

**VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY HYDERABAD**  
**B.TECH. IV YEAR**  
**(COMPUTER SCIENCE AND BUSINESS SYSTEMS)**

**VII SEMESTER**

**R19**

<b>Course Code</b>	<b>Title of the Course</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Contact Hours/ Week</b>	<b>Credits</b>
19PC1CB15	Usability Design of Software Applications	2	1	0	3	3
19HS1MG06	Financial Management	3	0	0	3	3
<b>Professional Elective – III</b>						
19PE1CB07	Cognitive Science and Analytics	2	1	0	3	3
19PE1CB08	Introduction to IoT					
19PE1CB09	Cryptology					
<b>Professional Elective – IV</b>						
19PE1CB10	Quantum Computation and Quantum Information	2	1	0	3	3
19PE1CB11	Advanced Social, Text and Media Analytics					
19PE1CB12	Mobile Computing					
<b>Open Elective – III</b>						
19OE1CB07	Human Resource Management	3	0	0	3	3
19OE1CB08	Blockchain Technologies					
19OE1CB09	Advanced Operating Systems					
<b>Professional Electives-IV Laboratory</b>						
19PE2CB07	Quantum Computation and Quantum Information Laboratory	0	0	2	2	1
19PE2CB08	Advanced Social, Text and Media Analytics Laboratory					
19PE2CB09	Mobile Computing Laboratory					
19PC2CB11	Usability Design of Software Applications Laboratory	0	0	2	2	1
19PW4CB02	Mini-Project*	0	0	4	4	2
19PW4CB03	Major Project Phase - I	0	0	8	8	4
<b>Total</b>		<b>12</b>	<b>3</b>	<b>16</b>	<b>31</b>	<b>23</b>

**\* Mini-Project to be pursued during summer vacation after VI semester and evaluated in VII semester**

## VIII SEMESTER

R19

Course Code	Title of the Course	L	T	P	Contact Hours/ Week	Credits
<b>Professional Elective – V</b>						
19PE1CB13	Behavioural Economics	2	1	0	3	3
19PE1CB14	Computational Finance and Modeling					
19PE1CB15	Psychology					
<b>Professional Elective – VI</b>						
19PE1CB16	Enterprise Systems	2	1	0	3	3
19PE1CB17	Advance Finance					
19PE1CB18	Image Processing and Pattern Recognition					
<b>Open Elective – IV</b>						
19OE1CB10	IT Project Management	3	0	0	3	3
19OE1CB11	Services Science and Service Operational Management					
19OE1CB12	Marketing Research and Marketing Management					
19PW4CB04	Major Project Phase - II	0	0	12	12	6
<b>Total</b>		<b>7</b>	<b>2</b>	<b>12</b>	<b>21</b>	<b>15</b>

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. VII Semester

L	T/P/D	C
2	1	3

(19PC1CB15) USABILITY DESIGN OF SOFTWARE APPLICATIONS

**COURSE OBJECTIVES:**

- To create a learning system through which management students can enhance their innovation and creative thinking skills
- To acquaint themselves with the special challenges of starting new ventures
- To use IPR as an effective tool to protect their innovations and intangible assets from exploitation
- To gain expertise in redesigning an existing Application or website for better user experience

**COURSE OUTCOMES:** After completion of the course, the student shall be able to

**CO-1:** Explain fundamentals of User Centered Design and User Experience their relevance and contribution to businesses

**CO-2:** Relate the facets of User Experience (UX) Design, particularly as applied to the digital artefacts

**CO-3:** Appraise user research, solution conceptualization and validation as interwoven activities in the design and development lifecycle

**CO-4:** Analyse and identify the methods to offer a better UI experience for the applications

**UNIT – I:**

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

**UNIT – II:**

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

**UNIT – III:**

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

**UNIT – IV:**

**UX Research:** Understanding users, their goals, context of use, and environment of use. Research Techniques: Contextual Enquiry, User Interviews, Competitive Analysis for UX

**UNIT – V:**

**Personas and Scenarios:** Scenarios and Persona Technique –Overview of Design Thinking Technique - Discovery and brainstorming

**UNIT – IV:**

**Development and Prototyping:** Concept Development - Task flow detailing for the Project – Prototyping Techniques - Paper, Electronic, and Prototyping Tools.

**TEXT BOOKS:**

1. Interaction Design: Beyond Human-Computer Interaction, Jenny Preece, Helen Sharp and Yvonne Rogers 4<sup>th</sup> Edition,
2. A Practitioner's Guide to User Research, Elizabeth Goodman, Mike Kuniavsky, Andrea Moed, Observing the User Experience, 2<sup>nd</sup> Edition

**REFERENCES:**

1. About Face, Alan Cooper and Robert Reimann, 4<sup>th</sup> Edition,
2. The Elements of User Experience: User-Centered Design for the Web and Beyond, Jesse James Garrett, 2<sup>nd</sup> Edition
3. Understanding Design Thinking, Lean, and Agile, Jonny Schneider

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3	0	3

(19HS1MG06) FINANCIAL MANAGEMENT

**COURSE OBJECTIVES:**

- To understand the fundamentals of Financial Management and Time Value of Money
- To explain the Valuation of securities and calculation of portfolio of risk and return
- To understand fundamentals of Leverages and how resources are used efficiently, effectively and economically
- To understand cash management and accounts receivables in business firms

**COURSE OUTCOMES:** After completion of the course, students should be able to

**CO-1:** Analyze the concepts of financial management, and importance of Time value of Money, valuation of Securities

**CO-2:** Apply concepts of Risk and Return such as cost of capital, risk and return, and Financial Leverage

**CO-3:** Evaluate investment proposals through Capital Budgeting and working capital management

**CO-4:** Apply the concepts of Cash management of Accounts 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:**

**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.

**UNIT – IV:**

**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 – V:**

**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 – VI:**

**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 BOOKS:**

1. Financial Management, Prasanna Chandra, Theory & Practice, Tata McGraw Hill
2. Financial Management, M. Y. Khan, P. K. Jain, 8<sup>th</sup> Edition, McGraw Hill 2018

**REFERENCES:**

1. Financial Management, Srivastava, Misra, OUP
2. Fundamentals of Financial Management, Van Horne and Wachowicz, Prentice Hall/ Pearson Education
3. Investment Analysis and Management, Charles P. Jones, 9<sup>th</sup> Edition, 2004

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B.Tech. VII Semester

L	T/P/D	C
2	1	3

(19PE1CB07) COGNITIVE SCIENCE AND ANALYTICS

**COURSE OBJECTIVES:**

- To identify core concepts of data and cognitive analytics for intelligent applications
- To explore language semantics and information processing models
- To focus on engineering principles of cognitive science
- To understand the need of Cognitive engineering for business applications

**COURSE OUTCOMES:** After completion of the course, students should be able to

**CO-1:** Apply basic concepts of data analytics in the field of AI and cognitive engineering

**CO-2:** Explore the fundamentals of evolution of cognitive science for language semantics, data interpretation and memory processing

**CO-3:** Demonstrate the concepts of cognitive analytics to develop information processing system for business specifications

**CO-4:** Analyse deep understanding of learning patterns and cognitive engagement of virtual devices connected in digital environment

**UNIT – I:**

**Foundational Areas of Analytics:**

**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

**UNIT – II:**

**Foundational Areas of Cognitive Science:**

**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 – III:

#### **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 – IV:

#### **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 – V:

#### **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 – VI:

#### 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, ResNet, 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

#### TEXT BOOKS:

1. Emerging Trends and Applications in Cognitive Computing, Pradeep Kumar Mallick, Samarjeet Borah, IGI Global Publishers, 2019
2. Cognitive Science: An Introduction to the Science of the Mind, Jose Luis Bermudez, Cambridge University Press, New York, 2020
3. Evolution of Analytics, Hall P., Phan W., & Whitson K., O'Reilly Media, 2016

#### REFERENCES:

1. Cognitive Computing and Big Data Analytics, Judith S. Hurwitz, Marcia Kaufman, Adrian Bowles
2. Learning From Data: Concepts, Theory, and Methods, Cherkassky V, & Mulier F. M. John Wiley & Sons, 2007
3. Business Analytics: The Science of Data-Driven Decision Making, Kumar U. D., Wiley, 2017

4. Practical Deep Learning for Cloud, Mobile, and Edge: Real-World AI & Computer-Vision Projects Using Python, Keras & Tensor Flow, 1<sup>st</sup> Edition
5. Multivariate Data Analysis, Hair J. F., Anderson R. E., Tatham R. L., & Black W. C. Englewood Cliff, New Jersey, USA, 5(3), 207-2019, 1998

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B.Tech. VII Semester

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(19PE1CB08) INTRODUCTION TO IOT

**COURSE OBJECTIVES:**

- To understand about the fundamentals of Internet of Things and its building blocks along with their characteristics
- To understand the recent application domains of IoT in everyday life
- To understand the protocols and standards designed for IoT and the current research on it
- To understand the other associated technologies like cloud and fog computing in the domain of IoT

**COURSE OUTCOMES:** After completion of the course, students should be able to

**CO-1:** Describe basic concepts of Internet-of-Things , use cases and architecture

**CO-2:** Relate sensor and industrial systems

**CO-3:** Analyze Networking and communication for IoT

**CO-4:** Discuss IoT data processing and storage

**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 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),

**UNIT – V:**

**Communication for IoT:** Communicating with cloud applications (web services, REST, TCP/IP and UDP/IP sockets, MQTT, WebSockets, protocols. Message encoding (JSON, Protocol Buffers)

**UNIT – VI:**

**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,

**TEXT BOOKS:**

1. The Internet of Things, Samuel Greengard, MIT Press Essential Knowledge Series,
2. The Internet of Things: Enabling Technologies, Platforms, and Use Cases, Pethuru Raj and Anupama C. Raman, CRC Press

**REFERENCES:**

1. Visualizing Data-Exploring and Explaining Data with the Processing Environment, Ben Fry, O'Reilly Media
2. Raspberry Pi Computer Architecture Essentials, Andrew K. Dennis
3. Getting Started with Arduino, M. Banzi, O Reilly Media

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B.Tech. VII Semester

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(19PE1CB09) CRYPTOLOGY

**COURSE OBJECTIVES:**

- To explain the basic and emerging concepts of cryptography algorithms
- To illustrate and defend against unauthorized access using Authentication process
- To illustrate and defend the security attacks on information systems using secure algorithms
- To evaluate the key concepts of cryptanalysis and quantum cryptography

**COURSE OUTCOMES:** After completion of the course, students should be able to

**CO-1:** Illustrate the need of security to introduce strong cryptosystems and analyse the cryptographic algorithms for information security.

**CO-2:** Design the authentication schemes for membership authorization.

**CO-3:** Evaluate the requirements for secure communication and challenges related to the secure applications

**CO-4:** Provide solutions for security related issues using Post quantum cryptography

**UNIT – I:**

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

**Basic Security Services:** confidentiality, integrity, availability, non-repudiation, privacy.

**UNIT – II:**

**Basic 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.

**UNIT – III:**

**Basic Symmetric Key Cryptosystems:**

**Block Ciphers:** DES, AES, Modes of Operation; Hash Functions; Authentication.

**UNIT – IV:**

**Public Key Cryptosystems:** RSA, ECC; Digital signatures

**UNIT – V:**

**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 – VI:**

**Introductory Topics in Post-Quantum Cryptography:** Post-Quantum Cryptography, lattice-based cryptography-NTRU Encryption, code-based cryptography-McEliece Cryptosystem, hash-based cryptography

**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
3. A Course in Number Theory And Cryptography, N. Koblitz, GTM, Springer

**REFERENCES:**

1. Cryptography and Network Security. W. Stallings, Prentice Hall
2. Security Engineering, R. Anderson, Wiley
3. RC4 Stream Cipher and Its Variants, G. Paul and S. Maitra, CRC Press, Taylor & Francis Group, Chapman & Hall Book, 2012
4. Design & Cryptanalysis of ZUC - A Stream Cipher in Mobile Telephony, C. S. Mukherjee, D. Roy, S. Maitra, Springer, 2020
5. Contact Tracing in Post-Covid World - A Cryptologic Approach, P. Chakraborty, S. Maitra, M. Nandi, S. Talnikar, Springer, 2020

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(19PE1CB10) QUANTUM COMPUTATION AND QUANTUM INFORMATION

**COURSE OBJECTIVES:**

- To understand the fundamental concepts on quantum computing
- To learn how to do computation using basic and advanced quantum algorithms
- To understand random number generators for quantumness
- To understand communication using quantum key distribution and post-quantum cryptography

**COURSE OUTCOMES:** After completion of the course, students should be able to

**CO -1:** Identify the concepts related to basic quantum information processing

**CO -2:** Analyze the behavior of basic and advanced quantum algorithms

**CO-3:** Explain quantum true random number generators to ensure the strongest level of encryption

**CO-4:** Choose secure communication using quantum key distribution method and Post-Quantum Cryptography related algorithms

**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 Basics:** Deutsch-Jozsa, Simon, Grover, Shor, Implication of Grover's and Simon's algorithms towards classical symmetric key cryptosystems

**UNIT – III:**

**Quantum Algorithms Advanced:** Implication of Shor's algorithm towards factorization and Discrete Logarithm based classical public key cryptosystems

**UNIT – IV:**

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

**UNIT – V:**

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

**UNIT – VI:**

**Introductory Topics in Post-Quantum Cryptography:** Is cryptography dead? A taste of post-quantum cryptography .Challenges in post-quantum cryptography. Quantum-resistant public-key cryptographic algorithms(any two) 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. Preskill Lecture notes: Available online:  
<http://www.theory.caltech.edu/~preskill/ph229/>

**REFERENCES:**

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 Algorithms for Cryptographically Significant Boolean Functions - An IBMQ Experience, SAPV Tharmashastha, D. Bera, A. Maitra and S. Maitra, Springer 2020
4. Handbook of Applied Cryptography, A. J. Menezes, P. C. van Oorschot, and S. A. Vanstone, CRC Press



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(19PE1CB11) ADVANCED SOCIAL, TEXT AND MEDIA ANALYTICS

**COURSE OBJECTIVES:**

- To provide an overview of common text mining and social media data analytic activities
- To understand the complexities of processing text and network data from different data sources
- Understand and apply social media analytics tools.
- To enable students to solve complex real-world problems for sentiment analysis and recommendation systems

**COURSE OUTCOMES:** After completion of the course, Student should be able to

**CO-1:** Understand Text Mining and carry out Pattern Discovery, Predictive Modeling

**CO-2:** Find state of the art web mining tools and libraries on realistic data sets as a basis for business decisions and applications

**CO-3:** Explore the use of social network analysis to understand the growing connectivity and complexity in the world around us on different scales – ranging from small groups to the World Wide Web

**CO-4:** Perform social network analysis to identify important social actors, subgroups (i.e., clusters), and network properties in social media sites such as Twitter, Facebook, and YouTube

**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,

**UNIT – IV:**

Web crawling and Indexing, Ranking algorithms, Web traffic models

**UNIT – V:**

**Social Media Analytics:** Social network and web data and methods. Graphs and Matrices. Basic measures for individuals and networks. Information visualization;

## **UNIT – VI:**

**Making Connections:** Link analysis. Random graphs and network evolution. Social contexts: Affiliation and identity; Social network analysis

### **Home Assignments:**

1. Language Analysis: Students are expected to analyze the language of a category of text (e.g., literary, academic, social media) of their selection. Based on the analysis, students are expected to provide a critical description of the texts involved and possibly distinguishing them from other texts and/or uncovering relationships or concepts communicated by the text authors.
2. Students are required Perform sentiment analysis using Twitter. Students will be required touse off the-shelf software and/or code of their own to detect sentiment/emotion in the data and write a description of the methods they use and the results.

### **TEXT BOOKS:**

1. The Text Mining Handbook: Advanced Approaches in Analyzing Unstructured Data, Ronen Feldman and James Sanger, Cambridge University Press, 2006
2. Analyzing Social Media Networks with NodeXL: Insights from a Connected World, Hansen, Derek, Ben Shneiderman, Marc Smith, 2011 Morgan Kaufmann, 304
3. Web Analytics 2.0: The Art of Online Accountability, Avinash Kaushik, 2009

### **REFERENCES:**

1. Introduction to Social Network Method Hanneman, Robert and Mark Riddle, 2005
2. Social Network Analysis: Methods and Applications, Wasserman S. & Faust K. New York, Cambridge University Press, 1994
3. Theories of Communication Networks, Monge P. R. & Contractor N. S, New York, 2003
4. <http://nosh.northwestern.edu/vita.html>, Oxford University Press
5. Web Data Mining Exploring Hyperlinks, Contents, and Usage Data, Bing Liu, 2<sup>nd</sup> Edition, Springer, 2011

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. VII Semester

L	T/P/D	C
2	1	3

### (19PE1CB12) MOBILE COMPUTING

#### COURSE OBJECTIVES:

- To learn about the basic concepts of wireless and mobile infrastructure
- To learn location management, handoff process, narrowband and wide band spectrum
- To describe current technology trends for the implementation and deployment of Mobile ad hoc and wireless sensor networks
- To design the wireless networks based on the cognitive radios and gives an understanding of cognitive radio architecture and D2D communications in 5G cellular networks

**COURSE OUTCOMES:** After completion of the course, students should be able to

**CO-1:** To understand the concepts of wireless, mobile infrastructure and to create propagation and path loss models

**CO-2:** To understand location management, handoff process, narrowband and wideband spectrum.

**CO-3:** Analyze the functionality of wireless transmission protocols and enables the students to examine the important aspects of Mobile Ad hoc Networks and wireless sensor networks

**CO-4:** Design and understand the wireless networks based on the cognitive radios, and to explain the concepts behind D2D communications in 5G Cellular networks

#### 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 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 Adhoc 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.

### **UNIT – VI:**

**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.

### **TEXT BOOKS:**

1. Mobile Communications, Jochen Schiller, Pearson Education
2. Wireless Communications, Andrea Goldsmith, Cambridge University Press
3. Wireless Communications: Principles and Practice, Theodore Rappaport, Pearson Education

### **REFERENCES:**

1. Wireless Communications, Ezio Biglieri, MIMO, Cambridge University Press
2. Handbook of Wireless Networking and Mobile Computing, Ivan Stojmenovic, Wiley
3. Dynamic Location Management in Heterogeneous Cellular Networks, James Cowling
4. MIT Thesis <http://people.csail.mit.edu/cowling/hons/jcowling-dynamic-Nov04.pdf>
5. Principles of Mobile Communication, Gordon L. Stber, Springer

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B.Tech. VII Semester

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3	0	3

(19OE1CB07) HUMAN RESOURCE MANAGEMENT

**COURSE OBJECTIVES:**

- To understand the functions, systems, policies and applications of Human Resource Management in organizations
- To familiarize how HRM assess the constraints and opportunities associated with managing employees in different socio-economic and political context
- To explain the emerging horizons of HRM in Organizations
- To comprehend how HRM activities lead to performance and sustainability of the organization

**COURSE OUTCOMES:** After completion of the course, students should be able to

**CO-1:** Analyse of the concept of human resource management and its relevance in organizations

**CO-2:** Identify necessary skill set for application of various HR functions

**CO-3:** Design the strategic HR activities with real time organisational environment

**CO-4:** Assess cross-cultural work dynamics and HR activities

**UNIT – I:**

**Human Resource 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; Training.

**UNIT – III:**

**Functional Areas of HRM:** recruitment and staffing, benefits, compensation, employee relations, HR compliance, organizational design, training and development, human resource information systems (H.R.I.S.) and payroll.

**UNIT – IV:**

**Human Resource Planning:** Demand Forecasting, Action Plans– Retention, Training, Redeployment & 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

**UNIT – VI:**

Human Resource Management in Service Sector- Special considerations for Service Sector including

- Managing the Customer – Employee Interaction
- Employee Empowerment and Customer Satisfaction
- Service Failure and Customer Recovery – the Role of Communication and Training
- Similarities and Differences in Nature of Work for the Frontline Workers and the Backend
- Support Services - Impact on HR Practices Stressing Mainly on Performance
- Flexible Working Practices – Implications for HR

**TEXT BOOKS:**

1. Human Resource Management, Dessler G., Varrkey B., 16<sup>th</sup> Edition, Pearson Education, India, 2020
2. International Human Resource Management, Peter J. Dowling, Marion Festing, Allen D. Engle, Cengage, 2017

**REFERENCES:**

1. Human Resource and Personal Management, K. Aswathappa, 8<sup>th</sup> Edition, Tata McGraw Hill, 2017
2. Human Resource Management, Joseph J. Martocchio, 15<sup>th</sup> Edition, Pearson Education Champaign, 2019
3. Human Resource Management, Mathis R. L., Jackson J. H., 15<sup>th</sup> Edition, Jakarta, SalembaEmpat

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(19OE1CB08) BLOCKCHAIN TECHNOLOGIES

**COURSE OBJECTIVES:**

- To study the concepts and foundation of Blockchain Technology
- To understand security mechanism and Consensus in Blockchain
- To design use cases and architecture Blockchain Technology
- To study benefits, limitations and identify application area of Blockchain Technology

**COURSE OUTCOMES:** After completion of the course, students should be able to

**CO-1:** Gain a clear understanding of the concepts that underlie digital distributed ledger

**CO-2:** Understand key mechanisms like decentralization, transparency and trust, Immutability

**CO-3:** Understand and apply the concept of Hash Function and Related Hash algorithms for high secure and availability of systems

**CO-4:** Learn how to design and implement any application in Blockchain Technology

**UNIT – I:**

**Introduction to Blockchain:** Introduction to centralized decentralized and distributed system, Distributed database, History of Blockchain, Various technical definitions of Blockchain, Generic elements of a blockchain: Block, Transaction, Peer-to-peer network, Node, genesis block, Why It's Called "Blockchain", characteristics of Blockchain.

**UNIT – II:**

Concept of Blockchain Technology, Structure of Blockchain, Component of block, Applications of blockchain technology, Tiers of blockchain technology Blockchain 0, Blockchain 1, Blockchain 2, Blockchain 3, Generation, Smart Contract.

**UNIT – III:**

Consensus mechanism, various consensus algorithm, Cryptography and Technical Foundations, Confidentiality, Integrity, Authentication, CAP theorem and blockchain, Public and private keys, RSA, Discrete logarithm problem, Message Digest (MD), Hashing, Hash Function, Secure Hash Algorithms (SHAs), Design of Secure Hash Algorithms (SHA), SHA-256, Design of SHA3, Elliptic Curve Digital signature algorithm.

**UNIT – IV:**

**Types of Blockchain:** Public blockchains, Private blockchains, Semi-private blockchains, Tokenization of assets, Tokenized blockchains, Tokenless blockchains, ledger, Permissioned ledger Distributed ledger Shared ledger application area of various types of blockchain.

**UNIT – V:**

Financial markets and trading, Trading, Exchanges, Trade life cycle, Order anticipators, Market manipulation, Crypto Currency: Bitcoin, Bitcoin definition, Keys and addresses, Public keys in Bitcoin, Private, keys in Bitcoin, Bitcoin currency units

**UNIT – VI:**

**Implementation Platforms:** Hyperledger as a protocol, Reference architecture, Hyperledger Fabric, Transaction Flow, Hyperledger Fabric Details, Fabric Membership, Fabric Membership, comparison between various platform.

**TEXT BOOKS:**

1. Mastering Blockchain, Imanan Bashir
2. Blockchain Technology, Chandramouli Subramanian, Universities Press

**REFERENCE:**

1. Blockchain For Dummies®, IBM Limited Edition, John Wiley & Sons, Inc



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(19OE1CB09) ADVANCED OPERATING SYSTEMS

**COURSE OBJECTIVES:**

- To understand main components of Real time Operating system and their working
- To study the operations performed by OS as a resource manager
- To understand the scheduling policies of DOS
- To implement the working principles of OS

**COURSE OUTCOMES:** After completion of the course, students should be able to

**CO-1:** Explain what a real-time operating system (RTOS) is, how real-time operating systems are useful for measurement and control applications

**CO-2:** Understand distributed operating system design issues, features and principles of working

**CO-3:** Analyze functions of Network operating systems

**CO-4:** Understand kernel Issues and development principles

**UNIT – I:**

**Real-time Operating Systems:** Introduction to Real-Time Operating Systems, Definitions, Role of an OS in Real Time Systems, Important Terminology and Concepts Example

**UNIT – II:**

**Real-Time Applications:** How Real-Time OSs Differ from General-Purpose OSs, Design issues, principles and case study.

**UNIT – III:**

**Distributed Operating System:** Introduction to Distributed Systems, Definitions, Goals, Advantages of Distributed Systems over Centralized Systems, Advantages of Distributed Systems over Independent PCs, Disadvantages of Distributed Systems Design issues, features and principles of working, case study.

**UNIT – IV:**

**Network Operating System:** Introduction to Network operating system, Definitions, Different types of network operating systems, Function of Network operating systems, Design issues, working principles and characteristic features, case study.

**UNIT – V:**

**Kernel Development:** Introduction, Overview, Issues and development principles, case study.

**UNIT – VI:**

Protection, privacy, access control and security issues, solutions.

**TEXT BOOKS:**

1. Applied Operating System Concepts, A. Silberschatz, Wiley, 2000
2. Operating System Principles, Lubemir F. Bic and Alan C. Shaw, Pearson Education, 2003
3. Distributed Operating Systems, Andrew S. Tanenbaum, PHI

**REFERENCES:**

1. Operating Systems: Internal and Design Principles, Stallings, 6<sup>th</sup> Edition, PE
2. Modern Operating Systems, Andrew S. Tanenbaum, 3<sup>rd</sup> Edition, PE
3. Operating System Principles, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 7<sup>th</sup> Edition, John Wiley
4. UNIX User Guide, Ritchie & Yates

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0	2	1

(19PE2CB07) QUANTUM COMPUTATION AND QUANTUM INFORMATION LABORATORY

**COURSE OBJECTIVES:**

- To understand the fundamental concepts on quantum computing
- To learn how to do computation using basic and advanced quantum algorithms
- To understand random number generators for quantumness
- To understand communication using quantum key distribution and post-quantum cryptography

**COURSE OUTCOMES:** After completion of the course, students should be able to

**CO-1:** Relate quantum instruction set architecture for performing quantum computations

**CO-2:** Identify and implement logics using quantum circuits

**CO-3:** Design and implement quantum algorithms

**CO-4:** Relate outcomes by implementing optimized quantum algorithms

**LIST OF PROGRAMS:**

**Week 1,2:** Introduction of quantum Instruction Set Architecture for quantum computations (quil)

**Week 3,4:** Use of quantum instruction language such as pyQuil for performing any quantum computations

**Week 5:** Programs using bits and qubits

**Week 6,7,8:** Implementation of quantum algorithms - Deutsch–Jozsa problem, Simon's algorithm and Shor's algorithm

**Week 9:** Implement classical logics using quantum circuits

**Week 10:** Program to implement Quantum counting

**Week 11,12:** Programs for Quantum optimization algorithms

**Week 13:** Program for quantum walk to solve problems include search and sampling without errors

**Week 14:** Implementation of Quantum algorithm for solving linear systems of equations

**TEXT BOOKS:**

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

**REFERENCES:**

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/](https://courses.cs.ut.ee/all/MTAT.07.024/2017_fall/uploads/)

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0	2	1

(19PE2CB08) ADVANCED SOCIAL, TEXT AND MEDIA ANALYTICS LABORATORY

### COURSE OBJECTIVES:

- To learn how to obtain, monitor, and evaluate social media data from major online platforms like Twitter and facebook
- To understand problems in analysing the free-form text using classification and clustering techniques
- To learn the advantages/disadvantages of using social media data

**COURSE OUTCOMES:** After completion of the course, students should be able to

**CO-1:** Utilize various Application Programming Interface (API) services to collect data from different social media sources such as YouTube, Twitter

**CO-2:** Explore how to process the collected data - using methods involving correlation, regression, and classification to derive insights about the sources and people who generated that data

**CO-3:** Analyse unstructured data - primarily textual comments - for sentiments expressed in them

**CO-4:** Use different tools for collecting, analysing, and exploring social media data for research and development purposes

### LIST OF PROGRAMS:

**Week 1, 2:** Implement page ranking algorithm

**Week 3, 6:** Implement text classification and clustering algorithms

### Implement topic modelling using LDA

**Week 7:** Extracting Data from Twitter Using Python

### Extracting Data from YouTube Using Python

**Week 8:** Statistical Analysis with Twitter Data

**Week 9,10:** Analysing Social Media Data Using Python

**Week 11,12:** Sentiment Analysis with Twitter

**Week13,14:** Implement web crawling

### TEXT BOOKS:

1. The Text Mining Handbook: Advanced Approaches in Analyzing Unstructured Data, Ronen Feldman and James Sanger, Cambridge University Press, 2006
2. Analyzing Social Media Networks with NodeXL: Insights from a Connected World, Hansen, Derek, Ben Shneiderman, Marc Smith, Morgan Kaufmann, 2011
3. Web Analytics 2.0: The Art of Online Accountability, Avinash Kaushik, 2009

**REFERENCES:**

1. Introduction to Social Network Method, Hanneman, Robert and Mark Riddle, 2005
2. Social network analysis: Methods and Applications, Wasserman S. & Faust K. New York: Cambridge University Press, 1994
3. Theories of Communication Networks, Monge, P. R. & Contractor, N. S, Oxford University Press. <http://nosh.northwestern.edu/vita.html>, 2003
4. Web Data Mining – Exploring Hyperlinks, Contents, and Usage Data, Bing Liu, 2<sup>nd</sup> Edition, Springer, 2011

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<b>0</b>	<b>2</b>	<b>1</b>

**(19PE2CB09) MOBILE COMPUTING LABORATORY**

**COURSE OBJECTIVES:**

- To learn about various wireless & cellular communication networks and various telephone and satellite networks
- To build knowledge on various Adhoc and sensor networks routing protocol and energy efficient protocol
- To build skills in working with Cognitive radio networks and recent telecommunication networks
- To design and development of various network protocol using simulation tools

**COURSE OUTCOMES:** After completion of course, the student should be able to

**CO-1:** Design various wireless network protocols using simulation tools

**CO-2:** Develop various wireless network protocols using simulation tools

**CO-3:** Apply testing on various wireless network protocols using simulation tools

**CO-4:** Describe and document various wireless network protocols using simulation tools

**LIST OF EXPERIMENTS:**

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

**Week 1,2:** Implement MAC Protocol

**Week 3,4:** Implement Routing Protocol

**Week 5,6:** Implement Transport Protocol

**Week 7,8,9:** Implement Congestion Control Protocol

**Week 10,11,12:** Implement Application Protocol

**Week 13,14:** Implement Security Protocol

**TEXT BOOKS:**

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

**REFERENCES:**

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

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0	2	1

(19PC2CB11) USABILITY DESIGN OF SOFTWARE APPLICATIONS LABORATORY

**COURSE OBJECTIVES:**

- To create an application that emerged from a problem statement or real-world problems
- To adopt the design life cycle while analyzing, designing, and developing the application
- To identify scenarios and develop the prototype for each task flow
- To gain expertise in developing and testing the applications with proper usage of Niche technologies and testing techniques

**COURSE OUTCOMES:** After completion of the course, students should be able to

**CO-1:** Identify or create a problem statement to solve real-world problems

**CO-2:** Analyse and Design the application by following the design life cycle

**CO-3:** Develop the application using Niche technologies for identified scenarios in Iterations

**CO-4:** Demonstrate the application through presentation after thorough testing using applicable testing techniques

**LIST OF PROGRAMS:**

**Week 1,2:** Identify a website or an App to redesign, with justification.

**Week 3,4:** Analysis of the mobile app or the website through the design life cycle.

**Week 5,6:** Identifying Personas and Scenarios for the App or the website.

**Week 7,8:** Concept development and task flow detailing.

**Week 9,10:** Prototype development with Iterations and justification

**Week 11,12:** Usability testing and demonstration

s/w: Rational Rose, HTML, CSS, JavaScript(jdk)

**TEXT BOOKS:**

1. Interaction Design: Beyond Human-Computer Interaction, Jenny Preece, Helen Sharp and Yvonne Rogers, 4<sup>th</sup> Edition
2. Observing the User Experience, A Practitioner's Guide to User Research, Elizabeth Goodman, Mike Kuniavsky, Andrea Moed, 2<sup>nd</sup> Edition

**REFERENCES:**

1. About Face, Alan Cooper and Robert Reimann, 4<sup>th</sup> Edition
2. The Elements of User Experience: User-Centered Design for the Web and Beyond, Jesse James Garrett, 2<sup>nd</sup> Edition
3. Understanding Design Thinking, Lean, and Agile, Jonny Schneider

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(19PW4CB02) MINI-PROJECT

**COURSE OUTCOMES:** After completion of the course, students should be able to

**CO-1:** Understand the formulated industry / technical problem

**CO-2:** Analyze and / or develop models for providing solution to Industry / Technical problems

**CO-3:** Interpret and arrive at conclusions from the project carried out

**CO-4:** Demonstrate effective communication skills through oral presentation

**CO-5:** Engage in effective written communication through project report

**COURSE OUTLINE:**

- A student shall undergo an industry oriented mini-project, in collaboration with an industry of their specialization, during the summer vacation after sixth semester (III year II semester) of the B.Tech. programme.
- Mini-project shall be carried out for a minimum period of 04 weeks and maximum of 06 weeks.
- Evaluation of the mini-project shall be done by a Project Review Committee (PRC) consisting of the Head of the Department, faculty supervisor and a senior faculty member of the department.
- The industry oriented mini-project shall be submitted in a report form and presented before the Project Review Committee (PRC) for evaluation.



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2	1	3

(19PE1CB13) BEHAVIOURAL ECONOMICS

**COURSE OBJECTIVES:**

- To understand the concepts of behavioural economics
- To impart knowledge on current ideas and concepts regarding decision making in economics, particularly from a behavioural science perspective
- To explore key departures and the consequences of behaviour of firms, households and other economics entities
- To provide an overview of how behavioural principles have been applied to economic problems

**COURSE OUTCOMES:** After completion of this course, the student should be able to

**CO-1:** Identify and evaluate evidence for systematic departures of economic behaviour from the Predictions of the neoclassical model, and psychological explanations for these anomalies

**CO-2:** Incorporate psychologically motivated assumptions into economic models, and interpret the implications of these assumptions

**CO-3:** Analyze the principles of game theory and ability to interpret incentives of people in interpersonal interactions

**CO-4:** Apply Behavioural principles in economic problems

**UNIT – I:**

**Introduction:** The neoclassical/standard model and behavioral economics in contrast; historical background; behavioral economics and other social sciences; theory and evidence in the social sciences and in behavioral economics; applications – gains and losses, money illusion, charitable donation.

**UNIT – II:**

**Basics of Choice Theory:** Revisiting the neoclassical model; utility in economics and psychology; models of rationality; connections with evolutionary biology and cognitive neuroscience; policy analysis – consumption and addiction, environmental protection, retail therapy; applications – pricing, valuation, public goods, choice anomalies

**UNIT – III:**

**Beliefs, Heuristics and Biases:** Revisiting rationality; causal aspects of irrationality; different kinds of biases and beliefs; self-evaluation and self-projection; inconsistent and biased beliefs; probability estimation; trading applications – trade in counterfeit goods, financial trading behavior, trade in memorabilia

#### **UNIT – IV:**

**Choice under Uncertainty:** Background and expected utility theory; prospect theory and other theories; reference points; loss aversion; marginal utility; decision and probability weighting; applications – ownership and trade, income and consumption, performance in sports.

#### **UNIT – V:**

**Intertemporal Choice:** Geometric discounting; preferences over time; anomalies of inter-temporal decisions; hyperbolic discounting; instantaneous utility; alternative concepts – future projection, mental accounts, heterogeneous selves, procedural choice; policy analysis – mobile calls, credit cards, organization of government; applications – consumption and savings, clubs and membership, consumption planning

#### **UNIT – VI:**

##### **Strategic Choice:**

1. Review of game theory and Nash equilibrium – strategies, information, equilibrium in pure and mixed strategies, iterated games, bargaining, signaling, learning; applications – competitive sports, bargaining and negotiation, monopoly and market entry
2. Individual preferences; choice anomalies and inconsistencies; social preferences; altruism; fairness; reciprocity; trust; learning; communication; intention; demographic and cultural aspects; social norms; compliance and punishment; inequity aversion; policy analysis – norms and markets, labor markets, market clearing, public goods; applications – logic and knowledge, voluntary contribution, compensation design.

#### **TEXT BOOKS :**

1. An Introduction to Behavioral Economics, N. Wilkinson and M. Klaes, 3<sup>rd</sup> Edition, Palgrave MacMillan
2. Introduction to Behavioral Economics, David R. Just, Wiely

#### **REFERENCE:**

1. Behavioural Economics: A Very Short Introduction (Very Short Introductions) Illustrated Edition, Oxford Press

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### (19PE1CB14) COMPUTATIONAL FINANCE AND MODELING

#### COURSE OBJECTIVES:

- To understand existing financial models in a quantitative and mathematical way
- To understand the quantitative tools to solve complex problems in the areas of portfolio management, risk management and financial engineering
- To explain the approaches required to calculate the price of options
- To identify the methods required to analyse information from financial data and trading systems

**COURSE OUTCOMES:** After completion of the course, students should be able to

**CO-1:** Analyze and interpret financial data, mathematical foundations of finance and financial modeling.

**CO-2:** Apply the skills and knowledge of financial markets and instruments, and application of tools and techniques of quantitative finance and option pricing models

**CO-3:** Evaluate and manage various types of financial risks, and design and test computational finance models

**CO-4:** Analyze the advance knowledge in designing, developing and testing of computational finance models

#### UNIT – I:

Numerical methods relevant to integration, differentiation and solving the partial differential equations of mathematical finance: examples of exact solutions including Black Scholes and its relatives, finite difference methods including algorithms and question of stability and convergence, treatment of near and far boundary conditions, the connection with binomial models, interest rate models, early exercise, and the corresponding free boundary problems, and a brief introduction to numerical methods for solving multi-factor models.

#### UNIT – II:

**Black-Scholes Framework:** Black-Scholes PDE: simple European calls and puts; put-call parity. The PDE for pricing commodity and currency options. Discontinuous payoffs - Binary and Digital options. The Greeks: theta, delta, gamma, vega & rho and their role in hedging. The mathematics of early exercise - American options: perpetual calls and puts; optimal exercise strategy and the smooth pasting condition. Volatility considerations - actual, historical, and implied volatility; local vol and volatility surfaces.

Simulation including random variable generation, variance reduction methods and statistical analysis of simulation output. Pseudo random numbers, Linear congruential generator, Mersenne twister RNG. The use of Monte Carlo simulation in solving applied problems on derivative pricing discussed in the current finance literature. The technical topics addressed include importance sampling, Monte Carlo integration,

Simulation of Random walk and approximations to diffusion processes, martingale control variables, stratification, and the estimation of the “Greeks. ”

#### **UNIT – III:**

**Financial Products and Markets:** Introduction to the financial markets and the products which are traded in them: Equities, indices, foreign exchange, and commodities. Options contracts and strategies for speculation and hedging.

#### **UNIT – IV:**

Application areas include the pricing of American options, pricing interest rate dependent claims, and credit risk. The use of importance sampling for Monte Carlo simulation of VaR for portfolios of options.

#### **UNIT – V:**

**Statistical Analysis of Financial Returns:** Fat-tailed and skewed distributions, outliers, stylized facts of volatility, implied volatility surface, and volatility estimation using high frequency data.

#### **UNIT –VI:**

Copulas, Hedging in incomplete markets, American Options, Exotic options, Electronic trading, Jump Diffusion Processes, High-dimensional covariance matrices, Extreme value theory, Statistical Arbitrage.

#### **TEXT BOOKS:**

1. Tools for Computational Finance, R. Seydel, 2<sup>nd</sup> Edition, Springer-Verlag, New York, 2004
2. Monte Carlo Methods in Financial Engineering, P. Glasserman, Springer-Verlag, New York, 2004
3. Statistics and Data Analysis for Financial Engineering, D. Ruppert

#### **REFERENCES:**

1. Numerical Recipes in C: The Art of Scientific Computing, W. Press, S. Teukolsky, W. Vetterling and B. Flannery, Cambridge University Press, Cambridge, 1997, UK Available on-line at: <http://www.nr.com/>
2. Option Valuation under Stochastic Volatility, A. Lewis:, Finance Press, Newport Beach, California, 2000
3. Efficient Methods for Valuing Interest Rate Derivatives, A. Pelsser:, Springer-Verlag, New York, 2000
4. Analysis of Financial Time Series, R. S. Tsay
5. Statistics of Financial Markets: An Introduction, J. Franke, W. K. Härdle and C. M. Hafner

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(19PE1CB15) PSYCHOLOGY

**COURSE OBJECTIVES:**

- To understand the content areas of industrial psychology and the application of psychological theory to organizational issues
- To describe about employment law, job analysis, recruitment and selection, training, performance appraisal and discipline, employee motivation, and workplace safety
- To explain how the science of human behaviour is used to select, develop, and manage employees
- To understand and learn how organizations can create a supportive work environment

**COURSE OUTCOMES:** After completion of the course, students should be able to

**CO-1:** Analyse the major content areas of Industrial Psychology (i.e., job analysis, recruitment, selection, employment law, training, performance management, and health/well-being issues in the workplace)

**CO-2:** Select the tests and measurements, collect accurate information and make sound data-based decisions

**CO-3:** Analyse the behaviour of individuals and groups in organizations in terms of the key factors that influence organizational behavior

**CO-4:** Evaluate the appropriateness of various leadership styles, organizational development strategies and motivational strategies used in a variety of organizational settings

**UNIT – I:**

**Introduction:** What is I/O Psychology? Research Methods, Statistics, and Evidence-based Practice, Introduction & Legal Context of Industrial Psychology, Job Analysis & Competency Modeling, Job Evaluation & Compensation, Job Design & Employee Well-Being, Recruitment.

**UNIT – II:**

**Evaluating the Quality of Performance Measures:** Identifying Criteria & Validating Tests and Measures, Screening Methods, Intensive Methods

**UNIT – III:**

**Employee Performance and Evaluation:** Performance Goals and Feedback, Performance Coaching and Evaluation, Evaluating Employee Performance

**UNIT – IV:**

**Organizational Fairness and Diversity Management:** Employee Motivation, Satisfaction and Commitment, Fairness and Diversity

**UNIT – V:**

**Organizational Behaviour:** The Organization of Work Behaviour, Teams in Organizations, Stress Management: Demands of Life and Work

**UNIT – VI:**

**Leadership and Organizational Development:** Leadership, Organizational Climate, Culture, and Development

**TEXT BOOKS:**

1. Work in the 21<sup>st</sup> Century, Landy F. J. and Conte J. M., 4<sup>th</sup> Edition, Oxford Blackwell Publishing, 2013
2. Organizational Behavior, Stephen Robbins, Prentice Hall, 2013

**REFERENCES:**

1. Industrial-Organizational Psychology, Miner B. J., McGraw Hill Inc., 1992
2. Human Resource Management: Text & Cases, K. Ashwathappa, 8<sup>th</sup> Edition, McGraw Hill Education, 2017
3. Industrial/Organizational Psychology: An Applied Approach, Aamodt M., 8<sup>th</sup> Edition, Wadsworth Publishing Co., 2015
4. Organizational Behavior, Fred Luthans, McGraw Hill, 2013

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(19PE1CB16) ENTERPRISE SYSTEMS

**COURSE OBJECTIVES:**

- To introduce the essential concepts of ERP involved in business processes
- To impart skills in the design and implementation of ERP architecture
- To impart skills in the implementation of ERP architecture
- To familiarize with various tools and technologies for developing ERP for large project

**COURSE OUTCOMES:** After completion of the course, students should be able to

**CO-1:** Identify the design involved in simple web applications using MVC architecture, related tools and techniques

**CO-2:** Evaluate SOA, ERP models, design and implement CRM, SRM models

**CO-3:** Analyze interactive network and applications

**CO-4:** Develop model for ERP for large projects understanding both hardware and software requirements

**UNIT – I:**

**Model - View - Control (MVC) Architecture:** Overview of MVC -MVC method of software development in a 3-tier environment -Control (MVC) development in a 3-tier environment.

**UNIT – II:**

**Tools and Technologies:** Microsoft .NET framework, PHP, Ruby on Rails, JavaScript, Ajax and Overview of SAP and Oracle Applications

**UNIT – III:**

**ERP Architecture and Generic Modules:** Service Oriented Architecture (SOA) - Principles of loose coupling – encapsulation - Inter-operability - Enterprise Resource Planning (ERP) systems and their architecture - Generic ERP Modules: Finance, HR, Materials Management, Investment - Examples of Domain Specific Modules

**UNIT – IV:**

**ERP Technologies:** Business Process Reengineering - Decision Support System - On-Line Analytical Processing -Electronic Data Exchange - Customer Relationship Management (CRM) - Supplier Relationship Management (SRM)

**UNIT – V:**

**ERP Networking & Security:** Overview of MPLS - Virtual Private Networks (VPN) – Firewalls - Network monitoring and enforcement of policies - ERP Security Issues – Authentication – Authorisation - Access control – Roles - single-sign-on -Directory servers - Audit trails - Digital signatures – Encryption - review of IPsec - SSL

## **UNIT – VI:**

### **Software Architectures for Enterprise Systems:**

**Software:** Acquisition Process – Tendering - conditions of contract - Commercial off the shelf software (COTS) Implementations - Bespoke Implementations - Total cost of ownership - Issues on using Open source software or free software and Licensed software

**Hardware Architectures for Enterprise Systems:** Hardware: Servers –Storage area networks - Storage units - Back-up strategies - Local Area Network (LAN) technologies and products - Data Centres - Hardware Acquisition - Disaster Recovery

### **TEXT BOOKS:**

1. Enterprise Resource Planning, Alexis Leon, 4<sup>th</sup> Edition, Tata McGraw Hill, 2020
2. Enterprise Resource Planning and Supply Chain Management, Kurbel K. E., Springer, 2016

### **REFERENCES:**

1. Enterprise Resource Planning - Fundamentals of Design and Implementation, Ganesh K., Sanjay M., Anbuudayasankar S. P., Sivakumar P., Springer, 2014
2. Enterprise Systems for Management, Luvai F. Motiwalla and Jeff Thompson, 2<sup>nd</sup> Edition, Pearson, ISBN-13: 978-0-13-214576-3, 2011
3. Enterprise Systems for Management, Motiwalla, L. F., & Thompson J., eBook, 2<sup>nd</sup> Edition, Boston, MA, Pearson, 2012



VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. VIII Semester

L	T/P/D	C
2	1	3

(19PE1CB17) ADVANCE FINANCE

**COURSE OBJECTIVES:**

- To understand about the various financial sources and instruments, and the Corporate Dividend decisions
- To explain about Leasing and decisions involving Leasing, Organizational goals with optimum investment, and Corporate Restructuring
- To understand financial restructuring and working capital management in business firms
- To understand risk and return in the Derivatives, swaps

**COURSE OUTCOMES:** After completion of the course, students should be able to

**CO-1:** Analyze the decisions involved in sources of finance and Dividend Decisions

**CO-2:** Interpretation of business information and application of financial theory in corporate investment decisions, and assess working capital management and leasing contracts

**CO-3:** Evaluate the corporate and financial restructuring

**CO-4:** Analyze the Derivative Markets and Swaps

**UNIT – I:**

**Sources of Funds (including regulatory framework):** Types of securities; Issuing the capital in market; Pricing of issue; Valuation of Stocks and bonds

**UNIT – II:**

**Dividend Decisions:** Traditional Approach, Dividend Relevance Model, Miller and Modigliani Model, Stability of Dividends, Forms of Dividends, Issue of bonus shares, Stock Split.

**UNIT – III:**

Evaluation of Lease Contracts

**UNIT – IV:**

**Corporate Restructuring:** Mergers and Acquisitions- Types of Mergers, Evaluation of Merger Proposal; Take-over; Amalgamation; Leverage buy-out; Management buy-out; Corporate Failure and Liquidation

**UNIT – V:**

Financial Restructuring; Share Split; Consolidation; Cancellation of Paid-up Capital; Other Mechanisms

**UNIT – VI:**

**Working Capital Management and Introduction to derivatives:** Working Capital Planning; Monitoring and Control of Working Capital; Working Capital Financing;

Managing the Components of Working Capital-Cash Management-Receivable Management- Inventory Management-Introduction to derivatives; Basics of Futures, Forwards, Options, Swaps; Interest rate Payoff Diagrams, Pricing of Futures, Put Call Parity, Option Pricing using Binomial Model and Black Scholes Model Use of Derivatives for Risk-Return Management- Credit Default Swaps

**Home Assignment:**

Case study materials book will be given to students. Students are required to meet in groups before coming to class and prepare on the case for the day. Instructor may ask the student groups to present their analysis and findings to the class.

Further, the topic for class discussion will be mentioned beforehand and students should be prepared to discuss these topics in class. Few topics are mentioned below as examples. Instructor can add or change any topic as per requirement.

1. Topic: Historical perspectives of markets like major boom and busts, bull and bear cycles, major market crashes, bubbles
2. Topic: Major scams in the market, e.g. Satyam case

**TEXT BOOKS:**

1. Principles of Corporate Finance, Brealey, Myers and Allen, 11<sup>th</sup> Edition, McGraw Hill, 2017
2. Investment analysis and portfolio Management, Prasanna Chandra, 4<sup>th</sup> Edition, TMH, 2013

**REFERENCES:**

1. Elements of Corporate Finance, S. M. Maheswari, Sultan Chand, 2016
2. Financial Management Text and Cases, IM Pandey, Vikas, 2012
3. Accounting for Management, S. N. Maheswari, S. K. Maheswari, 4<sup>th</sup> Edition, Vikas Publishing House, 2018

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. VIII Semester

L	T/P/D	C
2	1	3

(19PE1CB18) IMAGE PROCESSING AND PATTERN RECOGNITION

**COURSE OBJECTIVES:**

- To impart fundamental knowledge in the area image processing
- To understand various filters and techniques available to process an image
- To provide knowledge of the concepts related to image analysis
- To learn the fundamentals of pattern recognition

**COURSE OUTCOMES:** After completion of the course, students should be able to

**CO-1:** Understand the basics of image formation, transformations and filters

**CO-2:** Learn various techniques available for feature extraction and image segmentation

**CO-3:** Comprehend the techniques for image registration and morphological image processing

**CO-4:** Understand colour image processing techniques

**UNIT – I:**

**Introduction:** Image processing systems and its applications. Basic image file formats  
Image formation: Geometric and photometric models; Digitization - sampling, quantization; Image definition and its representation, neighbourhood metrics.

**UNIT – II:**

**Intensity Transformations and Spatial Filtering:** Enhancement, contrast stretching, histogram specification, local contrast enhancement; Smoothing, linear and order statistic filtering, sharpening, spatial convolution, Gaussian smoothing, DoG, LoG.

**UNIT – III:**

**Image/Object Features Extraction:** Textural features - gray level co-occurrence matrix; Moments; Connected component analysis; Convex hull; Distance transform, medial axis transform, skeletonization/thinning, shape properties.

**UNIT – IV:**

**Segmentation:** Pixel classification; Grey level thresholding, global/local thresholding; Optimum thresholding - Bayes analysis, Otsu method; Derivative based edge detection operators, edge detection/linking, Canny edge detector; Region growing, split/merge techniques, line detection, Hough transform.

**UNIT – V:**

**Registration:** Mono-modal/multimodal image registration; Global/local registration; Transform and similarity measures for registration; Intensity/pixel interpolation.

**UNIT – VI:**

**Colour Image Processing:** Fundamentals of different colour models - RGB, CMY, HSI, YCbCr, Lab; False colour; Pseudo colour; Enhancement; Segmentation.  
Morphological Filtering Basics: Dilation and Erosion Operators, Top Hat Filters

**TEXT BOOKS:**

1. Digital Image Processing, R. C. Gonzalez and R. E. Woods, Prentice Hall
2. Image Processing, Analysis, and Machine Vision, Milan Sonka, Vaclav Hlavac, Roger Boyle, Brooks/Cole, 3<sup>rd</sup> Edition

**REFERENCES:**

1. Image Processing: The Fundamentals. Maria Petrou and Panagiota Bosdogianni, John Wiley & Sons Ltd.
2. Digital Image Processing, K. R. Castleman, Prentice Hall, Englewood Cliffs
3. Digital Image Processing, William K. Pratt, Wiley
4. Fundamentals of Digital Image Processing, Anil K. Jain, Pearson

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. VIII Semester

L	T/P/D	C
3	0	3

(19OE1CB10) IT PROJECT MANAGEMENT

**COURSE OBJECTIVES:**

- To understand IT Project Management concepts, project overview and feasibility studies
- To apply Project Cost Control and Scheduling techniques like PERT and CPM.
- To describe Agile Project management, Principles and Methodologies
- To be familiar with Agile methodologies and techniques like Scrum, DevOps, etc

**COURSE OUTCOMES:** After completion of this course, the student should be able to

**CO-1:** Understand the techniques to effectively plan, manage, execute, and control projects within time and cost targets with a focus on Information Technology and Service Sector

**CO-2:** Apply the project cost control and scheduling techniques like PERT and CPM

**CO-3:** Explore and learn agile project management, principles and methodologies

**CO-4:** Aware of agile project management techniques such as Scrum and DevOps

**UNIT – I:**

Project Overview and Feasibility Studies- Identification, Market and Demand Analysis, Project Cost Estimate, Financial Appraisal

**UNIT – II:**

**Project Scheduling:** Project Scheduling, Introduction to PERT and CPM, Critical Path Calculation, Precedence Relationship, Difference between PERT and CPM, Float Calculation and its importance, Cost reduction by Crashing of activity.

**Cost Control and Scheduling:** Project Cost Control (PERT/Cost), Resource Scheduling & Resource Levelling.

**UNIT – III:**

**Project Management Features:** Risk Analysis, Project Control, Project Audit and Project Termination

**UNIT – IV:**

**Agile Project Management:** Introduction, Agile Principles, Agile methodologies, Relationship between Agile Scrum, Lean, DevOps and IT Service Management (ITIL).

**UNIT – V:**

**Scrum:** Various terminologies used in Scrum (Sprint, product backlog, sprint backlog, sprint review, retro perspective), various roles (Roles in Scrum), Best practices of Scrum.

**UNIT – VI:**

**DevOps:** Overview and its Components, Containerization Using Docker, Managing Source Code and Automating Builds, Automated Testing and Test Driven

Development, Continuous Integration, Configuration Management, Continuous Deployment, Automated Monitoring.

Other Agile Methodologies: Introduction to XP, FDD, DSDM, Crystal

**TEXT BOOKS:**

1. Succeeding with Agile: Software Development Using Scrum, Mike Cohn
2. Project Management for IT Related Projects. ISEB Foundation, BCS Publications
3. Project Planning and Management with CPM and PERT, Kundan Singh and Mitthan Lal Kansal

**REFERENCES:**

1. Agile Project Management: 2 Books in 1: Beginner's Guide & Methodology, The Definitive Guide to Master Scrum, Kanban, XP, Crystal, FDD, DSDM
2. Scrum Guide- Scrum Masters, Ken Schwaber and Jeff Sutherland
3. DevOps For Beginners, Joseph Joyner
4. Agile Product Management with Scrum, Roman Pichler,
5. Agile Project Management with Scrum, Ken Schwaber, Microsoft Professional

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B.Tech. VIII Semester

L	T/P/D	C
3	0	3

(19OE1CB11) SERVICES SCIENCE AND SERVICE OPERATIONAL MANAGEMENT

**COURSE OBJECTIVES:**

- To understand concepts related to services, operations and goods
- To learn about different ways to design Services and assess them using Service qualities
- To understand various methods to operate and manage Service businesses
- To know how innovation can be approached from Services point of view

**COURSE OUTCOMES:** After completion of the course, students should be able to

**CO-1:** Describe and distinguish concepts related to services, operations and goods

**CO-2:** Identify ways to design Services and evaluate them using Service qualities

**CO-3:** Relate how various methods can be used to operate and manage Service businesses

**CO-4:** Analyze about how innovation can be approached from Services point of view

**UNIT – I:**

**Introduction:** Introduction to the course, Introduction to service operations, Role of service in economy and society, Introduction to Indian service sector

**Nature of Services and Service Encounters:** Differences between services and operations, Service package, characteristics, various frameworks to design service operation system, Kind of service encounter, importance of encounters

**Service-Dominant Logic:** From Goods-Dominant logic to Service-Dominant logic, Value Co-creation

**UNIT – II:**

**Service Strategy and Competitiveness:** Development of Strategic Service Vision (SSV), Data Envelopment Analysis

**New Service Development:** NSD cycle, Service Blueprinting, Elements of service delivery system

**UNIT – III:**

**Service Design:** Customer Journey and Service Design, Design Thinking methods to aid Service Design

**Locating Facilities and Designing Their Layout:** models of facility locations (Huff's retail model), Role of service-scape in layout design

**UNIT – IV:**

**Service Quality:** SERVQUAL, Walk through Audit, Dimensions of Service quality & other quality tools

**Service Guarantee & Service Recovery:** How to provide Service guarantee? How to recover from Service failure?

#### **UNIT – V:**

**Forecasting Demand for Services:** A review of different types of forecasting methods for demand forecasting.

**Managing Capacity and Demand:** Strategies for matching capacity and demand, Psychology of waiting, Application of various tools used in managing waiting line in services.

#### **UNIT – VI:**

**Managing Facilitating Goods:** Review of inventory models, Role of inventory in services

**Managing Service Supply Relationship:** Understanding the supply chain/hub of service, Strategies for managing suppliers of service

Vehicle Routing Problem: Managing after sales service, Understanding services that involve transportation of people and vehicle, Techniques for optimizing vehicle routes

#### **TEXT BOOKS:**

1. Fitzsimmons & Fitzsimmons, Service Management: Operations, Strategy, Information Technology, 7<sup>th</sup> Edition, McGraw Hill
2. Services, marketing: Integrating Customer Focus Across the Firm, Wilson A., Zeithaml V. A., Bitner M. J., & Gremler D. D., McGraw Hill, 2012

#### **REFERENCES:**

1. Services Marketing, Lovelock, C, 7<sup>th</sup> Edition, Pearson Education India, 2011
2. Service Design for Business: A Practical Guide to Optimizing the Customer Experience, Reason, Ben, and Lovlie, Lavrans, Pan Macmillan India, 2016
3. Open Services Innovation: Rethinking Your Business to Grow and Compete In A New Era, Chesbrough, H. John Wiley & Sons, 2010



VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. VIII Semester

L	T/P/D	C
3	0	3

(19OE1CB12) MARKETING RESEARCH AND MARKETING MANAGEMENT

**COURSE OBJECTIVES:**

- To understand the need of study of Marketing and Marketing Research
- To explain the various concepts of Marketing research in Organisations
- To explain the various statistical tools and techniques for data analysis in Marketing Research
- To comprehend internet and B2B marketing

**COURSE OUTCOMES:** After completion of this course, the student should be able to

**CO-1:** Apply the basic marketing concepts in business organisations

**CO-2:** Interpret the dynamics of marketing and analyze how its various components interact with each other in the real world

**CO-3:** Leverage marketing research concepts, and identify statistical tools and techniques in marketing research for effective decision making

**CO-4:** Plan for internet marketing, and position and price B2B products and services

**UNIT – I:**

**Marketing Concepts and Applications:** Introduction to Marketing & Core Concepts, Marketing of Services, Importance of marketing in service sector.

**Marketing Planning & Environment:** Elements of Marketing Mix, Analyzing needs & trends in Environment - Macro, Economic, Political, Technical & Social

**Understanding the Consumer:** Determinants of consumer behavior, Factors influencing consumer behavior

**Market Segmentation:** Meaning & Concept, Basis of segmentation, selection of segments, Market Segmentation strategies, Target Marketing, Product Positioning

**UNIT – II:**

**Product Management:** Product Life cycle concept, New Product development & strategy, Stages in New Product development, Product decision and strategies, Branding & packaging

**UNIT – III:**

**Pricing, Promotion and Distribution Strategy:** Policies & Practices – Pricing Methods & Price determination Policies. Marketing Communication – The promotion mix, Advertising & Publicity, 5 M's of Advertising Management. Marketing Channels, Retailing, Marketing Communication.

**UNIT – IV:**

**Marketing Research:** Introduction, Type of Market Research, Scope, Objectives & Limitations Marketing Research Techniques, Survey Questionnaire design & drafting, Pricing Research, Media Research, Qualitative Research

**Data Analysis:** Use of various statistical tools – Descriptive & Inference Statistics, Statistical Hypothesis Testing, Multivariate Analysis - Discriminant Analysis, Cluster Analysis, Segmenting and Positioning, Factor Analysis

**UNIT – V:**

**Internet Marketing:** Introduction to Internet Marketing. Mapping fundamental concepts of Marketing (7Ps, STP); Strategy and Planning for Internet Marketing

**UNIT – VI:**

**Business to Business Marketing:** Fundamental of business markets. Organizational buying process. Business buyer needs. Market and sales potential. Product in business markets. Price in business markets. Place in business markets. Promotion in business markets. Relationship, networks and customer relationship management. Business to Business marketing strategy

**HOME ASSIGNMENTS:**

1. Written Analyses of Cases – Students are expected to report on their analysis and recommendations of what to do in specific business situations by applying concepts and principles learned in class (Case Studies to be shared by Faculty) e.g. “Marketing Myopia”
2. Field visit & live project covering steps involved in formulating Market Research Project
3. Measuring Internet Marketing Effectiveness: Metrics and Website Analytics

**TEXT BOOKS:**

1. Marketing Management, Philip Kotler & Keller Kevin, 4<sup>th</sup> Edition, Pearson Education, 2019
2. Marketing Research: An Applied Approach, Malhotra N. K., Nunan D., & Birks D. F., Pearson Education Limited, 2019

**REFERENCES:**

1. Marketing Management: A Relationship Approach, Hollensen S, Pearson Education, 2019
2. Marketing Management, Deepak R., Kanthiah Alias, and S. Jeyakumar, Educreation Publishing, 2019
3. Marketing Research: Text and Cases, Nargundkar R., McGraw-Hill Education, 2020
4. Marketing Management: A Cultural Perspective, Visconti L. M., Peñaloza L., & Toulouse N. (Eds.) Routledge, 2020

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

<b>B.Tech. VII Semester</b>	<b>L</b>	<b>T/P/D</b>	<b>C</b>
	<b>0</b>	<b>8</b>	<b>4</b>

### **(19PW4CB03) MAJOR PROJECT PHASE-I**

<b>B.Tech. VIII Semester</b>	<b>L</b>	<b>T/P/D</b>	<b>C</b>
	<b>0</b>	<b>12</b>	<b>6</b>

### **(19PW4CB04) MAJOR PROJECT PHASE-II**

**COURSE OUTCOMES:** After completion of the course, students should be able to

**CO-1:** Identify and formulate the problem (Industry/technical/societal)

**CO-2:** Analyze, design and develop a solution to industry/technical/societal problems

**CO-3:** Implement and execute the solution

**CO-4:** Demonstrate effective communication skills through oral presentation

**CO-5:** Engage in effective written communication through project report

### **COURSE OUTLINE:**

- A student shall initiate major project in seventh semester (IV year I semester) and continue it in the eighth semester (IV year II semester).
- Major project shall be carried out in two phases i.e., Major Project Phase-I in the seventh semester and Major Project Phase-II in the eighth semester.
- Major project shall be evaluated for a total of 200 marks. Out of which, Major Project Phase-I shall be evaluated for 100 marks in seventh semester and Major Project Phase-II for 100 marks in eighth semester.
- Evaluation of Major Project Phase-I and Major Project Phase-II shall consist of both CIE and SEE in each semester.
- CIE shall be done by a Project Review Committee (PRC) consisting of Head of the Department, project supervisor and senior faculty member of the Department.
- CIE shall be done on the basis of two seminars conducted in each semester as per the academic calendar and as per the evaluation format provided by the DoA.
- A student shall submit project progress in prescribed report format during each of the project reviews.
- SEE shall be carried out in both Major Project Phase-I and Major Project Phase-II.
- SEE in Major Project Phase-I shall be conducted by a committee consisting of Head of the Department, the project supervisor and one senior faculty of the programme.
- SEE in Major Project Phase-II (project viva-voce) shall be conducted by a committee consisting of an external examiner, Head of the Department, the project supervisor and one senior faculty of the programme.