SCHOOL OF INFORMATION TECHNOLOGY, RGPV BHOPAL

CB-703 FINANCIAL MANAGEMENT

Objectives:
- ☐ Understand the functional distinctions of a Finance Manager.
- ☐ Comprehend the technique of making decisions related to finance function.
- ☐ Understand the techniques involved in deciding upon purchase or sale of securities.
- ☐ An overview and generating investment project proposals.
- ☐ Motives for holding cash and receivables.

UNIT-I   INTRODUCTION
Introduction to Financial Management - Goals of the firm - Financial Environments. Time Value of Money: Simple and Compound Interest Rates, Amortization, Computing more than once a year, Annuity Factor.

UNIT-II   VALUATION OF SECURITIES
Bond Valuation, Preferred Stock Valuation, Common Stock Valuation, Concept of Yield and YTM. Risk & Return: Defining Risk and Return, Using Probability Distributions to Measure Risk, Attitudes Toward Risk, Risk and Return in a Portfolio Context, Diversification, The Capital Asset Pricing Model (CAPM).

UNIT-III   CAPITAL BUDGETING
The Capital Budgeting Concept & Process - An Overview, Generating Investment Project Proposals, Estimating Project, After Tax Incremental Operating Cash Flows, Capital Budgeting Techniques, Project Evaluation and Selection - Alternative Methods.

UNIT-IV   COST OF CAPITAL, OPERATING & FINANCIAL LEVERAGE
Cost of Capital : Concept , Computation of Specific Cost of Capital for Equity - Preference – Debt, Weighted Average Cost of Capital – Factors affecting Cost of Capital 4L.
Operating & Financial Leverage: Operating Leverage, Financial Leverage, Total Leverage and Indifference Analysis in leverage study.

UNIT-V   WORKING CAPITAL MANAGEMENT
Working Capital Management: Overview, Working Capital Issues, Financing Current Assets (Short Term and Long Term- Mix), Combining Liability Structures and Current Asset Decisions, Estimation of Working Capital. Accounts Receivable Management: Credit & Collection Policies, Analyzing the Credit Applicant, Credit References, Selecting optimum Credit period. 4L. Cash Management: Motives for Holding cash, Speeding Up Cash Receipts, Slowing Down Cash Payouts, Electronic Commerce, Outsourcing, Cash Balances to maintain, Factoring.

Course Outcomes:
On completion of the course, the students will be able to
- ☐ Identify the basic concepts of financial management and time value of money.
- ☐ Understand the various processes involved in securities market.
- ☐ Evaluate and choose the best project from alternatives based on cost-benefit analysis.
- ☐ Compute the fundamental concepts of financial management.
- ☐ Influence the concept for deciding financial angle of IT projects.

Text Books:
1. Chandra Prasanna, "Financial Management - Theory & Practice", Tata McGraw Hill, 10th Edition, 2019.
2. M.Y.Khanand and P.K.Jain, "Financial management, Text, Problems and Cases", Tata Mc Graw Hill, 5th Edition, 2000.
3. I.M.Pandey, "Financial Management", Vikas Publishing House Pvt.Ltd., 8th Edition, 2007.
4. Aswat Damodaran, "Corporate Finance Theory and Practice", John Wiley & Sons, 2nd Edition, 2008.
5. James C.Vanhorne, "Fundamentals of Financial Management", PHI Learning, 11th Edition, 2008.

Reference Books:
1. Van Horne and Wachowicz, "Fundamentals of Financial Management", Prentice Hall, 13th Edition, 2009.
2. Brigham and Ehrhardt, "Financial Management Theory and Practice", 11th edition, Cengage Learning, 2011.

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CB-704 HUMAN RESOURCES MANAGEMENT

Objectives:

☐ Facilitate student to imbibe knowledge about understanding the basic concepts and importance of Human Resources Management, Recruitment, Training, Communications, Employee Empowerment, Employee Interaction, Various Human Resources Applications and Practices, Managerial functions etc.

UNIT-I   HUMAN RESOURCES MANAGEMENT

Concept and Challenges, HR Philosophy, Policies, Procedures and Practices.

UNIT-II   HUMAN RESOURCE SYSTEM DESIGN

HR Profession and HR Department, Line Management Responsibility in HRM, Measuring HR, Human Resources Accounting and Audit, Human Resource Information system.

UNIT-III   FUNCTIONAL AREAS OF HRM

Recruitment and Staffing, benefits, compensation, Employee Relations, HR Compliance, Organizational Design, Training and Development, Human Resources Information systems (HRIS) and Payroll.

UNIT-IV   HUMAN RESOURCES PLANNING

Demand Forecasting, Action Plans – Retention, Training, Redeployment and staffing, succession Planning.

UNIT-V   STRATEGIC MANAGEMENT OF HUMAN RESOURCES

SHRM, relationship between HR strategy and overall Corporate Strategy, HR as a Factor of Competitive Advantage, Managing Diversity in the Workplace.

Course Outcomes:

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

☐ Be aware of the basic principles of Human Resource Management.
☐ Be familiarizing with the system design of Human Resource Management.
☐ Know the concepts, roles, functional areas and activities of HR.
☐ Understand organization's employee, their interest, motivation, satisfaction belief of fair treatment.
☐ Get awareness on actual impact on the firm's current performance and sustainability in the long run.

Text Books:

1 Prof. Gary Dessler , Human Resources Management, Pearson, 16th Edition, 2020.
2 Prof.John M.Ivancevich, "Human Resource Management", Tata McGraw Hill Publication, 12th Edition, 2003.
3 Prof.Aswathappa, "Human Resource Management and Personnel Management", 3rd Edition, Tata McGraw Hill, 2002.

Reference Books:

1 Dr.C.B.Gupta, "Human Resource Management ", Sultan Chand & Sons, New Delhi, 1st Edition, 2018.
2 Prof.S.S.Khanka, "Human Resource Management", Chand & Company, New Delhi, 2019.
3 Dr.S.Seetharaman et al., "Human Resource Management", SciTech Publications Pvt Ltd. Chennai,2012.

SCHOOL OF INFORMATION TECHNOLOGY, RGPV BHOPAL

CB-705 (A) COGNITIVE SCIENCE AND ANALYTICS

Objectives:
- Introduction to cognitive science, psychology, nervous system and brain.
- Understand brain and sensory motor information, representation of sensory information.
- Analyze from sensation to cognition; Roots of cognitive science.
- Develop language and embodiment.
- Implement affordances in biological and artificial systems, cognitive development.

UNIT-I   INTRODUCTION TO THE STUDY OF COGNITIVE SCIENCES

Introduction to the study of cognitive sciences - A brief history of cognitive science - Methodological concerns in philosophy - Artificial intelligence and psychology - Structure and constituents of the brain - Brief history of neuroscience - Mathematical models - Looking at brain signals - Processing of sensory information in the brain.

UNIT-II   COGNITIVE MODELS

Brain Imaging - FMRI, MEG - PET, EEG - Multisensory integration in cortex - Information fusion - From sensation to cognition – Cybernetics - From physics to meaning, Analog vs. Digital: Code duality.

UNIT-III   LINGUISTIC KNOWLEDGE

Linguistic knowledge: Syntax, semantics, (and pragmatics) - Generative linguistic - Brain and language - Language disorders – Lateralization - The great past tense debate - Cognitivist and emergent stand points - A robotic perspective.

UNIT-IV   AFFORDANCES

Direct perception - Ecological Psychology - Affordance learning in robotics - Child and robotic development -
Attention and related concepts - Human visual attention - Computational models of attention - Applications of computational models of attention.

UNIT-V   CATEGORIES AND CONCEPTS

Logic; Machine learning - Constructing memories - Explicit vs. implicit memory - Information processing (three-boxes) model of memory - Sensory memory; Short term memory – Long term memory; Rationality - Bounded rationality; Prospect theory; Heuristics and biases - Reasoning in computers - Key points in social cognition - Context and social judgment; Schemas; Social signals.

List of Experiments
1   Overview and practice: Cognitive Science and its methodology concerns in philosophy.
2   Experimental approach to processing sensory information in the brain using python.
3   Perform stemming operation in python using NLTK
4   Perform lemmatization in python using NLTK
5   Perform parts of speech tagging in python using NLTK
6   Writing and running Robot programs – Activity of PICK and Place of an object.
7   Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.
8   RNN NLU: Build a Recurrent Neural Network model using Microsoft Cognitive Tool Kit for spoken language understanding, mainly for intent detection and slot filling.
9   LSTM Human Activity Recognition: Build a Recurrent Neural Network model using Python for Human Activity Recognition (HAR) using TensorFlow on smartphone sensors dataset and a LSTM RNN.
10   NER-LSTM Build a Recurrent Neural Network model using Python for Named Entity Recognition.

Course Outcomes:
On completion of the course, the students will be able to
- Know introduction to cognitive science, psychology, nervous system and brain.
- Understand brain and sensory motor information, representation of sensory information.
- Analyze from sensation to cognition; Roots of Cognitive Science.
- Implement affordances in biological and artificial systems, cognitive development.
- Make attention, learning, memory, reasoning, social cognition.

Text Books:
1   Pradeep Kumar Mallick, Samarjeet Borah," Emerging Trends and Applications in Cognitive Computing", IGI Global Publishers, 2019.

Reference Books:
1   Jose Luis Bermudez, "Cognitive Science: An Introduction to the Science of the Mind", Cambridge University Press, New York, 2020.

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CB-705 (B) INTRODUCTION TO IOT

Objectives:

☐ To understand about the fundamentals of Internet of Things and its building blocks along with their characteristics.

☐ To gain knowledge about IoT Architecture.
☐ To understand and learn about Sensors and industrial systems.
☐ To understand the other associated technologies like networking and communication in the domain of IoT.
☐ To understand the data processing and standards designed for IoT and the current research on it.

UNIT-I   INTRODUCTION TO IOT AND USE CASES
Understanding basic concepts of IoT, Consumer IoT vs Industrial Internet, Fundamental building blocks, Use Cases of IoT in various industry domains.

UNIT-II   ARCHITECTURE
IoT reference architectures, Industrial Internet Reference Architecture, Edge Computing, IoT Gateways, Data Ingestion and Data Processing Pipelines, Data Stream Processing.

UNIT-III   SENSORS AND INDUSTRIAL SYSTEMS
Introduction to sensors and transducers, integrating sensors to sensor processing boards, introduction to industrial data acquisition systems, industrial control systems and their functions.

UNIT-IV   NETWORKING AND COMMUNICATION FOR IOT
Recap of OSI 7 layer architecture and mapping to IoT architecture, Introduction to proximity networking technologies (ZigBee, Bluetooth, Serial Communication), Industrial network protocols (Modbus, CANbus), Communicating with cloud applications - web services, REST, TCP/IP and UDP/IP sockets, MQTT, WebSockets, protocols. Message encoding (JSON, Protocol Buffers).

UNIT-V   IOT DATA PROCESSING AND STORAGE
Time series data and their characteristics, time series databases, basic time series analytics, data summarization and sketching, dealing with noisy and missing data, anomaly and outlier detection.

List of Experiments
1   Setting up the Arduino development environment, connecting analog sensors to an Arduino board and reading analog sensor data.
2   Digital input and output reading using an Arduino board and Arduino development environment.
3   Integrate an Arduino board to a Raspberry Pi computer and send sensor data from Arduino to the R Pi.
4   Setup Python on the R Pi and run sample R Pi programs on the R Pi. Read the data from Arduino using Python language.
5   Connect a R Pi Camera module to the Raspberry Pi and using Python programming capture still images and video.
6   Set up TCP/IP socket server on a PC. Send a message from the R Pi to the PC using socket communication.
7   Set up a MQTT broker on the PC. Send data from R Pi to PC using MQTT protocol. Receive data from PC to R Pi using MQTT protocol.
8   Connect LED lights to an Arduino. Connect the Arduino to the R Pi. Send Message from PC to R Pi via MQTT protocol. On receipt of the message, toggle the LED lights on the Arduino.
9   Set up an account in a cloud service (such as Google / AWS or Azure). Set up a simple Http server using a language of your choice. Push the image captured from the R Pi camera to this web service. On receiving the image, store the image in a database or file.
10   Develop a mobile application to view the images captured by the R Pi camera.

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

☐ Understand basic principles and concepts of Internet-of-Things use cases, applications, architecture and technologies.
☐ Gets an overview of an end to end IoT system encompassing the edge, cloud and application tiers.
☐ Build upon the foundations created in the pre-requisite courses and will equip the students to architect a complete IoT application on their own.
☐ Lead to building an IoT end-to-end application.
☐ Apply the concept to do research.

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Text Books:

1 Samuel Greengard, "The Internet of Things-Essential Knowledge Series", MIT Press, 1st Edition, 2015.

Reference Books :

1 Industrial Internet Reference Architecture - http://www.iiconsortium.org/IIRA.htm

2 World Economic Forum Report on Industrial Internet of Things - https://www.weforum.org/reports/industrial-internet-things

3 50 Sensor Applications for a Smarter World - http://www.libelium.com/resources/top_50_iot_sensor_applications_ranking/

4 Ben Fry, "Visualizing Data-Exploring and Explaining Data with the Processing Environment", O'Reilly Media, 2007.

5 Andrew K Dennis, "Raspberry Pi Computer Architecture Essentials", 2016.

6 M. Banzi, "Getting Started with Arduino", O Reilly Media.

7 GSMA IoT Security Guidelines & Assessment - https://www.gsma.com/iot/future-iot-networks/iot-security-guidelines/

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CB-705 (C) CRYPTOLOGY

Objectives:
- To understand the Basics of Number Theory.
- To be able to secure a message over an insecure channel by various means.
- To use a variety of public key cryptosystems and authentication methods.
- To gain a better understanding of the different security applications.
- To acquire a deeper insight of quantum computing on cryptography and security.

UNIT-I   INTRODUCTION
Introduction to Cryptography: Elementary number theory, Pseudo-random bit generation, Elementary cryptosystems. Basic security services: confidentiality, integrity, availability, non-repudiation, privacy.

UNIT-II   SYMMETRIC KEY CRYPTOSYSTEMS
Stream Cipher: Basic Ideas, Hardware and Software Implementations, Examples with some prominent ciphers: A5/1, Grain family, RC4, Salsa and ChaCha, HC128, SNOW family, ZUC; Block Ciphers: DES, AES and Modes of Operation.

UNIT-III   PUBLIC KEY CRYPTOSYSTEM & AUTHENTICATION
Public Key Cryptosystems: RSA, ECC; Digital signatures; Hash Functions; Authentication.

UNIT-IV   SECURITY APPLICATIONS
Electronic commerce (anonymous cash, micro-payments), Key management, Zero-knowledge protocols, Cryptology in Contact Tracing Applications.

UNIT-V   QUANTUM CRYPTANALYSIS & POST-QUANTUM CRYPTOGRAPHY
Quantum cryptography, quantum encryption, Issues related to Quantum Cryptanalysis. Post-Quantum Cryptography: Lattice-based cryptography : NTRU, Hash-based cryptography :SPHINCS, Multivariate cryptography: Rainbow.

List of Experiments
1. Implement the following Substitution and Transposition Techniques:
   a) Caesar Cipher
   b) Playfair Cipher
   c) Hill Cipher
   d) Vigenere Cipher
   e) Rail fence – row & Column Transformation
   f) Affine Cipher
2. Implement the following algorithms
   a) DES
   b) RSA Algorithm
   c) MD5
   d) SHA-1
3. Implement the Digital Signature Algorithm (DSA).
4. Implement Linux Privilege Escalation Checker.
5. Implement a Keylogger to record the keystrokes.
6. Set Up a honey pot and monitor the honeypot on network (Pentbox or Honeyd or any other equivalent s/w).
7. Demonstrate Intrusion Detection System using any tool (snort or any other equivalent s/w).
8. Demonstrate various exploits of Windows OS using Metasploit framework.
9. Install and Configure Firewalls for a variety of options (iptables or pfsense).
10. Demonstrate simple MITM attack (ettercap).

Course Outcomes:
On completion of the course, the students will be able to
- Understand and apply the various concepts of basics of Number Theory.
- Secure a message over an insecure channel by numerous symmetric key cryptosystem.
- Apply diverse Public Key Cryptosystem & Authentication.
- Implement varied security applications.
- Understand the implications of quantum computing on cryptography and security.

Text Books:
1. Douglas R. Stinson, "Cryptography, Theory and Practice", CRC Press, 3rd Edition, 2018.

2   A. Menezes, P. Van Oorschot and S. Vanstone, "Handbook of Applied Cryptography", CRC Press, 5th printing, 2001.
3   Stallings William, "Cryptography and Network Security - Principles and Practice", Pearson, Seventh Edition, 2017.

Reference Books:
1   Neal Koblitz, "A course in number theory and cryptography", GTM, Springer.
2   Ross Anderson**, "S**ecurity Engineering", Wiley, 3ʳᵈ Edition, 2020.
3   http://theory.caltech.edu/~preskill/ph229/

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CB-706(A) QUANTUM COMPUTATION AND QUANTUM INFORMATION

Objectives:
- To learn about Quantum information.
- To gain knowledge about Quantum algorithms.
- To understand and learn about Quantum random number generators.
- To study the basis of Post-Quantum cryptography.

UNIT-I   INTRODUCTION TO QUANTUM INFORMATION
States, Operators, Measurements, Quantum Entanglement: Quantum Teleportation, Super-dense coding, CHSH Game, Quantum gates and circuits.

UNIT-II   QUANTUM ALGORITHMS
Deutsch-Jozsa, Simon, Grover, Shor, Implication of Grover's and Simon's algorithms towards classical symmetric key cryptosystems, Implication of Shor's algorithm towards factorization and Discrete Logarithm based classical public key cryptosystems.

UNIT-III   QUANTUM TRUE RANDOM NUMBER GENERATORS
Detailed design and issues of quantumness, Commercial products and applications.

UNIT-IV   QUANTUM KEY DISTRIBUTION
BB84, Ekert, Semi-Quantum QKD protocols and their variations, Issues of Device Independence, Commercial products.

UNIT-V   INTRODUCTORY TOPICS IN POST-QUANTUM CRYPTOGRAPHY
API-Public-key Signatures, Key Encapsulation Mechanism (KEM), Digital Signature standard, Pair-Wise Key Establishment-Discrete Logarithm Cryptography, Integer Factorization Cryptography.

Course Outcomes:
On completion of the course, the students will be able to
- Apply quantum gates and circuits using quantum information.
- Apply quantum algorithms in cryptosystems.
- Understand the importance of Quantum random number generator.
- Understand the importance of Quantum key distribution.
- Apply the concept of post-quantum cryptography.

List of Experiments
1. Encoding logical qubits as grid states.
2. Sneaky error mitigation by IBM.
3. 2D cluster states of photons.
4. Quantum s***remacy and its enemies.
5. Boson sampling and its enemies.
6. Diamond qubits shine bright.
7. Error correction with superconducting qubits.

Text Books:
1. M. A. Nielsen and I. L. Chuang, "Quantum Computation and Quantum Information", Cambridge University Press, 10th Edition, 2010.
2. Presskil Lecture notes: Available online: http://www.theory.caltech.edu/~preskill/ph229/

Reference Books:
1. P. Kaye, R. Laflamme, and M. Mosca, "An Introduction to Quantum Computing". Oxford University Press, New York.
2. N. David Mermin, "Quantum Computer Science", Cambridge University Press.
3. Quantum Cryptography. D. Unruh:, Available online: https://courses.cs.ut.ee/all/MTAT.07.024/2017_fall/uploads/
4. SAPV Tharrmashastha, D. Bera, A. Maitra and S. Maitra, "Quantum Algorithms for Cryptographically Significant Boolean Functions - An IBMQ Experience", Springer, 2020.
5. Quantum Algorithm Zoo. https://quantumalgorithmzoo.org/
6. A. J. Menezes, P. C. van Oorschot, and S. A. Vanstone, "Handbook of Applied Cryptography", CRC Press.

CB-706(B) ADVANCED SOCIAL, TEXT AND MEDIA ANALYTICS

Objectives:
- To learn the fundamentals of text mining analysis.
- To be able to use various tools for text mining and carry out pattern discovery, predictive modeling.
- Explore the use of social network analysis to understand the growing connectivity and complexity.
- Perform social network analysis to identify important network properties in social media sites.
- Analysing interactions between people, and determine structural patterns in such interactions in real time application.

UNIT-I   INTRODUCTION TO TEXT MINING

Introduction- Defining text mining, general architecture of text mining systems. Core text mining operations- Using background knowledge for text mining, Text mining query languages. Pre-processing techniques-Task oriented approaches. Categorization-Applications of text categorizations, Definition of the problem, Document representations, Knowledge engineering approach to TC, Machine learning approach to TC, Using unlabeled evaluation of text classifiers.

UNIT-II   CLUSTERING AND INFORMATION EXTRACTION

Information extraction –Introduction, Historical evolution, Examples, Architecture of IE systems, Anaphora Resolution,Inductive algorithms, Structural IE.
Probabilistic models for information extraction- Hidden Markov Models, Stochastic Context Free Grammars, Maximal entropy 138odeling, Maximal entropy Markov Models, Conditional Random Fields. Text mining applications.

UNIT-III   TEXT MINING METHODS & APPROACHES

Content Analysis; Natural Language Processing; Clustering & Topic Detection; Simple Predictive Modelling; Sentiment Analysis; Sentiment Prediction.

UNIT-IV   WEB ANALYTICS

Web analytics tools, Clickstream analysis, A/B testing, online surveys; Web search and retrieval, Search engine optimization, Web crawling and Indexing, Ranking algorithms, Web traffic models.

UNIT-V   SOCIAL MEDIA ANALYTICS

Social network and web data and methods. Graphs and Matrices-Why Graphs? Graphs, Directed Graphs, Signed Graphs, Valued Graphs, Multigraphs, Hypergraphs, Relations, Matrices. Basic measures for individuals and networks. Information visualization: Architectural considerations, common visualization approaches for text mining, visualization technique in link analysis; Making connections: Link analysis. Random graphs and network evolution. Social contexts: Affiliation and identity; Social network analysis.

List of Experiments

1 Installation of NLTK and perform simple tokenize on any web page.
2 Find the frequency distribution of words for the given web page.
3 Perform word stemming using NLTK.
4 Perform an experiment for text summarization applying Deep Learning.
4 Collect the Tweets of a particular Movie and interpret the influence of the Movie providing thePositive/Negative Comments.
5 Analyse emoticons feedbacks of consumable product and conclude whether to buy a product or not from e-newspaper.
6 Based upon the counts of share, like, comments for a post in Facebook, analyse and comment the Post.
7 Consider the role of a marketing manager for an apparel software company and develop a campaign for LinkedIn target audience.
8 Use Tableau to derive decision for knowledge worker from available previous data sets.
9 In a video frame sequence use snapchat to raise trigger to skip horror frames by analysing the video.
10 Create an ontology for news article in English contents that are good/bad to the country.

Course Outcomes:
On completion of the course, the students will be able to
- Perceive the trends in recent years on online social networks.
- Draw the graphical relation between the community.
- Know various social network algorithms related to predictive modelling and pattern discovery.
- Determine the relation between the participants of various social media.
- Understand Social Network Mining Tools and apply in real time problems.

Text Books:

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1   Ronen Feldman and James Sanger, "The Text Mining Handbook: Advanced Approaches in Analyzing Unstructured Data", Cambridge University Press, 2006.
2   Hansen, Derek, Ben Sheiderman, Marc Smith, "Analyzing Social Media Networks with NodeXL: Insights from a Connected World", Morgan Kaufmann, 2011.
3   Avinash Kaushik, "Web Analytics 2.0: The Art of Online Accountability", 2009.
4   Hanneman, Robert and Mark Riddle, "Introduction to Social Network Method", 2005.
5   Ronen Feldman and James Sanger, "The Text Mining Handbook: Advanced Approaches in Analyzing Unstructured Data", Cambridge University Press, 2006.

Reference Books:
1   Wasserman, S. & Faust, K.. "Social Network Analysis: Methods and Applications", New York: Cambridge University Press, 1994.
2   Monge, P. R. & Contractor, N. S., "Theories of Communication Networks", New York: Oxford University Press, 2003.

CB-706(C) MOBILE COMPUTING

Objectives:
- To learn about the mobile infrastructure, radio resource management, overview of generation 1G to 5G.
- To illustrate the location management involved in GSM, Mobile IP.
- To illustrate the transmission, transaction technology involved in mobile.
- To explore the wireless network in mobile.
- To discover the cognitive radio networks in mobile.

UNIT-I   INTRODUCTION

Overview of wireless and mobile infrastructure, Preliminary concepts on cellular architecture, Design objectives and performance issues, Radio resource management and interface, Propagation and path loss models, Channel interference and frequency reuse, Cell splitting, Channel assignment strategies, Overview of generations:- 1G to 5G.

UNIT-II   LOCATION AND HANDOFF MANAGEMENT

Introduction to location management (HLR and VLR), Mobility models characterizing individual node movement (Random walk, Fluid flow, Markovian, Activity based), Mobility models characterizing the movement of groups of nodes (Reference point based group mobility model, Community based group mobility model), Static (Always vs. Never update, Reporting Cells, Location Areas) and Dynamic location management schemes (Time, Movement, Distance, Profile Based), Terminal Paging (Simultaneous paging, Sequential paging), Location management and
Mobile IP, Overview of handoff process, Factors affecting handoffs and performance evaluation metrics, Handoff strategies, Different types of handoffs (soft, hard, horizontal, vertical).

UNIT-III   WIRELESS TRANSMISSION FUNDAMENTALS

Introduction to narrow and wideband systems, Spread spectrum, Frequency hopping, Introduction to MIMO, MIMO Channel Capacity and diversity gain, Introduction to OFDM, MIMO-OFDM system, Multiple access control (FDMA, TDMA, CDMA, SDMA), Wireless local area network, Wireless personal area network (Bluetooth and zigbee).

UNIT-IV   WIRELESS NETWORK

Mobile Ad-hoc networks - Characteristics and applications; Coverage and connectivity problems, Routing in MANETs, Wireless sensor networks - Concepts, basic architecture, design objectives and applications; Sensing and communication range, Coverage and connectivity, Sensor placement, Data relaying and aggregation, Energy consumption, Clustering of sensors, Energy efficient Routing (LEACH).

UNIT-V   COGNITIVE RADIO NETWORKS

Fixed and dynamic spectrum access, Direct and indirect spectrum sensing, Spectrum sharing, Interoperability and co-existence issues, Applications of cognitive radio networks, Introduction to D2D communications-High level requirements for 5G architecture, Introduction to the radio resource management, power control and mode selection problems, Millimeter wave communication in 5G.

List of Experiments

Design and Development of different wireless network protocols using network simulators such as NS-3/ OMNET++

1.   MAC Protocol
2.   Routing Protocol
3.   Transport Protocol
4.   Congestion Control Protocol
5.   Application Protocol
6.   Security Protocol

Course Outcomes:
On completion of the course, the students will be able to
- Understand and apply the various concepts of Basics of Number Theory
- Secure a message over an insecure channel by numerous symmetric key cryptosystem
- Apply diverse Public Key Cryptosystem & Authentication
- Implement varied Security Applications
- Understand the implications of quantum computing on cryptography and security

Text Books:
1   Jochen Schiller, "Mobile Communications", Second Edition, Pearson, 2004.
2   Andrea Goldsmith, "Wireless Communications", Cambridge University Press, 2005.

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Reference Books:

1   Theodore Rappaport, "Wireless Communications: Principles and Practice", Pearson Education, 2014.
2   Ezio Biglieri, MIMO, "Wireless Communications", Cambridge University Press, 2009.
3   Ivan Stojmenovic, "Handbook of Wireless Networking and Mobile Computin", Wiley, 2002.
4   James Cowling, "Dynamic Location Management in Heterogeneous Cellular Networks", 2004.
5   MIT Thesis. http://people.csail.mit.edu/cowling/hons/jcowling-dynamic-Nov 2004.pdf
6   Travis Keshav, Location Management in Wireless Cellular Networks. 2006.
     https://www.cse.wustl.edu/~jain/cse574-06/ftp/cellular_location.pdf.
7   Fahd A. Batayneh, Location Management in Wireless Data Networks. 2006
     https://www.cse. wustl.edu/~jain/cse574-06/ftp/wireless_location.pdf.
8   Lingyang Song, Dusit Niyato, Zhu Han, and Ekram Hossain, "Principles of Mobile Communication", Springer, 2017.
9   Ezio Biglieri, Andrea J. Goldsmith, Larry J. Greenstein, Narayan Mandayam and H. Vincent Poor, "Principles of Cognitive Radio", Cambridge University Press, 2012.
10   Edgar H. Callaway, Jr. and Edgar H. Callaway, "Wireless Sensor Networks: Architectures and Protocols", CRC Press, 2003.