ITC-501 MICROPROCESSOR & INTERFACING
UNIT-I

Introduction to microprocessors, Microprocessor architecture and its operations, memory, inputs-outputs (I/Os), data transfer schemes interfacing devices, architecture, advancements of microprocessors.

UNIT-II

Architecture of 8085 microprocessor, Instruction set and Addressing modes of 8085 microprocessor, Assembly language programs of 8085 microprocessor, Stack, Subroutines, Time-Delay loops, Modular programming, Macro.

UNIT-III

8086 Microprocessor: Architecture, Register, Memory Segmentation, 8086 Memory Addressing Memory Read and Write Bus Cycle of 8086, Demultiplexing of the system Bus in 8086 and 8088 microprocessors, Instruction set and Addressing modes of 8086 microprocessor, Assembly language programs of 8086 microprocessor.

UNIT-IV

I/O and Memory Interfacing Using 8085/8086, Interrupts of 8085/8086 Microprocessors, 8259A Programmable Interrupt Controller, Programmable peripheral Interface, 8253 Programmable Counter/Interval Timer, Communication and Bus Interfacing with 8085/8086 Microprocessor, Serial Communication Interface, DMA Controller 8257, 8279-Programmable Keyboard and Display I/O Interface, Bus Interface,8089 I/O processor.

UNIT-V

8051 Microcontroller: Architecture of 8051 microcontroller, Memory organization, Timers/Counters, Interrupts, Addressing modes, 8051 Instruction set, Assembly language Programs, Applications of microcontrollers.

REFERENCES:

1. Douglas V Hall, "Microprocessors and interfacing – Programming & Hardware" TMH.
2. Gaonkar, "Microprocessor Architecture, Programming & Applications with 8085", TMH Grading System 2013 – 14.
3. Rafiquzzaman, "Microprocessors-Theory & Applications", PHI.
4. Savaliya, "8086 Programming & Advance Processor Architecture", Wiley India.
5. Ray, Bhurchandi, "Advanced Microprocessor and peripherals" TMH Pub.
6. Soumitra Kumar Mandal, "Microprocessors and Microcontroller" TMH Pub.

LIST OF EXPERIMENTS:

1. To study 8085 based microprocessor system.
2. To study 8086 based microprocessor system.
3. To develop and run a program for finding out the largest/smallest number from a given set of numbers.
4. To develop and run a program for arranging in ascending/descending order of a set of numbers.
5. To perform multiplication/division of given numbers.
6. To perform conversion of temperature from 0F to 0C and vice-versa.
7. To perform computation of square root of a given number.
8. To perform floating point mathematical operations (Addition, Subtraction, Multiplication and Division).
9. To obtain interfacing of RAM chip to 8085/8086 based system.
10. To obtain interfacing of keyboard controller.

ITC-502 COMPUTER GRAPHICS

UNIT-I

Introduction, Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices.

UNIT-II

Output primitives: Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms.

UNIT-III

2-D Geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

UNIT-IV

2-D Viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen Sutherland and Cyrus-beck line clipping algorithms, Sutherland Hodgeman polygon clipping algorithm.

UNIT-V

3-D Object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-spline curves, Bezier and B-spline surfaces. Basic illumination models, polygon rendering methods.

REFERENCES:
1. "Computer Graphics Second edition", Zhigand xiang, Roy Plastock, Schaum's outlines, Tata Mc Graw hill edition.
2. "Procedural elements for Computer Graphics", David F Rogers, Tata Mc Graw hill, 2nd edition.
3. "Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
4. "Principles of Computer Graphics", Shalini, Govil-Pai, Springer.

LIST OF EXPERIMENTS:

1. To implement Bresenham's algorithms for circle and ellipse drawing.

2. Program for Line Drawing using Bresenham"s algorithm using C and OpenGL.

3. To perform 2D Transformations such as translation, rotation, scaling, reflection and sharing.

4. To implement Cohen–Sutherland 2D clipping and window–viewport mapping.

5. To perform 3D Transformations such as translation, rotation and scaling.

6. To visualize projections of 3D images and Hidden Surface Elimination.

7. To convert between color models.

8. To implement text compression algorithm.

9. Program to implement basic graphics primitives in OpenGL.

10. Program for Line Drawing using DDA algorithm using C and OpenGL.

ITC-503 JAVA PROGRAMMING

UNIT-I

Introduction to Java: Basics of Java programming, Data types, Variables, Operators, Control structure including selection, Looping, Java methods, Overloading, Math class, Arrays in java.

UNIT-II

Objects and Classes: Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, String Buffer, File, this reference.

UNIT-III

Inheritance and Polymorphism: Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package.

UNIT-IV

Event and GUI programming: Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames. **Layout Managers:** Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing.

UNIT-V

Multithreading in java, Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try-catch-finally, Collections in java, Introduction to Java Beans and Network Programming.

REFERENCES:

1. Programming in Java, Sachin Malhotra & Saurabh Chaudhary, Oxford University Press.
2. The Complete Reference, Java.
3. (Fourth Edition), Herbert Schild, TMH.
4. Java Programming, D. S. Malik, Cengage Learning.
5. Naughton & Schildt "The Complete Reference Java 2", Tata McGraw Hill.

LIST OF EXPERIMENTS:

1. Write a Java program that displays area of different (Rectangle, Square, Triangle) using the method overloading.
2. To write a java program to print the individual digits of a 3 digit number.
3. To write a java program to read an integer and find whether the number is odd or even.
4. To write a java program find the biggest of three integers.
5. To write a java program to find the first 15 terms of Fibonacci sequence.
6. To write a java program to work with the creation of objects for the class with overloaded constructor and user defined methods returning a value.
7. To write a java program to get and sort names by command line argument.
8. To write a java program to understand the concept of functionalities of different Bitwise operators.
9. To write a java program to understand the concept of Method Overriding.
10. To write a java program to understand the steps in the creation of packages.

ITC-504(A) PRINCIPLES OF PROGRAMMING LANGUAGES
UNIT-I

Programming Language and its Implementation: Programming Language, Language categories, Language Evaluation Criteria, impacts on Language design, Programming Paradigms – Imperative, Object Oriented programming Structure, functional Programming, Logic Programming, Programming Language Implementation, Compilation process and Virtual Machines, programming environments.

UNIT-II

Data types and Statements: Overviews of Data type, category of data type, primitive and Non primitive data types, design and Implementation uses related to these types, Names, Variable, type checking, strong typing, type compatibility, named constants, variable initialization, control statement with Expressions, Conditional Statements, Loops, Exception handling.

UNIT-III

Subprograms and Blocks: Overviews of sub-programs, Lifetime and Scope of variable, static and dynamic scope, Design issues of subprograms, **parameter passing methods:** call by value, address and reference , overloaded sub-programs, Method Overriding, generic subprograms, , co-routines.

UNIT-IV

Abstract Data types: Data abstraction, level of abstraction, Abstractions and encapsulation, abstract data type, Static and Stack-Based Storage management, heap based storage management, Garbage Collection, object oriented programming in small talk, C++, Java, C#, PHP, Perl, **Concurrency:** Subprogram level concurrency, semaphores, monitors, massage passing, Java threads, C# threads.

UNIT–V

Exception Handling: Error, Type of Error, Exceptions, Type of Exception, exception Propagation, Exception handler in C++ and Java, Try, catch and throw statement, multiple catch.

REFERENCES:
1. Sebesta, "Concept of programming Language", Pearson Edu.
2. Louden, "Programming Languages: Principles & Practices", Cengage Learning.
3. Tucker, " Programming Languages: Principles and paradigms ", Tata McGraw –Hill.
4. Terrance W Pratt, "Programming Languages: Design and Implementation" Pearson Edu.

ITC-504(B) INFORMATION RETRIEVAL

UNIT-I

Introduction: Introduction -History of IR, Components of IR Issues, Open source Search engine Frameworks, The impact of the web on IR - The role of artificial intelligence (AI) in IR – IR Versus Web Search Components of a Search engine, Characterizing the web.

UNIT-II

Information Retrieval: Boolean and vector-space retrieval models Term weighting - TF-IDF weighting- cosine similarity, Preprocessing Inverted indices, efficient processing with sparse vectors, Language Model based IR, Probabilistic IR, Latent Semantic Indexing Relevance feed backand query expansion.

UNIT-III

Web Search Engine – Introduction And Crawling: Web search overview, web structure, the user, paid placement, search engine optimization/ spam. Web size measurement, search engine optimization/spam, Web Search Architectures, crawling, meta-crawlers, Focused Crawling, web indexes, Near-duplicate detection, Index Compression XMLretrieval.

UNIT-IV

Web Search – Link Analysis And Specialized Search: Link Analysis, hubs and authorities, Page Rank and HITS algorithms, Searching and Ranking, Relevance Scoring and ranking for Web, Similarity Hadoop & Map Reduce, Evaluation, Personalized search, Collaborative filtering and content-based recommendation of documents and products, handling "invisible" Web - Snippet generation, Summarization, Question Answering, Cross, Lingual Retrieval.

UNIT-V

Document Text Mining: Information filtering, organization and relevance feedback, Text Mining, Text classification and clustering, **Categorization algorithms:** naive Bayes, decision trees, and nearest neighbor, **Clustering algorithms:** agglomerative clustering, k-means, expectation maximization (EM).

REFERENCES:
1. Introduction to Information Retrieval South Asian Edition 2008 by Raghavan.
2. Modern Information Retrieval (ACM Press) Paperback – Import, 1999 by Dr Ricardo Baeza-Yates, Dr Berthier Ribeiro-Neto.

ITC-504(C) COMPUTER VISION

UNIT-I

Image formation and Image model, Components of a vision system, Cameras, camera model and camera calibration Radiometry, Light in space, Light in surface, Sources, shadows and shading.

UNIT-II

Multiple images, The Geometry of multiple views, Stereopsis Affine structure from motion, Elements of Affine Geometry Affine structure and motion from two images, Affine structure and motion from multiple images, From Affine to Euclidean images.

UNIT-III

High level vision, Geometric methods, Model based visionObtaining hypothesis by pose consistency, pose clustering and using Invariants, Verification.

UNIT-IV

Introduction to pattern and classification, supervised and unsupervised learning, Clustering Vs classification, Bayesian Decision Theory, Minimum error rate classification Classifiers, discriminant functions, decision surfaces, The normal density and discriminant, functions for the Normal density.

UNIT-V

Linear discriminant based classifiers and tree classifiers Linear discriminant function based classifiers, Perceptron Minimum Mean Squared Error (MME) method, Support Vector machine, **Decision Trees:** CART, ID3.

REFERENCES:
 1. C. M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006.
 2. R. O. Duda, P. E. Hart and D. G. Stork, Pattern Classification, John Wiley, 2001.
 3. Richard Hartley and Andrew Zisserman, Multiple View Geometry in Computer Vision, Second Edition, Cambridge University Press, 2004.
4. S. Theodoridis and K. Koutroumbas, Pattern Recognition, 4th Ed., Academic Press, 2009.

ITC-505(A) SOFTWARE ENGINEERING

UNIT-I

System Analysis and Design: Overview of System Analysis & Design, Business System Concept, System Development Life Cycle, Waterfall Model, Spiral Model, Feasibility Analysis, Technical Feasibility, Cost Benefit Analysis, COCOMO model.

UNIT-II

Design related issues: System Requirement Specification DFD, Data Dictionary, ER diagram, Process Organization & Interactions, System Design, Problem Partitioning, Top-Down And Bottom-Up design, Decision tree, decision table and structured English, Functional vs. Object Oriented approach.

UNIT-III

Coding & Documentation: Coding & Documentation, Structured Programming, OO Programming, Information Hiding, Reuse, System Documentation, Testing Levels of Testing, Integration Testing, Test case Specification, Reliability Assessment, Validation &Verification Metrics, Monitoring & Control.

UNIT-IV

Coding standard and guidelines, programming style, code sharing, code review, software components, rapid prototyping, specialization, construction, class extensions, intelligent software agents, reuse performance improvement, debugging.

UNIT-V

Software quality Assurance, Software quality factors, Quality assurance, quality metrics, Halstead's S/W Science. Software Testing, Techniques S/W testing fundamentals, White Box testing, Black box testing, Validation Testing, system Testing, debugging, software maintenance maintainability, maintenance tasks, Reverse engineering and Re engineering.

REFERENCES:

1.Roger S. Pressman –"Software Engineering", Mc.Graw Hill.
2. Rajiv mall: Software engineering".
3. Sommerville, "Software Engineering", Pearson Education.

ITC-505(B) GRAPH THEORY

UNIT-I
Introduction Graphs: Introduction, Isomorphism, Sub graphs, Walks, Paths, Circuits, Connectedness, Components, Euler graphs, Hamiltonian paths and circuits, **Trees:** Properties of Tree, Distance and centers in tree, Rooted and binary trees.

UNIT-II
Trees, Connectivity & Planarity: Spanning trees, Fundamental circuits, Spanning trees in a weighted graph, **Cut Sets:** Properties of cut set, All cut sets, Fundamental circuits and cut set, Connectivity and separability, Network flows, 1-Isomorphism, 2-Isomorphism, Combinational and geometric graphs, Planer graphs, Different representation of a Planner graph.

UNIT-III
Matrices, Colouring And Directed Graph: Chromatic number, Chromatic partitioning, Chromatic polynomial, Matching, Covering, Four color problem, Directed graphs, Types of directed graphs, Digraphs and binary relations, Directed paths and connectedness, Euler graphs.

UNIT-IV
Permutations & Combinations: Fundamental principles of counting, Permutations and combinations, Binomial theorem, combinations with repetition, Combinatorial numbers, Principle of inclusion and exclusion, Derangements, Arrangements with forbidden positions.

UNIT-V
Generating Functions: Generating functions, Partitions of integers, Exponential generating function, Summation operator, **Recurrence relations:** First order and second order, Non-homogeneous recurrence relations, Method of generating functions.

REFERENCES:
1. Clark J. and Holton D.A, "A First Look at Graph Theory", Allied Publishers, 1995.
2. Mott J.L., Kandel A. and Baker T.P. "Discrete Mathematics for Computer Scientists and Mathematicians", Prentice Hall of India, 1996.
3. Liu C.L., "Elements of Discrete Mathematics", Mc Graw Hill, 1985.
4. Rosen K.H., "Discrete Mathematics and Its Applications", Mc Graw Hill, 2007.

ITC-505(C) REAL TIME FAULT TOLERANT SYSTEMS

UNIT-I

Structure of Real Time System, Performance Measure for real time system, Task Assignments, Fault Tolerant Scheduling, Real Time Vs General purpose Data Bases, Data Bases for Hard Real Time System, Real Time Communication.

UNIT-II

Fault Tolerance, Fault-Error-Failure, Redundancy, Error Detection, Damage Confinement, Error Recovery, Fault Treatment, Fault Prevention, anticipated and unanticipated Faults, **Error models:** General coding scheme Error detection techniques, Watchdog processors, Heartbeats, consistency and capability checking, Data audits, Assertions, Control-flow checking, Error control coding. **Application:** DHCP.

UNIT-III

Fault tolerance: Coding technique fault, Tolerant self checking and fail safe circuits, Fault tolerance in combinatorial and sequential circuits, Synchronous and Asynchronous fail safe circuits, **Software fault tolerance:** Process pairs, Robust data structures, N version programming, Recovery blocks, Replica consistency & reintegration, Multithreaded programs Application, VAX. Network fault tolerance, Reliable communication protocols, Agreement protocols, Database commit protocols Application, Distributed SQL server Check pointing & Recovery Application, Micro check pointing, IRIX Checkpoints.

UNIT-IV

Experimental Evaluation: Modelling and simulation based, Fault injection based Application, NFTAPE fault injector. Modelling for performance, Dependability and perform ability, Dependability specific methods (fault trees, reliability block diagrams), Queues, Stochastic Petri nets and stochastic activity networks Application, Ultra SAN.

UNIT-V

Practical Systems for Fault Tolerance: Ad-hoc wireless network , NASA Remote Exploration & Experimentation System Architecture, Fault tolerant computers, General purpose commercial systems, Fault tolerant multiprocessor and VLSI based communication architecture. Fault tolerant software, Design-N-version programming recovery block acceptance tests-fault trees-validation of fault tolerant systems.

REFERENCES:

1. K.K.Pradhan, "Fault Tolerant computing theory and techniques" volume III. Prentice Hall,1989.
2. Krishna, Real Time System, TMH.
3. Anderson and Lee, "Fault Tolerant principles and practice" ,PHI 1989.
4. Siewert, Real Time Embeded System, Cengage Learning.
5. Rajiv Mall, Real Time System, Pearson Edu.
6. Parag K. Lala, "Fault Tolerant and Fault Testable, Hardware design" PHI 1985.

ITC-506(A) ADVANCE COMPUTER ARCHITECTURE

UNIT-I
Flynn's Classification, System Attributes to Performance, Parallel computer models - Multiprocessors and Multicomputers, Multivector and SIMD Computers. Data and resource dependences, Hardware and Software Parallelism, Program partitioning and scheduling, Grain size and latency, Control flow, Data flow and Demand driven mechanisms. Static interconnection networks, Dynamic interconnection Networks, Bus Systems, Crossbar Switch, Multiport Memory, Multistage and Combining Networks.

UNIT- II
Instruction set Architecture, CISC Scalar Processors , RISC Scalar Processors, VLIW architecture, Memory Hierarchy, Inclusion, Coherence and Locality, Memory capacity planning. Interleaved memory organization, Memory interleaving, Pipelined memory access, Bandwidth and Fault Tolerance. Backplane Bus System, Backplane bus specification, Addressing and timing protocols, Arbitration transaction and interrupt.

UNIT-III
Linear Pipeline Processor, Nonlinear Pipeline Processor, Instruction Pipeline design, Mechanisms for instruction Pipelining, Pipeline Hazards, Dynamic instruction scheduling - score boarding and Tomosulo's algorithm, Branch handling techniques, Arithmetic Pipeline Design, Static arithmetic Pipeline, Multifunctional Arithmetic Pipelines. Superscaler Pipeline design, Super Pipeline Processor Design.

UNIT-IV
Cache Coherence, Snoopy protocols, Directory based protocols. Message routing schemes in multicomputer network, Deadlock and virtual channel. Vector Processing Principles, Vector instruction types, Vector-access memory schemes. Vector supercomputer architecture, SIMD organization, Distributed memory model and shared memory model. Principles of Multithreading, Multithreading Issues and Solutions, Multiple-Context Processors.

UNIT-V
Parallel Programming Models, Shared-Variable Model, Message-Passing Model, Data-Parallel Model, Object-Oriented Model, Functional and Logic Models, Parallel Languages and Compilers, Language Features for Parallelism, Parallel Programming Environment, Software Tools and Environments.

REFERENCES:

1. Kai Hwang, "Advanced computer architecture", TMH.
2. J.P.Hayes, "computer Architecture and organization"; MGH.
3.V.Rajaranam & C.S.R.Murthy, "Parallel computer"; PHI Learning.
4. Kain,"Advance Computer Architecture: - A System Design Approach", PHI Learning India.

ITC-506(B) MULTIMEDIA

UNIT-I

Multimedia System Design: An Introduction Multimedia Elements, Multimedia Applications, Multimedia System Architecture, Evolving Technologies for Multimedia Systems, Multimedia Databases.

UNIT-II

Compression and Decompression Techniques: Types of Compression, Binary Image Compression Schemes, Color, Gray scale, Still-video image compression, Discrete Cosine Transform, Video Image compression, MPEG Coding methodology, Audio Compression, Data and File format standards- RTF, TIFF,RIFF, MIDI, JPEG, AVI, JPEG, TWAIN Architecture.

UNIT-III

Multimedia Input And Output Technologies: Key Technology Issues, Pen Input, Video and Image Display Systems, Print Output Technologies, Image Scanners, Digital Voice and Audio, Video Images and Animation, Full Motion Video.

UNIT-IV

Storage And Retrieval Technologies: Magnetic Media Technology, RAID-Level-0 To 5, Optical Media, WORM optical drives, Hierarchical Storage Management, Cache Management for storage systems.

UNIT-V

Multimedia Application Design: Types of Multimedia systems, Virtual Reality Design, Components of Multimedia syste, Distributed Application Design Issues, Multimedia Authoring and User Interface, Hypermedia Messaging, Distributed Multimedia Systems.

REFERENCES:

1. Andleigh PK and Thakrar K, "Multimedia Systems", Addison Wesley Longman, 1999.
2. Fred Halsall, "Multimedia Communications", Addison Wesley, 2000.
3. Ralf Steinmetz, Klara Nahrstedt, "Multimedia, computing, communications and applications", Prentice Hall, 1995.
4. Tay Vaughan, "Multimedia making It work", TMH 5th Edition 2001.
5. Weixel, Fulton, Barksdale.Morse, "Multimedia Basics", Easwar Press 2004.

ITC-506(C) INFORMATION THEORY & CODING

UNIT-I
Uncertainty, Information and Entropy Information Measures, Characteristics on information measure, Shannon's concept of information, Shannon's measure of information, Model for source coding theorem, Communication system, Source coding and line/channel coding, channel mutual information capacity (Bandwidth).

UNIT-II
Channel coding, Theorem for discrete memory less channel, Information capacity theorem: Error detecting and error correcting codes, Types of codes, Block codes, Tree codes, Hamming Codes, Description of linear block codes by matrices, Description of linear tree code by matrices, Parity check codes, Parity check polynomials.

UNIT-III
Compression: Lossless and lossy, Huffman codes, Binary Image compression schemes, Run length Encoding, CCITT group-3 1D compression, CCITT group-3 2D compression, CCITT group-4 2D compression.

UNIT-IV
Video Image Compression: Requirement of full motion video compression, CCITT H 261 video coding algorithm, MPEG compression methodology, MPEG-2 compression, Audio (Speech)compression.

UNIT-V
Cryptography: Encryption, Decryption, Cryptogram (cipher text), Concept of cipher, Cryptanalysis, Keys: Single key (Secret key), Cryptography, two-key (Public key) cryptography, Single key cryptography, Ciphers, Block Cipher code, Stream ciphers, Requirements for secrecy, The data Encryption Standard, Public Key Cryptography, Diffie- Hellmann public key distribution, The Rivest- Shamin Adelman(R-S-A) system for public key cryptography, Digital Signature.

REFERENCES:

1. Rajan Bose "Information Theory, Coding and Cryptography", TMH, 2002.
2. G A Jones J M Jones, "Information and Coding Theory", Springer Verlag, 2004.
3. Cole, "Network Security", Bible, Wiley INDIA, Second Addition.
4. K Sayood, "Introduction to Data Compression" 3/e, Elsevier 2006.