

- All questions are self-explanatory and require no further explanation during exam time.
- Make sure to sign the attendance sheet before leaving the examination room.
- Return the question paper along with the answer sheet.

(CLO-1: Explain the basic computing models and its related hardware)

- Q# 1. Explain the Von Neumann architecture in computer systems. Provide details about its components and how they interact with each other. Additionally, discuss the significance of the Von Neumann architecture in modern computing. [3 Marks]
- Q# 2. Explain the instruction execution cycle performed by the machine when processing an instruction. Include the stages involved and describe how each stage contributes to the overall process. How much time would it take if two instructions get executed using 5-stage pipelining and three without pipelining, given that each stage takes 0.5 nanoseconds? [3 Marks]
- Q# 3. Describe two factors contributing to the better speed of SSD as compared to HDD. [2 Marks]

(CLO-2: Work out with different number systems and codes)

- Q# 4. A company selling wireless routers assigns a unique alpha-numeric service tag to their routers which consists of digits (0-9) and upper-case letters (A, B). When you call their technical support, they would like to know the service tag number. One way to automate this is to have you type in your service tag number. Since there is no convenient way to uniquely type alphabets on a standard telephone keypad, the company also gives you an express code, which is a decimal number calculated from the service tag. The calculation algorithm is simple: the service tag is treated as a base-12 number, where A=10, B=11. Given a wireless router has a service tag: A93B84, find the express code that corresponds to this service tag. Show all your steps. [3 Marks]
- Q# 5. Subtract $(5752740022)_{10}$ from $(10F9AB38)_{16}$. Since both the numbers are represented in different numbering systems, convert any one of them to match the numbering system of other and perform the subtraction. Show all your steps to get the credit. [2 Marks]
- Q# 6. Convert $(4532.766)_{10}$ into decimal. [2 Marks]

(CLO-3: Describe the fundamental concepts of ICT domains)

- Q#7. A university is implementing a new online learning platform that requires robust networking infrastructure. The platform will host live lectures, provide access to course materials, and allow for collaboration among students and faculty. The university's existing network struggles with bandwidth and connectivity during peak usage times, particularly in lecture halls and hostels. [2+1+2=5 Marks]
- a) Discuss the advantages of utilizing a campus-wide LAN (Local Area Network) and that of integrating a WLAN (Wireless Local Area Network).
- b) What network topology would be ideal for the university's lecture halls to ensure minimal downtime and optimal performance during live lectures?
- c) Given the demands of streaming lectures and real-time collaboration, what data transmission characteristics should be prioritized? How might they affect the user's experience?
- Q#8. Identify and explain three key strategies or technologies that can help organizations safeguard against threats to users, hardware, and data. *encryption, firewall,* [2 Marks]
- Q#9. A logistics company is debating whether to move from its current file-based storage system to a DBMS for tracking shipments, drivers, and customer orders. [3 Marks]
- a) Describe the main advantages the logistics company would gain by adopting a DBMS.
- b) What potential disadvantages or challenges could the company face with the implementation of a DBMS?