IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)

Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.) [Computer Science & Engineering]

VIII Semester

S.No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory			Practical						
				End Sem	Mid Sem. Exam.	Quiz/ Assignment	End Sem	Term work / Lab Work & Sessional		L	T	P	
1.	**PEC-CS801**	PEC	**Elective-V**	70	20	10	–	–	**100**	3	–	–	**3**
2.	**PEC-CS802**	PEC	**Elective-VI**	70	20	10	60	40	**200**	3	–	2	**4**
3.	**OEC-CS801**	OEC	**Open Elective-IV**	70	20	10	–	–	**100**	3	–	–	**3**
4.	**PROJ-CS801**	PROJ	**Project-III**	–	–	–	120	80	**200**	–	–	12	**6**
5.	**PROJ-CS802**	PROJ	**Seminar-II**	–	–	–	–	50	**50**	–	–	2	**1**
		Total		**210**	**60**	**30**	**180**	**170**	**650**	**9**	**–**	**16**	**17**

Electives-V	**Electives-VI**	**Open Electives-IV**
PEC-CS801(A) Data Mining & Warehousing	PEC-CS802(A) Big Data & Hadoop	OEC-CS801(A) Wireless & Mobile Computing
PEC-CS801(B) Bio Informatics	PEC-CS802(B) Knowledge Management	OEC-CS801(B) E-Commerce & Web Technology
PEC-CS801(C) Digital Image Processing	PEC-CS802(C) Web & Information Retrieval	OEC-CS801(C) Disaster Preparedness & Planning
PEC-CS801(D) Quantum Computing	PEC-CS802(D) Data Visualization	OEC-CS801(D) Process Modeling & Simulation

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	1 Credit	1 Credit

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VIII-Semester

PEC-CS801 (A)	Data Mining and Warehousing	3L: 0T: 0P (3hrs.)	3 credits

Prerequisite: Computer Organization & Architecture

Course Objective:

Student should understand the value of Historical data and data mining in solving real- world problems.

Course Contents: (40 hrs.)

Module 1: **(10 hrs.)**

Data Warehousing: Introduction, Delivery Process, Data warehouse Architecture, Data Preprocessing: Data cleaning, Data Integration and transformation, Data reduction. Data warehouse Design: Data warehouse schema, Partitioning strategy Data Warehouse Implementation, Data Marts, Meta Data, Example of a Multidimensional Data model. Introduction to Pattern Warehousing.

Module 2: **(08 hrs.)**

OLAP Systems: Basic concepts, OLAP queries, Types of OLAP servers, OLAP operations etc. Data Warehouse Hardware and Operational Design: Security, Backup and Recovery,

Module 3: **(10 hrs.)**

Introduction to Data & Data Mining: Data Types, Quality of data, Data Preprocessing, Similarity measures, Summary statistics, Data distributions, Basic data mining tasks, Data Mining V/s knowledge discovery in databases. Issues in Data mining. Introduction to Fuzzy set sand fuzzy logic.

Module 4: **(08 hrs.)**

Supervised Learning: Classification: Statistical-based algorithms, Distance-based algorithms, Decision tree-based algorithms, neural network-based algorithms, Rule-based algorithms, and Probabilistic Classifiers

Module 5: **(04 hrs.)**

Clustering & Association Rule mining: Hierarchical algorithms, Partitioned algorithms, Clustering large databases–BIRCH, DBSCAN, CURE algorithms. Association rules: Parallel and distributed algorithms such as A priori and FP growth algorithms.

Course Outcome:

After completion of this course, the students would be able to:

1. Understand the need of designing Enterprise data warehouses and will be enabled to approach business problems analytically by identifying opportunities to derive business.
2. Compare and contrast various methods for storing & retrieving data from different data sources/repository.
3. As certain the application of data mining in various areas and preprocess the given data and visualize it for a given application or data exploration/mining task.
4. Apply supervised learning methods to given data sets such as classification and its various types.
5. Apply Unsupervised learning methods to given data sets such as clustering and its various types. Also apply Association rule mining to various domains.

List of Text / Reference Books:

1. Pennington, Steinbach &Kumar, "Introduction to Datamining", Pearson Edu,2019.
2. Jaiwei Han, Micheline Kamber, "Datamining: Concepts and Techniques", Morgan Kaufmann Publishers.
3. Margaret H. Dunham, "Datamining: Introductory and Advanced topics", PearsonEdu.2009.
4. Anahory & Murray, "Data Warehousing in the Real-world", Pearson Edu. 2009.

List of Experiments:
(All Experiments Performed on WEKA Tool)

1. Create an Employee Table with the help of Data Mining Tool WEKA.
2. Create a Weather Table with the help of Data Mining Tool WEKA.
3. Apply Pre-Processing techniques to the training dataset of Weather Table.
4. Apply Pre-Processing techniques to the training dataset of Employee Table.
5. Normalize Weather Table data using Knowledge Flow.
6. Normalize Employee Table data using Knowledge Flow.
7. Finding Association Rules for Buying data.
8. Finding Association Rules for Banking data.
9. Finding Association Rules for Employee data.
10. To Construct Decision Tree for Weather data and classify it.

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VIII-Semester

PEC-CS801 (B)	Bio Informatics	3L: 0T: 0P (3hrs.)	3 credits

Prerequisite: NA

Course Objective:

The course has been designed to be an entry level in Bio informatics. It is introductory in nature and will provide an overview of the concepts and practices in Bio informatics.

Course Contents: (40 hrs.)

Module 1: **(06 hrs.)**

Introduction: Introduction to bio informatics, objectives of bio informatics, Basic chemistry of nucleic acids, structure of DNA& RNA, Genes, structure of bacterial chromosome, cloning methodology, Data maintenance and Integrity Tasks.

Module 2: **(12 hrs.)**

Bio informatics Databases & Image Processing: Types of databases, Nucleotide sequence databases, Protein sequence databases, Protein structure databases, Normalization, Data cleaning and transformation, Protein folding, protein function, protein purification and characterization, Introduction to Java clients, CORBA, Using MYSQL, Feature Extraction.

Module 3: **(08 hrs.)**

Sequence Alignment and database searching: Introduction to sequence analysis, Models for sequence analysis, Methods of optimal alignment, Tools for sequence alignment, Dynamics Programming, Heuristic Methods, Multiple sequences Alignment.

Module 4: **(06 hrs.)**

Gene Finding and Expression: Cracking the Genome, Biological decoder ring, finding genes through mathematics & learning, Genes prediction tools, Gene Mapping, Application of Mapping, Modes of Gene Expression data, mining the Gene Expression Data.

Module 5: **(08 hrs.)**

Proteomics &Problem solving in Bioinformatics: Proteome analysis, tools for proteome analysis, Genetic networks, Network properties and analysis, complete pathway simulation: E-cell, Genomic analysis for DNA & Protein sequences, Strategies and options for similarity search, flow charts for protein structure prediction.

Course Outcome:

After Completing the course student should be able to:

1. Introduced to the basic concepts of Bio informatics and its significance in Bio logical data analysis.
2. Describe the history, scope and importance of Bioinformatics and role of internet in Bio informatics.
3. Explain about the methods to characterize and manage the different types of Biological data.
4. Classify different types of Biological Databases.
5. Introduction to the basics of sequence alignment and analysis.

List of Experiments:

1. To find information in online databases.
2. To retrieve the sequence of the Human keratin protein from Uni Pro database and to interpret the results.
3. To retrieve the sequence of the Human keratin protein from Gen bank database and to interpret the results.
4. To find the similarity between sequences using BLAST.
5. To find the similarity between sequences using FASTA.
6. To align more than two sequences and find out the similarity between those sequences using Clustal W.

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VIII-Semester

PEC-CS801 (A)	Digital Image Processing	3L: 0T: 0P (3hrs.)	3 credits

Prerequisite: Computer Graphics, Laplas Transform, Fourier Transform

Course Objective:

Describe and explain basic principles of digital image processing. Design and implement algorithms that perform basic image processing (e.g. noise removal and image enhancement).

Course Contents: (40 hrs.)

Module 1: **(08 hrs.)**

Digital Image fundamentals, a simple image model, Sampling and Quantization. Relationship between pixels, Imaging geometry, Image acquisition systems, Different types of digital images

Module 2: **(08 hrs.)**

Image transformations, Introduction to Fourier transforms, Discrete Fourier transforms, Fast Fourier transform, Walsh transformation, Ha mord transformation, Discrete Cosine transformation

Module 3: **(04 hrs.)**

Image enhancement, Filter sin spatial and frequency domains, Histogram based processing. Image subtraction, Averaging, Image smoothing, Nedion filtering, Low pass filtering, Image sharpening by High pass filtering.

Module 4: **(10 hrs.)**

Image encoding and segmentation, Encoding: Mapping, Quantizer, Coder, Error free compression, Lossy Compression schemes. JPEG Compression standard, Detection of discontinue by point detection, Line detection, edge detection, Edge linking and boundary detection, Local analysis, Global processing via Hough transforms and graph theoretic techniques

Module 5: **(10 hrs.)**

Mathematical morphology-Binary, Dilation, crosses, Opening and closing, simple methods of representation, Signatures, Boundary segments, Skeleton of a region, Polynomial approximation.

Course Outcome:

1. State the Image representation and modeling.
2. Describe the various Fourier transformation techniques.
3. Identify the various Image enhancements and filter techniques.
4. Recognize the Image encoding and segmentation techniques.
5. Illustrate the various morphology operations.

List of Text / Reference Books:

1. Rafael C Gonzalez, Richard E Woods 3rd Edition, Digital Image Processing Pearson.
2. Rafael C Gonzalez, Richard E Woods 3rd Edition, Digital Image Processing using Matlab– TMH. Sonka,
3. Digital Image Processing& Computer Vision, Cengage Learning. Jayaraman, Digital Image Processing, TMH. Pratt, Digital Image Processing, Wiley India

List of Experiments:

1. To create a program to display gray scale image using read and write operation.
2. To obtain histogram equalization image.
3. To implement smoothing or averaging filter in spatial domain.
4. Program for opening and closing of the image.
5. To fill the region of interest for the image.
6. Program for edge detection algorithm.
7. Program of sharpen image using gradient mask.
8. Program for morphological operation: erosion and dilation.
9. Program for DCT/IDCT computation.
10. To create a program for segmentation of an image using water shed transforms.

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VIII-Semester

PEC-CS801 (D)	Quantum Computing	3L: 0T: 0P (3hrs.)	3 credits

Prerequisite: NA

Course Objective:

The objective of this course is to provide the students an introduction to quantum computation. Much of the background material related to the algebra of complex vector spaces and quantum mechanics is covered with in the course.

Course Contents: (44 hrs.)

Module 1: **(06 hrs.)**

Introduction to quantum mechanics: Postulates of quantum mechanics, Qubit and quantum states, Vector Spaces, Single Qubit Gates, multiple Qubit Gates, Controlled Gates, Composite Gates, Matrices and operators.

Module 2: **(14 hrs.)**

Density operators: Density Operator for a Pure State, Density Operator for a Mixed State, Properties of a Density Operator, Characterizing Mixed States, Completely Mixed States, Partial Trace and Reduced Density Operator. Quantum measurement theory: Distinguishing Quantum States and Measurement, Projective Measurements, Measurements on Composite Systems, Generalized Measurements, and Positive Operator Valued Measures.

Module 3: **(12 hrs.)**

Entanglement: Quantum state entanglement, Bell's Theorem, The Pauli Representation, Using Bell States For Density Operator Representation, Quantum gates and circuits: Single Qubit Gates, The ZY Decomposition, Basic Quantum Circuit Diagrams, Controlled Gates, Application of Entanglementinteleportationandsupperdensecoding.,Distributedquantumcommunication Quantum Computer: Guiding Principles, Conditions for Quantum Computation, Harmonic Oscillator Quantum Computer, Optical Photon Quantum Computer –Optical cavity Quantum electrodynamics, Ion traps, Nuclear Magnetic resonance.

Module 4: **(06 hrs.)**

Quantum Algorithm: Hadamard Gates, The Phase Gate, Matrix Representation of Serial and Parallel Operations, Quantum Interference, Quantum Parallelism and Function Evaluation, Deutsch-Jozsa Algorithm, Quantum Fourier Transform, Phase Estimation, Shor's Algorithm, Quantum Searching and Grover's Algorithm

Module 5: **(06 hrs.)**

Quantum Error Correction: Introduction, Shor code, Theory of Quantum Error Correction, Constructing Quantum Codes, Stabilizer codes, Fault Tolerant Quantum Computation, Entropy and information–Shannon Entropy, Basic properties of Entropy, Von Neumann, Strong Sub Additivity, Data Compression, Entanglements a physical resource.

Course Outcome:

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

1. Analyze the behavior of basic quantum algorithms.
2. Implement simple quantum algorithm sand Information channels in the quantum circuit model.
3. Simulate a simple quantum error-correcting code.
4. Prove basic facts about quantum information channels.

List of Text / Reference Books:

1. Quantum Computing Explained: David McMahon, Wiley Inter science (IEEE Computer Science).
2. Quantum Computing without Magic Devices: Zdzislaw Meglicki; PHI.
3. Quantum Computation and Quantum Information: M.A. Nielsen & IsaacL. Chuang, Cambridge University Press.
4. Quantum Computing and communications: An Engineering Approach: Sand or Imre and Ferenc Balazs, Wiley.

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VIII-Semester

PEC-CS802 (A)	Big Data & Hadoop	3L: 0T: 2P (5hrs.)	4 credits

Prerequisite: Basic of Statistics.

Course Objective:

Understand the various parts of Hadoop condition, for instance, Hadoop2.7, Impala, Yarn, Map Reduce, Pig, Hive, HBase, Sqoop, Flume, and Apache Spark. Learn Hadoop Distributed File System (HDFS) and YARN building, and make sense of how to function with them for limit and resource organization.

Course Contents: (40 hrs.)

Module 1: **(06 hrs.)**

Introduction to Big Data Platform, Traits of Big data, Challenges of Conventional Systems, Web Data, Evolution of Analytic Scalability, Analysis vs Reporting, Statistical Concepts: Sampling Distributions, Re-Sampling, Statistical Inference, Prediction Error.

Module 2: **(05 hrs.)**

Need of Hadoop, Data centers and Hadoop Cluster overview, Overview of Hadoop Daemons, Hadoop Cluster and Racks, Learning Linux required for Hadoop, Hadoop ecosystem tools overview, Big data Hadoop opportunities

Module 3: **(12 hrs.)**

HDFS Daemons–Namenode, Data node, Secondary Namenode, Hadoop FS and Processing Environment's UIs, Fault Tolerant, High Availability, Block Replication, Hadoop Processing Framework: YARN Daemons–Resource Manager, Node Manager, Job assignment & Execution flow, Map Reduce Architecture, Map Reduce lifecycle, Word Count Example (or) Election Vote Count

Module 4: **(09 hrs.)**

Introducing Hadoop Hive, Detailed architecture of Hive, Comparing Hive with Pig and RDBMS, working with Hive Query Language, Creation of a database, table, group by and other clauses, Various types of Hive tables, H Catalog, Storing the Hive Results, Hive partitioning, and Buckets

Module 5: **(08 hrs.)**

Introduction to Hadoop Framework: Spark and Scala, Apache Pig: Advantage of Pig over Map Reduce, Pig vs Hive Usecase, Introduction to HBASE, Fundamentals of HBase, SQL vs. NOSQL, Application of Sqoop, Flume, Oozie

Course Outcome:

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

1. Explain the statistics of Big Data
2. Identify Hadoop Eco System
3. Understand HDFS and Map reduce algorithm
4. Articulate innovative insights of Hive
5. Identify and utilize various Hadoop tools

List of Text / Reference Books:

1. BartBaesens,"Analytics in a Big Data World: The Essential Guide to data Science and its Applications", Wiley publications.
2. Radha Shankarmani, M. Vijaylakshmi," Big Data Analytics", Wiley, Second edition.
3. Seema Acharya, Subhashini Chellappan," Big Data and Analytics", Wiley, First edition

List of Experiments:

1. Installation of Single Node and Cluster in Hadoop.
2. Write a Word Count program in Map Reduce and Yarn.
3. Database CURD operation in Hive.
4. Hands-on with Visual Data Analysis tools

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VIII-Semester

PEC-CS802 (B)	Knowledge Management	3L: 0T: 2P (5hrs.)	4 credits

Prerequisite: NA

Course Objective:

Learn the Evolution of Knowledge management, familiar with tools, exposed to Applications, familiar with some case studies.

Course Contents: (40 hrs.)

Module 1: **(10 hrs.)**

Introduction: An Introduction to Knowledge Management–The foundations of knowledge management- including cultural issues-technology applications organizational concepts and processes-management aspects-and decision support systems. The Evolution of Knowledge management: From Information Management to Knowledge Management–Key Challenges Facing the Evolution of Knowledge Management–Ethics for Knowledge Management.

Module 2: **(06 hrs.)**

OrganizationandKnowledgeManagement–BuildingtheLearningOrganization.Knowledge Markets: Cooperation among Distributed Technical Specialists–Tacit Knowledge and Quality Assurance.

Module 3: **(06 hrs.)**

Telecommunications and Networks in Knowledge Management–Internet Search Engines and Knowledge Management–Information Technology in Support of Knowledge Management–Knowledge Management and Vocabulary Control–Information Mapping in Information Retrieval–InformationCodingintheInternetEnvironment–RepackagingInformation.

Module 4: **(08 hrs.)**

Components of a Knowledge Strategy–Case Studies (From Library to Knowledge Center, Knowledge Management in the Health Sciences, Knowledge Management in Developing Countries).

Module 5: **(10 hrs.)**

Advanced topics and case studies in knowledge management–Development of acknowledge management map/plan that is integrated with an organization's strategic and business plan–A case study on Corporate Memories for supporting various aspects in the process life-cycles of an organization.

Course Outcome:

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

1. Describe how valuable individual, group and organizational knowledge is managed throughout the knowledge management cycle.
2. Define the different knowledge types and explain how they are addressed by knowledge management.
3. Describe them a jorroles and responsibilities in knowledge management implementations.
4. Identify some of the key tools and technique used in knowledge management applications.
5. Identify and evaluate major KM issues such as ethics, knowledge owner ship vs. authorship, copyright, intellectual property and knowledge sharing incentives.

List of Text / Reference Books:

1. Srikantaiah,T.K., Koenig,M., "Knowledge Management for the Information Professional "Information Today,Inc.,2000.
2. Nonaka,I., Takeuchi,H.,"TheKnowledge-Creating Company: How Japanese Companies Createthe Dynamics of Innovation",OxfordUniversityPress,1995.

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VIII-Semester

PEC-CS802 (C)	Web & Information Retrieval	3L: 0T: 2P (5hrs.)	4 credits

Prerequisite: Hypertext Markup Language

Course Objective:

This course aims at introducing the area of Information Retrieval and at examining the theoretical and practical issues involved in designing, implementing and evaluating Information Retrieval systems.

Course Contents: (40 hrs.)

Module 1: **(06 hrs.)**
Introduction: Information versus data retrieval, the retrieval process, taxonomy of Information Retrieval Models.

Module 2: **(12 hrs.)**
Classic Information Retrieval Techniques: Boolean Model, Vector model, Probabilistic Model, comparison of classical models. Introduction to alternative algebraic models such as Latent Semantic Indexing etc.

Module 3: **(08 hrs.)**
Keyword based Queries, User Relevance Feedback: Query Expansion and Rewriting, Document preprocessing and clustering, Indexing and Searching: Inverted Index construction, Introduction to Pattern matching.

Module 4: **(10 hrs.)**
Web Search: Crawling and Indexes, Search Engine architectures, Link Analysis and ranking algorithms such as HITS and PageRank, Meta searches, Performance Evaluation of search engines using various measures, Introduction to search engine optimization.

Module 5: **(04 hrs.)**
Introduction to online IR Systems, Digital Library searches and web Personalization.

Course Outcome:

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

1. To identify basic theories and analysis tools as they apply to information retrieval.
2. To develop understanding of problems and potentials of current IR systems.
3. To learn and appreciate different retrieval algorithms and systems.
4. To apply various indexing, matching, organizing, and evaluating methods to IR problem.
5. To become aware of current experimental and theoretical IR research.

List of Text / Reference Books:

1. Ricardo Baeza-Yates and Berthier Ribeiro-Neto, "Modern Information Retrieval" Pearson.
2. Education.C. Manning,P.Raghvan and H.Schutze,"Introduction to Information Retrieval",Cambridge University Press.
3. Amy N. Langville and CarlD.Meyer, "Google's Page Rank and Beyond: The Science of Search Engine Rankings", Princeton University Press.
4. Pierre Baldi, Paolo Frasconi and PadhraicSmy the, "Modelling the internet and the web: Probabilistic methods and Algorithms",John Wiley

List of Experiments:

- Students must experiment on various information retrieval systems like page rank etc.

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VIII-Semester

PEC-CS802 (D)	Data Visualization	3L: 0T: 2P (5hrs.)	4 credits

Prerequisite: Computer Graphics and Multimedia

Course Objective:

To understand the various types of data, apply and evaluate the principles of data visualization. Acquire skills to apply visualization techniques to a problem and its associated dataset.

Course Contents: (40 hrs.)

Module 1: **(06 hrs.)**

Introduction to Data Visualization: Overview of data Visualization-Data Abstraction -Analysis: Four Levels for Validation-Task Abstraction-Analysis: Four Levels for Validation.

Module 2: **(10 hrs.)**

Visualization Techniques Scalar and point techniques Color Maps Contouring Height Plots-Vector visualization techniques Vector Properties Vector Glyphs Vector Color Coding Stream Objects.

Module 3: **(10 hrs.)**

Visual Analytics: Visual Variables-Networks and Trees-Map Color and Other Channels-Manipulate View, Arrange Tables Geo Spatial Data Reduce Items and Attributes.

Module 4: **(08 hrs.)**

Visualization Tools and Techniques: Introduction to data visualization Tools-Tableau- Visualization using R.

Module 5: **(06 hrs.)**

Diverse Types of Visual Analysis Time-Series data visualization Text data visualization Multi variate data visualization and case studies. Dash board create

Course Outcome:

1. Identify the different data types, visualization types to bring out the insight. Relate the visualization towards the problem based on the dataset.
2. Identify the different attributes and show casing the min plots.
3. Identify and create various visualizations for geospatial and table data.
4. Ability to visualize categorical, quantitative and text data.
5. Illustrate the integration of visualization tools with Hadoop. Ability to visualize categorical, quantitative and text data.

List of Text / Reference Books:

1. Tamara Munzer, Visualization Analysis and Design-, CRC Press 2014
2. Alexandru Telea, Data Visualization Principles and Practice CRC Press 2014.
3. PaulJ.Deitel, Harvey Deitel, Java SE8 for Programmers (Deitel Developer Series)3rd Edition,2014.
4. Y.Daniel Liang, Introduction to Java programming-comprehensive version-TenthEdition,Pearsonltd2015.
5. PaulDeitel HarveyDeitel, Java, How to Program, PrenticeHall;9thedition,2011.
6. Cay Horstmann BIG JAVA,4thedition, John WileySons,2009
7. Nicholas S. Williams, Professional Java for Web Applications, WroxPress,2014.

List of Experiments:

1. Acquiring and plotting data**.**
2. Statistical Analysis such as Multivariate Analysis, PCA, LDA, Correlation, regression and analysis of variance.
3. Time-series analysis stock market. Visualization on Streaming dataset.
4. Dashboard Creation. Text visualization

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VIII-Semester

OEC-CS801 (A)	Wireless & Mobile Computing	3L: 0T: 0P (9hrs.)	3 credits

Prerequisite: Computer Networking.

Course Objective:

To provide an overview of Wireless Communication networks are and its applications**,** understand various traditional Routing & Transport protocol used in wireless communication.

Course Contents: (40 hrs.)

Module 1: **(10 hrs.)**

Review of traditional networks: Review of LAN, MAN, WAN, Intranet, Internet, and interconnectivity devices: bridges, Routers etc. Review of TCP/ IP Protocol Architecture: ARP/ RARP, IP addressing, IP Datagram format and its Delivery, Routing table format, ICMP Messages, Subnetting, Super netting and CIDR, DNS.NAT: Private addressing and NAT, SNAT, DNAT, NAT and firewalls, VLANS: Concepts, Comparison with Real LANS, Type of VLAN, Tagging, IPV6: address structure, address space and header.

Module 2: **(08 hrs.)**

Study of traditional routing and transport: Routing Protocols: BGP-Concept of hidden network and autonomous system, An Exterior gateway protocol, Different messages of BGP. Interior Gateway protocol: RIP, OSPF. Multiplexing and ports, TCP: Segment format, Sockets, Synchronization, Three Way Hand Shaking, Variable window size and Flow control, Time out and Retransmission algorithms, Connection Control, Silly window Syndrome. Example of TCP: Taho, Reno, Sack etc. UDP: Message Encapsulation, Format and Pseudo header.

Module 3: **(10 hrs.)**

Wireless LAN: Transmission Medium for WLANs, MAC problems, Hidden and Exposed terminals, Near and Far terminals, Infrastructure and Ad-hoc Networks, IEEE802.11-System arch, Protocol arch, Physical layer, Concept of spread spectrum, MAC and its management, Power management, Security. Mobile IP: unsuitability of Traditional IP; Goals, Terminology, Agent advertisement and discovery, Registration, Tunneling techniques. Ad-hoc network routing: Ad-hoc Network routing v/s Traditional IP routing, types of routing protocols, Examples: OADV, DSDV, DSR, ZRP etc.

Module 4: **(08 hrs.)**

Mobile transport layer: unsuitability of Traditional TCP; I-TCP, S-TCP, M-TCP. Wireless Cellular networks: Cellular system, Cellular networks v/s WLAN, GSM–Services, system architecture, Localization and calling, handover and Roaming.

Module 5: **(06 hrs.)**

Mobile Device Operating Systems: Special Constraints & Requirements, Commercial Mobile Operating Systems. Software Development Kit: IOS, Android etc. M Commerce: Structure, Pros &Cons, Mobile Payment System, Security Issues

Course Outcome:

1. Design and create traditional networks.
2. Understand the different issues in MAC and routing issues in multi hop wireless and ad-hoc networks and existing solutions for the same.
3. Evaluate the transport layer issues in wireless networks due to error's and mobility of nodes.
4. And understand existing solutions for the same.
5. Explain the architecture of GSM.
6. Discuss the services, emerging issues and future trends in M-Commerce.

List of Text / Reference Books:

1. Comer, "Internet working with TCP/IP Vol-I",5th edition, Addison Wesley,2006.
2. Jochen Schiller "Mobile communication",2nd edition, Pearson education,2008.
3. W.Richard Stevens,"TCP/IP Illustrated Vol-I", Addison-Wesley.
4. C.K.Toh,"AdHoc Mobile Wireless Networks", First Edition, Pearson Education.
5. Uwe Hansmann, LotharMerk, MartinS.Nicklons and Thomas Stober,"Principles of Mobile Computing", Springer.

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VIII-Semester

OEC-CS801 (B)	E-Commerce & Web Technology	3L: 0T: 0P (9hrs.)	3 credits

Prerequisite: Hypertext Markup Language

Course Objective:

Discuss fundamentals of web technology and e-commerce, types, and applications.

Course Contents: (40 hrs.)

Module 1: **(08 hrs.)**

Electronic Commerce and physical Commerce: Different type of e-commerce, e-commerce scenarios, advantages of e-commerce. Business models: Feature of B2B e-commerce, Business models, Integration. E-Services: category of e-services, Web-enabled services, Match making services, and information-selling on the web.

Module 2: **(08 hrs.)**

Internet payment system: Characteristics of payment system, 4C payments methods, SET Protocol for credit card payment, E-cash, E-check, Micro payment system, Overview of smart card, overview of Mondex. E-Governance: E-Governance architecture, Public private partnership, Readiness, Security, Cyber Crime and Law, IT Act

Module 3: **(08 hrs.)**

Advanced technologies for e-commerce: Introduction to mobile agents. WAP: the enabling technology: The WAP model, WAP Architecture, Benefit of WAP to e-commerce. Web Security, Encryption Schemes, Secure Web documents, Digital signatures and firewalls.

Module 4: **(08 hrs.)**

Introduction to building blocks of electronic commerce: Internet and networking. Technologies, IP addressing, ARP, RARP, BOOTP, DHCP, ICMP, DNS, TFTP, TELNET.

Module 5: **(08 hrs.)**

Static and dynamic web pages: tiers, plug-ins, frames and forms. Exposure to Markup languages, HTML, DHTML, VRML, SGML, XML etc. CGI, Applets& Serve-lets, JSP &JAVA Beans, active X control, ASP cookies creating and reading cookies, semantic web, semanticwebserviceontologyComparativecasestudyofMicrosoftandJAVAtechnologies, web server scalability, Distributed objects, object request brokers, component technology, Web services, Web application architectures, Browsers, Search engines.

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Course Outcome:

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

1. Understand the basic concepts and technologies used in the field of ecommerce.
2. Understand the processes of developing and implementing information systems.
3. Understand and apply the advance technology for ecommerce.
4. Understand the basic building blocks for ecommerce.
5. Understand the role of different technologies for developing web pages.

List of Text / Reference Books:

1. Henry Chan, Raymond Lee, Tharam Dillon, E-Commerce Fundamental and Applications, Willey Publication.
2. Minoli & Minoli,Web Commerce Technology HandBook, TMH Satyanarayana, E-Government, PHI.
3. Web Technology, Achyut Godbole, Atul Kahate, TMH
4. UttamK:Web Technologies, Oxford University Press.
5. G.Winfield Treese, Lawrence C. Stewart, Designing Systems for Internet Commerce, Long manPub.
6. Charles Trepper, E Commerce Strategies, Microsoft Press