

## 19-200-0401 Complex Variables and Partial Differential Equations

### **Module I**

Analytic function, Cauchy Riemann equation (Cartesian and polar)  
Harmonic function construction of analytic function given real or imaginary parts, Conformal mapping of standard elementary function and bilinear transformation.

### **Module II**

Cauchy's integral theorem, Cauchy's integral formula and for derivatives Taylor's and Laurent's expansion (without proof)  
Singularities Residues Cauchy's Residues theorem, Contour integration involving unit circle.

### **Module III**

Formation of partial differential equation eliminating arbitrary constants and function, Solution of first order equation four standard types, Lagrange's equation, Linear homogeneous partial differential equation with constant coefficient.

### **Module IV**

One dimensional wave equation, D'Alembert's solution and one dimensional heat flow equation, solution by the method of separation of variables, application of Fourier series solution. Solution of Laplace's equation over a rectangular region by the method of separation of variables

## 19-204-0402 Data Communication and Networking

### **Module I**

Introduction –Data Communications, Networks, The Internet, Protocols and Standards. Network Models, ISO/OSI Reference Model, TCP/IP Reference Model.

Physical Layer and Media:, Data and Signals: Analog and Digital, Transmission Impairments, Data Rate Limits, Performance, Digital

to Digital Conversion, Analog to Digital Conversion, Digital to Analog Conversion, Analog to Analog Conversion.

### **Module II**

Data Link Layer: Error Detection And Correction Types of Errors, Redundancy, Detection Vs Correction, Forward Error Correction Vs Retransmission, Block coding, Cyclic Codes, CRC, Polynomials, Checksum.

Data Link Control: Framing, Flow and Error Control, Protocols, Noiseless and Noisy channel, Point to Point Protocols. Wired LANs Ethernet, Wireless LANs IEEE 802.11, Bluetooth

### **Module III**

Introduction to Network Layer Logical Addressing, Internet Protocol, IPV4, IPV6, Address Mapping, Routing Algorithms – Distance Vector Routing, Link State Routing. Unicast Routing Protocols.

### **Module IV**

Transport Layer: Process to Process Delivery– Port Addressing, TCP & UDP Segment Format, TCP Connection, Congestion Control and Quality of service.

Application Layer Services: Domain Name System, Electronic Mail, File transfer, WWW & HTTP, Network Management: SNMP.

## **19-204-0403 Operating Systems**

### **Module I**

Introduction to Operating Systems: Operating system concepts, System calls, Operating System Structure. Processes: Process Concept, Process Scheduling, Inter process Communication; Process Synchronization: Race Conditions, Critical Sections, Mutual Exclusion, Busy Waiting, Sleep And Wakeup Semaphores. CPU Scheduling: Scheduling Criteria, Scheduling Algorithms: First come First Served, Shortest Job First, Priority scheduling, Round Robin Scheduling, Multiple queues scheduling, Guaranteed scheduling, Two level scheduling.

### **Module II**

Memory management. Multiprogramming and memory usage, Swapping, multiprogramming with fixed and variable partitions, Memory management with bitmaps, linked lists, Buddy system, Allocation of swap space. Virtual memory: paging and page tables, Associative memory, Inverted page tables; Page replacement algorithms, Segmentation.

### **Module III**

Deadlock: Conditions for deadlock, Deadlock Characterization, Methods for handling deadlock, Deadlock prevention, Deadlock avoidance: resource trajectories, safe and unsafe state, Banker's algorithm. Deadlock detection and recovery, Two phase locking, Non resource deadlocks, Starvation.

### **Module IV**

File systems and Input/output: Files, Directories, File system implementation, Directory Implementation, Security and Protection mechanisms. Principles of I/O hardware, I/O devices, Device controllers, DMA. Principles of I/O software, Interrupt handlers, Device drivers, Disk scheduling, Clocks and terminals. I/O Buffering, RAID, Disk Cache.

Real time Operating Systems: Introduction, Types of RTOS, Characteristics, Functions, Applications of Real Time Systems Scheduling in RTOS, Resource allocation in RTOS, Other issues in RTOS. Case Study: UNIX / LINUX operating system.

## **19-204-0404 Software Engineering**

### **Module I**

Software Engineering: Definition, The Evolution of Software Engineering, Software Process, Agile process Extreme programming.

Software Life Cycle: Waterfall model, Prototyping, Spiral model pros and cons of each model. Requirements analysis and specification: Levels of requirements; Requirements characteristics; Eliciting requirements, sources and techniques; Req. Documentation, IEEE format of SRS; Requirements validation.

### **Module II**

Software Design: Design concepts: Design principles (information hiding, cohesion, and coupling), Interactions between design and requirements.

Design strategies: Function oriented design, Object oriented design, Data structure centered design, Aspect oriented design. Architectural design: Architectural styles, patterns, and frameworks. Human computer Interaction design: General HCI design principles, Design modalities, Coding techniques and visual design, Localization and internationalization, Interface modalities, Psychology of HCI. Detailed design: Design patterns, Database design, Design notations, UML Diagrams.

### **Module III**

Software Quality Management: Definitions of quality, The costs and impacts of bad quality, Quality attributes for software. Software Quality Assurance: Elements of SQA, SQA Tasks. Quality Standards: Six Sigma in SE , ISO9000 and CMM.

Software Testing: Objectives of testing Functional(Black box) and Structural(White box) testing, Generation of test data, Test Plan, Unit testing Integration testing, Validation testing, System testing, Test reporting.

Software configuration management: Revision control, Release management, Configuration management tools, Software configuration management processes, Maintenance issues, Distribution and backup.

### **Module IV**

Software Project Management: Planning, Organizing, Staffing, Directing and Controlling. Software Project Cost Estimation: LOC and FP Based Estimation, COCOMO. Software Project Scheduling: Basic Principles, Task Network, Gantt chart, Program Evaluation and Review Technique (PERT) and the Critical Path Method (CPM). Evolution Processes: Working with legacy systems, Refactoring.

Risk Management: Reactive and Proactive Risk Strategies, Software Risk, Seven Principles of Risk Management, RMMM Plan

## **19-204-0405 Internet Programming**

### **Module I**

Fundamentals of Web: Internet, WWW, W3C, Web 2.0, web servers.

HTML 5: Basic syntax, Standard document structure, Basic text mark up, Images, Hypertext Links, Lists, Tables, Forms, Frames.

–XML, HTML Vs. XML Creating XML documents –

XML: Structuring data, XML namespaces, DTD, XML Schema.

### **Module II**

JavaScript: Overview of JavaScript, Screen output and keyboard input, Input with Dialogs, Memory concepts, operators, decision making, control statements, counter controlled repetition, Arrays, Functions, objects, events. Document Object Model (DOM): DOM nodes and trees, DOM tree, DOM Collections, dynamic styles.

### **Module III**

PHP: PHP basics, string processing, regular expressions, Handling HTML form with PHP, connecting to database, using cookies, dynamic content.

**Module IV**

Introduction to AJAX Programming, PHP with AJAX, working with Database. Ruby on Rails: Ruby introduction, Rails framework, Database driven web application

**19-204-0406 Object Oriented Programming in C++****Module I**

Procedure oriented programming, Object oriented programming paradigm, Basic concepts of object oriented programming, Benefits of OOP –console I/O operations formatted and unformatted –managing output with manipulators. Functions in C++:call and return by reference, inline functions, default arguments, const arguments function overloading –friend functions.

**Module II**

Classes and objects, Specifying a class, Defining member functions, Memory allocation for objects Static data members, Static member functions, Arrays of objects, const member functions Constructors and Destructors: Constructors: default, parameterised, with default arguments, copy constructor, destructors, operator overloading: overloading unary operators, overloading binary operators, overloading binary operators using friends, manipulation of strings using operators, Type conversions: basic to class, class to basic, class to class.

**Module III**

Inheritance: Defining derived classes, Single inheritance, Multilevel inheritance, multiple inheritance, Hierarchical inheritance, Hybrid inheritance virtual base classes, Abstract classes Constructors in derived classes ,pointers, pointers to objects, this pointer, pointers to derived classes, virtual functions, pure virtual functions.

**Module IV**

Working with files: classes for fstream operations, opening and closing of file, detecting end of file, file modes, file pointers and manipulators, sequential input and output operations, random access, Templates, Exception handling, Manipulating strings