Shri Rawatpura Sarkar University, Raipur

Examination Scheme & Syllabus

for

Master of Technology
in
Computer Science & Engineering

Specialization

WIRELESS & NETWORKS

Semester - II

(Effective from the session: 2021-22)

Department of Computer Science & Engineering

Shri Rawatpura Sarkar University, Raipur

Faculty of Engineering,

Master of Technology (Wireless & Networks)

Semester-II

Examination Scheme

(Effective from the session: 2021-22)

S.N.	Course Code	Th/ Pr	Subject	Type of Course	Teaching hours per week			TC	Examination Scheme				Total Marks
					L	T	P		Theory		Practical		
									EX	IN	EX	IN	
1	**EMT08201**	Th	Internet of things & Application	Core	4	-	-	4	70	30	-	-	100
2	**EMT08202**	Th	Protocol Engineering	Core	4	-	-	4	70	30	-	-	100
3	**EMT08203**	Th	Wireless Ad hoc Networks	Core	4	-	-	4	70	30	-	-	100
4	**EMT08204**	Th	Soft and Evolutionary Computing	Core	4	-	-	4	70	30	-	-	100
5	**EMT08251**	Th	**Elective – I**	Core	4	-	-	4	70	30	-	-	100
6	**EMT08291**	Pr.	IoT Laboratory	Core	-	-	4	2	-	-	35	15	50
7	**EMT08292**	Pr	Soft Computing Lab	Core	-	-	4	2	-	-	35	15	50
Total Contact hr per week: 28			**Total Credit: 24**						**Total Marks**				**600**

Elective- I			
Sr. No	**Board of Study**	**Subject Code**	**Subject Name**
1	Wireless & Networks	**EMT08251 A**	Block Chain Technology
2	Wireless & Networks	**EMT08251 B**	Cloud Computing & Intelligence
3	Wireless & Networks	**EMT08251 C**	Data Science

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Course Title	**Internet of things & Application**				
Course Code	**EMT08201**				
Course Credits	**L**	**T**	**P**	**TC**	
	4	**-**	**-**	**4**	
Prerequisites	Students must know basic concept of about internet, network				
Course Objectives	• To understand Concepts, design and characteristics of IoT. • To understand Architecture of IoT. • To understand basic protocols of IoTs. • To understand challenges and applications of IoTs • To develop IoT applications using Tools.				
Course Contents	**UNIT-1 : Introduction to IoT** **Introduction to IoT,** Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs. **UNIT-2 : IoT & M2M** **IoT & M2M** Machine to Machine, Difference between IoT and M2M, Software define Network. **UNIT-3: Network & Communication Aspects** **Network & Communication Aspects** Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination. **UNIT-4: Challenges and Applications of IoT** **Challenges and Applications of IoT** Design challenges, Development challenges, Security challenges, Other challenges. Home automation, Industry applications, Surveillance applications, Other IoT applications. **UNIT -5 : Developing IoTs** **Developing IoTs** Introduction to Python, Introduction to different IoT tools, Developing applications through IoT tools, Developing sensor based application through embedded system platform, Implementing IoT concepts with python.				

Course Outcomes	• Students will familiar with the concepts of Internet of Things. • Students will familiar with IoT Architecture • Students will ready to Analyze basic protocols in wireless sensor network • Students will be capable to design IoT applications in different domain and be able to analyze their performance • Capable to implement basic IoT applications on embedded platform
Text Books	1. Vijay Madisetti, Arshdeep Bahga, "Internet of Things: A Hands-On Approach" 2. Waltenegus Dargie,Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice"
Reference Books	1. Internet of Things with Arduino Cookbook by Macro Schwart Published by Packt Publishing Ltd

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Course Title	**Protocol Engineering**				
Course Code	**EMT08202**				
Course Credits	**L**	**T**	**P**	**TC**	
	4	**-**	**-**	**4**	
Prerequisites	Students must have basic knowledge of Computer Network.				
Course Objectives	1. Student will be able to build, operate and manage telematic services using analytical planning, sizing and analysis tools. 2. Student will be able to describe, program, validate and optimize communication protocols and interfaces at different levels of a network architecture. 3. Student will be able to design network architectures and telematic services. 4. Student will be able to program network and distributed telematic services and applications.				
Course Content	**Unit 1 Introduction:** Communication model, Communication Software, Communication Subsystems, Communication Protocol Definition/Representation, Formal and Informal Protocol Development Methods, Protocol Engineering Phases . Error Control, Flow Control: Type of Transmission Errors, Linear Block Code, Cyclic Redundancy Checks, Introduction to Flow Control, Window Protocols, Sequence Numbers, Negative Acknowledgments, Congestion Avoidance. **Unit 2Network Reference Model:** Layered Architecture, Network Services and Interfaces, Protocol Functions: Encapsulation, Segmentation, Reassembly, Multiplexing, Addressing, OSI Model Layer Functions, TCP/IP Protocol Suite, Application Protocols. Protocol Specification: Components of specification, Service specification, Communication Service Specification Protocol entity specification: Sender, Receiver and Channel specification, Interface specifications, Interactions, Multimedia specifications, Alternating Bit Protocol Specification, RSVP specification. **Unit 3Protocol Specification Language (SDL):** Salient Features. Communication System Description using SDL, Structure of SDL. Data types and communication paths, Examples of SDL based Protocol Specifications: Question and answer protocol, X-on-X-off protocol, Alternating bit protocol, Sliding window protocol specification, TCP protocol specification, SDL based platform for network, OSPF, BGP Multi Protocol Label Switching SDL components.Protocol Verification / Validation: Protocol Verification using FSM, ABP Verification, Protocol Design Errors, Deadlocks, Unspecified Reception, Non-executable Interactions, State Ambiguities, Protocol Validation Approaches: Perturbation Technique, Reachability Analysis, Fair Reachability Graphs, Process Algebra based Validation, SDL Based Protocol Verification: ABP Verification, Liveness Properties, SDL Based Protocol Validation: ABP				

	Validation. **Unit 4<u>Protocol Conformance and Performance Testing:</u>** Conformance Testing Methodology and Framework, Local and Distributed Conformance Test Architectures, Test Sequence Generation Methods: T, U, D and W methods, Distributed Architecture by Local Methods, Synchronizable Test Sequence, Conformance testing with Tree and Tabular Combined Notation (TTCN), Conformance Testing of RIP, Testing Multimedia Systems, quality of service test architecture(QOS), Performance Test methods, SDL Based Performance Testing of TCP, OSPF, Interoperability testing, Scalability testing protocol synthesis problem **Unit5 <u>Protocol Synthesis and Implementation:</u>** Synthesis methods, Interactive Synthesis Algorithm, Automatic Synthesis Algorithm, Automatic Synthesis of SDL from MSC, Protocol Re-synthesis, Requirements of Protocol Implementation, Objects Based Approach To Protocol Implementation, Protocol Compilers, Code generation from Estelle, LOTOS, SDL and CVOPS.
Course Outcomes	• At the end of the training plan, the student must be able to: Address the analysis and synthesis of communication protocols at a theoretical level. Address the use of the CASE tool for the validation and simulation of communication protocols at a practical level.
Text Books	Communication Protocol Engineering Hardcover – Import, 19 June 2006
References Books	1. ITU (Intl. Telecommunications Union) Recommendations: Z.100 11/99: "Specification and Description Language" SDL (Inglés) Z.120 11/99: "Message Sequence Chart" MSC (Inglés) Z.141 07/01: "The Tree and Tabular Combined Notation version 3¿ TTCN-3 (Inglés) Local copy available at "Aula Virtual"

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<table>
<tr><td>Course Title</td><td colspan="5">Wireless Ad hoc Networks</td></tr>
<tr><td>Course Code</td><td colspan="5">EMT08203</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td></td></tr>
<tr><td>4</td><td>-</td><td>-</td><td>4</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5">Basic knowledge about Computer Network.</td></tr>
<tr><td>Course Objectives</td><td colspan="5">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</td></tr>
<tr><td>Course Content</td><td colspan="5">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.</td></tr>
</table>

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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.

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<table>
<tr><td>Course Title</td><td colspan="5">Soft and Evolutionary Computing</td></tr>
<tr><td>Course Code</td><td colspan="5">EMT08204</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td></td></tr>
<tr><td>4</td><td>-</td><td>-</td><td>4</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5">• A strong mathematical background.
• Proficiency with algorithms.
• Programming skills in C, C++, or Java, MATLAB, etc.</td></tr>
<tr><td>Course Objectives</td><td colspan="5">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.</td></tr>
<tr><td>Course Contents</td><td colspan="5">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,</td></tr>
</table>

	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.

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<table>
<tr><td>Course Title</td><td colspan="5">Block Chain Technology</td></tr>
<tr><td>Course Code</td><td colspan="5">EMT08205</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td></td></tr>
<tr><td>4</td><td>-</td><td>-</td><td>4</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5">Basic Knowledge of Cryptography, Data Structure, Networking, OOP</td></tr>
<tr><td>Course Objectives</td><td colspan="5">• 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.</td></tr>
<tr><td>Course Contents</td><td colspan="5">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.</td></tr>
</table>

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.

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<table>
<tr><td>Course Title</td><td colspan="5">Cloud Computing & Intelligence</td></tr>
<tr><td>Course Code</td><td colspan="5">EMT08205</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td></td></tr>
<tr><td>4</td><td>-</td><td>-</td><td>4</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5">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</td></tr>
<tr><td>Course Objectives</td><td colspan="5">• 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.</td></tr>
<tr><td>Course Contents</td><td colspan="5">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</td></tr>
</table>

	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.
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

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Course Title	**Data Science**				
Course Code	**EMT08205**				
Course Credits	**L**	**T**	**P**	**TC**	
	4	**-**	**-**	**4**	
Prerequisites	Students must know basic knowledge of algorithms.				
Course Objectives	1. To make students understand the fundamentals of data science 2. To introduce python-based programming toolkit for developing basic models 3 To make student understand mathematics behind data analysis 3. To impart fundamentals of machine learning algorithms 4. To design and develop DS models for real time applications				
Course Contents	**UNIT-I Data science in a big data world**: 1.1 Why Data Science, Benefits and uses of data science; Facets of data. 1.2 The data science process: Setting up goal, retrieving data, data preparation, data exploration, data modelling, Presentation and automation. **UNIT-II Introduction to Programming**: Sequence data: string, list, dictionary, array and tuple. Tools for Data Science 2.1 Toolkits using Python: Matplotlib, NumPy, Scikit-learn, NLTK 2.2 Visualizing Data: Bar Charts, Line Charts, Scatter plots 2.3 Working with data: Reading Files, Scraping the Web, Using APIs (Example: Using the Twitter APIs), Cleaning and Munging, Manipulating Data, Rescaling, Dimensionality Reduction **UNIT-III Mathematical Foundations Mathematical Foundations** 3.1 Linear Algebra: Vectors, Matrices, 3.2 Statistics: Describing a Single Set of Data, Correlation, Simpson's Paradox, Correlation and Causation3.3 Probability: Dependence and Independence, Conditional Probability, Bayes's Theorem, Random Variables, Continuous Distributions, The Normal Distribution, The Central Limit Theorem 3.4 Hypothesis and Inference: Statistical Hypothesis Testing, Confidence Intervals, P-hacking, Bayesian Inference **UNIT-IV Machine Learning :** Overview of Machine learning concepts – Over fitting and train/test splits, Types of Machine learning – Supervised, Unsupervised,				

	Reinforced learning, Introduction to Bayes Theorem, Linear Regression- model assumptions, regularization (lasso, ridge, elastic net), Classification and Regression algorithms- Naïve Bayes, K-Nearest Neighbors, logistic regression, support vector machines (SVM), decision trees, and random forest, Classification Errors, Analysis of Time Series- Linear Systems Analysis, Nonlinear Dynamics, Rule Induction, Neural Networks Learning And Generalization, Overview of Deep Learning. **UNIT-V Application of Data Science** Complete development of an application using data science techniques like Weather forecasting, Stock market prediction, Object recognition, Real Time Sentimen Analysis.: Exploratory data analysis, data visualization on data set, Prediction, analysis and accuracy of the system.
Course Outcomes	1. Students should be familiar with data science tools 2. Students should be able to build a data science model using DS concept 3. Student should be able to visualize data and understand the data semantics. 4. Build data science applications using Python based toolkits
Text Books	1. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media 2. Davy Cielen, Arno, D,B Meysmen, Mohamed Ali "Introducing Data Science", Manning 3. Aurélien Géron, "Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems", 1st Edition, O'Reilly Media
Reference Books	1. Jain V.K., "Data Sciences", Khanna Publishing House, Delhi. 2. Jain V.K., "Big Data and Hadoop", Khanna Publishing House, Delhi. 3. Jeeva Jose, "Machine Learning", Khanna Publishing House, Delhi. 4. Chopra Rajiv, "Machine Learning", Khanna Publishing House, Delhi. 5. Ian Good fellow, Yoshua Bengio and Aaron Courville, "Deep Learning", MIT Press http://www.deeplearningbook.org 6. Han and Jian Pei, "Data Mining Concepts and Techniques 7. NPTEL course on " Data science using python"

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Course Title	**IoT Laboratory**				
Course Code	**EMT08291**				
Course Credits	**L**	**T**	**P**	**TC**	
	-	**-**	**4**	**2**	
Prerequisites	Students must know basic concept of about internet, network				
Course Objectives	• To understand Concepts, design and characteristics of IoT. • To understand Architecture of IoT. • To understand basic protocols of IoTs. • To understand challenges and applications of IoTs • To develop IoT applications using Tools.				
Course Contents	1. Define and Explain Eclipse IoT Project. 2. List and summarize few Eclipse IoT Projects. 3. Sketch the architecture of IoT Toolkit and explain each entity in brief. 4. Demonstrate a smart object API gateway service reference implementation in IoT toolkit. 5. Write and explain working of an HTTPto-CoAP semantic mapping proxy in IoT toolkit 6. Describe gateway-as-a-service deployment in IoT toolkit. 7. Explain application framework and embedded software agents for IoT toolkit. 8. Explain working of Raspberry Pi. 9. Connect Raspberry Pi with your existing system components. 10. Give overview of Zetta.				
Course Outcomes	• Students will familiar with the concepts of Internet of Things. • Students will familiar with IoT Architecture • Students will ready to Analyze basic protocols in wireless sensor network • Students will be capable to design IoT applications in different domain and be able to analyze their performance • Capable to implement basic IoT applications on embedded platform				
Text Books	1. Vijay Madisetti, Arshdeep Bahga, “Internet of Things: A Hands-On Approach” 2. Waltenegus Dargie,Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice"				
Reference Books	1. Internet of Things with Arduino Cookbook by Macro Schwart Published by Packt Publishing Ltd				

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Course Title	**Soft Computing Lab**				
Course Code	**EMT08292**				
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 IV. 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	1. 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.