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B.TECH – COMPUTER SCIENCE & ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

Course Structure R-20

SEMESTER VII

S.No.	Class	Course Code	Name of the Subject	L	T	P	C
1	PC	C77PC1	Deep learning	3	0	0	3
2	PC	C77PC2	Information Security	3	0	0	3
3	PE	C77PE3	Professional Elective IV: A. Soft Computing B. Cyber Security C. Mobile Application Development	3	0	0	3
4	PE	C77PE4	Professional Elective V: A. Pervasive Computing B. Semantic Web C. Computer Forensics	3	0	0	3
5	OE	C77OE5	Open Elective-II	3	0	0	3
6	PC	C77PC6	Deep learning Lab	0	0	2	1
7	PC	C77PC7	Cutting Edge Technologies lab (Practice on ParaMooN, PICASOO,QUEST, CODD, HYDRA)	0	0	2	1
8	PW	C77PW8	Major Project Phase I	0	0	4	2
9	MC	MC007	Competitive exams				Satisfactory
			Total credits				**19**

Major Project Phase I: Students can form a group of minimum of two or maximum of four under the allocated guide, students group should choose a project title, for the chosen project title carryout a detailed literature survey, problem formulation, planning higher level design. The project evaluation will be Continuous Internal Evaluation will be made by the PRC Committee. The PRC committee consists of Head, Project Coordinator, One Senior Professor, One Associate Professor, and guide.

Mandatory Course: Competitive Exams: For completion of this course the student can submit the proof of appearing the competitive exams like, GATE, IELTES, GRE, TOEFL, CDAC, CDS, CAT, or any examination organized by NATIONAL TESTING AGENCY (NTA), or college in the level of NTA. (or)
The student should request for the provision of conducting Technical Seminar by the department. The topic of seminar should be the current technology of respective Engineering Branch. The evaluation will be done by the Departmental Academic Committee (DAC) based on rubrics framed.

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Course Structure R-20

SEMESER VIII

S.No.	Class	Course Code	Name of the Subject	L	T	P	C
1	PE	C78PE1	Professional Elective VI: A. Quantum Computing B. Blockchain Technology C. Stack Technologies	3	0	0	3
2	OE	C78OE2	Open Elective-III	3	0	0	3
3	OE	C78OE3	Open Elective-IV	3	0	0	3
4	PW	C78PW4	Major Project Phase II	0	0	20	10
Total Credits							**19**

Major Project Phase II: The approved project in Major Project Phase 1 should be implemented, student should submit the progress of his implementation work in 2 phases, to the PRC (Project Review Committee). The PRC consists of Head, Project Coordinator, One Senior Professor, One Associate Professor, and guide. Upon approval in both the phases, the student is eligible to submit the final project report by completing proper documentation to the external viva voce.

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CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

B.Tech VII Semester **L/T/P/C**
3/0/0/3

DEEP LEARNING (C77PC1)

Course Objective:

Present the mathematical, statistical and computational challenges of building stable representations for high-dimensional data, such as images, text and data. We will delve into selected topics of Deep Learning, discussing recent models from both supervised and unsupervised learning. Special emphasis will be on convolutional architectures, invariance learning, unsupervised learning and non-convex optimization.

Course Outcomes:

Upon completion of the course, the student will

1. Understand the concepts of deep feed forward networks, regularization for Deep Learning taxonomy.
2. Know how to apply the knowledge to optimize training deep models, understand the motivation, and mechanism to build convolutional networks.
3. Develop sequence modelling using the knowledge of recurrent and recursive networks.
4. Analyse various auto encoders, gain overview of representation learning
5. Infer how to apply structured probabilistic models for deep learning.

UNIT I

Deep Feedforward Networks

Challenges Motivating Deep Learning, Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms.

Regularization for Deep Learning

Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training Tangent Distance, Tangent Prop, and Manifold Tangent Classifier.

UNIT II

Optimization for Training Deep Models

How Learning Differs from Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms.

Convolutional Networks

The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, The Neuro scientific Basis for Convolutional Networks.

UNIT III

Sequence Modeling: Recurrent and Recursive Nets

Unfolding Computational Graphs, Recurrent Neural Networks and Bidirectional RNN, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, The Challenge of Long-Term Dependencies, Echo State Networks, Leaky Units and Other Strategies for Multiple Time Scales, The Long Short-Term Memory and Other Gated RNNs, Optimization for Long-Term Dependencies, Explicit Memory,

Applications

Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing, Other Applications

UNIT IV

Autoencoders

Undercomplete Autoencoders, Regularized Autoencoders, Representational Power, Layer Size and Depth, Stochastic Encoders and Decoders, Denoising Autoencoders, Learning Manifolds with Autoencoders, Contractive Autoencoders, Predictive Sparse Decomposition, Applications of Autoencoders.

Representation Learning

Greedy Layer-Wise Unsupervised Pretraining, Transfer Learning and Domain Adaptation, Semi-Supervised Disentangling of Causal Factors, Distributed Representation, Exponential Gains from Depth, Providing Clues to Discover Underlying Causes.

UNIT V

Structured Probabilistic Models for Deep Learning

The Challenge of Unstructured Modeling, Using Graphs to Describe Model Structure, Sampling from Graphical Models, Advantages of Structured Modeling, Learning about Dependencies, Inference and Approximate Inference, The Deep Learning Approach to Structured Probabilistic Models.

Text Books:

1. Deep Learning, Ian Good Fellow, Yoshua Bengio and Aaron Courville.

Reference Books:

1. Neural Networks and Learning Machines, Simon Haykin, Third Edition, Pearson.
2. Michael Nielsen, “Neural Networks and Deep Learning”, Determination Press, 2015. http://neuralnetworksanddeeplearning.com/
3. Charu C.Aggarwal “Neural Networks and Deep learning” Springer International Publishing, 2018
4. Satish Kumar, “Neural Networks, A Classroom Approach”, Tata McGraw -Hill, 2007.
5. Simon Haykin, “Neural Networks, A Comprehensive Foundation”, 2nd Edition, Addison Wesley Longman, 2001.

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3/0/0/3

INFORMATION SECURITY (C77PC2)

Course Objective:

Ability to identify information system requirements for both of them such as client and server and to understand the current legal issues towards information security.

Course Outcomes:

Upon completion, of course the student will be able to

1. Know the history of information security, by understanding the approaches that are to be implemented in system development life cycle. Along with the needs of security.
2. Plan how to implement security involving legal, ethical and professional issues.
3. Identify and understand risk management issues evolved during planning for securing the information.
4. Implement Encryption mechanisms to develop security for information.
5. Learn about the technologies that are useful for securing the information; understand about the security management models.

UNIT I

Introduction to Information Security,

The History of Information Security, What Is Security?, CNSS Security Model, Components of an Information System, Balancing Information Security and Access, Approaches to Information Security Implementation, Security in the Systems Development Life Cycle, Security Professionals and the Organization, Communities of Interest,

Need for Security

Threats and Attacks, Compromises to Intellectual Property, Deviations in Quality of Service, Espionage or Trespass, Forces of Nature, Human Error or Failure, Information Extortion, Sabotage or Vandalism, Software Attacks, Technical Hardware Failures or Errors, Technical Software Failures or Errors, Technological Obsolescence, Theft.

UNIT II

Legal, Ethical, and Professional Issues in Information Security:

Law and Ethics in Information Security, Relevant U.S. Laws, International Laws and Legal Bodies, Ethics and Information Security, Codes of Ethics of Professional Organizations.

Planning for Security:

Information Security Planning and Governance, Information Security Policy, Standards, and Practices, The Information Security Blueprint Security Education, Training, and Awareness Program, Continuity Strategies.

Unit-III

Risk Management

An Overview of Risk Management, Risk Identification, Risk Assessment, Risk Control , Quantitative Versus Qualitative Risk Management Practices, Recommended Risk Control Practices.

UNIT IV

Encryption: A Brief History of Encryption, Early Codes, More Modern Codes ,Symmetric-Key Cryptography, Key Exchange, Public Key Cryptography, Key Exchange, Public Key Infrastructure, Structure and Function .

Implementing Information Security,

Information Security Project Management, Technical Aspects of Implementation, Nontechnical Aspects of Implementation, Information Systems Security Certification and Accreditation.

UNIT V

Information Security Maintenance:

Security Management Maintenance Models, Digital Forensics

Security Technology: Access Controls, Firewalls, and VPNs, Intrusion Detection and Prevention Systems, and Other Security Tools

Text Books:

1. Principles of Information Security, Michael E Whitman, Sixth Edition, Cengage Learning
2. Information Security, The Complete Reference, Mark Rhodes-Ousley

Reference:

1. Information Security by VS Bagade & I.A. Dhotre First Edition Technical Publications Pune

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SOFT COMPUTING (C77PE3A)

Course Objective:
To give students knowledge of soft computing theories fundamentals, i.e. fundamentals of artificial and neural networks, fuzzy sets and fuzzy logic and genetic algorithms.

Course Out comes:
Upon completion, of course the student will

1. Understand how to implement supervised, unsupervised learning approach, across a neural network.
2. Learn to associate patterns by training algorithms and build various associative memory networks.
3. Develop fuzzy logic to handle uncertainty problems.
4. Learn to use, member function using membership value assignments, defuzzification methods.

UNIT I
Supervised Learning Network:
Introduction, Perceptron Networks, Adaptive Linear Neuron, Multiple Adaptive Linear Neurons, Back Propagation Network, Radial Based Function Network

UNIT II
Associative Memory Networks
Introduction, Training Algorithms for Pattern Association, Auto associative Memory Network, Hetero Associative Memory Network, Bidirectional Associative Memory (BAM), Hopfield Networks, Iterative Auto associative Memory Networks, Temporial Associative Memory Network

UNIT III
Unsupervised Learning Networks:
Introduction, Fixed Weight Competitive Nets, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Network

UNIT IV
Introduction to Classical Sets and Fuzzy Sets: Introduction, Classical Sets, Fuzzy Sets.
Classical Relational and Fuzzy Relations: Introduction, Cartesian Product of Relation, Classical Relation, Fuzzy Relations, Tolerance and Equivalence Relations, Non interactive Fuzzy Sets

UNIT V
Membership Functions:
Introduction, Features of the Membership Functions, Fuzzification, Methods of Membership Value Assignments, Rank Ordering, Angular, Fuzzy Sets, Neural Networks, Genetic Algorithms, Induction Reasoning.

Defuzzification: Introduction, Lambda Cuts for Fuzzy Sets, Lambda Cuts for Fuzzy Relations, Defuzzication Methods

Text Books:

1. Principles of Soft Computing- S N Sivanandam, S N Deepa, Wiley India, 2007.

Reference Books:

1. Soft Computing and Intelligent System Design -Fakhreddine O Karray,Clarence D Silva, Pearson Edition, 2004.
2. Artificial Intelligence and Soft Computing- Behavioural and Cognitive Modelling of the Human Brain- Amit Konar, CRC press, Taylor and Francis Group
3. Artificial Intelligence – Elaine Rich and Kevin Knight, TMH, 1991,rp2008.
4. Artificial Intelligence – Patric Henry W inston – Third Edition, Pearson Education.
5. A first course in Fuzzy Logic-Hung T Nguyen and Elbert A Walker,CRC. Press Taylor and Francis Group.
6. Artificial Intelligence and Intelligent Systems,N.P.Padhy, Oxford Univ.Press.

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CYBER SECURITY (C77PE3B)

Course objective:
Understand cyber-attacks, types of cybercrimes, cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks

Course Outcomes:
Upon completion of the course, the student will

1. Understand the phenomenon of cybercrime based on classification in line to Indian regulations. Learn the essence to eradicate cyber offenses and criminal plans.
2. Know the challenges posed by mobile and wireless devices in terms of attacks and policies framed for handling mobile and wireless devices.
3. Gain the knowledge in implying the legal perspectives with respect to the phenomenon of cyber-crimes and cyber security acts.
4. Learn about the tools and methods used for committing cyber crimes
5. Know the organizational implications caused in view of cybercrimes and understands the causes of cyber terrorism like, psychology, Mind-set and skill of Hackers, role of social political, ethical, and intellectual property in the cyberspace.

UNIT I

Introduction to Cybercrime

Introduction, Cybercrime and Information Security, Cybercriminals, Classification of Cybercrimes, The legal Perspectives, An Indian Perspective, Cybercrime and the Indian ITA 2000, Global Perspective on Cybercrimes, Cybercrime Era.

Cyber offenses: Criminal Plans

Introduction, Criminal Plans the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets, Attack Vector, Cloud Computing,

UNIT II

Cyber Crime: Mobile and Wireless Devices

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT III

Tools and Methods Used in Cyber Crime

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors,

Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Network

UNIT IV

Cyber Crimes and Cyber Security: The Legal Perspectives

Introduction, Cybercrime and the Legal Landscape around the World, Need of Cyber laws, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information technology Act, Digital Signatures and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment, Cyber law, Technology and Students Indian Scenario

UNIT V

Cyber Security: Organizational Implications

Introduction, Cost of Cybercrimes and IPR Issues, Web Threats for Organizations, Security and Privacy Implications from Cloud Computing, Social Media Marketing, Social Computing and the Associated Challenges for Organizations, Protecting People's Privacy in the Organization, Organizational Guidelines for Internet Usage, Safe Computing Guidelines and Computer Usage Policy, Incident Handling,

Cybercrime and Cyber Terrorism: Social, Political, Ethical and Psychological Dimensions

Intellectual Property in the Cyberspace, The ethical dimensions of the cybercrimes, The Psychology, Mindset and Skills of Hackers and Other Cybercriminals, Sociology of Cybercriminals, Information Warfare

Text Books:

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley

Reference Books:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&F Group.
3. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles,Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

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MOBILE APPLICATION DEVELOPMENT (C77PE3C)

Course Objective:

To Model and manage mobile application development using a range of methods, designing and develop mobile applications using a chosen application development framework and to evaluate alternative mobile frameworks, and contrast different programming platforms.

Course Outcomes:

Upon completion, of course the student will be able

1. To demonstrate their understandings of the fundamentals of Android Operating System.
2. To improve their skills of using Android, ios software development tools.
3. To demonstrate their ability to develop software with reasonable complexity on mobile devices.
4. To demonstrate their ability to deploy software to mobile devices, debug programs running on mobile devices.

UNIT I

Introduction to Android Operating System: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools

Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes

Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes.

UNIT II

Android User Interface: Measurements – Device and pixel density independent measuring UNIT – s Layouts – Linear, Relative, Grid and Table Layouts User Interface (UI) Components – Editable and non-editable TextViews, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers

Event Handling – Handling clicks or changes of various UI components

Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

UNIT III

Intents and Broadcasts: Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS

Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity

Notifications – Creating and Displaying notifications, Displaying Toasts

UNIT IV

Persistent Storage: Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference

Database – Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and etindelg data,

UNIT V

iOS Programming*:* Apps for a Mobile Platform, iOS Benefits, iOS App Development Essentials, The Application Model., Examining an Objective-C Program., Defining Classes, Using Classes, Objects, Methods, and Variables, Managing Memory, Handling Exceptions, Organizing Program Files, Analyzing Objective-C's Object-Orientation Capabilities.

Text Books:

1. Professional Android4 Application Development, Reto Meier, Wiley India, (Wrox), 202
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 203
3. Beginning iOS Programming For Dummies A Wiley Brand

Reference Books:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 203

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PERVASIVE COMPUTING (C77PE4A)

Course Objective:
Providing a sound conceptual foundation in the area of Pervasive Computing aspects and developing a design thinking approach towards problem-solving in this domain.

Course Outcomes:
Upon completion, of course the student will be able to

1. Understand the fundamental theoretical concepts in pervasive computing.
2. Understand the aspects of context awareness
3. Study the methods for efficient resource allocation and task migration
4. Learn and Analyze the HCI Service Selection and HCI migration framework
5. Design and implement pervasive application systems

UNIT I
Pervasive Computing Concepts: Perspectives of Pervasive Computing, Challenges, Technology;
The Structure and Elements of Pervasive Computing Systems: Infrastructure and Devices, Middleware for Pervasive Computing Systems, Pervasive Computing Environments.
Context Collection, User Tracking, and Context Reasoning; Resource Management in Pervasive Computing: Efficient Resource Allocation in Pervasive Environments, Transparent Task Migration, Implementation and Illustrations.

UNIT II
Resource Management in Pervasive Computing: Efficient Resource Allocation in Pervasive Environments, Transparent Task Migration.
HCI interface in Pervasive Environments: HCI Service and Interaction Migration, Context- Driven HCI Service Selection, Scenario Study: Video Calls at a Smart Office, A Web Service– Based HCI Migration Framework.

UNIT III
Pervasive Mobile Transactions: Mobile Transaction Framework, Context-Aware Pervasive Transaction Model, Dynamic Transaction Management, Formal Transaction Verification, Evaluations.

UNIT IV
User Preferences and Recommendations: Content-Based Recommendation in an RSS Reader, A Collaborative Filtering-Based Recommendation, Preference-Based Top-*K* Recommendation in Social Networks

UNIT V
Case Studies: iCampus Prototype, IPSpace: An IPv6-Enabled Intelligent Space.

Text Books:

1. Minyi Guo, Jingyu Zhou, Feilong Tang, Yao Shen ,"Pervasive Computing: Concepts, Technologies and Applications", CRC Press, 2016.

Reference Books:

1. Obaidat, Mohammad S., Mieso Denko, and Isaac Woungang, eds. Pervasive computing and networking. John Wiley & Sons, 2011.
2. Laurence T. Yang, Handbook On Mobile And Ubiquitous Computing Status and Perspective, 2012, CRC Press.

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SEMANTIC WEB (C77PE4B)

Course Objective:

The underlying knowledge representation formalisms in use on the Semantic Web, the Linked Web of Data, common ontology design patterns and common application vocabularies in use on the Semantic Web.

Course Outcomes:

Upon completion of the course, the student will

1. Understand the concepts of semantic web, modelling, aggregating and knowledge representation.
2. Know how to describe the web resources, Develop queries using basics of SPARQL.
3. Gain knowledge in web ontology language 2.
4. Learn how to develop and implement logic and inference rules.

UNIT I

The Semantic Web

Introduction to Semantic Web, Limitations of current Web The Semantic solution, Development of Semantic Web, Semantic Web Technologies, A Layered Approach

Modelling, Aggregating and Knowledge Representation

Ontology and their role in the Semantic Web, Resource Description Framework – Web Ontology Language – Modelling and aggregating social network data: State-of-the-art in network data representation – Ontological representation of social individuals – Ontological representation of social relationships – Aggregating and reasoning with social network data – Advanced representations.

UNIT II

Describing Web Resources: RDF Introduction , RDF: Data Model, RDF Syntaxes, RDFS: Adding Semantics, RDF Schema: The Language , RDF and RDF Schema in RDF Schema, An Axiomatic Semantics for RDF and RDF Schema , A Direct Inference System for RDF and RDFS

UNIT III

Querying the Semantic Web

SPARQL Infrastructure, Basics: Matching Patterns, Filters, Constructs for Dealing with an Open World, Organizing Result Sets, Other Forms of SPARQL Queries, Querying Schemas, Adding Information with SPARQL Update, The Follow Your Nose

UNIT IV

Web Ontology Language: OWL2

Introduction, Requirements for Ontology Languages, Compatibility of OWL2 with RDF/RDFS, The OWL Language, OWL2 Profiles 4

UNIT V

Logic and Inference: Rules

Introduction, Example of Monotonic Rules: Family Relationships, Monotonic Rules: Syntax Monotonic Rules: Semantics, OWL2 RL: Description Logic Meets Rules, Rule Interchange Format: RIF, Semantic Web Rules Language (SWRL), Rules in SPARQL: SPIN

Non monotonic Rules: Motivation and Syntax, Example of Non monotonic Rules: Brokered Trade, Rule Markup Language (RuleML).

Text Books:

1. A semantic web primer: Grigoris Antoniou, Frank Van Harmelen and Rinke Hoekstra, Thirdedition, MIT press.
2. Peter Mika, ―Social Networks and the Semantic Web, First Edition, Springer 207.

References Books:

1. Borko Furht, ―Handbook of Social Network Technologies and Applications, 1st Edition, Springer, 200.
2. Guandong Xu, Yanchun Zhang and Lin Li, Web Mining and Social Networking – Techniques and applications, First Edition, Springer, 201.
3. Dion Goh and Schubert Foo - Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively, IGI Global Snippet, 208.
4. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling, IGI Global Snippet, 209.
5. John G. Breslin, Alexander Passant and Stefan Decker, -The Social Semantic Web, Springer, 209.

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COMPUTER FORENSICS (C77PE4C)

Course Objectives:

1. Computer forensic a systematic approach to perform comprehensive investigation in order to solve computer crimes.
2. The needs for computer forensic experts in corporations, law firms, insurance agencies, and law enforcement.
3. Evidence retrieved from computers and other digital media are becoming more relevant to convicting hackers and criminals.
4. The course covers both the principles and practice of digital forensics.
5. Methods and standards for extraction, preservation, and deposition of legal evidence in a court of law.

Course Outcomes:

Upon completion, of course the student will be able

1. To learn fundamentals of computer forensics till data recovery solution
2. To gather evidences and notify the types of evidences, implement data seizure techniques like, collection and archiving, control contamination-using tools, Authenticating evidences.
3. To know the methods used for computer forensic analysis and validation.
4. To use various tools for detecting cybercrimes caused using computers, mobile devices.
5. To work with windows and Dos operating systems to avoid cyber-attacks.

UNIT I

Computer Forensics Fundamentals: What is Computer Forensics?, Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps taken by Computer Forensics Specialists Types of Computer Forensics Technology: Types of Military Computer Forensic Technology, Types of Law Enforcement — Computer Forensic Technology — Types of Business Computer Forensic Technology Computer Forensics Evidence and Capture: Data Recovery Defined — Data Back-up and Recovery — The Role of Back-up in Data Recovery — The Data-Recovery Solution.

UNIT II

Evidence collection and Data seizure: Why Collect Evidence? Collection Options — Obstacles — Types of Evidence — The Rules of Evidence — Volatile Evidence — General Procedure — Collection and Archiving — Methods of Collection — Artifacts — Collection Steps — Controlling Contamination: The Chain of Custody Duplication and Preservation of Digital, Autopsy Tool, Encase Tool

Evidence: Preserving the Digital Crime Scene — Computer Evidence Processing Steps Legal Aspects of Collecting and Preserving Computer Forensic Evidence Computer Image Verification and Authentication: Special Needs of Evidential Authentication — Practical Consideration — Practical Implementation.

UNIT III

Computer forensics analysis and validation: Determining what data to collect and analyze, validating forensic data, addressing data-hiding techniques, and performing remote acquisitions Network Forensics: Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project. Processing Crime and Incident Scenes: Identifying digital evidence, collecting evidence in private-sector incident scenes, processing law enforcement crime scenes, preparing for a search, securing a computer incident or crime scene, seizing digital evidence at the scene, storing digital evidence, obtaining a digital hash, reviewing a case.

UNIT IV

Current Computer Forensic Tools: evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software E-Mail Investigations: Exploring the role of e-mail in investigation, exploring the roles of the client and server in e-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools.

Cellphone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices.

UNIT V

Working with Windows and DOS Systems: understanding file systems, exploring Microsoft File Structures, Examining NTFS disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks, MS-DOS startup tasks, virtual machines.

Text Books:

1. Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, New Delhi.
2. Computer Forensics and Investigations by Nelson, Phillips Enfinger, Steuart, CENGAGE Learning

Reference Books:

1. Real Digital Forensics by Keith J. Jones, Richard Bejtiich, Curtis W. Rose, Addison-Wesley Pearson Education.
2. Forensic Compiling, A Tractitioneris Guide by Tony Sammes and Brian Jenkinson, Springer International edition.
3. Computer Evidence Collection & Presentation by Christopher L.T. Brown, Firewall Media.
4. Homeland Security, Techniques & Technologies by Jesus Mena, Firewall Media.
5. Software Forensics Collecting Evidence from the Scene of a Digital Crime by Robert M. Slade, TMH205.
6. Windows Forensics by Chad Steel, WileyIndia.

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CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

B.Tech VII Semester **L/T/P/C**
0/0/2/1

DEEP LEARNING LAB (C77PC6)

Course Objectives:

1. Implement the various deep learning algorithms in Python.
2. Learn to work with different deep learning frameworks like Keras, Tensor flow, PyTorch, Caffe etc.

Course Outcomes:

Upon completion, of course the student will be able to

1. Expert knowledge in solving real world problems using state of art deep learning techniques

List of Experiments

1. Basic image processing operations : Histogram equalization, thresholding, edge detection, data augmentation, morphological operations
2. Implement SVM/Softmax classifier for CIFAR-10 dataset: (i) using KNN, (ii) using 3 layer neural network.
3. Study the effect of batch normalisation and dropout in neural network classifier
4. Familiarisation of image labelling tools for object detection, segmentation
5. Image segmentation using Mask RCNN, UNet, SegNet
6. Object detection with single-stage and two-stage detectors (Yolo, SSD, FRCNN, etc.)
7. Image Captioning with Vanilla RNNs
8. Image Captioning with LSTMs
9. Network Visualisation: Saliency maps, Class Visualisation
10. Generative Adversarial Networks
11. Chatbot using bi-directional LSTMs
12. Familiarisation of cloud based computing like Google colab

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CUTTING EDGE TECHNOLOGIES LAB (C77PC7)

Course Objective:

1. The Objective of Hydra which is an open-source Python framework that simplifies the development of research and other complex applications. The Objective is ability to dynamically create a hierarchical configuration by composition and override it through config files and the command line.
2. To understand Codd which is an Easy to use graphical tool for the automated creation, verification, retention, scaling and porting of database Meta data configurations
3. To Understand Picasso which can be used as query optimizer analysis, debugging, and redesign

Course Outcomes:

Upon completion, of course the student will be able to

1. Hierarchical configuration compassable from multiple sources, Configuration can be specified or overridden from the command line and Dynamic command line tab completion
2. Run application locally or launch it to run remotely and Run multiple jobs with different arguments with a single command
3. Metadata Processing Modes such as Metadata Constructing Mode, Metadata Retention Mode, Inter Engine Meta data Transfer Mode and Meta data Scaling

Programs on Hydra Tool

1. Install and configure Hydra and at-least Database engines.
2. Create and Establish a Database connection on POSTGRE, SQL & MYSQL Database engines.
3. Fetch Tables, Columns and Most frequent values in Hydra application
4. Generate relation summary in Hydra
5. Simulate the workload and generate database summary for any database engine.
6. Compare and calculate time complexity for different workloads on POSTGRE Database engine.

Programs on CODD

1. Installation and configuration of CODD
2. Construct Metadata using Construct mode for DB2, Oracle, SQL Server, PostgreSQL and Sybase.
3. Demonstrate metadata retention using retain mode for various database engines.
4. Demonstrate inter engine portability using inter engine mode for meta data transfer
5. Create a Histogram using the predefined set of Classical Distributions.
6. Validate metadata for DB2 Engine using CODD tool.

Programs of PICASSO

1. Installation and configuration of PICASSO
2. Develop a plan diagram to enumerate the execution plan choices
3. Develop a cost diagram to visualize the associated estimated plan execution costs
4. Develop a Reduced plan diagram to show the extent to which original plan diagram may be simplified.
5. Design a schematic plan tree diagram
6. Design a compiled plan tree diagram
7. Design a Foreign plan tree diagram on a database engine
8. Design a abstract plan diagram to visualize the behaviour of selected plan diagram
9. Produce a execution cost diagram to visualize the runtime query response times
10. Produce a cardinality diagram to visualize run time query result cardinalities

Programs of Paramoon

1. Installation and configuration of PARAMOON
2. Develop a scalable (parallel) solution of partial differential equation.

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QUANTUM COMPUTING (C78PE1A)

Course Objective

Paradigm change between conventional computing and quantum computing, and introduce several basic quantum algorithms.

Course Outcomes:

Upon completion, of course the student will be able to

1. Understand the Quantum Computing foundation.
2. State and analyze Quantum system and Quantum circuit model.
3. Analyze the Quantum algorithms.
4. Know Quantum computational complexity and imply error corrections.

UNIT I
FOUNDATION

Overview of traditional computing – Church-Turing thesis – circuit model of computation– reversible computation – quantum physics – quantum physics and computation Dirac notation and Hilbert Spaces – dual vectors – operators – the spectral theorem - functions of operators – tensor products – Schmidt decomposition theorem.

UNIT II
QUBITS AND QUANTUM MODEL OF COMPUTATION

State of a quantum system – time evolution of a closed system – composite systems – measurement – mixed states and general quantum operations – quantum circuit model – quantum gates – universal sets of quantum gates – unitary transformations – quantum circuits.

UNIT III
QUANTUM ALGORITHMS-I

Super dense coding, quantum teleportation: applications of teleportation, probabilistic versus quantum algorithms: phase kick-back, the Deutsch algorithm, the Deutsch- Jozsa algorithm, Simon's algorithm, Quantum phase estimation and quantum Fourier Transform: Eigen value Estimation.

UNIT IV
QUANTUM ALGORITHMS – II

Order-finding problem – eigen value estimation approach to order finding – Shor's algorithm for order finding – finding discrete logarithms – hidden subgroups – Grover's quantum search algorithm – amplitude amplification – quantum amplitude estimation – quantum counting – searching without knowing the success probability

UNIT V
QUANTUM COMPUTATIONAL COMPLEXITY AND ERROR CORRECTION

Computational complexity – black-box model – lower bounds for searching – general black-box lower bounds – polynomial method – block sensitivity – adversary methods –

classical error correction – classical three-bit code – fault tolerance – quantum error correction – three- and nine-qubit quantum codes – fault-tolerant quantum computation.

Text Book:

1. P. Kaye, R. Laflamme, and M. Mosca, "An introduction to Quantum Computing", Oxford University Press, 1999.

Reference Book:

1. V. Sahni, "Quantum Computing", Tata McGraw-Hill Publishing Company, 207.

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BLOCKCHAIN TECHNOLOGY (C78PE1B)

Course Objective:
Introduce Blockchain technology and Crypto Currency.

Course Outcome:
Upon completion of the course, the student will

1. Know the aspects, and learn how to recognize the potential need of block chain by understanding the ownership, by spending money twice.
2. Learn to protect, user accounts created during planning of block chain construction, documenting ownership, authorizing and storing transactions data.
3. Gain knowledge how, to use, store, and protect data among peers; to add transactions using the history of transactions by paying for integrity and bringing pieces together.
4. Know how to overcome the limitations by reinventing block chain and summarizing the events created.
5. Have a brief understanding about, monetary and nonmonetary currencies, demurrage currencies. Technical challenges, business model challenges, scandals and public perception, Government Regulation, Privacy challenges for personal records.

UNIT I
Terminology and Technical Foundations:
Thinking in Layers and Aspects, Seeing the Big Picture, Recognizing the Potential
Why the Blockchain Is Needed:
Discovering the Core Problem, Disambiguating the Term, Understanding the Nature of Ownership, Spending Money Twice

UNIT II
How the Blockchain Works-1:
Planning the Blockchain, Documenting Ownership, Hashing Data, Hashing in the Real World, Identifying and Protecting User Accounts, Authorizing Transactions, Storing Transaction Data

UNIT III
How the Blockchain Works-2
Using the Data Store, Protecting the Data Store, Distributing the Data Store Among Peers, Verifying and Adding Transactions, Choosing a Transaction History, Paying for Integrity, Bringing the Pieces Together

UNIT IV
Limitations and How to Overcome Them:
Seeing the Limitations, Reinventing the Blockchain
Using the Blockchain & Summary:
Using the Blockchain, Summarizing and Going Further

UNIT V

Advanced Concepts:

Currency, Token, Tokenizing, Currency Multiplicity: Monetary and Nonmonetary Currencies, Demurrage Currencies: Potentially Incitory and Redistributable

Limitations:

Technical Challenges, Business Model Challenges, Scandals and Public Perception, Government Regulation, Privacy Challenges for Personal Records

Text Books:

1. Blockchain Basics: A Non-Technical Introduction in 25 Steps 1st ed. Edition, by Daniel
2. Blockchain Blue print for Economy by Melanie Swan

References :

1. The Collected Writings of Bitcoin Creator Satoshi Nakomoto

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STACK TECHNOLOGIES (C78PE1C)

Course Objective:

Develop web sites and apply the basic design principles to implement ideas, information, products, and services on websites.

Course Outcomes:

Upon completion of this course students can able to

1. Understand that how to use hibernate to develop web applications
2. Understand the spring, spring boot framework
3. Understand usage of React JS in web application development
4. Understand the Micro services concept in application development

UNIT I

Hibernate

An Introduction to Hibernate 3, Integrating and Configuring Hibernate, Building a Simple Application ,The Persistence Life Cycle, An Overview of Mapping, Mapping with Annotations, Creating Mappings with Hibernate XML Files ,Using the Session, Searches and Queries, Advanced Queries Using Criteria .

UNIT II

Spring

Springing into Action, Wiring beans, Advanced wiring (3.3, 3.4), Building Spring web applications, Hitting the database with Spring and JDBC, Persisting data with object-relational mapping, Creating REST APIs with Spring MVC

UNIT III

Spring Boot

Spring Boot Introduction, Spring-boot basics, Spring MVC, Data Access

UNIT IV

React JS

Introduction to Meet React, <Hello World />: our first component, Data and data flow in React, Rendering and lifecycle methods in React, Working with forms in React, Integrating third-party libraries with React

UNIT V

Micro Services and Simple Spring boot micro services application integrating with React.JS

Text Books:

1. Hibernate in Action CHRISTIAN BAUER GAVIN KING MANNING
2. Spring Boot in Action Craig Walls MANNING
3. Spring Micro services in Action JOHN CARNELL MANNING
4. React JS In Action Mark Tielens Thomas MANNING

References:

1. Designing Applications with Spring Boot 2.2 and React JS: Step-by-step guide to design and develop intuitive full stack web applications by Dinesh Rajput