JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2025

B.Tech- BI (IT Minor) VII Semester

COURSE CODE (CREDITS): 25B1WCI731 (2) MAX. MARKS: 25

COURSE NAME: BUILDING IOT AND NETWORK APPLICATIONS

COURSE INSTRUCTORS: SKP MAX. TIME: 1 Hour 30 Min

Note: *(a) All questions are compulsory.*
(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems.

Q.No	Question	CO	Marks
Q1	*A household has multiple IoT devices sharing the same WiFi network, including: Smart TVs streaming video Security cameras uploading footage Smart thermostats and voice assistants During peak hours, the network slows down, and some security camera alerts are delayed.* a) Identify the potential causes of ***network congestion*** in this scenario. b) Propose how ***QoS mechanisms*** could ensure that critical security alerts are transmitted reliably without affecting video streaming.	2	4
Q2	*A company deploys hundreds of IoT sensors across a large factory to monitor temperature, humidity, and machine status. All sensors need to send data to multiple monitoring dashboards, a central analytics server, and occasionally trigger alert notifications. The system must handle sudden bursts of sensor updates without losing critical information.* a) Explain how the ***MQTT publish-subscribe model*** can be used to manage communication between sensors, dashboards, and servers in this scenario. b) Compare this approach to traditional client-server communication. How does MQTT improve ***scalability*** and ***reliability*** in a high-density IoT network?	3	4
Q3.	*A smart city deploys hundreds of IoT devices, including:* *Traffic sensors to monitor vehicle flow Weather stations to report temperature, humidity, and wind Pollution sensors to track air quality All devices send data to a central city management system for real-time monitoring and analytics. The network must handle thousands of messages per minute, with some data being critical (traffic light control) and some non-critical (pollution reports).* a) Explain how the choice of communication protocol affects the ***performance, reliability, and scalability*** of the smart city IoT system. b) Suggest appropriate protocols for ***critical and non-critical*** data streams, justifying your choices.	3	4

Q4.	*A company deploys IoT sensors in remote forests to monitor environmental parameters like temperature, humidity, and soil moisture. Sensors transmit data over a low-bandwidth wireless network to a central server for analysis. Some sensor readings are critical for fire detection, while others are used for general research.* a) Compare the ***trade-offs*** of using ***TCP Vs. UDP*** for transmitting sensor data in this IoT network. b) Which protocol would you recommend for ***critical vs. non-critical data***, and why?	1	4
Q5.	*A company deploys an IoT-based industrial monitoring system. Sensors continuously measure machine temperature and vibration to detect potential failures. The system must respond immediately to critical anomalies to prevent equipment damage.* ***a)*** Analyze how ***real-time operating systems (RTOS)*** enhance the reliability of IoT systems compared to ***general-purpose operating systems (GPOS).*** b) Give a specific ***example*** illustrating this improvement.	2	5
Q6.	*A smart agriculture system uses battery-powered sensors in remote fields to measure soil moisture, temperature, and humidity. The sensors need to send periodic data to a cloud server. Network bandwidth is limited, and devices must operate for months without battery replacement.* a) Compare ***CoAP and HTTP*** protocols in terms of suitability for constrained IoT devices. b) Explain why ***CoAP*** is often preferred for battery-operated sensors.	2	4

***** Best of luck *****