KUMARAGURU
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B.E DEGREE EXAMINATIONS: DEC 2022

(Regulation 2018)

Fifth Semester

ELECTRONICS & INSTRUMENTATION

U18EIT5004**:** Industrial Communication and Networking

COURSE OUTCOMES

CO1: Analyze the fundamentals of communications.
CO2: Examine the principles of selecting and installing telecommunications systems.
CO3: Make use of "best practice" decisions on the best and most cost-effective access options for an industrial network.
CO4: Identify, prevent, and troubleshoot industrial communications problems.
CO5: Test the installation and the configuration of a simple Ethernet network.
CO6: Interpret a protocol through simple implementation.

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions: -
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1. What happens if Modulation Index is greater than one?	CO1	[K$_2$]
2. A signal of 5 kHz frequency is amplitude modulated on a carrier wave of frequency 2 MHz Calculate the frequencies of the resultant signals	CO1	[K$_2$]
3. What is data encoding?	CO2	[K$_2$]
4. What is need for partitioning an industrial network?	CO3	[K$_2$]
5. What is the effect of EMI on a networks?	CO5	[K$_2$]
6. What is the difference between 2-wire and 4-wire current loop?	CO4	[K$_1$]
7. Why RS-232 to RS-442/RS-485/current loop converters are required?	CO5	[K$_2$]
8. What frequencies that the HART protocol uses for digital data transfer?	CO6	[K$_2$]
9. Which protocols is used in application layer of ISO-OSI model?	CO2	[K$_2$]
10. Is it possible to place a thermocouple or RTD directly on fieldbus?	CO6	[K$_2$]

Answer any FIVE Questions: -
PART B (5 x 4 = 20 Marks)
(Answer not more than 80 words)

11. What is modulation and why do we need modulation?	CO1	[K$_3$]
12. What factors that affect the data transmission?	CO2	[K$_2$]

13.	Is FOUNDATION H1 Fieldbus easier to use than traditional technology?		CO6	[K3]
14.	How does HART Communication work?		CO3	[K3]
15.	Why 120-ohm terminating resistors are used in RS-485?		CO4	[K4]
16.	What is Industrial Ethernet and how it is different from office Ethernet?		CO5	[K3]

Answer any FIVE Questions: -
PART C (5 x 12 = 60 Marks)
(Answer not more than 300 words)

17.	a)	Compare Narrow Band Frequency Modulation (NBFM) and Wide Band Frequency Modulation (WBFM) in detail.	7	CO1	[K3]
	b)	Compare and list the key differences between PAM, PWM and PPM.	5	CO1	[K3]

18.	a)	List the major differences between Industrial Ethernet and Commercial Ethernet.	5	CO5	[K4]
	b)	PROFIBUS PA, is like the set of parallel lights. That is, It is designed to continue operating even if several signals are wrong. This is the key strength of PROFIBUS network and poses some challenges. It means we may not know is there is a problem on the network.	7	CO5	[K4]

Prevention is better than cure. Preventing problems from the start is always better than trying to fix them later. Thorough, proper start-up is the key to trouble free operation for the future.

Hence, after installing the wires, but before connecting the devices some pre-startup wiring check, the following conditions were observed.

  i)   Low Resistance between PA+ lead and PA-lead or PA+ and shield:
  ii) Low Resistance between shield and ground:
  iii) Physical Layer Problems and device problems

List the possible scenario for these conditions.

19.	a)	What is CAN and how and where does CAN Communication work?	6	CO6	[K3]
	b)	List the benefits of mesh network topology for wirelessHART devices?	6	CO6	[K4]

20.	a)	For a Distillation column draw the PI diagram and implement Profibus for its control function.	8	CO2	[K3]

	b)	Explain different layers in OSI Model for Profibus and its main functions in brief.	4	CO4	[K$_L$]
21.	a)	Distinguish between Office /Commercial Networks and Industrial Networks	6	CO3	[K$_4$]
	b)	Analyze the hardware and the technical difference between RS-422 and RS-485?	6	CO4	[K$_4$]
22.		Implement Foundation Fieldbus and Modbus for a Unit operation plant in any one control loop and analyze their configuration.	12	CO3	[K$_4$]

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