Chhattisgarh Swami Vivekananda Technical University, Bhilai

Branch: Information Technology **Semester: V**
Subject: Artificial Intelligence and Machine Learning **Code: C033511(033)**
Total Theory Periods: 40 **Total Tutorial Periods:10**
No. of Class tests to be conducted: 2(Minimum) **Maximum Marks in ESE:100**
No. of Assignments to be submitted: One per Unit **Minimum Marks in ESE:35**
ESE Duration: Three Hours

COURSE OBJECTIVES

- To understand basic concepts of AI, heuristic search techniques, knowledge representation methods and planning for AI solutions.
- To provide understanding of Machine learning, Bayesian decision theory and Multivariate methods

COURSE OUTCOMES

After successful completion of this course, the students will be able to-

1. Apply the knowledge and skills of heuristic search and game playing for solving real time problems
2. Make decisions based on which knowledge representation to use
3. Ability to work with Natural Languages and implement linear and nonlinear planning
4. Apply suitable Bayesian decision theory for various types of learning problems
5. Develop learning models and required solutions for Multivariate datasets

Unit I: Introduction

Introduction to AI, Problem Solving. Production systems. State space search, Blind search: Depth first search, Breadth first search, Informed search: Heuristic function, Hill climbing search, Branch and Bound technique, A* Search, , Constraint Satisfaction problems Game Playing Minimax search procedure; Alpha-Beta cutoffs; Additional Refinements.

Unit II: Knowledge Representation

Knowledge agent, Propositional and Predicate logic, WFF, Skolemization Resolution., refutation, Unification, Inference rule & theorem proving, Rule Based Systems monotonic and non monotonic reasoning. Introduction to Prolog, Structured KR: Semantic Net - slots, inheritance, Frames-exceptions and defaults attached predicates, Scripts, Conceptual Dependency formalism.

Unit III: Natural Language Processing(NLP) & Planning

Overview of NLP tasks, Parsing, , Recursive Transition Nets (RTN); Augmented Transition Nets (ATN); Semantic Analysis. Machine translation. Planning Overview – An Example Domain: The Blocks World; Component of Planning Systems; Goal Stack Planning (linear planning); Non-linear Planning using constraint posting

Unit IV: Foundations for ML

Definition: Machine Learning Supervised/Unsupervised Learning, Probably Approximately Correct (PAC) Learning, Bayesian Decision theory, losses and risks, Discriminant functions, Utility Theory, bias and variance, bayes estimator, parametric classification

Unit V: Multivariate Methods

Multivariate Data. Parameter estimation. Multivariate classification. Multivariate regression. Dimensionality reduction. K-means clustering. Decision tress: Multivariate trees

TEXT BOOKS

1. Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-GrawHill.
2. Ethem Alpaydi, Introduction to Machine Learning, Second edition, the MIT Press,2015

REFERENCE BOOKS

1. Introduction to AI & Expert System: Dan W.Patterson, PHI.
2. Artificial Intelligence by Luger (Pearson Education)
3. Russel & Norvig, Artificial Intelligence: A Modern Approach, Pearson Education
4. Mitchell Tom, Machine Learning, Tata Mc Grawhill, 2017

Branch: Information Technology **Semester: V**
Subject: Theory of Computation **Code: C033512(033))**
Total Theory Periods: 40 **Total Tutorial Periods:10**
No. of Class tests to be conducted: 2(Minimum) **Maximum Marks in ESE:100**
No. of Assignments to be submitted: One per Unit **Minimum Marks in ESE:35**
ESE Duration: Three Hours

COURSE OBJECTIVES:

- Students will learn about a variety of issues in the mathematical development of computer science theory, particularly
- Students will gain a more formal understanding of algorithms and procedures finite representations for languages and machines,

COURSE OUTCOME

On successful completion of the course, the student should be able:

1. To construct finite state machines and minimize them.
2. To design regular expressions and to prove the equivalence of languages described by finite state machines and regular expressions
3. To design grammars and simplify context free grammars.
4. To construct pushdown automata and to prove the equivalence of languages described by pushdown automata and context free grammars
5. To solve various problems of applying Turing Machines

Unit I- The Theory of Automata

Introduction to automata theory, Examples of automata machine, Finite automata as a language acceptor and translator. Deterministic finite automata. Non deterministic finite automata, finite automata with output (Mealy Machine. Moore machine). Finite automata with null moves, Conversion of NFA to DFA, Minimization of DFA. Myhill Nerode theorem, Properties and limitation of FSM. Two way finite automata. Applications of finite automata.

Unit II- Regular Expressions

Regular expression, Properties of Regular Expression. Finite automata and Regular expressions. Arden's theorem, Regular Expression to DFA conversion & vice versa. Pumping lemma for regular sets. Application of pumping lemma, Regular sets and Regular grammar. Closure properties of regular sets. Decision algorithm for regular sets and regular grammar.

Unit III- Grammars

Definition and types of grammar. Chomsky hierarchy of grammar. Relation between types of grammars. Role and application areas of grammars. Context free grammar. Left most linear & right most derivation trees. Ambiguity in grammar. Simplification of context free grammar. Chomsky normal from. Greibach normal form, properties of context free language. Pumping lemma from context free language. Decision algorithm for context tree language.

Unit IV- Push Down Automata

Basic definitions. Deterministic push down automata and non-deterministic push down automata. Acceptance of push down automata. Push down automata and context free language.

Unit V- Turning Machine Model

Representation of Turing Machine Construction of Turing Machine for simple problems. Universal Turing machine and other modifications. Church's Hypothesis. Halting problem of Turing Machine, COMPUTABILITY: Introduction and Basic concepts. Recursive function, Partial recursive function, Undecidability.

TEXT BOOKS

1. Theory of Computer Science (Automata Language & Computation), K.L.P. Mishra and N. Chandrasekran, PHI.
2. Introduction to Automata theory. Language and Computation, John E. Hopcropt & Jeffery D.Ullman, Narosa Publishing House.

REFERENCE BOOKS

1. Finite Automata and Formal Languages: A Simple Approach, A.M. Padma Reddy, Pearson Education, India.
2. Theory of Automata and Formal Language, R.B. Patel & P. Nath, Umesh Publication.
3. An Introduction and finite automata theory, Adesh K. Pandey, TMH.
4. Theory of Computation, AM Natrajan. Tamilarasi, Bilasubramani, New Age International Publishers.

Branch: Information Technology **Semester: V**
Subject: Principles of Communication System **Code: C033513(033)**
Total Theory Periods: 40 **Total Tutorial Periods:10**
No. of Class tests to be conducted: 2(Minimum) **Maximum Marks in ESE:100**
No. of Assignments to be submitted: One per Unit **Minimum Marks in ESE:35**
ESE Duration: Three Hours

COURSE OBJECTIVES:

Objectives to include this subject in Information Technology discipline is:

- Various analog and digital modulation and demodulation techniques.
- Comparison of different performances and noise parameters for different modulation techniques.
- It also focuses on advanced communication systems such as Satellite communications and Optical Fiber Communications and their applications.

COURSE OUTCOMES:

1. The basic working of the communication system with analog modulation techniques and their comparative analysis and application suitability.
2. Types, characterization and performance parameters of modulation and demodulation.
3. Analog to digital conversion and digital data transmission.
4. Digital modulation techniques and their comparative analysis along with advanced multiplexing technique.
5. Basic working principles of existing and advanced communication technologies.

Unit 1: Amplitude Modulation:

Need for Modulation, Amplitude Modulation, Amplitude Modulation Index, Modulation Index for Sinusoidal AM, Frequency spectrum for Sinusoidal AM, Average power for Sinusoidal AM, Effective voltage and current for sinusoidal AM, Balanced Modulator, The Square law demodulator, DSBSC Modulation, SSB modulation and generation, VSB, FDM. Noise in communication systems, Signal to noise ratio Noise performance in AM.

Unit 2: Angle Modulation:

Phase and frequency modulation and their relationship. Frequency deviation, spectrum of FM Signal, BW of FM Signal, Effect of modulation on BW, constant BW, FM phasor diagram, Narrow-band F.M. Armstrong and Parameter variation methods of FM generation and FM demodulators. Noise performance in FM and comparison with AM.

Unit 3: Sampling, Quantization and Coding:

Sampling theorem, Pulse Modulation: PAM, PPM, PWM. Quantization of Signals, Quantization error, TDM, Pulse Code Modulation (PCM), DPCM, DM, ADM and their comparative performance evaluation.

Unit 4: Digital Modulation Techniques:

Modulation techniques for ASK, QASK, FSK, M-ary FSK, BPSK, DPSK, QPSK, M-ary PSK, QAM. Comparison of Noise performance of various PSK and FSK systems. Theme Example-Orthogonal Frequency Division Multiplexing (OFDM).

Unit 5: Advanced Communication Techniques:

Satellite Communication: Satellite orbits and positioning, Satellite Communication Systems, Satellite Subsystems, Ground Stations, Satellite Applications, Global Navigation Systems.

Fiber Optic Communication: Optical Principles, Optical Communication Systems, Fiber Optic Cables, Optical Transmitter and Receivers, Wavelength Divison Multiplexing, Passive Optical Networks, 40/100 Gbps Networks and Beyond.

Text Books:

1. Principles of Communication system by H.Taub and D.L. Shiling. TMH, 2008.
2. Communication Systems by R. P. Singh and S. D. Sapre 2 nd Edition TMH.
3. Principles of Electronic Communication Systems by Louis E. Frenzel Jr., 4th Edition

Reference Books:

1. Electronic Communications by Roddy & Coolen, PHI, 4 th Ed.
2. An Introduction to the Principle of Communication Theory by J.C. Hancock,Mc-Graw Hill.
3. Communication System-by A.B. Carlson ,Mc-Graw Hill, 3 rd Ed.
4. Electronic Communication System by Kenedy & Davis, TMH,

Branch: Information Technology **Semester: V**
Subject: Software Engineering & Project Management **Code: C033514(033)**
Total Theory Periods: 40 **Total Tutorial Periods:10**
No. of Class tests to be conducted: 2(Minimum) **Maximum Marks in ESE:100**
No. of Assignments to be submitted: One per Unit **Minimum Marks in ESE:35**
ESE Duration: Three Hours

COURSE OBJECTIVES

- To learn and understand the principles of Software Engineering
- To be acquainted with methods of capturing, specifying, visualizing and analyzing software requirements.
- To apply Design and Testing principles to S/W project development.
- To understand project management through life cycle of the project.
- To understand software quality attributes

COURSE OUTCOMES

On completion of the course, student will be able to–

1. Decide on a process model for a developing a software project
2. Classify software applications and Identify unique features of various domains
3. Design test cases of a software system.
4. Understand basics of IT Project management.
5. Plan, schedule and execute a project considering the risk management.
6. Apply quality attributes in software development life cycle.

Unit-I Introduction to Software Engineering, Software Process Models

Software Engineering Fundamentals: Software Engineering Principles, The Software Process, Software Myths. Process Models: A Generic Process Model, The Waterfall, Incremental Process. RAD, Prototyping, Evolutionary Process, Object oriented model, Advanced Process Models & Tools: Agile software development.

Unit-II Software Requirements Engineering& Analysis

Requirements Engineering: User and system requirements, Functional and non-functional requirements, Types & Metrics, A spiral view of the requirements engineering process. Software Requirements Specification (SRS): The software requirements Specification document, The structure of SRS, Requirements elicitation & Analysis**:** Process, Requirements validation, Requirements management.

Unit-3 Design Engineering

Design Process & quality, Design Concepts, the design Model, Architectural Design, Modeling Component Level Design, User Interface Design, effective modular design, top down, bottom up strategies, stepwise refinement.

Unit-4 Project Management

Project Management Concepts: The Management Spectrum, People, Product, Process, Project, Metrics and Measurement : size & function oriented metrics(FP & LOC), Metrics for Project and Software Quality, Project Estimation Software Project Estimation, Decomposition Techniques, Empirical Estimation Models: Structure, COCOMO, Estimation of Object-oriented Projects, Specialized Estimation, Project Scheduling: Basic Concepts, Defining a Task Set for the Software Project, Defining Task Network, Scheduling with time-line charts, Schedule tracking, Project Risk

Management : Risk Analysis & Management: Reactive versus Proactive Risk Strategies, Software Risks, Risk Identification, Risk Projection, Risk Refinement, Risk Mitigation, Risks Monitoring and Management. Software Configuration Management: SCM process, CMM-Capability Maturity Model.

Unit -5 Software Testing, Maintenance & Reengineering

Software Testing: Introduction to Software Testing, Principles of Testing, Verification and Validation, test activities, types of s/w test, black box testing, testing boundary condition, structural testing, test coverage criteria Based on data flow mechanisms, regression testing, testing in the large. S/W testing strategies, strategic approach and issue, unit testing – integration testing – validation testing – system testing and debugging. **Maintenance & Reengineering:** Software Maintenance, Software Supportability, Reengineering, Business Process Reengineering, Software Reengineering, Reverse Engineering, Restructuring, Forward Engineering.

Text Book:

1. Roger Pressman, ―Software Engineering: A Practitioner ‘s Approach‖, McGraw Hill, ISBN 0–07–337597–7
2. Ian Sommerville, ―Software Engineering‖, Addison and Wesley, ISBN 0-13-703515-2

REFERENCE BOOKS

1. Carlo Ghezzi, ―Fundamentals of Software Engineering", Prentice Hall India, ISBN-10: 0133056996
2. Rajib Mall, ―Fundamentals of Software Engineering‖, Prentice Hall India, ISBN-13: 978-8120348981
3. Pankaj Jalote, ―An Integrated Approach to Software Engineering‖, Springer, ISBN 13: 9788173192715.

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Branch: Information Technology **Semester: V**

Subject: Artificial Intelligence and Machine Learning Lab **Code: C033521(033)**

Total Lab Periods: 36 **Batch Size: 30**

Maximum Marks :40 **Minimum Marks :20**

1. Installation of gnu-prolog, Study of Prolog (gnu-prolog), its facts, and rules. Write simple facts for the statements and querying it.
2. Write a program for Family-tree.
3. Write Program for Monkey-banana Problem.
4. Write programs for computation of recursive functions like factorial Fibonacci numbers, etc.
5. Write a Program for water jug problem.

Python Programming Lab

6. Installation of Python, and learning interactively at command prompt and writing simple programs.
7. Learning the conditions and iterations in Python by writing and running simple programs.
8. Random number generations, and problems based on random numbers.
9. Handling tuples and exercises based on tuples.
10. Functions and files
11. Linear and binary search
12. Handeling tokens
13. Finding unique and duplicate items of a list.
14. Matrix addition, multiplications, and unity matrix.
15. Naïve Bayes using python
16. Programs related to python libraries like Numpy, Pandas, Scipy etc.
17. Machine learning codes with python

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Branch: Information Technology **Semester: V**

Subject: Software Engineering & Project Management Lab Code: C033522(033)

Total Lab Periods: 36 **Batch Size: 30**

Maximum Marks :40 **Minimum Marks :20**

Instructions To Be Strictly Followed By Students:

1. Every two to three students should form a group and should develop software that could be developed during session.
2. Students can opt any Technology/Tool for developing their project
3. The groups should prepare a softcopy as well as hardcopy of the documentation as per phases given below.
4. Every student in the group should have a copy of the documentation
5. Every student should get his own copy of the documentation properly checked from the Teacher In charge, after every phase of development given below.
6. Before the Final Practical examinations, every individual student should submit his own hardcopy of the documentation in a Punched Cardboard File Only.
7. One CD of the project and its documentation (softcopy), from every group should be submitted during final submissions.
8. During Final Submissions, every copy of the documentation should be accompanied by a Submission Certificate duly signed by the Teacher In-charge and Head of Department

Suggested List of Experiments (but should not be limited to):

Experiment.1: Phases in software development project, overview, need, coverage of topics
Procedure:

1. Open an appropriate software engineering guide and study the software development life cycle and related topics.
2. Study the need of the software engineering.
3. Study the coverage of topics such as life cycle models and their comparisons.

Experiment.2: To assign the requirement engineering tasks Procedure:

1. Identify the different requirement engineering tasks.
2. Assign these tasks to various students to set the ball rolling.
3. Ask the students to start working on the given tasks.

Experiment.3: To perform the system analysis: Requirement analysis, SRS Procedure:

1. Assign the group of the student's different tasks of system analysis.
2. Ask students to meet different users and start analysis the requirements.
3. Ask students to give presentations group-wise of their system requirements analysis.

Experiment.4: To perform the function oriented diagram: DFD and Structured chart Procedure:

1. Identify various processes, data store, input, output etc. of the
2. Use processes at various levels to draw the DFDs.
3. Identify various modules, input, output etc. of the system.
4. Use various modules to draw structured charts. Experiment.5: To perform the user's view analysis: Use case diagram Procedure:

1. Identify various processes, use-cases, actors etc. of the

2. Use processes at various levels to draw the use-case diagram.

Experiment.6: To draw the structural view diagram Class diagram, object diagram Procedure:

1. Identify various elements such as classes, member variables, member functions etc. of the class diagram
2. Draw the class diagram as per the norms.

Subject: Principles of Communication System Lab **Code: C033523(033)**

Total Lab Periods: 36 **Batch Size: 30**

Maximum Marks :40 **Minimum Marks :20**

Suggested List of Experiments (but should not be limited to):

1. To Draw the O/P waveform of Amplitude Modulation & Demodulation & Calculate Modulation Index.
2. To Draw the O/P waveform of Frequency Modulation & Demodulation & Calculate Modulation Index.
3. To Study DSB Transmitter & Receiver.
4. To Study SSB Transmitter & Receiver.
5. To Study FM Transmitter & Receiver.
6. To Observe & plot the Graph of PAM Modulation & Demodulation.
7. To Observe & plot the Graph of PPM Modulation & Demodulation.
8. To Observe & plot the Graph of PWM Modulation & Demodulation.
9. To Perform Sampling & Reconstruction of original signal & to calculate the Sampling Frequency.
10. To Perform Amplitude Shift Keying(ASK) thereby determining relative change in Amplitude.
11. To Perform Frequency Shift Keying(FSK) thereby determining relative change in Frequency.
12. To Perform Phase Shift Keying(PSK) thereby determining relative change in Phase
13. To Perform Quardrature Phase Shift Keying(QPSK) thereby determining relative change in Phase.
14. To Perform Quardrature Amplitude Modulation(QAM).
15. To perform Adaptive Delta Modulation, Demodulation .
16. To perform Delta Modulation & Compare it with Adaptive Delta Modulation (ADM).
17. To study & perform Transmission & Reception of signal using TDM Technique.

TEXT BOOK:

1. Electronic Communications by R.P.Singh & S.D.Sapre, TMH.
2. Electronic Communication System by Kenedy & Davis, TMH, 5th Ed.
3. Principles of Electronic Communication Systems by Louis E. Frenzel Jr., 4th Edition

Reference Books:

1. Principles of Communication system by H.Taub and D.L. Shiling, TMH, 2008.
2. An Introduction to the Principle of Communication Theory by J.C. Hancock, Mc-Graw Hill.
3. Signal Processing, Modulation and Noise -by Betts, English University Press, London.
4. Communication System-by A.B. Carlson, Mc-Graw Hill, 3rd Ed.

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Branch: **Information Technology** Semester: **V**

Subject: **Design and Analysis of Algorithm** Code**: C033531(033)**

Total Theory Periods: 40 Total Tutorial Periods:10

No. of Class tests to be conducted**: 2(Minimum)** Maximum Marks in ESE**:100**

No. of Assignments to be submitted**: One per Unit** Minimum Marks in ESE**:35**

*ESE Duration: **Three Hours***

COURSE OBJECTIVES

- Reinforce basic design concepts (e.g., pseudocode, specifications, top-down design).
- Knowledge of algorithm design strategies
- Familiarity with an assortment of important algorithms
- Ability to analyze time and space complexity

COURSE OUTCOMES

1. Apply design principles and concepts to algorithm design.
2. Have the mathematical foundation in analysis of algorithms
3. Understand different algorithmic design strategies
4. Analyze the efficiency of algorithms using time and space complexity theory

UNIT- I

Analyzing algorithms, Algorithm types, Recurrence Equations, Growth function: Asymptotic notation, Standard notation & common functions, Recurrence relation, different methods of solution of recurrence equations with examples.

UNIT-II

Introduction to Divide and Conquer paradigm, Quick and merge sorting techniques, Linear time selection algorithm, the basic divide and conquer algorithm for matrix multiplication Strassen Multiplication and, Red Black tree, Binary Search tree, heap sort, shell & bucket sort.

UNIT- III

Overview of the greedy paradigm examples of exact optimization solution (minimum cost spanning tree), Knapsack problem, Single source shortest paths. Overview, difference between dynamic programming and divide and conquer, Applications: Shortest path in graph, Matrix multiplication, Traveling salesman Problem, longest Common sequence.

UNIT-IV

Representational issues in graphs, Depth first search & Breath first search on graphs, Computation of biconnected components and strongly connected components using DFS, Topological sorting of nodes of an acyclic graph & applications, Shortest Path Algorithms, Bellman -Ford algorithm, Dijkstra's algorithm & Analysis of Dij kstra's algorithm using heaps, Floyd -Warshall's all pairs shortest path algorithm

UNIT-V

The general string problem as a finite automaton, Knuth Morris and Pratt algorithms, Linear time analysis of the KMP algorithm, The Boyer -Moore algorithm. Backtracking & Recursive backtracking, Applications of backtracking paradigm, Complexity measures, Polynomial Vs Nonpolynomial time complexity; NP - hard and NP -complete classes, examples.

TEXT BOOKS

1. Coreman, Rivest, Lisserson, : "Algorithm", PHI.
2. Basse, "Computer Algorithms: Introduction to Design & Analysis", Addision Wesley.

3. Horowitz & Sahani, "Fundamental of Computer Algorithm", Galgotia.

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Branch: Information Technology **Semester: V**

Subject: Computer Vision **Code: C033532(033)**

Total Theory Periods: 40 **Total Tutorial Periods:10**

No. of Class tests to be conducted: 2(Minimum) **Maximum Marks in ESE:100**

No. of Assignments to be submitted: One per Unit **Minimum Marks in ESE:35**

ESE Duration: Three Hours

COURSE OBJECTIVES:

- To learn and understand the fundamentals of Computer Vision techniques.
- To understand the basic techniques and issues in 3-D computer vision.
- To understand the image formation process
- To provide basic understanding of applications of Computer Vision techniques.
- To apply Computer Vision techniques to solve real world applications.

COURSE OUTCOMES:

On completion of the course, student will be able to–

1. Design and implement algorithms to perform image processing and feature extraction.
2. Design and implement algorithms for image segmentation.
3. Design and implement algorithms for representation of shape
4. Design and build a real computer vision-based system.

Unit-1 Image Formation Models

Monocular imaging system, Orthographic & Perspective Projection, Cameras – lenses, projections, sensors, Representation – color spaces, Camera model and Camera calibration, Binocular imaging systems, Sources, Shadows and Shading.

Unit-2 2D/3D Vision

Filters, Binary Images, Features, Edge Detection, Texture, Shape, Segmentation, Clustering, Model Fitting, Probabilistic Models, 3D Vision: Multi view geometry, Stereo, Shape from X, 3D data.

Unit-3 Image Processing and Feature Extraction

Image representations (continuous and discrete), Linear Filters, Texture, Edge detection. Motion Estimation: Regularization theory, Optical computation, Stereo Vision, Motion estimation, Structure from motion.

Unit-4 Shape Representation and Segmentation

Deformable curves and surfaces, Snakes and active contours, Level set representations, Fourier and wavelet descriptors, Medial representations, Multi-resolution analysis. Object recognition: Hough transforms and other simple object recognition methods, Shape correspondence and shape matching, Principal Component analysis, Shape priors for recognition

Unit-5 Latest trends in Computer Vision

Computer Vision Interaction For People With Severe Movement Restrictions, DARWIN: A Framework for Machine Learning and Computer Vision Research and Development, Computer Vision Face Tracking For Use in a Perceptual User Interface.

TEXT BOOKS:

1. R.C. Gonzalez, R.E Woods, Digital Image Processing, 3rd Edition, Pearson Education, 2008.
2. D. A. Forsyth, J. Ponce, Computer Vision: A Modern Approach, 2nd Edition, Prentice Hall, 2011
3. R. J. Schalkoff, Digital Image Processing and Computer Vision, John Wiley & Sons Australia, 1989

REFERENCE BOOKS:

1. L. Shapiro, G. Stockman, Computer Vision, Prentice-Hall, 2001
2. E. Trucco, A. Verri, Introductory Techniques for 3D Computer Vision, Prentice Hall, 1998

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Branch: Information Technology **Semester: V**

Subject: Multimedia Systems **Code: C033533(033)**

Total Theory Periods: 40 **Total Tutorial Periods:10**

No. of Class tests to be conducted: 2(Minimum) **Maximum Marks in ESE:100**

No. of Assignments to be submitted: One per Unit **Minimum Marks in ESE:35**

ESE Duration: Three Hours

COURSE OBJECTIVE:

- To understand the fundamental issues and problems in the representation, manipulation, and delivery of multimedia content particularly in a networked environment.

COURSE OUTCOMES:

1. To understand the concepts of multimedia components.
2. To understand the concepts and application of Virtual Reality System.
3. To understand the concepts and application of Augmented Reality System.

Unit I Introduction

Concept of Multimedia, media & data stream, Main properties of multimedia system, Data stream characteristics of continuous media, multimedia Applications, Hardware and software requirements, Multimedia Products & its evolution.

Unit II Components Of Multimedia

Text, Basic sound concepts, MIDI, Speech, Basic concept of Images, Graphics format, Overview of image processing, Basic concepts of Video & animation, Conventional system, Transmission, Enhanced system, High Definition system, Computer based animation, Design & authoring Tools, Categories of Authority Tools, Types of products

Unit III Data Compression

Coding requirement, Source, entropy, hybrid coding, JPEG, MPEG, Text compression using static Huffmann technique, Dynamic Huffmann Technique, Statistical coding techniques.

Unit IV Virtual Reality

Introduction to Virtual reality & Virtual reality Systems, Related Technologies: Teleoperation & augmented reality system VRML Programming, Domain Dependent Application like Medical, Visualisation Visibility computation Time Critical rendering.

Unit V Augmented Reality

Tracking for Augmented Reality, A Brief History of Augmented Reality, Mobile Augmented Reality, Augmented and Mixed Reality, Difference between Augmented Reality and Virtual Reality, Challenges with Augmented Reality.

TEXT BOOKS:

1. Multimedia System Design, Andleigh and Thakarar , PHI, 2003.
2. Multimedia Technology & Application, David Hillman, Galgotia Publications.

REFERENCE BOOKS:

1. Multimedia Computing Communication and Application, Steinmetz, Pearson Edn.
2. Virtual Reality Systems, John Vince, Pearson Education.
3. Fundamentals of Computer Graphics and Multimedia, D.P. Mukherjee, PHI
4. A Beginner's Guide to Augmented Reality with Unity at Udemy

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Branch: Information Technology **Semester: V**

Subject: Signal Processing **Code: C033534(033)**

Total Theory Periods: 40 **Total Tutorial Periods:10**

No. of Class tests to be conducted: 2(Minimum) **Maximum Marks in ESE:100**

No. of Assignments to be submitted: One per Unit **Minimum Marks in ESE:35**

ESE Duration: Three Hours

COURSE OBJECTIVES:

- To learn and understand the fundamental techniques and applications of signal processing
- To develop skills for analyzing and synthesizing algorithms and systems that process time signals, with emphasis on realization and implementation
- To learn about the IIR and FIR filter design and their representations
- To introduce multi-rate signal processing
- To know about few applications of signal processing systems

COURSE OUTCOMES:

On completion of the course, student will be able to–

1. Understand time domain to frequency domain transformations
2. Handle issues regarding designing of DSP systems
3. Understand current limits to and future priorities for, signal processing and communications.
4. Identify principles of signal processing, elaborate these principles in scientific and technological terms.
5. Apply concepts of Signal Processing in domain areas such as communications, radar, medical imaging

Unit-1 Fundamentals of Signals and Systems Basic elements of Signal Processing

Concepts of frequency in Analog and Digital Signals - sampling theorem - Discrete-time signals – systems – Analysis of discrete time LTI systems - Z transform - Convolution - Correlation.

Unit-2 Frequency Transformations Introduction to DFT

Properties of DFT - Circular Convolution - Filtering methods based on DFT - FFT Algorithms - Radix-2 - Decimation in time Algorithms - Decimation in frequency Algorithms - Use of FFT in Linear Filtering - DCT - Use and Application of DCT.

Unit-3 IIR Filter Design Structures of IIR

Analog filter design - Discrete time IIR filter from analog filter - IIR filter design by Impulse Invariance - Bilinear transformation - Approximation of derivatives (LPF - HPF - BPF - BRF) – Butterworth and Chebyshev approximation.

Unit-4 FIR Filter Design Structures of FIR

Linear phase FIR filter - Fourier Series - Filter design using windowing techniques (Rectangular Window - Hamming Window - Hanning Window) - Binary fixed point and floating point number representations - Comparison - Quantization noise - truncation and rounding - quantization noise power - input quantization error - coefficient quantization error - limit cycle oscillations - dead band - Overflow error - signal scaling.

Unit-5 Multi-Rate Signal Processing and Applications Decimator

Interpolator - Fractional Decimation - Applications - Speech processing - Image Enhancement and Image processing system. Course Outcomes Upon completion of the course, students will be able to: Perform frequency transforms for the signals, Suggest appropriate IIR and FIR filter design techniques for any given application, Predict the loss and decide on its acceptability for any application that requires digital signal processing, Appreciate and use decimators and interpolators for any given application, Apply DSP for Image and Speech processing systems.

TEXT BOOKS

1. John G. Proakis, Dimitris G. Manolakis, "Digital Signal Processing – Principles, Algorithms & Applications", Pearson Education, Prentice Hall, Fourth Edition, 2007.
2. Salivahanan, Vallavaraj and Gnanapriya, Digital Signal Processing , TMH.

REFERENCE BOOKS

1. Emmanuel C. Ifeachor, Barrie W. Jervis, "Digital Signal Processing", Second Edition, Pearson Education, 2002.
2. Sanjit K. Mitra, "Digital Signal Processing – A Computer Based Approach", Third Edition, Tata McGraw Hill, 2007.
3. A. V. Oppenheim, R. W. Schafer, J. R. Buck, "Discrete-Time Signal Processing", Eighth Indian Reprint, Pearson, 2004.
4. Andreas Antoniou, "Digital Signal Processing", Tata McGraw Hill, 2006

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Branch: Information Technology **Semester: V**

Subject: Artificial Neural Network **Code: C033535(033)**

Total Theory Periods: 40 **Total Tutorial Periods:10**

No. of Class tests to be conducted: 2(Minimum) **Maximum Marks in ESE:100**

No. of Assignments to be submitted: One per Unit **Minimum Marks in ESE:35**

ESE Duration: Three Hours

COURSE OBJECTIVE:

- To provide the student with the basic understanding of neural networks and fundamentals.
- To understand the related algorithms and Design the required and related systems.
- To cater the knowledge of Neural Networks for real time systems & Applications.

COURSE OUTCOME:

1. To provide adequate knowledge about concepts of feed forward neural networks and feedback neural networks.
2. Understanding the related algorithms and Design the required and related systems
3. Implementation of knowledge of Neural Networks in Real Time Applications.

Unit-1 Basics of Artificial Neural Networks:

Trends in Computing, Pattern & Data, Pattern Recognition Tasks, What is a neural network, The Human Brain, Characteristics of Neural Networks, Historical development of neural network principles, Terminology- Weights, Types of Activation functions, Bias, Threshold, Models of Neuron, Topology, Basic Learning Laws, Network Architectures.

Unit-2 Fundamental Models of Artificial Neural Networks:

Activation And Synaptic Dynamics - Introduction, Activation Dynamics Models, Synaptic Dynamics Models, Learning Methods, Stability and Convergence, Recall in Neural Networks McCulloch-Pitts Neuron Model, Perceptron, Learning Rules – Hebbian Learning Rule, Hebb Net, Perceptron Networks.

Unit-3 Adaline and Medaline Networks:

Introduction,Adaline – Architecture, Algorithm, Application Algorithm, Medaline-Architecture, MRI Algorithm, MRII Algorithm. Associative Memory Networks – Hetro Associative Memory Neural Networks, Auto Associative Memory Network, Bi-Directional Associative Memory.

Unit-4 Feedback Networks:

Discrete Hopfield Net – Architecture, Training Algorithm, Continuous Hopfiled Net, Feed Forward Networks – Back Propagation Network - Training Algorithm, Selection of Parameters.
Radial Basis function Network.

Unit-5 Application of Neural Networks:

Application of Neural Networks in - Bioinformatics, Image Processing & Compression, Pattern Recognition, Robotics, Forecasting

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TEXT BOOKS:

1. Introduction to Neural Networks using MATLAB 6.0 – S.N.Sivnandam, S.Sumathi, S.N.Deepa – PHI, 2003 edition.
2. Artificial Neural Networks by B.Yegnanarayana Prentice Hall of India, 2005 edition/New Edition (PHI).
3. Neural Networks and Learning Machines by Simon Haykin, 3rd Edition/New Edition, PEARSON Prentice Hall (PHI).

REFERENCE BOOKS:

1. Neural Networks by James A. Freeman and David M. Strapetuns, Prentice Hall,.
2. Neural Network Design by Hagan Demuth Deale Vikas Publication House.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the Program: **BTech** Semester: **V**
Subject: **Environmental Studies** Code: C000506(020)
Period per week (L-T-P): **(2-0-0) / Week** Non-Credit
Total Contact Hours: **40** No. of assignments to be submitted:

05

PREREQUISITE: Knowledge of basic Chemistry, Physics and Mathematics.

COURSE OBJECTIVES:

1. Basic knowledge of environment, ecology, ecosystems, biodiversity and conservation.
2. Fundamentals of natural resources, control, uses and its impact on environment.
3. Human population, growth, growing needs and its impact on society and environment.
4. Types of environmental pollution, legislations, enactment and management.

COURSE DETAILS:

UNIT I: Introduction to environmental studies, ecology and ecosystems (06 hours)

Introduction to environment; Concept and structure of ecology and ecosystem, energy flow; Community ecology; Food chains and webs; Ecological succession; Characteristic features of forest, grassland, desert and aquatic ecosystem; Multidisciplinary nature of environmental studies, scope and importance; Concept of sustainability and sustainable development.

UNIT II: Biodiversity and conservation (06 hours)

Introduction to biological diversity and levels of genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots; Threats to biodiversity, habitat loss, conflicts and biological invasions; In-situ and Ex-situ conservation of biodiversity: Ecosystem and biodiversity services.

UNIT III: Natural resources and environment (08 hours)

Concept of Renewable and non-renewable resources; Land resources, land use change, land degradation, soil erosion; Desertification; Deforestation: causes, consequences and remedial measures; Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state); Energy resources: environmental impacts of energy generation, use of alternative and nonconventional energy sources, growing energy needs.

UNIT IV: Human communities, social issues and environment (08 hours)

Basic concept of human population, growth and communities; Impacts on environment, human health, welfare and human rights; Resettlement and rehabilitation; Environmental natural disaster: floods, earthquake, cyclones, tsunami and landslides; Manmade disaster; Environmental movements; Environmental ethics: role of gender and cultures in environmental conservation; Environmental education and public awareness; Human health risks and preventive measurements.

UNIT V: Environmental pollution, policies, legislations, assessment and practices (12 hours)

Environmental pollution: Causes, effects and controls of air, water, soil, noise and marine pollution; Concept of hazardous and non-hazardous wastes, biomedical and e-wastes; Solid waste management and control measures; Climate change, global warming, ozone layer depletion, acid rain and their societal impacts; Environment laws: Wildlife Protection Act, Forest Conservation Act, Water (Prevention and control of Pollution) Act, Air (Prevention & Control of Pollution) Act, Environment Protection Act, Biodiversity Act, International agreements negotiations, protocols and practices; EIA, EMP.

On completion of each unit, students have to submit one assignment from each unit.

COURSE OUTCOMES (CO):

On completion of the course, students will able to:

1. Interpret and demonstrate the concept of ecology and ecosystem for environmental sustainability.
2. Define and establish the diversified knowledge of biodiversity and its conservation.
3. Explain the uses of natural resources efficiently and its impact on environment.
4. Illustrate and solve the simple and complex social issues relating to human communities.
5. Exemplify and make useful solution to combat the environmental degradation with the aid of national and international legislations and protocols there under.
6. Demonstrate and elucidate the complicated issues and anthropological problems for societal development.

TEXT BOOKS:

1. De, A.K., (2006).*Environmental Chemistry*, 6th Edition, New Age International, New Delhi.
2. Bharucha, E. (2013). *Textbook of Environmental Studies for Undergraduate Courses*. Universities Press.
3. Asthana, D. K. (2006).*Text Book of Environmental Studies*. S. Chand Publishing.

REFERENCE BOOKS:

1. Odum, E. P., Odum, H. T., & Andrews, J. (1971).*Fundamentals of ecology*. Philadelphia: Saunders.
2. Basu, M., Xavier, S. (2016). Fundamentals of Environmental Studies, Cambridge University Press, India.
3. Sharma, P. D., & Sharma, P. D. (2005).*Ecology and Environment*. Rastogi Publications.

OPEN SOURSE LEARNING:

http://nptel.ac.in/