DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING

CURRICULUM

FOR THE ACADEMIC YEAR 2024-25

VII AND VIII SEMESTER B.E.

POOJYA DODDAPPA APPA COLLEGE OF ENGINEERING

(An autonomous college under VTU)

KALABURAGI

VII Semester (Information Science & Engineering)													
Sl. No.	**Course and Course Code**		**Course Title**	**Teaching Department**	**Teaching Hours/Week**				**Examination**				**Credits**
					Theory Lecture	**Tutorial**	**Practical/Drawing**	**Self Study**	**Duration in**	**SEE Marks**	**CIE Marks**	**Total Marks**	
1.	PEC	21IS71A	Web Application Security	RD	3	0	0	0	03	50	50	100	3
2.	PEC	21IS72A	Machine Learning	RD	3	0	0	0	03	50	50	100	3
3.	OEC	21IS73OE1	Open Elective – II	RD	3	0	0	0	03	50	50	100	3
4.	OEC	21IS74OE1	Open Elective – III	RD	3	0	0	0	03	50	50	100	3
5.	Project	21ISP75	Project Work	RD	Two contact hours /week for interaction between the faculty and students.				03	50	50	100	10
6.	AEC	21NPAE76	Ability Enhancement Course (Online NPTEL Course of Minimum 8 weeks duration)		-	-				50	50	100	2
Total					**12**				**15**	**300**	**300**	**600**	

				01					**24**

Open elective-II	**Open elective –III**
Distributed Cloud Computing **(** 21IS73OE1)	Cryptography & Network Security **(**21IS74OE1)
PEC-I	**PEC-II**
Web Application Security (21IS71A) **Wireless & Mobile Networks (21IS71B)** **Storage Area Networks (21IS71C)**	**Machine Learning (21IS72A)** **Neural Networks (21IS72B)** **Introduction to Data Science (21IS72C)**

VIII Semester (Information Science & Engineering)											
Sl. No.	**Course and Course Code**		**Course Title**	**Teaching Department**	**Teaching Hours/Week**			**Self Study**	**Examination**				**Credits**
					Theory Lecture	**Tutorial**	**Practical/Drawing**		**Duration in**	**SEE Marks**	**CIE Marks**	**Total Marks**	
1.	Seminar	21ISS81	Technical Seminar		One contact hour /week for interaction between the faculty and students				03		50	50	1
2.	Internship	21ISI82	Research/Industry Internship		Two contact hours /week for interaction between the faculty and students.				03	50	50	100	15
					Total				**06**	**50**	**100**	**150**	**16**

Sl. No	Semester	21-22 (Batch)
01	I	20
02	II	20
03	III	20
04	IV	20
05	V	18
06	VI	22
07	VII	24
08	VIII	16
	Total CREDITS	160

WEB APPLICATION SECURITY		
Course Code: 21IS71A	Credit:03	CIE:50
Number of Lecture Hours/Week	03	SEE:50
Total Number of Lecture Hours	52	SEEHours:03

Prerequisites: Computer Networks, Information Security

Course Objectives:

To enable the students to understand Web Application Security in the following topics:

- The main objective is to understand the importance of Security.
- Todiscoverandexploitingsecurityflawsinwebapplicationswhichareaccessedusingaweb browser to communicate with a web server.
- To examine a wide variety of different technologies, such as databases, file systems, and web services, but only in the context in which these are employed by web applications.

MODULES	Teaching Hours
Module I **Web Application Insecurity And Defense Mechanism:** The Evolution of Web Applications, Web Application Security, Key Problem Factors, Handling User Access, Handling User Input, Handling Attackers **Web application technologies:** HTTP Protocol, Web Functionality, Encoding Schemes,	**11hrs**
Module II **Mapping application:** Enumerating Content and functionality, Analyzing application, **Attacking Authentication:** Authentication technologies, design flaws in authentication, implementation flaws in authentication, securing authentication	**10hrs**
Module III **Attacking Session Management:** The Need for state, Weaknesses in token generation, weaknesses in session token handling, securing session management. **Attacking Access Controls:** Common vulnerabilities, Attacking access controls, Securing access controls.	**10hrs**
Module IV **Attacking Data Stores:** Injecting into interpreted contexts ,injecting into SQL, InjectingintoNoSQL,injectingintoXPath,InjectingintoLDAP.**AttackingBack-end components:** Injecting OS Commands ,Manipulating File Paths, Injecting into XML Interpreters, Injecting into Back-end HTTP Requests, Injecting into Mail Services	**11hrs**
Module V **Attacking Application Logic:** The Nature of Logic Flaws , Real – World Logic Flaws, Ex.1 Fooling a password change function , Ex.2 Breaking the bank, Ex.3 Cheatingonbulkdiscounts,Ex.4Invalidatinginputvalidation,Ex.5Racingagainst The login, avoiding logic flaws	**10hrs**

TEXTBOOK:

1.WebApplicationHacker'sHandbook,DafyddStutarf,MarcusPinto,Wiley,2ndEdition

REFERENCEBOOKS:

1.HackingExposedWeb Applications, by JeolScambray,VincentLiuandCaleb Sima.3rdedition,

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome(CO)
	CO1	Describe web-based applications and Technologies and associated threats
	CO2	Analyze the application and authentication technologies and design, Implement flaws in authentication
	CO3	Evaluate web-application security vulnerabilities Develop a security strategy and solution for securing web-based applications
	CO4	Understand the role of web-based applications in E-commerce transactions Describe social networking and evaluate associated risks Identify webapplication security controls and risk mitigation techniques
	CO5	Assess web application security compliance requirements and objectives Designa web – application Vulnerability and Security Assessment Test Plan

Wireless & Mobile Networks		
Course Code: 21IS71B	Credit:03	CIE:50
Number of Lecture Hours/Week	03	SEE:50
Total Number of Lecture Hours	42	SEEHours:03

Prerequisites: Computer Networks, Information Security

Course objective

- To provide an overview of Wireless Communication networks area and its applications in communication engineering.
- To introduce various standards of mobile communication.
- To explain the various terminology, principles, devices, schemes, concepts used in Wireless Communication Networks.
- To introduce the concepts of Adhoc networks and Sensor networks and their issues
- To introduce various security threats in wireless networks and the techniques for the prevention and detection of threat

MODULES	**TeachingHours**
Module I Introduction to Network topologies and cellular communications. HIPERLAN : protocol Architecture. WLAN : Infrared vs radio transmission ,infrastructure and ad hoc networks, IEEE 802.11. GSM : Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services. Mobile computing: Introduction to MC, novel Applications, Limitations and architecture.	**08hrs**

Module II (Wireless) Medium Access Control : Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.MAC protocols for GSM , collision Avoidance (MACA, MACAW) protocols Mobile IP Network Layer : IP Mobile IP Network layers, packet delivery and handover management, location management registration, tunneling and encapsulation, Route optimizations, Dynamic Host Configuration Protocol (DHCP).	**08hrs**
Module III Mobile Transport Layer : Conventional TCP/IP protocols, Indirect TCP, Snooping TCP, Mobile TCP, other Transport Layer protocols for Mobile Networks Database Issues : Database Hoarding & caching techniques, client server computing with adaptation, transactional models, query processing, Data recovery process and QOS.	**08hrs**
Module IV Data Dissemination and synchronization: Communications asymmetry, classification of new data delivery mechanisms, Data Dissemination Broad cast Models, selective tuning and indexing Methods, Digital Audio and video Broadcasting(DAB &DVB) .Data synchronization – Introduction ,software and protocols	**09hrs**
Module V Mobile Ad hoc Networks (MANETs): Introduction , Applications & challenges of a MANET, Routing, classification of Routing Algorithms, Algorithms such as DSR,AODV,DSDV.., Mobile Agents, Service Discovery. Protocols and Platforms for Mobile computing WAP, Bluetooth ,XML, J2ME,	**09hrs**

TEXTBOOK:

1. Raj Kamal, ―Mobile Computing‖, Oxford University Press, 2017, ISBN: 0195686772 2. Jochen Schiller, ―Mobile Communications‖, Addison-Wesley, Second Edition, 2014

REFERENCEBOOKS:

1. Stojmenovic and Cacute, ―Handbook of Wireless Networks and Mobile Computing‖, Wiley, 2012, ISBN 0471419028.

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome(CO)
	CO1	Understand fundamentals of wireless communications.
	CO2	Analyze security, energy efficiency, mobility, scalability, and their unique characteristics in wireless networks.
	CO3	Demonstrate basic skills for cellular networks design.
	CO4	Apply knowledge of TCP/IP extensions for mobile and wireless networking
	CO5	Evaluate the performance of digital modulation schemes towards effective transmission of user data in different multiple access scenarios.

STORAGE AREA NETWORKS		
Course Code: 21IS71C	Credit:03	CIE:50
Number of Lecture Hours/Week	03	SEE:50
Total Number of Lecture Hours	42	SEEHours:03

Prerequisites: The student's should have a basic knowledge of computer networks.

Course objective

To enable the students to obtain the knowledge of Storage Area Networks in the following topics.

- To understand basics of storage area networks and network attached storage.
- To understand implementation of RAID, RAID impaction performance.
- To understand about direct attached storage (DAS) type benefits and limitations.
- To understand about content addressed storage (CAS) and storage virtualization.

MODULES	Teaching Hours
Module I **INTRODUCTION:** Server Centric IT Architecture and its Limitations; Storage - Centric IT Architecture and its advantages; Case study: Replacing a server with Storage Networks; The Data Storage and Data Access problem; The Battle for size and access. INTELLIGENTDISK SUBSYSTEMS- 1: Architecture of Intelligent Disk Sub systems.	**08hrs**
Module II Hard disks and Internal VO Channels, JBOD, Storage virtualization using RAID anddifferentRAIDlevels;INTELLIGENTDISKSUBSYSTEMS-1,I/OTECHNIQUES -1:Caching:AccelerationofHardDiskAccess;Intelligentdisksubsystems; Availability of disk subsystems. The Physical VO path from the CPU to the Storage System; SCSI.	**08hrs**
Module III **I/OTECHNIQUES-2, NETWORK ATTACHED STORAGE**: Fibre Channel ProtocolStack;FibreChannelSAN;IPStorage.TheNASArchitectureTheNAS hardware Architecture, The NAS Software Architecture, Network connectivity, NASasa storage system	**08hrs**
Module IV **FILESYSTEMANDNAS**:LocalFileSystems;NetworkfileSystemsandfileservers; Shared Disk file systems; Comparison of fiber Channel and NAS.	**09hrs**
Module V **STORAGE VIRTUALIZATION:** Definition of Storage virtualization; Implementation Considerations; Storage virtualization on Block or file level; Storage virtualization on various levels of the storage Network; Symmetric and Asymmetric storage virtualization in the Network.	**09hrs**

TEXTBOOK:

1. **StorageNetworksExplained**-UlfTroppens,RainerErkensandWolfgangMuller,WileyIndia, 2013
Storage Networks, **The Complete Reference**-RobertSpalding,TataMcGrawHill,2013.

REFERENCEBOOKS:

1. Storage Area Network Essentials A Complete Guide to Understanding and Implementing SANs - Richard Barker and Paul Massiglia, Wiley India, 2012.
2. **Storage Networking Fundamentals** - MarcFarley,CiscoPress, 2015.

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome(CO)
	CO1	Demonstrate the architecture, limitations and data Access techniques in SAN.
	CO2	Identify Intelligent Disk Subsystems, JBOD, Storage Virtualization Using RAID & RAID Levels
	CO3	Demonstrate the working principles of NAS
	CO4	Illustrate File System and Network Attached Storage Systems
	CO5	Describe Storage Virtualization on Various levels of Storage Network

MACHINE LEARNING		
Course Code	21IS72A	Credits:03
CIE:50	SEE:50	SEE: 03hours
Hours/Week: 3 hours(Theory)		TotalHours:42

Prerequisite: Students should have basic knowledge of algebra, discrete math and statistics.

Course Objectives:
To enable the students to obtain the knowledge of Machine Learning in the following topics.

- To introduce students to the basic concepts and techniques of machine learning.
- To develop skills of using recent machine learning software for solving practical problems.
- To gain experience of doing independent study and research.

Modules	**Teaching Hours**

Module-I Introduction: Well posed learning problems, Designing a Learning system, PerspectiveandIssuesinMachineLearning.ConceptLearning:Conceptlearning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm, Inductive Bias	**8 Hours**
Module-II Decision Tree Learning: Decision tree representation, Appropriate problems for decision tree learning, Basic decision tree learning algorithm, hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning	**8 Hours**
Module-III Artificial Neural Networks: Introduction, Neural Network representation, Appropriate problems, Perceptrons, Back propagation algorithm.	**8 Hours**
Module-IV BayesianLearning:Introduction,Bayestheorem,Bayestheoremandconceptlearning, ML and LS error hypothesis, ML for predicting probabilities, MDL principle, Naive Bayes classifier, Bayesian belief networks, EM algorithm	**9 Hours**
Module-V Evaluating Hypothesis: Motivation, Estimating hypothesis accuracy, Basics of sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms. Instance Based Learning: Introduction, k- nearest neighbor learning, locally weighted regression, radial basis function, cased- based reasoning, Reinforcement Learning: Introduction, Learning Task, Q Learning	**9 Hours**
Question paper pattern: 1. The question paper will have TEN questions. 2. There will be TWO questions in each module, covering all the topics. 3. The student needs to answer FIVE full questions, selecting ONE full question from each module.	
Textbooks: 1. TomM.Mitchell,"MachineLearning",McGraw-HillEducation(INDIANEDITION),2018.	
Reference Books: 1. EthemAlpaydin,"IntroductiontoMachineLearning",2ndEd.,PHILearningPvt.Ltd.,2016. 2. T.Hastie,R.Tibshirani,J.H.Friedman,"TheElementsofStatisticalLearning",Springer;1st edition, 2018 Books:	

Course outcomes: On completion of the course, the student will have the ability to:		
Course Code	**CO #**	**Course Outcome (CO)**
	CO1	Demonstrate the designing of a learning system and issues in machine learning
	CO2	Apply decision tree learning to solve machine learning problems
	CO3	Apply neural network techniques to solve complex problems
	CO4	Analyze Bayesian learning techniques for predicting probabilities
	CO5	Analyze and evaluate the hypothesis accuracy using sampling and probability theory

Neural Networks		
Subject Code: 21IS72B	Credit:03	CIE:50
Number of Lecture Hours/Week	03	SEE:50
Total Number of Lecture Hours	42	SEEHours:03
Prerequisites: Computer Networks, Information Security		

Course Objectives:

- To introduce the idea of artificial neural networks and their architecture
- To introduce techniques used for training artificial neural networks
- To enable design of an artificial neural network for classification
- To enable design and deployment of deep learning models for machine learning problems

MODULES	**TeachingHours**
Module I Introduction: Biological Neuron- Artificial Neural Model-Types of activation functions-Architecture: Feedforward and Feedback, Convex Sets, Convex Hull and Linear Separability, Non-Linear Separable Problem. XOR Problem, Multilayer Networks. Learning: Learning Algorithms, Error correction and Gradient Descent Rules, Learning objective of TLNs, Perceptron Learning Algorithm, Perceptron Convergence Theorem.	**08hrs**
Module II Supervised Learning: Perceptron learning and Non Separable sets, a-Least Mean Square Learning, MSE Error surface, Steepest Descent Search, μ-LMS approximate to gradient descent, Application of LMS to Noise Cancelling, Multi-layered Network Architecture, Backpropagation Learning Algorithm, Practical consideration of BP algorithm.	**08hrs**

Module III Support Vector Machines and Radial Basis Function: Learning from Examples, Statistical Learning Theory, Support Vector Machines, SVM application to Image Classification, Radial Basis FWJ.ction Regularization theory, Generalized RBF Networks, Learning in RBFNs, RBF application to face recognition.	**08hrs**
Module IV Attractor Neural Networks: Associative Learning Attractor Associative Memory, Linear Associative memory, Hopfield Network, application of Hopfield Network, Brain State in aBox neural Network, Simulated Annealing, Boltzmann Machine, Bidirectional Associative Memory.	**09hrs**
Module V Self -organization Feature Map: Maximal Eigenvector Filtering, Extracting Principal Components, Generalized Learning Laws, Vector Quantization, Self -organization Feature Maps, Application of SOM, Growing Neural Gas.	**09hrs**

TEXTBOOK:

Neural Networks A Classroom Approach -Satish Kumar, McGraw Hill Education (India) Pvt. Ltd, Second Edition.

REFERENCEBOOKS:

1. Introduction to Artificial Neural Systems - J.M. Zurada, Jaico Publications 2012.

2 Artificial Neural Networks- B. Yegnanarayana, Pill, New Delhi 2008.

Course outcomes: On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome(CO)
	CO1	Describe the basics of ANN and comparison with Human brain.
	CO2	Understand the role of neural networks in engineering, artificial intelligence, and cognitive modelling.
	CO3	Understand the concepts and techniques of neural networks through the study of the most important neural network models.
	CO4	Evaluate whether neural networks are appropriate to a particular application.
	CO5	Apply neural networks to particular application, and to know what steps to take to improve performance.

Introduction to Data Science		
Course Code : 21IS72C	Credit:03	CIE:50
Number of Lecture Hours/Week	03	SEE:50
Total Number of Lecture Hours	42	SEEHours:03
Prerequisites: Computer Networks, Information Security		

Course Objectives:

- Programming data science concepts and Big Data, modelling using R language.
- Analyze Basic tools of EDA, Data science process with case studies and Different algorithms.
- Optimize & solve real life problems with different spam filter. Explore Feature Generation and Feature Selection

MODULES	TeachingHours
Module I What is Data Science? Big Data and Data Science hype – and getting past the hype, Why now? – Datafication, Current landscape of perspectives, A data Science Profile, Skill sets. Statistical Inference, Populations and samples, Big Data, new kinds of data, modelling, statistical modeling probability distributions, fitting a model, - Introduction to R	**08hrs**
Module II Exploratory Data Analysis and the Data Science Process: Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA, The Data Science Process, Case Study: RealDirect (online real estate firm). Algorithms, machine Learning Algorithms, Three Basic Algorithms: Linear Regression, k-Nearest Neighbours (kNN), k-means, R Programs for the algorithms	**08hrs**
Module III Spam Filter, Linear Regression and Spam Filter, K-NN and spam Filter,, Naïve Bayes Algorithm, Spam Filter using Naïve Bayes, Laplace Smoothing,, Comparing Naïve Bayes to K-NN, Scraping the Web, introduction to Logical Regression and M6D case study	**08hrs**
Module IV Feature Generation and Feature Selection (Extracting Meaning from Data): Motivating application: user (customer) retention. Feature Generation (brainstorming, role of domain expertise, and place for imagination), Feature Selection algorithms. Filters; Wrappers; Decision Trees; Random Forests. Recommendation Systems: Building a User-Facing Data Product, Algorithmic ingredients of a Recommendation Engine, Dimensionality Reduction, Singular Value Decomposition, Principal Component Analysis, Exercise: build your own recommendation system	**09hrs**
Module V Data Engineering, Map reduce, Word Frequency Problem,, Map Reduce Solution, Other Examples of Map Reduce, Pregel-An Introduction. Data Visualization: Basic principles, ideas and tools for data visualization. Mining SocialNetwork Graphs: Social networks as graphs, Clustering of graphs, Direct discovery of communities in graphs, Partitioning in graphs.	**09hrs**

TEXTBOOK:

1. Cathy O Neil, Rachel Schutt, 2019, "Doing Data Science-Straight Talk from the Frontline", Orielly 2. Jure Leskovek, Anand Rajaraman, Jeffrey Ullman, 2014 Mining of Massive Data Sets, Cambridge University Press

REFERENCEBOOKS:

1. Kevin Murphy, 2017, Machine learning: A Probabalistic Perspective, 2. Peter Bruce, Andre Bruce, Practical Statistics for Data Scientists, Orielly Series

Course outcomes: On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome(CO)
	CO1	Explain and programme Data Science, Big data and fitting model .
	CO2	Explore Data Analysis, Data Science Process and R Programs for the algorithms.
	CO3	Analyze the Feature Selection algorithms and Recommendation Systems.
	CO4	Design Map Reduce Solutions.
	CO5	Perform statistical analysis of data.

Distributed Systems and Cloud Computing		
Course Code: **21IS73OE1**	Credit:03	CIE:50
Number of Lecture Hours/Week	03	SEE:50
Total Number of Lecture Hours	42	SEEHours:03

Prerequisites: Knowledge of Data Structures and Algorithms; Ideal: Computer Architecture, Basic OS and Networking concepts.

Course Objectives:

- This course explores the principles of distributed computing systems with different skills that enable students to understand the goals and architectures of distributed computing, analyze, design,
- Implement a distributed system taking into account the most important design issues and impact criteria. It explores different types of distributed systems including grids, clusters, overlay networks,
- As an example of distributed systems, the course covers main topics of cloud computing including the cloud converging technologies, service models, virtualization, cloud storage, cloud frameworks and security.
- Offers students the opportunity to engage in depth study of a number of selected topics within the areas of distributed systems and cloud computing

MODULES	**TeachingHours**

Module I **Introduction to Distributed and Cloud Computing** Characterization of Distributed systems. - Technologies for Network Based Systems: multi-core and multi-threading; - Distributed and Cloud Computing Models: client server; clusters; grids; peer-to-peer. Enabling Technologies for Building Distributed Systems Socket Programming: datagram sockets; stream mode sockets - Remote Method Invocation and XML-RPC - Extensible Markup Language (XML): XML markup; XML namespaces; XML schema	**9hrs**
Module II **Service Oriented Architecture for Distributed Computing** Service and Service Oriented Architectures - Web Services: simple object access protocol (SOAP); building web services with SOAP; web services description language (WSDL); Web service implementation RESTful Web Services: architectural principles of REST; REST vs. SOAP; RESTful	**8hrs**
Module III **Cloud Computing Architecture** - Service Models: public clouds; private clouds; hybrid clouds - Layer and Types of Clouds: IaaS; PaaS; SaaS **Virtualization**: Level of virtualization; virtualization support at the OS level; middleware support; virtualization of CPU, memory, and i/o devices; virtualization tools	**9hrs**
Module IV **Cloud Programming Environments** MapReduce, Hadoop and Big Data – NoSQL datastores. Table based (Google Big Table), key-based (Amazon Dynamo), and Cassandra. The Hector API. Cloud Security and Trust Management. Cloud security stack - Cloud Security Defense Strategies Distributed Intrusion/Anomaly Detection - Data and Software Protection Techniques	**8hrs**
Module V Ubiquitous computing and Internet of things Enabling Technologies for the Internet of Things - Architectures of the IoT - Mobile cloud computing and cloudlets.	**8hrs**

TEXTBOOK:

1- Dan C. Marinescu, 2017, Cloud Computing: Theory and Practice,2nd Ed ,Morgan Kaufmann Publishers

2- G. Coulouris, J. Dollimore, T. Kindberg, and G. Blair, (2013), "Distributed Systems: Concepts and Design", 6th Edition, Pearson.

REFERENCEBOOKS:

1- . Geoffrey C. Fox, Jack Dongarra, Kai Hwang, (2017), "Distributed and Cloud Computing From Parallel Processing to the Internet of Things",

2- C. Surianarayanan, Pethuru Raj Chelliah - Essentials of Cloud Computing_ A Holistic Perspective (2019, 1 st ed, Springer International Publishing.\

Course outcomes: On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome(CO)

	CO1	Show understanding of the concepts, components, and issues of distributed and cloud computing
	CO2	Explain cloud enabling technologies, cloud mechanisms, service models, deployment models, cloud architectures, and security.
	CO3	Compare the differences between various distributed computing middleware and their communication mechanisms.
	CO4	Design a distributed computing system using middleware where appropriate.
	CO5	Build a private cloud computing environment to demonstrate the cloud functions.

CRYPTOGRAPHY AND NETWORK SECURITY		
Course Code: 21IS74OE1	Credit:03	CIE:50
Number of Lecture Hours/Week	03	SEE:50
Total Number of Lecture Hours	42	SEEHours:03

Prerequisites: Computer Networks, Information Security.

Course Objectives:

- This Course focuses towards the introduction of network security using various cryptographic algorithms. Underlying network security applications.
- It also focuses on the practical applications that have been implemented and are in use to provide email and web security.

MODULES	**Teaching Hours**
Module I Introduction to the Concepts of Security: The need for security, Security Approaches, Principles of Security, Types of Attacks. Cryptographic Techniques: Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption and Decryption, Symmetric and Asymmetric Key Cryptography.	**09hrs**
Module II Steganography, Key Range and Key Size, Possible Types of Attacks. Computer-based Symmetric Key Cryptographic Algorithms: Algorithm Types and Modes, An overview of Symmetric Key Cryptography, DES. International Data Encryption Algorithm (IDEA), RC5, Blowfish, AES, Differential and Linear Cryptanalysis.	**09hrs**
Module III International Data Encryption Algorithm (IDEA), RC5, Blowfish, AES, Differential and Linear Cryptanalysis, Computer-based Asymmetric Key Cryptography: Brief History of Asymmetric Key Cryptography, An overview of Asymmetric Key Cryptography, The RSA Algorithm.	**08hrs**

Module IV Symmetric and Asymmetric Key Cryptography Together, Digital Signatures, Knapsack Algorithm, Some other Algorithms, Public Key Infrastructure: Digital Certificates, Private Key Management, The PKIX Model, Public Key Cryptography Standards, XML, PKI and Security.	**08hrs**
Module V Internet Security Protocols: Basic Concepts, Secure Socket Layer, SHTTP, Time Stamping Protocol, Secure Electronic Transaction, SSL versus SET, 3-D Secure Protocol, Electronic Money, E-mail Security, Wireless Application Protocol (WAP) Security, Security in GSM.	**09hrs**

TEXTBOOK:

1. Cryptography and Network Security – by Atul Kahate – TMH.
2. Data Communications and Networking- by Behourz A Forouzan

REFERENCEBOOKS:

1. Cyber Security Operations Handbook – by J.W. Rittiaghouse and William M.Hancok – Elseviers.

Course outcomes: On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome(CO)
	CO1	Understand the most common type of cryptographic algorithm.
	CO2	Understand the Public-Key Infrastructure.
	CO3	Understand security protocols for protecting data on networks.
	CO4	Be able to digitally sign emails and files.
	CO5	Implement configure simple firewall architectures · Understand Virtual Private Networks

PROJECT WORK		
Subject Code	21ISP75	Credits:10
CIE: 50	SEE:50	SEE: 03hours
Hours/Week:2 Hrs(Theory)	TotalHours:28	

Prerequisite: The Students should have the knowledge of Software Engineering, Object Oriented Modeling and Designing, Analysis and Design of Algorithms, Data Structures and Programming Skills.

Course Objectives:

- To apply programming skills for module implementation.
- To design test case and perform module testing.
- To understand the project management skills.
- To understand the impact of project on society.
- To demonstrate the documentation and presentation skills.

	Teaching Hours
Project Phase–II comprises of: Students should continue with the problem defined in Project Phase-II.	
Project Phase-II comprises of: 1. Architectural design module analysis based on SRS. 2. Project implementation 3. Module validation and analysis 4. Future scope and limitations 5. Presentation Evaluation of the project work will be done by means of conducting demo and checking the validation report periodically. Students should submit a project report along with executable code, at the end of the semester.	
Note: 1. Project will be carried out in batches with a maximum of 3 students.	

Course outcomes: On completion of the course, the student will have the ability to:	

Course Code	**CO#**	**Course Outcome(CO)**
	CO1	Demonstrate the architecture, limitations and data Access techniques in SAN.
	CO2	Identify Intelligent Disk Subsystems, JBOD, Storage Virtualization Using RAID & RAID Levels
	CO3	Demonstrate the working principles of NAS
	CO4	Illustrate File System and Network Attached Storage Systems
	CO5	Describe Storage Virtualization on Various levels of Storage Network

EIGHTH SEMESTER

TECHNICAL SEMINAR		
Course Code	21ISS81	Credits:01
CIE:50	SEE:---	Total hours: 14 hrs
Prerequisite: The Students should have the knowledge of current technologies, Creativity and programming skills.		

Course Objectives:

- To understand the current trends in the industries
- To apply the documentation techniques.
- To exhibit the presentation skills and interactive skills.
- To apply the analysis skills.

Modules	Teaching Hours
SEMINAR COMPRISES OF: • Technical survey–identifying the recent development in the modern technology. • Technical requirement–identifying the current industrial skills. • Co-related technologies–identifying the co-related technologies. • Report generation–preparing the IEEE standard documents of the same. • Seminar document contains Abstract, introduction, problem formulation, design and application based on the above factors. Document should be submitted in the mid of semester. • Seminar will be evaluated for 1 credit by means of presentation.	**14 Hours**

Course outcomes: On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
	CO1	To demonstrate the different surveys to understand the current industrial requirements.
	CO2	To analyze different technical requirements and demonstrate interactive skills.
	CO3	To demonstrate the presentation skills.
	CO4	To demonstrate the analytical skills.
	CO5	To examine the intensity of the interactive sessions.

INTERNSHIP		
Course Code	**21ISI82**	Credits:15
CIE:50	SEE.50	SEE: 03hours

Research Internship /Industry Internship of sufficient duration encourages students early on in their career. Its main goal is to give an opportunity to improve their analytical and technical skills in an international environment. Internship can be in an industry or at an appropriate work place. Research internships and industrial internships have different purposes and come with their set of benefits. A prior experience in any field is always preferred over a fresh start. Therefore, one of them can be selected depending on the interest the students have. Internships pose unexpected challenges and make students to think appropriately, tackle difficulties with ease and act in a scholarly way to get past the hurdles and practical constraints. An internship is always beneficial however good or bad it is. Internships not only enhance one's learning but also identifies him/her as someone who has thecommitment to approaching a project and completing it with or without the guidance. The internship learning is an impetus to professional development. While research internship is a step stone to higher studies, an industry internship is a pathway for a placement. Those who are self-motivated and interested in search of new things that are original and unique can choose a research internship. Those who are interested in the real industry- experience and aspire to get a job soon after graduation can choose an industry internship.