Help, Information Search, Information Visualization

Unit 6 **(5)**

Outside the Box- Group ware, Ubiquitous computing and augmented realities, Hypertext, multimedia, and the world wide web Text

Unit 7 **(6)**

Information Search and visualization - Introduction, Search in Textual Documents and Database Querying, Multimedia Document Searches, Advanced Filtering and Search Interfaces, Information Visualization, OAI Model for Website Design.

Unit 8 **(5)**

Hypertext, Multimedia and the world wide web, Introduction, Understanding hypertext, Web technology and issues, Static web content, dynamic web content

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Internal Continuous Assessment (ICA) :

Minimum 10 to 12 assignments based on above topics.

Text Books :

1. Human Computer Interaction, Alan Dix, Janet Finlay, Gregory Abowd and Russel Beale, Prentice Hall Publication
2. Designing the User Interface, Ben Shneiderman, 4th Edition, Pearson Education, 2008, ISBN 81- 7808-262-4

Reference Book :

1. Human Computer Interaction, Dan R. Olsen, Cengage Learning, India Edition, ISBN No.978-81-315-1137-4
2. The Essential Guide to User Interface Design, Second Edition, An Introduction to GUI Design Principles and Techniques, Wilbert O. Galitz, Wiley India (P) Ltd., ISBN : 81- 265-0280-0
3. The Essential of Interaction Design, Alan Copper, Robert Reimann, David Cronin, Wiley India (P) Ltd., ISBN : 978-81-265-1305-5

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SEMESTER - I
CS414B : PROFESSIONAL ELECTIVE – III : BIG DATA ANALYTICS

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hours /Week, 3 credits	ESE - 70 Marks
Practical: 2 Hour/Week, 1 credit	ISE - 30 marks
	ICA - 25 marks

COURSE OUTCOMES:

At the end of this course, students will be able to

1. Comprehend limitations of conventional DBMS and recognize need for Big Data Analytics.
2. Compare Big data processing technologies and choose appropriate one for a given scenario.
3. Use Various Big data technologies for Big data analytics
4. Write Map Reduce program to process Big Data.

SECTION – I

Unit 1: Introduction to Types of Digital Data (4)

Classification of Digital Data, Structured Data, Sources of structured data, Ease with Structured data, Semi-Structured data, sources of semi-structured data, Unstructured data, sources of unstructured data, Issues with terminology, Dealing with unstructured data, Place me in the basket.

Unit 2: Introduction to Big Data (4)

Big data, What is big data? Why big data?, Other characteristics of data which are not definitional traits of big data, Challenges with big data, Big data stack, Exercises - Puzzle, Fill in the blanks.

Unit 3: Big Data Analytics (6)

Big Data Analytics, Analytics 1.0, Analytics 2.0, Analytics 3.0, Traditional BI vs. Big Data Environment, Terminologies used in Big Data Environment, Big Data Technology Landscape, NoSQL Databases, NoSQL Vs. RDBMS, NewSQL, Hadoop, Hadoop 1.0 vs. Hadoop 2.0, Exercises, Data Science is multidisciplinary, Data Scientist - Your new best friend.

Unit 4: Introduction to Hadoop (10)

Introducing Hadoop, Why not RDBMS, Distributed Computing Challenges, A Brief History of Hadoop, Hadoop Overview, Hadoop Components, High Level Architecture of Hadoop, Hadoop Distributed File System, HDFS Architecture, Daemons Related to HDFS, Working with HDFS Command, Special Features of Hadoop, Processing Data With Hadoop, Introduction How Map Reduce Works, Map Reduce Example, Word Count Example using Java Managing Resources and Applications with YARN Introduction, Limitation of Hadoop 1.0, Hadoop 2: HDFS, Hadoop 2: YARN, Interacting with Hadoop EcoSystem Hive, Pig, HBase, Sqoop.

SECTION – II

Unit 5: Introduction to MongoDB (4)

Recap of NoSQL databases, MongoDB – CRUD, MongoDB- Arrays, Java Scripts, Cursors, Map Reduce Programming, Aggregations.

Unit 6: Introduction to Cassandra (4)

Features of Cassandra, CQLSH - CRUD, Collections, Counter, List, Set, Map, Tracing.

Unit 7: Introduction to Hive (8)

What is Hive? History of Hive and Recent Releases of Hive, Hive Features, Hive Integration and Work Flow, Hive Data Units, Hive Architecture, Hive Primitive and Collection Data Types, Hive File Format, Hive Query Language(HQL)–Statements – DDL,DML. Hive Partitions – Bucketing, Views, Sub Query, Joins, Hive User Defined Function, Aggregations in Hive, Group by andHaving, Serialization and Deserialization, Hive Analytic Functions.

Unit 8: Introduction to Pig **(4)**

Introducing Pig, History and Anatomy of Pig, Pig on Hadoop, Pig Philosophy, ETL Processing, Pig Latin Overview, Word count example using Pig.

Internal Continuous Assessment (ICA) :

- Objective of assignments should be to test students understanding and assess their ability to putinto practice the concepts and terminologies learned.
- Assignments must be of nature, which require students to identify the use case scenarios forusing technologies mentioned in syllabus.
- It should consist of the 08-10 practical based on following guidelines
  1. Basic big data operations using NumPy, SciPy & Pandas.
  2. Implementation of Plotting, Filtering and Cleaning a CSV File Data Using NumPy & Pandas.
  3. Linear Regression using WEKA.
  4. Implement multidimensional visualization by adding variables such as color, size, shape, andlabel by using Tableau.
  5. Apply Filters on Dimensions and Measures for any dataset using tableau.
  6. Apply K-means Clustering on iris dataset in tableau.
  7. Integrate R with tableau for data visualization.
  8. Simple MongoDB and its CRUD Operations
  9. Performing import, export and aggregation in MongoDB.
  10. Performing CRUD operations using Cassandra.
  11. Store the login details of the user such as UserID and Password. The information stored shouldexpire in a day's time using time to live (TTL).
  12. Map-Reduce Programming examples
  13. Partitioning and processing using Hive.
  14. Perform group by, order by, sort by, cluster by, distribute by queries using Hive.
  15. Find out frequency of each word (word count) using pig.

Text Book :

1. Big Data and Analytics, Seema Acharya, Subhashini Chellappan, - Wiley India Pvt. Ltd.
2. Hadoop: The Definitive Guide, 3rd Edition, Tom White , - O'reilly Media.
3. Programming Hive, Edward Rutherglen, Dean Wampler, Jason Rutherglen, Edward Capriolo. - O'reilly Media.
4. The Definitive Guide to MongoDB: A Complete Guide to Dealing with Big Data Using MongoDB (Definitive Guide Apress) 2e by David Hows, Eelco Plugge, Peter Membrey, Tim Hawkins.
5. Programming Pig, by Alan Gates - O'reilly Media.
6. Cassandra: The Definitive Guide, Eben Hewitt - O'reilly Media.

Reference Book :

1. Big Data For Dummies, Judith Hurwitz, Alan Nugent, Dr. Fern Halper, Marcia Kaufman, Wiley Brand.
2. Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses (Wiley CIO), Michael Minelli, Michele Chambers, Ambiga Dhiraj : John Wiley & Sons.
3. Mining of Massive Datasets, Anand Rajaraman, Jure Leskovec, Jeff rey D. Ullman, Cambridge University Press.
4. Hadoop in Action, Chuck Lam, Dreamtech Press, ISBN : 978-81-7722-813-7.

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Final Year B.Tech. (COMPUTER SCIENCE & ENGINEERING)

SEMESTER - I

CS414C : PROFESSIONAL ELECTIVE – III : INFORMATION RETRIEVAL

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hours /Week, 3 credits	ESE - 70 Marks
Practical: 2 Hour/Week, 1 credit	ISE - 30 marks
	ICA - 25 marks

Course Objectives:

1. To acquaint students to information retrieval process and information models.
2. To evaluate the performance of information retrieval systems.
3. To search text using sequential searching &pattern matching algorithms and using various indexing structures.
4. To learn difference in data retrieval, information retrieval and multimedia retrieval systems.
5. To learn different components of search engine and ranking algorithms.

Course Outcomes:

Students will be able to

1. Perform text operations, build classic information retrieval models, and evaluate the performance of information retrieval algorithms.
2. Formulate various types of queries and perform query operations.
3. Speed up retrieval result of text retrieval using indexing, searching techniques.
4. Model, index and search documents containing multimedia objects.
5. Search web using web search engines & web directories and use ranking algorithms to rank web pages.

SECTION – I

Unit 1 : Introduction **(07)**

Information retrieval vs. data retrieval, User Task, Logical View of the documents,Information retrieval process, Text Operations: Introduction, document pre-processing, Document Clustering, Text Compression, Comparing text compression techniques

Unit 2 : Information Retrieval Models& Performance Evaluation **(08)**

A Formal Characterization of IR Models, Classic Information Retrieval, Models for Browsing, Recall and Precision, Alternative measures

Unit 3 : Query Languages and Query Operations **(07)**

Keyword based querying, Pattern Matching, Query operations: User relevance feedback, Automatic local analysis, Automatic global analysis

Section – II

Unit 4: Indexing and Searching **(10)**

Inverted Files and Indices for text search, Boolean Queries, Sequential searching, Pattern Matching

Unit 5: Multimedia IR - Models and Languages **(8)**

Data Modelling & Query Languages, Indexing and searching

Unit 6: Searching the Web **(5)**

Search Engine architecture, User interfaces, Ranking,Web Crawling, Browsing, Metasearchers, Searching using Hyperlinks

Text Book -

1. Modern Information Retrieval - Ricardo Baeza-Yates and Berthier Ribeiro-Neto - Pearson Education (Low Price Edition)

Reference:

1. Introduction to Information Retrieval, Christopher D. Manning, Prabhakar Raghavan and Hinrich Schütze, Cambridge University Press. 2008.(http://nlp.stanford.edu/IR-book/information-retrieval-book.html)
2. Information Storage and Retrieval- Robert R Korthage, WILEY-INDIA

Internal Continuous Assessment (ICA):

- It should consist of the 08-10 practical based on following guidelines

1. Study of different search engines
2. Perform text operation and create logical Views of documents
3. Implementation of IR system using Boolean model.
4. Implementation of IR system using Vector model
5. Implementation of IR system using various types of queries.
6. Searching using inverted index (construction & Searching)
7. Sequential searching using Brute Force Algorithm
8. Sequential searching using Knuth-Morris-Pratt Algorithm
9. Sequential searching using Boyer- Moore Algorithm
10. Sequential searching using BDM (Backward DAWG Matching) Algorithm.
11. Sequential searching using Shift-OR Algorithm
12. Approximate matching using dynamic Programming
13. Implementation of Multimedia Information Retrieval System

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Text Book -

1. Modern Information Retrieval - Ricardo Baeza-Yates and Berthier Ribeiro-Neto - Pearson Education (Low Price Edition)

Reference:

1. Introduction to Information Retrieval, Christopher D. Manning, Prabhakar Raghavan and Hinrich Schütze, Cambridge University Press. 2008.(http://nlp.stanford.edu/IR-book/information-retrieval-book.html)
2. Information Storage and Retrieval- Robert R Korthage, WILEY-INDIA

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Final Year B.Tech. (COMPUTER SCIENCE & ENGINEERING)
SEMESTER - I
CS415 : DevOps

Teaching Scheme	**Examination Scheme**
Lectures: 2 Hours /Week, 2 credits	ISE - 25 Marks
Practical: 2 Hour/Week, 1 credit	POE – 50 marks
	ICA - 25 marks

Course Objectives:

1. To introduce DevOps terminology, definition & concepts
2. To understand the different Version control tools.
3. To understand the concepts of Continuous Integration / Continuous Deployment)
4. To get acquainted with concept of docker and kubernets
5. To Illustrate the benefits and drive the adoption of cloud-based Devops tools to solve real world problems

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Course Outcomes:

At the end of the course, students will be able to

1. Apply DevOps principles to meet software development requirements.
2. Apply CI/CD using tools such as Jenkins, Git and Maven
3. Analyze the Containerization ofimages and deployment of applications over Docker
4. Collaborate and adopt Devops in real-time projects.

SECTION - I

Chapter1:Introductionto Devops **05**

Devops Essentials - Introduction To AWS, GCP, Azure - Version control systems: Git and Github, Introduction to GitLab, Introduction to BitBucket

Chapter 2 : Compile and Build Using Maven **05**

Introduction, Installation of Maven, POM files, Maven Build lifecycle, Build Phases (compile build,test, package) Maven Profiles, Maven Repositories (local, central, global), Maven plugins, Maven Create and Build Artifacts, Dependency Management

Chapter 3 : Continuous Integration Using Jenkins **06**

Introduction to CI/CD, Install & Configure Jenkins,Jenkins Architecture Overview, Build Jobs and Configurations, Jenkins Plugins, Jenkins Integration with other Tools

SECTION – II

Chapter 4 :Containerization with Docker **05**

Introduction to Containerization, Introduction to Docker, Understanding Images and Containers, Working with Containers.

Chapter 5 : Kubernetes **05**

Introduction to Kubernetes, Need of Kubernetes, Kubernetes Architecture, Setup Kubernetes, Kubernetes Concepts

Chapter 6 : Building Devops Pipelines Using any Cloud Platform **05**

Create Github Account, Create Repository, Create Organization, Create a New Pipeline, Build a Sample Code

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Text Books :

1. DevOps Tools from Practitioner's Viewpoint. Deepak Gaikwad, Viral Thakkar,. Wiley publications.
2. Jenkins, The Definitive Guide, John Ferguson Smart,O'Reilly Publication.

Reference Books:

1. The DevOps2.1 ToolKit : Docker Swarm, Building, Testing, Deploying, and Monitoring services inside Docker Swarm clusters by Viktor FarcicPackt Birmingham, Mumbai.
2. MariotTsitoara, "Ansible 6. Beginning Git and GitHub: A Comprehensive Guide to Version Control, Project Management, and Teamwork for the New Developer", Second Edition, 2019.
3. https://maven.apache.org/guides/getting-started/

Internal Continuous Assessment (ICA):

ICA shall include Minimum 8 to 10 practical assignments based on the syllabus topics.

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SEMESTER - I

CS417 : PROJECT PHASE I

Teaching Scheme	**Examination Scheme**
2 Practicals/Week, 1 Credit	**ICA : 25 Marks**
	ESE : 25 Marks

Introduction :

Project based learning is a paradigm which is becoming time-honored now a days. To keep abreast with this, Project course is included in the curriculum which is spread over both semesters of final year. For this course, students carry out a project as a team that allows them to demonstrate their abilities and to develop skills within their chosen area of interest. Hardware realization as well software projects with focus on design and research aspects are accepted. Also communicating effectively, both in oral and written form are an important skill for engineering graduates in many different contexts. This course also aims to foster these skills.

Course Prerequisite:

Student shall have technical competency as well as behavioral facet to carry project as a part of a team. Student shall have an adept knowledge of hardware and software architecture and associated programming skills. Student shall also possess necessary technical report writing skills, presentation skills.

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course objectives :

1. Explore project identification process and carryout literature survey for real world problem.
2. Evaluate alternative approaches, and justify the use of selected tools and methods.
3. Consider relevant social, ethical and legal issues.
4. Give an exposure to planning and designing a project.
5. Enhance team working and leadership skills.
6. Enhance presentation and technical documentation skills.

Course outcomes :

1. Study and select problem of societal relevance.
2. Select an appropriate solution design with due consideration for society.
3. Carry out impact analysis for environment and sustainability consideration(s).
4. Design a system using software engineering techniques and modern tools.
5. Engage in teamwork and communicate effectively, while observing professional ethics.

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SEMESTER - I

SL41A : SELF LEARNING : UI / UX Technology

Examination Scheme

1 Credit **ESE : 50 Marks**

Introduction:

Web Technology alludes to the different tools and techniques that are used during the process of communication between various sorts of gadgets over the web or the internet. This course includes different technologies which help to build the front end and backend for websites and web applications.

Course outcomes:

At the end of course, students will be able to

1. Design web pages using HTML, CSS and JavaScript
2. Analyze client/server-sidescripting technologies to meet requirements of web application and choose an appropriate one.
3. Develop a web application using client / server-side scripting technologies for a given problem.

SECTION-I

Unit 1: UI Design

HTML5: Features of HTML5, designing frontend using HTML5, Designing Graphics using Canvas API, Web storage (Session and local storage).

CSS3: Features of CSS3,Styling front end usingCSS3

JavaScript: Syntax and Semantics of JavaScript, Document Object Model, Event Handling, Browser Object Model, Form handling, and validations. Object-Oriented Techniques in JavaScript.XML.

JSON: Introduction to AJAX. Introduction to JQuery and D3JS, JavaScript in Browser.

Unit 2 : REACTJS

Introduction, Fundamentals of ReactJS, Working with Lists and Conditionals, Styling React Components and Elements, Debugging React apps, Understanding HTTP Requests in React in the context of AJAX

Unit 3 : ElectronJS

Introduction, Fundamentals of Electron JS, Creating cross-platform applications, Deployment of ElectronJS application

SECTION-II

Unit 4 : RESTful WebServices

REST and the Rebirth of HTTP, RESTful Architectural Principles, The Object Model,Model the URIs, Defining the Data Format, Assigning HTTP Methods, JAX-RS

Unit 5 : Introduction to Server-side JS Framework–Node.js

Introduction-What isNode JS, Architecture, Feature of Node JS, Installation and setup, creating web servers with HTTP (Request & Response), Event Handling, GET & POST implementation - Connectto NoSQL Database using NodeJS, Implementation of CRUD operations.

Unit 6 :PHP and MySQL

Introduction to PHP5 and PHP6, variables and constants, program flow, functions, arrays and files and directories, Forms and Databases, integration with MySQL applications on PHP

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SEMESTER - I

SL41B : SELF LEARNING : Software Licensing and Practices

Examination Scheme

1 Credit **ESE : 50 Marks**

Course Outcomes:

1. Students will develop basic understanding of software licensing models and practices adopted in software development and distribution.
2. Students will be able to analyze and choose appropriate software licensing model and strategy for their own softwares developed.

Unit 1 - Introduction

Basic Principles of Copyright Law, Contract and Copyright, Open Source Software Licensing, Issues, with Copyrights and Patents, The Open Source Definition, Warranties.

Unit 2 - Software Licenses

The MIT License, The BSD License , The Apache License, v1.1 and v2.0, The Academic Free License, Application and Philosophy of MIT and BSD Licenses, GNU General Public License, GNU Lesser General Public License, The Mozilla Public License, Application and Philosophy of GNU GPL and GNU LGPL.

Unit 3 - Creative Commons Licenses and Non Open Source Software Licenses

Creative Commons Licenses, Classic Proprietary License, Sun CommUnity Source License, Microsoft Shared Source Initiative.

Unit 4 - Legal Impacts of Open Source and Free Software Licensing

Entering Contracts, Statutory Developments Related to Software Contracts, The Self Enforcing Nature of Open Source and Free Software Licenses, The Global Scope of Open Source and Free Software Licensing, The "Negative Effects" of Open Source and Free Software Licensing, Community Enforcement of Open Source and Free Software Licenses, Compatible and Incompatible Licensing: Multiple and Cross Licensing.

Text Books:

1. Intellectual Property and Open Source: A Practical Guide to Protecting Code - By Van Lindberg, Oreily Media.
2. Understanding Open Source and Free Software Licensing - By Andrew M. St. Laurent, Oreily Media. (e-Resource available at : http://oreilly.com/openbook/osfreesoft/book/index.html)

Reference Books:

1. Essentials of Licensing Intellectual Property - By Alexander I. Poltorak and Paul J. Lerner, John Wiley Publication.

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Final Year B.Tech. (COMPUTER SCIENCE & ENGINEERING)

SEMESTER - I

CS417 : VOCATIONAL TRAINING

Teaching Scheme	**Examination Scheme**
1 credit	ICA - 25 marks

The student should attend vocational training arranged at Industry or Institute and should complete a mini project on the technology on which training was given. A report regarding satisfactory completion of the training should be submitted to the college by competent authority from Industry / Institute. The evaluation of Term Work will be carried out by a panel of Examiners decided by the institute.

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Final Year B.Tech. (COMPUTER SCIENCE & ENGINEERING)

SEMESTER - II

CS421 : PROJECT PHASE II

Teaching Scheme
Practical: 20 Hours/Week, 10 Credit

Examination Scheme
POE – 100 Marks
ICA – 100 Marks

Introduction:

Project based learning is a paradigm which is becoming time-honored now a days. To keep abreast with this, Project course is included in the curriculum which is spread over both semesters of final year. For this course, students carry out a project as a team that allows them to demonstrate their abilities and to develop skills within their chosen area of interest. Hardware realization as well software projects with focus on design, development and research aspects are accepted. Also communicating effectively, both in oral and written form are an important skill for engineering graduates in many different contexts. This course also aims to foster these skills.

Course objectives:

1. Apply programming skills to bring out solutions to global, economic, environmental and societal problems.
2. Apply engineering and management principles to achieve project goal.
3. Implement project using latest tools and technologies
4. Expose students to test and analyze the modules of planned project.
5. Enhance team working and leadership skills
6. Enhance presentation and technical documentation skills

Course outcomes:

1. Analyze technological alternatives for developing IT solution with relevance to environment and sustainability.
2. Explore state-of-art tools and FOSS alternatives to develop solutions meeting societal and professional needs.
3. Develop a system through Software Development Life Cycle.
4. Demonstrate ability to engage in teamwork while observing professional ethics.
5. Write and present a well organized project report
6. Inculcate habit of self study and lifelong learning.
