Department of Computer Science and Business Systems (CSBS)

Structure & Syllabi

T. Y. B. Tech (2019 Pattern)

w.e.f. Academic Year 2023-2024

Department of Computer Science and Business Systems (CSBS)

Vision

To serve society by developing competent ethical professionals through quality education.

Mission of Department

- To empower students with fundamentals of Computer Engineering and Management skills to be successful professionals.
- To impart quality education, enabling the students for higher studies, research and entrepreneurship.
- To strive for betterment of society through professional ethics and life skills.

Dr. K. P. Moholkar
BoS, CSBS

Dr. R. B. Joshi
Dean Academics

Dr. R. K. Jain
Director RSCOE, Pune

Department of Computer Science and Business Systems (CSBS)

Program Outcomes (POs)

Engineering Graduates will be able to:

1.Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2.Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3.Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4.Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5.Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7.Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8.Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9.Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10.Communication: Communicate effectively on complex engineering activities with the engineering community and
with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11.Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12.Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Department of Computer Science and Business Systems (CSBS)

Program Specific Outcomes (PSOs)

Upon successful completion of UG course in Computer Science and Business Systems, the students will attain following Program Specific Outcomes:

PSO1: Apply principles and domain knowledge of Computer Engineering and problem-solving skills to solve complex real time problems.

PSO2: Demonstrate critical-thinking and problem-solving abilities in Business Management by exhibiting awareness of management concepts.

PSO3: To recognize the significance of lifelong learning and research for betterment of society.

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Highlights of the Syllabus

Curriculum of UG program for Computer Science and Business Systems is designed in association with

Academic Experts

Industry/Corporate Experts

Distinguished Alumni

Features of **Computer Science and Business Systems** curriculum are designed in association with the **Tata Consultancy Services.**

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Unique features of the curriculum

1. **Curriculum centered at Outcome Based Education:**
   The new Curriculum is based on student-centered instruction models that focus on measuring student performance through outcomes. The outcomes include subject knowledge, industry required skills and attitudes.

2. **Emphasize on Fundamentals:**
   The nature of the new curriculum is rigorous and well prescribed so that the students can spend more time on preparation and self-study. The students have to learn core subjects, solve practical based assignments and must attempt periodical quizzes. This will benefit them to grasp and keep a strong hold on fundamentals of Engineering in the most effective way.

3. **Experiential Learning:**
   The curriculum emphasizes on hands-on sessions along with theoretical information. The new curriculum considers Problem Based Learning (PBL) as a teaching pedagogy and includes different subjects that encourage the students for hands on learning through virtual labs, mini-projects, etc. Accordingly, the curriculum maintains good balance between theory and laboratory credits.

4. **Promote Creativity and Innovation:**
   Along with experiential learning, the curriculum also motivates the students to inculcate creativity and innovation. Apart from conventional lab, the curriculum provides a freedom for students to perform industry assignments, pilot projects, innovative development, etc.

5. **Inculcating Ethics and Values:**
   To improvise student's behavior, the curriculum has included systematic courses on ethics and values. The moral principles can help students to make right decisions, lead their professional lives and become ethical citizen.

6. **Blend of Curricular and Non-curricular Activities**
   The curriculum also gives importance of different activities like co-curricular, extra-curricular, sports, culture, etc. This will help to do all round development of students in all possible ways.

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7. **Four Tracks in B-Tech:**
   By offering various courses flexibility in choosing mentoring at work in specified field as:
   I. Industry Internship
   II. Higher Studies and Research
   III. Entrepreneur
   IV. In house Project
8. **Global Competence:**
   The curriculum provides a unique opportunity for students to learn and engage in open and effective interaction with people from diverse and interconnected world. The combination of foreign languages (German, Japanese, English) and international internships in the curriculum help the students to build a capacity to examine global and intercultural issues and to propose perspectives and views.
9. **Industry Induced Internship Program**
   To support ever demanding industry requirements, the curriculum has included an industry internship with an objective to learn technologies pertaining to their discipline and enhance their technical knowledge with a support of the live platform of Industry.
10. **Motivation for Self-Learning:**
    The curriculum also offers a freedom to students to take the initiatives in their learning needs and set the goals with the help of online learning platforms like MOOCs, NPTEL, Swayam, etc.

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T. Y. B. Tech (Computer Science and Business Systems)

Academic Year – 2023-2024 Semester -V Structure

Course Code	Course	Teaching Scheme			Examination Schemes						Credits
		TH	Tut	Lab	Theory			Practical		Total	Total
					ISE (15)	MSE (25)	ESE (60)	TW	Lab		
CB3101	Machine Learning	3	-	2	15	25	60	-	25	125	4
CB3102	Computer Networks and Security	3	-	2	15	25	60	-	25	125	4
CB3107	Fundamentals of Management and Business Strategy	3	-	0	15	25	60	-	-	100	3
CB3103	Elective I	3	-	2	15	25	60	-	25	125	4
CB3104	Elective II	3	-	2	15	25	60	-	25	125	4
CB3108	Business Communication & Value Science – IV	-	-	2	-	-	-		25	25	1
CB3105	Skill Development Lab-II			2					25	25	1
CB3106	Project Stage I	-		2	-	-	-	25	50	75	1
	Audit Course III	Non Credit									
Total		**15**	**-**	**14**	**75**	**125**	**300**	**-**	**200**	**700**	**22**

Elective I Specialization (Track)	
Course Code	**Course Name**
CB3103A	Artificial Intelligence
CB3103B	Information Security
CB3103C	Computer Graphics and Animation
Elective II (Technology Track)	
Course Code	**Course Name**
CB3104A	Internet of Things
CB3104B	Modern Web Applications
CB3104C	Cloud Microsystems, Applications and Security

Audit Course	
Code	**Name of Course**
HS3106	Essence of Indian Knowledge Tradition –I
HS3108	Cultural Studies
CE3113	Urbanization and Environment

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Dr. R. B. Joshi
Dean Academics

Dr. R. K. Jain
Director RSCOE, Pune

T. Y. B. Tech (Computer Science and Business Systems)
Academic Year – 2023-2024 Semester -VI Structure

Course Code	Course	Teaching Scheme			Examination Schemes						Credits
		TH	Tut	Lab	Theory			Practical		Total	Total
					ISE (15)	MSE (25)	ESE (60)	TW	Lab		
CB3109	Data Mining and Analytics	3	-	2	15	25	60	-	25	125	4
CB3110	Compiler Design	3	-	2	15	25	60	-	25	125	4
CB3111	Elective III	3	-	2	15	25	60	-	25	125	4
HS/CB	Elective IV	3	-	-	15	25	60	-	-	100	3
HS3111	Marketing Research and Marketing Management	3	-	-	15	25	60	-	-	100	3
CB3113	Project Stage II	-		4	-	-	-		125	125	2
	Audit Course IV	Non Credit									
Total		**15**	**0**	**10**	**75**	**125**	**300**	**0**	**200**	**700**	**20**

Elective III	
Course Code	**Course Name**
CB3111A	Deep Learning
CB3111B	Cryptology
CB3111C	Multimedia Techniques
Elective IV	
CB3112	Operations Research
HS3103A	Industrial Psychology
HS3101C	Finance and Cost Accounting

Audit	
Code	**Name of Course**
HS3107	Essence of Indian Knowledge Tradition –II
HS3109	Introduction to Human Factors and Ergonomics
HS3110	Mind Education

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BoS, CSBS

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Dean Academics

Dr. R. K. Jain
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Academic Year – 2023-2024

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Semester V

T. Y. B. Tech (Computer Science and Business Systems)
Academic Year – 2023-2024 Semester –V
[CB3101]: Machine Learning

Teaching Scheme:	Credit	Examination Scheme:
TH: - 3Hours/Week	TH: 3	In Sem. Evaluation :15 Marks
PR: - 2 Hours/Week	PR: 1	Mid Sem. Exam : 25 Marks
		End Sem. Exam : 60 Marks
		Lab Evaluation : 25 Marks

Course Prerequisites : Linear algebra [ES1109] ,Introduction to probability, Statistical and Calculus [ES1106], Computational Statistics [CB2104]

Course Objective:

1. To understand human learning aspects and relate it with machine learning concepts.
2. To understand nature of the problem and apply machine learning algorithm
3. To become aware of various parametric and non-parametric methods in machine learning
4. Compare efficiency of learning algorithms.

Course Outcome:

After successful completion of the course, students will able to:

CO 1: Identify and Evaluate Machine Learning algorithms using various metrics.
CO 2: Apply and evaluate regression algorithms to solve real time problems.
CO 3: Apply and evaluate SVM ,Naive Bayes algorithms to solve real time classification problems.
CO 4: Apply and evaluate ensemble algorithms to solve real time classification problems.
CO 5: Apply and evaluate Hidden Markov Models to solve real time problems.
CO 6: Apply and analyze different unsupervised machine learning algorithms to solve real time clustering problems.

Course Contents

UNIT-I	Introduction to Machine Learning	8 Hours

Introduction to Machine Learning (ML); Types: Supervised , Unsupervised, Reinforcement Learning, Example and applications of ML , ML and Big data, Data Scaling and Normalization, Feature selection and feature engineering; Training and testing classifier models; Cross-validation; Model evaluation (precision, reca l, F1-mesure, accuracy, area under curve, Evaluation Metrics: MAE, RMSE, R2); Exploratory Data Analysis

UNIT-II	Supervised Learning: Regression	6 Hour

Classification: Supervised Learning; The problem of classification; Linear Regression and higher dimensionality, Regularization; LASSO, Ridge, Polynomial Regression: Artificial Neural Networks: Single Layer Neural Network, Gradient descent algorithm. A-priori Algorithm,

Case Study: Stock Market Price Prediction

UNIT-III	Naïve Bayes and SVM	8 Hours

Statistical decision theory including discriminant functions and decision surfaces; Naive Bayes classification and types; Support Vector Machine(SVM)- Linear Support Vector Machines, soft margin, multiclass, Micro and Macro Average Precision and Recall, F-score and difference, non-linear, Bayesian networks; Generative vs. Discriminative Models, Linear-Gaussian models.

Case study: Prediction of Thyroid disorders using multiclass classifier.		
UNIT-IV	**Decision Tree and Ensemble Models**	**8 Hours**
Decision Tree and Random Forests; , k-Nearest neighbor classification, Concepts of Weak and eager learner, Ensembles of classifiers including bagging and boosting, AdaBoost, XGBoost, CatBoost, Gradient Tree Boosting, Voting Classifier, Evaluation Matrices. **Case study:** online shopping store		
UNIT-V	**Hidden Markov Models (HMM)**	**6 Hours**
Hidden Markov Models (HMM) with forward-backward and Vierbi algorithms; Sequence classification using HMM; Conditional random fields;		
UNIT-VI	**Unsupervised Learning**	**8 Hours**
Clustering: Hard and soft clustering, Expectation-Maximization (EM) algorithm; Minimum spanning tree clustering; K-nearest neighbors clustering; BIRCH; CURE; DBSCAN, Evaluation metrics and score: elbow method, extrinsic and intrinsic method, Anomaly and outlier detection methods. **Case study: Market basket analysis/Customer Segmentation**		
Lab Contents		
Guidelines for Assessment		
1) Continuous assessment shall be based on experiments performed, submission of results of program in the form of report/journal, timely completion, attendance, understanding, efficient codes, punctuality and neatness. 2) Practical/Oral examination shall be based on the practical's performed in the lab. 3) Lab assessment of 25 marks shall be based on continuous assessment and performance in Practical/Oral examination		
List of Laboratory Assignments		
1	**Mini Project:** Using suitable public domain dataset in UCI ML repository, apply different classification algorithms and compare the results. a. Naive Bayes Algorithm. b. SVM c. Decision Tree d. k-Nearest neighbor classification	
2	**Mini Project:** Using suitable public domain dataset in UCI ML repository, apply different ensemble algorithms and compare the results.	
3	**Mini Project:** Using suitable public domain dataset in UCI ML repository, apply a-priori algorithm to find frequently occurring items from given data and generate strong association rules using support and confidence thresholds. For Example: Market Basket Analysis.	
4	**Mini Project:** Using public domain datasets in UCI ML repository and apply different clustering algorithms and compare the results. Visualize the clusters using suitable tools a. EM b. Hierarchical Clustering: single, complete, average, Ward, CURE c. K-nearest neighbors clustering d. DBSCAN	
Text Books:		

Dr. K. P. Moholkar
BoS, CSBS

Dr. R. B. Joshi
Dean Academics

Dr. R. K. Jain
Director RSCOE, Pune

T1. Ethem Alpaydın, Introduction to Machine Learning, PHI, Third Edition, ISBN No. 978-81-203- 5078-6

T2. Christopher M. Bishop, Pattern Recognition and Machine Learning, Mcgraw-Hill, ISBN No. 0-07-115467-1

T3. Tom Mitchell, Machine Learning, Mcgraw-Hill, First Edition, ISBN No. 0-07-115467-1.

T4. Giuseppe Bonaccorso, "Machine Learning Algorithms", Packt Publishing Limited, ISBN10: 1785889621, ISBN-13: 978-1785889622

T5. Jiawei Han, Micheline Kamber, and Jian Pie, "Data Mining: Concepts and Techniques", Elsevier Publishers Third Edition, ISBN: 9780123814791,9780123814807

Reference Books:

R1. R.O. Duda, P.E. Hart, D.G. Stork, Pattern Classification, 2/e, Wiley, 2001

R2. Shaishalev-Shwartz and Shai Ben-David, Understanding Machine Learning(From Theory to Algorithms), Cambridge University Press, First Edition, ISBN No. 978-1-107-51282-5.

R3. A. Rostamizadeh, A. Talwalkar, M. Mohri, Foundations of Machine Learning, MIT Press.

R4. A. Webb, Statistical Pattern Recognition, 3/e, Wiley, 2011.

R5. Mark Fenner, Machine Learning with Python for Everyone,3rd Edition, Pearson

R6. Anderson, Guido, Introduction to Machine Learning with Python, O'Really

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T. Y. B. Tech (Computer Science and Business Systems)

Academic Year – 2023-2024 Semester -V

[CB3102]: Computer Networks and Security

Teaching Scheme:	Credit	Examination Scheme:
TH: 3 Hours/Week	TH:3	In Sem. Evaluation:15 Marks
PR: 2 Hours/Week	PR: 1	Mid Sem. Exam : 25 Marks
		End Sem. Exam : 60 Marks
		Lab Evaluation : 25 Marks

Course Prerequisites: Computer Organization & Architecture [CB2103]

Course Objective:

- To learn the network architecture.
- To learn various networking protocols & layers.
- To learn and understand network security.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Explain the fundamental concepts of computer networks, protocols and technologies.
CO2: Summarize the functions and working of data link layer.
CO3: Analyze the working of different routing protocols and IP addressing mechanisms.
CO4: Implement client server applications using socket programming.
CO5: Discuss role of application layer with its protocols and client server architectures.
CO6: Comprehend the basics of Network Security.

Course Contents

UNIT-I	Introduction and Data Communication Components	6 Hours

Computer Networks and Distributed Systems, Classifications of Computer Networks, Preliminaries of Layered Network Structures. Representation of Data and Its Flow, Various Connection Topology, Protocols and Standards, OSI Model, TCP/IP Model, Principals of physical layer: Media, Bandwidth, Data rate and Modulations, Transmission Media. Network Architectures: Client-Server, Peer To Peer, Hybrid. Line Coding Schemes: Manchester and Differential Manchester Encodings, Frequency Hopping (FHSS) and Direct Sequence Spread Spectrum (DSSS).
Case Study: Study of Campus wide networking

UNIT-II	Data Link Layer	8 Hours

Wired LAN, Wireless LAN and Virtual LAN, Multiplexing - Frequency Division, Time Division and Wave Division, Concepts on Spread Spectrum. 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. Introduction to Ethernet
Case Study: Demonstration of DLL protocols on Simulator

UNIT-III	Network Layer	8 Hours

Function of Network layer, Switching Techniques, IP Protocol, Logical Addressing – IPV4, IPV6; Sub net, CIDR, Network layer protocols – ARP, RARP, BOOTP, ICMP, IGMP and DHCP–Delivery, Routing Protocols: Static , dynamic, distance vector, link state, Path vector, Forwarding and Unicast Routing Protocols. Routing in Manet.

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Case Study: Demonstration of Routing Protocols on simulator		
UNIT-IV	**Transport Layer**	**7 Hours**
Process to Process Communication, Socket Programming, Elements of transport layer protocol, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service (QoS), QoS Improving Techniques - Leaky Bucket and Token Bucket Algorithms. Differentiated services, TCP and UDP for Wireless networks. **Case Study:** Demonstration of Transport Layer Protocols on simulator		
UNIT-V	**Application Layer**	**6 Hours**
DNS, DDNS, TELNET, EMAIL, FTP, WWW, HTTP, SNMP, Bluetooth, Electronic Mail, Directory Services and Network Management.		
UNIT-VI	**Security**	**6 Hours**
Overview of Network Security: Elements of Network Security, Basic concepts of Cryptography. Classification of Network Attacks ,Security Methods ,Symmetric-Key Cryptography :Data Encryption Standard (DES),Advanced Encryption Standard (AES) , Public-Key Cryptography :RSA Algorithm ,Diffie-Hellman Key-Exchange Protocol , Authentication :Hash Function , Secure Hash Algorithm (SHA) , Digital Signatures , Firewalls and Packet Filtering ,Packet Filtering , Proxy Server .		

Lab Contents

Guidelines for Assessment

1) Continuous assessment shall be based on experiments performed, submission of results of program in the form of report/journal, timely completion, attendance, understanding, efficient codes, punctuality and neatness.
2) Practical/Oral examination shall be based on the practical performed in the lab.
3) Lab assessment of 25 marks shall be based on continuous assessment and performance in Practical/Oral examination

List of Laboratory Assignments/Experiments

1	Setting up a Local Area Network (2PC/4 PC) and configuration for sharing resources. It includes preparation of cable, testing of cable using line tester, Performing an Initial Switch Configuration and Initial Router Configuration, configuration machine using IP addresses, testing using PING utility and demonstrating the PING packets captured traces using Wireshark Packet Analyzer Tool.
2	Write a program for error detection and correction for 7 or 8 bits ASCII codes using CRC.
3	Write a program to simulate Go-back-N and Selective Repeat modes of sliding window protocol.
4	Write a program for DNS lookup. Given an IP address as input, it should return URL and viceversa
5	Write a program using TCP socket using C++ for following: a. Say Hello to Each other (For all students) b. File transfer (For all students) c. Calculator (Arithmetic)
6	Write a program using UDP Sockets to enable file transfer (Script, Text, Audio and Video one file each) between two machines.
7	Write a program using TCP sockets and UDP sockets for wired network to implement: a. Peer to Peer Chat b. Multiuser Chat

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8	Capture packets using Wireshark, write the exact packet capture filter expressions to accomplish the following and save the output in file: 1. Capture all TCP traffic to/from Facebook, during the time when you log in to your Facebook account 2. Capture all HTTP traffic to/from Facebook, when you log in to your Facebook account 3. Write a DISPLAY filter expression to count all TCP packets (captured under item #1) that havethe flags SYN, PSH, and RST set. Show the fraction of packets that had each flag set. 4. Count how many TCP packets you received from / sent to Face book, and how many of eachwere also HTTP packets.
9	Installation and configuration web server (Client-server based).
10	Virtual Lab: http://vlabs.iitb.ac.in/vlab/

Text Books

T2. Computer Networks, A. Tannenbaum, Pearson Education-Prentice Hall.

T3. Data and Computer Communication, William Stallings, Pearson.

Reference Books:

R1. Forouzan B, "Data communication & Networking", 5 th edition, Tata Macgraw Hill.

R2. UNIX Network Programming, Vol. 1, 2 & 3, W. Richard Stevens.

R3. B. Schneier, Applied Cryptography, 2nd Ed, John Wiley & Sons, Inc., 1996.

R4. A. Menezes, P. van Oorshot and S. Vanstone, Handbook of Applied Cryptogrphy, CRC Press, 1997.

R5. C. Kauffman, R. Perham and M. Speciner, Network Security: Private Communication in a Public World, Prentice-Hall, 1994.

R6. H. C. A. van Tilborg, Fundamentals of Cryptology, Kluwer Academic Publishers, 2000.

R7. P. Garrett, Making and Breaking Codes: An Introduction to Cryptology, Prentice-Hall, 2001.

R8. P. Wayner, Disappearing Cryptography, 2nd Ed, Morgan Kaufmann, 2002.

R9. W. Cheswick, S. Bellovin and A. Rubin, Firewalls and Internet Security. Repelling the Wiley Hacker, 2nd Ed, Addison-Wesley, 2003

Links:

- Unit 1 https://www.youtube.com/watch?v=4D55Cmj2t-A
- Unit 2 https://www.youtube.com/watch?v=UAKok0wg1p8
- https://www.youtube.com/watch?v=IR-p1A_PQ3w
- https://www.youtube.com/watch?v=LN1NlN5Q3YI
- Unit 3 https://www.youtube.com/watch?v=JRgmPco0KWI
- https://www.youtube.com/watch?v=WYM9nFYnYAg
- https://www.youtube.com/watch?v=G0h0dC4Zycs
- Unit 4 https://www.youtube.com/watch?v=rW1jPlYgp_0
- https://www.youtube.com/watch?v=kAty4mKczEg
- Unit 5 https://www.youtube.com/watch?v=8An0dRalJeM
- https://www.youtube.com/watch?v=6Jubl1UnJTE

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T. Y. B. Tech (Computer Science and Business Systems)
Academic Year – 2023-2024 Semester -V
[HS3102]: Fundamentals of Management and Business Strategy

Teaching Scheme:	Credit	Examination Scheme:
TH: - 3 Hours/Week	TH:3	In Sem. Evaluation:15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks

Course Prerequisites : Basics of Management

Course Objectives:

- To prepare the students for various forms of the Management Systems and its application in organizations.
- To expose the students to the managerial issues relating to Organization help them identify and evaluate various options in Management Systems.
- To prepare engineering students for the inter-relationships of business to individuals, other organizations, government and society.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Explain the need, usage and importance of Management basics.
CO2: Comprehend the activities that are undertaken while planning, Organizing, staffing, directing and controlling of management.
CO3: Discuss the activities and culture of organization.
CO4: Explain the concepts of strategic management.
CO5: Explain fundamental principles of and interrelationships among business functions.
CO6: Summarize the inter-relationships of business to individuals, other organizations, government and society.

Course Contents

UNIT-I	Management Theories and Functions	6 Hours

Concept and Foundations of Management, Evolution of Management Thoughts [Pre-Scientific Management Era (before 1880), Classical management Era (1880-1930), Neo-classical Management Era (1930-1950), Modern Management era (1950-on word). Contribution of Management Thinkers: Taylor, Fayol, Elton Mayo etc. Planning, Organizing, Staffing, Directing, Controlling, execution and evaluation
Case Study: **Mumbai dabbawala**

UNIT-II	Organization Behavior and Design	6 Hours

Introduction, Personality, Perception, Learning and Reinforcement, Motivation, Group Dynamics, Power & Influence, Work Stress and Stress Management, Decision Making, Problems in Decision Making, Decision Making, Organizational Culture, Managing Cultural Diversity. Classical, Neoclassical and Contingency approaches to organizational design; Organizational theory and design, Organizational structure (Simple Structure, Functional Structure, Divisional Structure, Matrix Structure, Collaboration with stakeholders and cross teams, team& project management fundamentals
Case Study: **Amazon, Walmart, Microsoft**

UNIT-III	Managerial Ethics and Leadership	6 Hours

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BoS, CSBS

Dr. R. B. Joshi
Dean Academics

Dr. R. K. Jain
Director RSCOE, Pune

Ethics and Business, Ethics of Marketing & advertising, Ethics of Finance & Accounting, Decision – making frameworks, Business and Social Responsibility, International Standards, Corporate Governance, Corporate Citizenship, Corporate Social Responsibility, Concept, Nature, Importance, Attributes of a leader, developing leaders across the organization, Leadership Grid

Case Study: **Starbucks,An Environmental Problem**

UNIT-IV	**Introduction to Strategic Management**	**6 Hours**

Importance of Strategic Management, Vision and Objectives, Schools of thought in Strategic Management, Strategy Content, Process, and Practice, Fit Concept and Configuration Perspective in Strategic Management

Case Study: **Bisleri**

UNIT-V	**Internal and External Environments of Firm**	**6 Hours**

Core Competence as the Root of Competitive Advantage, Sources of Sustained Competitive Advantage, Business Processes and Capabilities-based Approach to Strategy, Five Forces of Industry Attractiveness that Shape Strategy, The concept of Strategic Groups, and Industry Life Cycle, Generic Strategies, Generic Strategies and the Value Chain

UNIT-VI	**Strategy Implementation**	**6 Hours**

The Motive for Diversification, Related and Unrelated Diversification, Business Portfolio Analysis, Expansion, Integration and Diversification, Strategic Alliances, Joint Ventures, and Mergers & Acquisitions, The 7S Framework, Strategic Control and Corporate Governance

Case Study: **Toyota, Soni**

Assignments

1. Group Discussion: Corporate social responsibility (CSR) and HRM implications: What does it mean to be socially responsible within an increasingly financially driven market economy?
2. The debate: Leaders are Born, Not Made!
3. Students should take an example of well known brands like starbuks, McDonalds etc and present a report on their complete business strategy as a part of ISE assessment.

Text Books:

T1 Richard L. Daft, *Understanding the Theory and Design of Organizations.*

Reference Books:

R1: Stephen P. Robbins, Timothy A. Judge, Neharika Vohra, Organizational Behavior.
R2: Rothaermel, F. 2020. "Strategic Management" (5th ed.).
R3: Henry, E.A. Understanding Strategic Management, Oxford
R4: Jauch, L.R. and Glueck, W.F. Business Policy and Strategic Management, McGraw-Hill.
R5: Pearce II, J.A., Robinson R.B and Mittal, A. Strategic Management: Formulation, Implementation and Control, McGraw Hill.
R6: Thompson, A. Peteraf, M.A., Gamble, J.E., Strickland, A.J., and Jain A.K. Crafting and Executing Strategy, McGraw-Hill
R7: Kajmi, A. Business Policy and Strategic Management, Tata McGraw Hill Adhikari, D.R. Strategic Management, Buddha Publication
R8: Wheelan, T.L. and Hunger J.D. Strategic Management and Business Policy, Pearson

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T. Y. B. Tech (Computer Science and Business Systems)
Academic Year – 2023-2024 Semester -VI
Elective I [CB3103A]: Artificial Intelligence

Teaching Scheme:	Credit	Examination Scheme:
TH: 3 Hours/Week	TH:3	In Sem. Evaluation:15 Marks
PR: 2 Hours/Week	PR: 1	Mid Sem. Exam : 25 Marks
		End Sem. Exam : 60 Marks
		Lab Evaluation : 25 Marks

Course Prerequisites : Discrete Mathematics [ES1108], Data Structure and Algorithms [CB1104]

Course Objective:
- To provide a strong foundation of fundamental concepts in Artificial Intelligence.
- To identify the type of an AI problem
- To acquire knowledge on intelligent systems and agents, formalization of knowledge and reasoning

Course Outcome:
After successful completion of the course, students will able to:
CO1: Demonstrate knowledge of the building blocks of AI as presented in terms of intelligent agents.
CO2: Analyze and formalize the problem as a state space search.
CO3: Describe the strengths and limitations of various state-space search algorithms, and choose the appropriate algorithm
CO4: Develop intelligent algorithms for constraint satisfaction problems
CO5: Ability to apply knowledge representation and use this to perform inference or planning.
CO6: Formulate and solve problems with uncertain information using Bayesian approaches.

Course Contents

UNIT-I	Introduction To AI	08 Hours

Introduction, Overview of Artificial intelligence: Problems of AI, AI technique, Tic - Tac - Toe problem. Intelligent Agents, Agents & environment, nature of environment, structure of agents, goal based agents, utility based agents, learning agents. Defining the problem as state space search, production system, problem characteristics, issues in the design of search programs.
Case Studies: Nought and Crosses,Vacuum Cleaner Problem, Water Jug Problem

UNIT-II	Search techniques	08 Hours

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 annealing search, local beam search

UNIT-III	Constraint satisfaction problems	06 Hours

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.

UNIT-IV	Knowledge & Reasoning	08 Hours

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. Fuzzy Logic Systems , Axiomatic Systems, Representing knowledge using rules, Procedural verses declarative knowledge, logic programming, forward verses backward reasoning, matching, control knowledge.

UNIT-V	Probabilistic reasoning & Expert Systems	08 Hours

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. Capabilities and Components of Expert systems, Implementations, Expert technologies, advantages disadvantage and characteristics , Rules for Knowledge representation Applications, approaches to expert systems, Certainty and uncertainty factors..
Case Study: Robotics and Machine Vision

UNIT-VI	AI and Society	06Hours

Ethical and Social Implications of AI: Bias and fairness in AI algorithms,Privacy and security concerns
AI in healthcare and other sensitive domains, Responsible AI development and deployment
AI and Society: Socioeconomic impacts of AI, Job displacement and future of work, AI and creativity AI governance, policy, and regulations,
Advanced Topics and Future Directions: Advanced AI techniques (e.g., generative models, reinforcement learning advances), Cutting-edge AI research and emerging trends, Ethical AI design and future challenges

Lab Contents

Guidelines for Assessment

1) Continuous assessment shall be based on experiments performed, submission of results of program in the form of report/journal, timely completion, attendance ,understanding, efficient codes, punctuality and neatness.
2) Practical/Oral examination shall be based on the practical's performed in the lab.
3) Lab assessment of 25 marks shall be based on continuous assessment and performance in Practical/Oral examination

List of Laboratory Assignments/Experiments

1	Write a program for Automatic Nought and Crosses using random number
2	Implement and compare different search algorithms, such as breadth-first search, depth-first search, and A* search, on a given problem domain (e.g., a maze or a puzzle). Measure and compare the performance of the algorithms in terms of time complexity and solution quality.
3	Use Heuristic Search Techniques to Implement Hill-Climbing Algorithms.
4	Constraint Satisfaction Problem: Implement crypt-arithmetic problem or n-queens or graph coloring problem (Branch and Bound and Backtracking)
5	Implement Goal stack planning for block world problem
6	Developing a Simple Expert System: Build a rule-based expert system using a knowledge representation framework (e.g., propositional logic or fuzzy logic) to provide recommendations or make decisions in a specific domain (e.g., medical diagnosis or financial planning). Test the expert system with various inputs and evaluate its accuracy and usefulness.
7	Develop a conversational AI chatbot using natural language processing techniques and a dialogue management framework for customer enquiry.

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Text Books:

T1. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach

T2. Artificial Intelligence, Russel, Pearson

Reference Books:

R1. Artificial Intelligence, Ritch& Knight, TMH

R2. Introduction to Artificial Intelligence & Expert Systems, Patterson, PHI

R3. Logic & Prolog Programming, SarojKaushik, New Age International

R4. Expert Systems, Giarranto, VIKAS

Links:

- Unit 1 **https://nptel.ac.in/courses/106/106/106106198/**
- Unit 2 **https://nptel.ac.in/courses/111/107/111107137/**
- Unit 3 **https://nptel.ac.in/courses/106/106/106106202/**
- Unit 4 **https://nptel.ac.in/courses/106/106/106106213/**
- Unit 5 **https://nptel.ac.in/courses/106/105/106105152/**

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BoS, CSBS

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Dean Academics

Dr. R. K. Jain
Director RSCOE, Pune

T. Y. B. Tech (Computer Science and Business Systems)
Academic Year – 2023-2024 Semester -VI
Elective I[CB3103B]: Information Security

Teaching Scheme:	Credit	Examination Scheme:
TH: 03 Hours/Week	TH: 03	In Sem. Evaluation: 15 Marks
PR: 02 Hours/Week	PR: 01	Mid Sem. Exam : 25 Marks
		End Sem. Exam : 60 Marks
		Lab Evaluation : 25 Marks

Course Prerequisites : Operating System[CB2108], Computer Network[CB3102]

Course Objective:

The Information Security course provides an introduction to the fundamental concepts and principles of information security. Students will gain knowledge and skills in identifying, assessing, and mitigating information security risks. The course covers topics such as security policies and procedures, network security, cryptography, access control, security incident management, and ethical considerations in information security.

Course Outcome:

After successful completion of the course, students will able to:

CO 1: Implement the concepts of information security.
CO 2: Illustrate concepts of Access Control models.
CO 3: Analyse information security policy.
CO 4: Analyse information system design.
CO 5: Comprehend concept of Logic-based System.
CO 6: Analyze the operating system and database security methods.

Course Contents

UNIT-I	Overview of Security Parameters	7 Hours

Introduction to Securities: Introduction to security Threats, Attacks., services and mechanism, CNSS model, Components of Information security, Confidentiality, integrity and availability, Security violation and threats, Security policy and procedure; Assumptions and Trust; Security Assurance, Implementation and Operational Issues; Security Life Cycle., Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key, cryptography, steganography, key range and key size, possible types of attacks.

UNIT-II	Access Control Models	7 Hours

Access Control Mechanisms: Access Control Lists- Information Flow: Compiler-Based Mechanisms, Execution-Based Mechanisms- Confinement Problem: Isolation, Covert Channels, Discretionary, mandatory, roll-based and task-based models, unified models, access control algebra, temporal and spatio-temporal models.

UNIT-III	Security Policies	7 Hours

Types of Security Policies-Confidentiality policies: Goals of Confidentiality Policies, The Bell-LaPadula Model- Integrity policies: Biba Integrity Model, Clark-Wilson Integrity Model -Hybrid policies: Chinese Wall Model, Clinical Information Systems Security Policy

UNIT-IV	Systems Design	7 Hours

Design principles, representing identity, control of access and information flow, confinement problem. Assurance: Building systems with assurance, formal methods, evaluating systems. Goals of Formal Evaluation.

UNIT-V	Logic-based System	7 Hours
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.		
UNIT-VI	**Operating Systems and Database Security**	**6 Hours**
Operating Systems Security Architecture, IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Introduction to Secure Socket Layer, Secure electronic, transaction (SET), Analysis of Security in Linux/ Windows. IP layer security, Database Security Architecture, Enterprise security, Database auditing.		

Lab Contents

Guidelines for Assessment

1) Continuous assessment shall be based on experiments performed, submission of results of program in the form of report/journal, timely completion, attendance, understanding, efficient codes, punctuality and neatness.
2) Practical/Oral examination shall be based on the practical's performed in the lab.
3) Lab assessment marks shall be based on continuous assessment and performance in Practical/Oral examination

List of Laboratory Assignments/Experiments

1	Analysis of security in Unix/Linux: Perform a network security assessment on a given network. Identify potential vulnerabilities, such as open ports, weak passwords, misconfigured devices, and insecure network protocols. Document your findings and propose appropriate countermeasures to mitigate the identified vulnerabilities.
2	Administration of users, password policies, privileges and roles: a) User Account Creation, Configuration and management: b) Password Policy Implementation and testing c) Privileges and Roles Assignment and testing d) Access Control Mechanisms and testing
3	Write a Program to perform Confidentiality, integrity and availability
4	Implement the following Substitution & Transposition Techniques concepts: a) Caesar Cipher b) Rail fence row & Column Transformation
5	Write a Program to create Brute force attack, Dictionary attack, Cryptanalytic attack.
6	Write a Program to Convert a text message to hex (Bless Hex Editor).
7	Write a Program to Encrypt message and decryption messages using key.

Text Books:

T1. *Security Engineering*, Ross Anderson
T2. *Computer Security: Art and Science*, M. Bishop, Pearson Education.
T3. *Information Security: Principles and Practice*, M. Stamp.

Reference Books:

R1: Security in Computing, C.P. P fleeger, S.L. P fleeger, J. Margulies
R2: Secure Programming HOWTO, David Wheeler.
R3: Browser Security Handbook, Michael Zalewski.
R4: Handbook of Database Security, M. Gertz, S. Jajodia.

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Dean Academics

Dr. R. K. Jain
Director RSCOE, Pune

Links:

- Unit 1 https://www.youtube.com/watch?v=KxryzSO1Fjs
- Unit 2 https://www.springboard.com/blog/data-wrangling/
- Unit 3 https://towardsdatascience.com/exploratory-data-analysis-in-r-for-beginners-fe031add7072
- Unit 4 https://learn.datacamp.com/courses/exploratory-data-analysis-in-python

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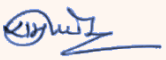

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Dean Academics

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Director RSCOE, Pune

T. Y. B. Tech (Computer Science and Business Systems)

Academic Year – 2023-2024 Semester -V

Elective I[CB3103C]: Computer Graphics And Animation

Teaching Scheme:	Credit	Examination Scheme:
TH: 03 Hours/Week PR: 02 Hours/Week	TH: 03 PR: 01	In Sem. Evaluation:15 Marks Mid Sem. Exam: 25 Marks End Sem. Exam : 60 Marks Lab Evaluation : 25 Marks

Course Prerequisites: Basic knowledge of computers and mathematics

Course Objective:

The Computer Graphics and Animation course introduces students to the principles, techniques, and tools used in computer graphics and animation. Students will learn both 2D and 3D graphics concepts and apply them to create visually appealing and interactive computer-generated images and animations. The course covers topics such as rendering algorithms, modeling techniques, animation principles, and the use of industry-standard software.

Course Outcome:

After successful completion of the course, students will able to:

CO 1: Understand the fundamental concepts and principles of computer graphics and animation.
CO 2: Apply various modeling techniques to create 2D and 3D objects.
CO 3: Implement rendering algorithms to generate realistic images.
CO 4: Apply animation principles to bring objects and characters to life.
CO 5: Analyze and critique computer-generated images and animations.

Course Contents

UNIT-I	Introduction	8 Hours

Definition and scope of computer graphics and animation, Importance and applications of computer graphics and animation, Overview of the graphics pipeline and rendering process, File formats, Graphics hardware components and their functions, Introduction to graphics software and tools,Overview of graphics programming languages (e.g., OpenGL, DirectX), devices

UNIT-II	2D Graphics and Image Processing	8 Hours

2D coordinate systems and transformations, Raster graphics concepts and algorithms, Image processing techniques (e.g., filtering, color manipulation)

UNIT-III	3D Modeling and Rendering	8 Hours

Principles of 3D modeling, Polygonal modeling techniques, Introduction to rendering algorithms (e.g., ray tracing, rasterization)

UNIT-IV	Special Effects	8 Hours

Basic lighting models (e.g., ambient, diffuse, specular),Shading techniques (e.g., flat, Gouraud, Phong) Global illumination and shadowing algorithms, Texture mapping principles and techniques, Texture coordinate systems and transformations, Procedural and image-based texture generation

UNIT-V	Animation	8 Hours

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Keyframe animation and interpolation techniques, Timing and motion principles (e.g., easing, anticipation),Character animation techniques (e.g., rigging, skeletal animation),Character Animation and Rigging, Character rigging techniques and tools, Skinning and deformation methods, Inverse kinematics and motion capture		
UNIT-VI	**Real-Time Graphics and Virtual Reality**	**8 Hours**
Real-time rendering techniques, Introduction to virtual reality (VR) concepts, VR rendering and interaction techniques, Advanced rendering techniques (e.g., global illumination, subsurface scattering) Non-photorealistic rendering (NPR) techniques, GPU programming and parallel computing in graphics		

Lab Contents

Guidelines for Assessment

1) Continuous assessment shall be based on experiments performed, submission of results of program in the form of report/journal, timely completion, attendance, understanding, efficient codes, punctuality and neatness.
2) Practical/Oral examination shall be based on the practical's performed in the lab.
3) Lab assessment marks shall be based on continuous assessment and performance in Practical/Oral examination

List of Laboratory Assignments/Experiments

1	Introduction to 2D Graphics • Install a 2D graphics software tool (e.g., Adobe Illustrator, Inkscape, Flash). • Create a simple 2D image using basic shapes and colors. • Apply transformations such as translation, rotation, and scaling to the image. • Experiment with different stroke and fill properties. • Export the image in a suitable file format.
2	3D Modeling and Rendering • Install a 3D modeling and rendering software tool (e.g., Blender, Autodesk Maya). • Create a basic 3D model (e.g., a simple object like a cup or a box) using polygonal modeling techniques. • Apply materials and textures to the 3D model. • Set up basic lighting and apply different shading techniques. • Render the 3D model from different angles and experiment with rendering settings.
3	Animation Principles • Use a suitable animation software tool (e.g., Adobe Animate, Autodesk 3ds Max) to create a new animation project. • Create a simple bouncing ball animation using keyframe animation. • Apply easing and timing principles to give the animation a more natural and appealing motion. • Experiment with different interpolation techniques (e.g., linear, ease-in, ease-out). • Preview and export the animation in a suitable file format.
4	Character Animation • Choose a character from a pre-existing library or create a simple character using a suitable software tool. • Rig the character with a skeletal system and apply weight painting. • Create a basic walk cycle animation for the character. • Implement facial expressions and lip-syncing for a short dialogue sequence.

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	• Refine and polish the animation, adding secondary motion and adjusting timing as needed.
5	Special Effects and Post-Processing • Create a simple particle system for generating effects like fire, smoke, or rain. • Apply physics-based simulations (e.g., cloth simulation, fluid simulation) to objects or characters. • Experiment with post-processing effects such as bloom, depth of field, or motion blur. • Integrate special effects and post-processing techniques into a scene or animation. • Render the final result with the applied effects and post-processing filters.

Text Books:

T1: Computer Graphics 2e (9/P) Paperback by Steven Harrington
T2: Computer Graphics By Donald Hearn and MPauline Baker
T3: Computer Graphics and Animation (English, Paperback, Trivedi M.C.)
T4:"Computer Graphics: Principles and Practice" by John F. Hughes, Andries van Dam, Morgan McGuire, David F. Sklar, James D. Foley, and Steven K. Feiner.
T5:"Introduction to Computer Graphics: A Practical Learning Approach" by Fabio Ganovelli, Massimiliano Corsini, and Sumanta Pattanaik.
T6:"Fundamentals of Computer Graphics" by Peter Shirley and Steve Marschner.

Reference Books:

R1: Computer Graphics C Version Second Edition By Pearson Paperback by Hearn
R2: Computer Animation: Theory and Practice by Nadia Magnenat-Thalmann and
R3: DanielThalmann
R4: "Interactive Computer Graphics: A Top-Down Approach with WebGL" by Edward Angel and Dave Shreiner.
R5: "Computer Animation: Algorithms and Techniques" by Rick Parent.
R6: "The Art of 3D Computer Animation and Effects" by Isaac Victor Kerlow.
R7: "Understanding Animation" by Paul Wells.
R8: "Digital Lighting and Rendering" by Jeremy Birn.
R9: "Mastering Autodesk Maya" by Todd Palamar.

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T. Y. B. Tech (Computer Science and Business Systems)
Academic Year – 2023-2024 Semester -V
Elective II[CB3104A]: Introduction to IoT

Teaching Scheme:	Credit	Examination Scheme:
TH: - 3 Hours/Week PR: - 2 Hours/Week	TH: 3 PR: 1	In Sem. Evaluation:15 Marks Mid Sem. Exam: 25 Marks End Sem. Exam: 60 Marks Lab Evaluation: 25 Marks

Course Prerequisites: Fundamentals of Computer Programming[CB1103] and Principles of Electronics Engineering[EC1102].

Course Objective:

- To understand fundamentals of IoT and basic design strategy and process modelling.
- To introduce students to a set of advanced topics in IoT and lead them to understand research in networks.
- To develop a comprehensive approach towards building small low cost embedded IoT systems.
- To understand fundamentals of security in IoT.

Course Outcome:

After successful completion of the course, students will able to:

CO 1: Summarize the basic concepts of IoT.
CO 2: Design implementation procedure for IoT application.
CO 3: Illustrate interfacing of different peripherals of IoT.
CO 4: Apply the design concept of IoT application in various domains.
CO 5: Identify different protocols and security aspects of IoT.
CO 6: Use python programming to develop IoT applications with Cloud Computing.

Course Contents

UNIT-I	Introduction & Concepts	07 Hours

Introduction to Internet of Things, Defining IoT, Characteristics of IoT, Functional blocks of IoT, Physical design of IoT, Logical design of IoT, IoT Protocols, Communication models & APIs, IoT levels and deployment templates.

UNIT-II	Embedded IoT stand devise method	07 Hours

Purpose and requirement specification, Process specification, Domain model specification, information model specification, Service specifications, IoT level specification, Functional view specification, Operational view specification, Device and component integration, Application development.

UNIT-III	IoT& M2M	07 Hours

M2M: The internet of devices, RFID: The internet of objects, WSN: The internet of transducer, SCADA: The internet of controllers, DCM: Device, Connect and Manage, Device: Things that talk, IoT Physical Devices and Endpoints: Basic building blocks of and IoT device, Exemplary device: Raspberry Pi, Raspberry Pi interfaces, Programming Raspberry Pi with Python, Other IoT Devices.

UNIT-IV	Domain specific applications of IoT	07 Hours

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Director RSCOE, Pune

Home automation, Industry applications, Surveillance applications, Agriculture, Industry, Home Intrusion Detection, Weather Monitoring System, Air Pollution Monitoring, Smart Irrigation. Other IoT applications.		
UNIT-V	**IoT Protocol Standardization and Security**	**07 Hours**
Protocol Standardization for IoT, SCADA and RFID Protocols, Unified Data Standards, Protocols – IEEE 802.15.4, BACNet Protocol, Modbus, KNX, Zigbee Architecture, Network layer. IoT Security: Vulnerabilities of IoT, Security Requirements, Challenges for Secure IoT, Threat Modeling, Key elements of IoT Security: Identity establishment, Access control, Security model for IoT.		
UNIT-VI	**Cloud for IoT and Developing IoTs**	**07 Hours**
Cloud of Things: Grid/SOA and Cloud Computing, Cloud Middleware, Cloud Standards: Cloud Providers and Systems. Introduction to Python, Introduction to different IoT tools, developing applications through IoT tools, developing sensor-based applications through embedded system platforms, Implementing IoT concepts with python.		

Lab Contents

Guidelines for Assessment

1) Continuous assessment shall be based on experiments performed, submission of results of program in the form of report/journal, timely completion, attendance, understanding, efficient codes, punctuality and neatness.
2) Practical/Oral examination shall be based on the practicals performed in the lab.
3) Lab assessment of 25 marks shall be based on continuous assessment and performance in Practical/Oral examination.

List of Laboratory Assignments

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

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Text Books:

T1: ArshdeepBahga, Vijay Madisetti, ― Internet of Things– A hands -on approach, Universities Press, ISBN: 0: 0996025510, 13:978-0996025515.

T2: Honbo Zhou, ―The Internet of Things in the Cloud: A Middleware Perspective‖, CRC Press, 2012. ISBN: 9781439892992.

Reference Books:

R1: Olivier Hersent, David Boswarthick, Omar Elloumi, The Internet of Things – Key applications and Protocols, Wiley, 2012, ISBN:978-1-119-99435-0.

R2: Adrian McEwen, Hakim Cassimally, Designing the Internet of Things‖, Wiley,2014, ISBN: 978-1-118-43063-7.

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T. Y. B. Tech (Computer Science and Business Systems)

Academic Year – 2023-2024 Semester -VI

Elective II[CB3104B]: Modern Web Application

Teaching Scheme:	Credit	Examination Scheme:
TH: 3 Hours/Week	TH:03	In Sem. Evaluation:15 Marks
PR:- 2 Hours/Week	PR:01	Mid Sem. Exam : 25 Marks
		End Sem. Exam : 60 Marks
		Lab Evaluation : 25 Marks

Course Prerequisites : Database Management Systems[CB2109], Computer Networks[CB3102]

Course Objective:

- Enable students to develop modern web application by leveraging latest technologies.
- Build strong foundation in students making them job ready as per industry requirements.
- Enable them to learn new technologies by applying foundation paradigms
- Building strong expertise to develop end to end application - web frontend and backend development

Course Outcome:

After successful completion of the course, students will able to:

CO 1: Explain the basic concepts of web development.
CO 2: Use different scripting languages to design a website.
CO 3: Solve the given problem using Java programming.
CO 4: Implement web applications using Angular framework.
CO 5: Create RESTful services using Spring Boot java framework.
CO 6: Integrate front end and back end Technology.

Course Contents

UNIT-I	Introduction	04 Hours

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

UNIT-II	Fundamentals of Scripting Language	08 Hours

HyperText Mark Up Language: - Languages used for website development, HTML5: basic tags, formatting tags, Adding images, Lists, Embedding multimedia in Web pages, Inserting tables, Internal and External Linking, Frames, Forms

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

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

UNIT-III	Java Fundamentals	06 Hours

Core Java: Introduction to Java programming language, Variables, data types, and operators, Control flow statements (if-else, loops),Object-oriented programming concepts (classes, objects, inheritance, polymorphism),Exception handling, File handling

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UNIT-IV	Front End Framework	08 Hours

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

Introduction to Angular framework: Angular components, templates, and data binding, Routing and navigation, Angular forms and validation, Services and dependency injection, Consuming RESTful APIs from the backend

UNIT-V	Back End Technologies	08Hours

Introduction to RESTful services, Resources, Messages (Request, Response), Addressing, Methods – (GET, POST, PUT, DELETE),Introduction to backend development, Creating RESTful APIs with Java and Spring Boot, Handling HTTP requests and responses, Implementing CRUD operations, Authentication and authorization, Database integration (e.g., MySQL, PostgreSQL), Overview of Spring Boot and Angular integration

UNIT-VI	Deployment and Testing	04 Hours

Setting up a project structure for Spring Boot and Angular integration, Introduction to deployment strategies, Application servers (e.g., Apache Tomcat, WildFly), Version control with Git, Automated testing with JUnit

Lab Contents

Guidelines for Assessment

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2) Practical/Oral examination shall be based on the practical performed in the lab.

3) Lab assessment of 25 marks shall be based on continuous assessment and performance in Practical/Oral examination.

Assignment

Mini Project:

It is suggested to develop a single web application development exercise covering all the units. This exercise can be also done in group of 2-3 students. Student can define the suitable web application example to implement as per their choice. It should cover followings:

- 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.

Text Books:

T1: Achyut Godbole &Atul Kahate, ‖Web Technologies: TCP/IP to Internet Application Architectures‖, McGraw Hill Education publications, ISBN, 007047298X, 9780070472983

T2: Ralph Moseley & M. T. Savaliya, —Developing Web Applications‖, Wiley publications, ISBN 13 : 9788126538676

Reference Books:

R1: Black Book, —Struts 2‖, Dreamtech Press, ISBN 13, : 9788177228700

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R2: Black Book, — JDBC 4.2, Servlet 3.1 & JSP 2.3‖, Dreamtech Press, ISBN-13: 978-8177228700
R3: Giuli oZambon, — Beginning JSP, JSF and Tomcat‖, Apress Publication, ISBN-10: 1430246235; ISBN-13: 978-1430246237
R4: Robin Nixon, —Learning PHP, Mysql and Javascript with JQuery, CSS & HTML5‖, O'REILLY, ISBN: 13:978-93-5213-015-3
R5: Giulio Zambon, — Beginning JSP, JSF and Tomcat‖, Apress Publication, ISBN-10: 1430246235; ISBN-13: 978-1430246237
R6: Sandeep Panda, —Angular JS: Novice To Ninja‖, SPD, First Edition 2014, ISBN-13: 978-0992279455

Links:

- https://www.coursehero.com/file/66643350/Lesson-1-Introduction-to-WebApplicationDevelpment-1pdf/
- https://www.youtube.com/watch?v=RsQ1tFLwldY
- https://www.youtube.com/watch?v=D-h8L5hgW-w

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T. Y. B. Tech (Computer Science and Business Systems)

Academic Year – 2023-2024 Semester -V

Elective II[CB3104C]: Cloud, Micro services & Application

Teaching Scheme:	Credit	Examination Scheme:
TH: 3 Hours/Week	TH:03	In Sem. Evaluation:15 Marks
PR:- 2 Hours/Week	PR:01	Mid Sem. Exam : 25 Marks
		End Sem. Exam : 60 Marks
		Lab Evaluation : 25 Marks

Course Prerequisites : Object Oriented Programming [CB2102]

Course Objective:

- How to design applications for cloud.
- Develop applications using various services.
- Deploy Applications on cloud by using cloud native services.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Understand the evolution of cloud computing paradigm and its architecture.

CO2: Explain and characterize different cloud deployment models and service models.

CO3: Identify the technological drivers of cloud computing paradigm.

CO4: Identify the security issues in cloud computing.

Course Contents

UNIT-I	**Introduction to cloud**	**9 Hours**
Traditional IT overview, What is cloud Computing, Types of Cloud Computing, Cloud Overview, Create cloud account, Cost Budget Setup, Shared Responsibility Model		
UNIT-II	**Instance**	**9 Hours**
Instance Basics , Instance Types, Security Groups, Connect to Instance from Linux and windows.		
UNIT-III	**Storage**	**8 Hours**
Instance Storage, Storage Snapshots, AMI overview, NFS storage, Versioning, Replication Storage classes Overview Encryption		
UNIT-IV	**Databases**	**6 Hours**
Relational Database on cloud, NoSQL database on cloud, Simple Storage		
UNIT-V	**Load Balancer**	**6 Hours**
High Availability, Scalability and Elasticity, Load Balancing , Auto Scaling strategies		
UNIT-VI	**Cloud Monitoring and Integrations**	**6 Hours**
Cloud Metrics and Alarms, Health Dashboard, Notifications services, Mail Services, Queue Services		

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BoS, CSBS

Dr. R. B. Joshi
Dean Academics

Dr. R. K. Jain
Director RSCOE, Pune

Lab Contents	
Guidelines for Assessment	
1) Continuous assessment shall be based on experiments performed, submission of results of program in the form of report/journal, timely completion, attendance, understanding, efficient codes, punctuality and neatness. 2) Practical/Oral examination shall be based on the practicals performed in the lab. 3) Lab assessment of 25 marks shall be based on continuous assessment and performance in Practical/Oral examination.	
Lab Assignments	
1	Create instance and connect from windows/linux machine
2	Create Machine image and deploy n number of machines in one go.
3	Deploy static website on cloud
4	Create database on cloud and connect to db using any application
5	Create load balancer to balance load among different instances
6	Integrate notification services
7	Integrate Queue services
8	Create health dashboard

Text Books:

T1. Fundamentals of cloud application development Siddhartha Gupta | Soumya Chatterjee |Ashok Mishra | Siddhartha Ghoshal | Rohit Malik | AnkanGanguly | Jasvinder Singh Bhatia | Ganesh Baviskar | Sandeep Sadhukhan | Avijit Das | SumedhWaikar

T2. K. Chandrasekaran, Essentials of Cloud Computing, CRC Press, 2015

Reference Books:

R1. Barrie Sosinsky, Cloud Computing Bible, Wiley-India, 2010

R2. RajkumarBuyya, James Broberg, Andrzej M. Goscinski, Cloud Computing: Principles and Paradigms, Wiley, 2011

R3. Nikos Antonopoulos, Lee Gillam, Cloud Computing: Principles, Systems and Applications, Springer, 2012

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BoS, CSBS

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Dean Academics

Dr. R. K. Jain
Director RSCOE, Pune

T. Y. B. Tech (Computer Science and Business Systems)
Academic Year – 2023-2024 Semester -V
[CB3108]: Business Communication & Value Science - IV

Teaching Scheme: PR: -2 Hours/Week	Credit PR: 1	Examination Scheme: Lab Evaluation: 25 Marks

Course Prerequisites: Basic Knowledge of English (verbal and written).Completion of all units from previous Semesters.

Course Objectives:

- Recognize the importance of diversity in workplace
- Recognize the best practices of communicative writing.
- Apply emotional intelligence in real life scenarios.
- Use the best practices of public speaking in real life scenarios.
- Understand the importance of corporate social responsibility (CSR)
- Practice corporate etiquettes in real life scenarios.
- Use the basic guidelines required to manage conflicts.
- Practice the best stress and time management practices.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Apply emotional intelligence in real life scenarios.
CO2: Apply the best practices of communicative writing.
CO3: Identify the best practices to manage stress and to identify time management techniques.
CO4: Recognize the best practices to manage conflicts and to share and receive feedback.
CO5: Describe the attributes needed to function and grow in a corporate environment

Course Contents

UNIT-I	Communicative Writing

Introduce the concept of Diversity in corporate environments through an activity.Discussion, role plays and sharing reference materials.Communicative Writing -Principles of Communicative Writing Formal and Business letters, create a business proposal to get funding to begin a start-up of their choice.Tell a story with charts and graphs.

UNIT-II	Emotional Intelligence & CSR

Introduce the concept of EI and give them the experience through a game/activity. Lead them to the concept of public speaking. Public speaking – best practices Get, Set, go – sell your start-up ideas-Presentation of Startup ideas to panel. Anubhav activities to be carried out. Introduction to CSR and why CSR is important. Attributes required for work and life - Qualities of a good team member:

UNIT-III	Personal Branding

Who am I?(Image Management. Building a perfect image)connect to importance of personal branding to stay relevant.Activity for applying Emotional Intelligence using scenarios within each start-up

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group.short session in which students will participate in at least 2 AnubhavActivities.awareness of multiple intelligences and learning styles in communication.Tips to receive and give feedback.	
UNIT-IV	**Corporate Teams and Conflict Management**
Understanding conflicts - tips to manage conflicts at work. Corporate etiquette. Business idioms and Corporate Terms. Download the TCS Biz Vocab on their smart phones.	
UNIT-V	**Managing Stress**
Introduction to stress management -discuss stress and its impact.The Long-term Effects of Stress. Create a poster with stress management tips to be presented in the next class and upload on their Fb/Insta pages. A list of stress management tips to be put up on the Fb/Insta page.	
UNIT-VI	**Managing Time Effectively**
Importance of Time Management for Better Life Style.Open house discussion, where the participants will share their challenges to manage time. Managing your time better - Time Squared Activity for better time management.Recap activity on the entire BCVS Course.	

Lab Contents

Guidelines for Assessment

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2) Practical/Oral examination shall be based on the practical's performed in the lab.
3) Lab assessment of 25 marks shall be based on continuous assessment and performance in Practical/Oral examination

List of Laboratory Assignments

1	Formal and Business letter writing
2	Presentation to pitch their start-up idea to a panel consisting of external professors.
3	Prepare and present CSR activity of Tata Steel, Microsoft, Google, TCS, Starbucks, Titan, Tata Chemicals and TOMS Shoes. (Any one company)
4	Activity for applying Emotional Intelligence using scenarios within each start-up group
5	Presentation on Time /conflict/Stress management at work place.
6	Project - The evaluation for this POC

Text Books:

There are no prescribed texts for Semester 6 – there will be handouts and reference links shared.

Reference Books:

R1. Emotional Intelligence: Why it Can Matter More Than IQ by Daniel Goleman

R2. Putting Emotional Intelligence to Work by Ryback David.

R3. How to Develop Self Confidence and Improve Public Speaking - Time - Tested Methods of Persuasion by Dale Carnegie

R4.TED Talks: The official TED guide to public speaking: Tips and tricks for giving unforgettable speeches and presentations

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T. Y. B. Tech (Computer Science and Business Systems)

Academic Year – 2023-2024 Semester -V

[CB3105]: Skill Development Lab-II

Teaching Scheme: PR: 02 Hours/Week	Credit PR:1	Examination Scheme: Lab Evaluation: 25 marks

Course Prerequisites: Object oriented Programming[CB2102]

Course Objective: The course aims to familiarize students with the Swift programming language, its syntax, and key language features. Understand Core Concepts and Develop iOS Applications.

Course Outcome:

After successful completion of the course, students will able to:

CO 1: Comprehend the fundamental concepts of SWIFT programming language.
CO 2: Develop iOS Applications using Xcode
CO 3: Design and implement user interfaces for iOS applications using UIKit

Lab Contents

Guidelines for Assessment

1) Continuous assessment shall be based on experiments performed, submission of results of program in the form of report/journal, timely completion, attendance, understanding, efficient codes, punctuality and neatness.
2) Practical/Oral examination shall be based on the practical's performed in the lab.
3) Lab assessment of 25 marks shall be based on continuous assessment and performance in Practical/Oral examination

1	**Calculator App:** Create a Swift program that simulates a calculator. Implement functions for basic arithmetic operations (addition, subtraction, multiplication, division) and display the result to the user. Allow the user to input numbers and perform multiple calculations in a single session.
2	**Hangman Game:** Design a Swift program that implements the classic Hangman game. Generate a random word for the user to guess and display it as a series of underscores. Allow the user to input letters and check if they are present in the word, updating the display accordingly. Track the number of incorrect guesses and display a hangman figure as the game progresses.
3	**Image Manipulation:** Build a Swift program that performs basic image manipulation operations. Implement functions to resize, rotate, and apply filters to an image. Use an image processing library or built-in Swift functions for image manipulation.
4	**Music Player:** Develop a music player application in Swift. Create a class to represent a song with properties like title, artist, and duration. Implement functions to add songs to a playlist, play, pause, skip, and shuffle songs. Allow the user to interact with the music player through a user interface.

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Director RSCOE, Pune

5	**Tic-Tac-Toe Game:** Create a Swift program that allows two players to play a game of Tic-Tac-Toe. Implement the game logic to check for win conditions and determine the winner. Display the game board and prompt the players to make their moves.
6	**Currency Exchange Rate:** Build a Swift program that fetches currency exchange rates from an API. Implement a function that takes a base currency and target currency as input and retrieves the exchange rate. Display the exchange rate to the user.
7	**Weather Forecast:** Create a Swift program that fetches weather forecast data from an API. Implement a function that retrieves weather information for a specific location and displays it to the user. Include features such as current temperature, weather conditions, and forecast for the next few days.
8	**Morse Code Translator**: Develop a Swift program that translates text to Morse code and vice versa. Implement functions to convert text to Morse code and Morse code to text. Display the translated result to the user.
9	**Quiz Game:** Design a Swift program that simulates a quiz game. Implement a class to represent a quiz question with properties like the question text, options, and correct answer. Implement functions to display a question, collect the user's answer, and keep track of the user's score. Load a set of quiz questions from a file or define them in the code and present them to the user one by one.
10	**Note-Taking App:** Build a Swift program that acts as a simple note-taking application. Implement classes to represent notes and a note manager. Implement functions to create new notes, view existing notes, update notes, and delete notes. Allow the user to perform these operations through a command-line interface or a graphical user interface

Text Books:

1. https://github.com/mwesterby/app-development-with-swift
2. efaidnbmnnnibpcajpcglclefindmkaj/https://carlosicaza.com/swiftbooks/SwiftLanguage.pdf
3. https://docs.swift.org/swift-book/documentation/the-swift-programming-language/aboutswift/
4. https://developer.apple.com/swift/

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JSPM's
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(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)

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Academic Year – 2023-2024 Semester -V
[CB3106]: Project Stage I

Teaching Scheme:	Credit	Examination Scheme:
PR: 02 Hours/Week	PR: 2	Lab Evaluation : 50 Marks

Course Prerequisites : Engineering Design & Innovation[CB2113]

Course Objective:

The course will be laying the foundation for your project by defining its scope, objectives, and requirements. The primary objective of this project-based learning course is to develop critical thinking and problem-solving skills by exploring and proposing solutions to current computer engineering problems in the real world. This course will help students begin to identify themselves as computer engineers and prepare them for opportunities for their undergraduate studies.To explore the basic principles of communication (verbal and non-verbal) and active,
empathetic listening, speaking and writing techniques

- To explore the latest technologies
- To enhance the communication skills
- To develop problem analysis skills
- To Apply the knowledge for solving realistic problem
- To develop problem solving ability
- To Organize, sustain and report on a substantial piece of team work over a period of several months
- To Evaluate alternative approaches, and justify the use of selected tools and methods
- To Reflect upon the experience gained and lessons learned
- To Consider relevant social, ethical and legal issues
- To find information for yourself from appropriate sources such as manuals, books, research journals and from other sources, and in turn increase analytical skills.
- To Work in Team and learn professionalism

Course Outcome:

After successful completion of the course, students will able to:
CO1: Identify an engineering problem and analyze it by applying knowledge.
CO2: Analyze alternative approaches, apply and use most appropriate one for feasible solution.
CO3: Write precise reports and technical documents in a nutshell
CO4: Participate effectively in multi-disciplinary and heterogeneous teams exhibiting team work
CO5: Inter-personal relationships, conflict management and leadership quality.

Guidelines

Group Structure:

Working in supervisor/mentor monitored groups; the students plan, manage, and complete a task/project/activity which addresses the stated problem.
1. There should be team/group of 3-4 students
2. A supervisor/mentor teacher assigned to individual groups

Problem Statement Selection:

A problem statement can be practical, social, technical, and/or scientific in nature in order to be considered an illustration. A selected problem statement must be illustrative. The analysis and solution stages of the problem could both require an interdisciplinary approach.

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Project Stage I Requirements:

1. **Project Selection:**
- Identify a suitable project topic or area of interest within the field of computer science.
- Consider your personal interests, the relevance of the project to the industry or research domain, and the feasibility of implementation.

2. **Define Project Objectives:**
- Clearly articulate the objectives and goals of your project.
- Specify what you aim to achieve or solve through your project.

3. **Project Scope:**
- Define the boundaries and limitations of your project.
- Determine what functionalities or features will be included and what will be excluded.

4. **Literature Review:**
- Conduct thorough research on the selected project topic.
- Review existing literature, research papers, and similar projects to gain a deeper understanding of the subject matter.

5. **Project Requirements Gathering:**
- Identify and document the functional and non-functional requirements of your project.
- Involve stakeholders (if applicable) to gather their input and expectations.
- Create a requirements document that serves as a reference for the project's development.

6. **Feasibility Analysis:**
- Assess the feasibility of your project in terms of technical, economic, and time constraints.
- Evaluate the available resources, tools, and technologies required for the project implementation.
- Identify potential risks and challenges that may arise during the course of the project.

7. **System Design:**
- Develop a high-level design or system architecture for your project.
- Identify the main components, modules, and their interconnections.
- Define the data flow and system behavior at a conceptual level.

8. **Project Plan and Timeline:**
- Create a project plan that outlines the major tasks, milestones, and deliverables.
- Estimate the time required for each task and create a timeline for the project.
- Consider any dependencies, potential risks, and buffer time for unforeseen circumstances.

9. **Resource Allocation:**
- Determine the resources required for the project, such as hardware, software, and personnel.
- Identify any additional skills or expertise needed and plan accordingly.

10. **Project Proposal:**
- Write a comprehensive project proposal that summarizes the project's objectives, scope, requirements, and expected outcomes.
- Include the project plan, timeline, and resource allocation in the proposal.
- Seek approval from your project supervisor or evaluation committee for the proposed project.

Recommended Format of the Seminar Report

- Title Page with Title of the topic, Name of the candidate with Exam Seat Number / Roll Number,
- Name of the Guide, Name of the Department, Institution and Year and University
- Seminar Approval Sheet/Certificate
- Abstract and Keywords

Dr. K. P. Moholkar	Dr. R. B. Joshi		Dr. R. K. Jain
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- Acknowledgements
- Table of Contents, List of Figures, List of Tables and Nomenclature
- Chapters Covering topic of discussion- Introduction with section including organization of the report, Literature Survey and Findings /Details of design/technology/System Architecture, Methodology/Analytical and/or experimental work, if any/ Timeline Chart….., Discussions, Interpretation and Conclusions, Bibliography/References
- Plagiarism Check report (less than 15%)

Guidelines for Assessment

Project requires regular mentoring by faculty throughout the semester for successful completion of the idea/project tasks selected by the students per batch. Project is monitored and continuous assessment is done by supervisor /mentor and authorities. It is recommended that all activities should to be recorded regularly, regular assessment of work need to be done and proper documents need to be maintained at department end by both students as well as mentor (Project work book). Continuous Assessment Sheet (CAS) is to be maintained by all mentors.

Recommended parameters for assessment, evaluation and weight age for Project Stage-I :

- Findings of Literature Survey/ Analysis of Problem/ Problem Solving Skills/ Solution provided (60%) (Individual assessment and team assessment)
- Documentation (Gathering requirements/ design & modeling/ use of technology and seminar report, other documents) (20%)
- Presentation (20%)

Each student, under the guidance of a Faculty, is required to

- Present the seminar on the selected project orally using audio/visual aids for a duration of 20-25 minutes
- Answer the queries and involve in debate/discussion.
- Submit two copies of the typed report prepared in Latex only.
- Use of Project Log book recommended.

Project workbook will serve the purpose and facilitate the job of students, mentor and project coordinator. This workbook will reflect accountability, punctuality, technical writing ability and work flow of the work undertaken. During university examination Internal examiner (preferably the guide) and External examiners jointly, evaluate the project work. The student shall submit the duly certified progress report of project in standard format for satisfactory completion of the work by the concerned guide and head of the Department. Project Exam will be conducted at end of semester. The participants shall take part in discussion to foster friendly and stimulating environment in which the students are motivated to reach high standards and become self-confident.

Project Reviews

1	**Review 1:** Problem Statement Finalization, Motivation, Objectives and Literature Review, Feasibility and Scope
2	**Review 2:** Requirements Analysis (SRS)
3	**Review 3:** Design Methodology and UML
4	**Review 4:** Project Proposal
5	**Review 5:** Each group should present a Survey paper in International journal/ Conference/ UGC care journal or register for IPR/patent.

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Text Books:

T1. Rebecca Stott, Cordelia Bryan, Tory Young, "Speaking Your Mind: Oral Presentation and Seminar Skills (Speak-Write Series)", Longman, ISBN-13: 978-0582382435

T2. Johnson-Sheehan, Richard, "Technical Communication", Longman. ISBN 0-321-11764-6

T3. VikasShirodka, "Fundamental skills for building Professionals", SPD, ISBN 978-93-5213-146-5

T4. A new model of problem based learning. By Terry Barrett. All Ireland Society for higher education (AISHE). ISBN:978-0-9935254-6-9; 2017

T5. Problem Based Learning. By Mahnazmoallem, woei hung and Nada Dabbagh, Wiley Publishers. 2019.

T6. Stem Project based learning and integrated science, Technology, Engineering and mathematics approach. By Robert Capraro, Mary Margaret Capraro

T7. Hassan Gomaa, "Software Modeling and Design- UML, Use cases, Patterns and Software Architectures" Cambridge University Press, 2011, ISBN 978-0-521-76414-8.

Reference Books:

R1. De Graaff E, Kolmos A., red.: Management of change: Implementation of problem-based and project-based learning in engineering. Rotterdam: Sense Publishers. 2007.

R2. Gopalan," Project management core text book", 2 Indian Edition

R3. James Shore and Shane Warden, " The Art of Agile Development"

R4. GardyBooch, James Rambaugh, IvarJacobson,"The unified modeling language user guide" , Pearson Education, Second edition, 2008, ISBN 0-321-24562-8.

R5. Mason, Peter & Wright, Pamela &Luu, Hoat. (2008). Writing and Publishing a Scientific Paper. 10.13140/2.1.4010.0480.

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BoS, CSBS	Dean Academics		Director RSCOE, Pune

Semester VI

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BoS, CSBS

Dr. R. B. Joshi
Dean Academics

Dr. R. K. Jain
Director RSCOE, Pune

T. Y. B. Tech (Computer Science and Business Systems)
Academic Year – 2023-2024 Semester -VI
[CB3109]: Data Mining and Analytics

Teaching Scheme:	Credit	Examination Scheme:
TH: - 3 Hours/Week	TH: 3	In Sem. Evaluation: 15 Marks
PR: - 2 Hours/Week	PR: 1	Mid Sem. Exam : 25 Marks
		End Sem. Exam : 60 Marks
		Lab Evaluation : 25 Marks

Course Prerequisites : Computational Statistics [CB2104]

Course Objective:

- Understand basic concepts and techniques of Data Mining.
- Develop skills of using data mining software for solving practical problems.
- Understand and apply several statistical analysis techniques: regression, ANOVA, data reduction.

Course Outcome:

After successful completion of the course, students will able to:

CO 1: Explain basic concepts and techniques of data warehouse and design model of data warehouse.
CO 2: Apply different pre-processing methods to prepare data set.
CO 3: Analyze and Apply data mining algorithms for solving practical problems.
CO 4: Apply Linear and non linear models for solving real time applications.
CO 5: Apply Time series and Prescriptive analytics models for solving practical problems.
CO 6: Explain different trends in Data Mining

Course Contents

UNIT-I	Introduction to Data Mining	6 Hours

Introduction to Data Mining: Data Mining Functionalities, Related technologies : Machine Learning, DBMS, OLAP, Types of Data, Interestingness Patterns, Stages of the Data Mining Process, Classification of Data Mining systems, Data mining Task primitives, Integration of Data mining system with a Data warehouse, Major issues in Data Mining,

UNIT-II	Data Preprocessing And Knowledge Representation	7 Hours

Data preprocessing: Data cleaning, integration, Data transformation, Data reduction, transformation, Discretization and generating concept hierarchies, Data mining knowledge representation: Task relevant data, Visualization techniques, Attribute-oriented analysis: Attribute generalization, Attribute relevance, Class comparison, Statistical measures.

UNIT-III	Data Mining Algorithms	8 Hours

Association rules Motivation and terminology, Example: mining weather data, Basic idea: item sets,

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Generating item sets and rules efficiently, Correlation analysis. Classification: Basic learning/mining tasks, Inferring rudimentary rules: 1R, algorithm, Decision trees, covering rules. Prediction: The prediction task, Instance-based methods (nearest neighbor), linear models.		
UNIT-IV	**Descriptive Analytics**	**8 Hours**
Data Modeling, Trend Analysis, Forecasting models: Heuristic methods, predictive modeling and pattern discovery, Logistic Regression: Logit transform, ML estimation, Tests of hypotheses, Wald test, , multiple logistic regression, forward, backward method, 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 nonlinearity, initial estimates, Iterative procedures for NLS, grid search, Newton-Raphson, steepest descent, Marquardt's methods. Introduction to semi parametric regression models, additive regression models. Introduction to nonparametric.		
UNIT-V	**TIME SERIES ANALYSIS**	**8 Hours**
Auto - Covariance, Auto-correlation. 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 and 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.		
UNIT-VI	**Recent Trends in Data Mining**	**6 Hours**
Mining Complex Data Types, Data Mining Applications: Finance, Retail, Science and Engineering, Recommender systems, Intrusion Detection, Text Mining, Web mining, Social network Analysis, Big Data, Data Mining and Society: Ubiquitous and Invisible Data Mining ,Privacy, Security, and Social Impacts of Data Mining.		

Lab Contents

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List of Laboratory Assignments

1	**Experiments with Weka:** Visualization Techniques, using filters and statistics, mining association rules, decision trees rules, Prediction
2	**Mining real data:** Preprocessing data from a real domain (Medical/ Retail/ Banking);Applying various data mining techniques to create a comprehensive and accurate model of the data
3	**Analytics Assignment 1:** Conduct and Present a summary report on an end to end statistical model building exercise using sample data – Data preprocessing, Descriptive Analysis (Exploratory Data Analysis), Hypothesis building, Model Fitting, Model Validation and Interpretation of results.
4	**Analytics Assignment 2:** Build a statistical model using USA_Housing dataset using Linear Regression;Robust Regression;

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	;Ridge Regression; LASSO Regression; Elastic Net; Polynomial Regression
5	**Time series: Build a** Time series analysis for multitude of business applications for forecasting a quantity into the future and explaining its historical patterns.

Text Books:

T1. Jiawei Han and Micheline Kamber, "Data Mining: Concepts and Techniques", Morgan Kaufmann Publishers, 3rded, 2010.

T2. LiorRokach and OdedMaimon, "Data Mining and Knowledge Discovery Handbook", Springer, 2nd edition, 2010.

T3. Box, G.E.P and Jenkins G.M. (1970) Time Series Analysis, Forecasting and Control, Holden-Day.

Reference Books:

R1. Draper, N. R. and Smith, H. (1998), "Applied Regression Analysis", John Wiley, Third Edition.

R2. Hosmer, D. W. and Lemeshow, S. (1989), "Applied Logistic Regression", Wiley.

Web links:

Unit 1 : https://www.youtube.com/watch?time_continue=4&v=IZZA_gajkLY&feature=emb_logo

Unit 2: https://www.youtube.com/watch?v=L8ZJajcQzew

Unit 3: https://www.youtube.com/watch?v=WPgslzdr60g

Unit 4: https://www.youtube.com/watch?v=mgxYPYRneyk

Unit 5: https://www.youtube.com/watch?v=ZQN2ehPcGx5c

Dr. K. P. Moholkar
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Dean Academics

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Director RSCOE, Pune

T. Y. B. Tech (Computer Science and Business Systems)
Academic Year – 2023-2024 Semester -VI
[CB3110]: Compiler Design

Teaching Scheme:	Credit	Examination Scheme:
TH: - 3 Hours/Week	TH: 3	In Sem. Evaluation: 15 Marks
PR: - 2 Hours/Week	PR: 1	Mid Sem. Exam : 25 Marks
		End Sem. Exam : 60 Marks
		Lab Evaluation : 25 Marks

Course Prerequisites : Discrete mathematics [ES1108], Formal language & Automata theory [CB2101]

Course Objective:

- To learn and understand the design of a compiler
- To learn and use tools for construction of a compiler.

Course Outcome:

After successful completion of the course, students will able to:

CO 1: Analyse lexical structure of language and Design Lexical analyzer for given language using tools.

CO 2: Analyse syntactic structure of language and Design syntax analyzer for given language using tools.

CO 3: Analyse semantic structure of language and implement symbol table.

CO 4: Describe techniques for intermediate code and machine code optimisation.

CO 5: Design the structures and support required for compiling advanced language features.

Course Contents

UNIT-I	Lexical Analysis	07 Hours

Introduction: Definition of Compiler, Types of Compilers, Phases of compilation and overview. Lexical Analysis (scanner): Regular languages, finite automata, regular expressions, relating regular expressions and finite automata, scanner generator (lex, flex),Symbol Table ,Token ,Lexeme and Pattern ,Single pass Compiler and Multipass Compiler,
Case Study of Different Compilers.

UNIT-II	Syntax Analysis	08 Hours

Syntax Analysis (Parser): Context-free languages and grammars, Error-Recovery Strategies, push-down automata, Parsing in Compiler: Top Down and Bottom Up Parsing LL(1) grammars and top-down parsing, operator grammars, LR(O), SLR(1), LR(1), LALR(1) grammars and bottom-up parsing, ambiguity and LR parsing, LALR(1) parser generator (yacc, bison),Operator Precedence Parser

UNIT-III	Semantic Analysis & Symbol Table	07 Hours

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Semantic Analysis: Attribute grammars, syntax directed definition, evaluation and flow of attribute in a syntax tree, Introduction to Type Systems, Type Checking and Conversion.
Symbol Table: Basic structure, symbol attributes and management. Run-time environment: Procedure activation, parameter passing, value return, memory allocation, scope.

UNIT-IV	Intermediate Code Generation	06 Hours

Intermediate Code Generation: Translation of different language features, different types of intermediate forms. Declarations, assignment statements, iterative statements, case statements, arrays, structures, conditional statements, Boolean expressions, back patching, procedure calls, Intermediate code generation using YACC.

UNIT-V	Code Optimization	06 Hours

Code Improvement (optimization): control-flow, data-flow dependence etc.; local optimization, global optimization, loop optimization, peep-hole optimization etc. Optimizing transformations: compile time evaluation, Common sub-expression elimination, variable propagation, code movement, strength reduction, dead code elimination and loop optimization

UNIT-VI	Code Generation & Advanced topics	06 Hours

Architecture dependent code improvement: instruction scheduling (for pipeline), loop optimization (for cache memory) etc. Register allocation and target code generation. Advanced topics: Type systems, data abstraction, compilation of Object-Oriented features and non-imperative programming languages.

Lab Contents

Guidelines for Assessment

1) Continuous assessment shall be based on experiments performed, submission of results of program in the form of report/journal, timely completion, attendance ,understanding, efficient codes, punctuality and neatness.
2) Practical/Oral examination shall be based on the practical's performed in the lab.
3) Lab assessment of 25 marks shall be based on continuous assessment and performance in Practical/Oral examination

List of Laboratory Assignments/Experiments

1	Write a program to count number of lines, tabs, spaces, words, characters from a given text file.
2	Implement the Lexical analyzer for the given language. The lexical analyzer should ignore redundant spaces, tabs and new lines. It should also ignore comments. Although the syntax specification states that identifiers can be arbitrarily long, you may restrict the length to some reasonable value.
3	Write a program for syntax checking of subset of given language using LEX and YACC.
4	Write a program for syntax checking of control statements using LEX and YACC.
5	Write a program to check syntax of declaration statement using LEX and YACC.
6	Implement a desk calculator using LEX and YACC.
7	Write a program to generate ICG using LEX and YACC.
8	Write a program for code optimization.
9	Write a program for code generation.

Text Books:

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T1. A.V. Aho, R. Sethi, .J D Ullman, "Compilers: Principles, Techniques, and Tools", Pearson Education, ISBN 81 - 7758 - 590 - 8.

T2. D. M. Dhamdhere, “Compiler Construction: Principles and Practice”, Macmillan India, 1983.

T3. J. R. Levine, T. Mason, D. Brown, "Lex&Yacc", O'Reilly, 2000, ISBN 81-7366-061-X.

Reference Books:

R1. BjarneStroustrup, " The Design and Evolution of C++", Addison-Wesley, ISBN 0-201-54330-3.

R2. S. Chattopadhyay, "Compiler Design", Prentice-Hall of India, 2005, ISBN 81-203-2725-X.

R3. K. Louden, "Compiler Construction: Principles and Practice", Cengage Learning, ISBN 978-81-315-0132-0.

R4. K. Cooper, L, Torczon, "Engineering a Compiler", Morgan Kaufinann Publishers, ISBN 81-8147-369-8.

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T. Y. B. Tech (Computer Science and Business Systems)

Academic Year – 2023-2024 Semester -VI

Elective III [CB3111A]: Deep Learning

Teaching Scheme:	Credit	Examination Scheme:
TH: 03 Hours/Week	TH: 03	In Sem. Evaluation :15 Marks
PR: 02 Hours/Week	PR: 01	Mid Sem. Exam : 25 Marks
		End Sem. Exam : 60 Marks
		Lab Evaluation : 25 Marks

Course Prerequisites: Machine Learning [CB3101], Computational Statistics [CB2104]

Course Objectives:

- Understand the fundamental concepts and principles of Deep Learning.
- Familiarize with popular Deep Learning architectures, such as Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs).
- Explore various Deep Learning applications, including image classification, natural language processing, and generative models.

Course Outcome:

After successful completion of the course, students will able to:

CO 1: Explain basic principles behind neural network and deep learning
CO 2: Explain the parameters affecting the efficiency of deep neural network.
CO 3: Compare different modeling aspects of various neural networks architectures.
CO 4: Implement Convolution Neural Network for given computer vision problem.
CO 5: Implement sequential models for given real world problem.
CO 6: Implement Deep Generative Models for given real world problem.

Course Contents

UNIT-I	Introduction To Deep Learning	6 Hours

Basics of Neural Networks model, MLP, Weight initialization, Training Neural Network, Gradient Descent, vanishing and Exploding gradient descent, Activation Functions, loss function, optimization algorithm., Hyper parameters : Learning Rate, Regularization: L1/L2 regularization, early stopping, dropout, data argumentation, Common Architectural Principles of Deep Network, Applications of Deep learning

Case Study: IMDb Review Classification: Feed forward

UNIT-II	Convolution Neural Network	7 Hours

The Basic Structure of a Convolutional Network: CNN architecture overview, Padding, Strides, Convolution, Pooling, Variants of convolution function, data types, ReLU layer, unsupervised features, Training a Convolutional Network, CNN Architectures: VGG16, Alexnet, InceptionNet, RestNet, Googlenet

Case Study IMDb Review Classification: CNN

UNIT-III	Computer Vision using Convolution Neural Network	7 Hours

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Introduction to convnets,using pretrained convnets, Pre processing tasks in computer vision: image scalling, data augumentation, Object Detction: Bounding Box, Sliding Window based Object Detection. YOLO Algorithm, Transfer learning and fine-tuning **Case Study: Malaria/Carcinoma/COVID detection**		
UNIT-IV	**Sequential Models**	**7 Hours**
Introduction to Sequential Data, Recurrent Neural Networks, data preparation, vanishing gradient problem and RNN, LSTM, GRU, Bidirectional RNNs, The Challenge of Long-Term Dependencies, Optimization for Long-Term Dependencies, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent, CTRNN (Continuous Time RNN) **Case Study: IMDb Review Classification: RNN, LSTM**		
UNIT-V	**Deep Generative Models**	**8 Hours**
Introduction to deep generative model, Boltzmann Machine, Deep Belief Networks, Generative adversarial network (GAN), discriminator network, generator network, types of GAN, Applications of GAN networks, Introduction of deep reinforcement learning **Case Study: Image generation using GAN**		
UNIT-VI	**Large Language Models (LLMs)**	**8 Hours**
Transformer Architecture and Variants: BERT, GPT-3, PaLM, etc., Pre-training and Fine-tuning: Techniques for training and adapting LLMs, Applications of LLMs: Text generation, translation, writing assistance, code generation, Ethical and Societal Implications of Generative AI,Bias and fairness in generative models, Ethical considerations in AI research and deployment **Case Study: ChatGPT, ethical challenges in generative AI**		

Lab Contents

Guidelines for Assessment

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2) Practical/Oral examination shall be based on the practical's performed in the lab.
3) Lab assessment of 25 marks shall be based on continuous assessment and performance in Practical/Oral examination

Lab Assignments

1	Build a feed forward neural network model for: a. linear regression using single variables b. linear regression using multiple variables Compare results for different hyper-parameter values.
2	**Image Analytics:** Images classification using MLPs, CNN and back propagation for CIFAR-10 dataset with data augmentation
3	**Video Analytics:** Write a program for object detection.
4	**Audio Analytics:** Speech to Text, Text to Speech, Transcript Services
5	**Textual Data Analytics:** Text generation techniques using RNN
6	**Mini Project:** (Any 1) • Gender and Age Detection using voice

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	• Face Aging • Predict Emoji from text • Driver Drowsiness detection system • Human Pose Estimation • Human face Detection • Visual tracking system: Apply Video Analytics techniques to analyze videos for Motion-based Behavior Recognition, Behavioral Observations • Coloring old B&W photos • Music genre generation and classification system • Text Summarizer • Use the Google stock prices dataset and design a time series analysis and prediction system using RNN • Language Translator

Text Books:

T1: Jacek M. Zurada,"Introduction to artificial neural systems", West Publishing Co., 1992, ISBN: 0-3 14-93391 -3

T2: Goodfellow, I., Bengio, Y.,,Courville, A, ―Deep Learning, MIT Press, 2016.

T3: Josh Patterson & Adam Gibson, ―Deep Learning

T4: Charu Agarwal, Neural Networks and deep learning, A textbook

T5: Nikhil Buduma, Fundamentals of Deep Learning, SPD

T6: Bishop C. M., "Pattern Recognition and Machine Learning", Springer, 2006,

T7: Francois chollet, Deep Learning with Python Neural Networks and Deep Learning, by Michael Nielsen, Online Book: http://neuralnetworksanddeeplearning.com.

T8:. Amit Das, "Deep Learning", Person Education

Reference Books:

R1: Image and video text recognition using convolutional neural networks: Study of new CNNs architectures for binarization, segmentation and recognition of text images, byZohra Saidane, Publisher: LAP LAMBERT Academic Publishing

R2: Richard Hartley and Andrew Zisserman, Multiple View Geometry in Computer Vision, Second Edition, Cambridge University Press, March 2004

R3: Christopher M. Bishop; Pattern Recognition and Machine Learning, Springer, 2006

R4: Francois Duval, ―Deep Learning for Beginners, Practical Guide with Python and Tensorflow

R5: Computer Vision: A Modern Approach, D. A. Forsyth, J. Ponce, Pearson Education, 2003

e-Books :

1. **http://csis.pace.edu/ctappert/cs855-18fall/DeepLearningPractitionersApproach.pdf**
2. **https://www.dkriesel.com/_media/science/neuronalenetze-en-zeta2-1col-dkrieselcom.pdf**

Web references:

- **https://www.youtube.com/watch?v=oXlwWbU8l2o**
- **https://www.datacamp.com/community/tutorials/exploratory-data-analysis-python**
- **https://www.analyticsvidhya.com/blog/2020/02/learn-image-classification-cnn-convolutional-neural-networks-3datasets**

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T. Y. B. Tech (Computer Science and Business Systems)
Academic Year – 2023-2024 Semester -VI
Elective III[CB3111B]:Cryptology

Teaching Scheme:	Credit	Examination Scheme:
TH: - 3 Hours/Week	TH: 03	In Sem. Evaluation:15 Marks
PR: - 2 Hours/Week	PR: 01	Mid Sem. Exam : 25 Marks
		End Sem. Exam : 60 Marks
		Lab Evaluation : 25 Marks

Course Prerequisites :Computer Network

Course Objective:
The objectives of this course are to familiarize the students with cryptography and its applications. The students will be able to develop basic understanding of cryptographic mechanisms.

Course Outcome:
After successful completion of the course, students will able to:
CO1: Comprehend different Concepts of Cryptogrphy.
CO2: Implement key security algorithms regarding symmetric key cryptographic.
CO3: Implement key security algorithms regarding asymmetric key cryptographic.
CO4: Explain Cryptographic Hash Functions and Digital Signatures
CO5: Explain different authentication functions
CO6: Explain different Security Applications

Course Contents

UNIT-I	Introduction to the Concept of Cryptography	7 Hours

Unit I: Introduction and Classical Ciphers, Security: Computer Security, Information Security, Network Security, CIA Triad: Confidentiality, Integrity, Availability, Cryptography, Cryptosystem, Cryptanalysis, Security Threats:, Attacks: Passive (Release of message, Traffic analysis), Active (Replay, Denial of service) Security Services: Authentication, Access Control, Nonrepudiation Security Mechanisms, Policy and Mechanism, Classical Cryptosystems: Hierarchy of cipher Substitution Techniques: - Monoalphabetic: Ceasar Cipher, Hill - Polyalphabetic: Vigenere Cipher (Variants: vernam, one time pad), Playfair Transposition Techniques: Rail Fence Cipher, Modern Ciphers: Block Ciphers, Stream Ciphers,Symmetric Ciphers, Asymmetric Ciphers

UNIT-II	Symmetric Key Cryptography	8 Hours

Introduction, Algorithm Types and Models, An Overview of Symmetric Key Cryptography, Data Encryption Standard(DES), International Data Encryption Algorithm(IDEA), RC5, Blowfish, Advanced Encryption Standard(AES), Differential and Linear Cryptanalysis.

UNIT-III	Asymmetric Key Cryptography	8 Hours

Number Theory: Prime Numbers, Primality Testing, Miller-Rabin Algorithm, Fermat's Theorem, Euler's Totient Function and Euler's Theorem, Primitive Root, Discrete Logarithms, Public Key Cryptosystems, Applications of Public Key Cryptosystems, Distribution of public key, Distribution of secret key by using public key cryptography, Diffie Hellman Key Exchange, Man-in-the-Middle Attack, RSA Algorithm: Key

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Generation, Encryption and Decryption Process, Elgamal Cryptographic System: Key Generation, Encryption and Decryption Process

UNIT-IV	Cryptographic Hash Functions and Digital Signatures	8 Hours

Message Authentication, Message Authentication Functions, Message Authentication Codes, Hash Functions, Properties of Hash functions, Applications of Hash Functions, Message Digests: Details of MD4 and MD5 algorithms, Secure Hash Algorithms: Details of SHA-1 and SHA-2 algorithms, Comparison of SHA parameters, SHA-512, Digital Signatures: Direct Digital Signatures, Arbitrated Digital Signature, Digital Signature Standard: The DSS Approach, Digital Signature Algorithm(DSA), Digital Signature Standard: The RSA Approach

UNIT-V	Authentication	7 Hours

Authentication System, Password Based Authentication, Dictionary Attacks (Online and Offline), Challenge Response System, One Way Authentication, Mutual Authentication, Biometric System, Needham-Schroeder Scheme, Kerberos Protocol, Kerberos 5, Malicious Logic, Types of Malicious Logic: Virus, Worm, Trojan Horse, Zombies, Denial of Service Attacks, Intrusion, Intruders and their types (Masquerader, Misfeasor, Clandestine),Intrusion Detection System: Statistical anomaly detection, Rule-based detection

UNIT-VI	Security Applications	6 Hours

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

Case Study: Post-Quantum Cryptography

Lab Contents

Guidelines for Assessment

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2) Practical/Oral examination shall be based on the practical's performed in the lab.
3) Lab assessment of 25 marks shall be based on continuous assessment and performance in Practical/Oral examination

List of Laboratory Assignments

1	Implement any two of the following Substitution & Transposition Techniques concepts: a) Caesar Cipher b) Playfair Cipher c) Hill Cipher d) Vigenere Cipher
2	Implement any two of the following algorithms a) DES b) RSA Algorithm c) Diffiee-Hellman d) MD5 e) SHA-1
3	Implement the Signature Scheme - Digital Signature Standard
4	Demonstrate intrusion detection system (ids) using any tool (snort or any other s/w)
5	Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript. Consider the end user as one of the parties (Alice) and the JavaScript application as other party (bob).
6	Write a JAVA program to implement the Rijndael algorithm logic

Text Books:

T1. Stallings, W. Network security Essentials: Applications and standards, Prentice Hall, 2000.

T2. Kaufman, c., Perlman, R., and Speciner, M., Network Security, Private Communication in a public world, 2nd ed., Prentice Hall PTR., 2002

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T3. Atul Kahate – Cryptography and Network Security , 2nd Edition Tata McGraw Hill ublication, New Delhi-2006

Reference Books:

R1. Charlie Kaufman, Radia Perlman, and Mike Speciner, Network Security: Private Communication in a Public World, 2nd Edition, Prentice Hall, 2002, ISBN: 0-13-0460192.

R2. Stallings, W.,.Cryptography and Network Security: Principles and Practice, 3rd ed., Prentice Hall PTR.,2003.

R3. Cryptography and Network Security; McGraw Hill; Behrouz A Forouzan.

R4. Information Security Intelligence Cryptographic Principles and App. Calabrese Thomson

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T. Y. B. Tech (Computer Science Business Systems)
Academic Year – 2023-2024 Semester -VI
Elective III[CB3111C]: Multimedia Techniques

Teaching Scheme:	Credit	Examination Scheme:
TH: 3 Hours/Week	TH:03	In Sem. Evaluation:15 Marks
PR:- 2 Hours/Week	PR:01	Mid Sem. Exam : 25 Marks
		End Sem. Exam : 60 Marks
		Lab Evaluation : 25 Marks

Course Prerequisites: Computer Graphics and Animation[CB3103C]

Course Objective:

This course introduces students to the fundamental concepts and techniques used in multimedia production. Students will gain hands-on experience with various multimedia tools and technologies to create engaging and interactive multimedia projects. The course covers topics such as digital media fundamentals, graphic design principles, audio and video production, animation, interactive multimedia, and project development.

Course Outcome:

After successful completion of the course, students will able to:

CO 1: Explain fundamental concepts and principles of multimedia.
CO 2: Apply graphic design principles to create visually appealing multimedia content.
CO 3: Produce and edit audio and video content for multimedia projects.
CO 4: Create 2D and 3D animations using industry-standard software.
CO 5: Design interactive multimedia applications and interfaces.
CO 6: Develop project management skills and comply with ethical and legal considerations in multimedia production.

Course Contents

UNIT-I	Introduction to Multimedia	07 Hours

Definition and scope of multimedia, History and evolution of multimedia, Applications and importance of multimedia, Digital Media Fundamentals: Digital image concepts and manipulation: Digital image, audio, and video concepts, File formats and compression techniques.

UNIT-II	Graphic Design Principles	07 Hours

Elements and principles of design, Typography and layout design, Color theory and color management, Image editing and manipulation techniques

UNIT-III	Digital Audio- Video Techniques	07 Hours

Audio fundamentals and editing techniques, Audio recording and editing fundamentals, Sound synthesis and effects, Music production and mixing techniques, Audio compression and streaming, Video

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Production and Editing: Video basics, editing principles, Video recording techniques, Video editing software and tools, Video effects and transitions, Motion graphics and visual effects		
UNIT-IV	**Advanced Multimedia Techniques**	**07 Hours**
2D and 3D animation principles, Animation techniques and software, Modeling, texturing, and lighting in 3D graphics Rendering, Virtual reality (VR) and augmented reality (AR),Motion graphics and visual effects, Advanced interactive multimedia design.		
UNIT-V	**Interactive Multimedia**	**07 Hours**
User experience (UX) design principles, Interactive media authoring tools, Multimedia integration and interactivity, Web-based multimedia and user interfaces, HTML5, CSS, and JavaScript for multimedia, Multimedia plugins and frameworks, Multimedia streaming and delivery methods, Responsive design and optimization for different devices, Multimedia. Web-based Multimedia Applications		
UNIT-VI	**Multimedia Project Development**	**07 Hours**
Planning and conceptualization of multimedia projects, Storyboarding and scriptwriting, Project management and timeline, Presentation and delivery of multimedia projects, Ethics and Legal Considerations: Copyright and fair use in multimedia, Intellectual property protection Privacy and security issues in multimedia, Ethical considerations in multimedia production and distribution		

Lab Contents

Guidelines for Assessment

1) Continuous assessment shall be based on experiments performed, submission of results of program in the form of report/journal, timely completion, attendance ,understanding, efficient codes, punctuality and neatness.
2) Practical/Oral examination shall be based on the practical's performed in the lab.
3) Lab assessment of 25 marks shall be based on continuous assessment and performance in Practical/Oral examination

List of Laboratory Assignments

1	**Introduction to Multimedia Tools:** • Install multimedia software tools such as CUnity. • Explore the user interface and basic functionalities of the tools. • Create a simple multimedia project (e.g., a basic image editing task, a 3D model, or a simple interactive scene) using the chosen tool. • Experiment with various tools and features available within the software. • Present and discuss the created project in the class, highlighting the features used.
2	**Image Editing and Manipulation** • Select a set of images with different attributes (e.g., landscapes, portraits, objects). • Use image editing software (e.g., Adobe Photoshop, GIMP) to perform basic edits like cropping, resizing, and adjusting brightness/contrast. • Apply advanced image manipulation techniques like retouching, removing backgrounds, or adding special effects. • Create a composite image by combining multiple images using layering and blending techniques.

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	• Showcase the edited images and explain the techniques used in each image.
3	**Video Editing and Production** • Import video clips and audio files into a video editing software (e.g., Adobe Premiere Pro, Final Cut Pro). • Arrange and trim the video clips to create a coherent storyline. • Add transitions, titles, and effects to enhance the visual appeal. • Adjust audio levels and synchronize audio with video. • Export the final edited video in a suitable format and resolution. • Screen the edited video in class and discuss the editing techniques employed.
4	**Interactive Multimedia Presentation** • Select a topic and gather relevant multimedia content (e.g., images, videos, audio, and text). • Use an authoring tool such as Adobe Flash, PowerPoint, or Prezi to create an interactive presentation. • Incorporate multimedia elements, such as images, videos, animations, and hyperlinks. • Include interactive elements like buttons, quizzes, or navigation menus. • Test the interactivity and functionality of the presentation. • Deliver the presentation to the class, allowing for user interaction and engagement.
5	**Web Multimedia Project** • Choose a project idea that involves multimedia elements (e.g., a portfolio website, an interactive game, a multimedia-rich blog). • Design and develop the web project using HTML, CSS, and JavaScript. • Incorporate multimedia elements such as images, videos, animations, and audio. • Implement interactivity and user engagement features (e.g., forms, navigation, sliders). • Test the website across different browsers and devices for compatibility. • Demonstrate the functioning and features of the web project in class.

Text Books:

T1:"Introduction to Multimedia" by Tay Vaughan
T2:"The Essential Guide to Digital Video and Audio" by Andrew Wilson
T3:"The Animator's Survival Kit" by Richard Williams
T4:"Learning Web Design" by Jennifer Niederst Robbins
T5:"The Complete Guide to Digital Privacy and Security" by Bobbi Sandberg
T6:"Multimedia Systems: Algorithms, Standards, and Industry Practices" by Parag Havaldar and Gerard Medioni

Reference Books:

R1: "Multimedia: Making It Work" by Tay Vaughan
R2: "Multimedia Communications: Applications, Networks, Protocols and Standards" by Fred Halsall
R3: "Multimedia Systems Design" by Prabhat K. Andleigh and Kiran Thakrar
R4: "Multimedia Programming with Pure Data" by Bryan WC Chung
R5: "Multimedia Learning" by Richard E. Mayer
R6: "Multimedia: A Critical Introduction" by Professor Robert Burnett and Anna Notaro
R7: "Multimedia Projects in Education: Designing, Producing, and Assessing" by Fredricka K. Reisman

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BoS, CSBS

Dr. R. B. Joshi
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R8: "Multimedia Authoring: Building Educational and Informational Programs" by Bernard R. Robin
R9: "Multimedia Fundamentals: Volume 1: Media Coding and Content Processing" by Ralf Steinmetz and Klara Nahrstedt

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T. Y. B. Tech (Computer Science Business Systems)
Academic Year – 2023-2024 Semester -VI
Elective IV[CB3112]: Operations Research

Teaching Scheme:	Credit	Examination Scheme:
TH: - 03 Hours/Week	TH: 03	In Sem. Evaluation:15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks

Course Prerequisites: Introductory topics in Probability [ES1106], Statistical Methods [ES1110], Discrete Mathematics [ES1108], Linear Algebra [ES1109]

Course Objective:

- Identify and develop Operation Research models from the verbal description of the real-world Problem.
- Develop various Linear Programming (LP) models
- Understand the mathematical tools that are needed to solve optimization problems.
- Use of CPM and PERT techniques, to plan, schedule, and control project activities.

Course Outcome:
After successful completion of the course, students will able to:
CO1: Describe characteristics and scope of OR.
CO2: Use appropriate decision-making approaches and tools.
CO3: Build various dynamic and adaptive models.
CO4: Apply Project scheduling techniques.
CO5: Develop critical thinking and objective analysis of decision problems.
CO6: Apply the OR techniques for efficacy.

Course Contents

UNIT-I	Introduction to OR	06 Hours

Origin of OR and its definition. Concept of optimizing performance measure, Types of OR problems, Deterministic vs. Stochastic optimization, Phases of OR problem approach – problem formulation, building mathematical models, deriving solutions, validating models, controlling and implementing solution.

UNIT-II	Linear Programming	06 Hours

Linear programming – Examples from industrial cases, formulation & definitions, Matrix form. Implicit assumptions of LPP. Some basic concepts and results of linear algebra – Vectors, Matrices, Linear Independence/Dependence of vectors, Rank, Basis, System of linear eqns., Hyperplane, Convex set, Convex polyhedron, Extreme points, Initial Basic Feasible Solutions (IBFS), Basic feasible solutions. Geometric method: 2-variable case, Special cases – infeasibility, unboundedness, redundancy & degeneracy, With examples. Simplex Algorithm – slack, surplus & artificial variables, computational details, big-M method, identification and resolution of special cases through simplex iterations. Duality – formulation, results, fundamental theorem of duality, dual-simplex and primal-dual algorithms.

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UNIT-III	Transportation and Assignment problems	06 Hours
TP – Definitions, Examples – decision variables, supply & demand constraints, formulation of TP, Balanced & unbalanced situations, Solution methods –NWCM, minimum cost and VAM, test for optimality (MODI method), degeneracy and its resolution. AP - Definitions, Examples – decision variables, constraints, formulation of AP, Balanced & unbalanced situations, Solution method – Hungarian, test for optimality (MODI method), degeneracy & its resolution.		
UNIT-IV	**PERT – CPM**	**06 Hours**
Project definition, Project scheduling techniques – Gantt chart, PERT & CPM, Determination of critical paths, Estimation of Project time and its variance in PERT using statistical principles, Concept of project crashing, time v/s cost trade-off. All estimates of Time, Examples from industrial cases.		
UNIT-V	**Inventory Control**	**06 Hours**
Functions of inventory and its disadvantages, ABC analysis, Concept of inventory costs, Basics of inventory policy (order, lead time, types), Fixed order-quantity models – EOQ, POQ & Quantity discount models. EOQ models for discrete units, sensitivity analysis and Robustness, Special cases of EOQ models for safety stock with known/unknown stock out situations, models under prescribed policy, Probabilistic situations.		
UNIT-VI	**Queuing Theory and Simulation Methodology**	**06 Hours**
Definitions – queue (waiting line), waiting costs, characteristics (arrival, queue, service discipline) of queuing system, queue types (channel vs. phase). Kendall's notation, Little's law, steady state behavior, Poisson's Process & queue, Models with examples - M/M/1 and its performance measures; M/M/m and its performance measures; brief description about some special models. Examples from real world cases – Super Market, Network Router, etc. Definition and steps of simulation, random number, random number generator, True v/s pseudo random number generators, Examples where random numbers are required, Hashing, Encryption, etc. Discrete Event Systems Simulation – clock, event list, Application in Scheduling, Queuing systems and Inventory systems.		

Text Books:

T1. Operations Research: An Introduction. H. A. Taha.

Reference Books:

R1. Linear Programming. K.G. Murthy.
R2. Linear Programming. G. Hadley.
R3. Principles of OR with Application to Managerial Decisions. H.M. Wagner.
R4. Introduction to Operations Research. F.S. Hiller and G.J. Lieberman.
R5. Elements of Queuing Theory. Thomas L. Saaty.
R6. Operations Research and Management Science, Hand Book: Edited By A. Ravi Ravindran.
R7. Management Guide to PERT/CPM. Wiest& Levy.
R8. Modern Inventory Management. J.W. Prichard and R.H. Eagle.

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T. Y. B. Tech (Computer Science Business Systems)
Academic Year – 2023-2024 Semester -VI
Elective IV[HS3103A]: Industrial Psychology

Teaching Scheme:	Credit	Examination Scheme:
PR: -3 Hours/Week	TH:3	In Sem. Evaluation:15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks

Course Prerequisites: Basic Knowledge of English

Course Objectives:

- To help students to understand the rationale behind positive psychology.
- To help students understand structure –functions and design of organizations.
- To make students understand the processes of group decision making and leadership functions in different organizations.
- To make students understand the individuals and groups in respect to patterns of social behavior and attitudes
- To help students gain insight into the dynamics of intergroup relationships, conflict, prejudice and cooperation.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Define the basic concepts of psychology.
CO2: Describe the significance of social cognition, attitudes, stereotypes and prejudices in explaining human behavior in the social contexts.
CO3:Understand the significant aspects group behavior and social influence that constitute the core of human relationships.
CO4:Explain different concepts and dynamics related to organizational systems, behavior, and management.
CO5:Identify steps to motivate employees in the perspectives of the theories of work motivation.
CO6: Discuss the role of positive psychology in building effective professional relationships.

Course Contents

UNIT-I	Basic Concepts in Psychology :	6 Hours
Introduction to Psychology, Definitions of Psychology, Research Methods, Statistics, and Evidence-based Practice, Introduction & Legal Context of Industrial Psychology, Job Analysis & Competency Modelling, Job Evaluation & Compensation, Job Design & Employee Well-Being, Recruitmen		
UNIT-II	**Psychological Testing**	**6 Hours**
Identifying Criteria & Validating Tests and Measures, Screening Methods, Intensive Methods,		
UNIT-III	**Organization & Leadership**	**6 Hours**
Leadership- Definitions and functions, Organizational Climate, Culture, and Development, Teams in Organizations, The Organization of Work Behavior		

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UNIT-IV	Social Behavior & Motivation	6 Hours
Pro-social behavior- Cooperation and helping, personal, situational and socio-cultural determinants, Theoretical explanations of pro-social behavior.Employee Motivation, Satisfaction and Commitment, Fairness and Diversity		
UNIT-V	**Performance Management**	**6 Hours**
Performance Goals and Feedback, Performance Coaching and Evaluation, Evaluating Employee Performance. Modern Methods of Performance evaluation.		
UNIT-VI	**Work Stress Management**	**6 Hours**
Stress – Definition, types – Eustress and Distress. Stress Management Techniques: Demands of Life and Work. Quality of work life. Work life balance.		

Text Books:

T1. Landy, F. J. and Conte, J. M. (2013). Work in the 21st Century (4th Edition). Oxford: Blackwell Publishing

T2. Robbins, S.P.; Timothy, A.J. &Vohra, N. (2012). Organizational Behavior, 15th Edn. PearsonEducation: New Delhi

Reference Books:

R1. Essentials of understanding psychology, Feldman. S.R, Tata McGraw Hill.

R2. Psychology, Baron, R.A and Misra, G. Pearson Education Ltd.

R3. Greenberg, J. & Baron, R.A. (2007). Behavior in Organizations (9th Ed.). India: Dorling Kindersley.

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T. Y. B. Tech (Computer Science and Business Systems)
Academic Year – 2023-2024 Semester -VI
Elective IV[HS3101C]: Finance and Cost Accounting

Teaching Scheme:	Credit	Examination Scheme:
TH: 03 Hours/Week	TH:3	In Sem. Evaluation:15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks

Course Prerequisites: Fundamentals of Management and Strategy Formulation [HS3101]

Course Objective:

- To create an awareness about the importance and usefulness of the accounting concepts and their managerial implications.
- To develop an understanding of the financial statements and the underlying principles and learn to interpret financial statements.
- To create an awareness about cost accounting, different types of costing and cost management.

Course Outcome:

After successful completion of the course, students will able to:

CO 1: Explain the conceptual framework of Cost & Management Accounting.
CO 2: Explain the importance and usefulness of the accounting concepts and their managerial implications.
CO 3: Interpret cost accounting statements.
CO 4: Identify and apply the concepts of Financial Management.

Course Contents

UNIT-I	Accounting Concepts	07 Hours
Evolution of cost accounting, Cost accounting concepts, Cost accounting principles, Techniques and Conventions, Cost accounting standards, Financial Statements- Understanding and Interpreting Financial Statements.		
UNIT-II	**Accounting Process**	**07 Hours**
Journal, Ledger, Book keeping and record maintenance, Fundamental principles and double entry, , Trial balance, Balance sheet, Cash book and subsidiary books, Rectification of errors.		
UNIT-III	**Financial Statements**	**07 Hours**
Financial Statements: Form and Contents of Financial Statements, Types of financial statements, Analyzing and interpreting financial statements, Accounting standards, Final accounts		
UNIT-IV	**Cost Accounting**	**07 Hours**

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Basic Concepts of Cost Accounting, Objectives, Importance and Advantages of Cost Accounting, Cost Centre, Cost Unit, Elements of Cost, Classification and Analysis of Costs, Relevant and Irrelevant Costs, Differential Costs, Sunk Cost, Opportunity Cost, Preparation of Cost Sheet. Project Cost Accounting		
UNIT-V	**Short Term Business Decision Techniques – Marginal Costing**	**07 Hours**
Meaning, Principles, Advantages and Limitations, Contribution, P/V Ratio, Break-Even Point (BEP), Cost Volume Profit (CVP) Analysis, Short Term Business Decisions–Product Mix Decisions, Make or Buy (Outsourcing) Decisions, Accept or Reject Special Order Decisions, Shutting Down Decisions.		
UNIT-VI	**Company Accounts and Annual Reports**	**07 Hours**
Company annual report- Purpose, Contents, Types of readers of an annual report and their purpose, Audit Reports and Statutory Requirements, Directors Report, Notes to Accounts, Pitfalls.		

Text Books:

T1. Financial Accounting by Kimmel and Weygandt and Kieso, John Wiley, 7th Edition.

T2. A Textbook of Financial Cost and Management Accounting, by P. Periasamy, Himalaya Pub. House, 2010.

Reference Books:

R1: Financial Intelligence: A Manager's Guide to Knowing What the Numbers Really Mean, by Joe Knight and Karen Berman, Harvard Business Review Press, 2006.

R2: Cost Accounting: Text, Problems and Cases, by JawaharLal, Manisha Singh, and SeemaSrivastav, McGraw-Hill Education, 2019.

R3: Financial Policy And Management Accounting, By Bhabatosh Banerjee, PHI Learning Pvt. Ltd, 2012.

R4: Accounting: Texts and Cases, by Robert N Anthony, David Hawkins and Kenneth Marchant, McGraw-Hill, 1995.

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BoS, CSBS

Dr. R. B. Joshi
Dean Academics

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Academic Year – 2023-2024 Semester -VI

[HS3111]: Marketing Research and Marketing Management

Teaching Scheme:	Credit	Examination Scheme:
TH: - 03 Hours/Week	TH: 03	In Sem. Evaluation :15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks

Course Prerequisites: Economics [HS1101], Fundamentals Of Management And Strategy Foundation[HS3102]

Course Objective:

- Learn marketing concepts and consumer changing behavior
- Demonstrate product management, Branding & Labeling packaging strategies
- Assimilate marketing communication

Course Outcome:

After successful completion of the course, students will able to:

CO 1: Explain the the basic marketing concepts.
CO 2: Comprehend the dynamics of marketing and analyze how various components interact with each other in the real world.
CO 3: Leverage marketing concepts for effective decision making.
CO 4: Determine the pricing and distribution strategies
CO 5: Explain the basic concepts and the application of statistical tools in marketing research.
CO 6: Explain the internet marketing, Business to Business marketing, Promotion in business markets, CRM and Strategies adopted in B2B markets.

Course Contents

UNIT-I	Marketing Concepts and Applications	06 Hours

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, Business value proposals: eg how to add more value to existing market/business, value can be end customer satisfaction/retentions, attracting new potential end customers, revenue etc.

UNIT-II	Product Management	06 Hours

Product Life cycle concept, New Product development & strategy, Stages in New Product development, Product Testing and QA,Product decision and strategies, Branding & packaging. Feedback of Customer and Consumer

UNIT-III	Pricing, Promotion and Distribution Strategy	06 Hours

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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, Advertising

UNIT-IV	Marketing Research	06 Hours

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, Digital Marketing, Social Marketing and E-commerce

Case Study: Intel, IBM, Microsoft Case study

UNIT-V	Internet Marketing	06 Hours

Introduction to Internet Marketing. Mapping fundamental concepts of Marketing (7Ps, STP); Strategy and Planning for Internet Marketing, Social Media Marketing, Digital Marketing and Ecommerce

Case Study: Facebook

UNIT-VI	Business to Business Marketing	06 Hours

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.

Case Study: "Rovio: How Rovio Grew Into a Gaming Superpower

Text Books:

T1. Marketing Management (Analysis, Planning, Implementation & Control) – Philip Kotler
T2. Fundamentals of Marketing – William J. Stanton & Others
T3. Marketing Management – V.S. Ramaswamy and S. Namakumari
T4. Marketing Research – RajendraNargundkar
T5. Market Research – G.C. Beri
T6. MarketResearch, Concepts, & Cases – Cooper Schindler

Reference Books:

R1: Marketing Management – RajanSaxena
R2: Marketing Management – S.A. Sherlekar
R3: The IUP Journal of Marketing Management, Harvard Business Review
R4: Research for Marketing Decisions by Paul Green, Donald, Tull
R5: Business Statistics, A First Course, David M Levine at al, Pearson Publication

Links:

- https://onlinecourses.nptel.ac.in/noc21_mg51/preview
- https://www.edx.org/course/marketing management?index=product&queryID=d757b8fcf377b56ab5f232913 737553&position=1
- https://www.edx.org/course/marketing-management 2?index=product&queryID=3f97462d431d5de04821d99a5a8ce238&p osition=2

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Academic Year – 2023-2024 Semester -VI
[CB3113]: Project Stage II

Teaching Scheme:	Credit	Examination Scheme:
PR: 04 Hours/Week	PR: 2	Lab Evaluation : 125 Marks

Course Prerequisites: Project Stage I[CB3106]

Course Objective:

The primary objective of this project-based learning course is to develop critical thinking and problem-solving skills by exploring and proposing solutions to current computer engineering problems in the real world. This course will help students begin to identify themselves as computer engineers and prepare them for opportunities for their undergraduate studies.

Course Outcome:

After successful completion of the course, students will able to:

CO 1: Plan, design and develop solutions for framed problem statement
CO 2: Test and analyze the modules of planned project.
CO 3: Write effective technical report and demonstrate through presentation
CO 4: Apply engineering and management principles to achieve project goal.
CO 5: Participate effectively in multi-disciplinary and heterogeneous teams exhibiting team work
CO 6: Comprehend the importance of ethical practices in project planning, including respecting intellectual property rights, privacy considerations, and maintaining integrity in conducting research.

Guidelines

Group Structure:

Working in supervisor/mentor monitored groups; the students plan, manage, and complete a task/project/activity which addresses the stated problem.

1. There should be team/group of 3-4 students
2. A supervisor/mentor teacher assigned to individual groups

Project Stage II details

1. **Detailed Design and Architecture:**
   - Refine the high-level design and architecture of your project based on the requirements gathered in Stage I.
   - Decompose the system into smaller components or modules.
   - Identify the relationships and interactions between different components.
   - Define interfaces and APIs for communication between modules.
2. **Data Model and Database Design:**
   - Design the data model based on the project requirements and functional specifications.
   - Determine the entities, attributes, and relationships that need to be represented in the database.

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- Decide on the database management system (DBMS) to be used and design the schema accordingly.

3. **Technology Selection:**
- Evaluate and select appropriate technologies, frameworks, and libraries that align with the project requirements and objectives.
- Consider factors such as scalability, performance, compatibility, and community support.
- Research and explore different options for frontend development, backend development, database management, and any other relevant areas.

4. **Implementation of Core Features:**
- Start implementing the core features of your project based on the detailed design.
- Develop the required modules and functionalities using the chosen programming languages and frameworks.
- Follow coding best practices and adhere to coding standards to maintain clean and readable code.

5. **Integration of Third-Party Components:**
- Identify any third-party components, libraries, or APIs that can enhance your project's functionality.
- Integrate these components into your project as needed, ensuring proper configuration and compatibility.
- Test the integration to verify that the third-party components work correctly with your project.

6. **Testing and Quality Assurance:**
- Create and execute test cases to verify the functionality and reliability of your project.
- Perform unit testing, integration testing, and system testing to identify and fix any bugs or issues.
- Consider using automated testing tools and frameworks to streamline the testing process.

7. **Progress Tracking and Version Control:**
- Use a version control system, such as Git, to track and manage changes in your project's codebase.
- Maintain a repository and commit code regularly, providing clear and concise commit messages.
- Create branches for new features or bug fixes, and merge them back into the main branch after testing and review.

8. **Regular Project Updates:**
- Keep your project supervisor or advisor informed about the progress of your project.
- Schedule regular meetings or progress updates to discuss any challenges faced, seek guidance, and ensure alignment with project goals.

9. **Documentation:**
- Maintain documentation for your project, including design documents, user manuals, and any relevant technical documentation.
- Document the setup instructions, configuration details, and dependencies required to run your project.

Recommended Format of the Project Report
- Title Page with Title of the topic, Name of the candidate with Exam Seat Number / Roll Number,
- Name of the Guide, Name of the Department, Institution and Year and University
- Seminar Approval Sheet/Certificate

- Abstract and Keywords
- Acknowledgements
- Table of Contents, List of Figures, List of Tables and Nomenclature
- Chapters Covering topic of discussion- Introduction with section including organization of the report, Literature Survey and Findings /Details of design/technology/System Architecture, Methodology/Analytical and/or experimental work/ Comparative Analysis, if any/ Timeline Chart….., Discussions, Interpretation and Conclusions, Bibliography/References
- Plagiarism Check report (less than 15%)

Students Role in Project Based Learning

Project requires regular mentoring by faculty throughout the semester for successful completion of the idea/project tasks selected by the students per batch. Project is monitored and continuous assessment is done by supervisor /mentor and authorities. It is recommended that all activities should to be recorded regularly, regular assessment of work need to be done and proper documents need to be maintained at department end by both students as well as mentor (Project work book). Continuous Assessment Sheet (CAS) is to be maintained by all mentors.

Recommended parameters for assessment, evaluation and weight age for Project Stage-II :

- Idea Inception (10%)
- Outcomes of Project/ Analysis of Problem/ Problem Solving Skills/ Solution provided/ Final product (40%) (Individual assessment and team assessment)
- Documentation (Gathering requirements/ design & modeling/ implementation/execution, use of technology and final report, other documents) (10%)
- Demonstration (Presentation, User Interface, Usability etc) (10%)
- Participation in Project Competition/ Hackathon etc (10 %)
- Publication (15 %)
- Awareness /Consideration of-Environment/ Social /Ethics/ Safety measures/Legal aspects (5%)

Each student, under the guidance of a Faculty, is required to

- Demonstrate the working model of the project and present the topic using audio/visual aids.
- Answer the queries.
- Submit number of team members plus one copies of the typed report prepared in Latex only.
- Use of Project Log book recommended.

Project workbook will serve the purpose and facilitate the job of students, mentor and project coordinator. This workbook will reflect accountability, punctuality, technical writing ability and work flow of the work undertaken. During university examination Internal examiner (preferably the guide) and External examiners jointly, evaluate the project work. The student shall submit the duly certified progress report of project in standard format for satisfactory completion of the work by the concerned guide and head of the Department. Project Exam will be conducted at end of semester. The participants shall take part in discussion to foster friendly and stimulating environment in which the students are motivated to reach high standards and become self-confident.

Project Phases

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	Review 1: Summary of work done in stage I, Technology to be used and planning for stage II. Detailed Design and Architecture, Data Model and Database Design, Technology Selection
	Review 2: Implementation of Core Features, Integration of Third-Party Components
1	**Review 3:** Implementation of complete system
2	**Review 4:** Presentation on Implementation paper and publishing in Scopus Indexed International journal/ Conference/ UGC care journal or register for IPR/patent.

Text Books:

T1. A new model of problem based learning. By Terry Barrett. All Ireland Society for higher education (AISHE). ISBN:978-0-9935254-6-9; 2017

T2. Problem Based Learning. By Mahnazmoallem, woei hung and Nada Dabbagh, Wiley Publishers. 2019.

T3. Stem Project based learning and integrated science, Technology, Engineering and mathematics approach. By Robert Capraro, Mary Margaret Capraro

T4. Hassan Gomaa, "Software Modeling and Design- UML, Use cases, Patterns and Software Architectures" Cambridge University Press, 2011, ISBN 978-0-521-76414-8.

Reference Books:

R1. De Graaff E, Kolmos A., red.: Management of change: Implementation of problem-based and project-based learning in engineering. Rotterdam: Sense Publishers. 2007.

R2. Gopalan," Project management core text book", 2 Indian Edition

R3. James Shore and Shane Warden, " The Art of Agile Development"

R4. GardyBooch, James Rambaugh, IvarJacobson,"The unified modeling language user guide" , Pearson Education, Second edition, 2008, ISBN 0-321-24562-8.

R5. Mason, Peter & Wright, Pamela &Luu, Hoat. (2008). Writing and Publishing a Scientific Paper. 10.13140/2.1.4010.0480.

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T. Y. B. Tech (Computer Science and Business Systems)
Academic Year – 2023-2024 Semester -V

Teaching Scheme:	Credit	Examination Scheme:
-	-	-

List of Courses to be opted (Any one) under Audit Course III

Code	Name of Course	Link
HS3106	Essence of Indian Knowledge Tradition -I	https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-2/ug-vol2.pdf
HS3108	Cultural Studies	https://onlinecourses.swayam2.ac.in/aic19_as04/preview
CE 3113	Urbanization and Environment	https://onlinecourses.nptel.ac.in/noc21_hs96/preview

GUIDELINES FOR CONDUCTION OF AUDIT COURS

A student shall be awarded the bachelor's degree if he/she earns 170 credits and clears all the audit courses specified in the syllabus. The student shall be awarded grade as AP (Audit Course Pass) on successful completion of audit course. The student may opt for one of the audit courses per semester, starting from second year first semester. List of options offered is provided. Each student has to choose one audit course from the list per semester. Evaluation of audit course shall be done. Method of conduction and method of assessment for audit courses are suggested.

Using NPTEL Platform:

NPTEL is an initiative by MHRD to enhance learning effectiveness in the field of technical education by developing curriculum based video courses and web based e-courses. The details of NPTEL courses are available on its official website www.nptel.ac.in

- Student can select any one of the courses mentioned above and has to register for the corresponding online course available on the NPTEL platform as an Audit course.
- Once the course is completed the student can appear for the examination as per the guidelines on the NPTEL portal.
- After clearing the examination successfully; student will be awarded with certificate.

Guidelines for Assessment:

The assessment of the course will be done at the institute level. The department has to maintain the record of the various audit courses opted by the students. The audit course opted by the students could be interdisciplinary.

- During the course students will be submitting the online assignments. A copy of same students can submit as a part of term work for the corresponding Audit course.
- On the satisfactory submission of assignments, the institute can mark as "Present" and the student will be awarded the grade AP on the marksheet.

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BoS, CSBS

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Director RSCOE, Pune

T. Y. B. Tech (Computer Science and Business Systems)
Academic Year – 2023-2024 Semester -VI

Teaching Scheme:	Credit	Examination Scheme:
-	-	-

List of Courses to be opted (Any one) under Audit Course IV

Code	Name of Course	Link
HS3107	Essence of Indian Knowledge Tradition -II	https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-2/ug-vol2.pdf
HS3109	Introduction to Human Factors and Ergonomics	https://onlinecourses.swayam2.ac.in/aic20_ed03/preview
HS3110	Mind Education	https://onlinecourses.swayam2.ac.in/aic19_as05/preview

GUIDELINES FOR CONDUCTION OF AUDIT COURS

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