



## GEETHANJALI INSTITUTE OF SCIENCE & TECHNOLOGY

Unit of USHODAYA EDUCATIONAL SOCIETY

An ISO 9001:2015 certified Institution: Recognized under Sec. 2(f)& 12(B) of UGC Act, 1956  
3rd Mile, Bombay Highway, Gangavaram (V), Kovur(M), SPSR Nellore (Dt), Andhra Pradesh, India- 524137  
Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: [www.gist.edu.in](http://www.gist.edu.in)

### COURSES OFFERED FOR HONOURS DEGREE IN CSE

- Note:** 1. Honors degree subjects are having a total of 20 additional Credits  
2. Students should acquire 4 credits through MOOCs compulsory to award the Honors Degree

Sl. No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	22A05H01	Secure Software Engineering	3	1	0	4
2	22A05H02	Agile Software Development Approaches	3	1	0	4
3	22A05H03	Introduction to IOT	3	1	0	4
4	22A05H04	Computer Vision	3	1	0	4
5	22A05H05	Visual Programming	3	1	0	4
6	22A05H06	Network Management Systems	3	1	0	4
7	22A05H07	Artificial Neural Networks	3	1	0	4
8	22A05H08	Distributed Systems	3	1	0	4



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<b>SECURE SOFTWARE ENGINEERING</b>					
<b>(Common to CSE, AIML, CS, DS)</b>					
Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
<b>22A05H01a</b>	<b>4:0:0:0</b>	<b>4</b>	<b>CIE: 30 SEE:70</b>	<b>3 Hours</b>	<b>Honours</b>
<b>Course Objectives:</b>					
This course will enable students to: <ul style="list-style-type: none"> <li>• Design and implementation of secure software.</li> <li>• Demonstrate about the characteristics and best security programming practices.</li> <li>• Specify Desired Security Properties for web and mobile applications.</li> </ul>					
<b>Course Outcomes (CO):</b>					
<b>On completion of this course, student will be able to</b> <ul style="list-style-type: none"> <li>• Explain the Properties of Secure Software and Specify Desired Security Properties.</li> <li>• Incorporate requirements into secured software development process</li> <li>• Apply secure design principles for developing attack resistant software</li> <li>• Analyze the Security and complexity of system drivers.</li> <li>• Examine features of Governance and Security and Maturity of Practice</li> </ul>					
<b>Syllabus</b>				<b>Total Hours:48</b>	
<b>Module-I</b>	<b>Security a software Issue</b>			<b>10 Hrs</b>	
Introduction, the problem, Software Assurance and Software Security, Threats to software security, Sources of software insecurity, Benefits of Detecting Software Security What Makes Software Secure: Properties of Secure Software, Influencing the security properties of software, Asserting and specifying the desired security properties.					
<b>Module-II</b>	<b>Requirements Engineering for secure software</b>			<b>10 Hrs</b>	
Introduction, the SQUARE process Model, Requirements elicitation and prioritization.					
<b>Module-III</b>	<b>Secure Software Architecture and Design</b>			<b>10 Hrs</b>	
Introduction, software security practices for architecture and design: architectural risk analysis, software security knowledge for architecture and design: security principles, security guidelines and attack patterns Secure coding and Testing: Code analysis, Software Security testing, Security testing considerations throughout the SDLC.					
<b>Module-IV</b>	<b>Security and Complexity</b>			<b>9 Hrs</b>	
System Assembly Challenges: introduction, security failures, functional and attacker perspectives for security analysis, system complexity drivers and security.					
<b>Module-V</b>	<b>Governance and Managing for More Secure Software</b>			<b>9 Hrs</b>	
Governance and security, adopting an enterprise software security framework, How much security is enough, Security and project management, Maturity of Practice.					

**Text Books:**

1. Software Security Engineering: A Guide for Project Managers, Julia H. Allen, Sean Barnum, Robert J. Ellison, Gary McGraw, Nancy R. Mead, Addison- Wesley Professional

**Reference Books:**

1. Howard , M and Lipner,S : The Security Development Lifecycle , Microsoft Press, 2006
2. Swiderski, F and Snyder W. ., Threat Modeling, Microsoft Press, 2004.
3. Viega, J and MCGraw G., : Building Secure Software: How to avoid Security Problems in the Right Way, Addison-Wesley,2001



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<b>AGILE SOFTWARE DEVELOPMENT APPROACHES</b>					
(Common to CSE, AI&ML, DS, CS)					
Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
<b>22A05H01b</b>	<b>4: 0:0:0</b>	<b>4</b>	<b>CIE: 30 SEE:70</b>	<b>3 Hours</b>	<b>Honours</b>
<b>Course Objectives:</b>					
<ul style="list-style-type: none"> <li>Organize Agile Software Development, Extreme Programming and Software Development Rhythms.</li> <li>Describe their unique features relative to traditional software practices.</li> <li>Examine their applications in the real world and addresses their impacts on developing software.</li> <li>An awareness of current research in software development, the analytical skills and research techniques for their critical and independent evaluation and their application to new problems.</li> </ul>					
<b>Course Outcomes (CO):</b>					
On completion of this course, student will be able to:					
<ul style="list-style-type: none"> <li>Summarize the agile methodologies: extreme programming, scrum, and feature driven programming.</li> <li>Apply The Twelve XP Practices and Illustrate pair programming and its characteristics.</li> <li>Apply XP to a small project.</li> <li>Examine Feature-Driven Development and Regaining Control</li> <li>Outline Agile Modeling and RUP.</li> <li>Apply the various tools available to Agile Development to facilitate the project.</li> </ul>					
<b>Syllabus</b>					<b>Total Hours:48</b>
<b>Module-I</b>	<b>Introduction</b>				<b>10 Hrs</b>
<b>Introduction:</b> Agile Methods, Agile Manifesto, and Agile Modeling Introduction, What Is Agile, The Agile Manifesto, Agile Methods, XP: Extreme Programming, DSDM, SCRUM, Feature-Driven Development, Modeling Misconceptions, Agile Modeling, Tools of Misconceptions, Updating Agile Models					
<b>Module-II</b>	<b>Extreme Programming</b>				<b>9 Hrs</b>
<b>Extreme Programming:</b> Introduction, Core XP Values, The Twelve XP Practices, About Extreme Programming, Planning XP Projects, Test First Coding, Making Pair Programming Work.					
<b>Module-III</b>	<b>Agile Modeling and XP</b>				<b>9Hrs</b>
<b>Agile Modeling and XP:</b> Introduction, The Fit, Common Practices, Modeling Specific Practices, XP Objections to Agile Modeling, Agile Modeling and Planning XP Projects, XP Implementation Phase.					
<b>Module-IV</b>	<b>Feature-Driven Development</b>				<b>9 Hrs</b>
<b>Feature-Driven Development:</b> Introduction, Incremental Software Development, Regaining Control: The Motivation behind FDD, Planning Iterative Project, Architecture Centric, FDD and XP.					
<b>Module-V</b>	<b>Agile Methods with RUP and PRINCE2 and Tools and Obstacles</b>				<b>10Hrs</b>
<b>Agile Methods with RUP and PRINCE2 and Tools and Obstacles:</b> Agile Modeling and RUP, FDD and RUP, Agile Methods and Prince2, Tools to Help with Agile Development, Eclipse: An Agile IDE, Obstacles to Agile Software Development, Management Intransigence, The Failed Project Syndrome, Contractual Difficulties, Familiarity with Agility.					

**Text Books:**

1. Agile software construction,1/e,John hunt, springer, 2005
2. Agile and Iterative Development: a manager's guide, Addison-Wesley Craig Larman, [Pearson Education] - 2004.

**Reference Books:**

1. The Art of Agile Development, Pearson, Robert C. Martin, Juli, James Shore, Chromatic, 2013, O'Reilly Media.
2. Agile Testing, Elisabeth Hendrickson, Quality Tree Software Inc 2008.



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<b>Introduction to IOT</b> (Common to CSE, AI&ML, DS, CS)					
Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A05H02a	4: 0:0:0	4	CIE: 30 SEE:70	3 Hours	Honours
<b>Course Objectives:</b>					
Introduce the fundamental concepts of IoT and physical computing, Expose the student to a variety of embedded boards and IoT Platform, Create a basic understanding of the communication protocols in IoT communications. Familiarize the student with application program interfaces for IoT and Enable students to create simple IoT applications.					
<b>Course Outcomes (COS):</b>					
After completion of the course, students will be able to:					
<ul style="list-style-type: none"> <li>● Understand the Basic sensors and actuators for an IoT application.</li> <li>● Select protocols for a specific IoT application.</li> <li>● Utilize the cloud platform and APIs for IoT applications.</li> <li>● Experiment with embedded boards for creating IoT prototypes.</li> <li>● Design a solution for a given IoT application.</li> <li>● Able to understand the application areas of IOT.</li> </ul>					
<b>Syllabus</b>					<b>Total Hours:48</b>
<b>Module- I</b>	<b>Overview of IoT</b>				<b>12 Hrs</b>
<p><b>The Internet of Things:</b> An Overview, The Flavor of the Internet of Things, the “Internet” of “Things”, The Technology of the Internet of Things, Enchanted Objects, who is Making the Internet of Things?</p> <p><b>Design Principles for Connected Devices:</b> Calm and Ambient Technology, Privacy, Web Thinking for Connected Devices, Affordances.</p> <p><b>Prototyping:</b> Sketching, Familiarity, Costs Vs Ease of Prototyping, Prototypes and Production, Open-source Vs Close source, Tapping into the community</p>					
<b>Module-II</b>	<b>Embedded Devices</b>				<b>9 Hrs</b>
Electronics, Embedded Computing Basics, Arduino, Raspberry Pi, Mobile phones and tablets, Plug Computing: Always-on Internet of Things					
<b>Module-III</b>	<b>Communication in the IoT</b>				<b>9 Hrs</b>
<p>Internet Communications: An Overview, IP Addresses, MAC Addresses, TCP and UDP Ports, Application Layer Protocols</p> <p><b>Prototyping Online Components:</b> Getting Started with an API, Writing a New API, Real-Time Reactions, Other Protocols Protocol</p>					
<b>Module-IV</b>	<b>Business Models</b>				<b>9 Hrs</b>
<p><b>Business Models:</b> A short history of business models, the business model canvas, Who is the business model for, Models, Funding an Internet of Things startup, Lean Startups.</p> <p><b>Manufacturing:</b> What are you producing, designing kits, Designing printed circuit boards.</p>					

Module-V	Manufacturing Process	9 Hrs
<p><b>Manufacturing continued:</b> Manufacturing printed circuit boards, Mass-producing the case and other fixtures, Certification, Costs, Scaling up software.</p> <p><b>Ethics:</b> Characterizing the Internet of Things, Privacy, Control, Environment, Solutions</p>		
<p><b>Textbooks:</b></p> <ol style="list-style-type: none"> <li>1. Adrian McEwen, Hakim Cassimally - Designing the Internet of Things, Wiley Publications, 2012</li> </ol>		
<p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>1. Arshdeep Bahga, Vijay Madisetti - Internet of Things: A Hands-On Approach, Universities Press, 2014.</li> <li>2. The Internet of Things, Enabling technologies and use cases – Pethuru Raj, Anupama C. Raman, CRC Press.</li> </ol>		
<p><b>Online Learning Resources:</b></p> <ol style="list-style-type: none"> <li>1. <a href="https://www.arduino.cc/">https://www.arduino.cc/</a></li> <li>2. <a href="https://www.raspberrypi.org/">https://www.raspberrypi.org/</a></li> </ol>		



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<b>COMPUTER VISION</b> (Common to CSE, AI&ML, DS, CS)					
Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A05H02b	4: 0:0:0	4	CIE: 30 SEE:70	3 Hours	Honours
<b>Course Objectives:</b>					
<ul style="list-style-type: none"> <li>To understand the Fundamental Concepts of vision</li> <li>To understand the filtering and image filtering operations</li> <li>To understand basic principles of Thresholding.</li> <li>To teach the importance of edge detection in computer vision</li> <li>To understand the broad concepts of texture</li> </ul>					
<b>Course Outcomes (COS):</b>					
After completion of the course, students will be able to:					
<ul style="list-style-type: none"> <li>Understand vision and its concepts(L1)</li> <li>Understand the concepts of image filtering (L2).</li> <li>Use the Thresholding techniques in image conversion (L3)</li> <li>Use image edge detection for smoothing (L2)</li> <li>Understand the use of texture in image processing (L2).</li> </ul>					
<b>Syllabus</b>					<b>Total Hours:48</b>
<b>Module-I</b>	<b>Vision, the Challenge</b>				<b>9Hrs</b>
<b>Vision, the Challenge:</b> Introduction, The Nature of Vision- The Process of Recognition, Tackling the Recognition Problem, Object Location, Scene Analysis, Vision as Inverse Graphics					
<b>Module-II</b>	<b>Imaging and Image Filtering Operations</b>				<b>10 Hrs</b>
<b>Images and Imaging Operations:</b> Introduction, Image Processing Operations, Convolutions and Point Spread Functions. Sequential Versus Parallel Operations.					
<b>Basic Image Filtering Operations:</b> Introduction, Noise Suppression by Gaussian Smoothing, Median Filters, Mode Filters, Rank Order Filters, Shifts Introduced by Median Filters, Discrete Model of Median Shifts					
<b>Module-III</b>	<b>Thresholding Techniques</b>				<b>9Hrs</b>
<b>Thresholding Techniques:</b> Introduction, Region-Growing Methods, Thresholding, Adaptive Thresholding, More Thoroughgoing Approaches to Threshold Selection, The Global Valley Approach to Thresholding, Practical Results Obtained Using the Global Valley Method.					
<b>Module-IV</b>	<b>Edge Detection</b>				<b>10 Hrs</b>
<b>Edge detection:</b> Introduction, Basic Theory of Edge Detection, The Template Matching Approach, Theory of 3 3 3 Template Operators, The Design of Differential Gradient Operators, The Concept of a Circular Operator, Detailed Implementation of Circular Operators, 0 Hysteresis Thresholding, The Canny Operator, The Laplacian Operator, Practical Results Obtained Using Active Contour					
<b>Module-V</b>	<b>Texture and Binary Shape Analysis</b>				<b>10 Hrs</b>



**Texture:** Some Basic Approaches to Texture Analysis, Gray level Co-occurrence Matrices, Laws' Texture Energy Approach, Ade's Eigen filter Approach, Appraisal of the Laws and Ade Approaches  
Binary Shape Analysis: Connectedness in Binary Images, Size Filtering, Distance Functions and Their Uses.

**Text Books:**

1. E. R. DAVIES, Machine Vision: Theory, Algorithms, Practicalities Fourth Edition

**Reference Books:**

1. David A. Forsyth and Jean Ponce: Computer Vision – A Modern Approach, PHI Learning (Indian Edition), 2009.
2. R. C. Gonzalez and R. E. Woods “Digital Image Processing” Addison Wesley 2008.
3. Richard Szeliski “Computer Vision: Algorithms and Applications” Springer-Verlag London Limited 2011.

**E-resources:**

1. [https://onlinecourses.nptel.ac.in/noc19\\_cs58/preview](https://onlinecourses.nptel.ac.in/noc19_cs58/preview)



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<b>VISUAL PROGRAMMING</b> (Common to CSE, AI&ML, DS, CS)					
Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
<b>22A05H03a</b>	<b>4: 0:0:0</b>	<b>4</b>	<b>CIE: 30 SEE:70</b>	<b>3 Hours</b>	<b>Honours</b>
<b>Course Objectives:</b>					
<ul style="list-style-type: none"> <li>To introduce the fundamental concepts of object-oriented programming to design &amp; implement object-oriented programming concepts in Visual Programming.</li> <li>To learn Graphical User Interface Language.</li> <li>To develop an application using GUI Language.</li> <li>Implement VB programs to solve simple problems.</li> <li>Learn the usage of Control structures, Creating Menus and MDI Forms in Visual programming.</li> </ul>					
<b>Course Outcomes (COS):</b>					
After completion of the course, students will be able to:					
<ul style="list-style-type: none"> <li>Understand the basic concepts of OOP</li> <li>Compare &amp; Contrast basic constructs of OOP &amp; POP</li> <li>Design &amp; Develop a Forms in Visual programming</li> <li>Apply Control statements to solve real time problems</li> <li>Analyze the concepts of forms and its controls, Properties of Tool Box</li> <li>Implementing Menus &amp; MDI Forms in Visual programming</li> </ul>					
<b>Syllabus</b>					<b>Total Hours:48</b>
<b>Module-I</b>	<b>Fundamentals of Visual Programming</b>				<b>9Hrs</b>
<p><b>Object Oriented Programming:</b> Introduction to OOPS – Basic Concepts – Objects and Classes – Concepts of Inheritance, Encapsulation and Polymorphism.</p> <p><b>Fundamentals Of Visual Programming:</b> Introduction to Visual programming– Examples of Visual Programming - Applications of Visual Programming language- Advantages of visual programming language- Disadvantages of visual programming language</p>					
<b>Module-II</b>	<b>Fundamentals of Visual Basic</b>				<b>10 Hrs</b>
<p><b>Fundamentals Of Visual Basic:</b> Features of VB – VB Editions – Controls – Properties – Events – Methods.</p> <p><b>Application Window:</b> The Project Explorer window – the Properties Window -Tool Box: Text box control- Command Button – Check Box-Menu Bar -Tool Bars – Tool Box – Project Explorer Window – Properties Window – Object Browser – Form Designer – Code Editor Window – Form Layout Window</p>					
<b>Module-III</b>	<b>Forms and Controls</b>				<b>9Hrs</b>
<p><b>Forms and Controls:</b> Setting Form Properties – Working with Properties Window – Name – Caption – Picture – The Control Box – Min Button and Max Button – Movable – Border Style - Font Properties</p> <p><b>Form Methods</b> – Move, Graphic Methods – Show Method</p> <p><b>Form Events</b> – Working with a Control – Opening the Code Window</p>					
<b>Module-IV</b>	<b>Variables in VB, Arrays</b>				<b>10 Hrs</b>

**Variables In Vb:** Declaring Variables – Data Types – Constants – Conversion – Operators

**Arrays:** Definition, One Dimensional & Two-Dimensional Arrays, Declaring Array, Storing Values in An Array, Control Arrays.

**Writing Code in VB:** The Code Window – Subroutine – control structures in VB – Performing Loops in VB.

**Module-V**

**Menus, Multi Document Interface**

**10 Hrs**

**Menus:** Menu Conventions – Creating Menus in VB. Menu Editor

**Multiple Document Interface:** Features of MDI form–Property– Creating MDI Forms.

**Text Books:**

1. Programming with Visual Basic Mohammed Azam-Vikas publishing house Pvt.Ltd.New Delhi. Mastering Visual Basic 6 by Evangelos Perroutosos (BPB Publications)
2. Gary Cornell - Visual Basic 6 from the Ground up - Tata McGraw Hill

**E-resources:**

1. <https://www.tutlane.com/tutorial/visual-basic>
2. <https://www.vbtutor.net/lesson1.html>
3. <https://www.geeksforgeeks.org/introduction-to-visual-programming-language/>



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<b>NETWORK MANAGEMENT SYSTEMS</b> (Common to CSE, AI&ML, DS, CS)					
Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
<b>22A05H03b</b>	<b>4: 0:0:0</b>	<b>4</b>	<b>CIE: 30 SEE:70</b>	<b>3 Hours</b>	<b>Honours</b>
<b>Course Objectives:</b>					
<ul style="list-style-type: none"> <li>• Describe the introduction concepts of Network Management System platform, Current Status and Future of Network Management.</li> <li>• Implement network management standards to manage practical networks</li> <li>• Identify different approaches for managing OSI network model.</li> <li>• Illustrate SNMP and RMON for monitoring the behavior of the network</li> <li>• Describe different types of Broad band access networks</li> <li>• Identify Network Management Applications</li> </ul>					
<b>Course Outcomes (COS):</b>					
After completion of the course, students will be able to: <ul style="list-style-type: none"> <li>• Analyze the issues and challenges pertaining to management of emerging network technologies such as wired/wireless networks and high-speed internets.</li> <li>• Apply network management standards to manage practical networks</li> <li>• Formulate possible approaches for managing OSI network model.</li> <li>• Infer SNMP for managing the network</li> <li>• Infer RMON for monitoring the behavior of the network</li> <li>• Identify the various components of network and formulate the scheme for the managing them.</li> </ul>					
<b>Syllabus</b>					<b>Total Hours:48</b>
<b>Module-I</b>	<b>Introduction</b>				<b>9 Hrs</b>
<b>Introduction:</b> Analogy of Telephone Network Management, Data and Telecommunication Network Distributed computing Environments, TCP/IP Based Networks: The Internet and Intranets, Communications Protocols and Standards- Communication Architectures, Protocol Layers and Services; The Importance of topology , Filtering Does Not Reduce Load on Node, Some Common Network Problems; Challenges of Information Technology Managers, Network Management: Goals, Organization, and Functions- Goal of Network Management, Network Provisioning, Network Operations and the NOC, Network Installation and Maintenance; Network and System Management, Network Management System platform, Current Status and Future of Network Management.					
<b>Module-II</b>	<b>Basic Foundations</b>				<b>9 Hrs</b>
<b>Basic Foundations:</b> Standards, Models, and Language: Network Management Standards, Network Management Model, Organization Model, Information Model – Management Information Trees, Communication Model; ASN.1- Terminology, Symbols, and Conventions, Objects and Data Types, Object Names, An Example of ASN.1 from ISO 8824; Encoding Structure; Macros, Functional Model.					
<b>Module-III</b>	<b>SNMPv1 Network Management</b>				<b>10 Hrs</b>

<p><b>SNMPv1 Network Management:</b> Managed Network: The SNMP Model, The Organization Model, The Information Model – Introduction, The Structure of Management Information, Managed Objects, Management Information Base. The SNMP Communication Model – The SNMP Architecture, Administrative Model, SNMP Specifications, SNMP Operations, Functional Model SNMP Management – RMON: Remote Monitoring, RMON SMI and MIB, RMON1- RMON1 Textual Conventions, RMON1 Groups and Functions, Relationship Between Control and Data Tables, RMON1 Common and Ethernet Groups, RMON Token Ring Extension Groups, RMON2 – The RMON2 Management Information Base, RMON2 Conformance Specifications.</p>		
<b>Module-IV</b>	<b>Broadband Access Networks</b>	<b>10 Hrs</b>
<p><b>Broadband Access Networks:</b> Broadband Access Technology; HFCT Technology: The Broadband LAN, The Cable Modem, The Cable Modem Termination System, The HFC Plant, The RF Spectrum for Cable Modem; Data Over Cable, Reference Architecture; HFC Management – Cable Modem and CMTS Management, HFC Link Management, RF Spectrum Management, DSL Technology; Asymmetric Digital Subscriber Line Technology – Role of the ADSL Access Network in an Overall Network, ADSL Architecture, ADSL Channeling Schemes, ADSL Encoding Schemes; ADSL Management – ADSL Network Management Elements, ADSL Configuration Management, ADSL Fault Management, ADSL Performance Management,.</p>		
<b>Module-V</b>	<b>Network Management Applications</b>	<b>10Hrs</b>
<p><b>Network Management Applications:</b> Configuration Management- Network Provisioning, Inventory Management, Network Topology, Fault Management- Fault Detection, Performance Management – Performance Metrics, Data Monitoring, Performance Statistics; Event Correlation Techniques – Rule-Based Reasoning, State Transition Graph Model, Finite State Machine Model, Security Management – Policies and Procedures, Security Breaches and the Resources Needed to Prevent Them, Firewalls, Cryptography, Authentication and Authorization, Client/Server Authentication Systems, Report Management,</p>		
<p><b>Text Books:</b></p> <ol style="list-style-type: none"> <li>1. Simon Haykin, “Neural Networks: A comprehensive foundation”, Second Edition, Pearson Education Asia.</li> <li>2. Satish Kumar, “Neural Networks: A classroom approach”, Tata McGraw Hill, 2004.</li> </ol>		
<p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>1. Robert J. Schalkoff, “Artificial Neural Networks”, McGraw-Hill International Editions, 1997.</li> </ol>		



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Ph. No. 08622-212769, E-Mail: geethanjali@gist.edu.in, Website: [www.gist.edu.in](http://www.gist.edu.in)

<b>ARTIFICIAL NEURAL NETWORKS</b> (Common to CSE, AI&ML, DS, CS)					
Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
<b>22A05H04a</b>	<b>4: 0:0:0</b>	<b>4</b>	<b>CIE: 30 SEE:70</b>	<b>3 Hours</b>	<b>Honours</b>
<b>Course Objectives:</b>					
The course introduces perceptrons, discusses its capabilities and limitations as a pattern classifier and later develops concepts of multilayer perceptrons with back propagation learning					
<b>Course Outcomes (COS):</b>					
After completion of the course, students will be able to: <ul style="list-style-type: none"> <li>● Understand the role of neural networks in engineering, artificial intelligence, and cognitive modeling.</li> <li>● Analyze the Mathematical foundations &amp; Learning Mechanisms in neural networks</li> <li>● Classify single layer perceptrons by using neural networks</li> <li>● Design Multi-layer feed forward networks in neural networks.</li> <li>● Apply various Radial basis function networks in neural networks.</li> <li>● Provide hands-on experience in selected applications</li> </ul>					
<b>Syllabus</b>					<b>Total Hours:48</b>
<b>Module-I</b>	<b>Introduction and ANN Structure</b>				<b>9 Hrs</b>
<b>Introduction and ANN Structure:</b> Biological neurons and artificial neurons. Model of an ANN. Activation functions used in ANNs. Typical classes of network architectures.					
<b>Module-II</b>	<b>Mathematical Foundations and Learning mechanisms</b>				<b>9 Hrs</b>
<b>Mathematical Foundations and Learning mechanisms:</b> Re-visiting vector and matrix algebra. State-space concepts. Concepts of optimization. Error-correction learning. Memory-based learning. Hebbian learning. Competitive learning.					
<b>Module-III</b>	<b>Single layer perceptrons</b>				<b>10 Hrs</b>
<b>Single layer perceptrons:</b> Structure and learning of perceptrons. Pattern classifier – introduction and Bayes’ classifiers. Perceptron as a pattern classifier. Perceptron convergence. Limitations of a perceptrons.					
<b>Module-IV</b>	<b>Feed forward ANN</b>				<b>10 Hrs</b>
<b>Feed forward ANN:</b> Structures of Multi-layer feed forward networks. Back propagation algorithm. Back propagation – training and convergence. Functional approximation with back propagation. Practical and design issues of back propagation learning.					
<b>Module-V</b>	<b>Radial Basis Function Networks:</b>				<b>10 Hrs</b>
<b>Radial Basis Function Networks:</b> Pattern separability and interpolation. Regularization Theory. Regularization and RBF networks. RBF network design and training. Approximation properties of RBF.					

**Text Books:**

1. E. R. DAVIES, Machine Vision: Theory, Algorithms, Practicalities Fourth Edition

**Reference Books:**

1. David A. Forsyth and Jean Ponce: Computer Vision – A Modern Approach, PHI Learning (Indian Edition), 2009.
2. R. C. Gonzalez and R. E. Woods “Digital Image Processing” Addison Wesley 2008.
3. Richard Szeliski “Computer Vision: Algorithms and Applications” Springer-Verlag London Limited 2011.

**E-resources:**

1. [https://onlinecourses.nptel.ac.in/noc19\\_cs58/preview](https://onlinecourses.nptel.ac.in/noc19_cs58/preview)



## GEETHANJALI INSTITUTE OF SCIENCE & TECHNOLOGY

Unit of USHODAYA EDUCATIONAL SOCIETY

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<b>DISTRIBUTED SYSTEMS</b>					
(Common to CSE, AI&ML, DS, CS)					
Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
<b>22A05H04b</b>	<b>4: 0:0:0</b>	<b>4</b>	<b>CIE: 30 SEE:70</b>	<b>3 Hours</b>	<b>Honours</b>
<b>Course Objectives:</b>					
<ul style="list-style-type: none"> <li>To learn the principles, architectures, algorithms and programming models used in distributed systems.</li> <li>To examine state-of-the-art distributed systems, such as Google File System.</li> <li>To design and implement sample distributed systems.</li> </ul>					
<b>Course Outcomes (COS):</b>					
After completion of the course, students will be able to:					
<p><b>CO1:</b> Understand the basic concepts of Distributed Systems, Architectural and Fundamental Models.</p> <p><b>CO2:</b> Analyze the distributed debugging concepts and multicast communication and its related problems.</p> <p><b>CO3:</b> Choose proper APIs for Internet protocols and client server communication and its marshalling.</p> <p><b>CO4:</b> Construct the basic architecture of a distributed file system and its name services.</p> <p><b>CO5:</b> Analyze the transaction modes and concurrency control in distributed transactions.</p> <p><b>CO6:</b> Identify the common deadlocks in transaction recovery while processing.</p>					
<b>Syllabus</b>					<b>Total Hours:48</b>
<b>Module-I</b>	<b>Characterization of Distributed Systems, System Models</b>				<b>9 Hrs</b>
<p><b>Characterization of Distributed Systems:</b> Introduction, Examples of Distributed systems, Resource sharing and web, challenges.</p> <p><b>System Models:</b> Introduction, Architectural and Fundamental models.</p>					
<b>Module-II</b>	<b>Time and Global States, Agreement</b>				<b>9 Hrs</b>
<p><b>Time and Global States:</b> Introduction, Clocks, Events and Process states, Synchronizing physical clocks, Logical time and Logical clocks, Global states, Distributed Debugging.</p> <p><b>Coordination and Agreement:</b> Introduction, Distributed mutual exclusion, Elections, Multicast Communication, Consensus and Related problems.</p>					
<b>Module-III</b>	<b>Inter Process Communication, Distributed Objects and Remote Invocation</b>				<b>10 Hrs</b>
<p><b>Inter Process Communication:</b> Introduction, The API for the internet protocols, External Data Representation and Marshalling, Client-Server Communication, Group Communication, Case Study: IPC in UNIX.</p> <p><b>Distributed Objects and Remote Invocation:</b> Introduction, Communication between Distributed Objects, Remote Procedure Call, Events and Notifications, Case study-Java RMI.</p>					
<b>Module-IV</b>	<b>Distributed File Systems, Name Services, Distributed Shared Memory</b>				<b>10 Hrs</b>



**Distributed File Systems:** Introduction, File service Architecture, Case Study1: Sun Network File System, Case Study 2: The Andrew File System.

**Name Services:** Introduction, Name Services and the Domain Name System, Directory Services, Case study of the Global Name Service.

**Distributed Shared Memory:** Introduction Design and Implementation issues, Sequential consistency and Ivy case study, Release consistency and Munin case study, other consistency models.

**Module-V**

**Transactions and Concurrency Control, Distributed Transactions**

**10Hrs**

**Transactions and Concurrency Control:** Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering, Comparison of methods for concurrency control.

**Distributed Transactions:** Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery

**Text Books:**

1. Distributed Systems, Concepts and Design, George Coulouris, J Dollimore and Tim Kindberg, Pearson Education, 4th Edition,2009.

**Reference Books:**

1. Distributed Systems, Principles and paradigms, Andrew S.Tanenbaum, Maarten Van Steen, Second Edition, PHI.
2. Distributed Systems, An Algorithm Approach, Sikumar Ghosh, Chapman & Hall/CRC, Taylor & Fransis Group, 2007.

**E-resources:**

1. <https://nptel.ac.in/courses>
2. <https://freevidelectures.com/university/iitm>