Nagarjuna College of Engineering and Technology, Bengaluru Scheme & Syllabus 2020-2021 Outcome-Based Education (OBE) and Choice-Based Credit System (CBCS) Effective from the Academic year 2021-2022												
	VII Semester											
H Ĕ							k	Examination				
Sl. No.	Course Code	Course Title	Teaching Departn	L	Т	Р	S	Duration in Hrs	CIE Marks	SEE Marks	Total Marks	Credits
1	20ISI71	Deep Learning (IC)	ISE	3	0	2	0	3	50	50	100	4
2	20ISI72	Cryptography & Network Security (IC)	ISE	3	0	2	0	3	50	50	100	4
3	20IST73X	Professional Elective – IV	ISE	3	0	0	0	3	50	50	100	3
4	20IST74X	Professional Elective – V	ISE	3	0	0	0	3	50	50	100	3
5	20IST75X	Industrial Elective – I	ISE	3	0	0	0	3	50	50	100	3
6	20ISP76	Project Phase – I	ISE	0	0	3	0	3	50	50	100	3
	15 0 5 0 300 600 20											

Professional Elective – IV

Course	Course Name			
Code				
20187721	Software Testing & Quality			
20131731	Assurance			
20IST732	Network Management			
20IST733	Human Computer Interaction			

Professional Elective – V

Course Code	Course Name
20IST741	UML & Agile Practices
20IST742	Natural Language Processing
20IST743	Software Architecture & Design Pattern

Industry Elective – I

Course Code	Course Name
20IST751	Cyber Security & Cyber Forensics
20IST752	Advanced Cloud Computing
20IST753	Precision Agriculture

DEEP LEARNING

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
20ISI71	3:0:2:0	4	CIE:50 SEE:50	3 Hours	РСС

Prerequisites:

Data Mining, Data warehouse, Database, Big data, Cloud computing, Testing.

Course Objectives:

In this course, students will learn the fundamentals of deep learning, and the main research activities in this field. Moreover, students will learn to implement, train, and validate their own neural network, and they will improve their understanding of the on-going research in computer vision and multimedia field.

Module I

Machine Learning

Machine Learning - Examples of machine learning applications - Types of machine learning – Supervised Learning: Classification - Decision Trees, Neural Networks – Unsupervised Learning: Clustering- Clustering Methods-Graph Clustering.

Module II

Fundamentals of Neural Networks

Basics of Neural Networks- Neural network representation-History and Cognitive basis of neural computation- Perceptrons- Perceptron Learning Algorithm- Multilayer Perceptrons (MLPs) - Representation Power of MLPs -Back Propagation.

Module III

Deep Learning Fundamentals and Strategies Introduction to deep learning-History of Deep Learning- Perspectives and issues in deep learning – Deep Neural Networks - Unsupervised deep learning - Deep reinforcement learning -Deep learning strategies.

Module IV

CNN and RNN Foundations on CNN, Convolutional Neural Networks (CNNs): LeNet, AlexNet, ZF- Net, VGGNet, GoogLeNet, ResNet—Recurrent Neural Networks- Optimization in deep learning:Gradient Descent(GD)-Momentum Based GD.

Module V

Deep Learning Tools CUDA Tool Kit: Introduction, Programming Model, Programming interface, Performance Guidelines- NVIDIA- NVIDIA Architecture- Case Study : Tensor Flow, Caffe, Theano, Torch.

Course Outcomes:

Students undergoing this course are able to:

- 1. Discuss the concepts of machine learning algorithms.
- 2. Understand the fundamentals of neural networks.
- 3. Explain the different Strategies and Perspectives of Deep learning fundamentals.
- 4. Illustrate the concepts of CNN and RNN models.
- 5. Apply the knowledge in deep learning tools.

Text Books

- 1. Goodfellow, I., Bengio, Y., and Courville, A., ,Deep Learning', MIT Press, 2016.
- 2. Ethem Alpaydin, ,Introduction to Machine Learning', MIT Press,2014.

3. Li Deng and Ding Yu, ,Deep Learning Methods and Applications', Now Publishers,

2014.

Reference Books

- 1. Tom M Mitchell, ,Machine Learning', First Edition, McGraw Hill Education, 2013
- 2. Yegnanarayana, B, ,Artificial Neural Networks', PHI Learning Pvt. Ltd,2009.
- 3. Satish Kumar, Neural Networks: A Classroom Approach', Tata McGraw-Hill Education,2004.
- 4. Christopher Bishop, ,Pattern Recognition and Machine Learning' 2e, Springer, 2006.
- 5. Francois Chollet, "Deep learning with Python" Manning Publications.

List of Exercises / 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 normalization and dropout in neural network classifier

- 4. Familiarization 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 Visualization: Saliency maps, Class Visualization
- 10. Generative Adversarial Networks
- 11. Chatbot using bi-directional LSTMs
- 12. Familiarization of cloud based computing like Google colab

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type		
20ISI72	3:0:2:0	4	CIE:50 SEE:50	3 Hours	PCC		
 Course Objectives: As a student will be able to learn: Acquire the knowledge of basic concepts of cryptography and network security and classify attacks on a network. Understand and analyse the different process for hiding the information with conventional cryptographic algorithms. Comprehend various block cipher cryptosystems. Learn the concepts of public cryptosystems and key management Systems. Understand and apply authentication techniques to provide secure communication. 							
			Syllabus				
Introduction: Service mechanisms and attacks, The OSI security architecture, A Model for Network Security. Symmetric Ciphers: Symmetric cipher model, substitution techniques. 08 Hours Module – II Symmetric Ciphers: Transposition techniques, Steganography. Block Ciphers and DES:							
Module – III Advanced Encryption Standard - AES Transformation Function: Cipher-Substitute Bytes Transformation, Shift Row Transformation, Mix Column Transformation, Add Round Key							
	08 Hours						
Module – IV Asymmetric Ciphers - Public key cryptography and RSA: Principles of public key cryptosystems, RSA algorithm. Other public key cryptosystems and key management: Key management, Diffie-Hellman key exchange. Elliptic Curve Cryptography. 08 Hours							
		N	/Iodule – V				
Network Secur Kerberos. Electi	ity Application conic Mail Secu	s - Authent rity: PGP.	tication Application	ns: X.509 Authentic	cation Service,		

CRYPTOGRAPHY & NETWORK SECURITY

	LIST OF EXPERIMENTS
1	Caesar Cipher: Implement a simple Caesar cipher encryption and decryption algorithm.
2	Public Key Cryptography: Introduce RSA encryption and decryption. Generate public and private keys and encrypt/decrypt messages.
3.	Establish a shared secret between two parties that can be used for secret communication to exchange data over a public network using Diffie-Hellman algorithm.
4.	Implement Simplified DES - Key Generation Simulation Program using C Programming
5.	Implement Hill program using c
6.	Secure Email Configure email clients for encrypted communication using PGP/GPG. Exchange encrypted emails.

Course Outcomes:

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

- **CO1:** Describe the basic concepts of cryptography and network security and classify attacks on a network, symmetric ciphers and substitution techniques.
- **CO2:** Apply and integrate the different process for hiding the information with conventional cryptographic algorithms, transposition techniques and block ciphers.
- **CO3:** Illustrate the various block cipher cryptosystems like DES and AES.
- **CO4:**Analyze public cryptosystems and key management systems

CO5: Demonstrate and analyze authentication techniques to provide secure communication.

Textbooks:

- 1) Cryptography and Network Security: William Stallings, Pearson Education, 2003
- 2) Behrouz A Forouzan, Debdeep Mukhopadhyay: Cryptography and Network Security, 2nd Edition, Special Indian edition, Tata McGraw-Hill, 2011.

Reference Books:

1) Cryptography and Network Security, Atul Kahate, TMH, 2003

Reference Online Resources:

1) https://nptel.ac.in/course.php

SOFTWARE TESTING AND QUALITY ASSURANCE

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type				
20IST731	3:0:0:0	3	CIE:50 SEE:50	3 Hours	PEC				
Course Objectiv 1. Learn to 2. To know	Course Objectives: Learn to apply the testing strategies and methodologies in projects. 								
 To know To expla To learn assessme 	 To know test management strategies and tools for testing. To know the awareness on the open problems in software testing and maintenance. To explain quality assurance and various tools used in quality management. To learn in detail about various quality assurance models and to understand the audit assessment procedures to achieve quality. 								
			Syllabus:						
			Module – I						
Software Testing Testing as a proc development org design, Defect ex	Software Testing Basics: Testing as an engineering activity, Role of process in software quality, Testing as a process, Basic definitions, Software testing principles, The tester's role in a software development organization, Origins of defects, Defect classes, The defect repository and test design, Defect examples, Developer / Tester support for developing a defect repository.								
			Module – II						
Testing Techniq Testing Vs. Stru Using Black Box Decision tables, S Levels of Testing Usability and Acc	Testing Techniques And Levels Of Testing: Using White Box Approach to Test design - Static Testing Vs. Structural Testing, Code Functional Testing, Coverage and Control Flow Graphs, Using Black Box Approaches to Test Case Design, Random Testing, Requirements based testing, Decision tables, State-based testing, Cause-effect graphing, Error guessing, Compatibility testing, Levels of Testing -Unit Testing, Integration Testing, Defect Bash Elimination. System Testing - Usability and Accessibility Testing, Configuration Testing, Compatibility Testing.								
			Module – III						
Software Test Automation And Quality Metrics: Software Test Automation, Skills needed for Automation, Scope of Automation, Design and Architecture for Automation, Requirements for a Test Tool, Challenges in Automation Tracking the Bug, Debugging. Testing Software System Security - Six-Sigma, TQM - Complexity Metrics and Models, Quality Management Metrics, Availability Metrics, Defect Removal Effectiveness, FMEA, Quality Function Deployment, Taguchi Quality Loss Function, Cost of Quality									
08 Hours									
			Module – IV						
Fundamentals Of Software Quality Assurance: SQA basics, Components of the Software Quality Assurance System, software quality in business context, planning for software quality assurance, product quality and process quality, software process models, 7 QC Tools and Modern Tools									

Module – V

Software Quality Assurance Models And Trends: Models for Quality Assurance, ISO-9000 series, CMM, CMMI, Test Maturity Models, SPICE, Malcolm Baldrige Model- P-CMM Software Process- PSP and TSP, OO Methodology, Clean-room software engineering, Defect Injection and prevention, Internal Auditing and Assessments, Inspections & Walkthroughs, Case Tools and their Affect on Software Quality.

08 Hours

Course Outcomes:

By the end of the course, students should be able to

- 1. Applying testing techniques to deliver a product free from bugs.
- 2. Evaluate the scenario and to select the proper testing technique.
- **3**. Explore the test automation concepts and tools and estimation of cost, schedule based on standard metrics.
- 4. Understand how to detect, classify, prevent and remove defects.
- 5. Identify the appropriate quality assurance models and develop quality.

Textbooks:

- 1. Srinivasan Desikan, GopalaswamyRamesh,Software Testing: Principles and Practices Pearson.
- 2. Daniel Galin, Software Quality Assurance: From Theory to Implementation, Pearson Addison Wesley

Reference Books:

- 1. Aditya P. Mathur, Foundations of Software Testing, Pearson.
- 2. Paul Ammann, Jeff Offutt, Introduction to Software Testing, Cambridge University Press.
- 3. Paul C. Jorgensen, Software Testing: A Craftsman's Approach, Auerbach Publications.
- 4. William Perry, Effective Methods of Software Testing, Wiley Publishing, Third Edition.
- 5. RenuRajani, Pradeep Oak, Software Testing Effective Methods, Tools and Techniques, Tata McGraw Hill.
- 6. Stephen Kan, Metrics and Models in Software Quality, Addison Wesley, Second Edition.

Reference Online Resources:

- $1.\ https://www.tutorialspoint.com/software_testing/software_testing_qa_qc_testing.htm.$
- 2. https://www.bmc.com/blogs/quality-assurance-software-testing/#.
- 3. https://strongqa.com/qa-portal/knowledge-base/key-concepts/software-testing

NETWORK MANAGEMENT

Course Code	CodeL:T:P:SCreditsExam MarksExam DurationCourse Type							
20IST732	3:0:0:0	3	CIE:50 SEE:50	3 Hours	PEC			
			Module 1					
Data communication and network management overview: Analogy of Telephone Network Management, Communications protocols and Standards, Case Histories of Networking and Management, Challenges of Information Technology Managers, Network Management: Goals, Organization, and Functions, Network and System Management, Network Management System Platform, Current Status and future of Network Management.								
			Module 2					
SNMPV1 Networ	·k Managem	ent Manage	d Network: Organiz	ation and Information	Models			
Managed Networ Organization Mod	k: Case Histo el, System Ov	ries and Exa verview, The	mples, The History o Information Model.	f SNMP Management,	The SNMP Model, The			
Snmpv1 Network Management: Communication and Functional Models, The SNMP Communication Model, Functional model. SNMP Management: SNMPv2 Major Changes in SNMPv2, SNMPv2 System architecture, SNMPv2 Structure of Management Information, The SNMPv2 Management Information Base, SNMPv2 Protocol, Compatibility with SNMPv1.								
					08 Hours			
			Module 3					
SNMP Managem ATM Remote Mor	ent: RMON nitoring, A Ca	: What is I se Study of	Remote Monitoring	? ,RMON SMI and M g RMON	IB, RMON1, RMON2,			
Tele communication TMN Standards, T Implementation Is	o ns Managen FMN Architeo sues.	1ent networl 2ture, TMN	k: Why TMN?, Og Management Service	perations Systems, TM e Architecture, An Inte	AN Conceptual Model, egrated View of TMN,			
					08 Hours			
			Module 4					
Network Manage	ement Tools A	And System	s:					
Network Managen Network Managen Management Solut	nent Tools, N nent systems, ions.	etwork Stati Commercia	stics Measurement S l Network managem	Systems, History of E nent Systems, System I	nterprise Management, Management, Enterprise			
	Module 5							
Web-Based Mana NMS with Web Int	agement : terface and W	/eh-Based M	anagement Web Inte	erface to SNMP Manag	zement			
NMS with Web Interface and Web-Based Management, Web Interface to SNMP Management, Embedded Web-Based Management, Desktop management Interface, Web-Based Enterprise Management, WBEM: Windows Management Instrumentation, Java management Extensions, Management of a Storage Area Network, Future Directions. Case Studies:								

Course Outcomes :

After the completion of course, the student will able to

1. Acquire the knowledge about network management standards (OSI and TCP/IP)

2. Acquire the knowledge about various network management tools and the skill to use the min monitoring a network.

3. Analise the challenges faced by Network managers

4. Evaluate various commercial network management systems and open network management systems. Analise and interpret

Text Book:

Mani Subrahmanian, "Network Management Principles and Practice", 2nd Edition, Pearson Education, 2010.

References:

Morris, "Network management", 1stEdition, Pearson Education,2008.

Mark Burges, "Principles of Network System Administration", 1st Edition, Wiley DreamTech, 2008.

HUMAN COMPUTER INTERACTION

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type			
20IST733	3:0:0:0	3	CIE:50 SEE:50	3 Hours	PEC			
 Course Objectives: To learn the foundations of Human Computer Interaction. To become familiar with the design technologies for individuals and persons with disabilities. To be aware of mobile HCI. To learn the guidelines for user interface. 								
			Syllabus					
			Module – I					
Foundations of The Human: I/O Memory – pro- elements – inter	HCI: O channels – I cessing and ne activity- Paradi	Memory – etworks; In gms. – Cas	Reasoning and prob teraction: Models – e Studies.	lem solving; The Co frameworks – Ergo	mputer: Devices – nomics – styles – 08 Hours			
			Module – II					
Design & Softw Interactive Des prototyping. HC practice – desig – Universal Des	Design & Software Process: Interactive Design: Basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process: Software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules: principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.							
			Module – III		08 Hours			
Models and Th Mobile Ecosyst Applications, Ga Design, Tools	Models and Theories Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools. – Case Studies. 08 Hours							
			Module – IV					
HCI in the Soft HCI in the soft prototyping Des usability Standa Evaluation thro method. Univers	HCI in the Software Process HCI in the software process, The software life cycle Usability engineering Iterative design and prototyping Design Focus: Prototyping in practice Design rationale Design rules Principles to support usability Standards Golden rules and heuristics HCI patterns Evaluation techniques, Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, Choosing an evaluation method. Universal design, Universal design principles Multi-modal interaction. 08 Hours							
	Module – V							
Module – V Web Interface Design Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow – Case Studies. 08 Hours								

Course Outcomes:

- Upon completion of the course, the students should be able to:
- Design effective dialog for HCI
- Design effective HCI for individuals and persons with disabilities.
- Assess the importance of user feedback.
- Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites.
- Develop meaningful user interface.

Textbooks:

- Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, —Human Computer Interaction, 3rd Edition, Pearson Education, 2004 (UNIT I, II, III & IV)
- Bill Scott and Theresa Neil, —Designing Web Interfaces, First Edition, O'Reilly, 2009. (UNIT-V)

Reference Books:

- Mobile Design and Development, Brian Fling, First Edition, O'Reilly Media Inc., 2009
- The essential guide to user interface design, Wilbert O Galitz, Wiley DreamaTech.
- Designing the user interface. 3rd Edition Ben Shneidermann, Pearson Education Asia.

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
20IST741	3:0:0:0	3	CIE:50 SEE:50	3 Hours	PEC

UML & AGILE PRACTICES

Course Objectives:

This course will enable students to:

• Understand the basic concepts of Object Orientation and UML.

• Get a clear understanding of how to use UML and design diagrams.

• Comprehend an iterative; incremental development process leads to faster delivery of more useful software.

• Apply the principles and practices of extreme programming.

• Analyse the essence of agile development methods and develop prototyping in the software process.

Syllabus

Module – I

UML Diagrams: What is Object Orientation? What is OO development? OO themes; Evidence for usefulness of OO development; OO modeling history. UML diagrams – Use Case – Class Diagrams– Interaction Diagrams – State Diagrams – Activity Diagrams – Package, component and Deployment Diagrams.

08 hours

Module – II

Advanced Modeling And Design: System sequence diagrams - Relationship between sequence diagrams and use cases Logical architecture and UML package diagram – Logical architecture refinement - UML class diagrams derived data; Packages; State Modeling, Advanced: Events, States, Transitions and Conditions; State diagrams; State diagram behaviour, nested states signal generalization concurrency; Relation of class and state models.

08 hours

Module – III

The Agile Movement-A Five Minute Primer, What is Agile Development? The Agile Methodologies Agile Values, Agile Practices, Agile Principles.

Agile Characteristics-The Characteristics of an Agile Project, The Development Team Project Management, The Customer, Processes and Tools The Contract, What Projects Can Benefit from Agile Development?

08hours

Module-IV

The Agile Methodologies:

Extreme Programming, Scrum, Crystal family of methodologies, Feature Driven Development, Adaptive Software Development, Dynamic Systems Development Method, Lean Software Development. **Selecting an Approach that Fits:** Choosing between an Agile or Traditional Approach.

08hours

Module-V

Scrum Practices: Scrum Master, product Backlog, Scrum teams, Scrum meetings, Sprint Planning meeting, Sprint.

08 hours

Course Outcomes

On completion of this course, the students will be able to:

CO1: Understand the basic concepts of object orientation analyse and design object oriented system using UML.

CO2: Use the advanced UML analysis and design diagrams.

CO3: Comprehend the common characteristics of an agile development process.

CO4: Analyse and contrast agile software development process models and plan driven process models.

CO5: Determine software project characteristics that would be suitable for an agile process.

Text Books:

1. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis andDesignandIterativeDevelopment",ThirdEdition,PearsonEducation,2005.(module1and 2)

2. Michael Blaha, James Rumbaugh: Object-Oriented Modeling and Design with UML, 2nd Edition, Pearson Education, 2005. (module 1 and2)

3. Ken Schwaber And Mike Beedle, Agile Software Development With Scrum, Pearson Education, 2015. ISBN-13:9780132074896 (Module 5)

4. Peter Schuh, Integrating Agile Development In The Real World (Charles River Media Programming), 2004 Cengage Learning, ISBN-13:9781584503644

5. Agile software development methods, Review and analysis By Pekka Abrahamsson, Outi Salo & Jussi Ronkainen(VTT Electronics, Juhani Warsta, University of Oulu)

Reference Books:

1. Simon Bennett, Steve Mc Robb and Ray Farmer, "Object Oriented Systems Analysis and Design Using UML", Fourth Edition, Mc-Graw Hill Education, 2010.

2. Alistair Cockburn, Agile Software Development: The Cooperative Game, Pearson Education, 2015. ISBN-13:9780321482754

3. Mike Cohn, Succeeding With Agile : Software Development Using Scrum, Pearson Education Limited, 2016, ISBN-13:9789332547964

NATURAL LANGUAGE PROCESSING

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type			
20IST742	3:0:0:0	3	CIE:50 SEE:50	3 Hours	PEC			
Course Content	s:							
		Mo	dule I					
Introduction: Knowledge in Speech and Language Processing, Ambiguity, Models and Algorithms; Language, Thought, and Understanding; The State of the Art and The Near Term Future; Regular Expressions and Automata; Morphology and Finite-State Transducers: Lexicon-free FSTs: The Porter Stemmer, Human Morphological Processing.								
		Maa	1		8 Hours			
		Moo	iule II					
Word Classes ar Stochastic Part-o Constituency, Co	N-grams: Counting Words in Corpora, Smoothing, N-grams for Spelling and Pronunciation, Entropy; Word Classes and Part-of-Speech Tagging: Part-of-Speech Tagging, Rule-based Part-of-speech Tagging, Stochastic Part-of-speech Tagging, Transformation-Based Tagging; Context-Free Grammars for English: Constituency, Context-Free Rules and Trees, Sentence Level Constructions, The Noun Phrase. 8 Hours							
		Mod	ule III					
Parsing with Context-Free Grammars: The Early Algorithm; Features and Unification: Feature Structures, Unification of Feature Structures, Features Structures in the Grammar, Implementing Unification, Parsing with Unification Constraints; Lexicalized and Probabilistic Parsing: Probabilistic Context-Free Grammars, Problems with PCFGs. 8 Hours Module IV Representing Meaning: First Order Predicate Calculus, Some Linguistically Relevant Concepts, Related Representational Approaches, Alternative Approaches to Meaning; Semantic Analysis : Syntax-Driven Semantic Analysis, Attachments for a Fragment of English; Lexical Semantics : Relations Among Lexemes								
	,				8 Hours			
		Moo	dule V					
Discourse: Refe Language Gener Differences, The	Discourse: Reference Resolution, Text Coherence, Discourse Structure; Generation: Introduction to Language Generation, An Architecture for Generation; Machine Translation: Language Similarities and Differences, The Transfer Metaphor.							
Course Outcom	es (COs):				ð Hours			
 Course Outcomes (COs): CO1: At the end of the course, the students should be able to: 1. Interpret how speech and language technology relies on formal models to capture knowledge, and language processing deals with subparts of words (morphology). (PO1,5,11, PSO-2) CO2: Illustrate the way N-gram tool is used for spelling and pronunciation processing, and part-of-speech tagging mechanism using various categories. (PO-2,3, 11, PSO-2) CO3: Describe feature structures and unification operation which is used to combine them, and probabilistic parsing to capture more syntactic information. (PO-2,11, PSO-2) CO4: Outline representations used to bridge the gap from language to common sense Knowledge 								

- **CO4:** Outline representations used to bridge the gap from language to common sense Knowledge (semantic processing), and meanings associated with lexical items. (PO1,3,5,11, PSO-2)
- **CO5:** Emphasize problems that NLP systems face, natural language outputs construction from nonlinguistic inputs and machine translation framework approaches. (PO-1,11, PSO-2)

Text Book:

1. Daniel Jurafsky and James H Martin, "Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", Prentice Hall, 2nd Edition, 2008.

Reference Book:

1. Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", Oxford University Press, 2008.

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
20IST743	3:0:0:0	3	CIE:50 SEE:50	3 Hours	PEC
Course Objecti	ves:				
This course is	designed to ur	nderstand de	sign patterns and	their underlying ot	ojects oriented
concepts.					
Learn patter	the day-to-day	<i>p</i> roblems	faced by object-ori	ented designers an	d how design
Provid	le an interface	for creating	families of related	l objects without sp	pecifying their
concre ➤ To kn	ete classes. ow the conseque	ences of com	bining patterns on th	ne overall quality of	a system.
	<u></u>		Module I		
Introduction	to Design Patte	rns			
Design Pattern Catalog of De Patterns, Selec	n Definition, De sign Patterns, C tion of a Design	esign Pattern Organizing th Pattern, Use	ns in Small Talk N e Catalog, Solving e of Design Patterns.	IVC, Describing De of Design Problems	esign Patterns, s using Design 8 Hours
			Module II		
Designing a D	ocument Edito	r: A Case St	tudy		
Design proble Multiple Look Spelling Chec Method, Proto	ms, Document s c and Feel stan king and Hyph type, Singleton,	structure, Fo dards, Supp enation. Cro Discussion o	rmatting, Embellish orting Multiple Wi eational Patterns: A of Creational Pattern	ing the User Interfa indow Systems, Us bstract Factory, Bu s.	ce, Supporting er Operations, 1ilder, Factory 8 Hours
			Module III		
Structural Pa	tterns-1: Adapte	er, Bridge, C	omposite.		
Structural Pa	tterns-2: Decora	ator, Facade,	Flyweight, Proxy, I	Discuss of Structural	Patterns.
					8 Hours
Module IV					
Behavioral Patterns-1: Chain of Responsibility, Command, Interpreter, Iterator. Behavioral Patterns-2: Mediator, Memento, Observer.					
		,			8 Hours
Module V					
Behavioral Pa Behavioral Pa Community A	atterns-2(cont'o atterns. What to n Invitation, A P	I): State, St D Expect fr Parting Thoug	rategy, Template M om Design Patterr ght.	ethod, Visitor, and s, a Brief History	Discussion of . The Pattern

SYSTEM ARCHITECTURE & DESIGN PATTERNS

Course Outcomes:

Upon completion of the course, the students should be able to:

CO1: Develop own way of working with design patterns. (L6).

CO2: Critique well-known design patterns (L5).

CO3: Distinguish different categories of design patterns (L4).

CO4: Apply common design patterns to incremental/iterative development (L3).

CO5: Identify appropriate patterns for solving a given problem (L3).

Text Book:

1. Erich Gamma, "Design Patterns", PearsonEducation.

Reference Books:

- 1. Mark Grand, "Pattern's in JAVA", Vol-I, WileyDreamTech.
- 2. Mark Grand, "Pattern's in JAVA", Vol-II By, WileyDreamTech.
- 3. Mark Grand, "JAVA Enterprise Design Patterns", Vol-III, WileyDreamTech.
- 4. Buschmann & others, "Pattern Oriented Software Architecture", John Wiley & Sons.

CYBER SECURITY AND CYBER FORENSIC

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type	
20IST751	3:0:0:0	3	CIE:50 SEE:50	3 Hours	IEC	
Course Objectives This course will en Understand the Identify cybers Identify the cybers Analyse cybers	s:0:0:0 able students to e fundamental c security risks an per vulnerability crime scenario	o, concepts of c nd take risk issues and cy sand learn to	cite:50 SEE:50 syber security and in preventive steps. yber hacking Technic investigate by coll Syllabus Module I	nformation security iques. lecting the evidence		
Module-1 Cybor Security: Network and Security Concepts Information Assurance Fundamentals Pasia						
Cryptography, Symmetric Encryption, Public Key Encryption, the Domain Name System (DNS), Firewalls, Virtualization, Radio-Frequency Identification.						
		M	Module_ II		vonouis	
AS, Metasploit. Net Network Sniffers a Cyber Ethical Ha Enumeration –Syst Motivations: Anti-fo ReplicatingMalicio Attacks, DLL Injec	cking: Introdu em Hacking – orensics,Fraud usCode,Stealin tion, Browser H	Notify Scan ols– Tcp dur Malware Thr Gechniques, gInformatio Helper Objec	nng - Netcat, Soca np and Wireshark, fodule – III printing, and Reco eats–Sniffing. code,ThreatInfrastru- nandExploitation,F	t, Network Reconn H ping Kismet. onnaissance - Scar Attacker Te ucture.MaliciousCo formGrabbing, M	aissance – Nmap, 08Hours nning Networks – echniques and de:Self- Man-in-the-Middle	
08 Hours						
Cyber Crime: Intr Attackvectors,Cybe with ComputerCrime,In age,Realms of the 0	roduction to Cy erspaceandCrin troductiontoInc Cyber world.	yber Crime ninalBehavio	and law Cyber Crin or,ClarificationofTe	mes, Types of Cyb erms,TraditionalPro s,ComputerLangua	ercrime, Hacking, blemsAssociated ge,NetworkLangu 08Hours	
		Ν	Aodule – V			
Cyber Forensics : Cracking, Key logs	Introduction to gers and Spywa	Cyber Crir are, Virus a	ne Investigation Find Warms, Trojan	rewalls and Packet and backdoors, Ste	Filters, password ganography, DOS	

and DDOS attack, SQL injection, Buffer Overflow, Attack on wireless Networks.

Course Outcomes:

On completion of this course, the students will be able to,

CO1: Define and illustrate Cyber Security concepts and their application.

CO2: Analyse the cyber vulnerabilities and techniques used by hackers to create frauds.

CO3: Analyse and compare various types of malicious code.

CO4: Illustrate appropriate techniques to solve cyber security threats.

CO5: Analyse and compare various types of cybercrime and its forensic investigations.

Textbooks:

- 1) James Graham, Richard Howard, Ryan Olson- CyberSecurity Essentials CRCPress, ISBN9780815351429, Published December14, 2010, by Auerbach Publications.
- Sunit Belapure and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley India Pvt Ltd, ISBN: 978-81-265-21791, PublishDate2013.

References

- 1) MarjieT.Britz-Computer Forensics and Cyber Crime: An Introduction–Pearson.
- Kimberly Graves "Official Certified Ethical Hacker Review Guide", ISBN-13:978-0-7821-4437-6, Wiley Publishing, Inc. 2015.
- 3) Chwan-Hwa (John) Wu,J. David Irwin Introduction to Computer Networks and Cyber security CRCPress.

E-Resources:

- 1) https://www.hacker101.com/
- 2) https://blog.elearnsecurity.com/free-resources-to-legally-practice-ethical-hacking.html
- https://www.routledge.com/Cyber-Security-Essentials/Graham-Olson-Howard/p/book/9781439851234
- 4) https://doc.lagout.org/security/ceh-official-certified-ethical-hacker-review-guide-exam-312-50.9780782144376.27422.pdf
- 5) https://www.pdfdrive.com/ethical-hacking-and-penetration-testing-guide-e18776556.html
- 6) https://heimdalsecurity.com/pdf/cyber_security_for_beginners_ebook.pdf

ADVANCED CLOUD	COMPUTING
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Code	L:1:F:5	Credits	Exam Marks	Exam Duration	Course Ty
20IST752	3:0:0:0	3	CIE:50 SEE:50	3 Hours	IEC
Course Object This course of Identify t Understa Learn abect Get know Study the	ectives: will enable stude he security and nd the access co out data encrypt yledge about the e AWS services	ents to: compliance ontrol and m ion methods important s to protect ne	benefits of by using anagement features o s to secure all types o steps for managing va etwork security.	the AWS Cloud. of AWS. f sensitive data. arious AWS resources	S.
		S	yllabus		
			Module–I		
Introduction to other clou Understandin Loading Dat	n to AWS: AW ud computing p ng the role of a into S3 Bucke	S history, fe providers. A the AWS ets, S3 URL	eatures, AWS Global An overview of the Management Conso naming conventions.	infrastructure, Comp AWS API, AWS A ble, creating an AW	PI security. 7S account, 08 Hours
AWS Stora	ge services: AV	WS S3, AW	Module–II /S EBS, AWS S3 co	ncepts, creating S3 b	oucket, AWS
AWS Stora storage class AWS IAM, 1	ge services: AV es, AWS versic features, IAM ic	WS S3, AW oning, stora lentities, IA	Module–II S EBS, AWS S3 co ge gateway, AWS sn M roles.	ncepts, creating S3 b lowball. AWS Ident	oucket, AWS ity Services: 08 Hours
AWS Storage storage class AWS IAM, 1	ge services: AV ses, AWS versic features, IAM ic	WS S3, AW oning, stora lentities, IA	Module–II 'S EBS, AWS S3 co ge gateway, AWS sn M roles. Module–III	ncepts, creating S3 b lowball. AWS Ident	oucket, AWS ity Services: 08 Hours
AWS Storag storage class AWS IAM, t AWS comp scaling, crea AWS Lambo	ge services: AV bes, AWS version features, IAM ic uting and marking an EC2 ir la, CloudWatch	WS S3, AW oning, storag lentities, IA ketplace : A nstances, EI EC2, AWS	Module–II S EBS, AWS S3 co ge gateway, AWS sn M roles. Module–III WS EC2, EC2 pricin BS volume types, A Route53.	ncepts, creating S3 b lowball. AWS Ident ng options, AWS EB WS AMI, AWS loa	oucket, AWS ity Services: 08 Hours S, EC2 auto d balancing, 08 Hours
AWS Storag storage class AWS IAM, 1 AWS comp scaling, crea AWS Lambo	ge services: AV ees, AWS versic features, IAM ic uting and mark tting an EC2 ir la, CloudWatch	WS S3, AW oning, storag lentities, IA ketplace : A nstances, EI EC2, AWS	Module–II S EBS, AWS S3 co ge gateway, AWS sn M roles. Module–III WS EC2, EC2 pricin BS volume types, A Route53. Module–IV	ncepts, creating S3 b lowball. AWS Ident ng options, AWS EB WS AMI, AWS loa	oucket, AWS ity Services: 08 Hours S, EC2 auto d balancing, 08 Hours
AWS Storage storage class AWS IAM, f AWS composed scaling, creat AWS Lambo AWS Network direct connect Non-relation	ge services: AV bes, AWS version features, IAM ic uting and mark ting an EC2 ir la, CloudWatch orking and dat ct, Architecture al Database, AV	WS S3, AW oning, storag lentities, IA ketplace : A nstances, EI EC2, AWS tabase serv of direct co WS elasticac	Module–II S EBS, AWS S3 co ge gateway, AWS sn M roles. Module–III WS EC2, EC2 pricin BS volume types, A Route53. Module–IV ices: AWS VPC, ard pnnect, features of din the, Aws DynamoDB	ncepts, creating S3 b lowball. AWS Ident ng options, AWS EB WS AMI, AWS loa chitecture of VPC, V rect connect, Relation S, AWS Aurora, AWS	oucket, AWS ity Services: 08 Hours 08 Hours 08 Hours 08 Hours /PC peering, al Database, 5 redshift. 08 Hours
AWS Storag storage class AWS IAM, f AWS comp scaling, crea AWS Lambo direct connec Non-relation	ge services: AV ses, AWS versic features, IAM ic uting and mark ting an EC2 ir la, CloudWatch orking and dat ct, Architecture al Database, AV	WS S3, AW oning, storag lentities, IA ketplace : A nstances, EI EC2, AWS tabase serv of direct co WS elasticac	Module–II S EBS, AWS S3 co ge gateway, AWS sn M roles. Module–III WS EC2, EC2 pricin BS volume types, A Route53. Module–IV ices: AWS VPC, ard onnect, features of dir the, Aws DynamoDB Module–V	ncepts, creating S3 b lowball. AWS Ident ng options, AWS EB WS AMI, AWS loa chitecture of VPC, V rect connect, Relation 8, AWS Aurora, AWS	oucket, AWS ity Services: 08 Hours OS, EC2 auto d balancing, 08 Hours /PC peering, nal Database, 5 redshift. 08 Hours

CO1: Discuss system virtualization and outline its role in enabling the cloud computing

system model.

CO2: Illustrate the fundamental concepts of cloud storage and demonstrate their use in storage systems such as Amazon S3 and HDFS.

CO3: Design various management and other distinguish services of AWS.

CO4: Develop security and compliances for AWS.

CO5: Analyze the billing of resources and other paradigm: how to deal with disasters.

Text Books:

1) Barrie Sosinsky. John Wiley & Sons. Cloud Computing Bible.. First Edition January 2011.ISBN-13: 978-0470903568.

2) Bernard Golden Amazon Web Services For Dummies. For Dummies publication; 1 edition (9 August 2013)ISBN-13: 978- 1118571835

3) Rajkumar Buyya, Cloud Computing: Principles and Paradigms, John Wiley & Sons, FirstEdition(3 January 2011).ISBN: 9780470887998

Reference Books:

1) Amazon.com Mashups by Francis Shanahan, Wrox, Wiley Publishing Inc., ISBN-13: 978-0470097779, ISBN-10: 0470097779

2) Amazon Web Services in Action by Michael Wittig and Andreas Wittig, Dreamtech Press, ISBN: 9789351198758

3) Building Applications in the Cloud: Concepts, Patterns and Projects by Christopher M. Moyer, Pearson Addison-Wesley Professional, ISBN-10: 0321720202, ISBN-13: 978-0321720207

4) Cloud Computing Design Patterns by Thomas Erl, Prentice Hall, ISBN-10: 0133858561, ISBN- 13: 978-0133858563

E-Resources

1) Amazon Security overview whitepaper- https://aws.amazon.com/whitepapers

2) IAM Getting started Guide

http://docs.aws.amazon.com/IAM/latest/UserGuide/getting-started.html

PRECISION AGRICULTURE

Course Code	L:T:P	Credits	Exam Marks	Exam Duration	Course Type		
20IST753	3:0:0:0	3	CIE:50 SEE:50	3 Hours	IEC		
Prerequisites: Basic Computer D Programming Sk	Knowledge L ills – Langua	inear Algeb ge such as P	ra Statistics and Pro Python, R, MATLA	bability Calculus Gra B, C + + or Octave Da	aph Theory ata, Hardware.		
Course Objective This course will e	es: enable studen	its to:					
 Detailed of Describe Learn diff Make data Learn pol 	lescription of different type ferent modeli a driven base icies and regi	f latest tools of hardwar ng technique d decision n ulations for	and technologies av e, platforms and tec es in precision agric naking & support sy adopting AI & ML	vailable for the Agricu hniques for use in sm culture. vstems. techniques in Agricul	ulture 5.0. art farming. ture.		
_			Syllabus				
			Module I				
Specific Crop Technology (VR' Agriculture, Smart Intelligen Modern Day A Intelligent Precis	t Precision griculture, 1	(SSCM, of Smart Pr Agriculture Digitization ire, Benefits	variable Rate Ap ecision Agriculture. of Agriculture-D of Smart Intelligen	igital Farming, Tra	ns about Precision nsition to Smart e. 08 Hours		
Module II							
Adoption of Win Sensors and Wi WSN in Agricult Agricultural Syst Traditional Agric Agriculture, Secu Based Agricultu Introduction, Arc Things, Inter-Op Implementation of Platform with Lo	reless Sensor reless Sensor ture, Feature em, Intellige ulture, Senso urity Issues a ral Systems: chitecture of erability Cha of IoT in Sm	Network (r Network, s of Agricu ent Sensors or Based Var and Challen loT, Brief llenges, Appart Farming	WSN) in Smart Pr Evolution of Wire lturally Based Sens Versus Smart Sense riable Rate Applicat ges for WSN Impl Overview of IoT I plications of IoT in g, Security and Priv	ecision Agriculture: less Sensor Network sors, Types of Senso ors, Impact of the W tion,, Applications of ementation. IoT (Int Network, Characterist Smart Agriculture, G acy Issues of an IoT	s, Introduction of rs Used for WSN ireless Sensors on WSN in Precision ternet of Things) tics of Internet of Challenges for the , Fusion of Cloud		
					08 Hours		
			Module III				

AI (Artificial Intelligence) Driven Smart Agriculture:

Artificial Intelligence (AI) – Introduction, Categories of AI, Subsets of AI, Life Cycle of an Artificial Intelligence-Based, Prerequisites for Building an ML/AI-Based Agricultural Model, Advantages of A.I in Agriculture.

Machine Learning (ML) Driven Agriculture:

Cognitive Technologies, Introduction to Machine Learning, Types of ML, Artificial Neural Networks and Deep Learning, General Applications of Machine Learning, Scope of Artificial Intelligence and Machine Learning in Agriculture, Applications of A.I and M.L in Agriculture.

08 Hours

Module IV

Data-Driven Smart Farming:

Introduction, Collection and Managementof Real-Time Agricultural Big Data, Transforming Field Data into Meaningful Insights, Processing and Predictive Analysis of Agricultural Data, Predictive Modeling.

Decision-Making and Decision-Support Systems:

Introduction, Intelligent Agricultural Decision Support Systems (ADSS), Features and Workings of an Intelligent Agricultural Decision Support System (ADSS), Intelligent Decision-Making using AI, ML, and IoT for Farmers.

08 Hours

Module V

Agriculture 5.0 – The Future:

Introduction to Agriculture 4.0, Nanotechnology and Smart Farming, Blockchain -Securing the Agriculture Value Chain, Edge-Fog Computing for Smart Farming, Role of Big Data in Agriculture, Transition to Agriculture.

Social and Economic Impacts:

Societal and Economic Impact of AI, ML, and IoT in Intelligent Precision Farming, Existence of Forums for Innovation and Commercialization of Intelligent Precision Farming Technology (IPFT). **Environmental Impact and Regulations:**

Potential Impact on the Environment with Different IPFT, Policy Making and Governance.

08 Hours

Course Outcomes:

On completion of the course, students will be able to:

CO1: Describe about Artificial Intelligence in precision agriculture

CO2: Analyze the WSN and IoT based Agricultural systems

CO3: Design AI and ML Driven system for agriculture

CO4: Describe the key aspects of data driven and decision making & support systems.

CO5: Discuss AI, its current scope and limitations, and societal implications.

Text books:

- 1. Latief Ahmad and FirasathNabi:**Agriculture 5.0**, Artificial intelligence, IoT and machine learning, Taylor & Francis,1st edition,2021.
- 2. Rajesh Singh, Anita Gehlot, Mahesh Kumar Prajapat, Bhupendra Singh, Artificial Intelligence In Agriculture, 2021.

Reference books:

- 1. <u>K.C. Ting</u>, <u>S. Panigrahi</u> : Artificial Intelligence for Biology and Agriculture, 1998.
- 2. <u>GurjitKaur, PradeepTomar</u> : Artificial Intelligence and IoT-Based Technologies for Sustainable Farming and Smart Agriculture, 2019.