

### **BCA 301 (Numerical Methods and Statistical Techniques Numerical Methods)**

Numerical methods versus numerical analysis, Errors and Measure of Errors.

Non-linear Equations, Iterative solutions, multiple roots and other difficulties, interpolation methods, BI-section, false position methods, Newton Raphson-Methods.

Simultaneous Solutions of Equations, Gauss elimination Methods, Gauss Jordan methods, Gauss Siedel methods.

Interpolations and curve fitting, lagrangian polynomials, Newton's methods: Forward Difference methods, Backward Difference methods, Divided difference methods.

Numerical Integration: Trapezoidal Rule, Simpson 1/3 Rule Simpson's 3/8 Rule.

Numerical Differentiation by polynomial Fit.

#### **Statistical techniques:**

Measure of central tendency, Preparing frequency distribution table. Mean, arithmetic mean, Harmonic Mean. Median, mode.

Measure of dispersion, skewness and kurtosis Ranges, Mean deviation. Standard deviation, co-efficiency of variation, Moments, skewness, kurtosis.

Correlation.

Regression linear; Regression.

Least square fit linear trend, Non-linear trend.

$$Y=ax^b; \quad Y=ax^x; \quad Y=ae^x$$
$$\text{Polynomial fit: } Y=a+bx+cx^2$$

### **BCA 302 (Fundamental Concepts of Operating Systems)**

Operating systems overview: Computer System Structure, operating systems structure, OS functions, facilities; Processes: introduction, concurrency, inter process communication, classical problems, process scheduling, Memory management: swapping, virtual memory segmentation. File systems: files, directories, file system implementation, security, and protection mechanism. Input/output: principles of input/output hardware and software, disks, clocks, terminals. Deadlocks: introduction, detection, recovery, and prevention; Coordinated Case Study of Unix and Windows.

### **BCA 303 (Introduction to Object Programming using C++)**

#### **OOP**

Programming methodologies: concepts of structured and object oriented programming; advantage of OOP methodologies, characteristics of OOP languages: objects, classes, Data Abstraction, Encapsulation, inheritance, reusability, polymorphism and operator overloading, function overloading;

#### **Programming in C++**

Data types, constants, expressions and statements, Arrays Strings, function overloading, functions, friend functions, in line functions. Constructors and destructors, derived classes, friend classes, operator overloading, support for data abstraction, derived class, base class, pointers and arrays, pointers and functions, support for OOP.

## **BCA 304 (System Programming Concepts & Design)**

Mathematical preliminaries, sets, relations and functions, graphs and trees, strings, theory of automata, DFA, NFA, acceptability of a string by finite automata, minimization of finite automata, applications of finite automata-lexical analysis, text editors etc. Introduction to formal languages-regular grammars, context free grammar, context sensitive grammar. Evolution of the Components of a Programming System, compilers, Assemblers, loaders Absolute loader, relocating loader, direct linkage loader, linkers, Macros, Variety of software tools, Text editors, Interpreters and program generators Debug Monitor.

Compilers: Basic concepts, compilers and interpreters, pass of a compilers, phases-lexical phase, syntax phase. Semantic analysis phase, parser, top down, bottom up parsing, translation schemes, type analysis and type checking, code generation phase and optimization, Symbol table management, error handling.

## **BCA 305 (System Analysis and Design)**

### **UNIT I: OVERVIEW**

#### **The Systems Concept**

##### **Characteristics of a system**

Organization, interaction, interdependence, integration, central objective.

##### **Elements of a system**

Output and Input, Processor, Control, Feedback, Environment, Boundaries and interfaces

##### **Categories of information system**

- Transaction Processing System
- Management Information System
- Decision Support System
- Real Time System
- Distributed System

##### **Data and information**

- Strategic information
- Tactical information
- Operational information

### **UNIT II: INFORMATION SYSTEMS ANALYSIS OVERVIEW**

#### **The role and task of system analyst**

##### **Attributes of a system analyst**

##### **System Development Life Cycle**

Requirement Determination, Requirements Specification, Feasibility analysis, Final Specification, Hardware Study, System Design, System implementation, System evaluation, System modification

## **UNIT III: SYSTEM ANALYSIS**

### **System Planning**

**Fact Finding Techniques-** Interview, Questionnaire, Record Review, Observation

#### **Tools for Structured Analysis**

- Data Flow Diagram
- Data Dictionary
- Decision Tree
- Structured English
- Decision Table
- Entity Relationship Diagram

## **UNIT IV: SYSTEM DESIGN**

### **Structured Chart**

#### **Input/ Output Design**

- Inputting and validating input data
- Coding Techniques
- Interactive data input
- Objectives of output design
- Design of reports and screens
- Use of business graphics

#### **File Organization and Database Design**

- Sequential
- Indexed
- Hashed
- Normalization

## **UNIT V: SYSTEM IMPLEMENTATION**

Coding Testing and implementation

Software maintenance

Project management techniques

**Text:** Analysis and Design of Information Systems: V Rajaraman

**Reference:** System Analysis and Design: Elias M. Awad