ACE
Engineering College
An Autonomous Institution
DEPARTMENT OF INFORMATION TECHNOLOGY
COURSE STRUCTURE

IV B.Tech I Semester

S.No	Course Type	Course Code	Course Title	Periods Per Week			Credits
				L	T	P	
1	PCC	IT701PC	Information Security	3	0	0	3
2	PCC	CS702PC	Data Mining	2	0	0	2
3	PEC		Professional Elective -IV	3	0	0	3
4	PEC		Professional Elective -V	3	0	0	3
5	OEC		Open Elective-II	3	0	0	3
6	PCC	IT703PC	Information Security Lab	0	0	2	1
7	SI	IT704PC	Industrial Oriented Mini Project / Summer Internship	0	0	0	2*
8	PROJ	IT705PC	Seminar	0	0	2	1
9	PROJ	IT706PC	Project Stage-I	0	0	6	3
			Total Credits	**14**	**0**	**10**	**21**

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IT701PC: INFORMATION SECURITY

B.Tech. IV Year I Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
IT701PC	**Core**	3	0	0	3	30	70	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		

Prerequisite: A Course on "Computer Networks and a course on Mathematics

Course Objectives:
- To understand the fundamentals of Cryptography
- To understand various key distribution and management schemes
- To understand how to deploy encryption techniques to secure data in transit across datanetworks
- To apply algorithms used for secure transactions in real world applications

Course Outcomes:
- Demonstrate the knowledge of cryptography, network security concepts and applications.
- Ability to apply security principles in system design.

UNIT-I		**No.of Classes: 09**

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security. Classical Encryption Techniques, DES, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operation, Blowfish, Placement of Encryption Function, Traffic Confidentiality, key Distribution, Random Number Generation.

UNIT-II		**No.of Classes: 09**

Public key Cryptography Principles, RSA algorithm, Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography. Message authentication and Hash Functions, Authentication Requirements and Functions, Message Authentication, Hash Functions and MACs Hash and MAC Algorithms SHA-512, HMAC.

UNIT-III		**No.of Classes: 09**

Digital Signatures, Authentication Protocols, Digital signature Standard, Authentication Applications, Kerberos, X.509 Directory Authentication Service. Email Security: Pretty Good Privacy (PGP) and S/MIME.

UNIT-IV		**No.of Classes: 09**

IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.
Web Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

UNIT-V		**No.of Classes: 09**

Intruders, Viruses and Worms Intruders, Viruses and related threats
Firewalls: Firewall Design Principles, Trusted Systems, Intrusion Detection Systems.

Text Books:
1. Cryptography and Network Security (principles and approaches) by William

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Stallings Pearson Education, 4th Edition.

Reference Books:

1. Network Security Essentials (Applications and Standards) by William Stallings PearsonEducation.
2. Principles of Information Security, Whitman, Thomson.

Web References:

https://nptel.ac.in/courses/106/106/106106129/

E-Text Books:

https://www.freetechbooks.com/information-security-f52.html

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CS702PC: DATA MINING

B.Tech. IV Year I Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
CS702PC	**Core**	2	0	0	2	30	70	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		

Prerequisite:
- A course on "Database Management Systems"
- Knowledge of probability and statistics

Course Objectives:
- It presents methods for mining frequent patterns, associations, and correlations.
- It then describes methods for data classification and prediction, and data–clusteringapproaches.
- It covers mining various types of data stores such as spatial, textual, multimedia, streams.

Course Outcomes:
- Ability to understand the types of the data to be mined and present a general classification oftasks and primitives to integrate a data mining system.
- Apply preprocessing methods for any given raw data.
- Extract interesting patterns from large amounts of data.
- Discover the role played by data mining in various fields.
- Choose and employ suitable data mining algorithms to build analytical applications
- Evaluate the accuracy of supervised and unsupervised models and algorithms.

UNIT-I		**No.of Classes: 09**

Data Mining: Data–Types of Data–, Data Mining Functionalities– Interestingness Patterns– Classification of Data Mining systems– Data mining Task primitives –Integration of Data mining system with a Data warehouse Major issues in Data Mining–Data Preprocessing

UNIT-II		**No.of Classes: 09**

Association Rule Mining: Mining Frequent Patterns–Associations and correlations – Mining Methods– Mining Various kinds of Association Rules– Correlation Analysis– Constraint based Association mining. Graph Pattern Mining, SPM.

UNIT-III		**No.of Classes: 09**

Classification: Classification and Prediction – Basic concepts–Decision tree induction–Bayesian classification, Rule–based classification, Lazy learner.

UNIT-IV		**No.of Classes: 09**

Clustering and Applications: Cluster analysis–Types of Data in Cluster Analysis– Categorization of Major Clustering Methods– Partitioning Methods, Hierarchical Methods– Density–Based Methods, Grid–Based Methods, Outlier Analysis.

UNIT-V		**No.of Classes: 09**

Advanced Concepts: Basic concepts in Mining data streams–Mining Time–series data––Mining sequence patterns in Transactional databases– Mining Object– Spatial– Multimedia–Text and Web data – Spatial Data mining– Multimedia Data mining–Text Mining– Mining the World Wide Web.

Text Books:
1. Data Mining – Concepts and Techniques – Jiawei Han & Micheline Kamber, 3rd Edition Elsevier.
2. Data Mining Introductory and Advanced topics – Margaret H Dunham, PEA.

Reference Books:
1. Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques (Second Edition), Morgan Kaufmann, 2005.

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Web References:
https://nptel.ac.in/courses/106/105/106105174/

E-Text Books:
https://link.springer.com/book/10.1007/978-3-319-14142-8
https://doc.lagout.org/Others/Data%20Mining/Data%20Mining_%20The%20Textbook%20%5BAggarwal%202015-04-14%5D.pdf

IT711PE: WEB SECURITY (Professional Elective - IV)

B.Tech. IV Year I Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
IT711PE	**PEC**	3	0	0	3	30	70	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		

Prerequisite: Nil

Course Objectives:

- Give an Overview of information security
- Give an overview of Access control of relational databases

Course Outcomes:

- Understand the Web architecture and applications
- Understand client side and service side programming
- Understand how common mistakes can be bypassed and exploit the application
- Identify common application vulnerabilities

UNIT-I		No.of Classes: 09

The Web Security, The Web Security Problem, Risk Analysis and Best Practices Cryptography and the Web: Cryptography and Web Security, Working Cryptographic Systems and Protocols, Legal Restrictions on Cryptography, Digital Identification

UNIT-II		No.of Classes: 09

The Web's War on Your Privacy, Privacy-Protecting Techniques, Backups and Antitheft, Web Server Security, Physical Security for Servers, Host Security for Servers, Securing Web Applications

UNIT-III		No.of Classes: 09

Database Security: Recent Advances in Access Control, Access Control Models for XML, Database Issues in Trust Management and Trust Negotiation, Security in Data Warehouses and OLAP Systems

UNIT-IV		No.of Classes: 09

Security Re-engineering for Databases: Concepts and Techniques, Database Watermarking for Copyright Protection, Trustworthy Records Retention, Damage Quarantine and Recovery in Data Processing Systems, Hippocratic Databases: Current Capabilities

UNIT-V		No.of Classes: 09

Future Trends Privacy in Database Publishing: A Bayesian Perspective, Privacy-enhanced Location based Access Control, Efficiently Enforcing the Security and Privacy Policies in a Mobile Environment

Text Books:

1. Web Security, Privacy and Commerce Simson G Arfinkel, Gene Spafford, O'Reilly.
2. Handbook on Database security applications and trends Michael Gertz, Sushil Jajodia

Web References:
https://nptel.ac.in/courses/106/106/106106129/

IT712PE: HIGH PERFORMANCE COMPUTING (Professional Elective - IV)

B.Tech. IV Year I Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
IT712PE	PEC	3	0	0	3	30	70	100

Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil	Total Classes: 45

Prerequisite:

· Computer Organization & Architecture

· Operating System Programming

Course Objectives:

· To Improve the system performance

· To learn various distributed and parallel computing architecture

· To learn different computing technologies

Course Outcomes:

· Understanding the concepts in grid computing

· Ability to set up cluster and run parallel applications

· Ability to understand the cluster projects and cluster OS

· Understanding the concepts of pervasive computing & quantum computing.

UNIT-I		No.of Classes: 09

Grid Computing: Data & Computational Grids, Grid Architectures And Its Relations To Various Distributed Technologies. Autonomic Computing, Examples Of The Grid Computing Efforts (Ibm).

UNIT-II		No.of Classes: 09

Cluster Setup & Its Advantages, Performance Models & Simulations; Networking Protocols & I/O, Messaging Systems. Process Scheduling, Load Sharing And Balancing; Distributed Shared Memory, Parallel I/O.

UNIT-III		No.of Classes: 09

Example Cluster System – Beowlf; Cluster Operating Systems: Compas And Nanos Pervasive Computing Concepts & Scenarios; Hardware & Software; Human – Machine Interface.

UNIT-IV		No.of Classes: 09

Device Connectivity; Java for Pervasive Devices; Application Examples.

UNIT-V		No.of Classes: 09

Classical Vs Quantum Logic Gates; One, Two & Three Qubit Quantum Gates; Fredkin & Toffoli Gates; Quantum Circuits; Quantum Algorithms.

Text Books:

1. "Selected Topics In Advanced Computing" Edited By Dr. P. Padmanabham And Dr. M.B.Srinivas, 2005 Pearson Education.

Reference Books:

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1. J. Joseph & C. Fellenstien: 'Grid Computing ', Pearson Education
2. J. Burkhardt et.al: 'pervasive computing' Pearson Education
3. Marivesar:' Approaching quantum computing', Pearson Education.
4. Raj kumar Buyya:'High performance cluster computing', Pearson Education.
5. Neilsen & Chung L:' Quantum computing and Quantum Information', Cambridge University Press.
6. A networking approach to Grid Computing, Minoli, Wiley

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CS713PE: ARTIFICIAL INTELLIGENCE (Professional Elective - IV)

B.Tech. IV Year I Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
CS713PE	**PEC**	3	0	0	3	30	70	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		

Prerequisites:
1. A course on "Computer Programming and Data Structures"
2. A course on "Advanced Data Structures"
3. A course on "Design and Analysis of Algorithms"
4. A course on "Mathematical Foundations of Computer Science"
5. Some background in linear algebra, data structures and algorithms, and probability
   will all be helpful

Course Objectives:

· To learn the distinction between optimal reasoning Vs. human like reasoning

· To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.

· To learn different knowledge representation techniques.

· To understand the applications of AI, namely game playing, theorem proving, and machine learning.

Course Outcomes:

· Ability to formulate an efficient problem space for a problem expressed in natural language.

· Select a search algorithm for a problem and estimate its time and space complexities.

· Possess the skill for representing knowledge using the appropriate technique for a given problem.

· Possess the ability to apply AI techniques to solve problems of game playing, and machine learning.

UNIT-I		**No.of Classes: 09**

Problem Solving by Search-I: Introduction to AI, Intelligent Agents
Problem Solving by Search -II: Problem-Solving Agents, Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Uniform cost search, Depth-first search, Iterative deepening Depth-first search, Bidirectional search, Informed (Heuristic) Search Strategies: Greedy best-first search, A*
search, Heuristic Functions, Beyond Classical Search: Hill-climbing search, Simulated annealing search, Local Search in Continuous Spaces, Searching with Non-Deterministic Actions, Searching wih Partial Observations, Online Search Agents and Unknown Environment .

UNIT-II		**No.of Classes: 09**

Problem Solving by Search-II and Propositional Logic
Adversarial Search: Games, Optimal Decisions in Games, Alpha–Beta Pruning,

Imperfect Real-Time Decisions.

Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Local Search for CSPs, The Structure of Problems.

Propositional Logic: Knowledge-Based Agents, The Wumpus World, Logic, Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses, Forward and backward chaining, Effective Propositional Model Checking, Agents Based on Propositional Logic.

UNIT-III		No.of Classes: 09

Logic and Knowledge Representation

First-Order Logic: Representation, Syntax and Semantics of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic.

Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.

Knowledge Representation: Ontological Engineering, Categories and Objects, Events. Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information.

UNIT-IV		No.of Classes: 09

Planning

Classical Planning: Definition of Classical Planning, Algorithms for Planning with State-Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches.

Planning and Acting in the Real World: Time, Schedules, and Resources, Hierarchical Planning, Planning and Acting in Nondeterministic Domains, Multi agent Planning.

UNIT-V		No.of Classes: 09

Uncertain knowledge and Learning

Uncertainty: Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes' Rule and Its Use,

Probabilistic Reasoning: Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First-Order Probability, Other Approaches to Uncertain Reasoning; Dempster-Shafer theory.

Learning: Forms of Learning, Supervised Learning, Learning Decision Trees. Knowledge in Learning: Logical Formulation of Learning, Knowledge in Learning, Explanation-Based Learning, Learning Using Relevance Information, Inductive Logic Programming.

Text Books:
> 1. Artificial Intelligence A Modern Approach, Third Edition, Stuart Russell and Peter Norvig, Pearson Education.

Reference Books:
1. Artificial Intelligence, 3rd Edn, E. Rich and K. Knight (TMH)
2. Artificial Intelligence, 3rd Edn., Patrick Henny Winston, Pearson Education.
3. Artificial Intelligence, Shivani Goel, Pearson Education.
4. Artificial Intelligence and Expert systems – Patterson, Pearson Education.

Web References:
https://nptel.ac.in/courses/106/102/106102220/

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CS714PE: CLOUD COMPUTING (Professional Elective - IV)

B.Tech. IV Year I Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
CS714PE	**PEC**	3	0	0	3	30	70	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		

Prerequisite:
1. A course on "Computer Networks"
2. A course on "Operating Systems"
3. A course on "Distributed Systems"

Course Objectives:

- This course provides an insight into cloud computing

- Topics covered include- distributed system models, different cloud service models, Service oriented architectures, cloud programming and software environments, resource management

Course Outcomes:

- Ability to understand various service delivery models of a cloud computing architecture.

- Ability to understand the ways in which the cloud can be programmed and deployed.

- Understanding cloud service providers.

UNIT-I		No.of Classes: 09

Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio computing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing.

UNIT-II		No.of Classes: 09

Cloud Computing Fundamentals: Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models

UNIT-III		No.of Classes: 09

Cloud Computing Architecture and Management: Cloud architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications, on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure Managing the Cloud application, Migrating Application to Cloud, Phases of Cloud Migration Approaches for Cloud Migration.

UNIT-IV		No.of Classes: 09

Cloud Service Models: Infrastructure as a Service, Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers, Platform as a Service,

Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers, Other Cloud Service Models.

UNIT-V		**No.of Classes: 09**

Cloud Service Providers: EMC, EMC IT, Captiva Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue ,service, Microsoft, Windows Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM, Cloud Models, IBM Smart Cloud, SAP Labs, SAP HANA Cloud Platform, Virtualization Services Provided by SAP, Sales force, Sales Cloud, Service Cloud: Knowledge as a Service, Rack space, VMware, Manjra soft, Aneka Platform

Text Books:
1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014

Reference Books:
1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012.
3. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp 2011.

Web References:
https://nptel.ac.in/courses/106/105/106105167/

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CS715PE: AD-HOC & SENSOR NETWORKS (Professional Elective - IV)

B.Tech. IV Year I Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
CS715PE	**PEC**	3	0	0	3	30	70	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		

Prerequisites
1. A course on "Computer Networks"
2. A course on "Mobile Computing"

Course Objectives:

· To understand the concepts of sensor networks

· To understand the MAC and transport protocols for ad hoc networks

· To understand the security of sensor networks

· To understand the applications of adhoc and sensor networks

Course Outcomes:

· Ability to understand the state-of-the-art research in the emerging subject of Ad Hoc and Wireless Sensor Networks

· Ability to solve the issues in real-time application development based on ASN.

· Ability to conduct further research in the domain of ASN

UNIT-I		**No.of Classes: 09**

Introduction to Ad Hoc Networks - Characteristics of MANETs, Applications of MANETs and Challenges of MANETs.
Routing in MANETs - Criteria for classification, Taxonomy of MANET routing algorithms, Topologybased routing algorithms-**Proactive**: DSDV; **Reactive**: DSR, AODV; Hybrid: ZRP; Position-based routing algorithms-**Location Services**-DREAM, Quorum-based; **Forwarding Strategies:** Greedy Packet, Restricted Directional Flooding-DREAM, LAR.

UNIT-II		**No.of Classes: 09**

Data Transmission - Broadcast Storm Problem, **Rebroadcasting Schemes**-Simple-flooding, Probability-based Methods, Area-based Methods, Neighbor Knowledge-based: SBA, Multipoint Relaying, AHBP. **Multicasting: Tree-based:** AMRIS, MAODV; **Mesh-based:** ODMRP, CAMP; **Hybrid:** AMRoute**,** MCEDAR.

UNIT-III		**No.of Classes: 09**

Geocasting: Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, MGR**.** TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

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UNIT-IV		No.of Classes: 09

Basics of Wireless, Sensors and Lower Layer Issues: Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.

UNIT-V		No.of Classes: 09

Upper Layer Issues of WSN: Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots.

Text Books:
1. Ad Hoc and Sensor Networks – Theory and Applications, Carlos Corderio Dharma P. Aggarwal, World Scientific Publications, March 2006, ISBN – 981–256–681–3.
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman).

Web References:
https://nptel.ac.in/courses/106/105/106105160/

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IT721PE: INTRUSION DETECTION SYSTEMS (Professional Elective - V)

B.Tech. IV Year I Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
IT721PE	**PEC**	3	0	0	3	30	70	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		

Prerequisite: Computer Networks, Computer Programming

Course Objectives:
- Compare alternative tools and approaches for Intrusion Detection through quantitative analysis to determine the best tool or approach to reduce risk from intrusion.
- Identify and describe the parts of all intrusion detection systems and characterize new and emerging IDS technologies according to the basic capabilities all intrusion detection systems share.

Course Outcomes:

After completion of the course, students will be able to:
- Possess a fundamental knowledge of Cyber Security.
- Understand what vulnerability is and how to address most common vulnerabilities.
- Know basic and fundamental risk management principles as it relates to Cyber Security and Mobile Computing.
- Have the knowledge needed to practice safer computing and safeguard your information using Digital Forensics.
- Understand basic technical controls in use today, such as firewalls and Intrusion Detection systems.
- Understand legal perspectives of Cyber Crimes and Cyber Security.

UNIT-I		No.of Classes: 09

The state of threats against computers, and networked systems-Overview of computer security solutions and why they fail-Vulnerability assessment, firewalls, VPN's - Overview of Intrusion Detection and Intrusion Prevention, Network and Host-based IDS

UNIT-II		No.of Classes: 09

Classes of attacks - Network layer: scans, denial of service, penetration Application layer: software exploits, code injection-Human layer: identity theft, root access-Classes of attackers-Kids/hackers/sop Hesitated groups-Automated: Drones, Worms, Viruses

UNIT-III		No.of Classes: 09

A General IDS model and taxonomy, Signature-based Solutions, Snort, Snort rules, Evaluation of IDS,Cost sensitive IDS

UNIT-IV		No.of Classes: 09

Anomaly Detection Systems and Algorithms-Network Behaviour Based Anomaly

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Detectors (rate based)-Host-based Anomaly Detectors-Software Vulnerabilities-State transition, Immunology, Payload Anomaly Detection		
UNIT-V		**No.of Classes: 09**
Attack trees and Correlation of alerts- Autopsy of Worms and Botnets-Malware detection -Obfuscation, polymorphism- Document vectors. Email/IM security issues-Viruses/Spam-From signatures to thumbprints to zero day detection-Insider Threat issues-Taxonomy-Masquerade and Impersonation Traitors, Decoys and Deception-Future: Collaborative Security		

Text Books:
 1. Peter Szor, The Art of Computer Virus Research and Defense, Symantec Press ISBN 0-321-30545-3.
  2. Markus Jakobsson and Zulfikar Ramzan, Crimeware, Understanding New Attacks and Defenses.

Reference Books:
1. Saiful Hasan, Intrusion Detection System, Kindle Edition.
2. Ankit Fadia, Intrusion Alert: An Ethical Hacking Guide to Intrusion Detection.

Web References:
https://www.youtube.com/watch?v=RYB4cG8G2xo

E-Text Books:
https://dl.acm.org/doi/book/10.5555/1394397

CS722PE: REAL TIME SYSTEMS (Professional Elective - V)

B.Tech. IV Year I Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
CS722PE	**PEC**	3	0	0	3	30	70	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		

Prerequisite: Computer Organization and Operating System

Course Objectives:

- To provide broad understanding of the requirements of Real Time Operating Systems.
- To make the student understand, applications of these Real Time features using case studies.

Course Outcomes:

Be able to explain real-time concepts such as preemptive multitasking, task priorities, priority inversions, mutual exclusion, context switching, and synchronization, interrupt latency and response time, and semaphores.

- Able describe how a real-time operating system kernel is implemented.
- Able explain how tasks are managed.
- Explain how the real-time operating system implements time management.
- Discuss how tasks can communicate using semaphores, mailboxes, and queues.
- Be able to implement a real-time system on an embedded processor.
- Be able to work with real time operating systems like RT Linux, Vx Works, MicroC /OSII, Tiny Os

UNIT-I		No.of Classes: 09

Introduction: Introduction to UNIX/LINUX, Overview of Commands, File I/O,(open, create, close, lseek, read, write), Process Control (fork, vfork, exit, wait, waitpid, exec).

UNIT-II		No.of Classes: 09

Real Time Operating Systems: Brief History of OS, Defining RTOS, The Scheduler, Objects, Services, Characteristics of RTOS, Defining a Task, asks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency. Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use

UNIT-III		No.of Classes: 09

Objects, Services and I/O: Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem

UNIT-IV		No.of Classes: 09

Exceptions, Interrupts and Timers: Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines(ISR), Soft Timers, Operations.

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UNIT-V	No.of Classes: 09

Case Studies of RTOS: RT Linux, MicroC/OS-II, Vx Works, Embedded Linux, and Tiny OS.

Text Books:

    1. Real Time Concepts for Embedded Systems – Qing Li, Elsevier, 2011

Reference Books:

1. Embedded Systems- Architecture, Programming and Design by Rajkamal, 2007, TMH.
2. Advanced UNIX Programming, Richard Stevens
3. Embedded Linux: Hardware, Software and Interfacing – Dr. Craig Hollabaugh

Web References:

https://onlinecourses.nptel.ac.in/noc21_cs98/preview
https://nptel.ac.in/courses/106/105/106105036/

E-Text Books:

https://link.springer.com/book/10.1007/978-1-4419-8237-7

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CS723PE: SOFT COMPUTING (Professional Elective - V)

B.Tech. IV Year I Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
CS723PE	**PEC**	3	0	0	3	30	70	100

Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil	Total Classes: 45

Prerequisite: Nil

Course Objectives:

- Familiarize with soft computing concepts
- Introduce and use the idea of fuzzy logic and use of heuristics based on human experience
- Familiarize the Neuro-Fuzzy modeling using Classification and Clustering techniques
- Learn the concepts of Genetic algorithm
- Acquire the knowledge of Rough Sets.

Course Outcomes:

On completion of this course, the students will be able to:

- Identify the difference between Conventional Artificial Intelligence to Computational
  Intelligence.
- Understand fuzzy logic and reasoning to handle and solve engineering problems
- Apply the Classification and clustering techniques on various applications.
- Understand the advanced neural networks and its applications
- Perform various operations of genetic algorithms, Rough Sets.
- Comprehend various techniques to build model for various applications

UNIT-I		**No.of Classes: 09**

Introduction to Soft Computing: Evolutionary Computing, "Soft" computing versus "Hard" computing, Soft Computing Methods, Recent Trends in Soft Computing, Characteristics of Soft computing, Applications of Soft Computing Techniques.

UNIT-II		**No.of Classes: 09**

Fuzzy Systems: Fuzzy Sets, Fuzzy Relations, Fuzzy Logic, Fuzzy Rule-Based Systems

UNIT-III		**No.of Classes: 09**

Fuzzy Decision Making, Particle Swarm Optimization

UNIT-IV		**No.of Classes: 09**

Genetic Algorithms: Basic Concepts, Basic Operators for Genetic Algorithms, Crossover and Mutation Properties, Genetic Algorithm Cycle, Fitness Function, Applications of Genetic Algorithm.

UNIT-V		**No.of Classes: 09**

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Rough Sets, Rough Sets, Rule Induction, and Discernibility Matrix, Integration of Soft Computing Techniques.

Text Books:

1. Soft Computing – Advances and Applications - Jan 2015 by B.K. Tripathy and J. Anuradha –Cengage Learning

Reference Books:

1. S. N. Sivanandam & S. N. Deepa, "Principles of Soft Computing", 2nd edition, Wiley India, 2008.
2. David E. Goldberg, "Genetic Algorithms-In Search, optimization and Machine learning", Pearson Education.
3. J. S. R. Jang, C.T. Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", Pearson Education, 2004.
4. G.J. Klir & B. Yuan, "Fuzzy Sets & Fuzzy Logic", PHI, 1995.
5. Melanie Mitchell, "An Introduction to Genetic Algorithm", PHI, 1998.
6. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw- Hill International editions, 1995

Web References:

https://nptel.ac.in/courses/106/105/106105173/

E-Text Books:

https://en.wikipedia.org/wiki/Soft_computing

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IT724PE: DISTRIBUTED DATABASES (Professional Elective - V)

B.Tech. IV Year I Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
IT724PE	**PEC**	3	0	0	3	30	70	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		

Prerequisite: A course on "Database Management Systems"

Course Objectives:

- The purpose of the course is to enrich the previous knowledge of database systems and exposing the need for distributed database technology to confront with the deficiencies of the centralized database systems.
- Introduce basic principles and implementation techniques of distributed database systems.
- Equip students with principles and knowledge of parallel and object-oriented databases.
- Topics include distributed DBMS architecture and design; query processing and optimization; distributed transaction management and reliability; parallel and object database management systems.

Course Outcomes:

- Understand theoretical and practical aspects of distributed database systems.
- Study and identify various issues related to the development of distributed database system.
- Understand the design aspects of object-oriented database system and related development.

UNIT-I		No.of Classes: 09

Introduction; Distributed Data Processing, Distributed Database System, Promises of DDBSs, Problem areas.

Distributed DBMS Architecture: Architectural Models for Distributed DBMS, DDMBS Architecture.

Distributed Database Design: Alternative Design Strategies, Distribution Design issues,Fragmentation, Allocation.

UNIT-II		No.of Classes: 09

Query processing and decomposition: Query processing objectives, characterization of query processors, layers of query processing, query decomposition, localization of distributed data.

Distributed query Optimization: Query optimization, centralized query optimization, distributed query optimization algorithms.

UNIT-III		No.of Classes: 09

Transaction Management: Definition, properties of transaction, types of transactions,

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distributed concurrency control: serializability, concurrency control mechanisms & algorithms, time - stamped & optimistic concurrency control Algorithms, deadlock Management.

UNIT-IV		No.of Classes: 09

Distributed DBMS Reliability: Reliability concepts and measures, fault-tolerance in distributed systems, failures in Distributed DBMS, local & distributed reliability protocols, site failures and network partitioning.
Parallel Database Systems: Parallel database system architectures, parallel data placement, parallel query processing, load balancing, database clusters.

UNIT-V		No.of Classes: 09

Distributed object Database Management Systems: Fundamental object concepts and models, object distributed design, architectural issues, object management, distributed object storage, object query Processing.
Object Oriented Data Model: Inheritance, object identity, persistent programming languages, persistence of objects, comparison OODBMS and ORDBMS

Text Books:
1. M. Tamer OZSU and Patuck Valduriez: Principles of Distributed Database Systems, PearsonEdn. Asia, 2001.
2. Stefano Ceri and Giuseppe Pelagatti: Distributed Databases, McGraw Hill.

Reference Books:
1. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom: "Database Systems: The Complete Book", Second Edition, Pearson International Edition

Web References:
https://www.youtube.com/watch?v=qMjCliHkdZk

E-Text Books:
https://link.springer.com/book/10.1007/978-1-4419-8834-8

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CS725PE: SOFTWARE PROCESS & PROJECT MANAGEMENT (Professional Elective - V)

B.Tech. IV Year I Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
CS725PE	PEC	3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

Prerequisite: Nil

Course Objectives:
- To acquire knowledge on software process management
- To acquire managerial skills for software project development
- To understand software economics

Course Outcomes:
- Gain knowledge of software economics, phases in the life cycle of software development, project organization, project control and process instrumentation
- Analyze the major and minor milestones, artifacts and metrics from management and technical perspective
- Design and develop software product using conventional and modern principles of software project management

UNIT-I		No.of Classes: 09

Software Process Maturity
Software maturity Framework, Principles of Software Process Change, Software Process Assessment,
The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process.
Process Reference Models
Capability Maturity Model (CMM), CMMI, PCMM, PSP, TSP).
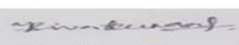
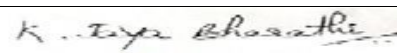| UNIT-II		No.of Classes: 09

Software Project Management Renaissance
Conventional Software Management, Evolution of Software Economics, Improving Software Economics, The old way and the new way.
Life-Cycle Phases and Process artifacts
Engineering and Production stages, inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model-based software architectures.

UNIT-III		No.of Classes: 09

Workflows and Checkpoints of process
Software process workflows, Iteration workflows, Major milestones, minor milestones, periodic status assessments.
Process Planning

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Work breakdown structures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning.

UNIT-IV	No.of Classes: 09

Project Organizations

Line-of- business organizations, project organizations, evolution of organizations, process automation.

Project Control and process instrumentation

The seven-core metrics, management indicators, quality indicators, life-cycle expectations, Pragmatic software metrics, metrics automation.

UNIT-V	No.of Classes: 09

CCPDS-R Case Study and Future Software Project Management Practices

Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions.

Text Books:

1. Managing the Software Process, Watts S. Humphrey, Pearson Education
2. Software Project Management, Walker Royce, Pearson Education

Reference Books:

1. An Introduction to the Team Software Process, Watts S. Humphrey, Pearson Education, 2000
2. Process Improvement essentials, James R. Persse, O'Reilly, 2006
3. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, TMH, 2006
4. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly, 2006.
5. Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly, 2007
6. Software Engineering Project Management, Richard H. Thayer & Edward Yourdon, 2nd edition, Wiley India, 2004.
7. Agile Project Management, Jim Highsmith, Pearson education, 2004.

Web References:

https://nptel.ac.in/courses/106/105/106105218/

E-Text Books:

https://www.edutechlearners.com/download/Software%20Project%20Management.pdf

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IT703PC: INFORMATION SECURITY LAB

B.Tech. IV Year I Semester

Course Code	Category	Hours/Week				Credits	Maximum Marks		
		L	**T**	**P**	**C**		**CIA**	**SEE**	**Total**
IT703PC	**Core**	0	0	2	1		30	70	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 33**					**Total Classes: 33**		

List of Experiments:

1. Write a C program that contains a string (char pointer) with a value 'Hello world'. The programshould XOR each character in this string with 0 and displays the result.

2. Write a C program that contains a string (char pointer) with a value 'Hello world'. The programshould AND or and XOR each character in this string with 127 and display the result.

3. Write a Java program to perform encryption and decryption using the following algorithms
   a. Ceaser cipher b. Substitution cipher c. Hill Cipher

4. Write a C/JAVA program to implement the DES algorithm logic.

5. Write a C/JAVA program to implement the Blowfish algorithm logic.

6. Write a C/JAVA program to implement the Rijndael algorithm logic.

7. Write the RC4 logic in Java Using Java cryptography; encrypt the text "Hello world" usingBlowfish. Create your own key using Java key tool.

8. Write a Java program to implement RSA algorithm.

9. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript.

10. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.

11. Calculate the message digest of a text using the MD5 algorithm in JAVA.

List of Equipment/Software Required:

Computer systems with C and Java Installed.

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