VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

ACCREDITED BY NAAC WITH A++ GRADE

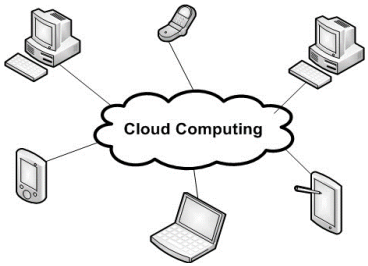
IBRAHIMBAGH, HYDERABAD-500 031

Approved by A.I.C.T.E., New Delhi and
Affiliated to Osmania University, Hyderabad-07

Sponsored by

VASAVI ACADEMY OF EDUCATION
Hyderabad

SCHEME OF INSTRUCTION AND SYLLABI UNDER CBCS FOR B.E. (IT) VII and VIII Semesters with effect from 2024-2025 (For the batch admitted in 2021-22) (R-21)



DEPARTMENT OF INFORMATION TECHNOLOGY
+91-40-23146050, 23146051
Fax: +91-40-23146090
Website: www.vce.ac.in

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

ACCREDITED BY NAAC WITH A++ GRADE

IBRAHIMBAGH, HYDERABAD-500 031

Vision

Striving for a symbiosis of technological excellence and human values.

Mission

To arm young brains with competitive technology and nurture holistic development of the individuals for a better tomorrow.

Quality Policy

Education without quality is like a flower without fragrance. It is our earnest resolve to strive towards imparting high standards of teaching, training and developing human resources.

DEPARTMENT OF INFORMATION TECHNOLOGY

Vision

To be a center of excellence in the emerging areas of Information Technology.

Mission

- Provide a comprehensive learning experience on the latest technologies and applications.
- Equip the stakeholders with latest technical knowledge and leadership skills with collaboration to become competent professionals.
- Motivate innovation and contribute to the societal issues with human values and professional ethics.

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DEPARTMENT OF INFORMATION TECHNOLOGY

Programme Educational Objectives (PEOs) for IT Program

A Graduate of Information Technology will be able to:

PEO1: Pursue higher studies in multidisciplinary areas with research orientation.

PEO2: Develop core IT competencies aligned with emerging industry trends to become global leaders with ethical values.

PEO3: Engage in continuous learning and address the societal problems with sustainable solutions.

Program Specific Outcomes (PSOs) for IT Program

Our students, upon graduation from the program, will be able to

PSO1: Identify and develop software solutions using programming languages, tools and AI/ML concepts.

PSO2: Design, develop and maintain secure stand-alone, embedded and networked systems.

PSO3: Analyze the architectures of autonomous or semi-autonomous intelligent systems and apply to real-time scenarios.

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Program Outcomes (POs) for IT Program

At the end of the program, the graduates will demonstrate

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 research methods 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 with an 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.

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
SCHEME OF INSTRUCTION AND EXAMINATION (R-21)
B.E. – INFORMATION TECHNOLOGY : SEVENTH SEMESTER (2024 - 2025)

B.E (IT) VII-SEMESTER								
Course Code	**Course Name**	**Scheme of Instruction**			**Scheme of Examination**			
		Hours per week			**Duration in Hrs**	**Maximum Marks**		**Credits**
		L	**T**	**P/D**		**SEE**	**CIE**	
U21PC710IT	Automata Theory and Compiler Design	3	1	-	3	60	40	4
U21PC720IT	Distributed Systems & Cloud Computing	3	1	-	3	60	40	4
U21PC730IT	Cyber Security	3	-	-	3	60	40	3
U21PE7XXIT	Professional Elective - I	3	-	-	3	60	40	3
U21PE7XXIT	Professional Elective – II	3	-	-	3	60	40	3
PRACTICALS								
U21PC711IT	Compiler Design Lab	-	-	2	3	50	30	1
U21PC721IT	Distributed Systems & Cloud Computing Lab	-	-	2	3	50	30	1
U21PE7XXIT	Professional Elective – I Lab	-	-	2	3	50	30	1
U21PE7XXIT	Professional Elective – II Lab	-	-	2	3	50	30	1
U21PW719IT	Project Seminar	-	-	2	-	-	30	1
	Library / Sports / Mentor Interaction	**-**	**-**	**-**	-	**-**	**-**	**-**
Total		**15**	**2**	**10**	**-**	**500**	**350**	**22**
Grand Total		**27**			**-**	**850**		

Professional Elective (Theory and Lab) Courses

Professional Elective – I (Theory)	**Professional Elective – II (Theory)**
U21PE710IT: Digital Image & Video Processing	U21PE750IT: Natural Language Processing
U21PE720IT: Cryptography & Network Security	U21PE760IT: Block Chain
U21PE730IT: Software Testing	U21PE770IT: Agile Software Development
U21PE740IT: Data Mining	U21PE780IT: Data Analytics with Visualization
Professional Elective – I (Lab)	**Professional Elective – II (Lab)**
U21PE711IT: Digital Image & Video Processing Lab	U21PE751IT: Natural Language Processing Lab
U21PE721IT: Cryptography & Network Security Lab	U21PE761IT: Block Chain Lab
U21PE731IT: Software Testing Lab	U21PE771IT: Agile Software Development Lab
U21PE741IT: Data Mining Lab	U21PE781IT: Data Analytics with Visualization Lab

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

AUTOMATA THEORY AND COMPILER DESIGN

SYLLABUS FOR B.E.- VII SEMESTER

L:T:P (Hrs./week):3:1:0	SEE Marks :60	Course Code: **U21PC710IT**
Credits : 4	CIE Marks: 40	Duration of SEE: 3 Hrs

Course Objective:	**Course Outcomes:**
The Objectives of the course:	**At the end of the course student will be able to:**
To introduce the fundamental concepts of formal languages, grammars and automata theory. Introduce the major concepts of language translation and compiler design and impart the knowledge of practical skills necessary for constructing a compiler.	1. Understand the concepts of automata theory and different phases of the complier. 2. Design context free grammars for formal languages and top down parsers. 3. Design bottom up parsers and analyze memory management techniques. 4. Implement semantic rules for specifying the syntax and semantics of programming languages, and also transform an AST into intermediate representation 5. Apply various optimization techniques on the Intermediate Representation. Generate target code from the IntermediateRepresentation.

UNIT 1:

Formal Languages and regular expressions: Introduction, Central Concepts of Automata Theory, Chomsky Hierarchy of Languages, DFA, NFA, NFA to DFA. Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions.

Introduction to Compilers and Lexical Analysis:

Introduction, Language Processors, the Structure of a Compiler. Lexical Analysis – The Role of Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens, The Lexical-Analyzer Generator-LEX.

UNIT 2:

Context Free Grammars: Definition of Context Free Grammars, Grammars and Languages Generated, Derivations, Parse Trees, Ambiguity in Grammars, and Languages, PDA, Simplification of CFG's

Syntax Analysis: Role of Parser, Top Down Parsing: Recursive Descent Parsing, Predictive Parsing, LL(1)parsing, LL(k) Grammars.

UNIT 3:

Bottom Up Parsing: Reductions, Handle pruning, Shift Reduce Parsing, Conflicts during Shift-Reduce parsing, Introduction to LR Parsing SLR, More Powerful LR Parsers CLR and LALR, Using Ambiguous Grammars, The Parser Generator YACC.

Run-Time Environments: Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management

UNIT 4:

Semantic Analysis: Syntax Directed Translation: Syntax Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax Directed Translation.

Intermediate Code Generation: Variants of Syntax Trees, Three-Address Code.

UNIT 5:

Code Optimization: Introduction, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, Peephole optimization, Machine Independent Optimizations-The Principal Sources of Optimizations.

Code Generation: Issues in the Design of a Code Generator, Object code forms, A Simple Code Generator, Register Allocation and Assignment.

Learning Resources:

1. John E.Hopcroft, Rajeev Motwani, Jeffery D Ulman, Introduction to Automata Theory Languages And Computation, Third edition, Pearson Education.
2. Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D Ullman – Compilers: Principles, Techniques &Tools –Pearson Education, Second Edition, 2007
3. Leland L Bech, System Software: An Introduction to Systems Programming, Pearson Education Asia, 1997.
4. Kenneth C. Louden, Compiler Construction: Principles and Practice, Thompson Learning, 2003.
5. K.Krithivasan and R.Rama; Introduction to Formal Languages, Automata Theory and Computation; Pearson Education, 2009.
6. John C. Martin, Introduction to Languages and The Theory of computation, Third edition, Tata McGraw Hill, 2003.
7. https://nptel.ac.in/courses/106106049/
8. https://nptel.ac.in/courses/106104028/

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:		30
2	No. of Assignments:	03	Max. Marks for each Assignment:		05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:		05

Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERBAD-500031

DEPARTMENT OF INFORMATION TECHNOLOGY

DISTRIBUTED SYSTEMS AND CLOUD COMPUTING

SYLLABUS FOR B.E.- VII SEMESTER

L:T:P(Hrs./week):3:1:0	SEE Marks : 60	Course Code : **U21PC720IT**
Credits : 4	CIE Marks : 40	Duration of SEE: 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES**
The Objectives of the course:	*On completion of the course, students will be able to:*
1. Examine state-of-the-art distributed systems. 2. Provide an overview of distributed resource management. 3. Provide the fundamentals and essentials of Cloud Computing. 4. Describe the importance of virtualization in Cloud Computing. 5. Explore some important cloud computing environments such as Google Apps, Microsoft Azure and Amazon Web Services.	1. Understand the principles of distributed system. 2. Illustrate the basic concepts of synchronization. and communication mechanisms used in distributed systems. 3. Compare the strengths and limitations of Cloud computing. 4. Analyse advantages and disadvantages of virtualization technology. 5. Identify the appropriate cloud services for a given application.

UNIT I

Characterization of Distributed Systems: Introduction, Examples of distributed systems, Resource sharing and the web, Challenges; Hardware concepts; Software Concepts

System Models: Introduction, Architectural models, Fundamental models.

Time and Global States: Introduction, Clocks events and process states, synchronizing physical clocks, Logical Clocks, Global states, Distributed debugging.

UNIT-II

Coordination and Agreement: Introduction, distributed mutual exclusion, Election, Multicast communication, Consensus and related problems.

Replication: Introduction, System model and group communication, Fault-tolerant services.

Distributed File Systems: Introduction; File service architecture; Case study: Sun Network File System;

UNIT-III

Introduction to Cloud Computing, Cloud Computing Architecture: Essential Characteristics, Service Models, Deployment Models, Pros and Cons of Cloud Computing. Scalable Computing over the Internet, Technologies for Network-

based Systems, System Models for Distributed and Cloud Computing, Software Environments for Distributed Systems and Clouds.

UNIT-IV

Virtual Machines and Virtualization of Clusters and Data Centers: Implementation levels of Virtualization, Virtualization Structures/Tools and Mechanisms, Virtualization of CPU Memory and I/O devises, Virtual Clusters and Resource Management, Virtualization for Data Center Automation

Case Studies: Xen Virtual machine monitors - Xen API. VMware - VMware products- VMware Features.

Containers: Container Architecture, Virtualization Vs. Containers, Overview of Dockers, Docker Components and Docker Commands.

UNIT-V

Cloud Platform Architecture over Virtualized Data Centers: Data Center Design and interconnection networks, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms: Google App Engine (GAE), Amazon Web Services (AWS), Microsoft Windows Azure. Inter-cloud Resource Management, Cloud Security and Trust Management

Learning Resources:

1. Colouris, Dollimore, Kindberg, " Distributed Systems concepts and Design" 5th Ed. Pearson Education, 2011
2. Kai Hwang, Geoffrey C Fox, Jack J. Dongarra, "Distributed and cloud Computing", Morgan Kaufmann
3. Andrew S. Tanenbaum, Van Steen, " Distributed Systems ", Pearson Education, 2010.
4. Rajkumar Buyya, James Broberg, Andrzej M Goscinski "Cloud Computing: Principles & Paradigms, Wiley Series on Parallel and Distributed computing, 2011
5. Singhal M, Shivratari N.G, "Advanced Concepts Introduction, Operating Systems" McGraw Hill, 2001
6. Pradeep K Sinha, " Distributed Opearating Systems: Concepts and Design", Pearson Education Asia India, 2007.
7. https://onlinecourses.nptel.ac.in/noc23_cs89/preview
8. https://onlinecourses.nptel.ac.in/noc23_cs72/preview

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

CYBER SECURITY

SYLLABUS FOR B.E VII-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U21PC730IT**
Credits : 3	CIE Marks : 40	Duration of SEE: 3 Hrs

Course Objectives	**Course Outcomes**
The Objectives of the course:	**At the end of the course student will be able to:**
1. Introduce the basics of Cyber Security cyber crime. 2. Explore essential techniques in protecting Information Systems,	1. Understand the concept of Cyber security and issues and challenges associated with it. 2. Interpret various cybercrimes, their nature, legal remedies and how to report the crimes through available platforms and procedures. 3. Gain knowledge about exploitations used by the attackers 4. understand the basic security aspects related to Computer and Mobiles. They will be able to use basic tools and technologies to protect their devices. 5. Demonstrate the use of standards and cyber laws to enhance information security in the development process and infrastructure protection

Unit-I Introduction to Cyber security: Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security.

Unit- II Cybercrime and Cyber law: Classification of cybercrimes, Common cybercrimes- cyber crime targeting computers and mobiles, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks.

Reporting of cybercrimes, Remedial and mitigation measures, Legal perspective of cyber crime, IT Act 2000 and its amendments, Cyber crime and offences, Organizations dealing with Cyber crime and Cyber security in India, Case studies.

UNIT- III Fraud Techniques – Phishing, Smishing, Vishing, Mobile malicious code, Rogue antivirus, Click fraud and Ransomware. Threat Infrastructure – Botnets, Fast-Flux, Advanced Fast-Flux.

Evading detection and Elevating Privileges – Obfuscation, VM Obfuscation, Persistent software techniques, Rootkits, Spyware, Attacks against privileged user accounts and escalation of privileges, token kidnapping, VM detection. Stealing information and exploitation – Form grabbing, Man-in-themiddle attacks, DLL injections, Browser Helper objects.

Unit-IV Digital Devices Security , Tools and Technologies for Cyber Security: Device security policy, Cyber Security best practices, Significance of host firewall and Ant-virus, Management of host firewall and Anti-virus, Wi-Fi security, Configuration of basic security policy and permissions.

Unit-V Cyber Laws and Forensics: Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, National Cyber Security Policy 2013. Introduction to Cyber Forensics, Need of Cyber Forensics, Cyber Evidence, Documentation and Management of Crime Sense, Image Capturing and its importance, Partial Volume Image, Web Attack Investigations, Denial of Service Investigations, Internet Crime Investigations, Internet Forensics, Steps for Investigating Internet Crime, Email Crime Investigations**.**

Learning Resources:

1. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011).
2. James Graham, Richard Howard, Ryan Olson, "Cyber Security Essentials", CRC Press, 2016.
3. Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson , 13th November, 2001)

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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Duration of Internal Test: **90 Minutes**

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IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

DIGITAL IMAGE & VIDEO PROCESSING
(Professional Elective-I)

L : T : P (Hrs./week): 3:0:0	SEE Marks :60	Course Code : **U21PE710IT**
Credits : 3	CIE Marks: 40	Duration of SEE: 3 Hours

Course Objectives	**Course Outcomes**
The Objectives of the course:	*At the end of the course student will be able to:*
1. Introduce fundamentals of image processing and transforms. 2. Describe image enhancement, image segmentation, image compression techniques and morphological operations. 3. Discuss fundamentals of video processing.	1. **Understand** the fundamental concepts of digital image processing and **analyze** the images by applying various transforms. 2. **Apply** different spatial and frequency domain methods for image enhancement. 3. **Apply** different techniques for image segmentation. 4. **Understand** the need for image compression and **Develop** solutions using different image compression methods. 5. **Apply** different morphological algorithms for image processing and outline essentials of video processing.

UNIT – I

Fundamentals of Image Processing and Image Transforms: Basic steps of Image Processing System, Sampling and Quantization of an image, relationship between pixels. Image Transforms: 2 D- Transformations, Discrete Fourier Transform, Discrete Cosine Transform (DCT)

UNIT – II

Image Processing Techniques: Image Enhancement: Spatial domain methods: Histogram processing, Fundamentals of Spatial filtering, Smoothing spatial filters, Sharpening spatial filters. Frequency domain methods: Basics of

filtering in frequency domain, image smoothing, image sharpening, Selective filtering.

UNIT – III

Image Segmentation: Segmentation concepts, Point, Line and Edge Detection. Thresholding, Region Based segmentation.

UNIT – IV

Image Compression: Image compression fundamentals - Coding Redundancy, Spatial and Temporal redundancy, Compression models: Lossy & Lossless, Huffman coding, Arithmetic coding, LZW coding, Run length coding, Bit plane coding, Transform coding, Predictive coding, Wavelet coding, JPEG Standards.

UNIT-V

Preliminaries of morphological Image processing - Erosion and Dilation, Closing, Opening, HIT, MISS operations, Basic Morphological algorithms , boundary extraction,Thining,Thikening,Skeletons

Video processing fundamentals:

Inter-frame redundancy, motion estimation techniques –full search, fast search strategies, forward and backward motion prediction, frame classification – I, P and B; Video sequence hierarchy – Group of pictures, frames, slices, macro-blocks and blocks; Video coding standards – MPEG and H.26X.

Learning Resources:

1. Gonzalez and Woods ,Digital Image Processing , 3rd ed., Pearson Education.
2. .William K. Pratt – Digital Image Processing – John Wiley & Sons-2/e, 2004
3. Digital Image and video process for GTU, Dhananjay k Theckedath
4. Multimedia Image and video processing 2nd ed, Ling Guan , Taylor & Francis
5. http://www.nptelvideos.in/2012/12/digital-image-processing.html

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Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING(Autonomous)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY
SYLLABUS FOR B.E. VII SEMESTER

CRYPTOGRAPHY AND NETWORK SECURITY

(Professional Elective-I)
SYLLABUS FOR B.E VII-SEMESTER

L : T : P (Hrs./week): 3:0:0	SEE Marks :60	Course Code : **U20PE720IT**
Credits : 3	CIE Marks :40	Duration of SEE : 3Hours

Course Objectives	**Course Outcomes**
The Objectives of the course:	*At the end of the course student will be able to:*
Acquire fundamental knowledge on the concepts of number theory, cryptographic techniques like hash functions, digital signature and cryptanalysis.	1. Understand the fundamentals of number theory and security concepts. 2. Demonstrate the knowledge of classical ciphers, block ciphers and stream ciphers 3. Analyse different types of Asymmetric key ciphers. 4. Summarize different message authentication algorithms. 5. Analyse network security protocols like TLS, IPSec

UNIT – I:

Introduction to cryptography, Number Theory: Divisibility and the Division Algorithm, The Euclidean Algorithm , Modular Arithmetic , Prime Numbers Fermat's and Euler's Theorems , Testing for Primality.

Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security

UNIT – II:

Symmetric Ciphers: Symmetric Cipher Model, Classical Encryption Techniques-,Substitution Techniques ,Transposition Techniques.

Block Ciphers: Traditional Block Cipher Structure, Block Cipher Design Principles. Block Cipher Modes of Operation. DES, The Strength of DES, Triple DES.

Advanced Encryption Standard: AES Structure ,AES Transformation Functions , Stream Ciphers.

UNIT – III:

Asymmetric Ciphers: Public-Key Cryptography and RSA - Principles of Public-Key Cryptosystems, The RSA Algorithm .

Other Public-Key Cryptosystems : Diffie-Hellman Key Exchange, ElGamal Cryptographic System, Elliptic Curve Arithmetic, Elliptic Curve Cryptography .

UNIT – IV:

Cryptographic Hash Functions : Applications of Cryptographic Hash Functions, MD5, Secure Hash Algorithm (SHA),SHA-3.

Message Authentication Codes : Message Authentication Requirements. Message Authentication Functions, MACs Based on Hash Functions: HMAC MACs Based on Block Ciphers: CMAC, Digital Signatures.

UNIT –V:

Transport Level Security: Web Security Considerations, Transport Layer Security

IP Security: IP Security overview, IP Security policy, Encapsulating Security payload

Learning Resources :

1. William Stallings, Cryptography and Network Security, 7th Edition, Pearson Education,2017.
2. https://onlinecourses-archive.nptel.ac.in/noc19_cs28/course.
3. Behrouz A. Ferouzan, "Cryptography & Network Security", Tata Mc Graw Hill, 2007.
4. Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms and Protocols", Wiley Publications,2003.

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Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING(Autonomous)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

SOFTWARE TESTING

(Professional Elective-I)
SYLLABUS FOR B.E VII-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks :60	Course Code : **U21PE730IT**
Credits : 3	CIE Marks: 40	Duration of SEE :3 Hrs

Course Objectives	**Course Outcomes**
The Objectives of the course:	**At the end of the course student will be able to:**
1. Explore software testing methods and tools. 2. Discuss various testing techniques to develop test cases.	1. Understand the fundamentals of software testing, verification and validation. 2. Design test cases for static and dynamic testing with validation. 3. Understand testing process and apply testing metrics for monitoring and controlling. 4. Develop test cases for object oriented and web-based applications. 5. Identify and apply appropriate tool to test a given software application.

UNIT-I

Introduction: Software-Testing, Terminology and Methodology: Software testing terminology, Software Testing Life Cycle (STLC),Software Testing Methodology

Verification and Validation: V & V activities, verification of requirements, verification of HLD and LLD, validation

UNIT-II

Dynamic Testing: Black Box Testing Techniques, White Box Testing Techniques, Static Testing, Validation Activities, Regression Testing.

UNIT-III

Test Management: Test Organization, Structure, Planning, Detailed test design and test specification, Software Metrics, Size Metrics, Testing Metrics

for Monitoring and Controlling the Testing Process, Efficient Test Suite Management.

UNIT-IV

Testing Process: Testing Objected Oriented Software, Testing Web Based Systems, Debugging

UNIT-V

Software Testing Tools-case study: Overview of Testing Tools, Testing an Application using WinRunner, Load Runner, JMeter, QTP

Learning Resources :

1. Naresh Chauhan, Software Testing Principles and Practices, Oxford University Press, 2010.
2. Dr.K.V.K.K.Prasad, Software Testing Tools, Dreamtech press, 2008.
3. William E. Perry, Effective Methods for Software Testing,Third Edition, Wiley & Sons, 2006.
4. Srinivasan Desikan, Gopalaswamy Ramesh, Software Testing: Principles and Practices, Pearson Education, 2006.
5. Testing and Quality Assurance for Component-based Software, by Gao, Tsao and Wu, Artech House Publishers
6. Software Testing Techniques, by Bories Beizer, Second Edition, Dreamtech Press
7. Managing the Testing Process, by Rex Black, Wiley
8. Handbook of Software Quality Assurance, by G. Gordon Schulmeyer, James I.McManus, Second Edition, International Thomson Computer Press
9. http://www.nptelvideos.in/2012/11/software-engineering.html
10. https://onlinecourses.nptel.ac.in/noc16_cs16/preview

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:		30
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Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING(Autonomous)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

DATA MINING
(Professional Elective-I)
SYLLABUS FOR B.E. - VII SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code : **U21PE740IT**
Credits : 3	CIE Marks : 40	Duration of SEE: 3 Hours

Course Objectives	Course Outcomes
The Objectives of the course:	At the end of the course student will be able to:
1. Introduce data mining functionalities and efficient frequent pattern mining techniques. 2. Explore classification and clustering algorithms. 3. Demonstrate the applications of data mining techniques in real-time applications.	1. Understand the functionalities of Data Mining, multidimensional data models and perform different OLAP operations. 2. Identify and infer interesting frequent patterns using association rule mining and correlations analysis. 3. Apply classification and clustering algorithms to graph, network data and identify outliers. 4. Apply mining concepts on different forms of data such as data streams, time-series, sequence, graph, multi relational data and social network. 5. Analyse the applications of data mining on object, spatial, multimedia, text, and web data using real time case studies.

UNIT – I

Introduction: Why and What is Data Mining, Kinds of Data, Kinds of patterns, Technologies used, Applications and Major Issues in Data Mining. Data preprocessing – Basics.

Data Warehouse and OLAP Technology: Data warehouse – Basic concepts, Modeling – Data cube and OLAP, warehouse design & usage, and warehouse implementation.

UNIT – II

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Market basket analysis, Frequent Item Set Mining Methods – Apriori algorithm, generating association rules, improving efficiency, Pattern growth approach. Pattern Evaluation – Association to correlation analysis, Comparison of pattern evaluation measures. Applications of pattern mining.

UNIT – III

Classification: Introduction, Classification using frequent patterns.

Cluster Analysis: Introduction, Clustering high dimensional data, Clustering Graph and Network data, Clustering with constraints.

Outlier Analysis: Basics, Outlier detection methods, Outlier detection in high dimensional data.

UNIT – IV

Mining Stream, Time-series and Sequence data: Mining Data Streams, Mining Time-Series data – Trend analysis, Mining sequence patterns.

Graph Mining, Social Network Analysis and Multi Relational Data Mining: Mining Frequent subgraphs and applications. Social network analysis – Basics, Link mining. What is Multi Relational Data Mining.

Unit-V

Mining Object, Spatial, Multimedia, Text and Web data Basics: Multi-Dimensional analysis and mining of complex data objects, Spatial Data Mining, Multimedia data mining, Text mining, Mining the World Wide Web.

Case Studies: Mining Twitter, Mining Facebook, Mining LinkedIn, Mining Google+, Mining web pages, Mining GitHub, and Mining mailboxes.

Learning Resources:

1. Han J & Kamber M, Data Mining: Concepts and Techniques, Third Edition, Elsevier, 2011.
2. Han J & Kamber M, Data Mining: Concepts and Techniques, Second Edition, Elsevier, 2006.
3. Matthew A Russell, Mining The Social Web – Data Mining Twitter, Facebook, Google+, GitHub, LinkedIn and more, Second edition. OReilly publications.
4. Pang-Ning Tan, Michael Steinback, Vipin Kumar, Introduction to Data Mining, Pearson Education, 2008.
5. Arun K Pujari, Data mining Techniques, Second Edition, University Press,2001.
6. Margaret H Dunham, S.Sridhar, Data mining: Introductory and Advanced Topics, Pearson Education, 2008.

7. Humphires, Hawkins, Dy, Data Warehousing: Architecture and Implementation, Pearson Education, 2009.
8. Anahory, Murray, Data Warehousing in the Real World, Pearson Education, 2008.
9. Kargupta, Joshi,etc., Data Mining: Next Generation Challenges and Future Directions, Prentice Hall of India Pvt Ltd, 2007.
10. http://freevideolectures.com/Course/2280/Database-Design/35
11. http://freevideolectures.com/Course/2668/Database-Management-System/31
12. http://nptel.ac.in/syllabus/syllabus_pdf/106106105.pdf

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

NATURAL LANGUAGE PROCESSING

(Professional Elective-II)
SYLLABUS FOR B.E VIII-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U21PE750IT**
Credits : 3	CIE Marks : 40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The Objectives of the course:	*On completion of the course, students will be able to:*
1. Introduce the fundamental techniques of natural language processing. 2. Demonstrate machine learning and deep learning models for NLP.	1. Understand Probabilistic Models for Natural Language Processing. 2. Apply logistic regression and naïve Bayes to perform sentiment analysis. 3. Understand vector semantics and embeddings**.** 4. Analyze deep learning architectures for sentiment analysis, text generation and named entity recognition. 5. Design NLP applications that perform question-answering and language translation.

UNIT- I

NLP with Probabilistic Models:

Regular Expressions, Text Normalization, Edit Distance: Introduction to NLP, Applications of NLP, Regular Expressions, Words, Corpora, Text Normalization, Minimum Edit Distance.

N-gram Language Models: N-Grams, Evaluating Language Models, Generalization and Zeros, Smoothing, Kneser-Ney Smoothing, Huge Language Models and Stupid Backoff.

Sequence Labeling for Parts of Speech and Named Entities: English Word Classes, Part-of-Speech Tagging, Named Entities and Named Entity Tagging, HMM for Part-of-Speech Tagging, Conditional Random Fields (CRFs).

UNIT- II

NLP with Classification:

Naive Bayes and Sentiment Classification: Naive Bayes Classifiers, Training the Naive Bayes Classifier, Worked example, Optimizing for Sentiment Analysis, Naive Bayes for other text classification tasks, Naive

Bayes as a Language Model, Evaluation, Test sets and Cross-validation, Statistical Significance Testing.

Logistic Regression: The sigmoid, Learning in Logistic Regression, The cross-entropy loss function, Gradient Descent, Regularization, Multinomial logistic regression, Interpreting models, Deriving the Gradient Equation.

UNIT- III

NLP with Vector Spaces:

Vector Semantics and Embeddings: Lexical Semantics, Vector Semantics, Words and Vectors, Cosine for measuring similarity, TF-IDF: Weighing terms in the vector, Pointwise Mutual Information (PMI), Applications of the TF-IDF or PPMI vector models, Word2vec, Visualizing Embeddings, Semantic properties of embeddings, Bias and Embeddings, Evaluating Vector Models.

UNIT- IV

NLP with Sequence Models:

Neural Networks and Neural Language Models: Units, The XOR problem, Feed-Forward Neural Networks, Training Neural Nets, Neural Language Models.

Deep Learning Architectures for Sequence Processing: Language Models Revisited, Recurrent Neural Networks, Managing Context in RNNs: LSTMs and GRUs.

UNIT- V

NLP with Attention Models:

Machine Translation and Encoder-Decoder Models: Self-Attention Networks-Transformers, Language Divergences and Typology, The Encoder-Decoder Model, Encoder-Decoder with RNNs, Attention, Beam Search, Encoder-Decoder with Transformers.

Question Answering: Information Retrieval, IR-based Factoid Question Answering, Entity Linking, Knowledge-based Question Answering, Using Language Models to do QA, Classic QA Models, Evaluation of Factoid Answers.

Chatbots & Dialogue Systems: Chatbots, GUS: Simple Frame-based Dialogue Systems, The Dialogue-State Architecture, Evaluating Dialogue Systems, Dialogue System Design.

Learning Resources :

1. Jurafsky Dan and Martin James H. "Speech and Language Processing", Third Edition, 2018.
2. Steven Bird, Ewan Klein and Edward Loper, —Natural Language Processing with Python, First Edition, OReilly Media, 2009.
3. James Allen, "Natural Language Understanding", Pearson Education
4. Christopher D Manning and HinrichSchutze, "Foundations of Statistical Natural Language Processing" MIT Press, 1999.
5. Akshar Bharti, Vineet Chaitanya and Rajeev Sangal, "NLP: A Paninian Perspective", Prentice Hall, New Delhi

6. https://nptel.ac.in/courses/106/105/106105158/
7. http://www.nptelvideos.in/2012/11/natural-language-processing.html

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Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

BLOCKCHAIN
(Professional Elective-II)
SYLLABUS FOR B.E VII-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U21PE760IT**
Credits : 3	CIE Marks : 40	Duration of SEE: 3 Hrs

Course Objectives	**Course Outcomes**
The Objectives of the course:	At the end of the course student will be able to:
1. Introduce the fundamental concepts of blockchain and cryptography. 2. Describe blockchain architectures and platforms. 3. 3. Demonstrate applications of blockchain with case studies.	1. Understand the cryptographic primitives and the need for decentralization. 2. Identifying the features and functionalities of Bitcoin and Ethereum's Solidity programming language. 3. Implementing permissioned blockchain networks using Hyperledger fabric. 4. Understanding the DID, blockchain security and interoperability. 5. Identify the applications of blockchain across various sectors like land records, financial services, government, etc.

UNIT-I:
Introduction: Need for decentralization, Decentralization with blockchain, properties of blockchain, Definition, History, Distributed ledger.
Cryptographic primitives: Hash function, properties of hash, SHA 256, Hash pointers, hashchain, Merkle tree, public key cryptography, signatures.

UNIT-II:
Bitcoin: Cryptocurrency Consensus over an open network, PoW, Block header, Transaction flooding, block reward, double spending, scalability and energy consumption.
Ethereum: Ethereum network, Ethereum smart contracts, Ethereum virtual machine, solidity language, deploy and execute contracts.

UNIT-III:

Permissioned blockchain: Distributed Systems, Permissioned Blockchains, Design goals, Overview of Consensus models for permissioned block chain- Distributed consensus in closed environment, Paxos, RAFT Consensus, Byzantine general problem, Byzantine fault tolerant system
Hyperledger: Hyperledger foundation projects, fabric architecture, Identities and Policies, Membership and Access Control, Channels, Transaction Validation, Writing smart contract using Hyperledger Fabric.

UNIT-IV:
Identity management: Concept of identity, centralized identity management, decentralized identity management.
Blockchain interoperability: Asset and data transfer, cross chain transfer and exchange of asset,
Blockchain security: 51% vulnerability, private key security.

UNIT-V:
usecases: Identifying good blockchain use cases, and land records and other kinds of record keeping between government entities, financial services, Decentralized marketplace. National Strategy of Blockchain in India

Learning Resources:
Textbooks:
1. Mastering Blockchain: A deep dive into distributed ledgers, consensus protocols, smart contracts, DApps, cryptocurrencies, Ethereum, and more, 3rd Edition, Imran Bashir, Packt Publishing, 2020, ISBN: 9781839213199, book website: **https://www.packtpub.com/product/mastering-blockchain-third-edition/9781839213199**
2. Kube, Nicolas. "Daniel Drescher: Blockchain basics: a non-technical introduction in 25 steps: Apress, 2017, 255 pp, ISBN: 978-1-4842-2603-2." (2018): 329-331.
3. LEE, WM. "Beginning Ethereum Smart Contracts Programming: With Examples in Python." *Solidity, and JavaScripty, Apress, Singapore* (2019).
4. Gaur, Nitin, et al. Blockchain with Hyperledger fabric: Build decentralized applications using Hyperledger fabric 2. Packt Publishing Ltd, 2020.

Online References:
1. NPTEL courses:
    a. Blockchain and its Applications,
    b. Blockchain Architecture Design and Use Cases

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

AGILE SOFTWARE DEVELOPMENT

(Professional Elective-II)

SYLLABUS FOR B.E VIII-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U21PE770IT**
Credits : 3	CIE Marks : 40	Duration of SEE: 3 Hrs

Course Objectives	**Course Outcomes**
The Objectives of the course:	At the end of the course student will be able to:
The Objectives of the course: Introduce Agile development methodologies and its practical application to today's software development in delivering the high-quality products /services.	**At the end of the course student will be able to:** 1. Understand Agile Software Development practices and work small teams to create high-quality software. 2. Apply the concepts of Agile scrum process. 3. Apply the concepts of Extreme Programming. 4. Apply the Agile project planning Techniques. 5. Analysing the Agile project progress.

UNIT I

Fundamentals of Agile Process: Introduction and background, Understanding Agile Values - Agile Manifesto, Agile Principles, Overview of Agile Development Models: Scrum, Extreme Programming, Feature Driven Development, Crystal, Kanban, and Lean Software Development.

UNIT II

Introduction to Scrum: Agile Scrum Framework, Scrum Artifacts, Meetings, Activities and Roles, Scrum Team Simulation, Scrum Planning Principles Scrum and self-organizing teams, Scrum Planning and Collective commitment.

Unit-III: Introduction to Extreme Programming (XP)- XP Lifecycle, The XP Team, XP Concepts: Refactoring, Technical Debt, Timeboxing, Stories, Velocity, XP and embracing change, XP Simplicity, and Incremental design.

Unit-IV: Agile Approach to Project Planning - Estimation: Estimating Size with story points, Estimate with Ideal Days, Techniques for estimating, Re-estimating, choosing between stories point and Ideal Days. Planning: Planning

for Value – Prioritizing themes, financial prioritization, prioritizing desirability. Splitting user stories.

Unit-V: Agile Scheduling, Tracking and Communicating – Release Planning, Iteration Planning, Estimating Velocity, Monitoring the Release plan, Iteration plan, Communication about plans. Metrics in Agile Projects.

Learning Resources:

Prescribed books:

1. Learning Agile Understanding Scrum, XP,Lean and Kanban – Andrew Stellman and Jennifer Greene. O'reilly. Fourth Indian Reprint Aug 2019, Shroff publishers
2. Cohn, Mike, Agile Estimating and Planning, Pearson Education, 2006.
3. Agile Project Management with Azure DevOps Concepts, Templates and metrics - Joachim Rossberg, Apress, reprint year 2023.

Reference Books:

1. Robert C. Martin, Agile Software Development- Principles, Patterns and Practices, Prentice Hall,2013.
2. James Shore and Shane Warden, The Art of Agile Development, O'Reilly Media, 2007.
3. Cohn, Mike, User Stories Applied: For Agile Software Development Addison Wisley, 2004.
4. David J. Anderson and Eli Schragenheim, —Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results, Prentice Hall, 2003.
5. Hazza and Dubinsky, —Agile Software Engineering, Series: Undergraduate Topics in Computer Science, Springer, 2009.

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Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING(Autonomous)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

DATA ANALYTICS WITH VISUALIZATION
(Professional Elective-II)
SYLLABUS FOR B.E VII-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks :60	Course Code : **U21PE780IT**
Credits : 3	CIE Marks: 40	Duration of SEE :3 Hrs

Course Objectives	**Course Outcomes**
The Objectives of the course:	**At the end of the course student will be able to:**
1. Introduce the fundamental concepts in Data analytics, visualization and exploration. 2. Find insights from data using R & Python programming.	1. Understand the basics of data, analysis and visualization for data driven decision making. 2. Apply R & Python libraries for data collection, cleaning, and pre-processing. 3. Apply R & Python libraries for visualization to infer insights. 4. Apply exploratory data analysis tools to check assumptions, hypothesis, trends in data. 5. Develop effective data storytelling using visualization techniques for driving change in business scenarios.

UNIT–I

Data Definitions: Elements, Variables, and Data categorization, NOIR classification, Levels of Measurement, Data analytics.

Analytics with Data visualization: introduction, exploration, explanation, insight visualization, insight to action, Data driven decision making, Data story telling – Psychology, anatomy, narrative, visuals structure.

UNIT-II

Introduction to R: Install R studio, R markdown, data structures: Vector, list, matrix, data frame, factors.

Data import/export: read/write csv files, excel files, loading datasets.

Descriptive stats: Central tendency, dispersion measurements.

Data Pre-processing: Tabularizing, cleaning, imputation, scaling, normalizing, selection, filtering, sort, aggregate, joining with Tidyverse, dplyr R libraries, Pandas Python library.

UNIT – III

Visualizations in R: Intro to ggplot2, Basic visualization – Histogram, Bar / Line Chart, Box plot, Scatter plot. Advanced Visualization: Heat Map, Mosaic Map, Map Visualization, 3D Graphs, Correlogram.

Visualization using Seaborn: – Histogram, Bar / Line Chart, Box plot, Scatter plot, Heat Map, 3D Graphs.

UNIT-IV

Hypothesis testing: z-test, t-test, Chi-square test.

Exploratory Data Analysis: univariate, bivariate, multivariate analysis using descriptive and visualization to check assumptions, hypothesis, anomalies and discover trends and patterns in the data.

Interactive Dashboards: Interactive dash boards with shiny library. Intro to Tableau, PowerBI.

UNIT-V

Business case studies: in health, finance, transport, food, and supply chain: Understanding business scenarios, Feature engineering and visualization, creating your own data story, exploration, insight to action, driving change.

Learning Resources :

1. Effective Data Storytelling: How to Drive Change with Data, Narrative, and Visuals by Brent Dykes.
2. The Big Book of Dashboards. Visualize Your Data Using Real-World Business Scenarios by Steve Wexler, Jeffrey Shaffer, and Andy Cotgreave.
3. Data visualizations in R
4. Comprehensive Guide to Data Visualization in R
5. https://www.datacamp.com/
6. https://seaborn.pydata.org/
7. https://www.r-project.org/
8. https://www.ibm.com/in-en/cloud/learn/exploratory-data-analysis

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

COMPILER DESIGN LAB

SYLLABUS FOR B.E. VII SEMESTER

L : T : P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code : **U21PC711IT**
Credits : 1	CIE Marks: 30	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
The Objectives of the course:	**At the end of the course student will be able to:**
1. Provide hands-on experience to implement various phases of compiler. 2. Demonstrate LEX and YACC tools.	1. Understand JFLAP and Generate tokens for a given high level language program using lexical analyzer. 2. Use LEX and YACC tools to develop lexical analyzer and parser. 3. Apply various syntax analysis techniques on CFG to build the parsers. 4. Generate optimized code using code optimization techniques. 5. Generate machine code from the intermediate code forms.

LIST OF EXPERIMENTS

1. Understanding of software like JFLAP (Java Formal Languages and Automata Package) for experimenting with formal languages
2. Implementation of Lexical Analyser to recognize a few patterns in C. (Ex. identifiers, constants, comments, operators etc.)
3. Implementation of Lexical Analyzer using LEX tool.
4. Implementation of Recursive Descent Parser.
5. Implementation of FIRST() of a given Context-Free Grammar.
6. Implementation of FOLLOW() of a given Context-Free Grammar.
7. Construction of a Predictive parsing Table for a given CFG.
8. Implementation of SLR parsing algorithm.
9. Implementation of Desktop Calculator using LEX and YACC tools.
10. Implementation of code optimization techniques.
11. Implementation of Code Generation.

Virtual Lab:

Learning Resources:

1. John E.Hopcroft, Rajeev Motwani, Jeffery D Ulman, Introduction to Automata Theory Languages And Computation, Third edition, Pearson Education.
2. V Aho, Monica S Lam, Ravi Sethi, Jeffrey D Ullman – Compilers: Principles , Techniques &Tools – Pearson Education, Second Edition, 2007
3. John R Levine, Tony Mason, Dougn Broun, Lex and Yacc, Orielly, 2nd Edition,2009

Online Resources:

1. http://cse.iitkgp.ac.in/~bivasm/notes/LexAndYaccTutorial.pdf

No. of Internal Tests:	02	Max. Marks for Internal Test:	12
Marks for assessment of each experiment			18
Duration of Internal Test: 2Hours			

VASAVI COLLEGE OF ENGINEERING(Autonomous)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

DISTRIBUTED SYSTEMS & CLOUD COMPUTING LAB

SYLLABUS FOR B.E.- VII SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code : **U21PC721IT**
Credits : 1	CIE Marks : 30	Duration of SEE: 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The Objectives of the course:	**On completion of the course, students will be able to:**
1. Demonstrate client server application in distributed environment. 2. Illustrate cluster environment and execute distributed application. 3. Provide hands on experience to create virtual machines and hosting of a website in public cloud environments.	1. Design and develop distributed client server applications using socket programming concepts. 2. Design and develop distributed applications using MPI clusters. 3. Create and manage virtual machines using XEN SDK and open stack. 4. Write a distributed application using Map Reduce. 5. Deploy a website in AWS, AZURE and GAE environments.

1. Write a program for command line based client server Java application using TCP protocol.
2. Write a program for command line based client server Java application using UDP protocol.
3. Write a program for implementation of Network Time Protocol (NTP) client server for clock synchronization.
4. Write a program for Message Passing Interface (MPI) Cluster for matrix multiplication of order 1000 x 1000.
5. Setup and implement the concept of Type 1 virtualization using Xen.
6. Create a virtual machine using open stack.
7. Write a Map Reduce application and execute it on Hadoop environment.
8. Using Amazon Web Services (AWS) Academy Sandbox environment:
    i) Create an Amazon Elastic Compute Cloud (Amazon EC2) instance that hosts a simple website.
    ii) Create an Amazon Simple Storage Service (Amazon S3) bucket to host a static webpage.

iii) Create Docker container on the above machine.
iv) Write a simple hello world application and run on the above Docker container.

9. Using Microsoft Azure Cloud environment:
   i) Create virtual machine.
   ii) Host a simple website on the virtual machine.
10. Install Google App Engine (GAE), Create simple hello world app using python. Use GAE to create and launch simple web application.

Virtual Lab:

11. Microsoft Azure Cloud environment

Additional Experiments:

1. Write a Java program using Xen SDK to create virtual machine with vdisk, vnetwork, vram and vNIC.
2. Write SOAP/REST Web services in Java using NetBeans.

Learning Resources:

1. AMAZON WEB SERVICES: The Complete Guide From Beginners For Amazon Web Services, Richard Derry, Amazon
2. Learning AWS, by Aurobindo Sarkar, Amit Shah, 2015, Packt Publishing Digital Services LLC, 2019
3. Colouris, Dollimore, Kindberg, " Distributed Systems concepts and Design" 5th Ed. Pearson Education, 2011
4. Rajkumar Buyya, James Broberg, Andrzej M Goscinski "Cloud Computing: Principles & Paradigms, Wiley Series on Parallel and Distributed computing, 2011
5. Herbert Schildt, "Java : the complete reference" McGraw-Hill Education, 2019
6. azure.microsoft.com

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Marks for assessment of each experiment			18
Duration of Internal Test: 2 Hours			

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

DIGITAL IMAGE AND VIDEO PROCESSING LAB

(Professional Elective-I)

SYLLABUS FOR B.E. VII SEMESTER

L : T : P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code : **U21PE711IT**
Credits : 1	CIE Marks: 30	Duration of SEE : 3 Hours

Course Objectives:	**Course Outcomes:**
	At the end of the course student will be able to:
Introduce the basic concepts and methodology for digital image and video processing	1. Apply mathematical operations on image processing. 2. Select suitable algorithm for image (or) video enhancement, segmentation, and compression. 3. Apply morphological operations on image (or) video frames

List of Experiments

1. Simulation and Display of an Image, Negative of an Image (Binary & Gray Scale)
2. Implementation of Relationships between Pixels
3. Implementation of Transformations of an Image
4. Contrast stretching of a low contrast image, Histogram, and Histogram Equalization
5. Display of bit planes of an Image
6. Implementation of Image Smoothening Filters(Mean and Median filtering of an Image)
7. Implementation of image sharpening filters and Edge Detection using Gradient Filters
8. Image Compression by DCT, HUFFMAN coding
9. Implementation of Image Intensity slicing technique for image enhancement
10. Image segmentation – Edge detection, line detection and point detection
11. Basic Morphological operations on an image

12. Region based Segmentation.
13. Mini project on video processing

Learning Resources:

1. Digital Image processing" and Gonzalez, Woods.
2. Digital Image Processing, WILLIAM K PRATT WILEY Publication.

Online Resources:

https://cse19-iiith.vlabs.ac.in/

No. of Internal Tests:	02	Max. Marks for Internal Test:	12
Marks for assessment of each experiment			18
Duration of Internal Test: 2 Hours			

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS) IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

CRYPTOGRAPHY AND NETWORK SECURITY LAB

(Professional Elective-I)

SYLLABUS FOR B.E. VII SEMESTER

L : T : P (Hrs./week):	SEE Marks : 50	Course Code :
Credits : 1	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
The Objectives of the course:	At the end of the course student will be able
1. Use Wireshark packet sniffertool. 2. Implement different cipher techniques. 3. Analyze the performance of	1. Demonstrate the packet sniffing using opensource tools. 2. Develop code for classical 3. Build cryptosystems by applying symmetricand public key encryption algorithms. 4. Construct code for authentication algorithms

List of Experiments

1. Working with Wire shark packet sniffer for monitoring network communication.
2. Implement the following Substitution & Transposition Techniques:
   a) Caesar Cipher
   b) Play fair Cipher
   c) Hill Cipher
   d) Vigenere Cipher
   e) Rail fence
   f) Row & Column Transformation
3. Write a code for a random number generator
   a) Using Python code
   b) Using a secure pseudo-random number generator tool.
4. Implementation and Performance Evaluation following block cipher cryptographic algorithms:
   a) DES
   b) AES
5. Implementation and Performance Evaluation following stream cipher

cryptographic
   a) CFB (Cipher Feedback)
   b) OFB (Output Feedback).
6. Implement asymmetric key to generate encryption and decryption on messages using RSA algorithm.
7. Implementation of Diffie-Hellman exchange Algorithm.
8. Implement the following hashing technique algorithm
   a) MD5
   b) SHA-1
9. Implement the Signature Scheme - Digital Signature Standard
10. Demonstrate intrusion detection systems (IDs) using the Snort tool.
11. Implementation of IPsec over the network using VPN tool (cisco / NS3).

Suggested Reading:

1. William Stallings, Cryptography and Network Security, 7th Edition, Pearson Education,2017.
2. Neal Koblitz, A course in number theory and cryptography, Springer.

Online Resources:

https://www.wireshark.org/
https://nptel.ac.in/courses/106105162

No. of Internal Tests:	02	Max. Marks for Internal Test:	12
Marks for assessment of each experiment			18
Duration of Internal Test: 2 Hours			

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

SOFTWARE TESTING LAB

(Professional Elective-I)

SYLLABUS FOR B.E. VII SEMESTER

L : T : P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code : **U21PE731IT**
Credits : 1	CIE Marks: 30	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
The Objectives of the course:	At the end of the course student will be able to:
1. To learn and understand the tools and techniques of software testing and its practice in the industry. 2. To develop skills in software test automation and management using latest tools	1. Test the software by applying testing techniques to deliver a product free from bugs 2. Generation of test cases from requirements 3. Creation of test plans document. 4. Working with Bug tracking tool Bugzilla. 5. Testing an application with an open source testing tool.

List of Experiments

1. Write programs in C- Language to demonstrate the working of the following constructs: i) do.. .while ii) while….do iii) if…else iv) switch v) for
   And introspect the causes for its failure and write down the possible reasons for its failure.
2. Develop a complete Test Plan document for a Library Information System.
3. Create a document for testing login functionality of a web application using Black box testing.
   (In this scenario, we will test the login page without having access to the internal code or implementation details.)
4. Create a document for testing login functionality of a web application using White box testing.

(In this scenario, we will test the login page using internal code or implementation details.)

5. Create a document for testing an ATM application APIs Functionalities.
6. Testing an application for Load testing and Stress testing using testing tool **WinRunner**.
7. Testing a Web application for regression testing using a testing tool **Selenium.**
8. Identifying the bugs using Bug Tracking Tool Bugzilla for a GMAIL application.

Virtual Labs:

9. Software Engineering Virtual Lab — IIT Kharagpur (iitkgp.ac.in) http://vlabs.iitkgp.ac.in/se/10/theory/

Suggested Reading:

1. Software Testing techniques - Boris Beizer, Dreamtech, secondedition.
2. Srinivasan Desikan, Gopalaswamy Ramesh, Software Testing: Principles and Practices, Pearson Education, 2006.
3. Software Testing Tools – Dr.K.V.K.K.Prasad, Dreamtech.
4. http://www.nptelvideos.in/2012/11/software-engineering.html.
5. https://onlinecourses.nptel.ac.in/noc16_cs16/preview.

No. of Internal Tests:	02	Max. Marks for Internal Test:	12
Marks for assessment of each experiment			18
Duration of Internal Test: 2 Hours			

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

DATA MINING LAB

(Professional Elective-I)

SYLLABUS FOR B.E. VII SEMESTER

L : T : P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code : **U21PE741IT**
Credits : 1	CIE Marks: 30	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
The Objectives of the course:	At the end of the course student will be able to:
The objective of this course is to gain expertise in learning any open-source data mining tool, to help the students to understand and perform various data mining tasks such as data preprocessing tasks, association rule mining and machine learning tasks.	1. Demonstrate proficiency in navigating the tool and its interfaces to perform data mining tasks 2. Demonstrate skills in preprocessing datasets 3. Implement classification & regression tasks using machine learning algorithms 4. Implement clustering tasks using machine learning algorithms 5. Implement Association Rule Mining

List of Experiments

1. Install Open Source Data Mining Tool. Get accustomed to all the components of the tool.
2. Load any dataset and explore its attributes, their types, find outliers and computer summary statistics.
3. Experiment to check for missing values in any given dataset and handle them using various options provided by the tool. Save the pre-processed data.
4. Experiment to carry out numeric data transformation using normalization. Save the pre-processed data.
5. Experiment to carry out numeric data transformation using standardization or Z-score normalization. Save the pre-processed data.
6. Experiment to carry out discretization of numeric attributes into categorical attributes. Save the pre-processed data.

7. Experiment to carry out encoding of categorical attributes into numerical attributes. Save the pre-processed data.
8. Experiment to check for outliers and handle them using various options provided by the tool. Save the pre-processed data.
9. Experiment to carry out sampling a subset of dataset using filters. Save the pre-processed data.
10. Experiment for feature selection to choose most relevant attributes based on various feature selection techniques provided by the tool. Save the pre-processed data.
11. Experiment to carry out encoding of categorical attributes into numerical attributes. Save the pre-processed data.
12. Experiment to load transactional data and discover association rules using Apriori algorithm. Generate Rules with support/confidence values
13. Experiment to load Boston Housing dataset and build a regression model using Linear Regression algorithm. Evaluate the performance measure.
14. Experiment to classify Iris dataset with Decision Trees and evaluate the results.
15. Experiment to cluster Wine dataset using K-means clustering and evaluate the results.

Suggested Reading:

3. Han J & Kamber M, Data Mining: Concepts and Techniques, Third Edition, Elsevier, 2011.
4. Pang-Ning Tan, Michael Steinback, Vipin Kumar, Introduction to Data Mining, Pearson Education, 2008.

Online Resources:

1. https://nptel.ac.in/courses/106/105/106105174/
2. https://cse20-iiith.vlabs.ac.in/exp/mst-based/index.html
3. https://www.javatpoint.com/orange-data-mining
4. https://www.tutorialspoint.com/weka/what_is_weka.htm

No. of Internal Tests:	02	Max. Marks for Internal Test:	12
Marks for assessment of each experiment			18
Duration of Internal Test: 2 Hours			

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

NATURAL LANGUAGE PROCESSING LAB
(Professional Elective-II)
SYLLABUS FOR B.E. VII SEMESTER

L : T : P (Hrs./week): 0:0:2	SEE Marks: 50	Course Code :
Credits : 1	CIE Marks :30	Duration of SEE: 3 Hours

Course	Course Outcomes:
The course will enable	**At the end of the course student will be**
Demonstrate applying and comparing of various NLP models to real world language problems.	1. Demonstrate the knowledge of NLP frameworks for basics on various architectures, datasets, preprocessing and normalization. 2. Apply existing probabilistic N-gram models to NLP problems. 3. Apply ML models to NLP classification and sentiment analysis.

1. Implement computations of 2-gram and 3-gram models on Text corpus.
2. Implement generative text using N-gram models with smoothing techniques.
3. Implement HMM model for POS Tagging problem.
4. Implement multinomial logistic regression on sentiment analysis.
5. Implement Naïve Bayes on sentiment analysis.
6. Implement or use TF-IDF embeddings for Text corpus.
7. Implement or use word2vec embeddings for Text corpus
8. Use LSTM model for word classification problem.
9. Use LSTM model for language identification problem.
10. Use Encoder-Decoder model for Neural machine translation problem.
11. Use Transformer model for Neural machine translation problem.
12. Use RAG techniques with ChatGPT OpenAI to develop domain specific chatbots.

Learning Resources:

1. https://pytorch.org/
2. https://chat.openai.com/
3. https://huggingface.co/

No. of Internal Tests:	02	Max. Marks for Internal Test:	12
Marks for assessment of each experiment			18
Duration of Internal Test: 2 Hours			

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

BLOCKCHAIN LAB

(Professional Elective-II)

SYLLABUS FOR B.E. VII SEMESTER

L : T : P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code : **U21PE761IT**
Credits : 1	CIE Marks: 30	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
The Objectives of the course:	At the end of the course student will be able to:
1. Introduce Hyperledger framework and Ethereum blockchains. 2. Provide hands-on experience in designing, implementing, and testing smart contracts	1. Implement the data structures used blockchain technology. 2. Install and configure blockchain development tools such as Ganache, Truffle, Hardhat, MetaMask, Hyperledger Fabric and Hyperledger Indy 3. Develop smart contracts using Ethereum, Solidity, and Truffle 4. Develop and deploy chain code on a permissioned blockchain network using Hyperledger Fabric 5. Analyse real-world case studies and use cases to identify opportunities and challenges associated with blockchain adoption.

List of Experiments

1. Write a program to create Merkel tree data structure. Explore the structure of a block in blockchain.
2. Installing ganache, truffle, hardhat, metamask.
3. Write a solidity program to find the maximum number from the given number by that user.
4. Write a solidity program to sort the numbers given by that user. Two or three users will be giving numbers.
5. Write a smart contract for a lottery. Whoever wins the lottery will get all the amount given by the remaining people.
6. Write a voting program. The person who deployed the contract can start the voting process, register the candidates, announce the winner and stop the voting process.
7. Create a currency and circulate among the participants.
8. Installing Hyperledger Fabric, Hyperledger Indy.

9. Write a sample chain code for tracking fridge purchase, repair and reselling.
10. Write a sample chain code for car servicing, repairs, etc.
11. Case study on supply chain management.
12. Case study on Ubin, GST, cryptoKitties etc.

Suggested Reading:

5. LEE, WM. "Beginning Ethereum Smart Contracts Programming: With Examples in Python." *Solidity, and JavaScripty, Apress, Singapore* (2019).
6. Gaur, Nitin, et al. Blockchain with Hyperledger fabric: Build decentralized applications using Hyperledger fabric 2. Packt Publishing Ltd, 2020.

Online Resources:

https://onlinecourses.nptel.ac.in/noc22_cs44/preview

No. of Internal Tests:	02	Max. Marks for Internal Test:	12
Marks for assessment of each experiment			18
Duration of Internal Test: 2 Hours			

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

AGILE SOFTWARE DEVELOPMENT LAB

(Professional Elective-II)

SYLLABUS FOR B.E. VII SEMESTER

L : T : P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code : **U21PE771IT**
Credits : 1	CIE Marks: 30	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
The Objectives of the course:	At the end of the course student will be able to:
1. Discuss the use of various tools used in Agile software development. 2. To provide students with skills in teamwork and objective-based development	1. Perform requirement analysis and write the user stories. 2. Develop and track the Release plan and Iteration Plan. 3. Apply Agile methodologies in development 4. Develop builds iteratively using automated build tools. 5. Demonstrate version control, Continuous Integration and documentation using automated tools.

List of Experiments

1. Understand the background and driving forces for taking an Agile approach to Software Development.
2. Build out a backlog and user stories.
3. Demonstrate and use automated build tool.
4. Demonstrate version control tool.
5. Demonstrate Continuous Integration tool
6. Perform Testing activities within an agile project.
7. Case Study based on tools and demonstration.
8. Hands on tools like Jira, Jenkins, Miro and Confluence OR Jira and DevOps.

Virtual Lab:

Suggested Reading:

1. Cohn, Mike, Agile Estimating and Planning, Pearson Education, 2006.
2. Cohn, Mike, User Stories Applied: For Agile Software Development Addison Wisley, 2004.

3. "The DevOps Handbook: How to Create World-Class Agility, Reliability, & Security in Technology Organizations" by Gene Kim, Patrick Debois, John Willis, and Jez Humble

Online Resources:

- https://miro.com/
- https://www.atlassian.com/software/jira
- https://www.atlassian.com/software/confluence
- https://www.jenkins.io/
- https://aws.amazon.com/devops/what-is-devops/

No. of Internal Tests:	02	Max. Marks for Internal Test:	12
Marks for assessment of each experiment			18
Duration of Internal Test: 2 Hours			

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

DATA ANALYTICS AND VISUALIZATION LAB

(Professional Elective-II)

SYLLABUS FOR B.E. VII SEMESTER

L : T : P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code : **U21PE781IT**
Credits : 1	CIE Marks: 30	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The Objectives of the course:	At the end of the course student will be able to:
1.Use Data science and visualization libraries in Python & R for descriptive and visual analysis. 2. Design statistical tests and dashboards using various libraries.	1. Implement descriptive analysis on datasets using Python & R. 2. Apply various data preprocessing techniques using Python & R Tidy verse. 3. Implement various visualizations using Seaborn and ggplot2. 4. Investigate the data, refine your hypothesis and analyse them. 5. Exploratory data analysis using various tools. 6. Design various interactive Dashboards using Tableau.

List of Experiments

1. Write a program for working with Pandas data frames leveraging descriptive and visualizations of data frame.
2. Install and use R Studio and R Markdown. Browse various datasets in R Studio.
3. Implement programs using Vectors, list, matrix, data frames and factors in R.
4. Import/export data from various sources CSV, Excel in R and Python.
5. Write a program to summarize various descriptive statistics using Pandas and R.
6. Write a program to tidy, cleaning and imputation using Tidyverse and dplyr.
7. Write a program for scaling and data normalization using Tidyverse, dplyr R libraries.

8. Write a program for selection, filter, sort, aggregate and joins data using Tidyverse, dplyr R libraries.
9. Write a program for creating line charts, bar plots, box plot, scatter plots, 3Dgraphs, Heatmaps and histograms using Seaborn.
10. Write a program for creating line charts, bar plots, box plot, scatter plots, 3D graphs and histograms using R ggplot2 library.
11. Visualize different types of Maps by loading dataset in ggplot2.
12. Write a program for Hypothesis testing using z-test , t-tests, and chi square tests.
13. Write a program for EDA on Wine Quality Data Set.
14. Implement data visualization and basic dashboards in Tableau.

Advanced: Case studies should be given to students. Ask them to analyse using descriptive, visualizations and come up with the conclusions.

Suggested Reading:

1. Data visualization with python: create an impact with meaningful data insights using interactive and engaging visuals, Mario Dobler, Tim Grobmann, Packt Publications, 2019
2. Practical Tableau: 100 Tips, Tutorials, and Strategies from a Tableau Zen Master, Ryan Sleeper, Oreilly Publications, 2018.
3. Data Visualization with R: 111 Examples by Thomas Rahlf, Springer, 2020

Online Resources:

1. Data visualizations in R
2. Comprehensive Guide to Data Visualization in R
3. https://www.datacamp.com/
4. https://seaborn.pydata.org/
5. https://www.r-project.org/
6. https://www.ibm.com/in-en/cloud/learn/exploratory-data-analysis

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

PROJECT SEMINAR

SYLLABUS FOR B.E VII- SEMESTER

L : T : P (Hrs./week): 0:0:2	SEE Marks : --	Course Code:**U21PW719IT**
Credits : 1	CIE Marks : 30	Duration of SEE : --

COURSE OBJECTIVES	COURSE OUTCOMES
The Objectives of the course:	*On completion of the course, students will be able to:*
Actively involve the student in the initial work required to undertake the final year project. It may comprise of: 1. Problem definition and specifications. 2. A broad understanding of the available technologies/ tools to solve a problem of interest. 3. Presentation (Oral and Written) of the project.	1. Review the literature relevant to the problem area /selected domain. 2. Define the problem by analysing existing solutions and prepare a synopsis on identified problem. 3. Identify tools and techniques for solving the problem and Setup the environment for implementation. 4. Communicate the work effectively in both oral and written forms.

Seminar topics may be chosen by the students with advice from the faculty members.

First 4 weeks of VII-Semester will be spent on special lectures by faculty members, research scholar speakers from industries and R&D institutions. The objective of these talks is to be expose students to real life / practical problems and methodologies to solve them.

A seminar schedule will be prepared by the coordinator for all the students. It should be from the 5th week to the last week of the semester and should be strictly adhered to.

Each student will be required to

1. Submit a one page synopsis of the seminar to be delivered for display on notice board.
2. Give a 20 minutes presentation followed by 10 minutes discussion.
3. Submit a technical write up on the talk delivered.

At least two teachers will be associated with the evaluation of the project seminar for the award of the CIE marks which should be on the basis of

performance on all the three items stated above.

In the first Semester the student is expected to complete problem definition, requirements specification and analysis, design.

No. of Internal Reviews:	03	Max. Marks for Internal Reviews:	30

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
SCHEME OF INSTRUCTION AND EXAMINATION (R-21)
B.E. – INFORMATION TECHNOLOGY : EIGHTH SEMESTER (2024 - 2025)

B.E (IT) VIII-SEMESTER									
S No.	Course Code	Course Name	Scheme of Instruction			Scheme of Examination			
			Hours per week			Duration in Hrs	Maximum Marks		Credits
			L	T	P/D		SEE	CIE	
1	U21PE8XXIT	Professional Elective - III	3	-	-	3	60	40	3
2	U21PE8XXIT	Professional Elective -IV	3	-	-	3	60	40	3
PRACTICALS									
3	U21PW819IT	Project / Internship	-	-	12	Viva-Voce	50	50	6
		Total	**6**	**-**	**12**		**170**	**130**	**12**
		Grand Total	**18**			**-**	**300**		

Professional Elective – III	Professional Elective – IV
U21PE810IT : Computer Vision	U21PE850IT: Generative AI
U21PE820IT: Information Security	U21PE860IT: Cloud Security
U21PE830IT: Software Project Management	U21PE870IT: Software Reuse Techniques
U21PE840IT: Quantum Computing	U21PE880IT: Fog and Edge Computing

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

COMPUTER VISION
(Professional Elective-III)
SYLLABUS FOR B.E VIII-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U21PE810IT**
Credits : 3	CIE Marks : 40	Duration of SEE: 3 Hrs

Course Objectives	**Course Outcomes**
The Objectives of the course:	**At the end of the course student will be able to:**
1. Explain geometric primitives and transformations. 2. Discuss feature extraction, classification and clustering approaches for image analysis. 3. Explore deep learning models for computer vision applications.	1. Understand image formation, geometric primitives and transformations. 2. Analyze feature detection and extraction techniques. 3. Choose appropriate segmentation and classification techniques for image analysis. 4. Examine various deep learning models in the literature for object detection, instance recognition, category recognition, context and scene understanding. 5. Analyze suitable deep learning models for computer vision applications including face recognition, visual question answering, tracking and gesture recognition.

Unit -1
Introduction: Background, requirements and issues, human vision
Image formation: Geometric primitives and transformations, Photometric image formation, The digital camera.

Unit-2
Feature detection and matching: Points and patches, Edges, Lines
Statistical approaches for Feature Extraction: Mathematical Notation & Background, Fourier Transform, Windowed Fourier Transform, Wavelets, Bayesian Decision Theory, Principal and Independent Component Analysis

Unit-3
Classification and Clustering: Bayes classifiers, SVM classifiers

Segmentation, Split and merge, Mean shift and mode finding – Medical Image segmentation

Unit 4:

Artificial neural networks: CNNS, Deep Learning Methods for Image classification, object detection and Instance recognition. Category recognition, Context and scene understanding

Unit -5

Deep learning for Face recognition, Visual question answering, Tracking, Gesture recognition

Learning Resources:

1. "Computer Vision: Algorithms and Applications", Richard Szeliski, 2010 (online version available at no cost for personal use).
2. "Computer Vision: A Modern Approach", D. Forsyth and J. Ponce, 2010.
3. "Deep Learning: Algorithms and Applications", I. Goodfellow, Y. Bengio and A. Courville, 2017 (online version available at no cost for personal use).
4. "A Guide to Convolutional Neural Networks for Computer Vision", S. Khan, H. Rahmani, S. Shah and M. Bennamoun, 2018 (online version available from a USC account).

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF INFORMATION TECHNOLOGY

INFORMATION SECURITY
(Professional Elective-III)
SYLLABUS FOR B.E VIII-SEMESTER

L : T : P (Hrs./week): 3:0:0	SEE Marks :60	Course Code : **U21PE820IT**
Credits : 3	CIE Marks: 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
The course will enable the students to:	**At the end of the course student will be able to:**
Develop an understanding of information security, gain familiarity with prevalent attacks, defenses against systems, and forensics to investigate the aftermath, develop a basic understanding of cryptography, how it has evolved, have a knowledge of information security planning and maintenance.	1. Enumerate the key terms and basics of Information Security along with Sec SDLC. 2. Understand how risk is identified and managed. 3. Identify management's role in development, maintenance and enforcement of Information Security policies 4. Plan for and respond to intruders in an information system, understand the basic principles of cryptography 5. Analyze the organizations information security blue print, discuss the need of maintaining information security program.

UNIT- I

Introduction: History, critical characteristics of information, NSTISSC security model, Components of an information system, Securing the components, balancing security and access, The SDLC, The security SDLC

Need for Security: Business needs, Threats, Attacks-secure software development

UNIT-II

Legal, Ethical and Professional Issues: Law and ethics in information security, relevant U.S laws-international laws and legal bodies, Ethics and information security

Risk Management: Overview, Risk Identification, risk assessment, Risk Control strategies, selecting a risk control strategy, Quantitative versus

qualitative risk control practices, Risk management discussion points, recommended risk control practices

UNIT-III

Planning for Security: Security policy, Standards and practices, Security blue print, Security education, Continuity strategies.

Security Technology: Firewalls and VPNs: Physical design, firewalls, protecting remote connections.

UNIT-IV

Security Technology: Intrusion detection, Access control and other security tools: Intrusion detection and prevention systems, Scanning and analysis tools, Access control devices.

Cryptography: Foundations of cryptology, cipher methods, cryptographic Algorithms, Cryptographic tools, Protocols for secure communications, Attacks on cryptosystems

UNIT-V

Implementing Information Security: information security project management, technical topics of implementation , Non- technical aspects of implementation, Security certification and accreditation

Security and Personnel: Positioning and staffing security function, Employment policies and practices, internal control strategies.

Information security Maintenance: Security management models. The maintenance model, Digital forensics.

Learning Resources:

1. Michael E. Whitman and Hebert J Mattord, Principles of Information Security, 4th edition, Ed. Cengage Learning 2011
2. Thomas R Peltier, Justing Peltier, John Blackley, Information Security. Fundamentals, Auerbacj Publications 2010
3. Detmar W Straub, Seymor Goodman, Richard L Baskerville, Information Security. Policy proceses and practices PHI 2008
4. Marks Merkow and Jim Breithaupt, Information Security. Principle and Practices, Pearson Education, 2007.
5. https://onlinecourses.nptel.ac.in/noc17_cs08/preview
6. http://nptel.ac.in/courses/106106129/

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:		30
2	No. of Assignments:	03	Max. Marks for each Assignment:		05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:		05

Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

SOFTWARE PROJECT MANAGEMENT

(Professional Elective-III)
SYLLABUS FOR B.E VIII-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U21PE830IT**
Credits : 3	CIE Marks : 40	Duration of SEE: 3 Hrs

Course Objectives	**Course Outcomes**
The Objectives of the course:	**At the end of the course student will be able to:**
1. Introduce the fundamental principles of Software Project management. 2. Design of artifacts, metrics for effective project management.	3. Compare traditional and modern software project management. 4. Understand workflows and artifacts for engineering and production stages. 5. Analyze iterative process planning for effective project management. 6. Apply seven core metrics to manage project and process. 7. Understand modern process improvement and map to CMM.

UNIT-I

Conventional Software Management: The waterfall model, conventional software Management performance, Evolution of Software Economics, Improving Software Economics: Reducing Software product size. The old way and the new: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

UNIT-II

Life cycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases.Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, pragmatic artifacts,Work Flows of the process, Checkpoints of the process.

UNIT-III

Iterative Process Planning: work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process,

Pragmatic planning, Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations.

UNIT-IV

Project Control and Process instrumentation: The seven core Metrics, Management indicators, quality indicators, Tailoring the Process: Process discriminants. Managing people and organizing teams.

UNIT-V

Future Software Project Management: modern Project Profiles, Next generation Software economics, modern process transitions. Process improvement and mapping to the CMM.

Learning Resources:

1. Walker Royce, Software Project Management: A Unified Framework, Pearson Education 1998
2. Bob Hughes and Mike Cotterell – Software Project Management, 4th Edition – Tata McGraw Hill – 2006
3. Pankaj Jalote, Software Project Management, Pearson Education – 2002
4. http://nptel.ac.in/courses/106101061/29

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

QUANTUM COMPUTING
(Professional Elective-III)
SYLLABUS FOR B.E VIII-SEMESTER

L : T : P (Hrs./week): 3:0:0	SEE Marks :60	Course Code : **U21PE840IT**
Credits : 3	CIE Marks: 40	Duration of SEE: 3 Hours

Course Objectives	Course Outcomes
The Objectives of the course:	**At the end of the course student will be able to:**
Study Quantum Computing in relation to Computer Science, learn Classical to Quantum computing, fundamental concepts of Quantum Computing and Quantum Supremacy. To study the details of Quantum mechanics, gain the knowledge about the basic hardware (Quantum Circuits) and mathematical models of Quantum computation. Learn Quantum Programming., basics of Quantum Information and Quantum Cryptography	1. Compare classical systems with Quantum Computing systems. 2. Demonstrate the role of Quantum Physics in Quantum Computing and use basic terminology in Quantum Computing. 3. Illustrate the significance of different components for computation of a Quantum model. 4. Explain, differentiate and apply the different Quantum algorithms. 5. Apply quantum programming on specific use cases of Quantum Computing.

Unit-I

Introduction – The leap from classical to Quantum, Classical deterministic systems, Probabilistic Systems, Quantum Systems, Assembling systems, Global Perspectives- History of Quantum computation and Quantum information, Nomenclature and Notation- Linear Algebra and Quantum Mechanics, Information theory and probability, frequently used quantum gates and circuit symbols, Quantum supremacy.

Unit- II

Basic Quantum theory- Quantum states: Superposition, Entanglement, the role of Quantum Physics: Quantum interference, Quantum entanglement, Quantum decoherence, Quantum bit: Qubit, Multiple Qubits, The state of

Quantum system, Observables, Measurements, Quantum Dynamics, Assembling Quantum systems, Super conducting Quantum Interface Devices (SQUID), Superconducting Qubits.

Unit – III

Quantum model of computation – Classical Gates, Reversible gates, Quantum gates, Quantum circuit model, Quantum Gates: 1-Qubit Gates, Controlled-U Gates, Universal Sets of Quantum Gates, Measurements with Quantum Circuits, Quantum Error Correction, Introduction to Quantum Communication and Quantum Cryptography.

Unit- IV

Quantum Algorithms: Deutsch's Algorithm, Deutsch-Jozsa Algorithm, Simon's periodicity Algorithm, Grover's Search Algorithm, Shor's Factoring Algorithm, Quantum computing use cases: Search, Quantum Simulations, Optimization, Cryptography, Image Processing, Healthcare, Finance, Chemical and biological engineering, Artificial Intelligence.

Unit-V

Quantum Programming Languages: Programming in Quantum world, Quantum Assembly Programming, Quantum Turing Machine, Quantum Random Access Memory Model (QRAM), Quantum Hardware Interface (QHI), Higher-level Quantum Programming, Introduction to Qiskit and IBM Quantum Experience, Introduction to Quantum python Library Pennylane.

Learning Resources:

1. Quantum Computing for Computer Scientists, Noson S. Yanofsky, Mirco A. Mannucci, Cambridge University Press,2008.
2. An Introduction to Quantum Computing, Phillip Kaye, Raymond Laflamme, Michele Mosca, Oxford University press, 2007.
3. Quantum Computing in Practice with Qiskit and IBM Quantum Experience, Hassi Norlen, 2020.
4. Quantum Computation and Quantum Information, Michael A. Nielsen & Isaac, I. Chuang, Cambridge University Press, 2010.
5. Swayam NPTEL, https://onlinecourses.nptel.ac.in/noc22_cs79/
6. A cross platform Python library for differential Programming of Quantum computers, Pennylane , https://pennylane.ai/

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05

Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF INFORMATION TECHNOLOGY

Generative AI

(Professional Elective-IV)

SYLLABUS FOR B.E VIII-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code: **U21PE850IT**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
The objective of this course is to provide the principles, tools and techniques of generative artificial intelligence and its application to various real world use cases.	1. Understand and Apply GenAI prompt engineering to various NLP tasks. 2. Identify and Apply advanced prompt engineering techniques including finetuning of LLMs. 3. Apply GenAI prompt engineering to various Vision tasks. 4. Apply GenAI prompt engineering to various Multi-modal tasks. 5. Understand GenAI Governance, Ethics and Regulation.

UNIT-I:

Introduction: Intro to Generative AI, Gen AI capabilities, limitations, and Applications.

Prompt engineering, Techniques: Basic tips like clarity, context, guiding, explicit instructions, formatting, multi steps and iterative refinement for reading, writing, and chatting. NLP applications: Inferring, Summarizing, Transforming and Chatbots.

UNIT-II:

GenAI using LLM: Advanced prompting techniques: Chain of thought, Meta prompting, Few-shot learning, Chaining, Prompt augmentation, Retrieval-Augmented Generation (RAG) and Lang Chain Framework.

LLM internals: OpenAI ChatGPT architecture, Pretraining on large corpus with Transformer, Supervised fine tuning (SFT), Reinforcement leaning with Human feedback (RLHF), Fine tuning LLMs: Data preparation, training, and evaluation of LLMs.

UNIT-III:
GenAI using Vision: Prompting Vision models, Image generation: Text prompts and adjusting hyper params.
Image segmentation: Prompting with positive, negative, and bounding box co-ordinates.
Object detection: Text prompts to identify objects.
In-Painting: Replace parts with GenAI.
Personalization of images with Fine tuning.
Introduction to Stable Diffusion 2.0 model for GenAI.

UNIT-IV:
Multi-model GenAI: Intro to Gemini multi-modal GenAI, prompting with text, audio, and images.
Audio Prompting Tips: simple queries, combined with Text and summarization.
Image prompting Tips: descriptive text, combined with text prompts, Image editing.
Intro to Microsoft Co-pilot.

UNIT-V:
Governance: Model vulnerabilities, Quality, Safety, and Security of LLMs, Responsible AI.
Ethical frameworks: Bias and Fairness, Transparency and Explainability, Risk mgmt., Public Trust.
Regulatory Compliance: Data privacy, Accountability and Liability, IP, frequent Auditing and Certification.

Learning Resources:

1. "Artificial Intelligence & Generative AI for Beginners" by David M. Patel.
2. "Generative Deep Learning: Teaching Machines to Paint, Write, Compose, and Play" by David Foster
3. "Generative AI with Python and TensorFlow 2" by Joseph Babcock and Raghav Bali.
4. "Generative AI for Business: The Essential Guide for Business Leaders" by Matt White.
5. "Generative AI in Practice" by Bernard Marr.
6. https://www.deeplearning.ai/courses/generative-ai-for-everyone/
7. https://www.deeplearning.ai/short-courses/chatgpt-prompt-engineering-for-developers/
8. https://www.deeplearning.ai/short-courses/building-systems-with-chatgpt/
9. https://www.deeplearning.ai/short-courses/langchain-for-llm-application-development/

10. https://www.deeplearning.ai/short-courses/finetuning-large-language-models/
11. https://www.deeplearning.ai/short-courses/building-evaluating-advanced-rag/
12. https://www.deeplearning.ai/short-courses/prompt-engineering-for-vision-models/
13. https://www.deeplearning.ai/short-courses/how-diffusion-models-work/
14. https://www.deeplearning.ai/short-courses/building-multimodal-search-and-rag/
15. https://gemini.google.com/
16. https://www.deeplearning.ai/short-courses/red-teaming-llm-applications/
17. https://www.deeplearning.ai/short-courses/quality-safety-llm-applications/

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

CLOUD SECURITY
(Professional Elective-IV)
SYLLABUS FOR B.E VIII-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U21PE860IT**
Credits : 3	CIE Marks : 40	Duration of SEE: 3 Hrs

Course Objectives	**Course Outcomes**
The Objectives of the course:	**At the end of the course student will be able to:**
Understand the concepts related to security mechanisms in cloud computing	1. Understand the basic principles of cloud security. 2. Explain the various security challenges and risks in cloud computing. 3. Identify the architectural features for providing cloud security 4. Interpret the security concerns and encryption techniques in data. 5. Analyze about the different security levels and security controls in the cloud.

UNIT-I

Cloud Computing Security Fundamentals: Optimize Security Operations in the Cloud Through the Lens of the NIST Framework , Security Objectives- Confidentiality, Integrity and Availability, Cloud Computing Services- Authentication, Authorization, Auditing, Accountability. Cloud Computing Risk Issues- The CIA Triad, Privacy and Compliance Risks, Threats to Infrastructure, Data and Access Control, Common Threats and Vulnerabilities, Eavesdropping, Denial of Service Attacks(DoS)

UNIT-II

Cloud Computing Security Challenges: Security Policy Implementation, Policy Types, Compliance and Regulations :Overview of compliance regulations : - HIPAA, PCI DSS, Computer Security Incident Response Team(CSIRT), Virtualization Security Management, Virtual Threats, Hypervisor Risks, Increased Denial of Service Risk, VM Security Recommendations, VM Specific Security Techniques. Case Study – Hypervisor Protection

UNIT-III

Architectural Considerations, Secure Execution Environments and Communications, Identity Management and Access Control, Identity Management, Passwords, Tokens, Memory Cards, Smart Cards, Biometrics,

Implementing Identity Management. Access Control- Controls Models for Controlling Access, Single Sign-On, Cloud Computing life cycle issues: Standards : Incident Response, Layered Security and IDS, IDS Issues,Security Incident Notification Process, Encryption and Key Management, Hardware Protection, Software- Based Protection . Case Study – AWS IAM.

UNIT-IV

Cloud Security and Trust Management, data Security in the Cloud: An Introduction to the Idea of Data Security, The Current State of Data Security in the Cloud, CryptDb: Onion Encryption layers – DET, RND, OPE, JOIN, SEARCH, HOM and Homomorphic Encryption, FPE. Trust – Zero Trust Model, Reputation and Security Management.

UNIT-V

Security at different levels: Infrastructure security; Network level security; Host level security; Application level security; Data security and storage; Implementation of security controls on AWS, Security controls in governance framework and types, Automating Compliance and Securing Data and Applications in AWS- Automate Compliance and Risk Management for Cloud Workloads, Build a Data Security Strategy in AWS, Design a Least Privilege Architecture in AWS, Use cases. Case Study : Cloud Watch

Learning Resources:

1. Ronald L. Krutz, Russell Dean Vines Cloud Security: A Comprehensive Guide to Secure Cloud Computing, , Wiley- India,2010
2. Frankm, DaveShackleFord, SANS Practical Guide to Security in the AWS Cloud, AWS Marketplace, Volume 1.
3. Thomas Erl 'Cloud Computing Design Patterns', Prentice Hall, 1st edition, June, 2015
4. https://reconshell.com/wp-content/uploads/2022/07/Cloud-Security-Handbook.pdf
5. https://dhoto.lecturer.pens.ac.id/lecture_notes/internet_of_things/CLOUD%20COMPUTING%20Principles%20and%20Paradigms.pdf
6. Raluca Ada Popa, Catherine M.S. Redfiled, NickolaiZeldovich, and Hari Balakrishnan, "Crypt DB" Protecting confidentiality with encrypted Query Processing" 23rd ACM Symposium on Operating Systems principles (SOSP 2011), Cascais, Portugal October 2011.
7. Craig Gentry,A fully Homomorhic Encryption Scheme, Doctoral Dissertation, September 2009
8. https://docs.aws.amazon.com/prescriptive-guidance/latest/aws-security-controls/sec-controls-gov-model.html
9. https://cloudtweaks.com/2014/07/computing-security-network-application-levels/

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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VASAVI COLLEGE OF ENGINEERING (Autonomous)
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DEPARTMENT OF INFORMATION TECHNOLOGY

SOFTWARE REUSE TECHNIQUES

(Professional Elective-IV)
SYLLABUS FOR B.E VIII-SEMESTER

L : T : P (Hrs./week): 3:0:0	SEE Marks :60	Course Code : **U21PE870IT**
Credits : 3	CIE Marks: 40	Duration of SEE : 3 Hours

Course Objectives	**Course Outcomes**
	At the end of the course student will be able to:
1. Provide overview of software reuse techniques. 2. Discuss creational, structural, behavioural and architectural design patterns.	1. Apply object-oriented techniques for designing reusable, maintainable and modifiable software. 2. Compare different design patterns for a given problem. 3. Demonstrate structural design patterns for better class and object composition. 4. Apply behavioural patterns for better organization and communication between the objects. 5. Analyze different architectural patterns for a software design.

UNIT-I
Software reuse success factors, Reuse driven software engineering business, Object oriented software engineering, applications and component sub systems, use case components, object components.

UNIT-II
Design Patterns – Introduction, Creational patterns, factory, factory method, abstract factory, singleton, builder prototype.

UNIT-III
Structural Patterns- Adapters, bridge, composite, decorator, façade, flyweight, proxy.
Behavioral Patterns – Chain of responsibility, command, interpreter.

UNIT-IV

Behavioral Patterns – Iterator, mediator, memento, observer,state, strategy, template, visitor, other, design patterns- Whole part, master-slave,view handler, forwarder- receiver, client – dispatcher- server, publisher – subscriber.

UNIT-V

Architectural patterns – Layers,pipes and filters, black board, broker, model-view controller,presentation- abstraction – control, micro kernel, reflection.

Learning Resources :

1. Ivar jacabson, Martin Griss, Patrick Hohson – Software Reuse. Architecture, Process and Organization for Bussiness Success, ACM Press, 1997.
2. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides – Design Patterns- Addison, 1995, Pearson Education.
3. Frank Buschmann etc. – Pattern Oriented Software Architecture – Volume 1, Wiley 1996.
4. James W Cooper – Java Design Patterns, a tutorial, Addison 2000, Pearson Education.
5. http://nptel.ac.in/courses/106101061/27
6. http://www.nptelvideos.com/video.php?id=910

The break-up of CIE: Internal Tests+ Assignments + Quizzes

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Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

FOG and EDGE Computing

[PROFESSIONAL ELECTIVE-IV]
SYLLABUS FOR B.E. VIII SEMESTER

L : T : P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code :**U21PE880IT**
Credits : 1	CIE Marks: 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The Objectives of the course:	At the end of the course student will be able to:
1. To introduce concepts, challenges and management issues related to fog and edge computing. 2. To learn architecture, middleware and data management in Fog and edge computing.	1. Explain the Internet of Things (IoT) and New Computing Paradigms and how they are related to cloud. 2. Identify the challenges and management of Cloud, Gof and edge computing. 3. Understand the middleware design issues of fog and edge computing. 4. Apply data management principles in fog computing. 5. Explain the architectures related to edge computing.

UNIT I:

Internet of Things (IoT) and New Computing Paradigms: Introduction, Relevant Technologies, Fog and Edge Computing Completing the Cloud, Advantages of FEC: SCALE,How FEC Achieves These Advantages: SCANC ,Hierarchy of Fog and Edge Computing ,Business Models ,Opportunities and Challenges, Out-of-Box Experience, Open Platforms, System Management.

UNIT II:

Addressing the Challenges in Federating Edge Resources :Introduction, The Networking Challenge, The Management Challenge, Miscellaneous Challenges.

Management and Orchestration of Network Slices in 5G, Fog, Edge, and Clouds

Introduction, 5G , Cloud Computing, Mobile Edge Computing (MEC) ,Edge and Fog Computing, Network Slicing in 5G, Infrastructure Layer, Network

Function and Virtualization Layer, Service and Application Layer. Slicing Management and Orchestration (MANO)

UNIT III

Middleware for Fog and Edge Computing: Design Issues

Introduction, Need for Fog and Edge Computing Middleware , Design Goals , State-of-the-Art Middleware Infrastructures, System Model , Proposed Architecture.

UNIT IV:

Data Management in Fog Computing:

Introduction, Background, Fog Data Management , Fog Data Life Cycle, Data Acquisition ,Lightweight Processing , Processing and Analysis , Sending Feedback , Command Execution, Data Characteristics, Data Pre-Processing and Analytics, Data Privacy , Data Storage and Data Placement

UNIT V:

A Lightweight Container Middleware for Edge Cloud: Architectures

Introduction, Background/Related Work , Edge Cloud Architectures, Clusters for Lightweight Edge Clouds , Architecture Management – Storage and Orchestration, OpenStack Storage , Docker Orchestration . IoT Integration , Security Management for Edge Cloud Architectures

Learning Resources:

1. Fog and Edge Computing: Principles and Paradigms, Edited by Rajkumar Buyya and Satish Narayana Srirama, Wiley Online Books.
2. https://onlinecourses.nptel.ac.in/noc24_cs66/preview

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Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
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DEPARTMENT OF INFORMATION TECHNOLOGY

PROJECT / INTERNSHIP

SYLLABUS FOR B.E VIII-SEMESTER

L:T:P (Hrs./week): 0:0:12	SEE Marks : 50	Course Code : **U21PW819IT**
Credits : 6	CIE Marks : 50	Duration of SEE: VIVA-VOCE

Course Objectives	**Course Outcomes**
The Objectives of the course:	*On completion of the course, students will be able to*
Analyze, Design and implement a system for the identified problem.	1. Apply practical knowledge within the chosen technology for project development. 2. Identify, analyze, design, formulate solution for complex engineering and societal problems with a comprehensive and systematic approach. 3. Apply modern tools and techniques for solving the real-time problems. 4. Develop project management skills effectively as a team or as an individual maintaining ethical values. 5. Demonstrate various stages of project through proper documentation and presentation.

Focus of U.G. Project should be on *Solving a Real Life Problem*.

Faculty members should prepare project briefs well in advance. They should be made available to the students at the departmental library.

A project may be classified as hardware/software/modeling/simulation. It should involve elements of such as analysis, design, coding, testing, etc.,

The department will appoint a project coordinator who will be incharge of the following:

- Grouping of students (a maximum of three in a group)
- Allotment of projects and project guides
- Project monitoring at regular intervals

Project allotments is to be completed by the 4th week of 1st Semester of IV years to that students

get sufficient time for completion of their projects.
All projects are to be based on the grade/marks, awarded by a monitoring committee comprising of faculty members as well as by the supervisor.
Efforts are to be made so that some of the projects are carried out in industries.
Projects may also be invited from industries.
Norms for final documentation of the project report are to be provided by the department.
* Excellent / Very Good / Good / Satisfactory / Unsatisfactory.
Note: Three periods of contact load will be assigned to each project guide.

No. of Internal Reviews:	2	Max. Marks for Internal Reviews:	50