Salahaddin University- Erbil

College of Science

Department of Computer Science and Information Technology

Subjects for Qualification Exam (2023-2024)

MSc. Level

No.	Modules
1.	C++ Programming
2.	Network and Communication
3.	Database System
4-	Information Security
5-	IT Fundamentals

Topics:

1.	C++ Programming

1- Data Definition Structures:

1. Data Types and structures
2. Variables Declaration and Namespace
3. Conditional and Iteration Statement.
4. Functions.

2- Data structure:

- *Arrays*
- *Stacks*
- *Queues*
- *Linked lists*
- *Trees*

2.	Network

1- Network Models:

1. TCP/IP Model
2. OSI Model
3. Network Protocols

2- Routing Protocols and IP Addressing:

1. IPv4 and IPv6
2. Subnetting & VLSM
3. Routing Process
4. Routing Protocols: RIP & OSPF.
5. EIGRP routing

References:

1- Data communications and networking / Behrouz A. Forouzan
2-Networking Basics, Patrick Ciccarelli

3.	Database System

1. Review of basic relational Concepts
2. Database Model Entity-Relational model
3. ER model of Hierarchy entity type
4. Transforming Database model to ER Model
5. Transforming ER diagram into Relation model
6. Specialization
7. Generalization
8. Aggregation
9. Terminologies Related to Normalization
10. DD & FD diagram
11. Dependencies (Multi value, Partial, Transitive)
12. Normalization
13- Relation Algebra & Calculus

References

1- Er.RAJIV CHOPPA ' Database management system'. First Edition 2010
2- Ramez Elmasri and Shamkant b. Navathe ,"Fundamental of Database Systems", Addison Wesley , 6th ed. p.c. ,2010

4.	Information Security

- **Introduction to Information Security**
  - Principles of information security
  - Risk management
  - Different types of threats to information security
- **Cryptography**
  - Classical encryption and decryption methods

- Modern encryption and decryption methods
- Symmetric and asymmetric encryption
- Digital signatures
- Hash functions
- Key management

❖ **Network Security**

- Secure network protocols
- Firewalls
- Intrusion detection
- prevention systems

❖ **System Security**

- Securing operating systems
- Authentication
- Authorization

❖ **Access Control**

- Authentication methods
- Two factor Authentication.
- Biometrics Application Security

❖ **Image Security**

- Concept of image security
- Steganography
- Watermarking
- Image security applications

❖ **Web Security**

- Web application security
- Common web vulnerabilities
- Web-based attacks.

References

- Stallings,W., "Cryptography and Network Security, Principles and Practice", Pearson International Edition, 7th Ed. 2017.
- "Adopting Biometric Technology: Challenges and Solutions", 2016, Ravendra Das, Taylor and Francis Group, LLC.
- Joseph Migga Kizza, "Guide to Computer Network Security", Springer London Heidelberg New York Dordrecht, 2nd edition, 2013
- Stallings,W., "Network Security Essentials, Applications and Standards", Prentice-Hall,4th Ed. 2011

5.	IT Fundamentals

1- **Information Technology (IT)**
2- **The Internet, the Web, and Electronic Commerce**
3- **Application Software**
4- **System Software**
5- **The System Unit**
6- **Input and Output**
7- **Secondary Storage**
8- **Privacy, Security, and Ethics**

Computing Essentials 2019
McGraw Hill; 27th edition (January 25, 2018)
by Timothy O'Leary (Author), Linda O'Leary (Author), Daniel O'Leary (Author)

1 Information Technology

1. information system: people, procedures, software, hardware, data, and the Internet.
2. Distinguish between system software and application software.
3. Differentiate between the three kinds of system software programs.
4. Define and compare general-purpose, specialized, and mobile applications.
5. the four types of computers and the five types of personal computers.
6. the different types of computer hardware, including the system unit, input, output, storage, and communication devices.
7. Define data and document, worksheet, database, and presentation files.
8. computer connectivity, the wireless revolution, the Internet, cloud computing, and IoT.

2 The Internet, the Web, and Electronic Commerce

1. the origins of the Internet and the web.
2. how to access the web using providers and browsers

3. Compare different web utilities including filters, file transfer utilities, and Internet security suites
4. Compare different Internet communications, including social networking blogs, microblogs, webcasts, podcasts, wikis, e-mail, text messaging, and instant messaging
5. search tools, including search engines and specialized search engines
6. the accuracy of information presented on the web
7. electronic commerce, including B2C, C2C, B2B, and security issues
8. cloud computing, including the three-way interaction of clients, Internet, and service providers
9. the Internet of Things (IoT) and the continuing development of the Internet to allow everyday objects to send and receive data

3 Application Software

1. general-purpose applications.
2. word processors, spreadsheets, presentation programs, and database management systems.
3. specialized applications, such as graphics, web authoring, and video game development programs.
4. mobile apps and app stores.
5. software suites.
6. office suites, cloud suites, specialized suites, and utility suites.

4 System Software

1. the differences between system software and application software.
2. the four types of system software programs.
3. the basic functions, features, and categories of operating systems.
4. Compare mobile operating systems iOS, Android, and Windows 10 Mobile.
5. Compare desktop operating systems, including Windows, MacOS, UNIX, Linux, and virtualization.
6. the purpose of utilities and utility suites.
7. the five most essential utilities.
8. Windows utility programs

5 The System Unit

1. Differentiate between the five basic types of system units.
2. system boards, including sockets, slots, and bus lines.
3. Recognize different microprocessors, including microprocessor chips and specialty processors.
4. Compare different types of computer memory, including RAM, ROM, and flash memory.
5. expansion slots and cards.
6. bus lines, bus widths, and expansion buses.
7. ports, including standard and specialized ports.
8. power supplies for desktop, laptop, tablet, and mobile devices.
9. how a computer can represent numbers and encode characters electronically.

6 Input and Output

1. Define input.
2. keyboard entry, including types and features of keyboards.
3. different pointing devices, including game controllers and styluses.
4. scanning devices, including optical scanners, RFID readers, and recognition devices.
5. Recognize image capturing and audio-input devices.
6. Define output.
7. different monitor features and types, including flat-panels and e-books.
8. Define printing features and types, including inkjet and cloud printers.
9. Recognize different audio and video devices, including portable media devices.
10. Define combination input and output devices, including multifunctional devices, VR head-mounted displays and controllers, drones, and robots.
11. ergonomics and ways to minimize physical damage.

7 Secondary Storage

1. Distinguish between primary and secondary storage.
2. the important characteristics of secondary storage, including media, capacity, storage devices, and access speed.
3. hard-disk platters, tracks, sectors, cylinders, and head crashes.
4. Compare internal and external hard drives.

5. Compare performance enhancements, including disk caching, RAID, file compression, and file decompression.
6. Define optical storage, including compact discs, digital versatile discs, and Blu-ray discs.
7. Define solid-state storage, including solid-state drives, flash memory cards, and USB drives.
8. Define cloud storage and cloud storage services.
9. mass storage, mass storage devices, enterprise storage systems, and storage area networks.

8- **Privacy, Security, and Ethics**

1. the impact of large databases, private networks, the Internet, and the web on privacy.
2. online identity and major laws on privacy.
3. cybercrimes including identity theft, Internet scams, data manipulation, ransomware, and denial of service.
4. social engineering and malicious software, including crackers, malware, viruses, worms, and Trojan horses.
5. malicious hardware, including zombies, botnets, rogue Wi-Fi networks, and infected USB flash drives.
6. Detail ways to protect computer security including restricting access, encrypting data, anticipating disasters, and preventing data loss.
7. computer ethics including copyright law, software piracy, digital rights management, the Digital Millennium Copyright Act, as well as plagiarism and ways to plagiarism.