

IV YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	CS701PC	Cryptography & Network Security	3	0	0	3
2	CS702PC	Data Mining	2	0	0	2
3		Professional Elective -IV	3	0	0	3
4		Professional Elective -V	3	0	0	3
5		Open Elective - II	3	0	0	3
6	CS703PC	Cryptography & Network Security Lab	0	0	2	1
7	CS704PC	Industrial Oriented Mini Project/ Summer Internship	0	0	0	2*
8	CS705PC	Seminar	0	0	2	1
9	CS706PC	Project Stage - I	0	0	6	3
		Total Credits	14	0	10	21

IV YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	SM801MS	Organizational Behaviour	3	0	0	3
2		Professional Elective - VI	3	0	0	3
3		Open Elective - III	3	0	0	3
4	CS802PC	Project Stage - II	0	0	14	7
		Total Credits	9	0	14	16

***MC – Satisfactory/Unsatisfactory**

Note: Industrial Oriented Mini Project/ Summer Internship is to be carried out during the summer vacation between 6th and 7th semesters. Students should submit report of Industrial Oriented Mini Project/ Summer Internship for evaluation.

Professional Elective - I

CS511PE	Information Theory & Coding
CS512PE	Advanced Computer Architecture
CS513PE	Data Analytics
CS514PE	Image Processing
CS515PE	Principles of Programming Languages

Professional Elective - II

CS521PE	Computer Graphics
CS522PE	Advanced Operating Systems
CS523PE	Informational Retrieval Systems
CS524PE	Distributed Databases
CS525PE	Natural Language Processing

Professional Elective - III

CS611PE	Concurrent Programming
CS612PE	Network Programming
CS613PE	Scripting Languages
CS614PE	Mobile Application Development
CS615PE	Software Testing Methodologies

Courses in PE - III and PE - III Lab must be in 1-1 correspondence.

SM801MS: ORGANIZATIONAL BEHAVIOUR (PC)**IV Year B.Tech. CSE II -Sem**

L	T	P	C
3	0	0	3

Course Objectives: The objective of the course is to provide the students with the conceptual framework and the theories underlying Organizational Behaviour.

UNIT- I:

Introduction to OB - Definition, Nature and Scope – Environmental and organizational context – Impact of IT, globalization, Diversity, Ethics, culture, reward systems and organizational design on Organizational Behaviour. Cognitive Processes-I: Perception and Attribution: Nature and importance of Perception – Perceptual selectivity and organization – Social perception – Attribution Theories – Locus of control –Attribution Errors –Impression Management.

UNIT-II:

Cognitive Processes-II: Personality and Attitudes – Personality as a continuum – Meaning of personality - Johari Window and Transactional Analysis - Nature and Dimension of Attitudes – Job satisfaction and organizational commitment-Motivational needs and processes- Work-Motivation Approaches Theories of Motivation- Motivation across cultures - Positive organizational behaviour: Optimism – Emotional intelligence – Self-Efficacy.

UNIT- III:

Dynamics of OB-I: Communication – types – interactive communication in organizations – barriers to communication and strategies to improve the follow of communication - Decision Making: Participative decision-making techniques – creativity and group decision making. Dynamics of OB –II Stress and Conflict: Meaning and types of stress –Meaning and types of conflict - Effect of stress and intra-individual conflict - strategies to cope with stress and conflict.

UNIT- IV:

Dynamics of OB –III Power and Politics: Meaning and types of power – empowerment - Groups Vs. Teams – Nature of groups – dynamics of informal groups – dysfunctions of groups and teams – teams in modern work place.

UNIT- V:

Leading High performance: Job design and Goal setting for High performance- Quality of Work Life- Socio technical Design and High-performance work practices - Behavioural performance management: reinforcement and punishment as principles of Learning –Process of Behavioural modification - Leadership theories - Styles, Activities and skills of Great leaders.

REFERENCE BOOKS:

1. Luthans, Fred: Organizational Behaviour 10/e, McGraw-Hill, 2009
2. McShane: Organizational Behaviour, 3e, TMH, 2008
3. Nelson: Organizational Behaviour, 3/e, Thomson, 2008.
4. Newstrom W. John & Davis Keith, Organisational Behaviour-- Human Behaviour at Work, 12/e, TMH, New Delhi, 2009.
5. Pierce and Gardner: Management and Organisational Behaviour: An Integrated perspective, Thomson, 2009.
6. Robbins, P. Stephen, Timothy A. Judge: Organisational Behaviour, 12/e, PHI/Pearson, New Delhi, 2009.
7. Pareek Udai: Behavioural Process at Work: Oxford & IBH, New Delhi, 2009.
8. Schermerhorn: Organizational Behaviour 9/e, Wiley, 2008.
9. Hitt: Organizational Behaviour, Wiley, 2008

10. Aswathappa: Organisational Behaviour, 7/e, Himalaya, 2009
11. Mullins: Management and Organisational Behaviour, Pearson, 2008.
12. McShane, Glinow: Organisational Behaviour--Essentials, TMH, 2009.
13. Ivancevich: Organisational Behaviour and Management, 7/e, TMH, 2008.

CS811PE: COMPUTATIONAL COMPLEXITY (Professional Elective - VI)**IV Year B.Tech. CSE II -Sem**

L	T	P	C
3	0	0	3

Prerequisites:

1. A course on "Computer Programming and Data Structures"
2. A course on "Discrete Structures and Graph Theory"

Course Objectives:

- Introduces to theory of computational complexity classes
- Discuss about algorithmic techniques and application of these techniques to problems.
- Introduce to randomized algorithms and discuss how effective they are in reducing time and space complexity.
- Discuss about Graph based algorithms and approximation algorithms
- Discuss about search trees

Course Outcomes:

- Ability to classify decision problems into appropriate complexity classes
- Ability to specify what it means to reduce one problem to another, and construct reductions for simple examples.
- Ability to classify optimization problems into appropriate approximation complexity classes
- Ability to choose appropriate data structure for the given problem
- Ability to choose and apply appropriate design method for the given problem

UNIT - I

Computational Complexity: Polynomial time and its justification, Nontrivial examples of polynomial-time algorithms, the concept of reduction (reducibility), Class P Class NP and NP- Completeness, The P versus NP problem and why it's hard

UNIT - II

Algorithmic paradigms: Dynamic Programming – Longest common subsequence, matrix chain multiplication, knapsack problem, Greedy – 0-1 knapsack, fractional knapsack, scheduling problem, Huffman coding, MST, Branch-and-bound – travelling sales person problem, 0/1 knapsack problem, Divide and Conquer – Merge sort, binary search, quick sort.

UNIT - III

Randomized Algorithms: Finger Printing, Pattern Matching, Graph Problems, Algebraic Methods, Probabilistic Primality Testing, De-Randomization Advanced Algorithms.

UNIT - IV

Graph Algorithms: Shortest paths, Flow networks, Spanning Trees; Approximation algorithms, Randomized algorithms. Approximation algorithms: Polynomial Time Approximation Schemes.

UNIT - V

Advanced Data Structures and applications: Decision Trees and Circuits, B-Trees, AVL Trees, Red and Black trees, Dictionaries and tries, Maps, Binomial Heaps, Fibonacci Heaps, Disjoint sets, Union by Rank and Path Compression

TEXT BOOKS:

1. T. Cormen, C. Leiserson, R. Rivest and C. Stein, Introduction to Algorithms, Third Edition, McGraw-Hill, 2009.
2. R. Motwani and P. Raghavan, Randomized Algorithms, Cambridge University Press, 1995.

3. J. J. McConnell, Analysis of Algorithms: An Active Learning Approach, Jones & Bartlett Publishers, 2001.
4. D. E. Knuth, Art of Computer Programming, Volume 3, Sorting and Searching, Second Edition, Addison-Wesley Professional, 1998.
5. S. Dasgupta, C. H. Papadimitriou and U. V. Vazirani, Algorithms, McGraw-Hill, 2008.

CS812PE: DISTRIBUTED SYSTEMS (Professional Elective - VI)**IV Year B.Tech. CSE II -Sem**

L	T	P	C
3	0	0	3

Prerequisites

1. A course on "Operating Systems"
2. A course on "Computer Organization & Architecture"

Course Objectives

- This course provides an insight into Distributed systems.
- Topics include- Peer to Peer Systems, Transactions and Concurrency control, Security and Distributed shared memory

Course Outcomes

- Ability to understand Transactions and Concurrency control.
- Ability to understand Security issues.
- Understanding Distributed shared memory.
- Ability to design distributed systems for basic level applications.

UNIT - I

Characterization of Distributed Systems-Introduction, Examples of Distributed systems, Resource sharing and web, challenges, System models -Introduction, Architectural and Fundamental models, Networking and Internetworking, Interprocess Communication, Distributed objects and Remote Invocation-Introduction, Communication between distributed objects, RPC, Events and notifications, Case study-Java RMI.

UNIT - II

Operating System Support- Introduction, OS layer, Protection, Processes and Threads, Communication and Invocation, Operating system architecture, Distributed File Systems-Introduction, File Service architecture.

UNIT - III

Peer to Peer Systems-Introduction, Napster and its legacy, Peer to Peer middleware, Routing overlays, Overlay case studies-Pastry, Tapestry, Application case studies-Squirrel, OceanStore.

Time and Global States-Introduction, Clocks, events and Process states, Synchronizing physical clocks, logical time and logical clocks, global states, distributed debugging.

Coordination and Agreement-Introduction, Distributed mutual exclusion, Elections, Multicast communication, consensus and related problems.

UNIT - IV

Transactions and Concurrency Control-Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering. Distributed Transactions-Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery.

UNIT - V

Replication-Introduction, System model and group communication, Fault tolerant services, Transactions with replicated data.

Distributed shared memory, Design and Implementation issues, Consistency models.

TEXT BOOKS:

1. Distributed Systems Concepts and Design, G Coulouris, J Dollimore and T Kindberg, Fourth Edition, Pearson Education.
2. Distributed Systems, S.Ghosh, Chapman & Hall/CRC, Taylor & Francis Group, 2010.

REFERENCE BOOKS:

1. Distributed Systems – Principles and Paradigms, A.S. Tanenbaum and M.V. Steen, Pearson Education.
2. Distributed Computing, Principles, Algorithms and Systems, Ajay D. Kshemakalyani and Mukesh Singhal, Cambridge, rp 2010.

CS813PE: NEURAL NETWORKS & DEEP LEARNING (Professional Elective - VI)**IV Year B.Tech. CSE II -Sem**

L	T	P	C
3	0	0	3

Course Objectives:

- To introduce the foundations of Artificial Neural Networks
- To acquire the knowledge on Deep Learning Concepts
- To learn various types of Artificial Neural Networks
- To gain knowledge to apply optimization strategies

Course Outcomes:

- Ability to understand the concepts of Neural Networks
- Ability to select the Learning Networks in modeling real world systems
- Ability to use an efficient algorithm for Deep Models
- Ability to apply optimization strategies for large scale applications

UNIT-I

Artificial Neural Networks Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, Back-propagation Network. Associative Memory Networks. Training Algorithms for pattern association, BAM and Hopfield Networks.

UNIT-II

Unsupervised Learning Network- Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks-Introduction to various networks.

UNIT - III

Introduction to Deep Learning, Historical Trends in Deep learning, Deep Feed - forward networks, Gradient-Based learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

UNIT - IV

Regularization for Deep Learning: Parameter norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised learning, Multi-task learning, Early Stopping, Parameter Typing and Parameter Sharing, Sparse Representations, Bagging and other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, tangent Prop and Manifold, Tangent Classifier

UNIT - V

Optimization for Train Deep Models: Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms

Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing

TEXT BOOKS:

1. Deep Learning: An MIT Press Book By Ian Goodfellow and Yoshua Bengio and Aaron Courville
2. Neural Networks and Learning Machines, Simon Haykin, 3rd Edition, Pearson Prentice Hall.

CS814PE: HUMAN COMPUTER INTERACTION (Professional Elective - VI)**IV Year B.Tech. CSE II -Sem**

L	T	P	C
3	0	0	3

Course Objectives: To gain an overview of Human-Computer Interaction (HCI), with an understanding of user interface design in general, and alternatives to traditional "keyboard and mouse" computing; become familiar with the vocabulary associated with sensory and cognitive systems as relevant to task performance by humans; be able to apply models from cognitive psychology to predicting user performance in various human-computer interaction tasks and recognize the limits of human performance as they apply to computer operation; appreciate the importance of a design and evaluation methodology that begins with and maintains a focus on the user; be familiar with a variety of both conventional and non-traditional user interface paradigms, the latter including virtual and augmented reality, mobile and wearable computing, and ubiquitous computing; and understand the social implications of technology and their ethical responsibilities as engineers in the design of technological systems. Finally, working in small groups on a product design from start to finish will provide you with invaluable team-work experience.

Course Outcomes:

- Ability to apply HCI and principles to interaction design.
- Ability to design certain tools for blind or PH people.

UNIT - I

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design.

The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT - II

Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

Screen Designing: Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT- III

Windows – New and Navigation schemes selection of window, selection of devices based and screen-based controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

UNIT- IV

HCI in the software process, The software life cycle Usability engineering Iterative design and prototyping Design Focus: Prototyping in practice Design rationale Design rules Principles to support usability Standards Golden rules and heuristics HCI patterns Evaluation techniques, Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, Choosing an evaluation method. Universal design, Universal design principles Multi-modal interaction

UNIT- V

Cognitive models Goal and task hierarchies Design Focus: GOMS saves money Linguistic models The challenge of display-based systems Physical and device models Cognitive architectures Ubiquitous computing and augmented realities Ubiquitous computing applications research Design Focus: Ambient

Wood – augmenting the physical Virtual and augmented reality Design Focus: Shared experience
Design Focus: Applications of augmented reality Information and data visualization Design Focus:
Getting the size right.

TEXT BOOKS:

1. The essential guide to user interface design, Wilbert O Galitz, Wiley Dream Tech. Units 1, 2, 3
2. Human – Computer Interaction. Alan Dix, Janet Finck, Greg Goryd, Abowd, Russell Beaulieu, Pearson Education Units 4,5

REFERENCE BOOKS:

1. Designing the user interface. 3rd Edition Ben Shneidermann, Pearson Education Asia.
2. Interaction Design Principles, Rogers, Sharps. Wiley Dreamtech.
3. User Interface Design, Soren Lauesen , Pearson Education.
4. Human –Computer Interaction, D. R. Olsen, Cengage Learning.
5. Human –Computer Interaction, Smith - Atakan, Cengage Learning.

CS815PE: CYBER FORENSICS (Professional Elective - VI)**IV Year B.Tech. CSE II -Sem**

L	T	P	C
3	0	0	3

Prerequisites: Network Security**Course Objectives:**

- A brief explanation of the objective is to provide digital evidences which are obtained from digital media.
- In order to understand the objectives of computer forensics, first of all, people have to recognize the different roles computer plays in a certain crime.
- According to a snippet from the United States Security Service, the functions computer has in different kinds of crimes.

Course Outcomes:

- Students will understand the usage of computers in forensic, and how to use various forensic tools for a wide variety of investigations.
- It gives an opportunity to students to continue their zeal in research in computer forensics

UNIT- I

Introduction of Cybercrime: Types, The Internet spawns crime, Worms versus viruses, Computers' roles in crimes, Introduction to digital forensics, Introduction to Incident - Incident Response Methodology – Steps - Activities in Initial Response, Phase after detection of an incident

UNIT-II

Initial Response and forensic duplication, Initial Response & Volatile Data Collection from Windows system -Initial Response & Volatile Data Collection from Unix system – Forensic Duplication: Forensic duplication: Forensic Duplicates as Admissible Evidence, Forensic Duplication Tool Requirements, Creating a Forensic. Duplicate/Qualified Forensic Duplicate of a Hard Drive

UNIT - III

Forensics analysis and validation: Determining what data to collect and analyze, validating forensic data, addressing data-hiding techniques, performing remote acquisitions

Network Forensics: Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project.

UNIT -IV

Current Forensic tools: evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software E-Mail Investigations: Exploring the role of e-mail in investigation, exploring the roles of the client and server in e-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools.

Cell phone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices.

UNIT- V

Working with Windows and DOS Systems: understanding file systems, exploring Microsoft File Structures, Examining NTFS disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks, MS-DOS startup tasks, virtual machines.

TEXT BOOKS:

1. Kevin Mandia, Chris Prosise, "Incident Response and computer forensics", Tata McGraw Hill, 2006.

2. Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, New Delhi.
3. Computer Forensics and Investigations by Nelson, Phillips Enfinger, Steuart, CENGAGE Learning

REFERENCE BOOKS:

1. Real Digital Forensics by Keith J. Jones, Richard Bejtich, Curtis W. Rose, Addison- Wesley Pearson Education
2. Forensic Compiling, A Tractitioneris Guide by Tony Sammes and Brian Jenkinson, Springer International edition.