



ACE Engineering College

An AUTONOMOUS Institution



Ghatkesar, Medchal (Dist), Hyderabad, Telangana State – 501 301

(NBA Accredited B.Tech Courses Accredited NAAC with A Grade 3.20 CGPA)

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DEPARTMENT OF CSE ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

COURSE STRUCTURE (R-20)

IV YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	SM801MS	Organizational Behaviour	3	0	0	3
2		Professional Elective - VI	3	0	0	3
3		Open Elective - III	3	0	0	3
4	CM804PC	Project Stage - II	0	0	14	7
Total Credits			9	0	14	16

Professional Elective - VI

S.No	Course Code	Course Title
1		Speech and Video Processing
2		Robotics Process Automation
3		Randomized Algorithms
4		Cognitive Computing
5		Semantic Web

Open Elective - III

S.No	Course Code	Course Title
1		Quantitative Analysis for Business Decisions

ORGANIZATIONAL BEHAVIOUR

B.Tech. IV Year II Sem.

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Course Objectives: The objective of the course is to provide the students with the conceptual framework and the theories underlying Organizational Behaviour.

UNIT - I:

Introduction to OB - Definition, Nature and Scope – Environmental and organizational context – Impact of IT, globalization, Diversity, Ethics, culture, reward systems and organizational design on Organizational Behaviour. Cognitive Processes-I: Perception and Attribution: Nature and importance of Perception – Perceptual selectivity and organization – Social perception – Attribution Theories – Locus of control – Attribution Errors – Impression Management.

UNIT- II:

Cognitive Processes-II: Personality and Attitudes – Personality as a continuum – Meaning of personality - Johari Window and Transactional Analysis - Nature and Dimension of Attitudes – Job satisfaction and organizational commitment-Motivational needs and processes- Work-Motivation Approaches Theories of Motivation- Motivation across cultures - Positive organizational behaviour: Optimism – Emotional intelligence – Self-Efficacy.

UNIT - III:

Dynamics of OB-I: Communication – types – interactive communication in organizations – barriers to communication and strategies to improve the follow of communication - Decision Making: Participative decision-making techniques – creativity and group decision making. Dynamics of OB –II Stress and Conflict: Meaning and types of stress –Meaning and types of conflict - Effect of stress and intra- individual conflict - strategies to cope with stress and conflict.

UNIT - IV:

Dynamics of OB –III Power and Politics: Meaning and types of power – empowerment - Groups Vs. Teams – Nature of groups – dynamics of informal groups – dysfunctions of groups and teams – teams in modern work place.

UNIT - V:

Leading High performance: Job design and Goal setting for High performance- Quality of Work Life- Socio technical Design and High-performance work practices - Behavioural performance management: reinforcement and punishment as principles of Learning –Process of Behavioural modification - Leadership theories - Styles, Activities and skills of Great leaders.

REFERENCE BOOKS:

1. Luthans, Fred: Organizational Behaviour 10/e, McGraw-Hill, 2009
2. McShane: Organizational Behaviour, 3e, TMH, 2008
3. Nelson: Organizational Behaviour, 3/e, Thomson, 2008.
4. Newstrom W. John & Davis Keith, Organisational Behaviour-- Human Behaviour at Work, 12/e, TMH, New Delhi, 2009.
5. Pierce and Gardner: Management and Organisational Behaviour: An Integrated perspective, Thomson, 2009.
6. Robbins, P. Stephen, Timothy A. Judge: Organisational Behaviour, 12/e, PHI/Pearson, New Delhi, 2009.
7. Pareek Uday: Behavioural Process at Work: Oxford & IBH, New Delhi, 2009.
8. Schermerhorn: Organizational Behaviour 9/e, Wiley, 2008.
9. Hitt: Organizational Behaviour, Wiley, 2008.

SPEECH AND VIDEO PROCESSING (Professional Elective – VI)

B.Tech. IV Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives: Knowledge on speech and video processing techniques

Course Outcomes:

1. Describe the mechanisms of human speech production systems and methods for speech feature extraction.
2. Understand basic algorithms of speech analysis and speech recognition.
3. Explain basic techniques in digital video processing, including imaging characteristics and sensors.
4. Apply motion estimation and object tracking algorithms on video sequence.

UNIT - I:

Speech processing concepts: The speech production mechanism, Discrete time speech signals, Pole-Zero modeling of speech, relevant properties of the fast Fourier transform for speech recognition, convolution, linear and nonlinear filter banks, spectral estimation of speech using DFT. Linear Prediction analysis of speech.

UNIT - II:

Speech recognition: Real and Complex Cepstrum, application of cepstral analysis to speech signal, feature extraction for speech, static and dynamic feature for speech recognition, robustness issues, discrimination in the feature space, feature selection, MFCC, LPCC, Distance measures, vector quantization models. Gaussian Mixture model, HMM.

UNIT - III:

Basics of Video Processing: Video formation, perception and representation: Principle of color video, video cameras, video display, pinhole model, CAHV model, Camera motion, Shape model, motion model, Scene model, two-dimensional motion models. Three-Dimensional Rigid Motion, Approximation of projective mapping.

UNIT - IV:

Motion estimation Techniques: Optical flow, motion representation, motion estimation criteria, optimization methods, pixel-based motion estimation, Block matching algorithm, gradient Based, Intensity matching, feature matching, frequency domain motion estimation, Depth from motion. Motion analysis applications: Video Summarization, video surveillance.

UNIT - V:

object tracking and segmentation: 2D and 3D video tracking, blob tracking, kernel based counter tracking, feature matching, filtering Mosaicing, video segmentation, mean shift based, active shape model, video shot boundary detection. Interframe compression, Motion compensation

TEXT BOOKS:

1. Fundamentals of Speech recognition – L. Rabiner and B. Juang, Prentice Hall signal processing series.
2. Digital Video processing, A Murat Tekalp, Prentice Hall.
3. Discrete-time speech signal processing: principles and practice, Thomas F. Quatieri, Coth.
4. Video Processing and Communications, Yao Wang, J. Osternann and Qin Zhang, Pearson Education.

REFERENCE BOOKS:

1. "Speech and Audio Signal Processing", B.Gold and N. Morgan, Wiley.
2. "Digital image sequence processing, Compression, and analysis", Todd R. Reed, CRC Press
3. "Handbook of Image and Video processing", Al Bovik, Academic press, second Edition

ROBOTIC PROCESS AUTOMATION (Professional Elective – VI)

B.Tech. IV Year II Sem.

L	T	P	C
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Course Objectives: Aim of the course is to make learners familiar with the concepts of Robotic Process Automation.

Course Outcomes:

1. Describe RPA, where it can be applied and how it's implemented.
2. Identify and understand Web Control Room and Client Introduction.
3. Understand how to handle various devices and the workload.
4. Understand Bot creators, Web recorders and task editors.

UNIT - I

Introduction to Robotic Process Automation & Bot Creation Introduction to RPA and Use cases – Automation Anywhere Enterprise Platform – Advanced features and capabilities – Ways to create Bots.

UNIT - II

Web Control Room and Client Introduction - Features Panel - Dashboard (Home, Bots, Devices, Audit, Workload, Insights) - Features Panel – Activity (View Tasks in Progress and Scheduled Tasks) - Bots (View Bots Uploaded and Credentials).

UNIT - III

Devices (View Development and Runtime Clients and Device Pools) - Workload (Queues and SLA Calculator) - Audit Log (View Activities Logged which are associated with Web CR) - Administration (Configure Settings, Users, Roles, License and Migration) - Demo of Exposed API's – Conclusion – Client introduction and Conclusion.

UNIT - IV

Bot Creator Introduction – Recorders – Smart Recorders – Web Recorders – Screen Recorders - Task Editor – Variables - Command Library – Loop Command – Excel Command – Database Command - String Operation Command - XML Command.

UNIT - V

Terminal Emulator Command - PDF Integration Command - FTP Command - PGP Command - Object Cloning Command - Error Handling Command - Manage Windows Control Command - Workflow Designer - Report Designer.

TEXT BOOKS:

1. Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool - UiPath: Create Software robots. with the leading RPA tool – UiPath Kindle Edition.

REFERENCES:

1. Robotic Process Automation A Complete Guide - 2020 Edition Kindle Edition.

RANDOMIZED ALGORITHMS (Professional Elective – VI)

B.Tech. IV Year II Sem.

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Course Objective: To introduce the power of randomization in the design and analysis of algorithms.

Course Outcomes:

1. Appreciate the fundamentals of randomized algorithm design.
2. Understand the fundamentals of Markov chains and the Monte Carlo method.
3. Apply high probability analysis to selected randomized algorithms.
4. Understand the Comparison of Fingerprinting Techniques and Pattern Matching

UNIT - I

Introduction, A Min – Cut algorithm, Las Vegas and Monte Carlo, Binary Planar Partitions, A Probabilistic Recurrence. Game – Theoretic Techniques: Game Tree Evaluation, The Minimax Principle

UNIT - II

Moments and Deviations: Occupancy Problems, The Markov and Chebyshev Inequalities, Randomized Selection. Markov Chains and Random Walks: A 2-SAT example, Markov Chains, Random Walks on Graphs, Graph Connectivity

UNIT - III

Algebraic Techniques: Fingerprinting and Freivald's Technique, Verifying Polynomial Identities, Perfect Matching in Graphs, Verifying Equality of Strings, A Comparison of Fingerprinting Techniques, Pattern Matching

UNIT - IV

Data Structures: The Fundamental Data-structuring Problem, Random Treaps, Skip Lists, Hashtables, Hashing with $O(1)$ Search Time. Graph Algorithms: All Pairs Shortest Paths, The Min- Cut Problem, Minimum Spanning Trees

UNIT - V

Geometric Algorithms: Randomized Incremental Construction, Convex Hulls in the Plane, Duality, Half-Space Intersections, Dalaunay Triangulations, Trapezoidal Decompositions. Parallel and Distributed Algorithms: The PRAM Model, Sorting on a PRAM, Maximal Independent Sets, Perfect Matchings

TEXT BOOKS:

1. Randomized Algorithms: Rajeev Motwani, Prabhakar Raghavan.
2. Probability and Computing: Randomization and Probabilistic Techniques in Algorithms and Data Analysis by Eli Upfal and Michael Mitzenmacher.

REFERENCE BOOK:

1. Rajeev Motwani, Prabhakar Raghavan, Randomized Algorithms, Cambridge University Press.

COGNITIVE COMPUTING (Professional Elective – VI)

B.Tech. IV Year II Sem.

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Prerequisites: Probability theory

Course Objectives:

1. To provide an understanding of the central challenges in realizing aspects of human cognition.
2. To provide a basic exposition to the goals and methods of human cognition.
3. To develop algorithms that use AI and machine learning along with human interaction and feedback to help humans make choices/decisions.
4. To support human reasoning by evaluating data in context and presenting relevant findings along with the evidence that justifies the answers.

Course Outcomes:

1. Understand what cognitive computing is, and how it differs from traditional approaches.
2. Plan and use the primary tools associated with cognitive computing.
3. Plan and execute a project that leverages cognitive computing.
4. Understand and develop the business implications of cognitive computing.

UNIT - I

Introduction to Cognitive Science: Understanding Cognition, IBM's Watson, Design for Human Cognition, Augmented Intelligence, Cognition Modeling Paradigms: Declarative/ logic-based computational cognitive modeling, connectionist models of cognition, Bayesian models of cognition, a dynamical systems approach to cognition.

UNIT - II

Cognitive Models of memory and language, computational models of episodic and semantic memory, modeling psycholinguistics.

UNIT - III

Cognitive Modeling: modeling the interaction of language, memory and learning, Modeling select aspects of cognition classical models of rationality, symbolic reasoning and decision making.

UNIT - IV

Formal models of inductive generalization, causality, categorization and similarity, the role of analogy in problem solving, Cognitive Development Child concept acquisition. Cognition and Artificial cognitive architectures such as ACT-R, SOAR, OpenCog, CopyCat, Memory Networks.

UNIT - V

DeepQA Architecture, Unstructured Information Management Architecture (UIMA), Structured Knowledge, Business Implications, Building Cognitive Applications, Application of Cognitive Computing and Systems.

TEXT BOOKS:

1. The Cambridge Handbook of Computational Psychology by Ron Sun (ed.), Cambridge University Press.
2. Formal Approaches in Categorization by Emmanuel M. Pothos, Andy J. Wills, Cambridge University Press.

REFERENCE BOOKS:

1. Judith S. Hurwitz, Marcia Kaufman, Adrian Bowles Cognitive Computing and Big Data Analytics, Wiley
2. Vijay V Raghavan, Venkat N. Gudivada, Venu Govindaraju, Cognitive Computing: Theory and Applications: Volume 35 (Handbook of Statistics), North Holland.

SEMANTIC WEB (Professional Elective – VI)

B.Tech. IV Year II Sem.

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Course Objectives:

1. To learn Web Intelligence.
2. To learn Knowledge Representation for the Semantic Web.
3. To learn Ontology Engineering.
4. To learn Semantic Web Applications, Services and Technology.

Course Outcomes:

1. Understand the characteristics of Semantic Web.
2. Apply SOAP and UDDI to web services.
3. Handle multiple web services using Orchestration.
4. Create documents using XML.
5. Construct and use Ontologies.

UNIT - I

Introduction: Introduction to Semantic Web, the Business Case for the Semantic Web, XML and Its Impact on the Enterprise.

UNIT - II

Web Services: Uses, Basics of Web Services, SOAP, UDDI, Orchestrating Web Services, Securing Web Services, Grid Enabled and Semantic Web of Web Services.

UNIT - III

Resource Description Framework: Features, Capturing Knowledge with RDF.

XML Technologies: XPath, The Style Sheet Family: XSL, XSLT, and XSL FO, XQuery, XLink, XPointer, XInclude, XMLBase, XHTML, XForms, SVG.

UNIT - IV

Taxonomies and Ontologies: Overview of Taxonomies, Defining the Ontology Spectrum, Topic Maps, Overview of Ontologies, Syntax, Structure, Semantics, and Pragmatics, Expressing Ontologies Logically, Knowledge Representation.

UNIT - V

Semantic Web Application: Semantic Web Services, e-Learning, Semantic Bioinformatics, Enterprise Application Integration, Knowledge Base. **Semantic Search Technology:** Search Engines, Semantic Search, Semantic Search Technology, Web Search Agents, Semantic Methods, Latent Semantic IndexSearch, TAP, Swoogle.

TEXT BOOK:

1. Thinking on the Web - Berners Lee, Godel and Turing, Wiley Interscience.

REFERENCE BOOKS:

1. The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management by Michael C. Daconta, Leo J. Obrst, Kevin T. Smith, Wiley Publishing, Inc.
2. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J.Davies, R.Studer, P.Warren, John Wiley & Sons.
3. Semantic Web and Semantic Web Services - Liyang Lu Chapman and Hall/CRC Publishers, (Taylor & Francis Group)
4. Information Sharing on the semantic Web - Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.
5. Programming the Semantic Web, T.Segaran, C.Evans, J.Taylor, O'Reilly, SPD.

ME600OE: QUANTITATIVE ANALYSIS FOR BUSINESS DECISIONS (Open Elective – III)

I V Year II Sem.

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Course Objectives:

- Understand the problem, identifying decision variables, objective and constraints
- Formulation of Optimization Problem by constructing Objective Function and Constraints functions
- Learn to select appropriate Optimization Technique for the formulated Optimization Problem
- Understood the procedure involved in the selected Optimization Technique
- Solve the Optimization Model with the selected Optimization Technique

Course Outcomes: At the end of the course, student will be :

- Familiar with issues that would crop up in business
- Able to formulate Mathematical Model to resolve the issue
- Able to select technique for solving the formulated Mathematical Model
- Able to analyze the results obtained through the selected technique for implementation.

UNIT – I:

Introduction and Linear Programming: Nature and Scope of O.R.–Analyzing and Defining the Problem, Developing A Model, Types of models, Typical Applications of Operations Research; Linear Programming: Graphical Method, Simplex Method; Solution methodology of Simplex algorithm, Artificial variables; Duality Principle, Definition of the Dual Problem, Primal - Dual Relationships.

UNIT – II:

Transportation and Assignment Models: Definition and Application of the Transportation Model, Solution of the Transportation Problem, the Assignment Model, & Variants of assignment problems. Traveling Salesman Problem.

UNIT – III:

Replacement Model: Replacement of Capital Cost items when money's worth is **not** considered, Replacement of Capital Cost items when money's worth is considered, Group replacement of low-cost items.

UNIT – IV:

Game Theory and Decision Analysis: Introduction – Two Person Zero-Sum Games, Pure Strategies, Games with Saddle Point, Mixed strategies, Rules of Dominance, Solution Methods of Games without Saddle point – Algebraic, arithmetic methods. Decision Analysis: Introduction to Decision Theory, Steps In the Decision Making, the Different environments In Which Decisions Are Made, Criteria For Decision Making Under Risk and Uncertainty, The Expected Value Criterion With Continuously Distributed Random Variables, Decision Trees, Graphic Displays of the Decision Making Process.

UNIT – V:

Queuing Theory and Simulation: Basic Elements of the Queuing Model, Poisson Arrivals and Exponential Service times; Different Queing models with FCFS Queue discipline: Single service station and infinite population, Single service station and finite population, Multi service station models with infinite population. **Simulation:** Nature and Scope, Applications, Types of simulation, Role of Random Numbers, Inventory Example, Queuing Examples, Simulation Languages.

TEXTBOOKS:

1. Operations Research: Theory and Applications/ J. K. Sharma: / Macmillan, 2008.
2. Operations Research/ Er. Prem Kumar Gupta & Dr. D. S. Hira / S. Chana, 2016

REFERENCE BOOKS:

1. Introduction To Operations Research; Hillier/Lieberman/ TMH, 2008.
 2. Render: Quantitative Analysis for Management, Pearson, 2009
 3. Quantitative Analysis for Business Decisions / Sridharabhat/ HPH, 2009.
 4. Operations Research / R. Panneerselvam/ PHI, 2008.
 5. Operations Research: An Introduction / Hamdy, A. Taha/ PHI, 2007.
 6. Quantitative Techniques/ Selvaraj/ Excel, 2009
 7. Quantitative Techniques for Decision Making / Gupta and Khanna/ PHI, 2009.
 8. Operations Research/ Ravindran, Phillips, Solberg/ Wiley, 2009.
- Quantitative Methods for Business/ Anderson, Sweeney, Williams/ 10/e, Cengage, 2008