RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

VII Semester

Bachelor of Technology (B. Tech.) - Computer Science and Business Systems (CSBS)

CB701 Usability Design of Software Applications

UNIT -1

Introduction to User Centered Design: Basics of User Centered Design, Aspects of User Centered Design: Product Appreciation Assignment, Evaluating the product from user aspects such as functionality, ease of use, ergonomics, and aesthetics.

UNIT-2

Heuristic Evaluation: 10 Heuristic Principles, Examples Heuristic Evaluation: Group Assignment initiation (Website and App), Evolution for Key tasks of the app or website for heuristic principles, severity, recommendations.

UNIT-3

Project design lifecycle: Redesign project through the design lifecycle - Discovery – Define-Design –Implement (Design Prototype) – Usability Testing.

UNIT-4

UX Research: Understanding users, their goals, context of use, and environment of use.

Research Techniques: Contextual Enquiry, User Interviews, Competitive Analysis for UX. Scenarios and Persona Technique.

UNIT -5

Personas and Scenarios: Overview of Design Thinking Technique - Discovery and brainstorming. **Development and Prototyping:** Concept Development-Task flow detailing for the Project – Prototyping Techniques - Paper, Electronic, and Prototyping Tools,

Text Book(s)

1. Jennifer Preece, Helen Sharp, Yvonne Rogers, “Interaction Design: Beyond Human-Computer Interaction”, 2015, 4th Edition, Wiley publications.

Reference Book(s)

1. Alan Cooper and Robert Riemann, “About Face The Essentials of Interaction Design”, 2014, 4th Edition, Wiley Publications.
2. Elizabeth Goodman, Mike Kuniavsky, Andrea Moed , “ Observing the User Experience - A Practitioner's Guide to User Research” , 2012, Second Edition, Morgan Kaufmann Publications.
3. About Face, 4th Edition, Alan Cooper and Robert Reimann
4. Elizabeth Goodman, Mike Kuniavsky, Andrea Moed , “Observing the User Experience”, Second Edition: A Practitioner's Guide to User Research.
5. Jesse James Garrett, “The Elements of User Experience: User-Centered Design for the Web and Beyond”. 2nd Edition,
6. Jonny Schneider, “Understanding Design Thinking, Lean, and Agile”

List of Experiments -

1. Identify a website or an App to redesign, with justification

2. Analysis of the mobile app or the website through the design life cycle
3. Identifying Personas and Scenarios for the App or the website
4. Concept development and task flow detailing
5. Prototype development with Iterations and justification
6. Usability testing and demonstration

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

VII Semester

Bachelor of Technology (B. Tech.) - Computer Science and Business Systems (CSBS)

CB702 Financial Management

UNIT 1

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 2

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 3

Operating & Financial Leverage: Operating Leverage, Financial Leverage, Total Leverage, Indifference Analysis in leverage study.

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.

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 4

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.

UNIT 5

Cash Management: Motives for Holding cash, Speeding Up Cash Receipts, Slowing Down Cash Payouts, Electronic Commerce, Outsourcing, Cash Balances to maintain, Factoring.

Accounts Receivable Management: Credit & Collection Policies, Analyzing the Credit Applicant, Credit References, Selecting optimum Credit period.

Text Book(s)-

1. Prasanna Chandra, “Financial Management - Theory & Practice”, Prentice Hall/Pearson Education.(2019)
2. I.M. Pandey, “Financial Management”, Vikas Publishing House (2016)
3. S.P. GUPTA, “Financial Management” - Sahitya Bhawan Publications

Reference Book(s) –

1. Rajiv Srivastava, Anil Misra, “Financial Management”, Oxford University Press India
2. J. Van Horne, John Wachowicz, “Fundamentals of Financial Management”, Prentice

Hall/Pearson Education.

3. Sheeba Kapil, “Financial Management”, Wiley India
4. Jonathan Berk, Peter DeMarzo, and Ashok Thampi, “Financial Management”, Pearson Education in South Asia,
5. M Y Khan, P K Jain, “Financial Management: Text, Problems and Cases” (8th ed.) McGraw Hill

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

VII Semester

Bachelor of Technology (B. Tech.) - Computer Science and Business Systems (CSBS)

CS703 (A) Cognitive Science & Analytics

UNIT-I: FOUNDATIONAL AREAS OF ANALYTICS & COGNITIVE SCIENCE

Introduction to Analytics: Definition, Description & Evolution of Analytics, History of Analytics, and Applicability of Analytics with development of Technology and Computer, How Analytics entered mainstream

Concepts of Analytics: Various overlapping concepts and fields of Analytics such as Data Mining, Machine Learning, Artificial Intelligence and Simulation

Emerging Areas in Analytics: Understanding of emerging research areas of Analytics: Mathematical programming, Evolutionary computation, Simulation, Machine learning/data mining, Logic-based models, and, Combinations of categories

Value Chain of Analytics: Descriptive Analytics Covering Exploratory Data Analysis & Basic of Statistics, Diagnostics Analytics: BI/Analysis, Trend, Pattern, Simultaneous Relationship, Predictive Analytics: Cause-Effect Relationship and Futuristic prediction in terms of probabilities, Continuous & Categorical Predictions, Simulation, Optimization, Multi-faceted Intelligent Technology driven Analytics combining Machine Intelligence with Human Brain Processing Abilities

Introduction & Evolution of Cognitive Science: Introduction to the study of cognitive sciences, Brief history of cognitive science development and Methodological concerns in philosophy

Understand Brain and Sensory Motor Information: Fundamentals of Neuro Science, Processing of sensory information in the brain, and Brain Imaging Elements

Language & Linguistic Knowledge: Background and details of Syntax & Semantics, Understanding of Generative Linguistic

Memory & Processing: Theory of Information Processing, Fundamentals of Short term Memory

UNIT II: DATA THEORY & TAXONOMY OF DATA

Data as a whole: Understanding of Data as a whole for distinguishing and relating various types of data and Categorization of Data: Structured, Unstructured Data, Quantitative & Qualitative Data.

Views of Data: Understanding Data as an interdisciplinary framework for learning methodologies: covering statistics, neural networks, and fuzzy logic

Measurement & Scaling Concepts: Measurement of variables and commonly used statistical tools: Number of procedures for measurement of the variables, Categorization procedures, Scale construction procedures and Techniques of data processing for qualitative as well as quantitative data;

Various types of Scales: Nominal, Ordinal, Interval & Ratio Scales

UNIT III: MULTIVARIATE DATA ANALYTICS & COGNITIVE ANALYTICS

Overview: High level overview of Categorization of Techniques: Inter-dependence Relationship Techniques and Dependence Relationship Techniques

Overview of Commonly Used Inter-dependence Techniques: Factor Analysis, Principal Component Analysis (PCA), Cluster Analysis

Overview of Commonly Used Dependence Techniques: Regression, Logistic Regression

Analytics Value Chain &Application of Analytics across Value Chain:

a. Basic statistical concepts such as Descriptive & Diagnostics statistics, concept of random variables, discrete and continuous random variables, confidence interval, hypothesis testing, analysis of variance and correlation.
b. Predictive analytics techniques such as multiple linear regression, logistic regression, decision tree learning Clustering and forecasting techniques.
c. Prescriptive analytics Concepts: linear programming, integer programming, goal programming & stochastic models
d. Cognitive analytics Concepts: Text Analytics, Learning Analytics, Data Mining, Cognitive Systems, Cognitive Computing, Learning Data Science, Machine Learning, Big data Analytics and Business analytics

UNIT IV: ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Fundamentals of Artificial Intelligence: Various areas of AI:

a. Knowledge: Text Analytics, Topic Modelling, Natural Language Processing (NLP), Natural Language Generation (NLG), Natural Language Understanding (NLU), Named-entity recognition (NER)
b. Perception: Image Analytics, Video Analytics & Audio Analytics
c. Memory: Cognitive Engagement: BOTs, Virtual & Digital Assistants, Augmented Reality, Virtual Reality, Mixed Reality
d. Learning: Intelligent Automation

Spectrum of AI

a. Reactive Machine: Low memory, works on Known rules, such as Object Detection/Games/Recommendations specific to known Rules
b. Limited Memory: Memory used to learn and improve continuously such as Most ML Models, Automated Vehicles
c. Theory of Mind: Machine Understands and responds such as BoTs/Virtual/Digital Assistants
d. Self-Aware: Human like intelligence such as Super Robots in Space etc.

UNIT V: APPROACH & METHODOLOGY

World Standard Methodology: CRISP-DM Methodology, SEMMA Methodology

Real Life Work around Multi-Variate Analytics: A few Selected Commonly used Techniques: Predictive & Classification Models, Regression, Clustering

Real Life Work around Artificial Intelligence, Machine Learning and Deep Learning: A few Selected Commonly used Techniques& Algorithms: ANN(Artificial Neural Network), CNN(Convolutional Neural Network), RNN (Recurrent Neural Network);

RN Architecture: LSTM, Bidirectional LSTM, Gated Recurrent Unit(GRU), CTRNN(Continuous Time RNN) CNN Architectures: VGG16, Alexnet, InceptionNet, RestNet, Googlenet.

Object Detection models: R-CNN, Fast R-CNN, Faster R-CNN, cascade R-CNN. Mask RCNN, Single Shot MultiBox Detector (SSD) ,You Only Look Once (YOLO), Single-Shot Refinement Neural Network for Object Detection (RefineDet), Retina-Net

Autoencoders: Denoising Autoencoder, GAN

Transformers: Attention based Encoder and Decoder: Eg- BERT(Bidirectional Encoder Representations from Transformers), Generative Pretrained Transformers GPT-3, GPT-2, BERT, XLNet, and RoBERTa.

LAB EXERCISES:

Structured Data Analytics: Segmentation & Clustering, Classification & Prediction, Forecasting Association Mining & Sequence Mining

Textual Data Analytics: Natural Language Processing (NLP), Natural Language Generation (NLG), Natural Language Understanding (NLU), Named-entity recognition (NER) driven Analytics: Key Word Extraction, Text Summarization, Insight Generation

Image Analytics: Malaria/Carcinoma/COVID detection, Visual inspection for QA/QC

Video Analytics: Motion based Behavior Recognition, Behavioural Observations, and Parkinson's Disease Prediction

Audio Analytics: Speech to Text, Text to Speech, Transcript Services

Artificial Intelligence, Machine Learning driven Automation: Banking Process Automation, Hospital Triage Process Automation AR/VR enabled Guided Operations

Conversational Analytics: Artificial Intelligence, Machine Learning, Augmented Reality, Virtual Reality, Robotics, Digital/Virtual Assistant, Chat-BOT/ Program BOT, Email-BOT

Text Book(s)-

Unit 1

1. Hall, P., Phan, W., & Whitson, K. (2016). Evolution of Analytics. O'Reilly Media Incorporated.
2. Cognitive Science: An Introduction to the Science of the Mind by José Luis Bermúdez
3. Cognitive Computing and Big Data Analytics by Judith S. Hurwitz (Author), Marcia Kaufman (Author), Adrian Bowles (Author)
4. Cognitive Science and Artificial Intelligence Advances and Applications: Authors: Gurumoorthy, Sasikumar, Rao, B Narendrakumar, Gao, Xiao-Zhi

Unit 2

1. Cherkassky, V., & Mulier, F. M. (2007). Learning from data: concepts, theory, and methods. John Wiley & Sons.
2. The visual display of Quantitative Information: Edward Tufte, Graphics Press, 2001.
3. Scaling Measurement and Statistical Tools for Extension Workers by Krunal D. Gulkari, Hemant V. Borate , Mayur S. Shitap , 2016.

Unit 3

1. Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). Multivariate data analysis. Englewood Cliff. New Jersey, USA, 5(3), 207-2019.
2. Kumar, U. D. (2017). Business analytics: The science of data-driven decision making. Wiley.
3. Özköse, H., Arı, E. S., & Gencer, C. (2015). Yesterday, today and tomorrow of big data. Procedia-Social and Behavioral Sciences, 195, 1042-1050.
4. Gudivada, Venkat N., M. T. Irfan, E. Fathi, and D. L. Rao. "Cognitive analytics: Going beyond big data analytics and machine learning." In Handbook of statistics, vol. 35, pp. 169-205. Elsevier, 2016.

Unit 4

1. Kao, A., & Poteet, S. R. (Eds.). (2007). Natural language processing and text mining. Springer Science & Business Media.
2. Demystifying Artificial intelligence: Simplified AI and Machine Learning concepts for Everyone (English Edition) Paperback – Import, 5 January 2021by Prashant Kikani
3. Kelleher, J. D., Mac Namee, B., & D'arcy, A. (2020). Fundamentals of machine learning for predictive data analytics: algorithms, worked examples, and case studies. MIT press.
4. Goodfellow, Ian, Yoshua Bengio, Aaron Courville, and Yoshua Bengio. Deep learning. Vol. 1, no. 2. Cambridge: MIT press, 2016.
5. Practical Deep Learning for Cloud, Mobile, and Edge: Real-World AI & Computer-Vision

Projects Using Python, Keras & TensorFlow 1st Edition,
6. Conversational Chatbots for Analytics Third Edition by Gerardus Blokdyk
7. BORNET, P. B. (2020). Intelligent automation: Welcome to the world of hyperautomation. World Scientific Publishing Company.

Unit 5

1. Maimon, O., & Rokach, L. (Eds.). (2005). Data mining and knowledge discovery handbook.
2. Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). Multivariate data analysis. Englewood Cliff. New Jersey, USA, 5(3), 207-2019.
3. Zhang, C., & Ma, Y. (Eds.). (2012). Ensemble machine learning: methods and applications. Springer Science & Business Media.

Reference Book(s)-

Unit 1

1. Seminal Paper: The evolution of analytics and implications for industry and academic programs MR Bowers, JD Camm, G Chakraborty - Interfaces, 2018 - pubsonline.informs.org.
2. Cognitive Analytics: Concepts, Methodologies, Tools, and Applications (4 Volumes) Information Resources Management Association (USA)A first course in Probability, S.M. Ross,Prentice Hall.

Unit 2

1. Seminal paper: Shneiderman, B. (2003). The eyes have it: A task by data type taxonomy for information visualizations. In The craft of information visualization (pp. 364-371). Morgan Kaufmann.C: The Complete Reference, (Fourth Edition), Herbert Schildt, McGraw Hill.

PEDAGOGY

Unit 1

1. Instructor Led
2. Mini Assignments & Quiz.

Unit 2

1. Instructor Led
2. Mini Assignments & Quiz.

Unit 3

1. Instructor Led
2. Mini Assignments & Quiz.

Unit 4

1. Instructor Led
2. Mini Assignments & Quiz
3. Industry Speakers

Unit 5

1. Instructor Led
2. Mini Assignments & Quiz
3. Industry Speakers

Unit 6

1. Industry Speakers
2. Mini Assignments & Quiz

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

VII Semester

Bachelor of Technology (B. Tech.) - Computer Science and Business Systems (CSBS)

CB703-(B) Introduction to IoT

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, CAN bus), Communicating with cloud applications (web services, REST, TCP/IP and UDP/IP sockets, MQTT, WebSocket's, 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,

Lab Exercises

1. Setting up the Arduino Development Environment, connecting analog sensors to an Arduino Boarding and reading analog sensor data.
2. Digital Input and Output reading using and 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.

Text Books:

1. Samuel Greengard, “The Internet of Things”, MIT Press Essential Knowledge Series.

Reference Books / Links:

1. Visualizing Data-Exploring and Explaining Data with the Processing Environment, By Ben Fry, Publisher: O'Reilly Media
2. Simone Cirani, "Internet of Things: Concepts and Applications", Wiley India
3. Raspberry Pi Computer Architecture Essentials, by Andrew K Dennis
4. Getting Started with Arduino, M. Banzi, O Reilly Media.
5. Industrial Internet Reference Architecture - http://www.iiconsortium.org/IIRA.htm
6. World Economic Forum Report on Industrial Internet of Things - https://www.weforum.org/reports/industrial-internet-things
7. 50 Sensor Applications for a Smarter World - http://www.libelium.com/resources/top_50_iot_sensor_applications_ranking/
8. Visualizing Data-Exploring and Explaining Data with the Processing Environment, By Ben Fry, Publisher: O'Reilly Media
9. Raspberry Pi Computer Architecture Essentials, by Andrew K Dennis
10. Getting Started with Arduino, M. Banzi, O Reilly Media
11. GSMA IoT Security Guidelines & Assessment - https://www.gsma.com/iot/future-iotnetworks/iot-security-guidelines/

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

VII Semester

Bachelor of Technology (B. Tech.) - Computer Science and Business Systems (CSBS)

CB703-(C) Cryptology

UNIT – I

Introduction to Cryptography: Elementary number theory, Pseudo-random bit generation, Elementary cryptosystems.

UNIT – II

Basic security services: confidentiality, integrity, availability, non-repudiation, privacy

UNIT – III

Symmetric key cryptosystems: Stream Cipher: Basic Ideas, Hardware and Software Implementations, Exampleswith some prominent ciphers: A5/1, Grain family, RC4, Salsa and Cha-cha, HC128, SNOW family, ZUC; Block Ciphers: DES, AES, Modes of Operation; Hash Functions; Authentication

UNIT – IV

Public Key Cryptosystems:RSA, ECC; Digital signatures

Security Applications (Selected Topics): Electronic commerce (anonymous cash, micro-payments), Key management, Zero-knowledge protocols, Cryptology in Contact Tracing Applications, Issues related to Quantum Cryptanalysis.

UNIT – V

Introductory topics in Post-Quantum Cryptography: Refer to https://csrc.nist.gov/projects/post-quantum-cryptography. May discuss any two ciphers from this list.

Text Books:

1. *Cryptography, Theory and Practice.* D. R. Stinson, CRC Press.
2. *Handbook of Applied Cryptography.* A. J. Menezes, P. C. van Oorschot, and S. A. Vanstone, CRC Press

Reference Books:

1. *A course in number theory and cryptography.* N. Koblitz:, GTM, Springer.
2. *Cryptography and Network Security.* W. Stallings, Prentice Hall.
3. *Information Security: Principles and Practice,* Mark Stamp, Wiley
4. *Security Engineering,* R. Anderson, Wiley
5. *RC4 Stream Cipher and Its Variants.* G. Paul and S. Maitra: CRC Press, Taylor & Francis Group, A Chapman & Hall Book, 2012
6. *Design & Cryptanalysis of ZUC - A Stream Cipher in Mobile Telephony.* C. S. Mukherjee, D. Roy, S. Maitra, Springer 2020
7. *Contact Tracing in Post-Covid World - A Cryptologic Approach.* P. Chakraborty, S. Maitra, M. Nandi, S. Talnikar, Springer 2020.
8. Presskil Lecture notes: Available online: http://www.theory.caltech.edu/~preskill/ph229

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

VII Semester

Bachelor of Technology (B. Tech.) - Computer Science and Business Systems (CSBS)

CS704 (A) Quantum Computation & Quantum Information

UNIT – I

Introduction to Quantum Information: States, Operators, Measurements, Quantum Entanglement: Quantum Teleportation, Super-dense coding, CHSHGame, Quantum gates and circuits

UNIT – II

Quantum Algorithms: Deutsch-Jozsa, Simon, Grover, Shor, Implication of Grover's and Simon's algorithms towards classical symmetrickey cryptosystems, Implication of Shor's algorithm towards factorization and Discrete Logarithmbased classical public key cryptosystems

UNIT – III

Quantum True Random Number Generators (QTRNG): Detailed design and issues of quantumness, Commercial products and applications

UNIT – IV

Quantum key distribution (QKD): BB84, Ekert, Semi-Quantum QKD protocols and their variations, Issues of Device Independence, Commercial products

UNIT – V

Introductory topics in Post-Quantum Cryptography: Refer to https://csrc.nist.gov/projects/post-quantum-cryptography. May discuss any two ciphers from this list.

Text Books:

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

Reference Books:

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

Note: If any student also opts for Cryptology course, in that case the ciphers discussed in this course must differ from the ciphers that will be discussed in Cryptology course.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

VII Semester

Bachelor of Technology (B. Tech.) - Computer Science and Business Systems (CSBS)

CS704-(B) Advanced Social, Text and Media Analytics

UNIT – I

Text Mining: Introduction, Core text mining operations, Preprocessing techniques, Categorization, Clustering, Information extraction, Probabilistic models for information extraction, Text mining applications

UNIT – II

Methods & Approaches: Content Analysis; Natural Language Processing; Clustering & Topic Detection; Simple Predictive Modeling; Sentiment Analysis; Sentiment Prediction

UNIT – III

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 – IV

Social Media Networks: Social network and web data and methods. Graphs and Matrices. Basic measures for individuals and networks.

UNIT – V

Social Media Analytics: Information visualization; Making connections: Link analysis. Random graphs and network evolution. Social contexts: Affiliation and identity; Social network analysis

Text Books:

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. 2011 Analyzing Social Media Networks with NodeXL: Insights from a Connected World, Morgan Kaufmann, 304
3. Avinash Kaushik. 2009. Web Analytics 2.0: The Art of Online Accountability.
4. Hanneman, Robert and Mark Riddle. 2005. Introduction to Social Network Method
5. Bing Liu, Web Data Mining-Exploring Hyperlinks, Contents, and Usage Data, Springer, Second Edition, 2011.
6. Reza Zafarani, Mohammad Ali Abbasi and Huan Liu, Social Media Mining-An Introduction, Cambridge University Press, 2014.

Reference Books:

1. Wasserman, S. & Faust, K. (1994). Social network analysis: Methods and applications. New York: Cambridge University Press.
2. Monge, P. R. & Contractor, N. S. (2003). Theories of communication networks. New York: Oxford University Press. http://nosh.northwestern.edu/vita.html.
3. Bing Liu, Sentiment Analysis: Mining Opinions, Sentiments, and Emotions, Cambridge University Press, Second Edition, 2020.
4. Ronen Feldman and James Sanger, The Text Mining Handbook: Advanced Approaches in Analyzing
5. Unstructured Data, Cambridge University Press, First Edition, 2009.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

VII Semester

Bachelor of Technology (B. Tech.) - Computer Science and Business Systems (CSBS)

CS704(C) Mobile Computing

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

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.

D2D communications in 5G cellular 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.

Laboratory:

Development and implementation of different network protocols using network simulators such as NS-3 and OMNET++.

Text Books:

1. Mobile Communications. Jochen Schiller, Pearson Education.
2. Wireless Communications. Andrea Goldsmith, Cambridge University Press.

Reference Books:

1. Wireless Communications: Principles and Practice. Theodore Rappaport, Pearson Education.
2. Wireless Communications. Ezio Biglieri, MIMO, Cambridge University Press.
3. Handbook of Wireless Networking and Mobile Computing. Ivan Stojmenovic, Wiley.
4. Dynamic Location Management in Heterogeneous Cellular Networks. James Cowling,
5. MIT Thesis. http://people.csail.mit.edu/cowling/hons/jcowling-dynamic-Nov04.pdf
6. Location Management in Wireless Cellular Networks. Travis Keshav https://www.cse.wustl.edu/~jain/cse574-06/ftp/cellular_location.pdf

List of Experiments

1. Write a program that identifies the Bluetooth devices in the wireless range.
2. Write a program that prints the signal strength of Wi-Fi connection of the given computer.
3. Prepare a wireless ad hoc network and show its working.
4. Write a program to perform infrared communication.
5. Write a program to perform Bluetooth file transfer.
6. Develop an android app which displays “Hello, welcome to Android Lab” message.
7. Develop calculator Android Application.
8. Using Android, Create a login Activity. It asks“username” and “password” from user. If username and password are valid, it display Welcome message using new activity
9. Write a program to find hamming distance. For example, Hamming distance d (v1, v2) =3if v1=011011, v2=110001.
10. Write a program that prints the signal strength of Wi-Fi connection of the given computer.