

### **Computer Network & Communication**

- The OSI model and TCP/IP protocol suite.
- TCP / IP Network layer.
- IPv4 addressing
- Delivery and Forwarding of IP packets.
- IP v4
- Address Resolution Protocol ARP
- Internet Control Message Protocol ICMP

**Ref1:** "TCP/IP Protocol Suite" by Behrouze

### **Artificial Intelligence Techniques**

- Search algorithms & methods
  - Blind Search
  - Heuristic Search
- Knowledge representation
  - Logic representation
  - Production representation
  - Network representation
  - Functional representation
- Expert systems

**Ref1:** "Artificial Intelligence, structures and strategies for complex problem solving", By: George Luger & William Stubblefield

## **Operating System**

- 1- Operating system structure
- 2- Processes
- 3- Threads
- 4- Process synchronization
- 5- Cpu scheduling
- 6- Deadlocks
- 7- Memory management and virtual memory

### **Ref1: "Operating System Concepts"**

By Abraham silberschatz, Peter bear galvin, Greg gagne. 9<sup>th</sup> ed., 2013

## **Microprocessor**

- 1- Software architecture of 8088 and 8086
- 2- Assembly language programming
- 3- Control flow instructions
- 4- The 8088 and 8086 microprocessor and their memory and input/output interfaces
- 5- Interrupt interfaces

### **Ref1: "The 8088 and 8086 Microprocessors, programming, interfacing, software, hardware, & application", By Trieble & singh, 4<sup>th</sup> ed., 2003**

## **Computer Architecture**

- 1- Top level view of computer function and interaction
- 2- Cache memory
- 3- Internal memory and external technology
- 4- Input/output
- 5- Addressing modes
- 6- Processor structure and function
- 7- Control unit
- 8- Microprogrammed control

### **Ref1: "Computer organization and architecture designing for performance"**

By William Stallings, 8<sup>th</sup> ed., 2010

### **Information Security**

- Classical Encryption Techniques
- Modern Encryption Techniques
  - Symmetric
  - Asymmetric
- Modular Arithmetic
- Introduction to Number Theory
- Diffie-Hellman Key Exchange
- Principles of Hash Function and Digital Signature
- Principles of Information Hiding

**Ref1:** "Cryptography and Network Security: Principles and Practice" (2<sup>nd</sup> Ed.), William Stallings, Prentice-Hall, Inc., 1999.

### **Information Technology / Image Processing Techniques**

- Introduction
- Image fundamentals
- Image transformation
- Image enhancement
- Image compression

**Ref1:** "Digital Image Processing" by Rafael Gonzale

**Information Technology / Data Base**

- Normalization
- Data Manipulation Language and Data Definition
- Distributed Database Management System Design
- Relational Algebra for Query Optimization
- Transaction Processing Systems
- Controlling Concurrency
- Failure and Recovery

SQL

**Ref1: "Principles of Distributed Database System"**

By M. Tame OZSU, 3<sup>rd</sup> ed., 2011

**Information Technology /**

**Object Oriented Programming**

- Issues with Procedure Oriented Programming
- Basic of Object Oriented Programming (OOP)
- Procedure Oriented versus Object Oriented Programming
- Concept of Object Oriented Programming
- Object
- Class
- Abstraction
- Encapsulation
- Inheritance
- Polymorphism

**Ref1: "Thinking in C# "**

**Ref2: "C# : How to Program"**