VASAVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

ACCREDITED BY NAAC WITH A++ GRADE

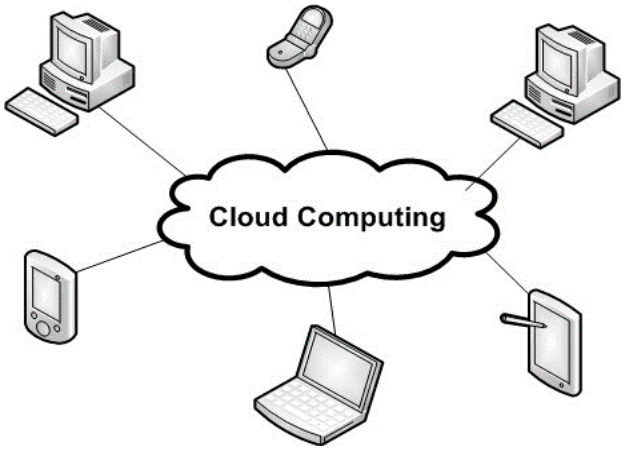
IBRAHIMBAGH, HYDERABAD-500 031

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 2023-2024
(For the batch admitted in 2020-21)
(R-20)



DEPARTMENT OF INFORMATION TECHNOLOGY
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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.

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-20)
B.E. – INFORMATION TECHNOLOGY : SEVENTH SEMESTER (2023 - 2024)

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**	
U20PC710IT	Compiler Construction	3	-	-	3	60	40	3
U20PC720IT	Distributed Systems & Cloud Computing	3	-	-	3	60	40	3
U20PE7XXIT	Professional Elective - I	3	-	-	3	60	40	3
U20PE7XXIT	Professional Elective – II	3	-	-	3	60	40	3
U20PE7XXIT	Professional Elective – III	3	-	-	3	60	40	3
U20PE7XXIT	Professional Elective – IV	3	-	-	3	60	40	3
PRACTICALS								
U20PC711IT	Compiler Construction Lab	-	-	2	3	50	30	1
U20PC721IT	Distributed Systems & Cloud Computing Lab	-	-	2	3	50	30	1
U20PW719IT	Project Seminar	-	-	2	-	-	30	1
	Library / Sports / Mentor Interaction	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Student should acquire one online certification course equivalent to 2 credits during III to VII Semesters.								**2**
Total		**18**	**-**	**6**	**-**	**460**	**330**	**23**
Grand Total		**24**			**-**	**790**		

Professional Elective – I	**Professional Elective – II**
U20PE710IT: Data Mining	U20PE750IT: Data Analytics with Visualization
U20PE720IT: Software Quality and Assurance	U20PE760IT: Software Testing
U20PE730IT: Graph Theory	U20PE770IT: Advanced Algorithms
U20PE740IT: Cryptography and Network Security	U20PE780IT: Information Security

Professional Elective – III	**Professional Elective – IV**
U20PE790IT : Neural Networks and Deep Learning	U20PE742IT: Digital Image & Video Processing
U20PE712IT: Software Reuse Techniques	U20PE752IT: Object Oriented Analysis and Design
U20PE722IT: Parallel and Distributed Algorithms	U20PE762IT: Quantum Computing
U20PE732IT: Information Storage and Management	U20PE772IT: Information Retrieval Systems

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

COMPILER CONSTRUCTION

SYLLABUS FOR B.E.- VII SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks :60	Course Code: **U20PC710IT**
Credits : 3	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:**
1. Explain the major concepts of language translation and various phases of compiler and its use. 2. Demonstrate various tools for building compilers.	1. Understand different phases of the compiler and develop a lexical analyzer using LEX tool. 2. Design top-down and bottom-up parsers. 3. Implement semantic rules for specifying the syntax and semantics of programming languages, and also transform an AST into intermediate representation. 4. Apply various optimization techniques on the Intermediate Representation. 5. Generate target code from the Intermediate Representation.

UNIT-I

Introduction to Compilers: 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-II

Syntax Analysis: Introduction, Context-Free Grammars.
Top-Down Parsing: Recursive Descent Parsing, Predictive Parsing, LL(1) Grammars. **Bottom-Up Parsing:** Shift-Reduce Parsing,Introduction to LR Parsing- SLR, More Powerful LR Parsers- CLR and LALR, Using Ambiguous Grammars, The Parser Generator- YACC.

UNIT-III

Syntax Directed Translation: Introduction, Syntax Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax Directed Translation.
Intermediate Code Generation: Variants of Syntax Trees, Three-Address Code, Types and Declarations, Translation of Expressions, Type Checking.

UNIT-IV

Run-Time Environments: Storage Organization, Stack Allocation of Space, Access to Non-local Data on the Stack, Heap Management, Introduction to Garbage Collection.
Code Optimization: Introduction, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, Machine Independent Optimizations – The Principal Sources of Optimizations.

UNIT-V

Code Generation: Introduction, Issues in the Design of a Code Generator, The Target Machine, A Simple Code Generator, Peephole Optimization, Register Allocation and Assignment, DAG for register allocation.

Learning Resources:

1. Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D Ullman – Compilers: Principles, Techniques &Tools – Pearson Education, Second Edition, 2007
2. Leland L Bech, System Software: An Introduction to Systems Programming, Pearson Education Asia, 1997.
3. Kenneth C. Louden, Compiler Construction: Principles and Practice, Thompson Learning, 2003.
4. J.P. Bennet, Introduction to Compiler Techniques, Second Edition, Tata McGraw-Hill, 2003.
5. https://nptel.ac.in/courses/106108052/
6. http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=Compilers

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):3:0:0	SEE Marks : 60	Course Code : **U20PC720IT**
Credits : 3	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, Microsoft Virtual Server- Features of Microsoft Virtual Server

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://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-172-performance-engineering-of-software-systems-fall-2010/video-lectures/lecture-20-distributed-systems
8. https://onlinecourses.nptel.ac.in/noc23_cs89/preview
9. 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

DATA MINING

(Professional Elective-I)

SYLLABUS FOR B.E. - VII SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code : **U20PE710IT**
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

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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)
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DEPARTMENT OF INFORMATION TECHNOLOGY

SOFTWARE QUALITY AND ASSURANCE

(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: 3 Hours

Course Objectives	**Course Outcomes**
The Objectives of the course:	**At the end of the course student will be able to:**
1.Introduce software quality and architectures. 2. Illustrate project life cycle quality management and metrics. 3.Familiarize software standards, certification and assessments.	1. **Understand** the basic principles of software quality and SQA Architecture. 2. **Examine** SQA components that can be integrated into the project life cycle. 3. **Analyze** various activities involved in software configuration management. 4. **Understand** software quality metrics and analyze its limitations and cost. 5. **Understand** standards, certifications and assessments of software quality management.

UNIT I : INTRODUCTION TO SOFTWARE QUALITY & ARCHITECTURE
Need for Software quality, Quality challenge, Software quality assurance (SQA): Definition and objectives, Software quality factors: McCall"s quality model, The SQA system: An SQA architecture, Software Project life cycle Components, Pre-project software quality components: Contract review, Development and quality plans.

UNIT II : SQA COMPONENTS IN THE PROJECT LIFE CYCLE
Software Development methodologies, Quality assurance activities in the development process, Verification and Validation, Reviews, Software Testing: Software Testing implementations, Quality of software maintenance: Pre-Maintenance software quality components, Quality assurance tools, CASE tools: software product quality, Software maintenance quality, Project Management.

UNIT III : SOFTWARE QUALITY INFRASTRUCTURE COMPONENTS
Procedures and work instructions, Templates, Checklists, 3S development: Staff training and certification, Corrective and preventive actions, Configuration management: Software change control Software Configuration management audit, Documentation control.

UNIT IV : SOFTWARE QUALITY MANAGEMENT & METRICS
Project progress control: Computerized tools, Software quality metrics: Objectives of quality measurement, Process metrics, Product metrics, Implementation, Limitations of software metrics, Costs of software quality: The classic model, Extended model, Application.

UNIT V : STANDARDS, CERTIFICATION & ASSESSMENT
Quality management standards, ISO 9001 and ISO 9000-3, Capability Maturity Models: CMM and CMMI assessment methodology, Bootstrap methodology, SPICE Project, SQA project process standards: IEEE Std 1012 & 1028, Organizing for Quality Assurance: Department management responsibilities, Project management responsibilities, SQA unit and other actors in SQA system.

Learning Resources:

1. Daniel Galin, "Software Quality Assurance", Pearson Publication, 2009.
2. Alan C. Gillies, "Software Quality: Theory and Management", International Thomson Computer Press, 1997.
3. Mordechai Ben-Menachem "Software Quality: Producing Practical Consistent Software", International Thompson Computer Press, 1997.

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Duration of Internal Test: **90 Minutes**

IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

GRAPH THEORY

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

L:T:P (Hrs./week):3:0:0	SEE Marks :60	Course Code : **U20PE730IT**
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:**
be familiar with the fundamental concepts related to graph theory.	1. Write precise and accurate mathematical definitions of objects using graph theory. 2. Identify and construct examples using the mathematical definitions studied 3. Validate and critically assess a mathematical proof. 4. Use the theoretical knowledge in the investigation of questions from graph theory 5. Use the definitions of graph theory in order to construct mathematical proofs.

UNIT-I:INTRODUCTION
Graphs – Introduction – Isomorphism – Sub graphs – Walks, Paths, Circuits –Connectedness – Components – Euler graphs – Hamiltonian paths and circuits – Trees – Properties of trees – Distance and centers in tree – Rooted and binary trees.

UNIT-II: TREES, CONNECTIVITY & PLANARITY
Spanning trees – Fundamental circuits – Spanning trees in a weighted graph – cut sets – Properties of cut set – All cut sets – Fundamental circuits and cut sets – Connectivity and separability – Network flows – 1-Isomorphism – 2-Isomorphism – Combinational and geometric graphs – Planer graphs – Different representation of a planer graph.

UNIT-III: MATRICES, COLOURING AND DIRECTED GRAPH
Chromatic number – Chromatic partitioning – Chromatic polynomial – Matching – Covering – Four color problem – Directed graphs – Types of directed graphs – Digraphs and binary relations – Directed paths and connectedness – Euler graphs.

UNIT-IV: PERMUTATIONS & COMBINATIONS
Fundamental principles of counting – Permutations and combinations – Binomial theorem – combinations with repetition – Combinatorial numbers – Principle of inclusion and exclusion – Derangement – Arrangements with forbidden positions.

UNIT-V: GENERATING FUNCTIONS
Generating functions – Partitions of integers – Exponential generating function – Summation operator – Recurrence relations – First order and second order – Non-homogeneous recurrence relations – Method of generating functions.

Learning Resources:

1. Narsingh Deo, "Graph Theory: With Application to Engineering and Computer Science", Prentice Hall of India, 2003.
2. Grimaldi R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", Addison Wesley, 1994.
3. Clark J. and Holton D.A, "A First Look at Graph Theory", Allied Publishers, 1995.
4. Mott J.L., Kandel A. and Baker T.P. "Discrete Mathematics for Computer Scientists and Mathematicians" , Prentice Hall of India, 1996.
5. Liu C.L., "Elements of Discrete Mathematics", Mc Graw Hill, 1985.
6. Rosen K.H., "Discrete Mathematics and Its Applications", Mc Graw Hill, 2007.

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Duration of Internal Test: **90 Minutes**

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 : **U20PE740IT**
Credits : 3	CIE Marks :40	Duration of SEE : 3Hours

COURSE OBJECTIVES	**COURSE OUTCOMES**
The Objectives of the course:	*On completion of the course, students will be able to:*
1. Provide fundamental knowledge on the concepts of number theory. 2. Demonstrate cryptographic techniques, hash functions, digital signature and cryptanalysis.	•Understand the fundamentals of number theory and security concepts. •Illustrate classical ciphers, block ciphers and stream ciphers. •Compare different types of Asymmetric key ciphers. •Distinguish different message authentication algorithms. •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:

Cryptanalysis: Introduction, Time-Memory Trade-off Attack, Differential and Linear Cryptanalysis. Cryptanalysis on Stream Cipher, Modern Stream Ciphers, Shamir's secret sharing, Identity-based Encryption (IBE), Attribute-based Encryption (ABE).

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.

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

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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**

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 : **U20PE750IT**
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

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**

SOFTWARE TESTING

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

L:T:P (Hrs./week):3:0:0	SEE Marks :60	Course Code : **U20PE760IT**
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

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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, HYDERABAD – 500 031
DEPARTMENT OF INFORMATION TECHNOLOGY

ADVANCED ALGORITHMS

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

L : T : P (Hrs./week): 3:0:0	SEE Marks :60	Course Code : **U20PE770IT**
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:**
Understand the differences among several advanced algorithms and recognize which one is better for the given problem under different conditions.	1. Use the comparisons and limitations of various algorithms and choose the right one for the given problem. 2. Analyze various Network and String matching algorithms. 3. Develop basic advanced algorithm analysis skills for analyzing the approximation ratio of approximation algorithms 4. Apply different methods and performance measures to analyze algorithms with respect to cost and scalability. 5. Analyze various Probabilistic Algorithms & Randomized Algorithms for their performance.

UNIT 1:
Fundamental Techniques: The Greedy Methodand Dynamic Programming.
Graphs: Elementary Graph Algorithms, Single Source Shortest Paths, All Pair Shortest Paths.

UNIT 2:
String Matching: Introduction to string-matching problem, Naïve algorithm, Rabin Karp, Knuth Morris Pratt algorithm.
NP Completeness: Polynomial time, Polynomial time verification, NP Completeness and reducibility.

UNIT 3:
Approximation Algorithms: Introduction, Approximation algorithms for vertex cover problem, The Travelling Salesman Problem, Set covering problem,The Subset-sum problem.

UNIT 4:
Parallel Algorithms: Introduction, Models, speedup and efficiency, some basic techniques, Two Examples from graph theory, Parallel sorting, Parallel sorting networks.

UNIT 5:
Probabilistic Algorithms: Numerical probabilistic algorithms: Numerical integration, Probabilistic counting, Monte Carlo algorithms: Verifying Matrix Multiplication, Las Vegas Algorithms: The Eight queens problem revisited, Probabilistic selection and sorting.

Learning Resources :

1. Thomas H. Cormen, Leiserson C.E, Rivest R.L , SteinC, Introduction to Algorithm, 4nd edition, MIT press, USA.
2. Fundamentals of Algorithmics : G.Brassard and P.Bratley
3. Approximation Algorithms: Vijay V.Vazirani
4. Randomized Algorithms: R. Motwani and P.Raghavan
1. Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.
2. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley.
3. Algorithms -- A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA.
4. Algorithmics : The spirit of computing: D.Harel

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Duration of Internal Test: **90 Minutes**

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

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

L : T : P (Hrs./week): 3:0:0	SEE Marks :60	Course Code : **U20PE780IT**
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:**
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

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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

NEURAL NETWORKS AND DEEP LEARNING

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

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U20PE790IT**
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 to Neural networks and deep learning. 2. Introduce Keras, Tensorflow and Pytorch libraries. 3. Explore the applications of CNN and RNN.	1. Understand activation functions and apply in multi-layer neural network models. 2. Apply appropriate regularization and optimization techniques for DL model training. 3. Implement and validate CNN models for classification problems in image. 4. Identify appropriate RNN architecture for sequence data analysis. 5. Develop DL models using Keras, Tensorflow and Pytorch libraries.

UNIT-I:
Introduction to Neural networks and Deep Learning: Perceptron, Sigmoid Neurons, Gradient descent, Multilayer Neural Network, Backpropagation, Convergence, Deep learning, Representation learning.

UNIT-II:
Regularization and Optimization techniques: L1 and L2 regularization, Early stopping, Dataset augmentation, Parameter sharing, Bagging and Ensemble, Dropout and Adversarial training.
Challenges in optimization, Basic algorithms: SGD, Momentum, NesterovMomentum; Parameter initialization strategies, Adaptative learning algorithms: RMSProp, Adam.

UNIT-III:
Convolutional Neural networks (or CNN): Convolution operation, Motivation, Pooling, Convolution and pooling as an infinitely strong prior, Convolution variants, AlexNet, GoogleNet models, Applications.

UNIT-IV:
Recurrent neural networks (or RNN): Intro, unfolding graph, Basic architecture, Backpropagation through time (BPTT), Long term dependencies, Vanishing and exploding gradients, Optimization for Long-term dependency challenge, LSTM, Encoder-decoder seq-seq architecture, Applications.

UNIT-V:
DL programming: Intro to Keras API, Intro to TensorFlow, Google Net convolution algorithm, Transfer learning for Image classification.
Intro to PyTorch, Neural machine translation algorithm.

Learning Resources:
1. Deep learning, MIT Press by Ian Goodfellow and YoshuaBengio and Aaron Courville.
2. https://www.cse.iitm.ac.in/~miteshk/CS7015.html
3. https://www.deeplearningbook.org/
4. https://keras.io/
5. https://www.tensorflow.org/
6. https://pytorch.org/

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

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Duration of Internal Test: **90 Minutes**

IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF INFORMATION TECHNOLOGY

SOFTWARE REUSE TECHNIQUES
(Professional Elective-III)
SYLLABUS FOR B.E VII-SEMESTER

L : T : P (Hrs./week): 3:0:0	SEE Marks :60	Course Code : **U20PE712IT**
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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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

PARALLEL AND DISTRIBUTED ALGORITHMS

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

L : T : P (Hrs./week): 3:0:0	SEE Marks :60	Course Code : **U20PE722IT**
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:**
Understand the basic algorithms used in parallel and distributed systems.	1. To learn parallel and distributed algorithms development techniques for shared memory and message passing models. 2. To study the main classes of parallel algorithms. 3. To study the complexity and correctness models for parallel algorithms.

UNIT-I :
Basic Techniques, Parallel Computers for increase Computation speed, Parallel & Cluster Computing, Dichotomy of Parallel Computing Platforms, Cost of Communication.

UNIT-II :
Message Passing Technique- Evaluating Parallel programs and debugging, PRAM algorithms:Prefix Sums, List Ranking, Preorder Tree Traversal, Merging Two Sorted Lists, Portioning and Divide and Conquer strategies examples.

UNIT-III :
Pipelining- Techniques computing platform, pipeline programs examples, Pipelining- Techniques computing platform, pipeline programs examples

UNIT-IV:
Synchronous Computations, load balancing, distributed termination examples, programming with shared memory, shared memory multiprocessor constructs, parallel programming languages and constructs, Shared Memory Parallel Programming using OpenMP.

UNIT-V :
Distributed shared memory systems and programming achieving constant memory distributed shared memory programming primitives, algorithms – sorting and numerical algorithms, Global state and snapshot algorithms, Mutual exclusion and Clock Synchronization.

Learning Resources:

1. Parallel Programming, Barry Wilkinson, Michael Allen, Pearson Education, 2nd Edition.
2. Introduction to Parallel algorithms by Jaja from Pearson, 1992
3. Michael J Quinn, Parallel Computing, TMH
4. Mukesh Singhal and Niranjan G. Shivaratri, Advanced Concepts in Operating Systems, TMH
5. Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, Introduction to Parallel Computing, Pearson

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

INFORMATION STORAGE AND MANAGEMENT

(Professional Elective-III)

SYLLABUS FOR B.E VII-SEMESTER

L : T : P (Hrs./week): 3:0:0	SEE Marks :60	Course Code : **U20PE732IT**
Credits : 3	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. Introduce various networked storage architectures. 2. Discuss business continuity solutions and security.	1. Understand challenges in data storage and management. 2. Illustrate disk functioning and Compare different RAID levels. 3. Compare different networked storage technologies. 4. Apply backup, replication and recovery mechanisms for business continuity. 5. Identify challenges in storage security and Virtualization

UNIT-I

Introduction to Storage Technology: Data creation and The value of data to a business, Information Lifecycle, Challenges in data storage and data management, Solutions available for data storage, Core elements of a Data Center infrastructure, role of each element in supporting business activities.

UNIT-II

Storage Systems Architecture: Hardware and software components of the host environment, Key protocols and concepts used by each component ,Physical and logical components of a connectivity environment ,Major physical components of a disk drive and their function, logical constructs of a physical disk, access characteristics, and performance Implications, Concept of RAID and its components, Different RAID levels and their suitability for different application environments: RAID 0, RAID 1, RAID 3, RAID 4, RAID 5, RAID 0+1, RAID 1+0, RAID 6, Integrated and Modular storage systems ,high-level architecture and working of an intelligent storage system

UNIT-III

Introduction to Networked Storage: Evolution of networked storage, Architecture, components, and topologies of FC-SAN, NAS, and IP-SAN, Benefits of the different networked storage options, Understand the need for long-term archiving solutions and describe how CAS fulfil the need, Understand the appropriateness of the different networked storage options for different application environments.

UNIT-IV

Information Availability, Monitoring & Managing Data Center: Reasons for planned/unplanned outages and the impact of downtime, Impact of downtime. Differentiate between business continuity (BC) and disaster recovery (DR), RTO and RPO, Identification of single points of failure in a storage infrastructure and solutions to mitigate these failures, Architecture of backup/recovery and the different backup/ recovery topologies, replication technologies and their role in ensuring information availability and business continuity, Remote replication technologies and their role in providing disaster recovery and business continuity capabilities. Key areas to monitor in a data center, Industry standards for data center monitoring and management, Key metrics to monitor storage infrastructure.

UNIT-V

Securing Storage and Storage Virtualization: Information Security, Critical security attributes for information systems, Storage security domains, Analyze the common threats in each domain. Storage Virtualization: Forms, Configurations and Challenges. Types of Storage Virtualization: Block-level and File-Level.

Learning Resources:

1. G.Somasundaram, Alok Shrivastava, EMC Education Series, "Information Storage and Management", 2nd Edition, Wiley, Publishing Inc., 2012.
2. Robert Spalding, "Storage Networks: The Complete Reference", TataMcGraw Hill,Osborne, 2003.
3. Marc Farley, "Building Storage Networks", TataMcGraw Hill, Osborne. 2001.
4. MeetaGupta, Storage Area Network Fundamentals, Pearson Education Limited, 2002.
5. http://nptel.ac.in/courses/106108058/

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
SYLLABUS FOR B.E VII-SEMESTER

DIGITAL IMAGE & VIDEO PROCESSING
(Professional Elective-IV)

L : T : P (Hrs./week): 3:0:0	SEE Marks :60	Course Code : **U20PE742IT**
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

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

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

OBJECT ORIENTED ANALYSIS AND DESIGN
(Professional Elective-IV)
SYLLABUS FOR B.E.- VII SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code : **U20PE752IT**
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:
• Learn the basics of OO analysis and design skills. • Learn the UML design diagrams. • Learn to map design to code. • Be exposed to the various testing techniques.	1. Use the UML analysis and design diagrams. 2. Design and implement projects using OO concepts. 3. Apply appropriate design patterns. 4. Create code from design. 5. Compare and contrast various testing techniques.

UNIT I UML DIAGRAMS
Introduction to OOAD – Unified Process – UML diagrams – Use Case – Class Diagrams– Interaction Diagrams – State Diagrams – Activity Diagrams – Package, component and Deployment Diagrams.

UNIT II DESIGN PATTERNS
GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion – Controller – Design Patterns – creational – factory method – structural – Bridge – Adapter – behavioral – Strategy – observer.

UNIT III CASE STUDY
Case study – the Next Gen POS system, Inception -Use case Modeling – Relating Use cases – include, extend and generalization – Elaboration – Domain Models – Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class Hierarchies – Aggregation and Composition.

UNIT IV APPLYING DESIGN PATTERNS
System sequence diagrams – Relationship between sequence diagrams and use cases Logical architecture and UML package diagram – Logical architecture refinement – UML class diagrams – UML interaction diagrams – Applying GoF design patterns.

UNIT V CODING AND TESTING
Mapping design to code – Testing: Issues in OO Testing – Class Testing – OO Integration Testing – GUI Testing – OO System Testing.

Learning Resources:

1. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development", Third Edition, Pearson Education, 2005.
2. Simon Bennett, Steve Mc Robb and Ray Farmer, "Object Oriented Systems Analysis and Design Using UML", Fourth Edition, Mc-Graw Hill Education, 2010.
3. Erich Gamma, and Richard Helm, Ralph Johnson, John Vlissides, "Design patterns: Elements of Reusable Object-Oriented Software", Addison-Wesley, 1995.
4. Martin Fowler, "UML Distilled: A Brief Guide to the Standard Object Modeling Language", Third edition, Addison Wesley, 2003.
5. Paul C. Jorgensen, "Software Testing:- A Craftsman‟s Approach", Third Edition, Auerbach Publications, Taylor and Francis Group, 2008.

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Duration of Internal Test: **90 Minutes**

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

QUANTUM COMPUTING
(Professional Elective-IV)
SYLLABUS FOR B.E VII-SEMESTER

L : T : P (Hrs./week): 3:0:0	SEE Marks :60	Course Code : **U20PE762IT**
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, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

INFORMATION RETRIEVAL SYSTEMS
(Professional Elective-IV)
SYLLABUS FOR B.E VII-SEMESTER

L : T : P (Hrs./week): 3:0:0	SEE Marks :60	Course Code : **U20PE772IT**
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. Provide an overview of information retrieval systems. 2. Introduce various retrieval models like classic IR, Structured Text Retrieval Models.	1. **Identify** appropriate IR Model to retrieve relevant information. 2. **Evaluate** structured text retrieval models. 3. **Understand** query operations and multimedia properties. 4. **Analyze** the different text compression and indexing techniques. 5. **Analyze** sequential searching, pattern matching, parallel and distributed IR.

UNIT-I
Introduction: Basic concepts, Past, present and Future of IRS, Retrieval Process. Modeling: Introduction, A Taxonomy of IR Models, Retrieval: Adhoc and Filtering, A formal characterization of IR Models, Classic IR, Set Theoretic Models, Algebraic Models, Probabilistic Models

UNIT-II
Structured Text Retrieval Models, Models for Browsing, Retrieval Evaluation: Introduction, Reference Collections. Query languages: Introduction, Keyword-based querying, pattern Matching, Structural Queries, Query Protocols.

UNIT-III
Query operations: Introduction, User Relevance Feedback, Automatic Local Analysis, Automatic Global Analysis.
Text and Multimedia Languages and Properties: Introduction, Meta Data, Text, Markup Languages, Multimedia.

UNIT-IV
Text operations: Introduction, Document Preprocessing, Document Clustering, Text Compression, Comparing Text Compression Techniques.
Indexing: Introduction, Inverted Files, Other Indices for Text, Boolean Queries.

UNIT-V
Searching: Sequential Searching, Pattern Matching.
Parallel and Distributed IR: Introduction, Parallel IR, Distributed IR.

Learning Resources:

1. Ricardo, Baeza-yates, Berthier Ribeiro-Neto, "Modern Information Retrieval" Pearson Education, 2008
2. David A. Grossman, Ophir Frieder, "Information Retrieval - Algorithms and Heuristics", Springer, 2nd Edition (Distributed by Universities Press), 2004.
3. Gerald Kowalski, "Information Retrieval Systems: Theory and Implementation", Kluwer Academic Publishers, 1997.
4. William B. Frakes, Ricardo Baeza- Yates, "Information Retrieval – Data Structures & Algorithms", Pearson Education, 2008.
5. http://videolectures.net/Top/Computer_Science/Information_Retrieval/

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**

DEPARTMENT OF INFORMATION TECHNOLOGY

COMPILER CONSTRUCTION LAB

SYLLABUS FOR B.E. VII SEMESTER

L : T : P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code : **U20PC711IT**
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. 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. Implementation of Lexical Analyzer to recognize a few patterns in C. (Ex. identifiers, constants, comments, operators etc.)
2. Implementation of Lexical Analyzer using LEX tool.
3. Implementation of Recursive Descent Parser.
4. Implementation of FIRST() of a given Context-Free Grammar.
5. Implementation of FOLLOW() of a given Context-Free Grammar.
6. Construction of a Predictive parsing Table for a given CFG.
7. Implementation of SLR parsing algorithm.
8. Implementation of Desktop Calculator using LEX and YACC tools.
9. Implementation of code optimization techniques.
10. Implementation of Code Generation.

Suggested Reading:

1. Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D Ullman – Compilers: Principles , Techniques &Tools – Pearson Education, Second Edition, 2007
2. 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 : **U19PC721IT**
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.

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

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

PROJECT SEMINAR

SYLLABUS FOR B.E VII- SEMESTER

L : T : P (Hrs./week): 0:0:2	SEE Marks : --	Course Code:**U20PW719IT**
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-20)
B.E. – INFORMATION TECHNOLOGY : EIGHTH SEMESTER (2023 - 2024)

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	U20PE8XXIT	Professional Elective - V	3	-	-	3	60	40	3
2	U20PE8XXIT	Professional Elective -VI	3	-	-	3	60	40	3
3	U20PE0XXIT	MOOCs Certification	-	-	-	-	-	-	2
PRACTICALS									
4	U20PW819IT	Project / Internship	-	-	12	Viva-Voce	50	50	6
		Total	**6**	**-**	**12**		**170**	**130**	**14**
		Grand Total	**18**			**-**	**300**		

Professional Elective – V	Professional Elective - VI
U20PE810IT: Natural Language Processing	U20PE850IT: Computer Vision
U20PE820IT: Software Project Management	U20PE860IT: Agile Software Development
U20PE830IT: Computational Number Theory	U20PE870IT: Information Theory and Coding
U20PE840IT: Block Chain	U20PE880IT: Cloud Security

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

NATURAL LANGUAGE PROCESSING

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

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U20PE810IT**
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

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-V)
SYLLABUS FOR B.E VIII-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U20PE820IT**
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.	1.Compare traditional and modern software project management. 2.Understand workflows and artifacts for engineering and production stages. 3.Analyze iterative process planning for effective project management. 4. Apply seven core metrics to manage project and process. 5. 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

COMPUTATIONAL NUMBER THEORY

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

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U20PE830IT**
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:**
Introduce computational aspects of number theory and various algorithms related to prime numbers, integer factorization and discrete logarithms.	1. Demonstrate knowledge of the computational aspects of number theory concepts. 2. Understand various algorithms available in number theory. 3. Apply the algorithms and study its practical computational aspects for integer factorization, primality testing. 4. Understand the complexity of various algorithms 5. Explain the relative strengths and weaknesses of different algorithms.

UNIT-I
Algorithms for integer arithmetic: Divisibility, gcd, modular arithmetic, modular exponentiation, Montgomery arithmetic, congruence, Chinese remainder theorem, Hensel lifting, orders and primitive roots, quadratic residues, integer and modular square roots, prime number theorem, continued fractions and rational approximations.
UNIT-II
Representation of finite fields: Prime and extension fields, representation of extension fields, polynomial basis, primitive elements, normal basis, optimal normal basis, irreducible polynomials.
Algorithms for polynomials: Root-finding and factorization, Lenstra-Lenstra-Lovasz algorithm, polynomials over finite fields.
UNIT-III
Elliptic curves: The elliptic curve group, elliptic curves over finite fields, Schoof's point counting algorithm
Primality testing algorithms: Fermat test, Miller-Rabin test, Solovay-Strassen test, AKS test.
UNIT-IV
Integer factoring algorithms: Trial division, Pollard rho method, p-1 method, CFRAC method, quadratic sieve method, elliptic curve method.
Computing discrete logarithms over finite fields: Baby-step-giant-step method, Pollard rho method, Pohlig-Hellman method, index calculus methods, linear sieve method, Coppersmith's algorithm.
UNIT-V
Applications: Algebraic coding theory, cryptography.

Learning Resources:

1. V. Shoup, *A computational introduction to number theory and algebra*, Cambridge University Press.
2. M. Mignotte, *Mathematics for computer algebra*, Springer-Verlag.
3. Niven, H. S. Zuckerman and H. L. Montgomery, *An introduction to the theory of numbers*, John Wiley.
4. J. von zurGathen and J. Gerhard, *Modern computer algebra*, Cambridge University Press.
5. R. Lidl and H. Niederreiter, *Introduction to finite fields and their applications*, Cambridge University Press.
6. J. Menezes, editor, *Applications of finite fields*, Kluwer Academic Publishers.
7. J. H. Silverman and J. Tate, *Rational points on elliptic curves*, Springer International Edition.
8. D. R. Hankerson, A. J. Menezes and S. A. Vanstone, *Guide to elliptic curve cryptography*, Springer-Verlag.
9. Das and C. E. VeniMadhavan, *Public-key cryptography: Theory and practice, Pearson Education Asia.*
10. H. Cohen, *A course in computational algebraic number theory*, Springer-Verlag

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

BLOCK CHAIN
(Professional Elective-V)
SYLLABUS FOR B.E VIII-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U20PE840IT**
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 block chain architectures and platforms. 3. Demonstrate applications of blockchain with case studies.	1. Understand fundamental concepts of cryptocurrency, consensus and privacy. 2. Distinguish various architectures of blockchain. 3. Analyse the use of public and private blockchains. 4. Build blockchain applications using ethereum and hyperledger platforms. 5. Understand applications of blockchain for financial, supply chain and government systems.

UNIT-I
Introduction: History: Digital Money to Distributed Ledgers, Crypto currencies, Design Primitives: Protocols, Security, Consensus, Permissions, Privacy

UNIT-II
Cryptography primitives, Blockchain Architecture and Design: Basic crypto primitives: Hashing, Signature, Privacy and Security, Hash chain to Blockchain, Basic consensus mechanisms, Requirements for the consensus protocols, Proof of Work (PoW), Scalability aspects of Blockchain consensus protocols

UNIT-III
Private and public Blockchains: Private, public, Permissioned Blockchains**,** Design goals, Consensus protocols for Permissioned Blockchains.

UNIT-IV
Ethereum and Hyperledger FabricPlatforms: Decomposing the consensus process, Hyperledger fabric components,Chain code Design and Implementation, fabric SDK and Front End, Hyperledger composer tool, Ethereum platform and programming.

UNIT-V
Use cases: Blockchain in Financial Software and Systems (FSS): Settlements, KYC, Capital markets, Insurance.
Blockchain in trade supply chain: Provenance of goods, visibility, trade supply chain finance, invoice management discounting, etc.
Blockchain for Government: Digital identity, land records and other kinds of record keeping between government entities, public distribution system social welfare systems

Learning Resources:

1. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, by Andreas Antonopoulos
2. Blockchain by Melanie Swa, OReilly
3. Hyperledger Fabric - https://www.hyperledger.org/projects/fabric
4. Zero to Blockchain - An IBM Redbooks course, by Bob Dill, David Smits
https://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/crse0401.html

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

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

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U20PE850IT**
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, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

AGILE SOFTWARE DEVELOPMENT

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

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U20PE860IT**
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:**
Introduce Agile development methodologies and understanding of its practical application to today's software development to deliver the products or services quickly with high quality.	1. Apply Agile Software Development practices and work small teams to create high-quality software. 2. Understand the concepts of software design and a set of software technologies and APIs. 3. Demonstrate Agile development and testing techniques. 4. Understand the benefits and pitfalls of working in an Agile team.

UNIT I

AGILE METHODOLOGY : Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model – Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams – Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values

UNIT II

AGILE PROCESSES : Lean Production – SCRUM, Crystal, Feature Driven Development- Adaptive Software Development – Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.

UNIT III

AGILITY AND KNOWLEDGE MANAGEMENT : Agile Information Systems – Agile Decision Making – Earl_S Schools of KM – Institutional Knowledge Evolution Cycle – Development, Acquisition, Refinement, Distribution, Deployment , Leveraging – KM in Software Engineering – Managing Software Knowledge – Challenges of Migrating to Agile Methodologies – Agile Knowledge Sharing – Role of Story-Cards – Story-Card Maturity Model (SMM).

UNIT IV

AGILITY AND REQUIREMENTS ENGINEERING : Impact of Agile Processes in RE–Current Agile Practices – Variance – Overview of RE Using Agile – Managing Unstable Requirements – Requirements Elicitation – Agile Requirements Abstraction Model – Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modeling and Generation – Concurrency in Agile Requirements Generation.

UNIT V

AGILITY AND QUALITY ASSURANCE : Agile Product Development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance – Test Driven Development – Agile Approach in Global Software Development.

Learning Resources:

1. David J. Anderson and Eli Schragenheim, —Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results, Prentice Hall, 2003.
2. Hazza and Dubinsky, —Agile Software Engineering, Series: Undergraduate Topics in Computer Science, Springer, 2009.
3. Craig Larman, —Agile and Iterative Development: A Managers Guide, Addison-Wesley, 2004.
4. Kevin C. Desouza, —Agile Information Systems: Conceptualization, Construction, and Management, Butterworth-Heinemann, 2007.

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

INFORMATION THEORY AND CODING

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

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U20PE870IT**
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 basic principles of Information Theory and coding.	1. Define the fundamental concepts related to Information Theory 2. Apply the concept of Huffman coding in block to variable length coding 3. Apply the concepts of Arithmetic, Lempel-Ziv and Tunstall codes in variable to variable length coding. 4. define and compute the channel capacity of discrete memoryless channels. 5. Define the concepts related to differential entropy, Gaussian channel, parallel gaussian channels.

UNIT-I:
Introduction: Entropy, Relative Entropy, Mutual Information, Information Inequalities,
Block to Variable length coding-I: Kraft's Inequality.

UNIT-II:
Block to variable length coding -II: Huffman coding, Variable to Block length coding: Tunstall coding.

UNIT-III:
Block to Block length coding: Typical sequences; Variable to variable length coding-I: Arithmetic codes, Variable to variable length coding-II: Lempel-Ziv codes.

UNIT-IV:
Asymptotic Equipartition property, coding for sources with memory, Noisy channel coding theorem, converse of noisy channel coding theorem, Channel capacity of discrete memoryless channels

UNIT -V:
Differential Entropy, Gaussian channel, Parallel Gaussian channel, Rate Distortion Theory.

Learning Resources:

1. **Thomas M. Cover, Joy A. Thomas, ``Elements of Information Theory'', 2nd Edition, John Wiley & Sons, 2006.**
2. https://nptel.ac.in/courses/117108097/

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

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Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
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DEPARTMENT OF INFORMATION TECHNOLOGY

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

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U20PE880IT**
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 concerns in cloud computing. 3. Assess the risk tolerance in cloud computing 4. Identify the architectural features for providing cloud security 5. Explain about the mechanisms related to security data in the cloud.

UNIT-I
Introduction to Cloud Security: Terminology and principles, Risk Management, Security as a business enabler, Systems engineering, IT Architecture, Control over security in cloud model.

UNIT-II
Cloud Computing Security concerns: Virtualization, Provisioning, Cloud Storage, Cloud Operation, Security and networking.

UNIT-III
Risk Tolerance in Cloud Computing: Assessing the Risk, Information assets and Risk, Privacy and confidentiality concerns, Data ownership and Locale concerns, Auditing and Forensics, Emerging threats.

UNIT-IV
Securing the Cloud - Architectural aspects: Security requirements for architecture-Physical security, Cloud security standards and policies, Cloud security requirements, Security patterns and architecture elements-Defense-in-depth, Honey-pots, Sandboxes, Network pattern, Importance of CMDB, Cabling patterns, Resilience and grace, planning for change

UNIT-V
Securing the Cloud-Data Security: Overview of Data security in Cloud Computing-Control over data and public cloud economics, organizational responsibility: ownership and custodianship, Data in rest, data in motion, common risk with cloud data security, Cloud data security: Sensitive data categorization- authentication and identity, access control techniques, data categorization and the use of data labels, application of encryption at data at rest and data in motion

Learning Resources:
1. Vic Winkler 'Securing the cloud' Syngress/Elsevier , April 2011
2. Thomas Erl 'Cloud Computing Design Patterns', Prentice Hall, 1st edition, June, 2015
3. https://www.oreilly.com/library/view/securing-the-cloud/9781597495929/
4. https://www.academia.edu/19589929/Securing_the_Cloud
5. file:///F:/IT%20Department/VCE%20AUTONOMOUS%20-%20BOS/2019-20/BOS%20CBCS%202019-20/Scheme/cscie_49.pdf
6. https://canvas.harvard.edu/courses/8146/assignments/syllabus

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

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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)
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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 : **U20PW819IT**
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 I Very Good I Good I Satisfactory I 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