



VIT
Vellore Institute of Technology

Final Assessment Test – April 2025

Course: BCSE313L - Fundamentals of Fog and Edge Computing

Class NBR(s): 1566/1570/1577/1599/1602/6625

Slot: F1+TF1

Time: Three Hours

Max. Marks: 100

- KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE
➤ DON'T WRITE ANYTHING ON THE QUESTION PAPER

Answer ALL Questions

(10 X 10 = 100 Marks)

1. Elaborate the opportunities and challenges in the context of fog edge eco system and map the opportunities and challenges in the prescribed tabular format.

S.No.	Mention Opportunities or Challenges in this column	Mention Description No. in this column
1		
2		
3		
4		
5		

Description No.

- Creating and maintaining OOBEE-based software is costly unless a unified standard for FEC-compatible hardware is established.
- Current edge platforms lack end-to-end support across all layers of edge networks.
- Open platforms like OpenStack++, WSO2-IoT Server for FEC are in early stages with limited deployment support.
- Minimizing latency during runtime adjustments, especially in dynamic outdoor environments.
- Use or develop abstract models to define resource requirements and interactions for FEC servers.

2. In the context of Integrating C2F2T concepts, Analyse and identify the Modelling techniques, metrics, and key findings/objectives for each of the following application.

Applications:

- Energy Consumption of Devices in Cloud-IoT Context
- Crowdsensing in Smart Traffic
- Smart Living Spaces with Cloud Access
- Wearable IoT for Healthcare
- Fault Tolerance

3. Illustrate the Seven-layer security model architecture for Internet of Vehicles with neat diagram.
4. Analyze the following scenarios in terms of optimization problems, solutions and considerations.

Scenario 1: video streaming service

Scenario 2: Computation Offloading in Mobile Edge Computing

Provide a brief justification for your choice using diversity of optimization problems.

5. In the bustling city of Mumbai, the local government is facing severe traffic congestion issues, affecting daily commutes, causing pollution, and slowing down emergency services. To address these challenges, Mumbai's Municipal Corporation has decided to implement based on fog computing middleware for traffic management system. This initiative aims to optimize traffic flow, reduce congestion, and improve overall transportation efficiency, making Mumbai a model smart city. Design a Fog Computing using middleware technologies for smart traffic management system that utilizes real-time sensor data (traffic flow, accidents, and weather) to dynamically adjust traffic lights and provide route recommendations to drivers.
6. Use a numerical example to demonstrate how predictive analytics for healthcare data using ML can be applied in fog nodes?
7. In the dynamic city of Hyderabad, ensuring public safety and security has become a top priority for the local government amidst rapid urbanization and increasing population density. To enhance surveillance and security, the Hyderabad Municipal Corporation has decided to implement an IoT-based surveillance system with Edge Computing. This initiative aims to monitor public spaces effectively, deter criminal activities, human detection and improve emergency response times, making Hyderabad a model smart city for public safety and security. Design architecture for IoT-Based surveillance system using Edge Computing. Justify your recommendations by highlighting the challenges and benefits of your design.
8. Elucidate optimization opportunities along the fog architecture and write brief note on different layers of fog architectures and its applications.
9. a) Match the correct answer in the design goals for fog and edge computing middleware

Middleware	Usecase
Ad-Hoc Device Discovery	drone monitoring system
Run-Time Execution	fitness app
Minimal Task Disruption	smart agriculture system
Overhead of Operational Parameters	connected vehicle system
Context-Aware Adaptive Design	smart traffic system

OR

9. b) Imagine you have a smart thermostat in your home that automatically adjusts the room temperature based on your preferences, weather conditions, and room occupancy. Assess and elaborate any six middleware technologies required for the given application in context to fog and edge computing. Justify why cloud computing is not sufficient for smart thermostat.

10. a) In the vibrant city of Bengaluru, known as the Silicon Valley of India, the local government is aiming to enhance its health care infrastructure by leveraging IoT-Based System with Fog Computing. With a growing population and increasing health care demands, Bengaluru's Municipal Corporation has embarked on a mission to implement an IoT-Based System with Fog Computing based health care management system. This initiative aims to improve health care delivery, enhance patient management, and make Bengaluru a model smart city. Design architecture for IoT-Based System with Fog Computing in health care management. Justify your recommendations by highlighting the features and benefits of your design.

OR

10. b) In the industrial city of Delhi, air pollution has become a significant public health concern, impacting the daily lives of its residents. To tackle this pressing issue, the Delhi Municipal Corporation has decided to implement an IoT-based air pollution monitoring system. This initiative aims to monitor air quality in real-time using sensors, identify pollution sources, and implement effective control measures, making Delhi a model smart city for environmental health. Design architecture for IoT-Based air pollution monitoring system using Fog Computing. Justify your recommendations by highlighting the features and benefits of your design.

===== F/E/TY =====