Menoufia University
Faculty of Electronic Engineering
Industrial Electronics and Control Eng.
Course: Elective-3
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Final Term Exam
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Exam Type: Written
No. of Exam Pages: 4
No. of Exam Questions: 3
Exam Marks: 70 Marks
Exam Time: 3 Hour

## *Answer the following questions:*

*Question-1: Put True (√) or False (×) signs for the following expressions (with Correction if found):* [45 Marks]

1. The EIA-232 interface standard specifies the method of connection of two devices, the DTE and anther DTE .
2. The EIA-485 transmitter is required to produce voltages in the range +/-15 to +/- 25 V
3. Logic one in the EIA-232 (Data) : +5 to +25 V.
4. The EIA-232 standard defines 25 electrical connections. The electrical connections are divided into two groups viz: Data lines ,and Control lines.
5. Half -duplex operation requires that transmission and reception occur simultaneously.
6. The data pins of DB-25 connector are allocated as follows: Data transmit pin 3, Data receive pin 2 ,and Signal common pin 5.
7. At the EIA-232 receiver, Logic one : +3 to +25 V.
8. Revision E supports all 25 signals associated with EIA-232.
9. The main limitations of EIA-422 is the point-to-point restriction.
10. EIA-232 permits a 'multidrop' network connection on 2 wires and allows reliable serial data communication.
11. According to the EIA-485 standard, there can be 32 'standard' transceivers on the network.
12. The major enhancement of EIA- 232 is that a line driver can operate in three states called tri-state operation: Logic 1 , Logic 0 ,and High-impedance.
13. At the EIA-232 control line asserted or made active by the transmitting device has a voltage range of +5 to +25 V.
14. EIA-422 is the most common asynchronous voltage standard in use today for multidrop communication systems since it is very resistant to noise.
15. The main working difference is that EIA-422 is used for 2-wire multidrop half-duplex systems and EIA-485 is for 4-wire point-to-point full-duplex systems.
16. The EIA-485 interface standard is very useful for systems where several instruments or controllers may be connected on the same line.
17. There are two) ways that noise can be induced into an EIA-485 circuit: Induced noise on the A/B lines , Common mode voltage problems .
18. The RTU mode (sometimes also referred to as Modbus-B for Modbus Binary) is the preferred Modbus mode.
19. The RTU transmission mode (sometimes referred to as Modbus-A) has a typical message that is about twice the length of the equivalent ASCII message.
20. Modbus II protocol was developed to overcome the 'single-master' limitation prevalent in the Modbus Protocol.
21. This star topology is the same as the one used in telephone networks, where the central node has the task of establishing connections between the various network stations.
22. The main advantage of common bus topology is that it can be implemented with a simple point to point protocol.

23. In star topology failure of the central node will crash the network.
24. The star topology has a main trunk line to which individual PLC nodes are connected in a multidrop fashion.
25. In common bus topology communication in a common bus network can occur between any two nodes without passing information through a network controller.
26. Ring topologies are very useful in distributed control applications.
27. The star topology Performs better than a bus topology under heavy network load.
28. Collision detection is an access technique that eliminates contention among the PLC stations trying to gain access to the network.
29. A number of design factors relating to the transmission medium and the signal determine the data rate and distance: Bandwidth and Transmission impairments (only).
30. Coaxial cables are used extensively in industry for point-to-point applications at distances of up to 4000 feet and at transmission rates as high as 250 kilo-baud.

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*Question-2:* Choose the correct answer [15 Marks]

1. The circuit functions are defined with reference to the DTE as follows
   i. ----------The protective ground ensures that the DTE and DCE chassis are at equal potentials (remember that this protective ground could cause problems with circulating earth currents).
      a) Protective ground (shield)
      b) DCE ready
      c) Data carrier detect (DCD)
   ii. ----------This line carries serial data from the DTE to the corresponding pin on the DCE. The line is held at a negative voltage during periods of line idle.
      a) DTE ready
      b) Data signal rate selector
      c) Transmitted data (TxD)
   iii. ----------This line carries serial data from the DCE to the corresponding pin on the DTE.
      a) Received data (RxD)
      b) Transmitted data (TxD)
      c) Protective ground (shield)
   iv. ---------- is the request to send hardware control line. This line is placed active (+V) when the DTE requests permission to send data. The DCE then activates (+V) the CTS (clear to send) for hardware data flow control.
      a) Protective ground (shield)
      b) Request to send (RTS)
      c) DTE ready
   v. ----------When a half-duplex modem is receiving, the DTE keeps RTS inhibited.
      a) Transmitted data (TxD)
      b) Clear to send (CTS)
      c) Protective ground (shield)
2. ---------- are networking devices that connect networks. Sometimes it is necessary to divide networks into subnets to reduce the amount of traffic on each larger subnet or for security reasons.
   a) Switches
   b) Modems
   c) Bridges

3. ---------- are far more efficient than hubs and are far more desirable for today's network environments.
    a) Routers
    b) network cards
    c) Switches
4. ---------- are network devices that literally route data around the network. By examining data as it arrives, it can determine the destination address for the data.
    a) Switches
    b) DCE
    c) Routers
5. ---------- is applied to any device, system, or software application that can perform the function of translating data from one format to another.
    a) Routers
    b) The gateway
    c) DTE
6. ---------- perform a simple function: They translate digital signals from a computer into analog signals that can travel across conventional phone lines.
    a) Switches
    b) Modems
    c) DCE
7. ---------- are the mechanisms by which computers connect to a network.
    a) Switches
    b) NICs
    c) Modems
8. ---------- is a networking device, either hardware or software based, that controls access to your organization's network.
    a) NICs
    b) DCE
    c) A firewall
9. A network or communications ---------- is a system of digital message formats and rules for exchanging those messages in or between computing systems and in telecommunications.
    a) Protocol
    b) Modems
    c) Switches
10. In ---------- Difficult to identify the problem if the entire network shuts down.
    a) bus topology
    b) star topology
    c) ring topology
11. In a ---------- network, there are computers set up to be primary providers of services such as file service or mail service.
    a) peer-to-peer
    b) a server based
    c) star topology

*Question-3:* **[10 Marks]**

**According to each request message state the function for the target controller.**

1.

| Address | Function Code | Initial Coil Offset | | Number of Points | | CRC | |
|---|---|---|---|---|---|---|---|
| | | Hi | Lo | Hi | Lo | | |
| 01 | 01 | 00 | 0A | 00 | 02 | 9D | C9 |

2.

| Address | Function Code | Initial Coil Offset | | Number of Points | | CRC | |
|---|---|---|---|---|---|---|---|
| | | Hi | Lo | Hi | Lo | | |
| 01 | 02 | 00 | 00 | 00 | 02 | F9 | CB |

3.

| Address | Function Code | Starting Register | | Register Count | | CRC | |
|---|---|---|---|---|---|---|---|
| | | Hi | Lo | Hi | Lo | | |
| 01 | 03 | 00 | 02 | 00 | 01 | 25 | CA |

4.

| Address | Function Code | Starting Register | | Register Count | | CRC | |
|---|---|---|---|---|---|---|---|
| | | Hi | Lo | Hi | Lo | | |
| 01 | 04 | 00 | 00 | 00 | 01 | 31 | CA |

5.

| Address | Function Code | Coil Offset | | New Coil Status | | CRC | |
|---|---|---|---|---|---|---|---|
| | | Hi | Lo | Hi | Lo | | |
| 01 | 05 | 00 | 0A | 00 | 00 | ED | C8 |

6.

| Address | Function Code | Register Offset | | Register Value | | CRC | |
|---|---|---|---|---|---|---|---|
| | | Hi | Lo | Hi | Lo | | |
| 01 | 06 | 00 | 02 | 0C | 00 | 2D | 0A |

7.

| Address | Function Code | CRC |
|---|---|---|
| 11 | 07 | .. .. |

8.

| Address | Function Code | Data Diagnostic Code | | Data | | CRC |
|---|---|---|---|---|---|---|
| | | Hi | Lo | Hi | Lo | |
| 11 | 08 | 00 | 00 | A5 | 37 | .. .. |

9.

| Address | Function Code | Address | | Byte Count | Data Coil Status | | CRC |
|---|---|---|---|---|---|---|---|
| | | Hi | Lo | | Hi | Lo | |
| 01 | 0F | 00 | 01 | 0F | FF | 03 | .. .. |

10.

| Address | Function Code | Address | | Quantity | | Byte Count | First Register | | Second Register | | CRC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Hi | Lo | Hi | Lo | | Hi | Lo | Hi | Lo | |
| 01 | 10 | 00 | 0A | 00 | 02 | 04 | 00 | 0A | 01 | 02 | .. .. |

*With best wishes*