

Reg. No.

Question Paper Code

13064

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024

Sixth Semester

Electrical and Electronics Engineering

20EEEL608 - INDUSTRIAL DATA COMMUNICATION

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 Marks)

Answer ALL Questions

Marks *K – Level* CO

1. Which model categorizes applications into layers such as One, Two, Three, or N-Tier models?
(a) ISO OSI Model (b) IEEE 802 Model (c) Application Model (d) Internet Model
1 K1 CO1
2. List the primary purpose of error coding in data communication
(a) To increase the data transfer speed (b) To reduce data size
(c) To detect and correct errors during data transmission (d) To encrypt data for security
1 K1 CO1
3. Which protocol layer model is often referred to as the "Internet Model"?
(a) OSI Model (b) IEEE 802 Model (c) TCP/IP Model (d) Application Mode
1 K1 CO1
4. In the ISO OSI model, which layer is responsible for end-to-end communication and error handling?
(a) Physical Layer (b) Transport Layer (c) Data Link Layer (d) Network Layer
1 K1 CO1
5. In LAN infrastructure, which component operates as a central device in a star topology to facilitate communication between connected devices?
(a) Router (b) Hub or Switch (c) Repeater (d) Bridge
1 K1 CO2
6. Which TIA/EIA standard is most commonly used for serial communication in PCs for short-distance communication?
(a) TIA/EIA-568 (b) TIA/EIA-232 (c) IEEE 802.3 (d) ISO 9000
1 K1 CO2
7. Which of the following is a function of the Logical Link Control (LL(C) layer in the IEEE 802 LAN model?
(a) Provides flow control and error checking (b) Manages physical media access
(c) Encodes data for transmission (d) Determines data routing
1 K1 CO2
8. In the IEEE 802 LAN Model, which sublayer is responsible for controlling the access to the physical transmission medium?
(a) Logical Link Control (LL(C) (b) Media Access Control (MA(C)
(c) Physical Layer (d) Data Link Layer
1 K1 CO3
9. Which industrial network is specifically designed to handle real-time communication requirements and is widely used in distributed control systems?
(a) MODBUS (b) TCP/IP (c) Foundation Fieldbus (d) HTTP
1 K1 CO3
10. Which device is primarily used in industrial networks to control machinery, processes, and other systems using programmed instructions?
(a) Router (b) Process Automation Controller
(c) Programmable Logic Controller (PL(C) (d) Gateway
1 K1 CO3
11. In industrial networking, which communication standard is known for high-speed data transfer and integration of both factory automation and process automation systems?
(a) PROFIBUS (b) MODBUS (c) Foundation Fieldbus (d) PROFINET
1 K1 CO3
12. Which network protocol is widely used in industrial networks to allow digital communication with analog signals in process automation?
(a) HART (b) Ethernet (c) HTTP (d) TCP/IP
1 K1 CO3

- | | | | |
|--|---|----|-----|
| 13. In wireless SCADA systems, which type of infrastructure is commonly used to communicate with remote sites like power generating stations? | 1 | K1 | CO4 |
| (a) Optical fiber cables (b) Wi-Fi only | | | |
| (c) Cellular networks and satellite communication (d) Ethernet cables | | | |
| 14. Which of the following is a common security measure used in SCADA communications to protect against unauthorized access? | 1 | K1 | CO4 |
| (a) Encryption (b) Open Access | | | |
| (c) Plaintext data transmission (d) Direct device control without authentication | | | |
| 15. In a power distribution system, SCADA applications primarily help in which of the following functions? | 1 | K1 | CO4 |
| (a) Predicting market trends | | | |
| (b) Real-time monitoring and control of electrical distribution | | | |
| (c) Automating office tasks | | | |
| (d) Data encryption for secure transmission | | | |
| 16. Which protocol is commonly used in SCADA systems for serial communication in industrial networks? | 1 | K1 | CO4 |
| (a) HTTP (b) Modbus RTU (c) FTP (d) SNMP | | | |
| 17. Wireless HART is primarily used in which type of network applications? | 1 | K1 | CO5 |
| (a) Consumer IoT devices (b) Industrial automation and process control | | | |
| (c) Office networks (d) Vehicle-to-vehicle communication | | | |
| 18. In a sensor network, which factor primarily affects the energy consumption of sensor nodes? | 1 | K1 | CO5 |
| (a) Data processing speed (b) Communication frequency and data transmission | | | |
| (c) Number of connected devices (d) Type of actuator used | | | |
| 19. Which wireless communication protocol is widely used in industrial applications for real-time process monitoring and control, offering secure, reliable, and low-power networking? | 1 | K1 | CO5 |
| (a) ISA 100 (b) Bluetooth (c) LTE (d) Wi-Fi | | | |
| 20. In wireless sensor networks, which hardware component is primarily responsible for data acquisition and sensing environmental conditions? | 1 | K1 | CO5 |
| (a) Router (b) Sensor node (c) Modem (d) Actuator | | | |

PART - B (10 × 2 = 20 Marks)

Answer ALL Questions

- | | | | |
|---|---|----|-----|
| 21. Define communication protocols. | 2 | K1 | CO1 |
| 22. Explain about on data link layer. | 2 | K2 | CO1 |
| 23. Compare balanced and unbalanced system into serial transmission. | 2 | K2 | CO2 |
| 24. List the advantages of universal serial bus compared to RS232. | 2 | K1 | CO2 |
| 25. Compare operating programming software and application programming software. | 2 | K2 | CO3 |
| 26. Name the advantages of PLC. | 2 | K1 | CO3 |
| 27. List the benefits of using wide area communication. | 2 | K1 | CO4 |
| 28. List types of wireless communication technologies are used in wireless SCADA systems. | 2 | K1 | CO4 |
| 29. List the different types of antennas used in wireless sensor networks. | 2 | K1 | CO5 |
| 30. Compare between Bluetooth Low Energy (BLE) and Classic Bluetooth. | 2 | K2 | CO5 |

PART - C (6 × 10 = 60 Marks)

Answer ALL Questions

- | | | | |
|--|----|----|-----|
| 31. a) Explain in detail the serial and parallel transmission of data communication With neat diagram. | 10 | K2 | CO1 |
|--|----|----|-----|

OR

- | | | | |
|--|----|----|-----|
| b) Explain in detail about each layer of the Internet model. | 10 | K2 | CO1 |
|--|----|----|-----|

32. a) Illustrate in detail about EIA/TIA 485(A). 10 K2 CO2
- OR**
- b) Explain on detail about Repeater, Hub, Bridge and router of LAN infrastructure. 10 K2 CO2
33. a) Construct the PLC architecture with neat diagram. 10 K3 CO3
- OR**
- b) Identify the PROFIBUS/PROFINET in networking. 10 K3 CO3
34. a) Summarize how SCADA improves the efficiency and reliability of power generation. 10 K2 CO4
- OR**
- b) Explain the key features of Modbus RTU and how they support various industrial automation applications. 10 K2 CO4
35. a) Explain the sensor networks be used to monitor and manage environmental conditions, such as air quality, water quality, and weather patterns with neat sketch? 10 K2 CO5
- OR**
- b) Explain salient features of Bluetooth and how they support various IoT applications. 10 K2 CO5
36. a) i) Explain some practical use cases for Modbus RTU. 5 K2 CO4
- ii) Explain the key hardware components of a wireless sensor network. 5 K2 CO5
- OR**
- b) i) Summarize how does SCADA help in real-time monitoring of the power generation process. 5 K2 CO4
- ii) Explain how does the development of IEEE 802.15.4 standards impact the future of IoT and wireless communication. 5 K2 CO5