SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT

OF

ELECTRONICS AND INSTRUMENTATION ENGINEERING

QUESTION BANK

VII SEMESTER

1907702-INDUSTRIAL DATA NETWORKS

Regulation – 2019

Academic Year 2022 – 2023 ODD

Prepared by

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SUBJECT : 1907702-INDUSTRIAL DATA NETWORKS

SEM / YEAR: VII /IV

UNIT I - DATA NETWORK FUNDAMENTALS

Networks hierarchy and switching – Open System Interconnection model of ISO - Data link control protocol - Media access protocol - Command / response - Token passing - CSMA/CD, TCP/IP.

PART – A

Q.No	Questions	BT Level	Competence
1.	Define line configuration.	**BTL-1**	Remember
2.	List the disadvantages of asynchronous communication.	**BTL-2**	Understand
3.	Summarize the limitations of using a circuit-switching network for data transmission.	**BTL-2**	Understand
4.	Compose the applications of networks.	**BTL-6**	Create
5.	Discuss about the term packet switching.	**BTL-2**	Understand
6.	Distinguish X-modem and Y-modem.	**BTL-4**	Analyze
7.	Classify the types of data link protocol.	**BTL-3**	Apply
8.	Assess the mechanism of poll/select.	**BTL-5**	Evaluate
9.	Write the mechanism of sliding window flow control.	**BTL-6**	Create
10.	Illustrate open system model.	**BTL-3**	Apply
11.	Define topology. What are the different types of topologies?	**BTL-1**	Remember
12.	What is mean by Command / response?	**BTL-2**	Understand
13.	Define network.	**BTL-1**	Remember
14.	Define CSMA/CD protocol.	**BTL-1**	Remember
15.	Define protocol.	**BTL-1**	Remember
16.	Compare circuit switching and packet switching.	**BTL-4**	Analyze
17.	Mention the modes in HDLC data link control protocol.	**BTL-5**	Evaluate
18.	List the benefits of token passing protocol for media access.	**BTL-1**	Remember
19.	Analyze How the three HDLC frame types differ from one another.	**BTL-4**	Analyze
20.	Classify different categories of networks.	**BTL-3**	Apply
21.	What is TCP/IP?	**BTL-2**	Understand
22.	Differentiate between character oriented and bit oriented protocol.	**BTL-3**	Apply
23.	Assess the term data transparency.	**BTL-5**	Evaluate
24.	Analyze how many layers available in OSI model?	**BTL-4**	Analyze

PART B

1.	**i.**	Mention the different types of network topologies with neat diagram.**(7)**	**BTL-3**	Apply
	ii.	Explain the different categories of networks and transmission mode with neat sketch .**(6)**		
2.	Discuss in detail about the functions of ISO-OSI layers.**(13)**		**BTL-2**	Understand
3.	Discuss about communicating devices and network hierarchy.**(13)**		**BTL-2**	Understand

4.	Examine HDLC in terms of frame format and frame contents.**(13)**		**BTL-1**	Remember
5.	Analyze the difference between the basic control format and extended control format with HDLC.**(13)**		**BTL-4**	Analyze
6.	**i.**	Explain about the operation of command-response mode in detail.**(6)**	**BTL-4**	Analyze
	ii.	Compare token bus and token ring in detail.**(7)**		
7.	Illustrate about Open Systems Interconnect model with neat diagram.**(13)**		**BTL-3**	Apply
8.	Write short notes on TCP/IP layer protocol. Also compare TCP/IP with OSI.**(13)**		**BTL-4**	Analyze
9.	**i.**	Sketch and explain the model of TCP/IP and also discuss the choice of protocols available in every layer of the same.**(10)**	**BTL-2**	Understand
	ii.	Give the limitations that exist when the reduced OSI model is implemented.**(3)**		
10.	Design the Go-back N ARQ and selective reject ARQ selective error mechanism with flow diagram.**(13)**		**BTL-6**	Create
11.	Describe in detail about the token passing protocol.**(13)**		**BTL-1**	Remember
12.	Discuss about packet switching and message switching in detail. **(13)**		**BTL-2**	Understand
13.	Describe about the concept of switching and explain about circuit switching in detail.**(13)**		**BTL-1**	Remember
14.	Explain how media is accessed and collision is detected in CSMA/CD with neat flow diagram.**(13)**		**BTL-5**	Evaluate
15.	Describe about asynchronous and synchronous protocols with neat diagram.**(13)**		**BTL-1**	Remember
16.	Explain about CAMA/CD protocol with neat sketch. **(13)**		**BTL-3**	Apply
17.	Infer about medium access control mechanism.**(13)**		**BTL-5**	Evaluate

PART C			
1.	Draw the segment format of TCP and explain the steps involved in connection establishment and connection termination.**(15)**	**BTL-6**	Create
2.	Summarize the CSMA/CD MAC technique with necessary diagrams.**(15)**	**BTL-5**	Evaluate
3.	Develop a process for establishing a link, exchange the frames and terminating the link using high level data link protocol with suitable example.**(15)**	**BTL-6**	Create
4.	Explain the network hierarchy and compare the performances of Packet switching, Message switching and Circuit switching.**(15)**	**BTL-5**	Evaluate
5.	Explain in detail about Data link control protocol with neat diagram**.(15)**	**BTL-5**	Evaluate

UNIT II – INTERNET WORKING and RS 232, RS 485			
Bridges - Routers - Gateways - Standard ETHERNET and ARCNET configuration special requirement for networks used for control - RS 232, RS 485 configuration Actuator Sensor (AS) – interface, Devicenet			
PART – A			
Q.No	**Questions**	**BT Level**	**Competence**
1.	Define the term router.	**BTL-1**	Remember
2.	Summarize the concept of socket address.	**BTL-5**	Evaluate
3.	Differentiate Intranet and Internet.	**BTL-2**	Understand

4.	Write the difference between Fast Ethernet and Gigabit Ethernet.	**BTL-6**	Create
5.	List the main elements of distance vector routing.	**BTL-1**	Remember
6.	Classify the different cabling in Ethernet communication.	**BTL-3**	Apply
7.	Discuss about the relationship between a switch and router.	**BTL-2**	Understand
8.	Quote the function of gateways..	**BTL-1**	Remember
9.	Assess the main reasons for collision on an Ethernet network.	**BTL-5**	Evaluate
10.	What is Fast Ethernet? What are the types of Ethernet?	**BTL-1**	Remember
11.	Express the two ASCII character used in RS-232 software handshaking.	**BTL-2**	Understand
12.	Point out the limitations of RS-232.	**BTL-4**	Analyze
13.	Classify the various transmission line effects on digital pulses.	**BTL-3**	Apply
14.	Give the four wire network configuration of EIA-485 network.	**BTL-2**	Understand
15.	Point out the various modes of operation in RS-485.	**BTL-1**	Remember
16.	List the Configuration and features of ARC net.	**BTL-4**	Analyze
17.	Specify any four faults monitored by AS-i fault monitoring system.	**BTL-1**	Remember
18.	Compare RS 232 with RS 485 communication standard.	**BTL-4**	Analyze
19.	Mention the hardware handshaking lines used in the RS-232.	**BTL-3**	Apply
20.	Formulate the Manchester code for the data signal 001001.	**BTL-6**	Create
21.	Define the term repeater.	**BTL-2**	Understand
22.	Mention the various functions of bridges.	**BTL-3**	Apply
23.	Assess the shortest path for adaptive routing.	**BTL-5**	Evaluate
24.	Analyze various functions of Devicenet.	**BTL-4**	Analyze

PART B				
1.	Describe the topology, cabling, and encoding scheme used in Ethernet communication.**(13)**		**BTL-1**	Remember
2.	**i.**	Discuss about the ARC net configuration with neat diagram.**(10)**	**BTL-2**	Understand
	ii.	Summarize the salient features of ARC net.**(3)**	**BTL-5**	Evaluate
3.	Discuss about the various Ethernet standards for networks.**(13)**		**BTL-2**	Understand
4.	List the various Ethernet technologies and explain each type.**(13)**		**BTL-1**	Remember
5.	**i.**	Explain open system with bridge configuration.**(6)**	**BTL-3**	Apply
	ii.	Illustrate the issues involved in the design of bridges.**(7)**		
6.	**i.**	What is the importance of using Gateways?**(5)**	**BTL-1**	Remember
	ii.	Quote the special requirements for networks used for control.**(8)**		
7.	**i.**	Write the functions of repeaters and explain each in detail.**(8)**	**BTL-3**	Apply
	ii.	Show the importance of Routers in an internet.**(5)**		
8.	**i.**	Tabulate the difference between the RS 232 and RS 485 standard.**(6)**	**BTL-1**	Remember
	ii.	Describe about the communication used in RS 232.**(7)**		
9.	Explain the topology, media access and formats of Actuator sensor interface network solution.**(13)**		**BTL-4**	Analyze
10.	Discuss the working of physical layer of AS-i interface, AS-i Master call up and slave response frame format.**(13)**		**BTL-2**	Understand
11.	Explain about the communication profile for Device net with necessary diagram.**(13)**		**BTL-4**	Analyze
12.	Describe about the RS 485 configuration with neat diagram.**(13)**		**BTL-2**	Understand
13.	Summarize the various features of standard Ethernets and compare		**BTL-6**	Create

	the same with ARCNET.**(13)**		
14.	Explain about the operation modes in RS 485. Can you convert RS 232 to RS485? Justify.**(13)**	**BTL-4**	Analyze
15.	List the different types of routers and explain in detail.**(13)**	**BTL-2**	Understand
16.	Explain bridges and gateways in detail with neat diagram.**(13)**	**BTL-3**	Apply
17.	What is transparent bridge? Elaborate the process of learning involved in such a bridge to create dynamic forwarding tables**.(13)**	**BTL-5**	Evaluate

PART C				
1.	Illustrate the half duplex communication between 2 PC's using RS-232 interface standard with the help of sequence diagram**. (15)**			
2.	Show in detail about Hall-duplex operational sequence of RS-232 with neat flow sketch between DTE and DCE over public switched telephone network.**(15)**		**BTL-5**	Evaluate
3.	**i.**	Can the length of an Ethernet be increased to many segments of 500 meters each merely by adding a repeater to connect each additional segment? Give reasons.**(10)**	**BTL-6**	Create
	ii.	Define various strategies involved in designing Bridge from 802.X to 802.Y.**(5)**		
4.	**i.**	Discuss the security aspect of internetworking when it is used for control applications.**(8)**	**BTL-5**	Evaluate
	ii.	Elaborate the features of IEEE 802.3 Ethernet.**(7)**		
5.	Explain the connectionless gateway configuration and describe the process of transmitting a datagram from network to network**.(15)**		**BTL-6**	Create

UNIT III - HART AND FIELDBUS

Introduction - Evolution of signal standard - HART communication protocol - HART networks – HART commands - HART applications – Field bus - Introduction - General Field bus architecture – Basic requirements of Field bus standard – Field bus topology - Interoperability - Interchangeability - Introduction to OLE for process control (OPC).

PART – A

Q.No.	Questions	BT Level	Competence
1.	List the different modes of digital transmission of data used by HART protocol.	**BTL-1**	Remember
2.	Show the difference between HART and Field bus.	**BTL-3**	Apply
3.	Classify Fieldbus standards.	**BTL-3**	Apply
4.	Examine briefly about the command "write polling address".	**BTL-1**	Remember
5.	Define interoperability.	**BTL-2**	Understand
6.	State the significance of HART Protocol.	**BTL-1**	Remember
7.	Analyze how OPC allow reusing applications with different sets of process interface equipment.	**BTL-4**	Analyze
8.	Generalize the different HART networks.	**BTL-6**	Create
9.	Discuss the two types of frame formats in HART protocol.	**BTL-2**	Understand
10.	Analyze how HART protocol linked with OSI model?	**BTL-6**	Create
11.	Express about a typical HART signal.	**BTL-2**	Understand
12.	Define Field bus.	**BTL-1**	Remember
13.	Summarize the drawbacks of Field bus.	**BTL-5**	Evaluate
14.	Point out various Field bus topology.	**BTL-4**	Analyze
15.	Define the frame format in HART protocol.	**BTL-1**	Remember
16.	Summarize the advantages of HART protocol.	**BTL-5**	Evaluate

17.	Give the advantages of Field bus.		**BTL-2**	Understand
18.	Analyze the operations of VCR.		**BTL-4**	Analyze
19.	Classify the operations of LAS.		**BTL-3**	Apply
20.	List the HART commands.		**BTL-1**	Remember
21.	What is OPC?		**BTL-2**	Understand
22.	What is mean by FMS?		**BTL-3**	Apply
23.	Give the advantages of OPC.		**BTL-5**	Evaluate
24.	Distinguish between interchangeability and interoperability.		**BTL-4**	Analyze
PART B				
1.	**i.**	Describe the command instruction formats and reference model of HART communication.**(8)**	**BTL-1**	Remember
	ii.	Explain typical application for HART communication protocol.**(5)**	**BTL-3**	Apply
2.	Describe the various HART communication layers**.(13)**			
3.	**i.**	Infer the precautions taken during wiring and installation of fieldbus system.**(6)**	**BTL-4**	Analyze
	ii.	With neat sketch, explain the different ways in which devices are connected to the Field bus.**(7)**		
4.	**i.**	Explain the origin and benefits of the Fieldbus systems.**(6)**	**BTL-4**	Analyze
	ii.	List the encoding logic with neat sketch and rules used by Field bus physical layer.**(7)**		
5.	Explain about the Field bus technology that supports various topologies.**(13)**		**BTL-4**	Analyze
6.	With neat sketch describe the general Field bus architecture.**(13)**		**BTL-1**	Remember
7.	Discuss in detail about the device commands of application layer of HART communication protocol with proper examples used by the host device to obtain and interpret field device data**.(13)**		**BTL-6**	Understand
8.	Discuss about structure and elements of HART communication systems.**(13)**		**BTL-2**	Understand
9.	Discuss about HART protocol implementation of OSI layer model.**(13)**		**BTL-2**	Understand
10.	**i.**	Describe the Physical layer of the HART protocol in detail.**(8)**	**BTL-1**	Understand
	ii.	Mentation the advantages and disadvantages of HART protocol**.(5)**		
11.	Discuss about the HSE and H1 in Field bus architecture with neat diagram.**(13)**		**BTL-1**	Remember
12.	Express the communication services in Field bus Message Specification and explain it.**(13)**		**BTL-2**	Create
13.	Explain in detail about the FAS with neat diagram.**(13)**		**BTL-5**	Evaluate
14.	Describe the general architecture and topologies used in fieldbus communication.**(13)**		**BTL-1**	Remember
15.	With neat diagram ,explain the two possible configurations in which HART device can operate?**(13)**		**BTL-2**	Understand
16.	Discuss about the Data link layer of the HART protocol and HART frame format in detail.**(13)**		**BTL-3**	Apply
17.	Elaborate in detail the general architecture of Field bus in a DCS environment of your own choice.**(13)**		**BTL-5**	Evaluate
PART C				
1.	Evaluate the three classes of HART command set and list 6 commands in each.**(15)**		**BTL-5**	Evaluate

2.	Sketch the architecture of FOUNDATION field bus and give explanation on any of the five blocks.**(15)**	**BTL-5**	Evaluate
3.	Asses the need of OPC and list the benefits of OPC. **(15)**	**BTL-6**	Create
4.	Design a complete package that helps to build, test and deploy HART enabled product for a leading oil and gas company, which holds turbine meter, flow meters and flow computers.**(15)**	**BTL-6**	Create
5.	Elaborate in detail the general architecture of OLE for process control applications.**(15)**	**BTL-5**	Evaluate

UNIT IV- MODBUS AND PROFIBUS PA/DP/FMS AND FF			
MODBUS protocol structure - function codes – troubleshooting Profibus, Introduction, Profibus protocol stack, Profibus communication model - communication objects - system operation - troubleshooting - review of foundation field bus - Data Highway.			
PART – A			
Q.No.	**Questions**	**BT Level**	**Competence**
1.	Classify the types of PROFIBUS.	**BTL-3**	Apply
2.	Summarize the features of PROFIBUS.	**BTL-2**	Understand
3.	Give the advantages of Foundation Field Bus.	**BTL-2**	Understand
4.	List any two applications of MODBUS and PROFIBUS.	**BTL-1**	Remember
5.	Summarize the benefits of Foundation Fieldbus over HART.	**BTL-2**	Understand
6.	List the sub layers in the application layer of Foundation Field Bus.	**BTL-1**	Remember
7.	Give the disadvantages of Field bus, compared to ± 20 mA analog HART standard.	**BTL-2**	Understand
8.	Define communication object.	**BTL-1**	Remember
9.	Draw the PROFIBUS protocol stack.	**BTL-3**	Apply
10.	Discover the common problems that occur with Modbus.	**BTL-3**	Apply
11.	Write the applications of FMS, DP and PA PROFIBUS.	**BTL-6**	Create
12.	Specify the transmission modes in which data is exchanged using MODBUS communication Protocol.	**BTL-4**	Analyze
13.	What are the data transmission services defined in profibus?	**BTL-1**	Remember
14.	List the various diagnostic tools available for troubleshooting in PROFIBUS.	**BTL-1**	Remember
15.	Evaluate the main task of lower layer interface in Profibus protocol.	**BTL-5**	Evaluate
16.	Point out the features of MODBUS communications.	**BTL-4**	Analyze
17.	State the MODBUS message frame format with size of each field.	**BTL-6**	Create
18.	List the contents in the structure of object dictionary which is used as communication object in PROFIBUS station.	**BTL-5**	Evaluate
19.	Inspect, which is the preferred MODBUS mode? Why?	**BTL-4**	Analyze
20.	What is data highway?	**BTL-1**	Remember
21.	Define PROFIBUS.	**BTL-2**	Understand
22.	What are the function codes in MODBUS?	**BTL-3**	Apply
23.	Analyze the data transmission services defined in Profibus.	**BTL-5**	Evaluate
24.	Mention the limitations of MODBUS.	**BTL-4**	Analyze
PART B			
1.	**i.** Describe the MODBUS functions and message format with an application.**(7)**	**BTL-1**	Remember

	ii.	With neat sketch explain the structure of MODBUS protocol.**(6)**	**BTL-4**	Analyze
2.	**i.**	Briefly explain the features of MODBUS.**(6)**	**BTL-4**	Analyze
	ii.	Discuss the common problems and faults related to MODBUS installation.**(7)**		
3.	Describe about Common MODBUS function code and Read coil code.**(13)**		**BTL-1**	Remember
4.	**i.**	Discuss about the features of FIB-BUS in detail.**(7)**	**BTL-2**	Understand
	ii.	With neat sketch explain the foundation field bus in detail.**(6)**	**BTL-4**	Analyze
5.	Discuss about MODBUS protocol structure and function codes.**(13)**		**BTL-2**	Understand
6.	**i.**	Discus about the MODBUS/TCP protocol.**(7)**	**BTL-2**	Understand
	ii.	List the different data types in MODBUS and explain each in detail.**(6)**	**BTL-1**	Remember
7.	With neat sketch discuss the architecture of Profibus protocol stack.**(13)**		**BTL-2**	Understand
8.	**i.**	Write short notes on classification of Profibus**.(6)**	**BTL-4**	Analyze
	ii.	Explain in detail about troubleshooting tools helpful in identifying Profibus communication problems.**(7)**		
9.	Explain the various layers of Profibus protocol stack.**(13)**		**BTL-5**	Evaluate
10.	What is Profibus protocol stack? Explain with suitable diagram.**(13)**		**BTL-2**	Understand
11.	With respect to MODBUS protocol, elaborate the following function codes with associated example for request message and response frame formats. **(i)** Read Coil Status (function code 01) **(4)** **(ii)** Preset Single Register (function code 06) **(3)** **(iii)** Loop Back Test(function code 08) **(3)** **(iv)** Force Multiple Register(function code 10) **(3)**		**BTL-1**	Remember
12.	Classify the types of function codes in Modbus and explain in detail about read digital input status.**(13)**		**BTL-3**	Apply
13.	List different types of layers in Profibus and explain each in detail.**(13)**		**BTL-3**	Apply
14.	Design the various types of layers in Data Highway in detail.**(13)**		**BTL-6**	Create
15.	What is communication object? Explain in detail the system operation of Profibus**.(13)**		**BTL-2**	Understand
16.	Describe the Profibus communication model depicting the structure of virtual field device with object dictionary.**(13)**		**BTL-3**	Apply
17.	Explain in detail about data highway protocol with neat diagram.**(13)**		**BTL-5**	Evaluate

PART C				
1.	Elaborate in detail the various layers used in Foundation Field bus.**(15)**		**BTL-5**	Evaluate
2.	Elaborate in detail the architecture of Foundation Field bus and give explanation on any of the five blocks.**(15)**		**BTL-6**	Create
3.	**i.**	Compare the features of FF with Profibus. **(8)**	**BTL-5**	Evaluate
	ii.	Explain the installation and troubleshooting of Profibus.**(7)**		
4.	Discuss in detail about system operation of PROFIBUS and classification of PROFIBUS.**(15)**		**BTL-6**	Create
5.	List the three OSI layers used in data highway protocol.		**BTL-5**	Evaluate

	Summarize the symbols, type and description for full duplex type of same protocol. **.(15)**		

UNIT V- INDUSTRIAL ETHERNET AND WIRELESS COMMUNICATION			
Industrial Ethernet, Introduction, 10 Mbps Ethernet, 100 Mbps Ethernet - Radio and wireless communication, Introduction, components of radio link - radio spectrum and frequency allocation - radio MODEMs-Introduction to wireless HART and ISA100.			
PART – A			
Q.No	**Questions**	**BT Level**	**Competence**
1.	Expand the following. (a) PTT (b) RSSI	**BTL-1**	Remember
2.	Give the advantages of 'spread spectrum' radio modem.	**BTL-2**	Understand
3.	Point out the common standard Ethernet implementations.	**BTL-4**	Analyze
4.	Differentiate radio and wireless communication.	**BTL-4**	Analyze
5.	Evaluate the baud rate of the standard 10-Mbps Ethernet.	**BTL-5**	Evaluate
6.	State the purpose of ISA 100 committee.	**BTL-4**	Analyze
7.	Evaluate the function of modem.	**BTL-5**	Evaluate
8.	Examine the specifications of 10 Mbps and 100 Mbps Ethernet.	**BTL-3**	Apply
9.	Give the advantages of radio waves.	**BTL-2**	Understand
10.	What is meant by 10 Base T systems?	**BTL-1**	Remember
11.	Examine RSSI in radio modem.	**BTL-3**	Apply
12.	Classify the components of a radio link.	**BTL-3**	Apply
13.	What is 5-4-3-2 rule in Ethernet?	**BTL-1**	Remember
14.	Give the types of cables used in communication system.	**BTL-2**	Understand
15.	Define 'Round trip delay'.	**BTL-1**	Remember
16.	Discuss about the modes and features of radio modem.	**BTL-2**	Understand
17.	Write the steps for implementing radio link.	**BTL-6**	Create
18.	Justify the need for wireless communication in industries.	**BTL-6**	Create
19.	What is 'Inter modulation'?	**BTL-1**	Remember
20.	Write the features of industrial Ethernet. And also list the different connectors used for industrial Ethernet.	**BTL-1**	Remember
21.	What are delays in 100 base T network?	**BTL-2**	Understand
22.	Mentation the magnitude of signal in Ethernet.	**BTL-3**	Apply
23.	Asses the various functions of ISA100.	**BTL-5**	Evaluate
24.	Evaluate the function of wireless HART.	**BTL-4**	Analyze

PART B				
1.	Describe the modem hardware used for modulation and demodulation with a neat diagram.**(13)**		**BTL-2**	Understand
2.	Describe 10 Base-5 Ethernet in detail with neat diagram.**(13)**		**BTL-1**	Remember
3.	**i.**	Illustrate about wireless technologies based on channel rate, transmit power and range.**(7)**	**BTL-3**	Apply
	ii.	Explain the components of radio links and radio modems.**(6)**		
4.	Elaborate in detail the 10 Base-2 Ethernet in detail with neat diagram.**(13)**		**BTL-5**	Evaluate
5.	Infer the range of frequency bands of radio transmission and give its applications.**(13)**		**BTL-4**	Analyze
6.	Examine the detail the 10 Base-T Ethernet in detail with neat diagram.**(13)**		**BTL-3**	Apply
7.	Brief the topology, cabling, media access and collision detection schemes of Ethernet Communication.**(13)**		**BTL-1**	Remember

8.	Describe 100 Mbps Ethernet with its specifications in brief.**(13)**		**BTL-1**	Remember
9.	**i.**	Distinguish between the IEEE 802.3 and Ethernet V2.**(7)**	**BTL-2**	Understand
	ii.	Discuss about the MAC Frame format.**(6)**		
10.	Describe about IEEE 802.3 standard Frame format.**(13)**		**BTL-1**	Remember
11.	**i.**	Explain how a radio path profile is created while implementing a radio link**.(7)**	**BTL-6**	Create
	ii.	Explain the modes and features of radio MODEM in detail.**(6)**		
12.	Discuss in detail about the components of radio link with neat sketch.**(13)**		**BTL-2**	Understand
13.	Draw the schematic of radio modem configuration and explain in detail.**(13)**		**BTL-4**	Analyze
14.	Explain about the technical details of wireless HART communication standard in detail.**(13)**		**BTL-4**	Analyze
15.	Write short notes on radio spectrum and frequency allocation.**(13)**		**BTL-2**	Understand
16.	Explain 100 Mbps Ethernet media system with neat diagram.**(13)**		**BTL-3**	Apply
17.	Explain in detail about wireless HART and ISA100 with neat diagram.**(13)**		**BTL-5**	Evaluate

PART C				
1.	Discuss the features of industrial Ethernet and comment on its superiority over standard Ethernet.**(15)**		**BTL-6**	Create
2.	**i.**	Write short notes on ISA 100.**(8)**	**BTL-5**	Evaluate
	ii.	Compare 10 Mbps Ethernet with 100 Mbps Ethernet in detail.**(7)**		
3.	Explain briefly about **(i)** Topology used in thick and thin Ethernet.**(8)** **(ii)** Connectors used in industrial Ethernet.**(7)**		**BTL-5**	Evaluate
4.	Explain in detail about 10 Base-5, 10 Base-2, 10 Base-T and 10 Base-F Ethernet with its specifications .**(15)**		**BTL-6**	Create
5.	Elaborate in detail about various 10Mbps Ethernet with neat diagram.**(15)**		**BTL-6**	Create