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| DHA SUFFA UNIVERSITYdha_suffa_logo  Department of Computer Science  Final Semester Examination - Spring-2023  **COURSE TITLE:** Software Design & Architecture **COURSE CODE: SE-2430**  Class/Section: SE-4A/4B Time Allowed: 3 Hours  Course Instructor: Syed Saad Luqman Max Marks: 40  Date: 12-07-2023 Moderated by: \_\_\_\_\_\_\_\_\_\_\_\_  Student’s Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Reg. No: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**Instructions:** Answer all questions in the given sequence and to the point**.**

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| **Question 1: [2+2+4+2] Marks**   1. Describe the concept of scalability within the context of software systems and explain the two methods used to scale an application. 2. What is meant by application latency and network latency, and what are the factors that can lead to higher latency in both the application and network domains? 3. Identify and discuss various aspects of a web application that can act as scalability bottlenecks, negatively impacting the scalability of the application. 4. Briefly define different strategies and techniques that can be utilized while designing a scalable system to effectively address and mitigate database bottlenecks.   **Question 2: [2+3+3+2] Marks**     1. What are the common reasons for system failures, and why is availability crucial in online services 2. Which architecture is best suited for designing a highly available and fault-tolerant system, and provide a justification for your selection? 3. Differentiate between Active-Passive and Active-Active High Availability (HA) modes, and include illustrations to compare the two. 4. What is high availability clustering, and how does it contribute to ensuring system reliability and uptime?   **Question 3: [3+3+2+2] Marks**     1. Illustrate the concepts of forward proxy and reverse proxy using diagram, and describe the benefits associated with each proxy type. 2. What is the role of load balancers in enabling scalability and availability of applications, and what are the various load balancing algorithms used to distribute the workload. 3. What are the benefits of using containers over virtual machines, and list out the key contents included within a Docker image. 4. What are the UI design principle you need to keep in mind while designing a graphical user interface.   **Question 4: [2+2+4+2] Marks**     1. Describe CAP Theorum and differentiate between eventual consistency and strong consistency using a real-world use case. 2. How is a secure communication channel established between client and server. 3. What are the different aspects of security to account for while building a large scale application. 4. Define the following software vulnerabilities and provide preventive measures to mitigate them.    1. SQL Injection    2. Cross Site Scripting |

**---------------------------------------- GOOD LUCK ----------------------------------------**