

INSTITUTE OF ENGINEERING AND TECHNOLOGY

DOCTOR HARISINGH GOUR VISHWAVIDYALAYA, SAGAR (M.P.)
470003
(A CENTRAL UNIVERSITY)
NAAC A+ Accreditation
(Approved by AICTE, New Delhi)



Curriculum Framework & Syllabus
of

UNDERGRADUATE PROGRAMME

B.Tech. in

COMPUTER SCIENCE AND ENGINEERING

IV th Year

(VII th and VIII th Semester)

Courses effective from Academic Session 2024-2025
only for 2022 batch

Date of BoS:

27/09/2024

PREAMBEL

The curriculum of B.Tech. Computer Science and Engineering program is prepared in accordance with the curriculum framework of AICTE. Further this Outcome Based Curriculum (OBC) is designed with Choice Based Credit and Semester System (CBCSS) In addition; the curriculum and syllabi are designed in a structured approach by deploying Feedback Mechanism on Curriculum from various stakeholders viz. Industry, Potential Employers, Alumni, Academia, Professional Bodies, Research Organizations and Parents to capture their voice of the respective stakeholders. The Curriculum design, delivery, and assessment, the three major pillars of academic system is completely aligned in line with Outcome Based Education (OBE) to assess and evaluate the learning outcomes to facilitate the learners to achieve their Professional and Career Accomplishments. The Vision To become the Centre of Excellence for technically competent and innovative computer engineers.

The B.Tech. in Computer Science and Engineering at Institute of Engineering and Technology focuses on teaching the fundamentals of hardware and software, algorithm analysis, and mathematics and science knowledge. The programme provides students with solid programming and engineering fundamentals as well as research and innovation skills in computer engineering. Artificial Intelligence, Machine Learning, Data Analytics, Cloud Computing, High-Performance Computing, Internet of Things, Network and Cyber Security, and Computer Forensics are among the cutting-edge technologies taught by experienced and eminent faculty.

For Semester V

S.No.	Nature of Courses	Credits
1.	Core Courses	13
2.	Laboratory Courses/Practical	7
Total		20 Credits

For Semester VI

S.No.	Nature of Courses	Credits
1.	Core Courses	11
2.	Laboratory Courses/Practical	9
Total		20 Credits

[A] Scheme of Examination:**(a) Theory Block**

1.	Mid exam (internal)	i Mid-I	: 20%
		ii Mid-II (IA)	: 10%
		(Assignments, tutorials, regularity, quizzes, class test)	
2.	End Exam (external)	i End-semester examination	: 70%
Total			: 100%

(b) Practical Block

1.	Mid exam (internal)	i Mid-I	: 20%
		ii Mid-II (IA)	: 20%
		(Lab work, field work/seminar, quizzes, assignments and regularity)	
2.	End Exam (external)	i End-semester examination	: 60%
Total			: 100%

(c) Project Evaluation:

1. Mid exam (internal)	i Mid-I Presentation and evaluation of Synopsis	: 20%
	ii Mid-II (IA) Presentation and evaluation of Progress of work	: 20%
2. End Exam (external)	i End-semester examination	: 60%
	▪ Evaluation of Project	
	▪ Presentation	
	▪ Viva	
Total		: 100%

[B] Assessments:

Internal Assessment (IA):

Each theory course, practical and project must clearly mention the methodology of assessment i.e. assignment, presentation, group discussion etc depending on the number of students in the class and feasibility of adopting a particular methodology. The distribution of marks for internal assessments (IA) shall be as follows;

(i)	Evaluation of the assignment,	:	
	presentation, group discussion etc	:	07 Marks
(ii)	Attendance	:	03 Marks

The marks for attendance shall be awarded as follows:

(i)	75 % and Below	:	00 Mark
(ii)	>75 % and upto 85 %	:	01 Mark
(iii)	>85 % and upto 95 %	:	02 Marks
(iv)	>95 % and above	:	03 Marks

- ***The introductory note must also mention that to be eligible to appear in End Semester Examination a student must appear in Mid Semester Examination and internal Assessment.***
- ***Attendance: 75 % attendance in a course is mandatory for a student to appear in end semester examination.***

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New Scheme Based on AICTE Flexible Curriculum

B.Tech Programme in Department of Computer Science and Engineering

Batch (2022)

VII th Semester

S .N,	Category	Subject code	Subject Name	L	T	P	C
1	PCC	BTC PCC 701	Ad Hoc Wireless Network	3	1	0	4
2	PCC	BTC PCC 702	Internet of Things	3	0	0	3
3	DE	BTC DE 703	Departmental Elective - III	3	0	0	3
4	OE	BTC OE 704	Open Elective -II	3	0	0	3
5	LC	BTC LC 705	Laboratory –VII (Ad-Hoc Lab)	0	0	4	2
6	PR	BTC PR 706	Major Project - I	0	0	4	2
7	INT	BTC INT 707	Evaluation of Internship – IV	0	0	6	3
TOTAL				12	1	14	20

S .N	Departmental Electives - III	Open Electives - III
1	BTC DE 703 (A) Cloud Computing	BTE OE 704(A) Cryptography and Computational number theory
2	BTC DE 703 (B) Deep and Reinforcement Learning	BTE OE 704(B) Natural Language Processing
3	BTC DE 703 (C) Mobile Computing	BTC OE 704(C) Agile Software Development

- PCC- Professional Core Courses
- INT- Internship
- P- Practical
- LC- Laboratory Courses
- MC-Mandatory Courses
- DE- Departmental Elective
- OE- Open Elective
- PR-Project

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B. Tech Programme in Department of Computer Science and Engineering

Batch (2022)

VIII th Sem

S .N,	Category	Subject code	Subject Name	L	T	P	C
1	PCC	BTC PCC 801	Soft Computing	3	1	0	4
2	DE	BTC DE 802	Departmental Elective- IV	4	0	0	4
3	OE	BTC OE 803	Open Elective - III	3	0	0	3
4	LC	BTC LC 804	Skill Based Lab (R Programming)	0	0	4	2
5	LC	BTC LC 805	Laboratory VIII (Soft Computing Lab)	0	0	4	2
6	PR	BTC PR 806	Major Project – II	0	0	10	5
TOTAL				10	1	18	20

S .N,	Departmental Electives - II	Open Elective – I
1	BTC DE 802 (A) Block Chain Technology	BTC OE 803 (A) Digital Image processing
2	BTC DE 802 (B) Web Engineering	BTC OE 804 (B) Big Data
3	BTC DE 802 (C) Parallel Computing	BTC OE 805 (C) Information and Storage Management
4	BTC DE 802 (D) Optimization Technique	

- DE – Departmental Elective
- OE- Open Elective
- PCC- Professional Core Courses
- INT- Internship
- P- Practical
- LC- Laboratory Courses
- PR- Project

Seventh

Semester

(7th Semester)

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**B.Tech. Fourth Year (VII semester)
Category- Professional Core Courses PCC**

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
PCC	BTC PCC 701	Ad Hoc Wireless Networks	3	1	0	4	20	10	70	100

COURSE OBJECTIVES:

To understand the state-of-the-art in network protocols, architectures and applications, analyze existing network protocols and networks, Develop new protocols in networking, To understand how networking research is done, To investigate novel ideas in the area of Networking via term-long research projects

Unit 1:

Introduction- Wireless Networks, Cellular Mobile Network, Wireless LAN, Ad Hoc Networks, Sensor Network, Differences between Cellular and Ad Hoc, Issues in Ad Hoc Wireless Networks, Applications of Ad Hoc Wireless Networks

Unit 2:

MAC Layer-Introduction, Issues and Need for Medium Access Control. Problems in Ad Hoc Channel Access such as Hidden Terminal Problem and Exposed Node Problem. Classification of MAC Protocols – Contention Based MAC Protocols such as ALOHA and CSMA, Contention-Based MAC Protocols with Reservation Mechanisms such as MACA and MACA-BI.

Unit 3:

Multicast routing In Ad Hoc Networks : Introduction, Issues in Designing a Multicast Routing Protocol, Operation of Multicast Routing Protocols, An Architecture Reference Model for Multicast Routing Protocols, Classifications of Multicast Routing Protocols, Tree-Based Multicast Routing Protocols, Mesh-Based Multicast Routing Protocols, Summary of Tree-and Mesh-Based Protocols -Energy-Efficient Multicasting.

Unit 4:

Transport Layer, Security Protocols: Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management

Unit 5:

QoS and Energy Management : Introduction, Issues and Challenges in Providing QoS in Ad Hoc Wireless Networks, Classifications of QoS Solutions, MAC Layer Solutions, Network Layer Solutions, Energy Management in Ad Hoc Wireless Networks –Introduction, Need for Energy Management in Ad Hoc Wireless Networks, Classification of Energy Management Schemes. Correspondence problem(PCB).

RECOMMENDED BOOKS :

- C. Siva Ram Murthy and B.S. Manoj “Ad Hoc Wireless Networks: Architectures and Protocols”, Pearson Education.
- C.K. Toh, “Ad Hoc Mobile Wireless Networks: Protocols and Systems”, Pearson Education.
- George Aggelou, “Mobile Wireless Networks”, Tata McGraw-Hill.

COURSE OUTCOMES:

After completion of this course, the students would be able to:

- CO1. **Outlines** the basics of wireless networks
- CO2. **Identify** various issues/problems associated with Ad-hoc networks and their Solutions.
- CO3. **Examine** the working of various Ad-hoc network protocols CO4.
- **CO4 Analyse** the performance of various Ad-hoc network protocols
- CO5. **Develop** the solutions of various problems/Issues associated with ad-hoc Networks

Essential- Students can use **scientific calculator** (without memory) and **log table** in internal as well as end sem exam in this paper.

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B.Tech. Fourth Year (VII semester)
Category- Professional Core Courses PCC

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
PCC	BTC PCC 702	Internet of Things	3	0	0	3	20	10	70	100

Unit-1:

Introduction: Definition, Characteristics of IOT, IOT Conceptual framework, IOT Architectural view, Physical design of IOT, Logical design of IOT, Application of IOT.

Unit-2:

Machine-to-machine (M2M), SDN (software defined networking) and NFV(network function virtualization) for IOT, data storage in IOT, IOT Cloud Based Services.

Unit -3:

Design Principles for Web Connectivity: Web Communication Protocols for connected devices, Message Communication Protocols for connected devices, SOAP, REST, HTTP Restfuland Web Sockets. Internet Connectivity Principles, Internet Connectivity, Internet based communication, IP addressing in IOT, Media Access control

Unit-4:

Sensor Technology, Participatory Sensing, Industrial IOT and Automotive IOT, Actuator, Sensor data Communication Protocols, Radio Frequency Identification Technology, Wireless Sensor Network Technology.

Unit -5:

IOT Design methodology: Specification requirement, process, model, service, functional & operational view, IOT Privacy and security solutions, Raspberry Pi & Arduino Devices. IOT Case studies, smart city streetlights control & monitoring.

Essential- Students can use **scientific calculator** (without memory) and **log table** in internal as well

as end sem exam in this paper.

Recommended Books

- Rajkamal, "Internet of Things", Tata McGraw Hill publication.
- Vijay Madisetti and Arshdeep Bahga, "Internet of things(A-Hand-on-Approach)" 1st Edition, Universal Press.
- Hakima Chaouchi "The Internet of Things: Connecting Objects", Wiley publication.
- Charless Bell "MySQL for the Internet of things", A press publications

COURSE OUT COMES

After completion of the course students would be able to:

- CO1 Able to understand the application areas of IOT ·
- CO2 Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
- CO3 Able to understand building blocks of Internet of Things and characteristics.

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B.Tech. Fourth Year (VII semester)
Category- Departmental Elective DE

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
DE	BTC DE 703 (A)	Cloud Computing	3	0	0	3	20	10	70	100

Course Objectives:

- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.

Unit-1: Introduction to Cloud Computing

Cloud computing introduction and overview, history, characteristics of cloud, service and deployment models, Role of virtualization in enabling the cloud, Applications, providers of IaaS, PaaS and SaaS; challenges, advantages and disadvantages, Issues, SOA Programming model, Cloud based OS, deployment tools, cloud as green computing model.

Unit –2: Virtualization

Introduction to virtualization, characteristics, virtualization at infrastructure level, CPU virtualization, storage virtualization, network virtualization, Hypervisors, SAN, VLAN, Server virtualization, data center challenges and solutions, scaling a cloud infrastructure.

Unit-3 : Service management in cloud

Service monitoring, load balancing, database recovery, backup management, virtual machine management, SLA. Migration of virtual Machines and techniques, different types of management issues.

Unit-4: Issues and challenges in cloud

Various issues in cloud, cloud security services, secure cloud software requirements, cloud security challenges, network security, virtual machine security, threads.

Unit-5: Using mobile cloud

Working with mobile devices, cloud services applied in smartphone, mobile web services, performance synchronization, Defining WAP & other protocols, Fog computing.

Case study: google app engine, amazon open stack, Aneka, Microsoft Azure.

Essential- Students can use **scientific calculator** (without memory) and **log table** in internal as well as end sem exam in this paper.

Recommended Books

- Rajkumar Buyya; Cloud Computing Principles and Paradigms; John Wiley & Sons 2011.
- Rajkumar Buyya; Mastering Cloud Computing; Elsevier Inc 2013.
- Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
- Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing, A Practical Approach” McGraw-Hill Osborne Media; 1 edition [ISBN: 0071626948], 2009

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B.Tech. Fourth Year (VII semester)
Category- Departmental Elective DE

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
DE	BTC DE 703 (B)	Deep and Reinforcement Learning	3	0	0	3	20	10	70	100

Pre-Requisite: Machine Learning

Unit 1:

History of Deep Learning, McCulloch Pitts Neuron, Thresholding Logic, Activation functions, Gradient Descent (GD), Momentum Based GD, Nesterov Accelerated GD, Stochastic GD, AdaGrad, RMSProp, Adam, Eigenvalue Decomposition. Recurrent Neural Networks, Backpropagation through time (BPTT), Vanishing and Exploding Gradients, Truncated BPTT, GRU, LSTMs, Encoder Decoder Models, Attention Mechanism, Attention over images.

Unit 2:

Autoencoders and relation to PCA, Regularization in autoencoders, Sparse autoencoders, Contractive autoencoders, Regularization: Bias Variance Tradeoff, L2 regularization, Early stopping, Dataset augmentation, Parameter sharing and tying, Injecting noise at input, Ensemble methods, Dropout, Batch Normalization, Instance Normalization, Group Normalization.

Unit 3:

Greedy Layerwise Pre-training, Better activation functions, Better weight initialization methods, Learning Vectorial Representations Of Words, Convolutional Neural Networks, LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet, Visualizing Convolutional Neural Networks, Guided Backpropagation, Deep Dream, Deep Art, Recent Trends in Deep Learning Architectures.

Unit 4:

Introduction to reinforcement learning(RL), Bandit algorithms – UCB, PAC, Median Elimination, Policy Gradient, Full RL & MDPs, Bellman Optimality, Dynamic Programming - Value iteration, Policy iteration, and Q-learning & Temporal Difference Methods, Temporal-Difference Learning, Eligibility Traces, Function Approximation, Least Squares Methods

Unit 5:

Fitted Q, Deep Q-Learning , Advanced Q-learning algorithms , Learning policies by imitating optimal controllers , DQN & Policy Gradient, Policy Gradient Algorithms for Full RL, Hierarchical RL, POMDPs, Actor-Critic Method, Inverse reinforcement learning, Maximum Entropy Deep Inverse Reinforcement Learning, Generative Adversarial Imitation Learning, Recent Trends in RL Architectures.

RECOMMENDED BOOKS

- Deep Learning, An MIT Press book, Ian Goodfellow and YoshuaBengio and Aaron Courville
- Pattern Classification- Richard O. Duda, Peter E. Hart, David G. Stork, John Wiley & Sons Inc.
- Reinforcement Learning: An Introduction, Sutton and Barto, 2nd Edition.
- Reinforcement Learning: State-of-the-Art, Marco Wiering and Martijn van Otterlo, Eds

COURSE OUTCOMES:

- CO1 Describe in-depth about theories, models and algorithms in machine learning.
- CO2 Compare and contrast different learning algorithms with parameters.
- CO3 Examine the nature of a problem at hand and find the appropriate learning algorithms and it's
- CO4 parameters that can solve it efficiently enough.
- CO5 Design and implement of deep and reinforcement learning approaches for solving real-life problems.

Essential- Students can use **scientific calculator** (without memory) and **log table** in internal as well as end sem exam in this paper.

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Category- Departmental Elective DE**

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
DE	BTC DE 703 (C)	Mobile Computing	3	0	0	3	20	10	70	100

Unit-1:

INTRODUCTION: Introduction to Mobile Computing –Applications of Mobile Computing-Generations of Mobile Communication Technologies-Multiplexing –Spread spectrum -MAC Protocols –SDMA-TDMA-FDMA-CDMA

Unit-2 :

MOBILE TELECOMMUNICATION SYSTEM: Introduction to Cellular Systems –GSM –Services & Architecture –Protocols –Connection Establishment –Frequency Allocation –Routing – Mobility Management –Security –GPRS-UMTS –Architecture –Handover –Security

Unit-3:

MOBILE NETWORK LAYER: Mobile IP –DHCP –AdHoc–Proactive protocol-DSDV, Reactive Routing Protocols –DSR, AODV , Hybrid routing –ZRP, Multicast Routing-ODMRP, Vehicular Ad Hoc networks (VANET) –MANET Vs VANET –Security.

Unit-4:

MOBILE TRANSPORT AND APPLICATION LAYER: Mobile TCP–WAP –Architecture –WDP –WTLS –WTP –WSP –WAE –WTA Architecture –WML

Unit-5:

MOBILE TRANSPORT AND APPLICATION LAYER: Mobile Device Operating Systems – Special Constraints & Requirements –Commercial Mobile Operating Systems –Software Development Kit: iOS, Android, BlackBerry, Windows Phone –M Commerce –Structure –Pros & Cons –Mobile Payment System –Security Issues

RECOMMENDED BOOKS

- JochenSchiller, —Mobile Communications, PHI, Second Edition, 2003.
- Prasant Kumar Pattnaik, Rajib Mall, —Fundamentals of Mobile Computing, PHI LearningPvt.Ltd, New Delhi –2012

REFERNCES:

1. Dharma Prakash Agarval, Qing and An Zeng, “Introduction to Wireless and Mobile systems”, Thomson Asia Pvt Ltd, 2005.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, —Principles ofMobile Computing, Springer, 2003.
3. William. C. Y. Lee,—Mobile Cellular Telecommunications-Analog and Digital Systems, Second Edition, Tata McGraw Hill Edition ,2006.
4. C. K. Toh, —AdHoc Mobile Wireless Networks, First Edition, Pearson Education, 2002.
5. Android Developers : <http://developer.android.com/index.html>
6. Apple Developer : <https://developer.apple.com/>
7. Windows Phone Dev. Center : <http://developer.windowsphone.com>
8. BlackBerry Developer : <http://developer.blackberry.com>

COURSE OUTCOMES:

- Describe the basic concepts and principles in mobile computing
- Understand the concept of Wireless LANs, PAN, Mobile Networks, and SensorNetworks
- Explain the structure and components for Mobile IP and Mobility Management
- Understand positioning techniques and location-based services and applications
- Describe the important issues and concerns on security and privacy Professional Skill
- Design and implement mobile applications to realize location-aware computing
- Design algorithms for location estimations based on different positioning techniquesand platforms
- Acquire the knowledge to administrate and to maintain a Wireless LAN Attitude
- Recognize the important issues and concerns on security and privacy

Essential- Students can use **scientific calculator** (without memory) and **log table** in internal as well as end sem exam in this paper.

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B.Tech. Fourth Year (VII semester)
Category- Open Elective OE

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
OE	BTC OE 704 (A)	Cryptography and Computational number theory	3	0	0	3	20	10	70	100

Learning Objectives: To learn the application of number theory in the design of cryptographic algorithm.

Prerequisite: Knowledge of Algorithms and Discrete mathematics.

Unit- 1

Notion of algorithms, types of algorithms, Analysis – Best case, worst case, average case. Performance issues – Time and space complexity, Asymptotic notations, Mathematical preliminaries, functions and their growth rates, Recurrence relations and their solving methods,

Unit 2

Elementary of number theory, GCD computations, Euclids algorithms, finite groups, subgroups, primitive roots, generator computation, modular arithmetic, solving modular linear equations, modular exponentiation, remainder theorem, Discrete Logarithmic problem, quadratic residues.

Unit 3

Key Exchange, Diffie Hellman key exchange, Cryptosystems based on discrete log, public key Cryptosystems and RSA, choice of the public key, attacks on RSA and remedies, rabin Cryptosystems.

Unit 4

Factorization, current state of the art, large prime variant, Dixon's factorization method, quadratic sieve factoring, pollard-Rho method, pollard-Rho analysis, Primality Testing, Fermat Primality Test, AKS Primality Tes.

Unit 5

Elliptic curves cryptography, Elliptic curves and finite fields, Elliptic curve encryption and decryption, ECDLP, Zero knowledge proof, cryptographic Hash function, Digital signature, authentication protocols, vproxy signature, Elgamal Digital signature scheme, Blind and prony signature, video datacippers

Recommended Books

- Introduction to Algorithms: T. H. Cormen, C. E. Leiserson, R. Rivest and C. Stein
Prentice Hall India, 2 nd Edition, 2002.
- Cryptography and Network security: Principles and Practice, William Stallings,
Pearson Education, 2002.
- Cryptography: Theory and Practice, Douglas R. Stinson, CRC Press.

COURSE OUT COMES

After completion of the course students would be able to:

- Familiar with Basics of number theory and its application in cryptography.
- Able to apply skills for writing programs for cryptography algorithms.

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Category- Open Elective OE

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
OE	BTC OE 704 (B)	Natural Language Processing	3	0	0	3	20	10	70	100

COURSE OBJECTIVES:

1. To teach the fundamentals of NLP, and also to make them for understanding CFG, PCFG in NLP.
2. To know the role of semantics of sentences and pragmatic.
3. To teach the basic concepts of speech processing along with analysis and modeling.

Unit 1

Introduction

Origins and challenges of nlp – language modeling: grammar-based lm, statistical lm – regular expressions, finite-state automata – english morphology, transducers for lexicon and rules, tokenization, detecting and correcting spelling errors, minimum edit distance

Word Level Analysis

Unsmoothed n-grams, evaluating n-grams, smoothing, interpolation and backoff – word classes, part-of-speech tagging, rule-based, stochastic and transformation-based tagging, issues in pos tagging – hidden markov and maximum entropy models.

Unit 2 Syntactic Analysis

Context free grammars, grammar rules for english, treebanks, normal forms for grammar – dependency grammar – syntactic parsing, ambiguity, dynamic programming parsing – shallow parsing – probabilistic cfg, probabilistic cyk, probabilistic lexicalized cfgs – feature structures, unification of feature structures.

Unit 3 Semantics And Pragmatics

Requirements for representation, first-order logic, description logics – syntax-driven semantic analysis, semantic attachments – word senses, relations between senses, thematic roles, selectional restrictions – word sense disambiguation, wsd using supervised, dictionary & thesaurus, bootstrapping methods – word similarity using thesaurus and distributional methods.

Unit 4 Basic Concepts of Speech Processing

Speech fundamentals: articulatory phonetics – production and classification of speech sounds; acoustic phonetics – acoustics of speech production; review of digital signal processing concepts; short-time fourier transform, filter- bank and lpc methods.

Unit 5 Speech-Analysis,Speech Modeling

Features, feature extraction and pattern comparison techniques: speech distortion measures– mathematical and perceptual – log–spectral distance, cepstral distances, weighted cepstral distances and filtering, time alignment and normalization – dynamic time warping, multiple time – alignment paths. Hidden markov models: markov processes, hmms – evaluation, optimal state sequence – viterbi search, baum-welch parameter re-estimation, implementation issues.

Recommended Books

- Daniel Jurafsky, James H. Martin—Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.
- Steven Bird, Ewan Klein and Edward Loper, —Natural Language Processing with Python, First Edition, O'Reilly Media, 2009.
- Lawrence Rabiner And Biing-Hwang Juang, “Fundamentals Of Speech Recognition”, Pearson Education, 2003.
- Daniel Jurafsky And James H Martin, “Speech And Language Processing – An Introduction To Natural Language Processing, Computational Linguistics, And Speech Recognition”, Pearson Education, 2002

COURSE OUT COMES

After completion of the course students would be able to:

- learn the fundamentals of natural language processing
- understand the use of CFG and PCFG in NLP
- understand the role of semantics of sentences and pragmatic
- Introduce Speech Production And Related Parameters Of Speech.
- Show The Computation And Use Of Techniques Such As Short Time Fourier Transform, Linear Predictive Coefficients and Other Coefficients in The Analysis Of Speech.

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Category- Open Elective OE

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total	Pre-
							Mid I	Mid II (IA)			
OE	BTC OE 704 (C)	Agile Software	3		-0	3	20	10	70	100	

Requisite: Software Engineering

Unit-1

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

Unit-2

Agile Projects: Planning for Agile Teams: Scrum Teams, XP Teams, General Agile Teams, Team Distribution; Agile Project Lifecycles: Typical Agile Project Lifecycles, Phase Activities, Product Vision, Release Planning: Creating the Product Backlog, User Stories, Prioritizing and Estimating, Creating the Release Plan; Monitoring and Adapting: Managing Risks and Issues, Retrospectives.

Unit-3

Introduction to Scrum: Agile Scrum Framework, Scrum Artifacts, Meetings, Activities and Roles, Scrum Team Simulation, Scrum Planning Principles, Product and Release Planning, Sprinting: Planning, Execution, Review and Retrospective; User story definition and Characteristics, Acceptance tests and Verifying stories, Burn down chart, Daily scrum, Scrum Case Study.

Unit-4

Introduction to Extreme Programming (XP): XP Lifecycle, The XP Team, XP Concepts: Refactoring, Technical Debt, Timeboxing, Stories, Velocity; Adopting XP: Pre-requisites, Challenges; Applying XP: Thinking- Pair Programming, Collaborating, Release, Planning, Development; XP Case Study.

Unit-5: Agile Software Design and Development: Agile design practices, Role of design Principles, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control; Agility and Quality Assurance: Agile Interaction Design, Agile approach to Quality Assurance, Test Driven Development, Pair programming: Issues and Challenges.

Recommended Books

- Robert C. Martin, Agile Software Development- Principles, Patterns and Practices, Prentice Hall, 2013.
- Kenneth S. Rubin, Essential Scrum: A Practical Guide to the Most Popular Agile Process, Addison Wesley, 2012.
- James Shore and Shane Warden, The Art of Agile Development, O'Reilly Media, 2007.
- Craig Larman, —Agile and Iterative Development: A manager's Guide, Addison-Wesley, 2004.
- Ken Schawber, Mike Beedle, Agile Software Development with Scrum, Pearson, 2001.
- Cohn, Mike, Agile Estimating and Planning, Pearson Education, 2006.
- Cohn, Mike, User Stories Applied: For Agile Software Development Addison Wisley, 2004.

COURSE OUT COMES

After completion of the course students would be able to:

- Describe the fundamental principles and practices associated with each of the agile development methods.
- Compare agile software development model with traditional development models and identify the benefits and pitfalls.
- Use techniques and skills to establish and mentor Agile Teams for effective software development.
- Apply core values and principles of Agile Methods in software development.

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New Scheme Based on AICTE Flexible Curriculum

B.Tech. Fourth Year (VII semester)
Category- Laboratory Course LC

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
LC	BTC LC 705	Laboratory VII (Ad Hoc Lab)	0	0	4	2	20	20	60	100

LIST OF EXPERIMENT (Ad Hoc Network):-

- Introduction of Wireless sensor network applications and its simulation.
- Network Simulator installation of wireless sensor network.
- Write TCL script for transmission between mobile nodes.
- Write TCL script for sensor nodes with different parameters.
- Generate tcl script for udp and CBR traffic in WSN nodes.
- Generate tcl script for TCP and CBR traffic in WSN nodes.
- Implementation of routing protocol in NS2 for AODV protocol.
- Implementation of routing protocol in NS2 for DSR protocol.
- Implementation of routing protocol in NS2 for TORA protocol.
- Study other wireless sensor network simulators (Mannasim. Contiki.)

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B.Tech. Fourth Year (VII semester)
Category- Project PR

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
PR	BTC PR 706	Major Project -I	0	0	4	2	20	20	60	100

Course Learning Objective: A significant project's goal is to show that the subject matter of pertinent theories, concepts, and procedures is deeply understood. Improve the student's capacity to carry out the individual assignments. Give them a chance to add their unique ideas or discoveries to the subject of study or academia. Apply and integrate the knowledge and abilities you've learned throughout the course to a particular issue or query. Boost your capacity for critical thinking and problem-solving to tackle challenging issues.

Course Learning Outcomes:

Upon successful completion of the course, the students will be having hands-on experience in project development.

Guidelines:

Overview:

Each student should complete a project on their own, or in certain circumstances, in a group of 4 or 5. Dissertations might be research-focused or application-oriented, utilizing the newest technology.

Supervisor:

Faculty of the department will be a project guide for the mentoring project which is decided by Head of the Department.

Platform:

The dissertation can be on any platform e.g., WINDOWS, UNIX, LINUX, Mac OS, etc. The dissertation can be done using any language or package learned within or outside the course such as C, C++, Java, NET, Python, etc.

Venue:

The project may be carried out at another organization or at the university itself.

Evaluation of Mid-I, Internal Assessment& Final Examination: Mid I and internal assessment consider the progress of the project and final examination through seminar/presentation, write-up/synopsis/ progress report and as per the below guidelines.

The students have to submit the power point presentation of minimum 15 slides of the training performed (comprising of points given by guide) along with the original certificate of training performed with proper seal and signature of the authorized person.

Evaluation will be evaluated by the project coordinator as well as external examiner

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B.Tech. Fourth Year (VII semester)
Category- Internship INT

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
INT	BTC INT 707	Evaluation of Internship – IV	0	0	6	3	20	20	60	100

Course Learning Objectives:

1. Analyse and summarize your internship experience.
2. Get real-world experience relevant to the student's growth and academic objectives.

Course Learning Outcomes:

1. Set clear goals and learning objectives for the internship.
2. Determine the measures or next steps that need to be taken to advance academic progress and advancement.

Guidelines:

Evaluation of Mid-I, Internal Assessment & Final Examination:

As this internship is already done by students in their previous year.

Mid I – Student has to give presentation on his /her internship topic

Internal Assessment- Final report submission and attendance during the classes.

Final Examination -

The students have to submit the power point presentation of minimum 15 slides of the internship performed (comprising of points given by guide) along with the original certificate of internship performed with proper seal and signature of the authorized person.

Evaluation will be evaluated by the internship coordinator as well as external examiner

Eight

Semester

(8th Semester)

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B.Tech. Fourth Year (VIII semester)
Category- Professional Core Course PCC

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
PCC	BTC PCC 801	Soft Computing	3	1	-	4	20	10	70	100

Course Objectives:

1. To familiarize with neural networks and learning methods for neural networks.
2. To introduce basics of genetic algorithms and their applications in optimization and planning.
3. To introduce the ideas of fuzzy sets, fuzzy logic and fuzzy inference system.
4. To develop skills thorough understanding of the theoretical and practical aspects of SoftComputing

Prerequisite: Analysis of Algorithm, Artificial Intelligence.

Unit 1 :

INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS

Evolution of Computing, Introduction of soft computing, soft computing vs. hard computing, varioustypes of soft computing techniques, applications of soft computing, Machine Learning Basics and Fundamentals of Neural Networks and Application.

Unit 2:

NEURAL NETWORKS

Backpropagation Networks, Architecture: perceptron model, single layer artificial neural network, multilayer perceptron model; backpropagation learning methods, effect of learning rule coefficient, backpropagation algorithm, factors affecting backpropagation training, Associative memory, Adaptive Resonance Theory.

Unit 3:

GENETIC ALGORITHMS

Genetic Algorithm (GA) Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, probability of crossover and probability of mutation, convergence. The Scheme Theorem – Classification

of Genetic Algorithm – Holland Classifier Systems. Simulated annealing

and stochastic models, Boltzmann Machine, Applications of Genetic Algorithm: genetic algorithms in search and optimization, GA based clustering Algorithm, Image processing and pattern Recognition.

Unit 4:

FUZZY LOGIC

Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions, Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzyfication&Defuzzification, Fuzzy Controller, Industrial applications Fuzzy Expert Systems, Fuzzy Decision Making.

Unit 5:

NEURO, FUZZY MODELING

Adaptive Neuro, Fuzzy Inference Systems Coactive Neuro, Fuzzy Modeling, Classification and Regression Trees Data Clustering Algorithms, Rulebase Structure, Identification, Neuro Fuzzy Control , Case studies.

Recommended Books

- S. Rajasekaran and G.A.VijayalakshmiPai.. Neural Networks Fuzzy Logic, and Genetic Algorithms, Prentice Hall of India.
- Timothy J. Ross, “Fuzzy Logic with Engineering Applications” Wiley India.
- Neural Networks and Fuzzy Systems: Dynamical Systems Application to Machine Intelligence-Bart Kosko, Prentice Hall, 1992.
- Mitchell Melanie, “An Introduction to Genetic Algorithm”, Prentice Hall, 1998.
- David E. Goldberg, “Genetic Algorithms in search, Optimization & Machine Learning” , Addison-Wesley, 1997.

COURSE OUT COMES

After completion of the course students would be able to:

- Identify and describe soft computing techniques and their roles in building intelligent machines.
- Apply neural networks to pattern classification and regression problems
- Recognize the feasibility of applying a soft computing methodology for a particular problem
- Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
- Apply genetic algorithms to combinatorial optimization problems.

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Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
DE	BTC DE 802 (A)	Block Chain Technology	4	-	-	4	20	10	70	100

Unit 1:

Introduction: Overview of Block chain, Public Ledgers, Bit coin, Smart Contracts, Block in a Block chain, Transactions, Distributed Consensus, Public vs Private Block chain, Understanding Crypto currency to Block chain, Permissioned Model of Block chain, Overview of Security aspects of Block chain; Basic Crypto Primitives: Cryptographic Hash Function, Properties of a hash function, Hash pointer and Merkle tree, Digital Signature, Public Key Cryptography, A basic crypto currency

Unit 2:

Understanding Block chain with Crypto currency: Bit coin and Block chain: Creation of coins, Payments and double spending, Bit coin Scripts, Bit coin P2P Network, Transaction in Bit coin Network, Block Mining, Block propagation and block relay. Working with Consensus in Bit coin: Distributed consensus in open environments, Consensus in a Bitcoin network, Proof of Work (PoW) – basic introduction, Hash Cash PoW, Bit coin PoW, Attack on PoW and the monopoly problem, Proof of Stake, Proof of Burn and Proof of Elapsed Time, The life of a Bitcoin Miner, Mining Difficulty, Mining Pool

Unit 3:

Understanding Block chain for Enterprises: Permissioned Block chain: Permissioned model and use cases, Design issues for Permissioned block chains, Execute contracts, State machine replication, Overview of Consensus models for permissioned block chain- Distributed consensus in closed environment, Paxos, RAFT Consensus, Byzantine general problem, Byzantine fault tolerant system, Lamport-Shostak-Pease BFT Algorithm, BFT over Asynchronous systems.

Unit 4:

Enterprise application of Block chain: Cross border payments, Know Your Customer (KYC), Food Security, Mortgage over Block chain, Block chain enabled Trade, We Trade – Trade Finance Network, Supply Chain Financing, and Identity on Block chain

Unit 5:

Block chain application development: Hyperledger Fabric- Architecture, Identities and Policies, Membership and Access Control, Channels, Transaction Validation, Writing smart contract using Hyperledger Fabric, Writing smart contract using Ethereum, Overview of Ripple and

Recommended Books

- Melanie Swan, “Block Chain: Blueprint for a New Economy”, O’Reilly, 2015
- Josh Thompsons, “Block Chain: The Block Chain for Beginners- Guide to Blockchain Technology and Leveraging Block Chain Programming”
- Daniel Drescher, “Block Chain Basics”, Apress; 1st edition, 2017
- Anshul Kaushik, “Block Chain and Crypto Currencies”, Khanna Publishing House, Delhi.
- 5.Imran Bashir, “Mastering Block Chain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained”, Packt Publishing
- Ritesh Modi, “Solidity Programming Essentials: A Beginner’s Guide to Build SmartContracts for Ethereum and Block Chain”, Packt Publishing
- Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O’Dowd, Venkatraman Ramakrishna, “Hands-On Block Chain with Hyperledger: Building Decentralized Applications with Hyperledger Fabric and Composer”, Import, 2018

COURSE OUT COMES

After completion of the course students would be able to:

- CO1: define various aspects of block chain
- CO2: illustrate fundamentals of Block Mining, Block propagation and block relay
- CO3: apply security mechanisms to achieve principles of Mortgage over Block chain, Block chain enabled Trade
- CO5: examine the vulnerabilities in Block chain applications

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New Scheme Based on AICTE Flexible Curriculum

B.Tech. Fourth Year (VIII semester)
Category- Departmental Elective DE

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
DE	BTC DE 802 (B)	Web Engineering	4	-	-	4	20	10	70	100

Course Objectives:

The goals of the course are as follows: To be able to analyze and design comprehensive systems for the creation, dissemination, storage, retrieval, and use of electronic records and documents

Unit – 1:

Web Engineering: Introduction, History, Evolution and Need, Time line, Motivation, Categories & Characteristics of Web Applications, Web Engineering Models, Software Engineering v/s Web Engineering. World Wide Web: Introduction to TCP/IP and WAP, DNS, Email, TelNet, HTTP and FTP. Browser and search engines: Introduction, Search fundamentals, Search strategies, Directories search engines and Meta search engines, Working of the search engines. Web Servers: Introduction, Features, caching, case study-IIS, Apache.

Unit -2:

Information Architecture: Role, Collaboration and Communication, Organizing Information, Organizational Challenges, Organizing Web sites parameters and Intranets Website Design: Development, Development phases, Design issues, Conceptual Design, High-Level Design, Indexing the Right Stuff, Grouping Content. Architectural Page Mockups, Design Sketches, Navigation Systems. Searching Systems, Good & bad web design, Process of Web Publishing. Web-site enhancement, submission of website to search engines. Web security: issues, Requirements Engineering for Web Applications

Unit – 3:

Technologies for Web Applications I: HTML and DHTML: Introduction, Structure of documents, Elements, Linking, Anchor Attributes, Image Maps, Meta Information, Image Preliminaries, Layouts, Backgrounds, Colors and Text, Fonts, Tables, Frames and layers, Audio and Video Support with HTML Database integration, CSS, Positioning with Style sheets, Forms Control, Form Elements. Introduction to CGI, PERL, JAVA SCRIPT, JSP, PHP, ASP & AJAX. Cookies: Creating and Reading

Unit 4:

Technologies for Web Applications II: XML: Introduction, HTML Vs XML, Validation of documents, DTD, Ways to use, XML for data files, Embedding XML into HTML documents, Converting XML to HTML for

Display, Displaying XML using CSS and XSL, Rewriting HTML as XML, Relationship between HTML, SGML and XML, web personalization, Semantic web, Semantic Web Services, Ontology

Unit – 5

E-Commerce: Business Models, Infrastructure, Creating an E-commerce WebSite, Environment and Opportunities. Modes & Approaches, Marketing & Advertising Concepts. Electronic Publishing issues, approaches, legalities and technologies, Secure Web document, Digital Signatures and Firewalls, Cyber crime and laws, IT Act. Electronic Cash, Electronic Payment Systems: RTGS, NEFT, Internet Banking, Credit/Debit Card. Security: Digital Certificates & Signatures, SSL, SET, 3D Secure Protocol.

Recommended Books

- Roger S. Pressman, David Lowe, “Web Engineering”, Tata Mc Graw Hill Publication, 2007
- Achyut S Godbole and Atul Kahate, “Web Technologies”, Tata McGraw Hill
- Gopalan N P , Akilandeswari, “Web Technology: A Developer s Perspective” , PHI
- Neil Gray, “Web server Programming” Wiley
- Chris Bates, “Web Programming: Building Internet applications” Wiley
- Moller, “An Introduction to XML and Web Technologies”, Pearson Education New Delhi, 2009
- “Web Technologies: Black Book”, Kogent, Dreamtech

COURSE OUT COMES

After completion of the course students would be able to:

- CO1 Employ techniques to analyze and evaluate software architectures on a real-world large-scale web-based software systems.
- CO2 Create and document reference architecture for a non-trivial Web based technological product.
- CO3 Present findings of case study analysis of software architectures of a family of large-scale web-based software systems.
- CO4 Envision an innovative product for a wicked problem and develop an architecture for the product that utilizes service-oriented computing technologies.
- CO5 Write a research-in-progress paper on a Web engineering topic that utilizes Design Science Research methodology and adheres to appropriate academic standards.

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New Scheme Based on AICTE Flexible Curriculum

B.Tech. Fourth Year (VIII semester)

Category- Departmental Elective DE

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
DE	BTC DE 802 (C)	Parallel Computing	4	-	-	4	20	10	70	100

Course Objectives:

To study the scalability & clustering issues, understand the technologies used for parallel computation, study the different inter connection networks and the different software programming models.

Unit-1

Evolution of Computer Architecture – Dimensions of Scalability – Parallel Computer Models – Basic Concepts Of Clustering – Scalable Design Principles – Parallel Programming Overview – Processes, Tasks and Threads – Parallelism Issues – Interaction / Communication Issues – Semantic Issues In Parallel Programs.

Unit-2

System Development Trends – Principles of Processor Design – Microprocessor Architecture Families – Hierarchical Memory Technology – Cache Coherence Protocols – Shared Memory Consistency – Distributed Cache Memory Architecture – Latency Tolerance Techniques – Multithreaded Latency Hiding.

Unit-3

SYSTEM INTERCONNECTS

Basics of Interconnection Networks – Network Topologies and Properties – Buses, Crossbar and Multistage Switches, Software Multithreading – Synchronization Mechanisms.

Unit-4

Paradigms And Programmability – Parallel Programming Models – Shared Memory Programming.

Unit-5

MESSAGE PASSING PROGRAMMING

Message Passing Paradigm – Message Passing Interface – Parallel Virtual Machine.

Recommended Books

- David E. Culler & Jaswinder Pal Singh, “Parallel Computing Architecture: A Hardware/Software Approach”, Morgan Kaufman Publishers, 1999.
- Michael J. Quinn, “Parallel Programming in C with MPI & OpenMP”, Tata McGraw-Hill, New Delhi, 2003.
- Kai Hwang, “Advanced Computer Architecture” Tata McGraw-Hill, New Delhi, 2003.

COURSE OUT COMES

After completion of the course students would be able to:

- CO1: To study the scalability and clustering issues and the technology necessary for them.
- CO2 To understand the technologies enabling parallel computing.
- CO3 To study the different types of interconnection networks.
- CO4 To study the different parallel programming models.
- CO5 To study the software support needed for shared memory programming.

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B.Tech. Fourth Year (VIII semester)
Category- Departmental Elective DE

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
DE	BTC DE 802 (D)	Optimization Technique	4	-	-	4	20	10	70	100

Course Objectives:

- Be exposed to compiler writing tools.
- Learn to implement the different Phases of compiler
- Be familiar with control flow and data flow analysis
- Learn simple optimization techniques

Unit-1

INTRODUCTION Non-linear programming. Mathematical fundamentals. Numerical evaluation of gradient. Unconstrained Optimization: One dimensional, single variable optimization. Maximum of a function. Unimodal-Fibonacci method. Polynomial based methods.

Unit-2

UNCONSTRAINED MINIMIZATION Multivariable functions. Necessary and sufficient conditions for optimality. Convexity. Steepest Descent Method -Convergence Characteristics. Conjugate Gradient Method. Linear programming -Simplex Method.

Unit-3

CONSTRAINED MINIMIZATION Non-linear programming. Gradient based methods. Rosens` gradient, Zoutendijk`s method, Generalized reduced gradient, Sequential quadratic programming. Sufficient condition for optimality.

Unit-4

DIRECT SEARCH METHODS : Direct search methods for nonlinear optimization. Cyclic coordinate search. Hooke and Jeeves Pattern search method. Generic algorithm. Discrete And Dynamic Programming: Integer and discrete programming. Branch and bound algorithm for mixed integers. General definition of dynamic programming problem. Problem modeling and computer implementation. Shortest path problem.

Unit-5

OPTIMIZATION APPLICATION: Transportation problem. Transportation simplex method. Network problems. Maximum flow in networks. General definition of dynamic programming. Problem modeling and computer implementation. Finite Element Based Optimization: Parameter optimization using gradient methods -Derivative calculation. Shape optimization. Topology optimization of continuum structures

Recommended Books

- George Leitmann, Optimization Techniques, Volume 51st Edition, ISBN: 9780080955131, Academic Press
- Foulds, L. R., Optimization Techniques anIntroduction, springer

COURSE OUT COMES

After completion of the course students would be able to:

- CO1 Implement the different Phases of compiler using tools
- CO2 Analyze the control flow and data flow of a typical program
- CO3 Optimize a given program
- CO4 Generate an assembly language program equivalent to a source language program
- CO5 Implementation of Lexical Analyzer using LEX Tool
- CO 6 Convert the BNF rules into YACC form and write code to generate Abstract Syntax Tree.

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B.Tech. Fourth Year (VIII semester)

Category- Open Elective OE

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
OE	BTC OE 803 (A)	Digital Image Processing	3	-	-	3	20	10	70	100

Course Objectives:

- To understand the fundamentals of image acquisition, image processing in spatial and frequency domain.
- To understand image transforms used in digital image processing.
- To know about the image restoration techniques and methods used in image processing.

Unit 1: Introduction and Fundamental: Introduction to Image Processing Systems, Digital Image fundamentals: Components of Digital Image Processing Systems, Image Model, Image Geometry, Sampling and Quantization of Images, Classification of Digital Images, Zooming and Shrinking, Relationship between pixels.

Unit 2: Image Enhancement in spatial Domain: Introduction, Basic Gray Level Function, Piecewise Linear Transformation, Contrast Stretching, Histogram Specification, Histogram Equalization, Local Enhancement using arithmetic and logical operation- Image Subtraction, Image averaging, Image Smoothing: Smoothing Spatial Filters, Smoothing Linear Filters, Image Sharpening.

Unit 3: Image Enhancement in Frequency Domain: Introduction to Fourier Transform, Filters: Low Pass and High Pass, Gaussian Filters, Homomorphic Filtering, Image Restoration: Model of Image Degradation/Restoration process, Noise Models, Noise Reduction in Spatial and Frequency Domain, Inverse Filtering, Mean Filters, Least Mean Square (Wiener) Filtering, FIR Wiener Filter.

Unit 4:

Morphological Image Processing: Logic operation involving binary images, Dilation and Erosion, Opening and Closing, Morphological Algorithms: Boundary Extraction, Region filling, Extraction of connected components, Convex Hull, Thinning and Thickening.

Unit 5:

Image Registration: Introduction, Geometric Transformation, Plane to plane Transformation, Mapping, Image Segmentation: Introduction, Region Extraction, Pixel based approach, Multilevel Thresholding, Local Thresholding, Region based approach, Region growing, Splitting and Merging, Edge and line detection, Corner Detection, Detection of Discontinuities, Edge and boundary detection.

Recommended Books

- Digital Image processing, Rafael C Gonzalez, Richard E Woods, Pearson Education.
- Fundamental of Digital Image processing, K. Jain, Pearson education.
- Digital Image Processing, S. Esakkirajan, S. Jayaraman, T. Veerakumar, Tata McGraw- Hill Education.

COURSE OUT COMES

After completion of the course students would be able to:

CO1: Explain different modalities and current techniques in image acquisition.

CO2: Classify spatial and frequency domain techniques used in image processing.

CO3: Apply image processing techniques to enhance visual images

CO4: Analyze the constraints in image processing when dealing with real problems.

CO5: Evaluate various enhancement, restoration and retrieval techniques of image processing.

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Category- Open Elective OE

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
OE	BTC OE 803 (B)	Big Data	3	-	-	3	20	10	70	100

Course Objectives:

- To teach the fundamentals of Big Data along with its characteristics, challenges and its data models.
- To understand and know various concepts of Big Data like Map Reduce, Hadoop and other architectures and its technologies and frameworks.

Unit – 1

Introduction

Distributed file system – big data and its importance, four vs, drivers for big data, big data analytics, big data applications, algorithms using map reduce, matrix-vector multiplication by map reduce. Apache hadoop – moving data in and out of hadoop – understanding inputs and outputs of mapreduce - data serialization, problems with traditional large-scale systems-requirements for a new approach-hadoop – scaling- distributed framework-hadoop v/s rdbms-brief history of hadoop.

Unit – 2

NoSQL Data Management

Introduction to nosql – aggregate data models – aggregates – key-value and document data models – relationships –graph databases – schema less databases – materialized views – distribution models – sharding — version – map reduce –partitioning and combining – composing map-reduce calculations

Unit – 3

CONFIGURATIONS OF HADOOP

Hadoop processes (nn, snn, jt, dn, tt)-temporary directory – ui-common errors when running hadoop cluster, solutions. Setting up hadoop on a local ubuntu host: prerequisites, downloading hadoop, setting up ssh, configuring the pseudo-distributed mode, hdfs directory, namenode, examples of mapreduce, using elastic mapreduce, comparison of local versus emr hadoop. Understanding mapreduce:key/value pairs,thehadoop java api for mapreduce, writing mapreduce programs, hadoop-specific data types, input/output. Developing mapreduce programs: using languages other than java with hadoop, analysing a large dataset.

Unit – 4

ADVANCED MAPREDUCE TECHNIQUES

Simple, advanced, and in-between joins, graph algorithms, using language-independent data structures. Hadoop configuration properties - setting up a cluster, cluster access control, managing the namenode, managing hdfs, mapreduce management, scaling.

Unit – 5**ADOOP STREAMING**

Hadoop streaming - streaming command options - specifying a java class as the mapper/reducer - packaging files with job submissions - specifying other plug-ins for jobs.

HIVE & PIG

Architecture, installation, configuration, hive vs rdbms, tables, ddl & dml, partitioning & bucketing, hive web interface, pig, use case of pig, pig components, data model, pig latin.

Recommended Books

- Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, Professional Hadoop Solutions, Wiley, 2015.
- Tom White, Hadoop: The Definitive Guide, OReilly Media Inc., 2015.
- Garry Turkington, Hadoop Beginners Guide, Packt Publishing, 2013.
- Eric Sammer, "Hadoop Operations", 1st Edition, OReilly, 2012.

COURSE OUT COMES

After completion of the course students would be able to:

- Understand the need of Big Data, challenges and different analytical architectures
- Understand the principles behind the NoSQL databases; know architectures and common features of the main types of NoSQL databases
- Manage Job Execution in Hadoop Environment
- Develop Big Data Solutions using Hadoop Eco System
- Understand the working environment of Pig and Hive for processing the structured and unstructured data.

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Category- Open Elective OE

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
OE	BTC OE 803 (C)	Information and Storage Management	3	-	-	3	20	10	70	100

Course Objectives:

- Search, retrieve and synthesize information from a variety of systems and sources.
- Evaluate systems and technologies in terms of quality, functionality, cost-effectiveness and adherence to professional standards.

Unit – 1

Introduction:-Data proliferation, evolution of various storage technologies, Overview of storage infrastructure components, Data creation and The value of data to a business, Information Lifecycle Management, Challenges in data storage and data management, Solutions available for data storage, Core elements of a Data Center infrastructure, Data categorization.

Unit – 2

Storage Systems Architecture:-Intelligent disk subsystems overview, Contrast of integrated vs modular arrays, Component architecture of intelligent disk subsystems, Disk physical structure components, properties, performance, and specifications, RAID levels & parity algorithms, hot sparing, Front end to host storage provisioning, mapping and operation.

Unit – 3

Introduction To Networked Storage:-Evolution of networked storage, Architecture, components, and topologies of FC-SAN, NAS, IP-SAN, Applications, Elements, connectivity, standards, management, security and limitations of DAS, NAS, CAS & SAN.

Introduction to Information Availability: -Business Continuity and Disaster Recovery Basics, Local business continuity techniques, Remote business continuity techniques, Disaster Recovery principles & techniques.

Unit – 4

Managing & Monitoring: -Management philosophies (holistic vs. system & component), Industry management standards (SNMP, SMI-S, CIM), Standard framework applications, Key management, Metric analysis methodologies & trend analysis, Reactive and pro-active management best practices, Provisioning & configuration change planning, Problem reporting, prioritization, and handling techniques, Management tools overview.

Unit – 5

Securing Storage and Storage Virtualization: -Information security, Critical security attributes for information systems, Storage security domains, List and analyzes the common threats in each domain, Virtualization technologies, block-level and file-level virtualization technologies and processes.

Recommended Books

- EMC Corporation, Information Storage and Management, Wiley, India.
- Robert Spalding, “Storage Networks: The Complete Reference“, Tata McGraw Hill, Osborne,
- Marc Farley, “Building Storage Networks”, Tata McGraw Hill ,Osborne, 2001.
- Additional resource material on www.emc.com/resource-library/resource-library.esp

COURSE OUT COMES

After completion of the course students would be able to:

- Evaluate systems and technologies in terms of quality, functionality, cost-effectiveness and adherence to professional standards.
- Integrate emerging technologies into professional practice.
- Apply theory and principles to diverse information contexts

INSTITUTE OF ENGINEERING AND TECHNOLOGY
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New Scheme Based on AICTE Flexible Curriculum

B.Tech. Fourth Year (VIII semester)

Category- Laboratory Course LC

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
LC	BTC LC 804	Skill Based Lab (R Programming)	-	-	4	2	20	20	60	100

Pre-requisites: Any Programming Language.

LIST OF EXPERIMENTS:

1. Download and install R-Programming environment and install basic packages using install.packages()

command in R.

2. Learn all the basics of R-Programming (Data types, Variables, Operators etc.,)

3. Write a program to find list of even numbers from 1 to n using R-Loops.

4. Create a function to print squares of numbers in sequence.

5. Write a program to join columns and rows in a data frame using cbind() and rbind() in R.

6. Implement different String Manipulation functions in R.

7. Implement different data structures in R (Vectors, Lists, Data Frames)

8. Write a program to read a csv file and analyze the data in the file in R. Semester - VII 123 G V P College of Engineering (Autonomous) 2017 CSE

9. Create pie chart and bar chart using R.

10. Create a data set and do statistical analysis on the data using R. TEXT BOO

Recommended Books

Norman Matloff, The Art of R Programming, UC Davis 2009.

COURSE OUT COMES

After completion of the course students would be able to:

- CO 1 Setup R Programming Environment.
- CO 2 Understand and use R – Data types.
- CO 3 Understand and use R – Data Structures.
- CO 4 Develop programming logic using R – Packages.
- CO 5 Analyze data sets using R – programming capabilities

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B.Tech. Fourth Year (VIII semester)
Category- Laboratory Course LC

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
LC	BTC LC 805	Laboratory VIII (Soft Computing Lab)	-	-	4	2	20	20	60	100

LIST OF EXPERIMENTS:

1. Create a perceptron with appropriate no. of inputs and outputs. Train it using fixed increment learning algorithm until no change in weights is required. Output the final weights.
- 2 Create a simple ADALINE network with appropriate no. of input and output nodes. Train it using delta learning rule until no change in weights is required. Output the final weights.
- 3 Train the autocorrelator by given patterns: $A1=(-1,1,-1,1)$, $A2=(1,1,1,-1)$, $A3=(-1, -1, -1, 1)$. Test it using patterns: $Ax=(-1,1,-1,1)$, $Ay=(1,1,1,1)$, $Az=(-1,-1,-1,-1)$.
- 4 Train the hetrocorrelator using multiple training encoding strategy for given patterns:
 $A1=(000111001)$ $B1=(010000111)$, $A2=(111001110)$ $B2=(100000001)$, $A3=(110110101)$
 $B3(101001010)$. Test it using pattern A2.
- 5 Implement Union, Intersection, Complement and Difference operations on fuzzy sets. Also create fuzzy relation by Cartesian product of any two fuzzy sets and perform maxmin composition on any two fuzzy relations.
- 6 Solve Greg Viot's fuzzy cruise controller using MATLAB Fuzzy logic toolbox.
- 7 Solve Air Conditioner Controller using MATLAB Fuzzy logic toolbox
- 8 Implement TSP using GA.

Recommended Books

- Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications, S.Rajasekaran, G. A. Vijayalakshami, PHI.
- Genetic Algorithms: Search and Optimization, E. Goldberg.
- Neuro-Fuzzy Systems, Chin Teng Lin, C. S. George Lee, PHI.
- Build_Neural_Network_With_MS_Excel_sample by Joe choong.

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B.Tech. Fourth Year (VIII semester)

Category- Project PR

Course Category	Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
							Mid I	Mid II (IA)		
PR	BTC PR 806	Major Project - II	-	-	10	5	20	20	60	100

Course Learning Objective: A significant project's goal is to show that the subject matter of pertinent theories, concepts, and procedures is deeply understood. Improve the student's capacity to carry out the individual assignments. Give them a chance to add their unique ideas or discoveries to the subject of study or academia. Apply and integrate the knowledge and abilities you've learned throughout the course to a particular issue or query. Boost your capacity for critical thinking and problem-solving to tackle challenging issues.

Course Learning Outcomes:

Upon successful completion of the course, the students will be having hands-on experience in project development.

Guidelines:

The same project is continuing in this semester which students did in last semester(VII). Each student should complete a project on their own, or in certain circumstances, in a group of 4 or 5. Dissertations might be research-focused or application-oriented, utilizing the newest technology.

Supervisor:

Faculty of the department will be a project guide for the mentoring project which is decided by Head of the Department.

Platform:

The dissertation can be on any platform e.g., WINDOWS, UNIX, LINUX, Mac OS, etc. The dissertation can be done using any language or package learned within or outside the course such as C, C++, Java, NET, Python, etc.

Venue:

The project may be carried out at another organization or at the university itself.

Evaluation of Mid-I, Internal Assessment& Final Examination: Mid I and internal assessment consider the progress of the project and final examination through seminar/presentation, write-up/synopsis/ progress report and as per the below guidelines.

The students have to submit the power point presentation of minimum 15 slides of the training performed (comprising of points given by guide) along with the original certificate of training performed with proper seal and signature of the authorized person.

Evaluation will be evaluated by the project coordinator as well as external examiner