

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

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|--|---|----------------------------------|---------------|--|---|
| Program: B Tech (Computer Science and Business Systems) | | | | Semester: VI | |
| Course - Computer Networks | | | | Code: BTICO06004 | |
| Teaching Scheme | | | | Evaluation Scheme | |
| Lecture (Hours per week) | Practical (Hours per week) | Tutorial (Hours per week) | Credit | Internal Continuous Assessment (ICA) (Marks - 50) | Term End Examinations (TEE) (Marks- 100 in Question Paper) |
| 3 | 2 | 0 | 4 | Marks Scaled to 50 | Marks Scaled to 50 |
| Pre-requisite: Operating System, Computer Organization and Architecture | | | | | |
| Objectives - This Course Provides the Fundamental knowledge of Computer networks, understanding of ISO-OSI model. | | | | | |
| Course Outcomes - After completion of the course, students would be able to <ol style="list-style-type: none"> 1. Discuss the fundamental of Computer networks, its types, transmission modes and different reference models, 2. Implement error free transmission of data and analyze data collision with various protocols, 3. Implement various routing and congestion control algorithms over a network, 4. Identify Quality of service parameters, addressing techniques and basic network security and management. | | | | | |
| Detailed Syllabus | | | | | |
| Unit | Description | | | | Duration |
| 1 | Introduction: Computer networks and distributed systems, Classifications of computer networks, Preliminaries of layered network structures. | | | | 02 |
| 2 | Data communication Components: Representation of data and its flow, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media. | | | | 03 |
| 3 | LAN: Wired LAN, Wireless LAN, Virtual LAN. | | | | 03 |
| 4 | Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum. | | | | 02 |

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| 5 | Data Link Layer and Medium Access Sub Layer: Fundamentals of Error Detection and Error Correction, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go-back-N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols - Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA | 09 | | | | | | | | |
| 6 | Network Layer: Switching, Logical addressing - IPV4, IPV6; Address mapping - ARP, RARP, BOOTP and DHCP-Delivery, Forwarding and Unicast Routing protocols. | 09 | | | | | | | | |
| 7 | Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service (QoS), QoS improving techniques - Leaky Bucket and Token Bucket algorithms. | 08 | | | | | | | | |
| 8 | Application Layer: DNS, DDNS, TELNET, EMAIL, FTP, WWW, HTTP, SNMP, Bluetooth, Firewalls. | 06 | | | | | | | | |
| 9 | Network Security: Electronic mail, directory services and network management, Basic concepts of Cryptography. | 03 | | | | | | | | |
| | Total | 45 | | | | | | | | |
| Text Books: 1. A. S. Tanenbaum, Computer Networks, 5th Edition, Pearson Prentice Hall, 1996. 2. W. Stallings, Data and Computer Communications, 8 th Edition, Pearson Prentice Hall, 2007. | | | | | | | | | | |
| Reference Books: 1. C. Kaufman, R. Perlman, M. Speciner, “Network Security: Private Communication in a Public World”, Prentice Hall Series in Computer Networking and Distributed Systems, 2nd Edition, Upper Saddle River, 2002 2. W. R. Stevens, unix network programming volum1,2 and 3, 2nd Edition, Prentice Hall PTR, Upper Saddle River, 2010 | | | | | | | | | | |
| Any other information: Details of Internal Continuous Assessment (ICA) Total Marks of Internal Continuous Assessment (ICA) : 50 Marks Distribution of ICA Marks : | | | | | | | | | | |
| <table><tr><td>Description of ICA</td><td>Marks</td></tr><tr><td>Test</td><td>20</td></tr><tr><td>Term Work</td><td>30</td></tr><tr><td>Total</td><td>50</td></tr></table> | | | Description of ICA | Marks | Test | 20 | Term Work | 30 | Total | 50 |
| Description of ICA | Marks | | | | | | | | | |
| Test | 20 | | | | | | | | | |
| Term Work | 30 | | | | | | | | | |
| Total | 50 | | | | | | | | | |

Signature
(Prepared by Concerned Faculty/HOD)

Signature
(Approved by Dean)

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|---|---|--------------------------------|---------------|--|---|
| Program: B.Tech.(Computer Science and Business Systems) | | | | Semester: VI | |
| Course: Information Security | | | | Code: BTCS06001 | |
| Teaching Scheme | | | | Evaluation Scheme | |
| Lecture Hours per week | Practical Hours per week | Tutorial Hours per week | Credit | Internal Continuous Assessment (ICA) (Marks - 50) | Term End Examinations (TEE) (Marks- 100 in Question Paper) |
| 3 | 2 | 0 | 4 | Marks Scaled to 50 | Marks Scaled to 50 |
| Pre-requisite: Operating Systems, Data Structures & Algorithm | | | | | |
| Objectives - This course focusses on the models, tools, and techniques for enforcement of security with some emphasis on the use of cryptography. Students will learn security from multiple perspectives. After the completion of the course, the students will be able to develop basic understanding of Information security, system attacks and defenses against them. | | | | | |
| Course Outcomes- After completion of the course, students would be able to <ol style="list-style-type: none"> 1. Understand the basic goals of Information Security and Authentication Mechanism and Access control models in Information domain, 2. Understand and Simulate Program Security tools and Understand Types of Virus and Threats, 3. Understand and Compare various system and system designs, 4. Compare and contrast between security of various operating systems and Database System. | | | | | |
| Detailed Syllabus: | | | | | |
| Unit | Description | | | | Duration |
| 1. | Introduction: Confidentiality, integrity and availability; Security violation and threats; Security policy and procedure; Assumptions and Trust; Security Assurance, Implementation and Operational Issues; Security Life Cycle. | | | | 03 |
| 2. | Authentication: Authentication basics, Password, Challenge response, SSO, Biometrics | | | | 05 |
| 3. | Access Control Models: Discretionary, mandatory, roll-based and task-based models, unified models, access control algebra, temporal and spatio-temporal models. | | | | 05 |
| 4. | Program Security: Secure programs, Non malicious Program Errors, Viruses and other malicious code, types of viruses, attack mechanism of viruses, Targeted Malicious Code, Controls Against Program Threats. | | | | 07 |
| 5. | Systems Design: Design principles, representing identity, control of access and information flow, confinement problem. | | | | 07 |

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| | Assurance: Building systems with assurance, formal methods, evaluating systems. | |
| 6. | Logic-based System: Malicious logic, vulnerability analysis, auditing, intrusion detection. Applications: Network security, operating system security, user security, program security. Special Topics: Data privacy, introduction to digital forensics, enterprise security specification. | 07 |
| 7. | Operating Systems Security: Security Architecture, Analysis of Security in Linux/Windows. | 03 |
| 8. | Database Security: Security requirements, Reliability and integrity, Sensitive data, Inference, Multilevel database, Proposals for multilevel security | 04 |
| 9. | Security Policies: Confidentiality policies, integrity policies, hybrid policies, non-interference and policy composition, international standards. | 04 |
| | Total | 45 |

Text Books:

1. Ross Anderson, "Security Engineering", 3rd Edition, Wiley Publications, 2001
2. Robert H Bishop, Computer Security: Art and Science, 2nd Edition, Pearson Education Publication, 2003
3. M. Stamp, Information Security: Principles and Practice, 2nd Edition, A John Wiley & sons Publications, 2005

Reference books

1. C.P. Pfleeger, S.L. Pfleeger, J. Margulies., "Security in Computing", 5th Edition, Pearson Publications, 2015
2. M. Gertz, S. Jajodia, Handbook of Database Security, 5th Edition, Springer Publications, 2007

Any other information:

Details of Internal Continuous Assessment (ICA)

Total Marks of Internal Continuous Assessment (ICA) : 50 Marks

Distribution of ICA Marks :

| Description of ICA | Marks |
|--------------------|-------|
| Test | 20 |
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|--|---|--------------------------------|---------------|--|---|
| Program: BTech (Computer Science and Business Systems) | | | | Semester: VI | |
| Course - Artificial Intelligence | | | | Code: MBCO06003 | |
| Teaching Scheme | | | | Evaluation Scheme | |
| Lecture Hours per week | Practical Hours per week | Tutorial Hours per week | Credit | Internal Continuous Assessment (ICA) (Marks - 50) | Term End Examinations (TEE) (Marks- 100 in Question Paper) |
| 3 | 2 | 0 | 4 | Marks Scaled to 50 | Marks Scaled to 50 |
| Pre-requisite: Data Structure and Algorithms, Fundamentals of Computer Science | | | | | |
| Objectives - To impart the knowledge of current theories, methods, and techniques in the field of Artificial Intelligence. To create the ability to analyze, design and develop AI-systems | | | | | |
| Course Outcomes- After completion of the course, students would be able to 1. Recognize Artificial Intelligent problem domains and agents, 2. Apply various searching strategies to solve AI problems, 3. Understand constraint satisfaction problem and knowledge representation schemes, 4. Analyze and apply probabilistic reasoning methods in expert systems. | | | | | |
| Detailed Syllabus: | | | | | |
| Unit | Description | | | | Duration |
| 1. | Introduction to Artificial Intelligence: Definitions, Problems of AI, AI technique. Intelligent Agents, Agents & environment, nature of environment, structure of agents, goal based agents, utility based agents, learning agents. | | | | 04 |
| 2. | Problem Solving, Problems, Problem Space & search: Defining the problem as state space search, production system, problem characteristics, issues in the design of search programs. | | | | 04 |
| 3. | Search techniques: Problem solving agents, searching for solutions; uniform search strategies: breadth first search, depth first search, depth limited search, bidirectional search, comparing uniform search strategies. Heuristic search strategies Greedy best-first search, A* search, AO* search, memory bounded heuristic search: local search algorithms & optimization problems: Hill climbing search, simulated | | | | 10 |

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| | annealing search, local beam search | |
| 4. | Constraint satisfaction problems: Local search for constraint satisfaction problems. Adversarial search, Games, optimal decisions & strategies in games, the minimax search procedure, alpha-beta pruning, additional refinements, iterative deepening. | 07 |
| 5. | Knowledge & reasoning: Knowledge representation issues, representation & mapping, approaches to knowledge representation. Using predicate logic, representing simple fact in logic, representing instant & ISA relationship, computable functions & predicates, resolution, natural deduction. Representing knowledge using rules, Procedural verses declarative knowledge, logic programming, forward verses backward reasoning, matching, control knowledge. | 10 |
| 6. | Probabilistic reasoning: Representing knowledge in an uncertain domain, the semantics of Bayesian networks, Dempster-Shafer theory, Planning Overview, components of a planning system, Goal stack planning, Hierarchical planning, other planning techniques. | 07 |
| 7. | Expert Systems: Representing and using domain knowledge, expert system shells, and knowledge acquisition. | 03 |
| | Total | 45 |

Text Books:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 3rd Edition, Pearson Education India, 2015.

Reference Books:

1. Ritch & Knight, "Artificial Intelligence", 3rd Edition, TMH, 2017.
2. Patterson, "Introduction to Artificial Intelligence and Expert Systems", 1st Edition, PHI, 2015.
3. Saroj Kaushik, "Logic & Prolog Programming", 1st Edition, New Age International, 2007.
4. Giarranto, "Expert Systems", , 4th Edition, Vikas Publishing House, 2017.

Any other information:

Details of Internal Continuous Assessment (ICA)

Total Marks of Internal Continuous Assessment (ICA) : 50 Marks

Distribution of ICA Marks :

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| Description of ICA | Marks |
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| Test | 20 |
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|---|--|--------------------------------|---------------|--|---|
| Program: B. Tech (Computer Science and Business Systems) | | | | Semester: VI | |
| Course : Financial & Cost Accounting | | | | Code: BTCS06002 | |
| Teaching Scheme | | | | Evaluation Scheme | |
| Lecture Hours per week | Practical Hours per week | Tutorial Hours per week | Credit | Internal Continuous Assessment (ICA) (Marks - 50) | Term End Examinations (TEE) (Marks- 100 in Question Paper) |
| 3 | 0 | 1 | 4 | Marks Scaled to 50 | Marks Scaled to 50 |
| Pre-requisite: Nil | | | | | |
| Objectives - To provide conceptual understanding of Financial and Cost accounting. To develop the ability to understand and prepare financial statement. To develop the ability to understand, analyze and use information in day-to-day business functioning. | | | | | |
| Course Outcomes- After completion of the course, students would be able to <ol style="list-style-type: none"> 1. To create an awareness about the importance and usefulness of the accounting concepts and their managerial implications, 2. To develop an understanding of the financial statements and the underlying principles and learn to interpret financial statements, 3. To create an awareness about cost accounting, different types of costing and cost management. | | | | | |
| Detailed Syllabus: | | | | | |
| Unit | Description | | | | Duration |
| 1. | Accounting Concept: Introduction, Techniques and Conventions, Financial Statements- Understanding & Interpreting Financial Statements | | | | 04 |
| 2. | Accounting Process: <ul style="list-style-type: none"> • Book Keeping and Record Maintenance • Fundamental Principles and Double Entry • Journal, Ledger, Trial Balance, Balance Sheet, Final Accounts • Cash Book and Subsidiary Books | | | | 16 |

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| | <ul style="list-style-type: none"> Rectification of Errors | |
| 3. | Financial Statements: Form and Contents of Financial Statements, Analyzing and Interpreting Financial Statements, Accounting Standards. <i>Class Discussion: Corporate Accounting Fraud- A Case Study of Satyam</i> | 04 |
| 4. | Cash Flow and Fund Flow Techniques: Introduction, How to prepare, Difference between them | 04 |
| 5. | Costing Systems: <ul style="list-style-type: none"> Elements of Cost Cost Behavior, Cost Allocation, OH Allocation Unit Costing, Process Costing, Job Costing Absorption Costing, Marginal Costing, Cost Volume Profit Analysis Budgets ABC Analysis <i>Class Discussion: Application of costing concepts in the Service Sector</i> | 12 |
| 6. | Company Accounts and Annual Reports: <ul style="list-style-type: none"> Audit Reports and Statutory Requirements Directors Report Notes to Accounts Pitfalls | 05 |
| | Total | 45 |
| Text Books: 1. Robert N Anthony, David Hawkins, Kenneth Marchant, "Accounting: Texts and | | |

Cases", 13th Edition, McGraw-Hill, 2019.

2. Lal. J., & Srivastava, S., Cost accounting, 5th Edition, Tata McGraw-Hill, 2014.

Reference books

1. Khan, M. Y., & Jain P. K., (2007). "Management Accounting", 7th Edition, McGraw Hill, 2017.
2. Shah, P. (2012). "Management Accounting", 7th Edition, Oxford University Press, 2015.
3. Sanyers, J., & Jenkins, & Arora, "Managerial Accounting", 1st Edition, Cengage Learning, 2012.
4. Horngren, C., Datar, S. & Rajan, M., "Cost accounting: A managerial emphasis", 15th Edition, Pearson Publication, 2014.

Any other information:

Details of Internal Continuous Assessment (ICA)

Total Marks of Internal Continuous Assessment (ICA) : 50 Marks

Distribution of ICA Marks :

| Description of ICA | Marks |
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| Test | 20 |
| Term Work | 30 |
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|--|---|--------------------------------|---------------|--|------------------------------------|
| Program: B. Tech (Computer Science and Business Systems) | | | | Semester: VI | |
| Course: Business Communication and Value Science-IV | | | | Code: BTCS06003 | |
| Teaching Scheme | | | | Evaluation Scheme | |
| Lecture Hours per week | Practical Hours per week | Tutorial Hours per week | Credit | Internal Continuous Assessment (ICA) (Marks - 50) | Term End Examinations (TEE) |
| 2 | 0 | 2 | 3 | Marks Scaled to 50 | ICA Only |
| Pre-requisite: Successful Completion of Business Communication and Values Science-I, Business Communication and Value Science-II, Business Communication and Value Science-III . | | | | | |
| Objectives- To impart in students an understanding of concepts like emotional intelligence; conflict resolution; time and stress management. To Impart in the students an ability to manage conflicts and stress adequately and resourcefully. To create awareness in students regarding the importance of feedback and feedback sharing mechanisms; diversity in workplace; empathy and inclusiveness. To create in students an awareness of Corporate Social Responsibility well integrated with an ethical code of conduct. | | | | | |
| Course Outcomes- After completion of the course, students would be able to <ol style="list-style-type: none"> 1. Apply emotional Intelligence at workplace to successfully manage their professional and personal relationships as well as to positively manage work in team set ups, 2. Understand the impact of stress on life and work and apply effective stress and time management techniques to create work life balance, 3. Apply appropriate feedback sharing practices for redirection and reinforcement, 4. Create, manage and follow relevant Corporate Social Responsibility initiatives to add value in society. | | | | | |
| Detailed Syllabus: | | | | | |
| Unit | Description | | | | Duration |
| 1 | Communicative Writing and Public Speaking: Recapitulation of Principles of Writing; Business Correspondence-Formal and Business Letters; Business Proposals; Graphical representation in Business Writing; Use of Business Idioms and Corporate terms; Public Speaking-Importance and Best Practices. | | | | 10 |
| 2 | Professional and Formal Communication: | | | | 06 |

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| | Emotional Intelligence-Meaning and Importance; Corporate Etiquette - Wining and Dining; small Talk; card exchange; etiquette governing group and team communication; etiquette in Personal Interviews. | |
| 3 | Soft Skills for work life balance: Conflict-Meaning and Importance of conflict in group scenarios; Conflict management and Conflict Resolution; Stress-Types of Stress; Stress Inducers and tools to manage stress; Time Management-Importance of Time Management; Stephen Covey's Time Management Matrix and other time management Tools | 08 |
| 4 | Feedback Oriented Leadership Communication and Corporate Communications: Feedback- Meaning and Importance; Types of Feedbacks and Methods of sharing feedbacks for successful reinforcement and redirection; Corporate Social Responsibility- Concept, relevance, and successful CSR Initiatives. | 06 |
| | Total | 30 |

Text Books:

1. Scot Ober and Newman Amy, "Contemporary Business Communication", 8th Edition, Biztantra Publications, 2017
2. John Seely, "Oxford Guide to Effective Writing and Speaking", 5th Edition, Oxford University Press, 2015

Reference books.

1. Dale Carnegie, "How to Develop Self Confidence and Influence People by Public Speaking - Time - Tested Methods of Persuasion", 3rd Edition, Simon and Shuster Publications, 2017
2. Daniel Goleman, "Emotional Intelligence: Why it Can Matter More Than IQ", 2nd Edition, Random House Publishing Group, 2009

Any other information:

Details of Internal Continuous Assessment (ICA)

Total Marks of Internal Continuous Assessment (ICA) : 50 Marks

Distribution of ICA Marks :

| Description of ICA | Marks |
|--------------------|-------|
| Test | 20 |
| Term Work | 30 |
| Total | 50 |

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|--|---|--------------------------------|---------------|--|---|
| Program: B. Tech (Computer Science and Business Systems) | | | | Semester: VI | |
| Course: Data Mining and Analytics (Elective – II) | | | | Code: BTCS06004 | |
| Teaching Scheme | | | | Evaluation Scheme | |
| Lecture Hours per week | Practical Hours per week | Tutorial Hours per week | Credit | Internal Continuous Assessment (ICA) (Marks - 50) | Term End Examinations (TEE) (Marks- 100 in Question Paper) |
| 3 | 2 | 0 | 4 | Marks Scaled to 50 | Marks Scaled to 50 50 |
| Pre-requisite: Machine Learning (Department Elective-I) | | | | | |
| Objectives - To provide a brief introduction to data mining techniques from a practical perspective. To introduce several data pre-processing and data mining techniques for accurate model building based on real domain data. | | | | | |
| Course Outcomes - After completion of the course, students would be able to 1. Understand basic concepts and techniques of Data Mining, 2. Develop skills of using data mining software for solving practical problems, 3. Understand and apply several statistical analysis techniques: regression, ANOVA and data reduction. | | | | | |
| Detailed Syllabus: | | | | | |
| Unit | Description | | | | Duration |
| 1. | Introduction to Data Mining: What is data mining? Related technologies - Machine Learning, DBMS, OLAP, Statistics, Stages of the Data Mining Process, Data Mining Techniques, Knowledge Representation Methods, Applications | | | | 03 |
| 2. | Data preprocessing: Data cleaning, Data transformation, Data reduction, Discretization and generating concept hierarchies, Installing Weka 3 Data Mining System, Experiments with Weka - filters, discretization Data mining knowledge representation: Task relevant data, Background knowledge, Representing input data and output knowledge, Visualization techniques Attribute-oriented analysis: Attribute generalization, Attribute relevance, Class comparison, Statistical measures | | | | 06 |
| 3. | Data mining algorithms - Association rules: Motivation and terminology, Example: mining weather data, Basic idea: item sets, Generating item sets and rules efficiently, Correlation analysis Data mining algorithms - Classification: Basic learning/mining | | | | 12 |

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| | tasks, Inferring rudimentary rules: 1R, algorithm, Decision trees, covering rules Data mining algorithms - Prediction: The prediction task, Statistical (Bayesian) classification, Bayesian networks, Instance-based methods (nearest neighbor), linear models | |
| 4. | Descriptive analytics: Data Modeling, Trend Analysis, Simple Linear Regression Analysis | 03 |
| 5. | Forecasting models: Heuristic methods, predictive modeling and pattern discovery, Logistic Regression: Logit transform, ML estimation, Tests of hypotheses, Wald test, LR test, score test, test for overall regression, multiple logistic regression, forward, backward method, interpretation of parameters, and relation with categorical data analysis. Interpreting Regression Models, Implementing Predictive Models Generalized Linear model: link functions such as Poisson, binomial, inverse binomial, inverse Gaussian, Gamma. Non-Linear Regression (NLS): Linearization transforms their uses & limitations, examination of non-linearity, initial estimates, and iterative procedures for NLS, grid search, Newton-Raphson, steepest descent, Marquardt's methods. Introduction to semiparametric regression models, additive regression models. Introduction to nonparametric regression methods | 11 |
| 6. | Time Series Analysis: Auto - Covariance, Auto-correlation and their properties. Exploratory time series analysis, Test for trend and seasonality, Exponential and moving average smoothing, Holt - Winter smoothing, forecasting based on smoothing Linear time series models: Autoregressive, Moving Average, Autoregressive Moving Average and Autoregressive Integrated Moving Average models; Estimation of ARMA models such as Yule-Walker estimation for AR Processes, Maximum likelihood and least squares estimation for ARMA Processes, Forecasting using ARIMA models Prescriptive Analytics: Mathematical optimization, Networks modeling-Multi-objective optimization-Stochastic modeling, Decision and Risk analysis, Decision trees. | 10 |

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|---|--------------|-----------|--------------------|-------|------|----|-----------|----|-------|----|
| | Total | 45 | | | | | | | | |
| Text Books: <ol style="list-style-type: none">1. Jiawei Han and Micheline Kamber, “Data Mining: Concepts and Techniques”, 3rd Edition, Morgan Kaufmann Publishers, 2010.2. Lior Rokach and Oded Maimon, “Data Mining and Knowledge Discovery Handbook”, 2nd Edition, Springer, 2010.3. Box, G.E.P and Jenkins G.M. “Time Series Analysis, Forecasting and Control”, 1st Edition, Holden-Day, 1970. | | | | | | | | | | |
| Reference books <ol style="list-style-type: none">1. Draper, N. R. and Smith. H, Hosmer, D. W. and Lemeshow, S., “Applied Logistic Regression”, 3rd Edition, Wiley Publication, 1998. | | | | | | | | | | |
| Any other information: Details of Internal Continuous Assessment (ICA) Total Marks of Internal Continuous Assessment (ICA) : 50 Marks Distribution of ICA Marks : | | | | | | | | | | |
| <table><tr><td>Description of ICA</td><td>Marks</td></tr><tr><td>Test</td><td>20</td></tr><tr><td>Term Work</td><td>30</td></tr><tr><td>Total</td><td>50</td></tr></table> | | | Description of ICA | Marks | Test | 20 | Term Work | 30 | Total | 50 |
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| Test | 20 | | | | | | | | | |
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|--|---|----------------------------------|---------------|--|---|
| Program: B Tech (Computer Science and Business Systems) | | | | Semester: VI | |
| Course: Modern Day Robotics and Its Industrial Applications (Elective -II) | | | | Module Code: | |
| Teaching Scheme | | | | Evaluation Scheme | |
| Lecture (Hours per week) | Practical (Hours per week) | Tutorial (Hours per week) | Credit | Internal Continuous Assessment (ICA) (Marks - 50) | Term End Examinations (TEE) (Marks- 100 in Question Paper) |
| 3 | 2 | 0 | 4 | Marks Scaled to 50 | (Marks Scaled to 50) |
| Pre-requisite: Basic Engineering Mathematics and Statistics | | | | | |
| Course Objectives- To impart knowledge about industrial robots for their control and design. To understand and analyze the various applications of robots. | | | | | |
| Course Outcomes- After completion of the course, Students will be able to <ol style="list-style-type: none"> 1. Understand basic concepts and technological advancements in AI and robotics. 2. Develop skills of using advanced software for solving practical problems in robotics pertaining to various industries. 3. Understand and apply several statistical analysis techniques and business analytics for cognitive robotics. 4. Understand and apply the programming of robots using python and R languages. | | | | | |
| Detailed Syllabus: | | | | | |
| Unit | Description | | | | Duration |
| 1. | Introduction to Modern Day Robotics and their industrial applications: Industry 4.0 Concept: Background and Overview-Industry 4.0 technologies: implementation patterns in manufacturing companies-Evolution of Industrial Robots and their Applications-Advancements in Robotics and Its Future Uses-Types of robotics in various fields for applications | | | | 04 |
| 2. | Technologies essential for Cognitive Robotics: Computer systems and Technologies relevant to modern day robotics-Robotic Process Automation: Overview of RPA and its applications-RPA, AI, and Cognitive Technologies for Leaders-Introduction to Robotics: Analysis, Control, Applications | | | | 05 |
| 3. | Introduction to computer vision and application of Vision Systems in Robotics: Concepts of computer vision and the how vision systems are becoming essential part of Robotics-Computer Vision: Models, | | | | 06 |

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| | Learning, and Inference -Mastering Computer Vision with TensorFlow 2.x: Build advanced computer vision applications using machine learning and deep learning techniques- Machine Vision Applications- Application areas for vision systems-Robot inspection case study- Autonomous driving using 3D imaging case study. | |
| 4. | AI in the context of Cognitive Robotics and Role of AI in Robotics: Foundation for Advanced Robotics and AI- A Concept for a Practical Robot Design Process- Demo to train A Robot Using AI - Deep learning core applications-Deep learning business applications | 04 |
| 5. | Data Science and Big Data in the context of Cognitive Robotics: Cognitive Technologies: The Next Step Up for Data and Analytics in robotics-Cognitive Deep Learning Technology for Big Data Cognitive Assistant Robots for Reducing Variability in Industrial Human-Robot Activities Artificial Intelligence and Robotics - The Review of Reliability Factors Related to Industrial Robots -Failure analysis of mature robots in automated production- Data Analytics for Predictive Maintenance of Industrial Robots - Failure Is an Option: How the Severity of Robot Errors Affects Human-Robot Interaction | 06 |
| 6. | Concepts of Cloud computing, cloud platforms and it applications in Robotics: Learning Cloud Computing: Core Concepts - Cloud Computing: Private Cloud Platforms -Robot as a Service in Cloud Computing -Cloud Computing Technology and Its Application in Robot Control - A Comprehensive Survey of Recent Trends in Cloud Robotics Architectures and Applications - Google's cloud robotics and high computing needs of industrial automation and systems-The role of cloud and opensource software in the future of robotics-The Power of Cloud Robotics by Robotics Industry Association | 08 |
| 7 | Basics of Robotic operating System: ROS for beginners an overview- Introduction to the Robot Operating System (ROS) Middleware - Secure communication for the Robot Operating System - An Introduction to Robot Operating System: The Ultimate Robot Application Framework by Adnan Quality of Service and Cybersecurity Communication Protocols - Analysis for the Robot Operating System Robotics systems communication- Threat modelling using ROS Towards cloud robotic system: A case study of online co-localization for fair resource competence-A Case Study on Model-Based Development of Robotic Systems using Monti Arc with Embedded Automata | 08 |

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| 8 | Introduction to Python and R Programming in the context of Robotics: Introduction to Python - Python Functions for Data Science-Basic ROS Learning Python for robotics- An introduction to R -The R in Robotics rosR: A New Language Extension for the Robot Operating System- | 04 |
| | Total | 45 |

Text Books:

1. Saeed Benjamin Niku, "Introduction to Robotics: Analysis, Control, Applications", Wiley Publishers, 2nd edition, 2011.
2. Simon J. D. Prince, "Computer Vision: Models, Learning, and Inference", Cambridge University Press, 2012.
3. Francis X. Govers, "Artificial Intelligence for Robotics: Build Intelligent Robots that Perform Human Tasks Using AI Techniques", Packt publishing, 2018.

Reference Books:

1. Krishnendu Kar, "Mastering Computer Vision with TensorFlow 2.x: Build Advanced Computer Vision Applications Using Machine Learning and Deep Learning Techniques", Packt publishing, 2020.
2. Armando Vieira, Bernardete Ribeiro, "Introduction to Deep Learning Business Applications for Developers from Conversational Bots in Customer Service to Medical Image processing", Apress, 2018.

Any other information :

Total Marks of Internal Continuous Assessment (ICA) : 50 Marks

Details of Internal Continuous Assessment (ICA)

| Description of ICA | Marks |
|--------------------|-------|
| Test | 20 |
| Term work | 30 |
| Total | 50 |

Signature
(Prepared by Concerned Faculty/HOD)

Signature
(Approved by Dean)

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

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|--|--|----------------------------------|---------------|--|---|
| Program: B Tech (Computer Science and Business Systems) | | | | Semester: VI | |
| Course: Modern Web Applications (Elective -II) | | | | Module Code: | |
| Teaching Scheme | | | | Evaluation Scheme | |
| Lecture (Hours per week) | Practical (Hours per week) | Tutorial (Hours per week) | Credit | Internal Continuous Assessment (ICA) (Marks - 50) | Term End Examinations (TEE) (Marks- 100 in Question Paper) |
| 3 | 2 | 1 | 4 | Marks Scaled to 50 | Practical Exam (Marks Scaled to 50) |
| Pre-requisite: Fundamental of Computer science, Database Management Systems. | | | | | |
| Course Objectives- This course enables students to develop modern web application by leveraging latest technologies. Builds strong foundation in students making them job ready as per industry requirements and enables them to learn new technologies by applying foundation paradigms, building strong expertise to develop end to end application - web frontend and backend development. | | | | | |
| Course Outcomes: After completion of the course, students would be able to: <ol style="list-style-type: none"> 1. Understand the fundamentals of web programming 2. Design front end of the web application using HTML5, CSS3, Javascript. 3. Implement client-side technologies – JQuery, Ajax, Bootstrap, AngularJS 4. Implement back end technology and databases for restful services | | | | | |
| Detailed Syllabus: | | | | | |
| Unit | Description | | | | Duration |
| 1. | Introduction: Concept of website, its need and purpose, Types of websites: Static and dynamic website, Introduction to HTML, XML, JSON, Web Browsers, – Web Servers, Uniform Resource Locator, Tools and Web Programming Languages. Web Standards, Tiered Architecture: Client Server Model, Three Tier Model, Service Oriented Architectures, REST services | | | | 06 |
| 2. | HyperText Mark Up Language: Languages used for website development, HTML5: basic tags, formatting tags, Adding images, Lists, Embedding multimedia in | | | | 06 |

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|---|--|-----------|
| | Web pages, Inserting tables, Internal and External Linking, Frames, Forms | |
| 3. | Cascading Style Sheets (CSS3): Basics of Cascading Style sheets, Advantages of CSS, External Style sheet, Internal style sheet, Inline style sheet, CSS Syntax, color, background, Font, images | 06 |
| 4. | Java Script: Features of JavaScript, extension of JavaScript, Syntax of JavaScript: data types, operators, variables, tag, Document Object Model (DOM) with JavaScript, Selection Statement using if and Switch, Iterative statement: for, for/in, while, do while, break and continue | 06 |
| 5. | Front End Framework: Introduction to jQuery - Syntax, Selectors, Events, Traversing, AJAX ; Introduction to Bootstrap – Basics, Grids, Themes ; Angular JS – Expressions, Modules, Data Binding, Scopes, Directives & Events, Controllers, Filters, Services, Validation | 14 |
| 6. | Back End Technologies: Introduction to RESTful services, Resources, Messages (Request, Response), Addressing, Methods – (GET, POST, PUT, DELETE) | 7 |
| | Total | 45 |
| Text Books: 1. Kogent Learning Solutions Inc, “HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery) Black Book”, 2 nd Edition, Dreamtech Press, 2016. 2. Adam Freemam, “Pro Angular JS”, 1 st Edition, Apress, 2014. 3. Laurence Svekis, “Modern Web Design with HTML5, CSS3, and JavaScript”, 3 rd Edition, Packt Publishing, 2020. | | |
| Reference Books: 1. Chip Lambert, “Beginning JavaScript and jQuery”, Packt Publishing, 2017. 2. DT Editorial Services, “HTML5 Black book, covers CSS 3, Javascript, XML, XHTML, AJAX, PHP and JQuery”, 2 nd Edition, Dreamtech Press/Wiley India Pvt. Ltd., 2016. | | |
| Any other information: | | |
| Total Marks of Internal Continuous Assessment (ICA) : 50 Marks | | |
| Details of Internal Continuous Assessment (ICA) | | |
| Description of ICA | Marks | |

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|-----------|----|
| Test | 20 |
| Term work | 30 |
| Total | 50 |

Minimum 10 practicals (A single web application development exercise covering all the units. This exercise can be also done in group of 2-3 students)/tutorials based on the entire syllabus

Application based mini project:

- Application should cover **Create, Read, Update, Delete** scenarios of data.
- Front end to be developed covering all the technologies (HTML5, CSS3, jQuery, AngularJS)
- Back end connectivity to be established through RESTful services and must have database connectivity.
- Student can choose any backend technologies and database for developing REST services required for the application development. RESTful services should be developed using technologies already familiar. E.g. Java OR C# OR Python etc.

Signature
(Prepared by Concerned Faculty/HOD)

Signature
(Approved by Dean)