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IC 1402 Computer Networks and Distributed Control System

1. Define networks?

A network is a set of devices (referred to as nodes) connected by media links. A node can be a computer, printer, or any other device capable of sending or/receiving data generated by other noded on the network. The links connecting the devices are called as communication channels.

2. Give some applications of networks?

- a) Marketing and sales,
- b) Financial services,
- c) Manufacturing,
- d) Electronic messaging,
- e) Directory services,
- f) Information services,
- g) Electronic data interchange,
- h) Teleconferencing,
- i) Cellular telephone,
- j) Cable television.

3. Define line configuration?

Line configuration refers to the way two or more communication devices attach to a link. A **link** is the physical communication pathway that transfers data from one device to another.

4. Define point-to-point line configuration?

A point-to-point line configuration provides a dedicated link between two devices. The entire capacity of the channel is reserved for transmission between those two devices.

5. Define multipoint line configuration?

A multipoint line configuration also called multidrop line configuration is one in which more than two specific devices share a single link.

6. Define topology? What are the different types of topology?

Topology refers to the way a network is laid out, either physically or logically. Two or more devices connect to a link; two or more links forms a topology. The different types of topology are,

- a) Mesh,
- b) Star,
- c) Tree,
- d) Bus
- e) Ring

7. Define peer-to-peer and primary-secondary transmissions?

Peer-to-peer is one where the devices share the link equally

Primary-secondary is one where one device controls traffic and the others must transmit through it.

8. What is meant by Mesh topology?

In a mesh topology every device has a dedicated point-to-point link to every other device. A fully connected mesh n/w therefore has $n(n-1)/2$ physical channels to link n devices.

9. What is meant by star topology?

In a star topology, each device has a dedicated point-to-point link only to a central controller, usually called a hub. The devices are not directly linked to each other.

10. What is meant by tree topology?

A tree topology is a variation of a star. As in a star, nodes in a tree are linked to a central hub that controls the traffic to the n/w. Every device does not connect directly to the hub. The majority of devices connect to a secondary hub that in turn is connected to the central hub.

11. What is the difference between active hub and passive hub?

Active hub:-The central hub in the tree is an active hub. An active hub contains a repeater, which is a hardware device that regenerates the received bit patterns before sending them out.

Passive hub:-A passive hub provides a simple physical connection between the attached devices.

12. What is meant by bus topology?

A bus topology is a multipoint configuration. One long cable acts as the backbone to link all devices in the network. Nodes are connected to the bus cable by drop lines and taps.

13. What is meant by Ring topology?

In a ring topology each device has a dedicated point-to-point line configuration only with the two devices on either side of it.

14. Define transmission modes? What are the types of transmission modes?

Transmission mode is used to define the direction of flow between two linked devices. There are three types of transmission modes;

a) Simplex :- The communication is unidirectional, as on a one-way street. Only one of the two stations on link can transmit; the other can only receive.

b) Half-duplex:- each station can transmit and receive but not at the same time. When one device is sending the other can only receive, and vice versa.

c) Full-Duplex:- both stations can transmit and receive simultaneously.

15. What are the different categories of n/w's?

a) LAN (Local Area Network):- A LAN is usually privately owned and links the devices in a single office, building or campus. LANs are designed to allow resources to be shared between personal computers and workstations.

b) MAN (Metropolitan Area Network):- A MAN is designed to extend over an entire city. It may be a single n/w such as a cable tv n/w, or it may be means of connecting a number of LANs into a larger network so that resources may be shared LAN-to-LAN as well device-to-device.

c) WAN (Wide Area Network):- WAN provides long distance transmission of data, voice, image and video information over large geographical areas that may comprise a country, or even the whole world.

16. What is an open system model?

An open system model is a model that allows any two different systems to communicate regardless of their underlying architecture. It is a layered framework for the design of network systems that allows for communication across all types of computer systems. It is built of seven ordered layers. They are,

Layer 1 – physical layer

Layer 2 – data link layer

Layer 3 – network layer

Layer 4 – transport layer

Layer 5 – session layer

Layer 6 – presentation layer

Layer 7 – application layer

17. What is physical layer? What is the function of this layer?

The physical layer coordinates the functions required to transmit a bit stream over a physical medium. It deals with the mechanical and electrical specifications of the interface and transmission medium. The functions are,

- Physical characteristics of interfaces and media.
- Representation of bits.
- Data rates.
- Synchronization of bits.
- Line configuration
- Physical topology.
- Transmission modes

18. What is data link layer? What is the function of this layer?

The data link layer transforms the physical layer, a raw transmission facility, to a reliable link and is responsible for node-to-node delivery. The functions are,

- framing
- physical addressing
- flow control
- error control
- access control

19. What is network layer? What is the function of this layer?

A network layer is responsible for the source to destination delivery of a packet possibly across multiple networks. The functions are,

- a) Intranet work operations and routing.
- b) Logical and service addressing.
- c) Switching control and terminal connections.
- d) X.25 specification is included in this layer.

20. What is transport layer? What is the function of this layer?

The transport layer is responsible for source-to-destination delivery of the entire message. The functions are

- service point addressing
- segmentation and reassembly
- Connection model.
- Flow control.
- Error control.

21. What is session layer? What is the function of this layer?

The session layer is the network dialog controller. It establishes, maintains, and synchronizes the interaction between communicating systems. The functions are,

- Dialog control.
- Synchronization

22. What is presentation layer? What is the function of this layer?

The presentation layer is concerned with the syntax and semantics of the information exchanged between two systems. The functions are,

- translation
- encryption
- Compression.

23. What is application layer? What is the function of this layer?

The application layer enables the user, whether human or software to access the network. The functions are,

- network virtual terminal
- file transfer and access and management

- Mail service.
- Directory service

24. What is the mechanism of ENQ/ACK?

The initiator first transmits a frame called an enquiry asking if the receiver is available to receive data. The receiver must answer either with an acknowledgement frame if it is ready to receive with negative acknowledgement.

25. Define flow control?

Flow control refers to a set of procedures used to restrict the amount of data the sender can send before waiting for acknowledgment

26. What are the two methods that control the flow of data across communication links?

- 1)stop and wait
- 2)sliding window

27.What is the mechanism of stop-and-wait flow control?

In the stop and wait method of flow control sender sends one frame and waits for an acknowledgement before sending the next frame

28.What is the mechanism of sliding window flow control?

In the sliding window flow control; the sending of data is constrained by imaginary window that expands and contracts according to the acknowledgement received by the sender.

29.What does the term error control mean in the data link layer?

Error control in the data link layer is based on the automatic repeat request which means retransmission of data in three cases: damaged frame lost frame, lost acknowledgment.

30. What is the mechanism of poll/select?

A poll is sent to the secondary device by the primary to determine if the secondary has to send. The secondary can respond by sending an acknowledgement or a data frame.

A select frame is sent from the primary device to the secondary device to tell the secondary to prepare to receive data. The secondary responds with an ACK or a NAK

31.Define protocol.

A protocol in data communications is the set of rules or specifications used to implement one or more layers of the OSI model.

32.What are the two types of data link protocol?

- 1).Asynchronous protocol
- 2).Synchronous protocol

33. Distinguish X-modem and Y-modem?

X-modem	Y-modem
1.the data is 128bytes 2.one CANS signal is used to abort a transmission 3.CRC error checking is used 4.It is a half-duplex stop and wait ARQ protocol	1.the data unit is 1024bytes 2.two CAN signals are used 3.ITU-T CRC is used for error checking 4.here multiple files can be sent simultaneously

34. What are the disadvantages of asynchronous transmission?

- 1).speed of transmission is less
- 2)It leaves unpredictable gaps of time between each character
- 3).the addition of start and stop bits and the insertion of gaps into the bit stream make asynchronous transmission slower.

35. What are the two types of synchronous protocol and explain it?

- 1)character oriented protocol
- 2)bit-oriented protocol

36. What is data transparency?

Data transparency in data communication means we should be able to send any combination of bits as data. The combination of bits as data is not confused with the control information.

37. Define BSC.

Binary synchronous communication is a well-known character oriented protocol. BSC operates in half-duplex mode using stop and wait ARQ in a point-to-point or multipoint configuration.

38. What is bit stuffing?

Bit stuffing is the process of adding one extra '0' whenever there are five consecutive '1's in the data. So that the receiver doesn't mistake the data for a flag.

39. What do you mean by HDLC?

High-level data link control is a bit oriented data link designed to support both half-duplex and full-duplex communication over point-to-point and multi-point links.

40. How do the three HDLC frame types differ from one another?

- a)I-frame -for data transmission and control
- b)S-frame-control
- c)U-frame -for control and management

41. What are the types of modes in HDLC?

- a) normal response mode (NRM)
- b) asynchronous response mode (ARM)
- c) Asynchronous balanced mode (ABM)

42. What is piggy bagging?

Piggy backing means combining data to be sent and acknowledgement of the frame received in one single frame.

43. Name the four types of s-frames?

- a) receive ready (RR)
- b) receive not ready (RNR)
- c) reject (REJ)
- d) selective reject (SREJ)

44. Name the five categories of U-frame.

- 1) Mode setting
- 2) Unnumbered exchanging
- 3) Disconnection
- 4) Initiation
- 5) Miscellaneous

45. What are the types of sliding window ARQ error control?

- 1) go-back-n
- 2) Selective –reject

46. What is the function of repeaters?

A repeater or regenerators is an electronic device that operates on only physical layer of the OSI model. A repeater installed on a link receives the signal before it becomes too weak or corrupted. Regenerates the original bit pattern and puts the refreshed copy back onto link.

47. What is the function of bridges?

It is operate on the physical layer and data link layers of the OSI model. Bridges can divide a large network into the small segments. They can also relay frames between two originally separate LANs. Bridges contain logic that filters traffic, thus making them useful for controlling congestion and isolating problem links.

48. What is the function of routers?

These have access to network layer address and contain software that enables them to determine which of several possible paths between those addresses in the best for a particular transmission. Routers operate in the physical , data link and network layers of the OSI model.

49. What are gateways?

A gateway is a protocol converter. A gateway can accept a packet formatted for one protocol and convert into a packet formatted for another protocol before forwarding it.

50. What is the function of gateway?

A gateway potentially operates in all seven layers of the OSI model. A gateway is a protocol converter. A gateway by itself can accept a packet formatted for one protocol and convert it to a packet formatted for another protocol before forwarding it.

51. What is network?

A network is a set of devices often referred to as nodes, connected by media link. A node can be a computer, printer or any device capable of sending and or receiving data generated by other nodes on the network. The links connecting the devices are often called communication channels.

52. What is inter network?

When two or more networks are connected they become an internetwork or internet. Individual networks are joined into internetworks by the use of internetworking devices. These include routers and gateways. The word internet means an interconnection of networks and is world wide network.

53. What is adaptive routing?

It involves a method in which router may select a new route for each packet in response to changes in condition and topology of the networks.

54. What is nonadaptive routing?

Once the path way towards a destination has been selected, the router sends all the packets to that destination along that one route. So the routing destinations are not made based on the condition or topology of the network.

55. What is distance vector routing?

Each router periodically shares its knowledge about the entire network with its neighbors.

Periodically sends its knowledge about the network only to those routers to which it has direct links.

Information sharing occurs.

56. What is link routing?

In link state routing each router shares its knowledge of its neighborhood with every other router in their internetwork.

Each router sends out information about the neighbors when there is a change.

57. What is flooding?

Each router sends the information to every other router on the internetworking not just to its neighbors. It does so by a process called flooding. Flooding means that a router sends its information to all of its neighbors.

58. What are the main elements of distance vector routing?

- shared information
- routing table
- updating data

59. What are the types of bridges?

- simple bridge
- multipoint bridge
- transparent bridge

60. What is spanning Tree Bridge?

Two LANs may be connected by more than one bridge. In this case, if the bridges are transparent bridges, they may create a loop, which means a packet may be going round, from one LAN to another and back again to the first LAN. To avoid this situation bridges today use what is called the spanning tree algorithm.

61. What is spanning tree bridge?

Bridge builds its table of station addresses on its own as it performs its bridge functions when the transparent bridge is first installed, its table is empty. As it encounters each packet, it looks at both the destination address, it relays the packet to all of the stations on both segments. It uses the source address to build its table.

62. What is Fast Ethernet?

It operates at 100 Mbps. With new applications such as computer aided design, image processing and real time audio and video being implemented on LANs.

63. What is Gigabit Ethernet?

It has a data rate of 1000Mbps. It is used in optical fiber, although the protocol does not eliminate the use of twisted pair cables.

64. What are the types of Ethernet?

- 10 BASE 5: Thick Ethernet
- 10 BASE 2: Thin Ethernet
- 10 BASE T: Twisted pair Ethernet
- Fast Ethernet
- Gigabit Ethernet
- Switched Ethernet.

65. What are the types of base band Ethernet?

- 10 BASE 5:
- 10 BASE 2:
- 10 BASE T
- 1 BASE 5
- 100 BASE T

66. What are the types of Topology used in network?

- mesh Topology
- star Topology
- bus Topology
- ring Topology

67. What are the advantages and disadvantages of Star topology?

Advantages-

- less expensive
- easy to install and configure

Disadvantages-

- Amount of cabling and number of I/O port required.

68. What are the advantages and disadvantages of Mesh topology?

Advantages-

- eliminating traffic problem
- robust
- privacy or security
- fault identification and fault isolation

Disadvantages-

- hardware is required

69. What are the advantages a of Tree topology?

Advantages-

- Many devices to be attached to a single central hub.
- Allows the networks to isolate

70. What is routing table?

A routing table has columns for at least three types of information: the network ID and ID of the next router. The network ID is the final destination of the packet. The cost is the number of hops a packet must make packet to get there. And the next router is the router to which a packet must be delivered on its way to a particular destination.

71. What is the significance of DCS?

Used for interfacing and computing functions and also provides the means of communication between the other devices. It consists of local control unit, low level interface, high level interface, shared communication facility. Etc

72. Mention any two advantages of DCS

- more reliable
- small expensive
- cost is lower than centralized system which performs the same function.

73. What is LCU?

Local control unit is the small collection of hard ware in the system that can do closed loop control. Local control unit interfaces directly to the process.

74. What is the significance of LLHI?

This is the device that allows the operator or instrumentation engineer to interact with the LCU to change set point, control modes, control configuration, or tuning using a direct connection. LLHI can also interface directly to the process.

75. What is the function of HLOI?

It has the functions similar to the LLHI with increased capacity and user with increased capability and user friendliness. It interfaces to other devices only over the shared communication facilities. Operator oriented program at this level is called HLOI. It is an instrument engineer oriented program.

76. What is shared communication?

One or more communication hardware and associated software that allow the sharing of data among all devices in the distributed system. Shared communication facilities do not include dedicated communication channels between specific devices.

77. What is the need can be satisfied in designing an industrial grade LCU?

- flexibility of changing the control configuration
- Ability to use the controller without being a computer expert.
- Ability to by pass the controller in case it fails. So that the process still can be controlled manually.
- Ability of the LCU to communicate with other LCUs and other elements in system.

78. What is the architecture parameter to be considered while selecting LCU?

- size of controller
- functionality of controller
- performance of controller
- communication channels out of controller
- Controller output security.

79. Compare the configuration of the controller

Architecture parameter	Configuration A	Configuration B	Configuration C
Controller size	Number of function needed for single PID loop or motor controller	Includes functions and I/O	Equivalent to small DDC system
Controller functionality	Uses both continues and logic function	Uses both continues and logic function Split between the controller	Uses both continues and logic function
Controller scalability	High degree of scalability	Requires both controller types	Not scalability

80. What are the security requirements of LCU?

- Maximize the availability of the automatic control functions of the system.
- During failure of the controller allows the operator to take the manual control of that process?
- Operator can shut the process down in an orderly and safe manner.

81. What is manual backup?

In this case, each LCU is designed to implemented only one or two control loops , and reliable is placed on the operator to take over manual control in case of a failure of LCU.

82. What is redundant control mode?

In this case, the LCU is backed up by another LCU that takes over if the primary controller fails. In this way, full automatic control is maintained even under failure conditions.

83. What are the approaches in designing a redundant LCU architecture?

- a) CPU redundancy,
- b) One-on-one redundancy,
- c) One-on-many redundancy,
- d) Multiple active redundancy.

84. What is meant by geographically centralized and geographically distributed control system?

All the LCUs are located in a central equipment room area, it is called as geographically centralized control system.

Each LCU is located in the plant area closest to the portion of the process that it controls. It is called as geographically distributed control system.

85. What is functionally distributed control system?

Several LCUs are used to implement the functions required in controlling the process. Therefore it is called as functionally distributed control system.

86. What are multiple active controllers?

In this case, several LCUs are active at the same time in reading process inputs calculating control algorithms and producing control outputs to the process. The multiple active approaches is designed so that a failure of one of the controllers does affect the automatic control function.

87. What are the redundant approaches of redundant controllers?

The redundant architecture should be kept as simple as possible. There is a law of diminishing in redundancy design. At some point, adding more hardware will reduce system reliability. The redundant nature of the controller configuration should be

transparent to the user that is the user should be able to deal with the system in the way as a non redundant one.

88. Mention the requirement of operator interface

- process monitoring
- process control
- process record keeping

89. What are the motivations for using LLOI?

- It provides an interface that is familiar to the operator trying to use panel board instrumentation.
- Less expensive
- Provide manual back up in the case if high level operator interface fails.

90. Explain about different types of operator display.

- Plant display.
- Area display.
- Group display.
- Loop display.
- Graphic display.
- Trend display.
- Tabular display.

91. What is the function of engineering interface?

- system configuration
- operator configuration
- system documentation
- system failure diagnosis

92. Define HART.

HART is an acronym for "Highway Addressable Remote Transducer". The HART protocol makes use of the Bell 202 Frequency Shift Keying (FSK) standard to superimpose digital communication signals at a low level on top of the 4-20mA as shown in fig. This enables two-way field communication to take place and makes it possible for additional information(tag numbers, measured variables, range & span data) beyond just the normal process variable to be communicated to/from a smart field instrument. The HART protocol communicates at 1200 bps without interrupting the 4-20mA signal and allows a host application (master) to get two or more digital updates per second from a field device. As the digital FSK signal is phase continuous, there is no interference with the 4-20mA signal.

93. Give the HART specifications?

The HART specifications include

- a) Physical form of transmission,
- b) Transaction Procedures,

- c) Message structures,
- d) Data formats,
- e) set of commands to perform required operation.

94. Write a brief note on HART signal Levels?

HART protocol specifies that master device transmit a voltage signal whereas slave device transmits a current signal. The current signal is converted in to corresponding voltage by a loop load resistor, so all devices use voltage sensitive receiver circuits. The wave shape is sinusoidal, but trapezoidal waveform is acceptable. A square wave is not acceptable.

95. Write a note on master slave operation?

HART is a master-slave protocol. That is each message transaction is originated by the master station, the slave device only replies only when it receives a command message. The reply from the slave device acknowledges that the command has been received and may contain data requested by the master.

96. Write a note on multimaster operation?

HART protocol allows two active masters in a system, one is “primary master”, another is “secondary master”. Primary master would be the control system secondary master may be a hand-held communicator or a maintenance computer.

97. What are the two modes of communication modes of HART?

- i) Normal mode:- Maximum communication speed in normal mode is 2 message/sec. It performs a normal master-slave operation.
- ii) Burst mode:- To achieve a high data rate a burst mode is used. The communication speed is 3 message/sec. In burst mode a slave device repeatedly sends a data message as though it had received a specific command to do so.

98. What are the two types of frame formats in HART protocol?

- i) Short frame format:- Older HART instruments (Version 4) used short frame format. In this the address of the slave device is ‘0’.
- ii) Long frame format:- HART version 5 introduced ‘Long frame format’. In this the address of the slave device is world wide unique identifier. It is a 38 bit number derived from the manufacturer code. It contains the device code and device id no. Long frame format gives extra security against the possible reception and acceptance of command meant for another device, either due to external interference or due to excessive cross talk.

99. What are the different groups of HART commands?

- i) Universal:- Provides functions which are implemented in all field devices.
Eg. read primary variable and units
- ii) Common-Practice :- Provides functions common to many field devices but not all. If a device uses these functions, these commands should be used to perform them.
- iii) Device specific:- Provides functions which are more or less unique to a particular field device .

100. What are the different HART networks?

i) Point-to-point: In point-to-point mode, the traditional 4–20 mA signal is used to communicate one process variable, while additional process variables, configuration parameters, and other device data are transferred digitally using the HART protocol. The communication takes place between two devices.

ii) Multidrop: -The multidrop mode of operation requires only a single pair of wires and, if applicable, safety barriers and an auxiliary power supply for up to 15 field devices. All process values are transmitted digitally. In multidrop mode, all field device polling addresses are >0, and the current through each device is fixed to a minimum value (typically 4 mA).

101. Write a note on HART compatible multiplexers?

HART-compatible multiplexers are ideal for users who want to interface with a large number of HART devices. Multiplexers can be modular and are capable of supporting both point-to-point and all-digital (multidrop) HART communication modes. Communication between a multiplexer and a host application depends on the multiplexer capabilities (e.g., RS232C, RS485, Modbus, and TCP/IP Ethernet).

102. What are the capabilities to be considered in selecting a HART multiplexer?

HART multiplexer systems, the following capabilities should be considered:

- q Number of HART channels supported
- q Number of HART channels that share a HART modem
- q Burst mode support
- q Multidrop support
- q Method of communication with the host computer or control system

103. What is meant by pass-through feature?

Some control systems are integrated with a configuration or instrument-management application. In these systems, the control system passes a HART command, issued by the management application, to the field device via its I/O interface. When the control system receives the reply from the field device, it sends the reply to the management application. This function is referred to as a *passthrough feature* of the control system.

104. Write a note on HART field controller implementation?

Microprocessor-based smart instrumentation enables control algorithms to be calculated in the field devices, close to the process (Figure 1). Some HART transmitters and actuators support control functionality in the device, which eliminates the need for a separate controller and reduces hardware, installation, and start-up costs. Accurate, closed-loop control becomes possible in areas where it was not economically feasible before. While the control algorithm uses the analog signal, HART communication provides the means to monitor the loop and change control setpoint and parameters.

105. How is the HART protocol linked with OSI model?

The HART protocol utilizes the OSI reference model. As is the case for most of the communication systems on the field level, the HART protocol

implements only the layers 1, 2 and 7 of the OSI model. The layers 3 to 6 remain empty since their services are either not required or provided by the application layer 7.

106)What are the features of HART protocol?

The most important performance features of the HART protocol include:

- ▶ proven in practice, simple design, easy to maintain and operate
- ▶ interoperability
- ▶ compatible with conventional analog instrumentation
- ▶ simultaneous analog and digital communication
- ▶ option of point-to-point or multidrop operation
- ▶ flexible data access via up to two master devices
- ▶ supports multivariable field devices
- ▶ sufficient response time of approx. 500 ms
- ▶ open de-facto standard freely available to any manufacturer or user

107.What is meant by Device Description(DD)?

Some HART host applications use *device descriptions* (DD) to obtain information about the variables and functions contained in a HART field device. The DD includes all of the information needed by a host application to fully communicate with the field device. HART *Device Description Language* (DDL) is used to write the DD, that combines all of the information needed by the host application into a single structured file. The DD identifies which common practice commands are supported as well as the format and structure of all device-specific commands. A DD for a HART field device is roughly equivalent to a printer driver for a computer.

108.What is meant by fieldbus?

Fieldbus is an all digital, serial two way communication system that interconnects devices in the field such as sensors, actuators and controllers. Fieldbus replaces the 4-20mA standards. Fieldbus is a LAN for instruments with built in capability to distribute a control application across the network.

109)Define interoperability?

Interoperability is defined as :-“The ability to operate multiple devices, dependent of manufacturer, in the same system, without loss of minimum functionality”. Interoperability allows mixing devices from different manufacturers on the same fieldbus and allows replacing a defective device with a device from a different vendor.

110)What are the main two components of interoperability?

The two major components are,

- i)Functional Block,
- ii)Device Description.

11)What is meant by device description?

A device description is a driver for the device. The DD includes the operating procedures, variable descriptions and other informations required by the host. DD's are written using Device Description Language.

112)Define interchangeability?

In digital oriented systems, each company product follows their own standards. If in a system with two different operations, one fails and device with slight change can do the other device's operation it is known as interchangeability.

113)What are the different fieldbus topologies?

- i)Point-to-point topology,
- ii)Bus with spurs topology,
- iii)Tree topology,
- iv)Daisy chain topology.

114)What is meant by Point-to-point topology?

This topology consist of a segment having only two devices. It is used in the field where slave and host devices operates independently. Eg; a transmitter and valve with no connection beyond the two.

115)What is meant by Bus with spur topology?

With this topology, the fieldbus devices are connected to the bus segment through a length of cable called a spur. A spur can vary in length from 1m to 120 m. If spur is less than 1 m it is called splice.

116)What is meant by daisy chain topology?

With this topology the fieldbus cable is routed from device to device on the segment and is interconnected at the terminals of each fieldbus devices.

117)What is meant by tree topology?

With this topology fieldbus devices on a single segment are connected via individual twisted wire pairs to a common junction box, terminals. It resembles the structure of a tree.

118)What is meant by mixed topology?

Combination of all the above topologies is called mixed topology.

119)What is meant by communication stack?

The communication stack is comprised of the layers 2 and 7 in the OSI model (Data Link layer and Application layer).

120)What are the two types of fieldbus?

- i)H1 fieldbus:- low speed (31.25 kbps),
error proof transmission,
used for control applications such as temp, level and flow control.

ii)H2 fieldbus:-High speed(1 mbps or 2.5 mbps)
used in advance process control, remote input/output and high
speed factory automation applications.