Syllabus
of
B.Tech.
in
Mathematics and Computing

Department of Engineering Mathematics and Computing

Madhav Institute of Technology & Science
Gwalior-474005

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal, M.P.)

Department of Mathematics & Computing

B. Tech (Sixth Semester)

COMPUTER GRAPHICS

MAC-250601

COURSE OBJECTIVES

- To provide an introduction to the theory and practice of computer graphics.
- To give a good exposure related to Computer Graphics algorithms and to design various graphics primitives.
- To enhance the proficiency in programming skills related to animation and graphics object Design

Unit-I

Introduction to Computer Graphics: Interactive Computer Graphics, Application of Computer Graphics, Random and Raster Scan Displays, Storage Tube Graphics Display, Calligraphic Refresh Graphics Display, Flat Panel Display, Refreshing, Flickering, Interlacing, Resolution, Bit Depth, Aspect Ratio etc.

Unit-II

Scan Conversion Technique: Image representation, Line drawing: DDA, Bresenham's Algorithm. Circle Drawing: General Method, Mid- Point, DDA, Bresenham's Circle Generation Algorithm, And Ellipse Generation Algorithm, Curves: Parametric Function, Bezier Method, B-Spline Method.

Unit-III

2D & 3D Transformations: Translation, Rotation, Scaling, Reflection, Shearing, Inverse Transformation, Composite Transformation, World Coordinate System, Viewing Transformation, Representation of 3D object on Screen, Parallel and Perspective Projections.

Unit-IV

Clipping: Point clipping, Line Clipping, Simple Visibility Line Clipping Algorithm, Cohen Sutherland Line Clipping Algorithm etc., Polygon Clipping, Convex and Concave Polygon, Sutherland Hodgeman Polygon Clipping Algorithm etc., Area Filling, Hidden Surface Elimination: Z-Buffer algorithm and Painter's Algorithm.

Unit-V

Basic Illumination Models: Diffuse Reflection, Specular Reflection, Phong Shading, Gouraud Shading, and Color Models like RGB, YIQ, CMY, HSV etc., and Introduction to Digital Image Processing (DIP), Fundamental Steps and Components of DIP.

COURSE OUTCOMES

After completion of the course students will be able to:

CO1. Explain interactive Computer Graphics, various display devices and explore applications of computer graphics.
CO2. Illustrate various line generations, circle generation, curve generation and shape Generation algorithms.
CO3. Apply various 2-Dimensional and 3-Dimensional transformations and projections on Images.
CO4. Classify methods of image clipping and various algorithms for Line and Polygon clipping.
CO5. Choose appropriate filling algorithms, Hidden Surface Elimination algorithm and apply on various images.
CO6. Discuss various color models, shading methods, animation and Digital Image Processing.

RECOMMENDED BOOKS

1. Computer Graphics, Donald Hearn and M.P. Becker, PHI Publication.
2. Computer Graphics principle and Practice, FoleyVandam, Feiner, Hughes.
3. Principles of Computers Graphics, Rogers, TMH.
4. Computer Graphics, Sinha and Udai, TMH. Digital Image Processing, Gonzalez.

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NAAC Accredited with A++ Grade

Department of Mathematics and Computing

B. Tech. (Sixth Semester)
Complier Design
(MAC – 250602)

L	T	P	Total Credits
3	1	0	4

Objective of Course

- To learn finite state machines and context free grammar.
- To learn, various phases of complier.
- To understand process of complier implementation.

Unit 1:
Overview of Translation Process: Introduction to complier, Translator, Interpreter and Assembler, overview and use of Linker and Loader. Major Data Structures in Complier, Other-Issues in Complier Structure, BOOT Strapping and Porting, Complier Structures: Analysis-Synthesis Model of compilation, Various Phase of a Complier, Tool Based Approach to Complier Construction.

Unit 2:
Lexical Analysis: Input Buffering, Symbol Table, Token, Recognition of Tokens, Lexeme and Patterns, Difficulties in Lexical Analysis, Error Reporting and Implementation, Regular Grammer and Language Definition, Transition diagrams, Design of Typical Scanner using LEX.

Unit 3:
Syntax Analysis: Context Free Grammer (CFGs), Ambiguity, Basic Parsing Techniques: Top Down Parsing, Recursive Descent Parsing, Transformation on the Grammer, Predictive Parsing LL(1) Grammer, Bottom-UP Parsing, Operator Precedence Parsing , LR Parsing (SLR, CLR, LALR), Design of Typical Parser Using YACC.

Unit 4:
Semantic Analysis: Compilation of Expression, Control, Structures, Conditional Statements, Various Intermediate Code Forms, Syntax, Directed Translation, Memory Allocation and Symbol Table Organizations, Static and Dynamic Array Allocation, String Allocation, Structure Allocation, etc., Error Detection Indication and Recovery, Routines or Printing Various Lexical, Syntax and Semantic Errors.

Unit 5:
Code Generation and Code Optimization: Issues, Basic Blocks and Flow Graphs,RegisterAllocation,CodeGeneration,DAGRepresentationofPrograms,CodeGenerationfromDAGS,Peep-holeOptimization,CodeGeneratorGenerators,Specificationof Machine. Code Optimization:Source of Optimizations, Optimizationof Basic Blocks, Loops, Global Data Flow Analysis, Solution to Iterative Data FlowEquations,CodeImprovingTransformations,DealingwithAliases,DataFlowAnalysisofStructuredFlowGraphs.

Course Outcomes

After completing this course, the students will be able to:

CO's	Description of CO's
CO1	**Define**theconceptsoffiniteautomataandcontextfreegrammar
CO2	**Build**theconceptofworkingofcompiler
CO3	**Examine**variousparsingtechniquesandtheircomparison.
CO4	**Compare**variouscodegenerationandcodeoptimizationtechniques.
CO5	**Analyse**differenttoolsandtechniquesfordesigningacompiler

Recommended Books:

1. Compilers: Principles,Techniquesand Tools,V. Aho, R. Sethi and J. D. Ullman,PearsonEducation.
2. CompilerConstruction:PrinciplesandPractice,K.C.Louden,CengageLeaming.

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B. Tech. (Sixth Semester)

Artificial Intelligence & Machine Learning (AI & ML)

MAC- 250604

L	T	P	Total Credits
3	0	2	4

COURSE OBJECTIVES:

- To provide the fundamental knowledge of Artificial Intelligence, Neural Network and MachineLearning.
- To present the basic representation and reasoning paradigms used in AI &ML.
- To understand the working of techniques used in AI &ML.

Unit – I: Introducing Artificial Intelligence: Definition, Goals of AI, Task of AI, Computation, Psychology and Cognitive Science. Perception, Understanding, and Action. Artificial intelligence vs machine learning vs deep learning and other related fields. Applications of Artificial intelligence and Machine Learning in the real world.

Unit – II: Problem, Problem Space and Search: Production System, Blind Search: BFS & DFS, Heuristic Search, Hill Climbing, Best First Search

Introduction to Neural Networks: History, Biological Neuron, Artificial Neural Network, Neural Network Architectures, Classification, & Clustering

Unit – III: Introduction to Machine Learning: Traditional Programming vs Machine learning. Key Elements of Machine Learning: Representation, process (Data Collection, Data Preparation, Model selection, Model Training, Model Evaluation and Prediction), Evaluation and Optimization. Typesof Learning: Supervised, Unsupervised and reinforcement learning. Regression vs classification problems.

Unit – IV: Supervised Machine Learning: Linear regression: implementation, applications & performance parameters. Decision tree classifier, terminology, classification vs regression trees, tree creation with Gini index and information gain, IDE3 algorithms, applications and performance parameters.Random forest classifier.Case study on regression and classification for solving real world problems.

Unit –V: Unsupervised Machine Learning: Introduction, types: Partitioning, density based, DBSCAN, distribution model-based, hierarchical, Agglomerative and Divisive, Common Distance measures, K-means clustering algorithm. Case study on clustering for solving real world problems.

COURSE OUTCOMES:

After completing the course, the student will be able to:

CO1: Define basic concepts of Artificial Intelligence & Machine Learning.
CO2: Illustrate various techniques for search and processing.
CO3: Identify various types of machine learning problems and techniques.
CO4: Analysis various techniques in Artificial Intelligence, ANN & Machine Learning.
CO5: Apply AI and ML techniques to solve real world problems.
CO6: Build AI enabled intelligent systems for solving real world problems.

RECOMMENDED BOOKS:

1. Artificial Intelligence: A Modern Approach by Stuart J. Russell and Peter Norvig, PrenticeHall.
2. Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-GrawHill.
3. Introduction to AI & Expert System: Dan W. Patterson,PHI.
4. Pattern Recognition and Machine Learning, Christopher M.Bishop
5. Introduction to Machine Learning using Python: Sarah Guido
6. Machine Learning in Action: Peter Harrington