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Vellore Institute of Technology

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Reg. No. :

Final Assessment Test (FAT) - May 2024

Programme	B.Tech.	Semester	WINTER SEMESTER 2023 - 24
Course Title	DESIGN OF SMART CITIES	Course Code	BCSE316L
Faculty Name	Prof. Gayathri R	Slot	E2+TE2
		Class Nbr	CH2023240501903
Time	3 Hours	Max. Marks	100

General Instructions:

- Write only Register Number in the Question Paper where space is provided (right-side at the top) & do not write any other details.

Answer all questions (10 X 10 Marks = 100 Marks)

01. Designing a smart city from scratch in a rapidly expanding urban area is the target decided by City Planning Commission. The task given is to overcome the complexities of smart city design by incorporating the latest trends in urban development. The city aims to leverage advanced technologies to enhance livability, sustainability, and economic prosperity. Elaborate the various complexities associated in smart city design and explore solutions to address the same through technological advancements. [10]

02. Consider you are designing a smart city to enhance benefits for supporting the growing population of India. The mission given is to utilize principles of urban planning and data organization to design a futuristic urban environment that enhances the quality of life for residents, address health-care related needs, providing emergency services and connecting to doctor's available in remote locations on-demand. [10]

a) Illustrate how would you efficiently plan the city's layout and infrastructure to meet out the above requirement using urban planning principles and data analysis. (5 Marks)

b) When promoting sustainability, deliberate your approach to design eco- friendly monitoring procedure to track the health status of elderly patients in the given location through the implementation of data organization techniques. (5 Marks)

03. Assume that you are leading a team of urban planners in the development of a smart city project called GreenScape. GreenScape aims to integrate cutting-edge technology to enhance decision-making processes, improve cohesion among various stakeholders, and maximize the efficiency of urban services. [10]

a) Illustrate how would you make decisions to prioritize initiatives and allocate resources effectively while ensuring they align with sustainability goals. (5 Marks)

b) Discuss strategies for fostering cohesion among different departments, agencies, and community groups involved in the development and implementation of GreenScape. (5 Marks)

04. In the bustling city of Greentown, local authorities are committed to understanding the environmental impact of its residents to promote eco-friendly living. They've devised a system to assess environmental footprints based on lifestyle choices such as transportation, waste [10]

management, and energy consumption. Consider the following scenario:

Residents in Greentown are categorized into three groups based on their lifestyles:

- Nature Lover: Owns a large SUV, takes two long-distance trips annually by plane, minimally recycles, and consumes 500 kWh of electricity monthly.
- Urbanite: Owns a compact car, takes one short flight annually for leisure, minimally recycles, and consumes 300 kWh of electricity monthly.
- Eco-conscious Citizen: Utilizes public transportation or bikes, avoids air travel, actively recycles, and consumes 150 kWh of electricity monthly.

a) Determine the environmental footprint for each resident category in Greentown, taking into account their lifestyle. (3 Marks)

b) Explore how fostering community engagement and unity can motivate residents to embrace sustainable habits. (4 Marks)

c) Propose several initiatives to encourage recycling and waste reduction, particularly among residents with higher environmental footprints. (3 Marks)

05. In the city of Techopolis, where advanced technology powers daily life, security issues pose a significant challenge to its smart city infrastructure. One major concern is the threat of hackers targeting the city's transportation system, energy grid, and surveillance systems. [10]

a) Explore the security strategy to address threats to the city's transportation system, energy grid, and surveillance systems. Also, provide technological measures to protect critical infrastructure from any known cyber-attack of your choice. (6 Marks)

b) Illustrate the various community engagement initiatives to raise awareness about cybersecurity risks. (4 Marks)

06. Analyze the vulnerabilities present in smart city scenarios and outline their potential impacts along with solutions to prevent future occurrences. Identify the security attacks corresponding to the given statements and develop mitigation strategies for each. [10]

a) Investigate the susceptibility of smart water supply networks in a smart city setting to cyberattacks aimed at tampering with water quality data. Evaluate the potential impacts of such breaches and devise comprehensive approaches to enhance the security and integrity of water supply infrastructure in future urban developments. (6 Marks)

b) Illustrate the vulnerability of smart street surveillance systems in smart city environments to cyberattacks aimed at manipulating or disabling security cameras. (4 Marks)

07. In Futura City, authorities are striving to evolve into a modern smart city. However, they face challenges in financing the development and establishing effective governance for smart initiatives. [10]

a) As the mayor of Futura City, outline the challenges in financing smart city projects. Discuss alternative funding sources and strategies for financial sustainability. (6 Marks)

b) Elucidate the importance of governance in Futura smart city transformation. Identify governance challenges and propose solutions to ensure transparent and effective management of smart technologies. (4 Marks)

08. In an aging manufacturing plant, management seeks to ensure both structural integrity and process efficiency. They plan to implement structural health monitoring (SHM) and process control measures. [10]

a) As the engineering manager, discuss the challenges and considerations in implementing SHM. Elaborate the types of sensors and monitoring strategies to detect structural issues early. (6 Marks)

b) Discuss the importance of process control and stabilization in improving manufacturing efficiency. (4 Marks)

09. In Metroville, city officials are considering implementing Internet of Vehicles (IoV) technology to address traffic congestion and enhance road safety. However, they face security concerns and must consider perspectives on integrating IoV with existing Intelligent Transport Systems (ITS). [10]

a) Discuss the importance and potential applications of IoV in improving transportation in Metroville. Highlight its benefits and how it could optimize traffic flow and increase safety. (4 Marks)

b) Illustrate the security challenges associated with implementing IoV in Metroville and propose strategies to address cyber threats and protect data privacy in IoV systems. (6 Marks)

10. In the vibrant city of Techville, stakeholders like government agencies, urban planners, universities, city developers, and communities use ICT and data analytics for urban development. As part of their urban planning course, students investigate how these groups utilize technology for decision-making and collaboration. [10]

a) Explore how different stakeholders in Techville use ICT and data analytics for decision-making and collaboration in city planning and governance. (4 Marks)

b) Discuss the role of government agencies and urban planners in utilizing ICT and data analytics for urban development in Techville. (6 Marks)