SCHOOL OF ENGINEERING

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

Outcome based Curriculum for

Undergraduate Degree Courses in Engineering & Technology

Department of Information Technology

ITA-701
Ad-Hoc And Sensor Network

ITA-701	Ad-HOC AND SENSOR NETWORK	**3L:0T:2P**	**4 credits**	**5 Hrs/Week**

OBJECTIVE :-

To understand the state–of–the–art in network protocols, architectures and applications, Analyze existing network protocols and networks, Develop new protocols in networking, To understand how networking research is done, To investigate novel ideas in the area of Networking via term–long research projects

OUTCOME:-

After completion of the course the student will be able to

- Describe the unique issues in ad-hoc/sensor networks.
- Describe current technology trends for the implementation anddeployment of wirelessad-hoc/sensor networks.
- Discuss the challenges in designing MAC, routing and transportprotocols for wireless ad-hoc/sensor networks.
- Discuss the challenges in designing routing and transport protocolsfor wireless Ad-hoc/sensor networks.

UNIT-I **(8 Hr.)**

Introduction :Introduction-Fundamentals of Wireless Communication Technology, The Electromagnetic Spectrum, GSM, GPRS, PCS, WLAN and UMTS, Components of Packet Radios, Routing in PRNETs, Ad Hoc Wireless Networks, Wireless Sensor Networks, Traffic Profiles, Types of Ad Hoc Mobile Communications, Types of Mobile Host Movements, Challenges Facing Ad Hoc Mobile Networks.

UNIT II **(9 Hr.)**

Ad Hoc wireless MAC protocols-Introduction, Synchronous and asynchronous MAC protocols, Problem in Ad Hoc channel access, Receiver-initiated and sender-initiated MAC protocols, Existing Ad Hoc MAC protocols, Ad Hoc Routing Protocols-Introduction, Classifications of Routing Protocols: Table-Driven Routing Protocols –Destination Sequenced Distance Vector (DSDV), Wireless Routing Protocol (WRP), Source-Initiated On-Demand Approaches -Ad Hoc On-Demand Distance Vector Routing (AODV), Dynamic Source Routing (DSR), Temporally Ordered Routing Algorithm (TORA), Signal Stability Routing (SSR) LocationAided Routing (LAR).

UNIT III **(8 Hr.)**

Multicast routing In Ad Hoc Networks : Introduction, Issues in Designing a Multicast Routing Protocol, Operation of Multicast Routing Protocols, An Architecture Reference Model for Multicast Routing Protocols, Classifications of Multicast Routing Protocols, Tree-Based Multicast Routing Protocols, Mesh-Based Multicast Routing Protocols, Summary of Tree-and Mesh-Based Protocols -Energy-Efficient Multicasting.

UNIT IV **(7 Hr.)**

Transport Layer, Security Protocols : Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management.

UNIT V **(8 Hr.)**

QoS and Energy Management : Introduction, Issues and Challenges in Providing QoS in Ad Hoc Wireless Networks, Classifications of QoS Solutions, MAC Layer Solutions, Network Layer Solutions,Energy Management in Ad Hoc Wireless Networks –Introduction, Need for Energy Management in Ad Hoc Wireless Networks, Classification of Energy Management Schemes.

REFERENCES BOOKS:-

1. C. Siva Ram Murthy and B.S. Manoj "Ad Hoc Wireless Networks: Architectures and Protocols", Pearson Education.

2. C.K. Toh, "Ad Hoc Mobile Wireless Networks: Protocols and Systems", Pearson Education.

3. George Aggelou, "Mobile Wireless Networks", Tata McGraw-Hill.

LIST OF EXPERIMENT:-

1. Introduction of Wireless sensor network applications and its simulation.
2. Network Simulator installation of wireless sensor network.
3. Write TCL script for transmission between mobile nodes.
4. Write TCL script for sensor nodes with different parameters.
5. Generate tcl script for udp and CBR traffic in WSN nodes.
6. Generate tcl script for TCP and CBR traffic in WSN nodes.
7. Implementation of routing protocol in NS2 for AODV protocol.
8. Implementation of routing protocol in NS2 for DSR protocol.
9. Implementation of routing protocol in NS2 for TORA protocol.
10. Study other wireless sensor network simulators (Mannasim. Contiki.)

ITA– 702

CLOUD COMPUTING

ITA-702	CLOUD COMPUTING	**3L:0T:2P**	**4 credits**	**5 Hrs/Week**

Objectives

The objective of this course is to provide graduate students of Information Technology with the comprehensive and in-depth knowledge of Cloud Computing concepts, technologies, architecture and applications by introducing and researching state-of-the-art in Cloud Computing fundamental issues, technologies, applications and implementations. Another objective is to expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research.

Outcomes

1. Analyze the Cloud computing setup with it's vulnerabilities and applications using different architectures.
2. Design different workflows according to requirements and apply map reduce programming model. algorithms.
3. Create combinatorial auctions for cloud resources and design scheduling algorithms for computing clouds
4. Assess cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application
5. addressing the security issues of cloud computing.

UNIT-I **(8 Hr.)**

Introduction, Cloud computing history, Cloud architecture, Characteristics of cloud computing as per NIST, Cloud services requirements, System Models for Distributed and Cloud Computing, NIST Cloud Computing Reference Architecture, Applications, ECG Analysis in the cloud, Protein structure prediction, Gene Expression Data Analysis, Satellite Image Processing, CRM and ERP, Social networking.

UNIT-II **(8 Hr.)**

Cloud Reference Model, Types of Clouds, Cloud Interoperability & Standards, Scalability and Fault Tolerance, Design Challenges, Inter Cloud Resource Management, Resource Provisioning and Platform Deployment, Global Exchange of Cloud Resources, Cloud services (Iaas, Paas & Saas).

UNIT-III **(9 Hr.)**

Basics of Virtualization, Types of Virtualization, Implementation Levels of Virtualization, Virtualization Structures, Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices, Virtual Clusters and Resource management, Virtualization for Data-center Automation, Virtual LAN (VLAN) and Virtual SAN (VSAN) and their benefits.

UNIT-IV **(7 Hr.)**

Cloud Security:- Security Overview Infrastructure security, Data security and storage, Network security – I , Network security – II, Host security, Disaster recovery and management, Cloud Information security fundamentals, Cloud security services, Design principles, Secure Cloud Software Requirements, Policy Implementation, Cloud Computing Security Challenges, Virtualization security Management, Cloud Computing Security Architecture.

UNIT-V **(8 Hr.)**

Cloud Solutions: - Cloud Ecosystem, Cloud Business Process Management, Cloud Service Management Third Party Cloud Services, Market Based Management of Clouds. Case study: - Amazon cloud services, Amazon EC2, Amazon S3, Google cloud services, Google Map reduce, GFS, Sales Force, Windows Azure- EMC cloud services, IBM cloud services, Apache Hadoop.

REFERENCES:

1. Kenneth Hess, Amy New Man – Practical Virtualization Solutions – Prentice Hall, 2010

2. Shahed Latif, Tim Mather, Subra Kumara swamy – Cloud Security and Privacy : An Enterprise perspective on risks and compliance – O‟Reilly Media Inc., 2009

3 Gautam Shroff – Enterprise Cloud Computing: Technology, Architecture, Applications – Cambridg Press, 2010

ITA-703(A)

OBJECT ORIENTED ANALYSIS AND DESIGN

ITA-703(A)	**OBJECT ORIENTED ANALYSIS AND DESIGN**	**3L:0T:0P**	**3 credits**	**3 Hrs/Week**

UNIT- I Introduction to OOAD **(10 Hr.)**

Introduction to OOAD – Unified Process – UML diagrams – Use Case – Class Diagrams– Interaction Diagrams – State Diagrams – Activity Diagrams – Package, component and Deployment Diagrams.

UNIT II DESIGN PATTERNS **(7 Hr.)**

GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion – Controller – Design Patterns – creational – factory method – structural – Bridge – Adapter – behavioural – Strategy – observer.

UNIT III CASE STUDY **(7 Hr.)**

Case study – the Next Gen POS system, Inception -Use case Modeling – Relating Use cases – include, extend and generalization – Elaboration – Domain Models – Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class Hierarchies – Aggregation and Composition.

UNIT IV APPLYING DESIGN PATTERNS **(8 Hr.)**

System sequence diagrams – Relationship between sequence diagrams and use cases Logical architecture and UML package diagram – Logical architecture refinement – UML class diagrams – UML interaction diagrams – Applying GoF design patterns.

UNIT V CODING AND TESTING **(8 Hr.)**

Mapping design to code – Testing: Issues in OO Testing – Class Testing – OO Integration Testing – GUI Testing – OO System Testing.

TEXT BOOK:

1. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and

Design and Iterative Development", Third Edition, Pearson Education, 2005.

REFERENCES:

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. Erich Gamma, and Richard Helm, Ralph Johnson, John Vlissides, "Design patterns: Elements of

Reusable Object-Oriented Software", Addison-Wesley, 1995.

3. Martin Fowler, "UML Distilled: A Brief Guide to the Standard Object Modeling Language"

CSA-703(B)

Neural Network

CSA-703(B)	Neural Network	3L:0T:0P	3 credits	3Hrs/Week

Objective:
Introduce major deep learning algorithms, the problem settings, and their applications to solve real world problems.

Outcomes:

Student should be able to:

- Describe the structure and function of the most common artificial neural network (ANN) types, e.g. multi-layer perceptron, recurrent network, self-organizing maps, Boltzmann machine, deep belief network, autoencoder, and provide examples of their applications
- Explain mechanisms of supervised/unsupervised learning from data and information processing in different ANN architectures, and also account for derivations of the basic ANN algorithms discussed in the course
- Demonstrate when and how deep architectures lead to increased performance in pattern recognition and data mining problems
- Quantitatively analyse the process and outcomes of learning in ANNs, and account for their shortcomings, limitations
- Apply, validate and evaluate suggested types of ANNs in typical small problems in the realm of regression, prediction, pattern recognition, scheduling and optimisation
- Devise and implement ANN approaches to selected problems in pattern recognition, system identification or predictive analytics using commonly available development tools, and critically examine their applicability

Unit-I **(9 Hr.)**

Neural Network (NN): Introduction, benefits of neural network, models of a neuron, neural network as directed graph, network architectures, artificial intelligence and neural network. **Learning processes:** error correction learning, memory based learning, Hebbian learning, competitive learning, Boltzman learning, learning tasks, adaptation, statistical nature of learning process, statistical learning theory.

Unit-II **(8 Hr.)**

Perceptrons
Single layer perceptrons: adaptive filtering problem, unconstrained optimization technique, linear least squares filter, least mean square algorithm (LMS), perceptron convergence theorem. **Multilayer perceptron**: architecture, back propagation algorithm, generalization, approximations of functions, network pruning techniques
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Unit-III **(8 Hr.)**

Radial Basis Function (RBF) Networks: Cover˝s theorem on the separability of patterns, interpolation problem, supervised learning as an Ill-posed hypersurface reconstruction problem, regularization theory, regularization network, generalized radial basis function networks (RBF), estimation of the regularization parameter, approximation properties of RBF networks, comparison of RBF networks and multilayer perceptrons, Kernel regression and its relation to RBF networks, learning strategies.

Unit-IV **(8 Hr.)**

Information-Theoretic Models: Entropy, maximum entropy principle, mutual information, Kullback-Leibler divergence, mutual information as an objective function to be optimized, maximum mutual information principle, infomax and redundancy reduction, spatially coherent and incoherent features, independent components analysis, maximum likelihood estimation, maximum entropy method.

Unit V **(8 Hr.)**

Dynamically Driven Recurrent Networks: Introduction, recurrent network architectures, state space model, non-linear autogressive with exogenous inputs model, computational power of recurrent networks, learning algorithms, back propagation through time, real time recurrent learning, Kalman filter, decoupled Kalman filter, vanishing gradients in recurrent networks, system identification, model reference adaptive control.

References:

1. S. Haykin: Neural Networks- A Comprehensive Foundation, PHI Learning.
2. S. N. Sivanandam, S. Sumathi and S. N. Deepa: Introduction to Neural Networks using Matlab 6.0, TMH, New Delhi.
3. J. A Freeman and D. M. Skapura: Fundamentals of Neural Networks- algorithms, applications and programming techniques, Pearson Education.
4. M. T. Hagan, H. B. Demuth and M. Beale: Neural Network Design, Cengage Learning.
5. J.A Anderson: An introduction ro Neural Networks, PHI Learning.
6. Satish Kumar: Neural Networks, TMH, New Delhi.

ITA-704(A)

Information And Storage Management

ITA-704(A)	**INFORMATION AND STORAGE MANAGEMENT**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

OBJECTIVE:-

ISM is very useful for efficient and effective planning and control functions of the management. Management is the art of getting things done through others. MIS will be instrumental in getting the things done by providing quick and timely information to the management. Reports give an idea about the performance of men, materials, machinery, money and management. Reports throw light on the utilization of resources employed in the organization.

OUTCOME:-

- Search, retrieve and synthesize information from a variety of systems and sources.
- Evaluate systems and technologies in terms of quality, functionality, cost-effectiveness and adherence to professional standards.
- Integrate emerging technologies into professional practice.
- Apply theory and principles to diverse information contexts

UNIT-I **(8 Hr.)**

Introduction:-Data proliferation, evolution of various storage technologies, Overview of storage infrastructure components,Data creation and The value of data to a business,Information Lifecycle Management, Challenges in data storage and data management, Solutions available for data storage, Core elements of a Data Center infrastructure,Data categorization.

UNIT-II **(8 Hr.)**

Storage Systems Architecture:-Intelligent disk subsystems overview, Contrast of integrated vsmodular arrays, Component architecture of intelligent disk subsystems, Disk physical structure components, properties, performance, and specifications, RAID levels & parity algorithms, hot sparing, Front end to host storage provisioning, mapping and operation.

UNIT-III **(9 Hr.)**

Introduction To Networked Storage:-Evolution of networked storage, Architecture, components, and topologies of FC-SAN, NAS,IP-SAN, Applications, Elements, connectivity, standards, management, security and limitations of DAS, NAS, CAS & SAN.

Introduction to Information Availability: -Business Continuity and Disaster Recovery Basics, Local business continuity techniques, Remote business continuity techniques, Disaster Recovery principles & techniques.

UNIT-IV **(8 Hr.)**

Managing & Monitoring:-Management philosophies (holistic vs. system & component), Industry management standards (SNMP, SMI-S, CIM), Standard framework applications, Key management, Metric analysis methodologies & trend analysis, Reactive and pro-active management best practices, Provisioning & configuration change planning, Problem reporting, prioritization, and handling techniques, Management tools overview.

UNIT-V **(7 Hr.)**

Securing Storage and Storage Virtualization:-Information security, Critical security attributes for information systems, Storage security domains, List and analyzes the common threats in each domain, Virtualization technologies, block-level and file-level virtualization technologies and processes.

REFERENCE BOOKS:

1. EMC Corporation, Information Storage and Management, Wiley, India.

2. Robert Spalding, "Storage Networks: The Complete Reference", Tata McGraw Hill , Osborne, 2003.

3. Marc Farley, "Building Storage Networks", Tata McGraw Hill ,Osborne, 2001.

4. Additional resource material on www.emc.com/resource-library/resource-library.esp

ITA-704(B)

Optimization Techniques

ITA-704(B)	**OPTIMIZATION TECHNIQUES**	**3L:0T:0P**	**3 credits**	**3 Hrs/Week**

OBJECTIVE:-

The student should be made to:

- Be exposed to compiler writing tools.
- Learn to implement the different Phases of compiler
- Be familiar with control flow and data flow analysis
- Learn simple optimization techniques

OUTCOME:-

- Implement the different Phases of compiler using tools
- Analyze the control flow and data flow of a typical program
- Optimize a given program
- Generate an assembly language program equivalent to a source language program

UNIT-I **(8 Hr.)**

INTRODUCTION Non-linear programming. Mathematical fundamentals. Numerical evaluation of gradient. Unconstrained Optimization: One dimensional, single variable optimization. Maximum of a function. Uni modal-Fibonacci method. Polynomial based methods.

UNIT-II **(7 Hr.)**

UNCONSTRAINED MINIMIZATION Multivariable functions. Necessary and sufficient conditions for optimality. Convexity. Steepest Descent Method -Convergence Characteristics. Conjugate Gradient Method. Linear programming - Simplex Method.

UNIT-III **(8 Hr.)**

CONSTRAINED MINIMIZATION Non-linear programming. Gradient based methods. Rosens`s gradient, Zoutendijk`s method, Generalizedreduced gradient, Sequential quadratic programming. Sufficient condition for optimality.

UNIT-IV **(9 Hr.)**

DIRECT SEARCH METHODSDirect search methods for nonlinear optimization. Cyclic coordinate search. Hooke and Jeeves Pattern search method. Generic algorithm. Discrete And Dynamic Programming: Integer and discrete programming. Branch and bound algorithm for mixed integers. General definition of dynamic programming problem. Problem modeling and computer implementation. Shortest path problem.

UNIT –V **(8 Hr.)**

OPTIMIZATION APPLICATION:Transportation problem. Transportation simplex method. Network problems. Maximum flow in networks. General definition of dynamic programming. Problem modeling and computer

implementation. Finite Element Based Optimization: Parameter optimization using gradient methods -Derivative calculation. Shape optimization. Topology optimizationof continuum structures

After Class Students should learn:

1. Implementation of Symbol Table
2. Develop a lexical analyzer to recognize a few patterns in C. (Ex. identifiers, constants, comments, operators etc.)
3. Implementation of Lexical Analyzer using Lex Tool
4. Convert the BNF rules into Yacc form and write code to generate Abstract Syntax Tree.
5. Implement control flow analysis and Data flow Analysis
7. Implement any one storage allocation strategies (Heap, Stack, Static)
8. Implementation of Simple Code Optimization Techniques (Constant Folding., etc.)

TEXT BOOK

1. George Leitmann, Optimization Techniques, Volume 51st Edition, ISBN: 9780080955131,Academic Press

REFERENCES BOOK

1.Foulds, L. R., Optimization Techniques anIntroduction, springer

ITA-705
Project Stage-I

ITA-705	**PROJECT STAGE-II**	**0L:0T:10P**	**5 credits**	**10 Hrs/Week**

Students must observe following points to enrich their learning in electrical engineering during industrial training:

- The training must be the advance/ different already done on minor training
- Industrial environment and work culture
- Organizational structure and inter personal communication
- Machines/ equipment/ instruments -their working and specifications.
- Product development procedures and phases.
- Project planning, monitoring and control.
- Quality control and assurance.-Maintenance system.
- Costing system.-Stores and purchase systems.-Roles and responsibilities of different categories of personnel.
- Customer services.
- Problems related to various areas of Work etc.
- Layout if any

To be submitted :The students has to submit the power point presentation of minimum15 slides of the training performed (comprising of points stated above) along with the original certificate of training performed with proper seal and signature of the authorized person.

ITA-706
Self Study/GD/Seminar

ITA-706	SELF STUDY/GD/SEMINAR II	**0L:0T:2P**	**1 credits**	**2Hrs/Week**

Objective

To improve the mass communication and convincing / understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves. Evaluation will be done by assigned faculty based on group discussion and power point presentation.

A group discussion among students is being organized to see and evaluate their thinking skills, listening abilities and how they are communicating their thoughts. One should learn to control the conversation through listening attentively and then having the perseverance to mold it towards his/her own direction.

Outcomes:

- Analytical thinking
- Lateral thinking
- constructive argument
- Communication skill
- Presentation of views

Students will discuss the course related and interdisciplinary topics for problem solving. They will improve the mass communication and convincing / understanding skills about subject and their related problem in a group of students.