

## **401: Computer Networks-I**

**No. of Credits : 5 (3L + 2T + 0L)**

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### **Objectives:**

The main objective is to introduce Computer Networks in a simple language to all undergraduate students, regardless of their specialization. It will help students in understanding of various types of computer networks, technologies behind networks and application protocols, e-mail and communication protocols will be introduced to students through this subject.

It will help them to pursue specialized programs leading to technical and professional careers and certifications in the Networking and Communication Industry.

### **Learning Outcomes:**

After completing this course, students will be able to:

- Administer and maintain a computer network.
- Demonstrate basic understanding of network principles.

Demonstrate understanding of how computers communicate with each other and the methods employed to assure that the communication is reliable.

### **Pre-requisites:**

This course assumes students have basic knowledge of Computer.

### **Reference Books:**

- 1) Data Communications & Networking, Behrouz A. Ferouzan (4th Edition)
  - 2) Computer Network, Andrew S. Tenenbaum(4<sup>th</sup> Edition)
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### **Unit I: Basics of Computer Network**

Fundamental of Transmission and Communication:- Signals and their properties, Mode of Communication, Computer Network : Definition, Goals, Advantages, Applications and structure. Network topology, Types of Network, Various Switching Techniques with their advantages and disadvantages.

## **Unit II: Computer Network Model:**

Introduction of layered architecture of Computer Network, OSI reference model: Layer wise functionality, various terminology associated with OSI Model. Internet Model: TCP/IP, comparison between OSI and ICP/IP Model.

## **Unit III: Transmission Media and Connecting Devices:**

Classes of Transmission Media, Guided or wired Media: Coaxial Cable, Twisted Pair, Optical Fiber. Unguided or wireless media: - Radio Waves, Infra-Red, Micro-Wave, Satellite, Light wave, unguided media (Wireless), Electromagnetic Spectrum for Wireless Communication

## **402: Software Testing**

**No. of Credits : 5 (3L+2T+0L)**

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### **Objectives:**

The primary goal of software testing is to reduce risk and acquire knowledge of software testing process using various techniques to improve the quality of software.

### **Learning Outcomes:**

After completing this course, students will be able to:

- a) Describe the software development V-Model, its critical activities, and where software testing and quality assurance fits in that process.
- b) Describe the purposes of software testing and quality assurance.
- c) Describe the generic test process and identify the inputs and outputs of each activity in the process.
- d) Identify and describe several testing techniques.
- e) Understand Use Case requirements and apply suitable techniques to derive a set of test cases from them.

### **Pre-requisites:**

This course assumes students have these skills:

- Basic knowledge of software concepts.
- Basic understanding of the roles within a software development team, such as the role of the Project Manager, System Analyst and Programmer.

### **Reference Books:**

- 1) Software Testing by Renu Rajani and Pradeep Oak
  - 2) Software Engineering by Roger S. Pressman
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### **Unit I: Introduction to Software Concepts:**

Introduction, Definition and Characteristics of Software, Importance of Software, Software types, Software components, Members involved in software development, Overview of SDLC.

### **Unit II: Introduction to Testing:**

What is testing, Importance of Testing. Testing goals and characteristics, Testing during planning stage, Testing during design stage, Testing during coding stage.

### **Unit III: Software Testing Lifecycle:**

Overview of STLC, Principles of Verification and Validation, Techniques of verification (review, inspections, walkthroughs),

V testing model

- a) Software development V & V
- b) Software acquisition V & V
- c) Software supply V & V

### **Unit IV: Software Testing Process:**

Testing process: a) Plan b) Develop c) Execute d) Manage  
Conventional Software Architectures.

### **Unit V: Software Testing Strategies:**

Test strategies for conventional software

- a) Unit Testing
- b) Integration Testing
  - i) Top-Down Integration
  - ii) Bottom-Up Integration
  - iii) Regression Testing
  - iv) Smoke Testing
  - v) Integration test documents
- c) Validation Testing
  - a. Test Criteria
  - b. Configuration Review
  - c. Alpha and Beta Testing
- d) System Testing
  - i) Recovery Testing
  - ii) Security Testing
  - iii) Stress Testing
  - iv) Performance Testing

Difference between Testing and Debugging, The Art of Debugging a) Debugging Process b) Debugging strategies c) Correcting the Error.

### **Unit VI: Software Testing Techniques:**

Overview of Black-Box and White-Box Testing, Methods of White-box Testing:

- a) Basis Path Testing
  - i) Flow Graph Notation
  - ii) Independent Program Paths
  - iii) Deriving Test Cases
  - iv) Graph Matrices

- b) Control Structure Testing
  - i) Conditional Testing
  - ii) Data Flow Testing
  - iii) Loop Testing
    - Simple Loops
    - Nested Loops
    - Concatenated Loop

Methods of Black-Box Testing:

- a) Graph Based Testing
- b) Equivalence Partitioning
- c) Boundary Value Analysis
- d) Orthogonal Array Testing

Testing of client/server Architectures, Testing Documentation and Help Facilities,

Testing for Real-Time Systems:

- a) Task Testing
- b) Behavioral Testing
- c) Intertask Testing
- d) System Testing

Testing Patterns:

- a) Pair Testing
- b) Separate Test Interface
- c) Scenario Testing

### **Unit VII: Risk Management:**

Introduction and Characteristics of Risks, Role of Testing in Risk Management,

Types of Risks:

- a) Project Risks
- b) Technical Risks
- c) Business Risks
- d) Predictable Risks
- e) Unpredictable Risks

### **Unit –IV : Wireless Networks**

Wireless Transmission : Radio Waves, Infra-Red, Micro-Wave,

Wireless LANs(IEEE802.11) Architecture : MAC Sub layer, Frame Format, Frame Types

Bluetooth : Architecture, (Piconet, Scatternet, Bluetooth layers), Applications

## **Unit –V : Network Connecting Devices**

Hubs (Passive and Active) , Repeaters, Bridges(Transparent Bridges, Spanning Tree Bridges, Source Routing Bridges), Switches (2-Layer Switch, 3-Layer Switch) , Gateways, Network Security Devices(firewalls, Proxy Server)

## **Unit VI: Local Area Network**

**Wired LANs:** Components, Network Adapter, Network Interface Card, Ethernet: Basic Features, Ethernet Types, Ethernet Cable, Ethernet Topologies, IEEE Standards: IEEE 802.3 (CSMA/CD), IEEE 802.4 (Token Bus), IEEE 802.5 (Token Ring).

**Wireless LANs:** Architecture of IEEE802.11- MAC Sub layer, Frame Format, Frame Types, Services

**Bluetooth:** Architecture- Pico net, Scatter net, Bluetooth Layers, Applications of Bluetooth Network.

## **Unit VII: Internet Basics:**

Concept of Intranet & Extranet, Internet Information Server (IIS), World Wide Web (WWW), Web Documents, Search Engines, Internet Service Providers(ISP), E-Mail.

## **403: Java Programming**

**No. of credits: 05 (3L+2T+0L)**

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**Objectives :** The objective of this paper is to make the students familiar with Object Oriented Programming Principles using JAVA. At the end of this course, students will be able to understand the most basic concepts of Java programming.

### **Learning Outcomes :**

At the end of the course a student should be able to -

- (a) understand the most basic aspects of Java features.
- (b) Basic programs through Java.

**Pre-requisites:** Object Oriented Language

### **Reference Books:**

1. E. Balgurusamy Programming with Java , Tata McGra-Hill, Third Edition, 2008.
  2. The Complete Reference Java2 Tata McGraw-Hall.
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### **UNIT I: Fundamentals of Java**

Basics of Java, History of Java, Features of Java, Comparison between java and C++, Java program structure ,JVM (Java Virtual Machine), Java byte code, compilation and Execution, Data types in Java,

Variables: Declaring, dynamic initialization & Scope, Type conversion

Operators: Arithmetic operators, Relational Operators, Logical Operators ,Conditional Operators

Assignment Operators, Bitwise Operators, Special operators.

Command line arguments.

### **UNIT II: Control Structures**

If, if-else, Nesting of if-else , Else-if ladder, switch statement

Loops: while, do, for statement

### **Unit-III**

Defining a Class, Fields declaration, Methods Declaration , Creating Objects, Accessing Class Members , constructors- default constructors, parameterized , constructor, Method overloading, this keyword, garbage collection, finalize() method.

### **UNIT-IV: Inheritance**

Concept of inheritance and implementation, single versus multiple inheritance.

method overriding, keywords: super and final, Extending a class

Interfaces- definition, user defined interfaces and their applications, implementing an interface, extending interfaces, Abstract classes, abstract methods.

### **UNIT –V: Exception Handling**

Types of errors, Overview of exception handling, using try and catch blocks, multiple catch blocks, nested try blocks, throwing exception (throw statement), throws keyword, finally keyword.

### **UNIT-VI: Packages**

Concept of package, Java API Packages , System packages , Naming Conventions, Creating, Accessing and Using a Package.

### **UNIT VII: Applet Programming**

Introduction to applet, Applet Vs Application, applet life cycle, building applet code, creating applet, Applet tag, adding applet to HTML file, Running applet.



## **404 : STATISTICS**

**No. of credits: 04 (2L+2T+0L)**

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### **Objectives:**

The main objective is to introduce basic concepts of statistics to the students.

### **Learning Outcomes:**

After completing this course, students will be able to understand the basic concepts of statistics like types of data, tabulation, classification, measures of central tendency, measures of dispersion, correlation and regression analysis.

### **Pre-requisites:**

This course assumes students have basic knowledge of statistics.

### **Reference Books:**

- 1) Fundamentals of Statistics , S.C. Gupta , Himalaya Publishing House (5th Edition)
  - 2) Business Statistics , S.P. Gupta, M.P. Gupta –Sultan Chand & Sons, New Delhi (16<sup>th</sup> Edition)
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### **Unit 1: Introduction to Statistical Methods :**

- 1.1 Definition of Statistics, Importance of Statistics,
- 1.2 Scope of statistics : Economics, Computer Science, Business and Management, etc., limitations of Statistics .

### **Unit 2: Collection and Organization of Data:**

- 2.1 Sources of Data : Primary and Secondary, Discrete and Continuous variables
- 2.2 Construction of frequency distribution, cumulative frequency distribution.
- 2.3 Graphical representation of frequency distribution : Histogram, frequency polygon
- 2.4 Diagrammatic representation : Simple bar, subdivided bar, pie diagram.

### **Unit 3: Measures of Central Tendency :**

3.1 Concept of central tendency, good measures of central tendency

3.2 Arithmetic mean : Definition, formula and computing for grouped and ungrouped data, merits and demerits.

3.3 Median : Definition, formula and computing for grouped and ungrouped data, merits and demerits.

3.4 Mode : Definition, formula and computing for grouped and ungrouped data, merits and demerits.

### **Unit 4: Measures of Dispersion :**

4.1 Concept of dispersion, Absolute and relative measure of dispersion,

4.2 Range, Average deviation, Standard deviation , variance, coefficient of variation.

### **Unit 5: Correlation :**

5.1 Concept of correlation, types of correlation,

5.2 Methods of studying correlation : Karl Pearson's coefficient, Rank coefficient

5.3 Properties of correlation coefficient

### **Unit 6: Regression Analysis**

6.1 Linear regression model, regression lines, Y on X and X on Y.

6.2 Regression coefficients, properties of Regression coefficients

6.3 Estimation of unknown values to find regression coefficient and correlation coefficient from lines of regression

6.4 correlation vs. regression analysis.

### **Unit 7: Analysis of Time series:**

7.1 Component of time series, measure of trends, moving average and least square.

**BCA -SEMESTER – IV**  
**405: JAVA PROGRAMMING**  
**PRACTICAL QUESTIONS:**

1. Write a java application program to display hello message.
2. Write a java program to accept a number from command line and check whether it is even or odd.
3. Write a java program to accept a number from command line and Calculate its factorial.
4. Develop a java application for displaying prime numbers between 1 to 50.
5. Develop an interface shape containing method 'area()' and implement it to other classes like Rectangle, Circle.
6. Develop a class student to store roll number, name and total marks. Use constructor to intialize values. Also provide parameterised constructor for the class.
7. Develop a class that handles ArithmeticException.
8. Write a java program to show effective use of finally block.
9. Develop a class that Throws IOException.
10. Create an abstract class 'Oval' by using interface. Inherit this Oval class to NewOval for implementation. [Hint: Oval class implements shape interface but doesn't give code for area(), Extend oval class and create NewOval that provides code for area()]

**Semester: IV**

**406: Minor Project-III**

**No. of Credits: 2(L: 0, T:2, P:4)**

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**Objective:** The objective of this course is to develop skills to solve a problem which requires more efforts than laboratory experiment; this also demands that students has to work in a group and distribute work to solve problem. Finally student document work as dissertation and evaluated it by panel of examiner. Examiner expected to evaluate on their work by testing the functionality of project and content of dissertation along with judging contribution of individual.

## **407: General Course IV Aptitude-I**

**No. of Credits : 2 (2L+0T+0L)**

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### **Objectives:**

The main objective is to introduce Quantitative Aptitude to all undergraduate students. It will help students in understanding of basic aptitude concepts .

### **Learning Outcomes:**

After completing this course, students will be able to appear for competitive examination.

### **Pre-requisites:**

This course assumes students have basic knowledge of mathematics.

### **Reference Books:**

1. Quantitative Aptitude and reasoning- R.V. Pravin-PHI
  2. Quantitative Aptitude for Competitive Examination-Abhijit Guha-McGraw Hill Education Series.
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**Unit I :** HCF and LCM

**Unit II :** Decimal Fractions

**Unit III :** Permutation and Combination

**Unit IV :** Ratio and Proportion

**Unit V :** Percentage

**Unit VI :** Profit and Loss

**Unit VII :** Simple and Compound interest