Course Title	Adhoc Wireless Network			
Course Code	EMT07201			
Course Credits	**L**	**T**	**P**	**TC**
	4	**-**	**-**	**4**
Prerequisites	Basic knowledge about Computer Network.			
Course Objectives	At the end of this course the student should be able to: i. Understand need for ad hoc networks. ii. ii. Explain the constraints of physical layer that affect the design and performance of ad hoc network. iii. Understand why protocols required for wired network may not work for wired network at MAC, Network and Transport Layer. iv. Explain the operations and performance of various MAC layer protocols, unicast routing protocols and transport layer protocols proposed for ad hoc networks. v. Understand security issues and QoS requirements			
Course Contents	**UNIT - 1 INTRODUCTION:** Introduction to ad-hoc networks – definition, characteristics features, applications. Characteristics of wireless channel, ad-hoc mobility models: indoor and outdoor models. **UNIT - 2 MEDIUM ACCESS PROTOCOLS:** MAC Protocols: Design issues, goals and classification. Contention based protocols – with reservation, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN. **UNIT - 3 NETWORK PROTOCOLS:** Routing Protocols: Design issues, goals and classification. Proactive Vs reactive routing, unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm, energy aware routing algorithm, hierarchical routing, QoS aware routing. **UNIT - 4 END – END DELIVERY AND SECURITY:** Transport Layer: Issues in designing – Transport layer classification, adhoc transport protocols. Security issues in adhoc networks: issues and challenges, network security attacks, secure routing protocols. **UNIT – 5 CROSS LAYER DESIGN:** Cross layer Design: Need for cross layer design, cross layer optimization, parameter optimization techniques, cross layer cautionary perspective. Integration of adhoc with Mobile IP networks.			

Course Outcomes	At the end of this course the student should be able to i. Understand the challenges in design of wireless ad hoc networks. ii. Understand and analyze proposed protocols at MAC and routing layers of ad hoc networks. iii. Understand and analyze attacks pertaining to network layer
Text Books	1. C. Siva Ram Murthy and B. S. Manoj, Ad hoc Wireless Networks Architecture and Protocols, 2nd edition, Pearson Edition, 2007. 2. Charles E. Perkins, Ad hoc Networking, Addison – Wesley, 2000. 3. Charles .E. Perkins, "Ad Hoc Networking", Pearson Education, 2008. 4. C.K.Toh, "Ad Hoc Mobile Wireless Networks-Protocols and Systems", Pearson Education, 2009.
Reference Books	1. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, Mobile ad-hoc networking, Wiley-IEEE press, 2004. 2. Mohammad Ilyas, The handbook of ad-hoc wireless networks, CRC press, 2002. 3. T. Camp, J. Boleng, and V. Davies " A Survey of Mobility Models for Ad-hoc Network" 4. Research, "Wireless Commun, and Mobile Comp.. Special Issue on Mobile Ad-hoc Networking Research, Trends and Applications, Vol. 2, no. 5, 2002, pp. 483 – 502. 5. A survey of integrating IP mobility protocols and Mobile Ad-hoc networks, Fekri M. bduljalil and Shrikant K. Bodhe, IEEE communication Survey and tutorials, no: 12007.

Course Title	Advanced Network Security			
Course Code	EMT07202			
Course Credits	**L**	**T**	**P**	**TC**
	4	**-**	**-**	**4**
Prerequisites	Basic knowledge of networks and TCP/IP.			
Course Objectives	By the end of this course, students will be able to: • Current trends and methods of network security • Which areas of network security you should look at • Why you shouldn't neglect them			
Course Contents	**UNIT - I** The data security concepts of confidentiality, integrity and availability. Security governance principles, including: security functions in the enterprise; organizational processes; roles and responsibilities; security control frameworks; due diligence; and compliance requirements. Legal, regulatory and compliance requirements that pertain to the information security of an enterprise. Modeling the ethics and standards of a security professional. **UNIT – II** Describing and classifying information and assets. Methods of determining and maintaining information and asset ownership. Methods of privacy protection. Methods of ensuring asset retention. Data security controls and protection methods. Secure information and asset handling requirements. **UNIT – III** The fundamental concepts of security models. The selection of controls based upon systems security requirements. The security capabilities of information systems, including memory protection, Trusted Platform Module (TPM), encryption and decryption. Methods to assess and mitigate the vulnerabilities of security architectures, designs, and solution elements, including: client-based and server-based systems, databases, cryptographic systems, Industrial Control Systems (ICS), Cloud-based systems, and Internet of Things (IoT). **UNIT – IV** Virtual private network management, including protocols, encryption, authentication and security monitoring. The various forms of network attack and the defensive methods and countermeasures for prevention and mitigation. Methods of securing network components. Methods of securing communication channels according to design. Designing and implementing a secure local area network, including network access control, intrusion prevention and detection systems, proxies, firewalls, honey pots **UNIT – V**			

	Identifying methods of integrating identity as a third-party service. The use of authorization mechanisms, including Role Based Access Control; Rule-based access control; Mandatory Access Control; Discretionary Access Control; and Attribute Based Access Control. The management of the identity and access provisioning lifecycle, including provisioning, user and system account review, and deprovisioning.
Course Outcomes	1. Recognize the technological trends of Computer Networking. 2. Discuss the key technological components of the Network. 3. Evaluate the challenges in building networks and solutions to those
Text Books	1. B. A. Forouzan – "Data Communications and Networking (3rd Ed.) " – TMH 2. A. S. Tanenbaum – "Computer Networks (4th Ed.)" – Pearson Education/PHI 3. W. Stallings – "Data and Computer Communications (5th Ed.)" – PHI/ Pearson Education 4. Zheng & Akhtar, Network for Computer Scientists & Engineers, OUP 5. Black, Data & Computer Communication, PHI 6. Miller, data Communication & Network, Vikas 7. Miller, Digital & Data Communication, Jaico 8. Shay, Understanding Data Communication & Network, Vikas
References Books	1. Kurose and Rose – "Computer Networking -A top down approach featuring the internet" – Pearson Education 2. Leon, Garica, Widjaja – "Communication Networks" – TMH 3. Walrand – "Communication Networks" – TMH. 4. Comer – "Internetworking with TCP/IP, vol. 1, 2, 3 (4th Ed.)" – Pearson Education/PHI

Course Title	Soft Computing
Course Code	EMT07203

Course Credits	L	T	P	TC	
	4	-	-	4	

Prerequisites	- A strong mathematical background. - Proficiency with algorithms. - Programming skills in C, C++, or Java, MATLAB, etc.
Course Objectives	The main objective of the course is to expose the students to soft computing, various types of soft computing techniques, and applications of soft computing. Upon completion of this course, the student should be able to get an idea on : 1. Artificial Intelligence, Various types of production systems, characteristics of production systems. 2. Neural Networks, architecture, functions and various algorithms involved. 3. Fuzzy Logic, Various fuzzy systems and their functions. 4. Genetic algorithms, its applications and advances.
Course Contents	**Unit –I** **Soft Computing:** Introduction to soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing. **Artificial Intelligence:** Introduction, Various types of production systems, characteristics of production systems, breadth first search, depth first search techniques, other Search Techniques like hill Climbing, Best first Search, A* algorithm, AO* Algorithms and various types of control strategies. Knowledge representation issues, Prepositional and predicate logic, monotonic and non monotonic reasoning, forward Reasoning, backward reasoning, Weak & Strong Slot & filler structures, NLP. **Unit –II** **Neural Network:** Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference b/w ANN and human brain, characteristic and applications of ANN, single layer network. **Unit – III** **Perceptron:** Perceptron training algorithm, Linear separability , Widrow & Hebb's learning rule/Delta rule, ADALINE, MADALINE, AI v/s ANN. Introduction of MLP, different activation functions, Error back propagation algorithm, derivation of BBPA, momentum, limitation, characteristics and application of EBPA.

	Counter propagation network: architecture, functioning & characteristics of counter Propagation network, Hop field/ Recurrent network, configuration, stability constraints, associative memory, and characteristics, limitations and applications. Hopfield v/s Boltzman machine. Adaptive Resonance Theory: Architecture, classifications, Implementation and training. Associative Memory.
	Unit – IV
	Fuzzy Logic:
	Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions. Fuzzy rule base system : Fuzzy propositions, formation, decomposition & aggregation of fuzzy Rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic.
	Unit – V
	Genetic algorithm:
	Fundamental, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator ,Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.
Course Outcomes	At the end of the course the student should be able to 1. Learn about soft computing techniques and their applications 2. Analyze various neural network architectures 3. Understand perceptrons and counter propagation networks. 4. Define the fuzzy systems 5. Analyze the genetic algorithms and their applications.
Text Books	1. S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications, 2nd Edition, 2011. 2. S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications, PHI Publication, 1st Edition, 2009.
Reference Books	1. N.K.Bose, Ping Liang, Neural Network fundamental with Graph, Algorithms & Applications, TMH, 1st Edition, 1998. 2. Bart Kosko, Neural Network & Fuzzy System, PHI Publication, 1st Edition, 2009. 3. Rich E, Knight K, Artificial Intelligence, TMH, 3rd Edition, 2012. 4. George J Klir, Bo Yuan, Fuzzy sets & Fuzzy Logic,Theory & Applications, PHI Publication, 1st Edition, 2009.

Course Title	Cloud Computing & Intelligence			
Course Code	EMT07204			
Course Credits	L	T	P	TC
	4	-	-	4

Prerequisites	1. Programming Skills 2. Familiarity with Databases 3. Basics of Security and Privacy 4. Knowledge of Agile Development 5. Familiarity with Operating Systems 6. Understanding of Virtualization 7. Basics of Networking
Course Objectives	This course gives students an insight into the basics of cloud computing along with virtualization, cloud computing is one of the fastest growing domain from a while now. It will provide the students basic understanding about cloud and virtualization along with it how one can migrate over it.
Course Contents	**UNIT-I:** **Cloud Computing Overview Origins of Cloud computing** – Cloud components - Essential characteristics – On-demand selfservice, Broad network access, Location independent resource pooling ,Rapid elasticity , Measured service, Comparing cloud providers with traditional IT service providers, Roots of cloud computing. **UNIT-II:** **Cloud Insights Architectural influences** – High-performance computing, Utility and Enterprise grid computing, Cloud scenarios – Benefits: scalability ,simplicity ,vendors ,security, Limitations – Sensitive information - Application development- security level of third party - security benefits, Regularity issues: Government policies. **UNIT-III:** **Cloud Architecture**- Layers and Models Layers in cloud architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform as a Service (PaaS), features of PaaS and benefits, Infrastructure as a Service (IaaS), features of IaaS and benefits, Service providers, challenges and risks in cloud adoption. Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing. **UNIT-IV:** **Cloud Simulators-** CloudSim and GreenCloud Introduction to Simulator, understanding CloudSim simulator, CloudSim Architecture(User code, CloudSim, GridSim,

	SimJava) Understanding Working platform for CloudSim, Introduction to GreenCloud
	UNIT-V:
	Introduction to VMWare Simulator -
	Basics of VMWare, advantages of VMware virtualization, using Vmware workstation, creating virtual machines-understanding virtual machines, create a new virtual machine on local host, cloning virtual machines, virtualize a physical machine, starting and stopping a virtual machine.
Course Outcomes	1. Describe the principles of Parallel and Distributed Computing and evolution of cloud computing from existing technologies 2. Implement different types of Virtualization technologies and Service Oriented Architecture systems 3. Elucidate the concepts of NIST Cloud Computing architecture and its design challenges 4. Analyse the issues in Resource provisioning and Securizty governance in clouds 5. Choose among various cloud technologies for implementing applications 6. Install and use current cloud technologies
Text Books	1. Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010 2. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate• Online - Michael Miller - Que 2008
Reference Books	1. Cloud computing for dummies- Judith Hurwitz , Robin Bloor , Marcia Kaufman ,Fern Halper, Wiley Publishing, Inc, 2010 2. Cloud Computing (Principles and Paradigms), Edited by Rajkumar Buyya, James Broberg,• Andrzej Goscinski, John Wiley & Sons, Inc. 2011

Master of Technology (Network and Internet Security)
Semester-II
2021-22

Course Title	**Block Chain Technology**			
Course Code	**EMT07205**			
Course Credits	**L**	**T**	**P**	**TC**
	4	**-**	**-**	**4**
Prerequisites	Basic Knowledge of Cryptography, Data Structure, Networking, OOP			
Course Objectives	This course is intended to study the basics of Blockchain technology. During this course learner will explore various aspects of Blockchain technology like application in various domains. By implementing learner will have idea about private and public Blockchain, and smart contract.			
Course Contents	**UNIT-I** **Introduction of Cryptography and Blockchain:** What is Blockchain, Blockchain Technology Mechanisms & Networks, Blockchain Origins, Objective of Blockchain, Blockchain Challenges, Transactions And Blocks, P2P Systems, Keys As Identity, Digital Signatures, Hashing, and public key cryptosystems, private vs. public Blockchain. **UNIT – II** **BitCoin and Cryptocurrency:** What is Bitcoin, The Bitcoin Network, The Bitcoin Mining Process, Mining Developments, Bitcoin Wallets, Decentralization and Hard Forks, Ethereum Virtual Machine (EVM), Merkle Tree, Double-Spend Problem, Blockchain And Digital Currency, Transactional Blocks, Impact Of Blockchain Technology On Cryptocurrency. **UNIT - III** **Introduction to Ethereum:** What is Ethereum, Introduction to Ethereum, Consensus Mechanisms, How Smart Contracts Work, Metamask Setup, Ethereum Accounts, Receiving Ether's What's a Transaction?, Smart Contracts. **Introduction to Hyperledger:** What is Hyperledger? Distributed Ledger Technology & its Challenges, Hyperledger & Distributed Ledger Technology, Hyperledger Fabric, Hyperledger Composer. **UNIT – IV** **Solidity Programming:** Solidity - Language of Smart Contracts, Installing Solidity & Ethereum Wallet, Basics of Solidity, Layout of a Solidity Source File & Structure of Smart Contracts, General Value Types (Int, Real, String, Bytes, Arrays, Mapping, Enum, address) **UNIT – V** **Blockchain Applications:** Internet of Things, Medical Record Management System, Domain Name Service and Future of Blockchain, Alt Coins.			
Course Outcomes	After the completion of this course, student will be able to			

	➢ Understand and explore the working of Blockchain technology (Understanding)
	➢Analyze the working of Smart Contracts (Analyze)
	➢Understand and analyze the working of Hyperledger (Analyze).
	➢Apply the learning of solidity and de-centralized apps on Ethereum (Apply).
Text Books	• Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016). • Antonopoulos, Mastering Bitcoin.
Reference Books	• Antonopoulos and G. Wood, Mastering Ethereum. • D. Drescher, Blockchain Basics. Apress, 2017.

Course Title	Advanced Network Security Lab			
Course Code	EMT07291			
Course Credits	L	T	P	TC
	-	-	4	2
Prerequisites	Basic knowledge of networks and TCP/IP.			
Course Objectives	The student should be made to: To learn different cipher techniques To implement the algorithms DES, RSA,MD5,SHA-1 To use network security tools and vulnerability assessment tools			

Course Contents	**List of Experiments:-**
	
	1. Perform encryption, decryption using the following substitution techniques
	    i. Ceaser cipher
	    ii. Playfair cipher
	    iii. Hill Cipher
	    iv. Vigenere cipher
	
	2. Perform encryption and decryption using following transposition techniques Rail fence - Row & Column Transformation
	3. Apply DES algorithm for practical applications.
	4. Apply AES algorithm for practical applications
	5. Implement RSA Algorithm using HTML and JavaScript
	6. Implement the Diffie-Hellman Key Exchange algorithm for a given problem.
	7. Calculate the message digest of a text using the SHA-1 algorithm
	8. Implement the SIGNATURE SCHEME - Digital Signature Standard.
	9. Demonstrate intrusion detection system (ids) using any tool eg. Snort or any other s/w.
	10. Automated Attack and Penetration Tools Exploring N-Stalker, a Vulnerability Assessment Tool
	11. Defeating Malware - Building Trojans, Rootkit Hunter			

Course	At the end of the course, the student should be able to			

Outcomes	• Develop code for classical Encryption Techniques to solve the problems. • Build cryptosystems by applying symmetric and public key encryption algorithms. • Construct code for authentication algorithms. • Develop a signature scheme using Digital signature standard. • Demonstrate the network security system using open source tools
Text Books	1. B. A. Forouzan – "Data Communications and Networking (3rd Ed.) " – TMH 2. A. S. Tanenbaum – "Computer Networks (4th Ed.)" – Pearson Education/PHI 3. W. Stallings – "Data and Computer Communications (5th Ed.)" – PHI/ Pearson Education 4. Zheng & Akhtar, Network for Computer Scientists & Engineers, OUP 5. Black, Data & Computer Communication, PHI 6. Miller, data Communication & Network, Vikas 7. Miller, Digital & Data Communication, Jaico 8. Shay, Understanding Data Communication & Network, Vikas
Reference Books	1. Kurose and Rose – "Computer Networking -A top down approach featuring the internet" – Pearson Education 2. Leon, Garica, Widjaja – "Communication Networks" – TMH 3. Walrand – "Communication Networks" – TMH. 4. Comer – "Internetworking with TCP/IP, vol. 1, 2, 3 (4th Ed.)" – Pearson Education/PHI

Course Title	Soft Computing Lab				
Course Code	EMT07292				
Course Credits	**L**	**T**	**P**	**TC**	
	-	**-**	**4**	**2**	
Prerequisites	- A strong mathematical background. - Proficiency with algorithms. - Programming skills in C, C++, or Java, MATLAB, etc.				
Course Objectives	The course should enable the students to: I. Understand Fuzzy concepts II. Learn neural networks with back propagation and without preparation III. Learn the operators of genetic algorithms III. Practice on crisp partitions				
Course Contents	1. Create a perceptron with appropriate number of inputs and outputs. Train it using fixed increment learning algorithm until no change in weights is required. Output the final weights 2. Write a program to implement artificial neural network without back propagation. Write a program to implement artificial neural network with back propagation. 3. Implement Union, Intersection, Complement and Difference operations on fuzzy sets. Also create fuzzy relation by Cartesian product of any two fuzzy sets and perform max-min composition on any two fuzzy relations. 4. Implement travelling sales person problem (tsp) using genetic algorithms. 5. Plot the correlation plot on dataset and visualize giving an overview of relationships among data on soya bins data. Analysis of covariance: variance (ANOVA), if data have categorical variables on iris data. 6. Implement linear regression and multi-regression for a set of data points 7. Implement crisp partitions for real-life iris dataset 8. Write a program to implement Hebb's rule Write a program to implement Delta rule. 9. Write a program to implement logic gates. 10. Implement svm classification by fuzzy concepts.				
Course Outcomes	At the end of the course the student should be able to 1. Learn about soft computing techniques and their applications				

	2. Analyze various neural network architectures
	3. Understand perceptrons and counter propagation networks.
	4. Define the fuzzy systems
	5. Analyze the genetic algorithms and their applications.
Text Books	D.K Prathikar, ―Soft Computing‖, Narosa Publishing House, New Delhi, 2008.
Reference Books	1. N.K.Bose, Ping Liang, Neural Network fundamental with Graph, Algorithms & Applications, TMH, 1st Edition, 1998.
	2. Bart Kosko, Neural Network & Fuzzy System, PHI Publication, 1st Edition, 2009.
	3. Rich E, Knight K, Artificial Intelligence, TMH, 3rd Edition, 2012.
	4. George J Klir, Bo Yuan, Fuzzy sets & Fuzzy Logic,Theory & Applications, PHI Publication, 1st Edition, 2009.