Rajiv Gandhi ProudyogikiVishwavidyalaya, Bhopal
New Scheme of Examination as per AICTE Flexible Curricula
IV Semester Bachelor of Technology (B.Tech.)
[3 D Animation & Graphics]Syllabus

BT401-MATHEMATICS-III

Course Objective: The objective of this course is to fulfill the needs of engineers to understand applications of Numerical Analysis, Transform Calculus and Statistical techniques in order to acquire mathematical knowledge and to solving wide range of practical problems appearing in different sections of science and engineering. More precisely, the objectives are:

- To introduce effective mathematical tools for the Numerical Solutions algebraic and transcendental equations.
- To enable young technocrats to acquire mathematical knowledge to understand Laplace transformation, Inverse Laplace transformation and Fourier Transform which are used in various branches of engineering.
- To acquaint the student with mathematical tools available in Statistics needed in various field of science and engineering.

Unit I Numerical Methods – 1: (8 hours): Solution of polynomial and transcendental equations – Bisection method, Newton-Raphson method and Regula-Falsi method. Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

Unit II Numerical Methods – 2: (6 hours): Numerical Differentiation, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Solution of Simultaneous Linear Algebraic Equations by Gauss's Elimination, Gauss's Jordan, Crout's methods, Jacobi's, Gauss-Seidal, and Relaxation method.,

Unit III Numerical Methods – 3: (10 hours): Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. RungeKutta method of fourth order for solving first and second order equations. Milne's and Adam's predicator-corrector methods. Partial differential equations: Finite difference solution two dimensional Laplace equation and Poission equation, Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank-Nicholson methods), Finite difference explicit method for wave equation.

Unit IV Transform Calculus: (8 hours): Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs by Laplace Transform method, Fourier transforms.

Unit V Concept of Probability: (8 hours): Probability Mass function, Probability Density Function, Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution.

Textbooks/References:

1. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.
3. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	**1 Credit**	**1 Credit**

4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2010.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
6. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.
7. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
8. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
9. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
Statistics

Course Outcomes:

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

1. Solve polynomial and transcendental equations
2. Solve Simultaneous Linear Algebraic Equations by various methods
3. Solve differential equations
4. Understand Laplace transformation, Inverse Laplace transformation and Fourier Transform
5. Use the knowledge of Probability in various applications

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	**1 Credit**	**1 Credit**

AG402- COMPUTER ARCHITECTURE

Course Objectives: The objective of this course is to enable the students to understand the basic structure and operation of computer system. Students will be able to know the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division. To study the different ways of communicating with I/O devices and standard I/O interfaces, hierarchical memory system including cache memories and virtual memory, concept of pipeline.

UnitI Computer architecture and organization, computer generations, Von Neumann model, CPU organization, Register organization, Various CPU registers, Register Transfer, Bus and Memory Transfers, Arithmetic, Logic and Shift micro-operations, Arithmetic logic shift unit

UnitII The arithmetic and logic unit, Fixed-Point representation: integer representation, signmagnitude, 1's and 2's complement and range, Integer arithmetic: negation, addition and subtraction, multiplication, division, Floating-Point representation, Floating-Point arithmetic, Hardwired micro-programmed control unit, Control memory, Micro-program sequence

UnitIII Central Processing Unit (CPU), Stack Organization, Memory Stack, Reverse Polish Notation. Instruction Formats, Zero, One, Two, Three- Address Instructions, RISC Instructions and CISC Characteristics, Addressing Modes, Modes of Transfer, Priority Interrupt, Daisy Chaining, DMA, Input-Output Processor (IOP)

UnitIV Computer memory system, Memory hierarchy, main memory: RAM, ROM chip, auxiliary and associative memory, Cache memory: associative mapping, direct mapping, setassociative mapping, write policy, cache performance, Virtual memory: address space, memory space, address mapping, paging and segmentation, TLB, page fault, effective access time, replacement algorithm

Unit V Parallel Processing, Pipelining General Consideration, Arithmetic Pipeline, and Instruction Pipeline, Vector Operations, Matrix Multiplication, and Memory Interleaving, Multiprocessors, Characteristics of Multiprocessors

Textbooks/References:

1. M. Morris Mano, "Computer System Architecture", Pearson.
2. Dr. M. Usha, T.S. Srikanth, "Computer System Architecture and Organization",Wiley India.
3. William Stallings, "Computer Organization and Architecture", Pearson.
4. V. Rajaraman, T. Radhakrishnan, "Computer Organization and Architecture", PHI.

Course Outcomes:

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

1. Understand basic structure of computer system, arithmetic operations
2. Understand hardwired and micro-programmed control units
3. Understand Instruction Formats
4. Develop the concepts of memory management, interleaving and mapping
5. Analyze the arithmetic and instructional pipelines

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	**1 Credit**	**1 Credit**

AG403-ANALYSIS & DESIGN OF ALGORITHMS

Course Objectives: The objective of this course is to enable the students to analyze various algorithms along with time and space complexities and to enable the students to design new algorithms

UnitIAlgorithms, Designing algorithms, analyzing algorithms, asymptotic notations, heap and heap sort. Introduction to divide and conquer technique, analysis, design and comparison of various algorithms based on this technique, example binary search, merge sort, quick sort, strassen's matrix multiplication

UnitIIStudy of Greedy strategy, examples of greedy method like optimal merge patterns, Huffman coding, minimum spanning trees, knapsack problem, job sequencing with deadlines, single source shortest path algorithm, etc.

Unit III Concept of dynamic programming, problems based on this approach such as 0/1 knapsack, multistage graph, reliability design, Floyd-Warshall algorithm, etc.

Unit IV Backtracking concept and its examples like 8 queen's problem, Hamiltonian cycle, Graph coloring problem etc. Introduction to branch & bound method, examples of branch and bound method like traveling salesman problem etc. Meaning of lower bound theory and its use in solving algebraic problem, introduction to parallel algorithms

Unit V Binary search trees, height balanced trees, 2-3 trees, B-trees, basic search and traversal techniques for trees and graphs (Inorder, preorder, postorder, DFS, BFS), NP-completeness

Textbooks/References:

1. Coremen Thomas, Leiserson CE, Rivest RL; Introduction to Algorithms; PHI.
2. Horowitz & Sahani; Analysis & Design of Algorithm
3. Dasgupta; algorithms; TMH
4. Ullmann; Analysis & Design of Algorithm;
5. Michael T Goodrich, Robarto Tamassia, Algorithm Design, Wiely India

Course Outcomes:
After the completion of this course, the students will be able to:
1 Implement sorting and searching algorithm
2 Experiment with techniques for obtaining maximum output with minnium efforts
3 Make use of dynamic programming for finding
4 Solve 8 queen's problem and others of the kind for application in real world scenarios .
5 Distinguish between NP hard and NP complete problems and develop their solutions

Suggested List of Experiments(expandable):
1. Write a program for Iterative and Recursive Binary Search.
2. Write a program for Merge Sort.
3. Write a program for Quick Sort.
4. Write a program for Strassen's Matrix Multiplication.
5. Write a program for optimal merge patterns.
6. Write a program for Huffman coding.
7. Write a program for minimum spanning trees using Kruskal's algorithm.
8. Write a program for minimum spanning trees using Prim's algorithm.
9. Write a program for single sources shortest path algorithm.

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
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10. Write a program for Floye-Warshal algorithm.
11. Write a program for traveling salesman problem.
12. Write a program for Hamiltonian cycle problem.

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
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AG404-COMPUTER GRAPHICS

Course Objectives: The objectives of this course is to enable the students to implement various shapes drawing algorithms and apply geometric transformations on graphic objects and also implement clipping, shading and color models

UnitIIntroduction to Raster scan displays, Storage tube displays, Pixel, Frame buffer, Vector & Character generation, Random Scan systems, Display devices, Scan Conversion techniques refreshing, flickering, interlacing, colour monitors, working of different types of printers , working principles of keyboard, mouse scanner, digitizing camera, track ball, tablets and joysticks, graphical input techniques, positioning techniques, rubber band techniques, dragging etc.

Unit II Line Drawing algorithms: simple DDA, Bresenham's Algorithm, Circle Drawing Algorithms: Midpoint Circle drawing and Bresenham's Algorithm, Polygon fill algorithm: Boundary-fill and Flood-fill algorithms.

UnitIII 2-D Transformation: Translation, Rotation, Scaling, Shearing, Reflection. Inverse Transformation, Homogeneous coordinate system, Matrices Transformation, Composite Transformation. Windowing & Clipping: World Coordinate System, Screen Coordinate System, Viewing Transformation, Line Clipping & Polygon Clipping Algorithms

UnitIV 3-D Transformations: Translation, Rotation and Scaling. Parallel & Perspective Projection: Types of Parallel & Perspective Projection, Hidden Surface elimination: Depth comparison, Back face detection algorithm, Painter's Algorithm, Z-Buffer Algorithm. Curve generation, Bezier and B-spline methods. Basic Illumination Model: Diffuse reflection, Specular reflection, Phong Shading, Gouraud shading, Ray Tracing, Color models like RGB, YIQ, CMY, HSV.

UnitV Visualization: Visualization of 2D/3D scalar fields: color mapping, ISO surfaces. Direct volume data rendering: ray-casting, transfer functions, segmentation. Visualization of Vector fields and flow data, Time-varying data, High-dimensional data: dimension reduction, parallel coordinates, Non-spatial data: multi-variate, tree/graph structured, text Perceptual and cognitive foundations, Evaluation of visualization methods, Applications of visualization, Basic Animation Techniques like traditional, key framing

Textbooks/References:

1. Donald Hearn and M.P. Becker "Computer Graphics" Pearson Pub.
2. Foley, Van Dam, Feiner, Hughes, "Computer Graphics: Principles and Practice" AddisonWesley
3. Rogers, "Procedural Elements of Computer Graphics", Tata McGraw Hill
4. Maurya, "Computer Graphics with Virtual Reality System " , Wiley India
5. Pakhira,"Computer Graphics ,Multimedia & Animation",PHI learning

Course Outcomes:

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

1. Understand the core concepts of computer graphics.
2. Implement various shapes drawing algorithms.
3. Apply geometric transformations on graphic objects and also implement clipping
4. Perform activities involved in design, development and testing of modeling, rendering, shading
5. Perform visualization tasks

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
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Suggested List of Practicals (Expandable):

1.Write a program to implement DDA line drawing algorithm
2.Write a program to implement Bresenham's line drawing algorithm.
3.Write a program to implement Bresenham's circle drawing algorithm.
4.Write a program to draw an ellipse using Bresenham's algorithm.
5.Write a program to perform various transformations on line , square & rectangle.
6.Write a program to implement Cohen Sutherland line clipping algorithm.
7.Write a program to implement Liang-Bersky line clipping algorithm.
8.Write a program to implement Cohen-Sutheland polygon clipping algorithm to clip a polygon with a Pattern.
9.Write a program to convert a color given in RGB space to it's equivalent CMY color space.

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
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AG405-DATABASE MANAGEMENT SYSTEM

Course Objectives: The objectives of this course are to enable the students to understand the file system, database concepts, ER diagrams and also to enable the Studentsto use SQL operations to manipulate the database, design and create a good database using functionaldependencies and normalization. The course provides an overview of transaction management, concurrency control and distributed database

Unit I Basic Concepts: Introduction to DBMS, File system vs DBMS, Advantages of database systems, Database System architecture, Data models, Schemas and instances, Data independence, Functions of DBA and designer, Entities and attributes, Entity types, Key attributes, Relationships, Defining the E-R diagram of database.

Unit II Relational Model: Structure of relational databases, Domains, Relations, Relational algebra – fundamental operators and syntax, relational algebra queries, Entity-Relationship model :Basic concepts, Design process, constraints, Keys, Design issues, E-R diagrams, weak entity sets, extended E-R features –generalization, specialization and aggregation

Unit IIISQL: Data definition in SQL, update statements and views in SQL: Data storage and definitions, Data retrieval queries and update statements, Query Processing & Query Optimization: Overview, measures of query cost, selection operation, sorting, join, evaluation of expressions, transformation of relational expressions, estimating statistics of expression results, evaluation plans. Case Study of ORACLE and DB2.

Unit IV Relational Database design: Functional Dependency –definition, trivial and non-trivial FD, closure of FD set, closure of attributes, irreducible set of FD, Normalization –1NF, 2NF, 3NF, Decomposition using FD-dependency preservation, lossless join, BCNF, Multi-valued dependency, 4NF, Join dependency and 5NF

Unit V Introduction of transaction, transaction processing and recovery, Concurrency control: Lock management, specialized locking techniques, concurrency control without locking, Protection and Security Introduction to: Distributed databases, Basic concepts of object oriented data base system.

Textbooks/References:

1. Korth, Silbertz, Sudarshan, “Database Concepts”, McGrawHill.
2. Elmasri, Navathe, “Fundamentals of Database Systems”, Pearson.
3. Ivan Bayross, “SQL, PL/SQL the Programming Language of Oracle”, BPB publications.
4. S. Sharma, J. Agrawal, S. Agrawal, “Advanced Database Management System”, Dreamtech Press.
5. Leon & Leon, “Fundamental of Data Base Management System”,TMH

Course Outcomes:

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

1. Analyze the physical and logical database designs and database modeling

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
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2. Understand the structure of relational databases
3. Formulate data retrieval queries in SQL and RelationalAlgebra.
4. Design a relational databaseand understand functional dependencies, normalization theory and apply such knowledge to the design of adatabase.
5. Demonstrate and explain terms like Transaction Processing, Concurrency Control and distributed database

Suggested List of Experiments:

1. To perform various SQL Commands of DDL, DML, DCL.
2. Write SQL Commands such as Insertion, deletion and updation for anyschema.
3. To execute Nested Queries, Join Queries, order-by, having clause and stringoperation.
4. To perform set operators like Union, Intersect, Minus on a set of tables.
5. To execute various commands for GROUP functions (avg, count, max, min, Sum).
6. Write a PL/SQL block for transaction application usingTriggers.
7. Write a DBMS program to prepare report for an application using function.
8. Designing of various Inputscreens/Forms.
9. Create reports using database connectivity ofFront end with back end.
10. Create database Design with normalization and implementing in anyapplication.

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
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AG406-INTRODUCTION TO MATLAB/SCILAB/WEB DESIGN

Course Objectives: To familiarize students with open source academic software like Scilab or licensed software like Matlab to carryout experiments in various fields in due course like computer graphics and multimedia, soft-computing, image processing, data mining etc. Experimental works in web design will enable students to design web pages and develop web based projects.

Introduction to MATLAB/SciLab Installing MATLAB/SciLab Under windows/linux, Basics of MATLAB programming, Data Types, Creating variables, comments, multiline comments, Array operations in MATLAB/Scilab, Loops and execution control statements, inbuilt mathematical functions, Working with files: Scripts and Functions, Plotting and program output, overview of various toolboxes, introduction to Matlab simulink.

Introduction to Web Design Introduction, Elements, Tags, Attributes, Paragraph, Headings, Line Breaks, Horizontal Rule, Lists, Formatting, Color Codes, Font, Text Links, Email, Images, Image Link, Forms, Table, Frames, Comments, Music Codes, Video Codes, Div, DHTML: Cascading Style Sheet Introduction, Types of CSS, Selectors (Tags), Class and Id with the Selectors, CSS Background & Color, CSS Text, CSS Font, CSS Border, CSS Padding.

Reference Books:

1. Fausett L.V. (2007) Applied Numerical Analysis Using MATLAB, 2nd Ed., Pearson Education
2. Chapra S.C. and Canale R.P. (2006) Numerical Methods for Engineers, 5th Ed., McGraw Hill
3. N.P. Gopalan, “Web Technology”, PHI.
4. Ivan Bayross, “HTML, JavaScript, DHTML and PHP”, BPB Publication.

Suggested List of Experiments/ program (Expandable):

1. Write your first Matlab/Scilab program.
2. Extract an individual element of an array
3. Write Matlab/Scilab program to illustrate loops and control statements.
4. Create a simple plot.
5. Name the title, axes title of the plot.
6. Create a webpage with HTML describing your department on following points: Use paragraph and list tags. Apply various colors to suitably distinguish key words. Also apply font styling like italics, underline and two other fonts to words you find appropriate. Also use header tags.
7. Create a web page using HTML for following: Create a table to show your class timetable. Use tables to provide layout to your HTML page describing your university infrastructure.

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
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BT408-CYBER SECURITY

Unit I Introduction- Introduction of Cyber Crime, Categorizing Cybercrime, Cybercrime Theory, Criminology perception of cyber criminals: hackers, computer intrusions and Attacks, Privacy, surveillance and protection, hiding crimes in cyberspace, cryptography, hacking vs cracking, privacy and security at risk in the global information society.

Unit II Application Security- Data Security, Security Technology-Firewall and VPNs, Intrusion Detection, Access Control. Security Threats -Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail Viruses, Macro Viruses, Malicious Software, Network and Denial of Services Attack, Security Threats to E-Commerce- Electronic Payment System, e- Cash, Credit/Debit Cards.

Unit III Cryptrography concepts and Techniques Plain text , cipher text, types – substitution ,transposition ,encryption, decryption , symmetric and asymmetric key cryptography algorithms, steganography .

Unit IV Security Policies- Development of Policies, WWW Policies, Email Security Policies, Policy Review Process-Corporate Policies-Sample Security Policies, Publishing and Notification Requirement of the Policies.

Unit V Information Security Standards-ISO, IT Act, Copyright Act, Patent Law, IPR. Cyber Laws in India; IT Act 2000 Provisions, Intellectual Property Law: Copy Right Law, Software License, Semiconductor Law and Patent Law. Case Study – Corporate Security , Cyber cases

References:

- Nina Godbole " Cyber Security: Wiley
- Michael E.Whitman and Herbert J Mattord "Principle of Information Security" Cengage
- William stallings "Cryptography and Network Security" PEARSON
- Charles P. Pfleeger, Shari Lawerance Pfleeger, "Analysing Computer Security", Pearson
- Education India. Vinod V. Sople, "Managing Intellectual Property" PHI Learning Private Limited
- IT Act 2000 Details www.mit.gov.in• Atul Khate, "Cryptrography and Network Security" ,TMH
- V.K.Pachghare, "Cryptography and information Security", PHI Learning Private Limited, Delhi
- CHANDER, HARISH," Cyber Laws And It Protection " , PHI Learning Private Limited ,Delhi

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
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