

EC8551 -COMMUNICATION NETWORKS QUESTION BANK**TWO MARK QUESTIONS WITH ANSWERS****UNIT 1****1. What are the three criteria necessary for an effective and efficient network?**

The most important criteria are performance, reliability and security. Performance of the network depends on number of users, type of transmission medium, the capabilities of the connected h/w and the efficiency of the s/w. Reliability is measured by frequency of failure, the time it takes a link to recover from the failure and the network's robustness in a catastrophe. Security issues include protecting data from unauthorized access and viruses.

2. Group the OSI layers by function.

The seven layers of the OSI model belonging to three subgroups. Network support layers: Consisting of Physical, data link and network layers and they deal with the physical aspects of moving data from one device to another. User support layers: Consists of Session, presentation and application layers and they allow interoperability among unrelated software systems. The transport layer ensures end-to-end reliable data transmission

3. What are the features provided by layering?

- It decomposes the problem of building a network into more manageable components. Rather than implementing a monolithic piece of software that does everything implement several layers, each of which solves one part of the problem.
- It provides more modular design. To add some new service, it is enough to modify the functionality at one layer, reusing the functions provided at all the other layers.

4. What are the two interfaces provided by protocols?

- Service interface
- Peer interface
- Service interface-defines the operations that local objects can perform on the protocol.
- Peer interface-defines the form and meaning of messages exchanged between protocol peers to implement the communication service.

5. What is LAN?

A LAN is a common name used to describe a group of devices that share a geographic location. LAN is limited to single building or campus.

6. What is 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.

7. Define Error detection and correction.

Error Detection:

Data can be corrupted during transmission. It is called as an error. For reliable

communication, the receiver must find out the errors occurred in the data which is called as error detection.

Error Correction:

It is the mechanism to correct the errors and it can be handled in 2 ways.

- a) When an error is discovered, the receiver can have the sender retransmit the entire data unit.
- b) A receiver can use an error correcting coder, which automatically corrects certain error.

8. What is the use of two dimensional parity in error detection?

Two-dimensional parity check increases the likelihood of detecting burst errors. It is used to detect errors occurred in more than one bits.

9. What are the issues in data link layer?

The data link layer has a number of specific functions it can carry out. These functions include,

- a) Providing a well-defined service interface to the network layer.
- b) Dealing with transmission errors.
- c) Regulating the flow of data so that slow receivers are not swamped by fast senders.

10. What are the ways to address the framing problem?

The framing problem can be addressed by the following protocols:

- Byte-Oriented Protocols(PPP)
- Bit-Oriented Protocols(HDLC)
- Clock-Based Framing(SONET)

11. What are the responsibilities of data link layer?

Specific responsibilities of data link layer include the following.

- a) Framing
- b) Physical addressing
- c) Flow control
- d) Error control
- e) Access control

12. Mention the types of errors.

There are 2 types of errors

- a) Single-bit error.
- b) Burst-bit error.

13. Define the following terms.

Single bit error: The term single bit error means that only one bit of a given data unit (such as byte character/data unit or packet) is changed from 1 to 0 or from 0 to 1.

Burst error: Means that 2 or more bits in the data unit have changed from 1 to 0 from 0 to 1.

14. What is redundancy?

It is the error detecting mechanism, which means a shorter group of bits or extra bits may be appended at the destination of each unit.

15. What is the purpose of hamming code?

A hamming code can be designed to correct burst errors of certain lengths. So the simple

strategy used by the hamming code to correct single bit errors must be redesigned to be applicable for multiple bit correction.

16. What is mean by error control?

Error control is a method that can be used to recover the corrupted data whenever possible. These are two basic types of error control which are backward error control and forward error control.

17. What is OSI?

A standard that specifies a conceptual model called Open systems Interconnection network interface model, which breaks networked communications into seven layers: Application, Presentation, Session, Transport, Network, Data link, Physical.

18. State the major functions performed by the presentation layer of the ISO OSI model.

(Nov Dec 2006)

Presentation layer is concerned with the format of data exchanged between peers, for example, whether an integer is 16, 32, or 64 bits long and whether the most significant bit is transmitted first or last, or how a video stream is formatted.

19. State the purpose of layering in networks? (May Jun 2007)

A layer is a collection of related functions that provides services to the layer above it and receives services from the layer below it.

To execute the functions by each layer is independent.

20. What are the two fundamental ways by which network performance is measured?

1. Bandwidth
2. Latency

UNIT - II

1. What are the responsibilities of Network Layer?

The Network Layer is responsible for the source-to-destination delivery of packet possibly across multiple networks (links).

- a. Logical Addressing
- b. Routing.

2. What is DHCP?

The Dynamic Host Configuration Protocol has been derived to provide dynamic configuration. DHCP is also needed when a host moves from network to network or is connected and disconnected from a network.

3. Define ICMP

Internet Control Message Protocol is a collection of error messages that are sent back to the source host whenever a router or host is unable to process an IP datagram successfully.

4. What is the need of internetwork?

To exchange data between networks, they need to be connected to make an Internetwork.

5. What are the types of class full addressing?

The types are Class A, Class B, Class C, Class D, and Class E

6. What do you mean by ARP?

ARP stands for Address resolution protocol. ARP is a dynamic mapping method that finds a physical address for a given a logical address. i.e. mapping IP address to physical address.

7. What do you mean by RARP?

RARP stands for Reverse Address resolution protocol, maps a MAC address to an IP address.

8. What are the functions of MAC?

MAC sub layer resolves the contention for the shared media. It contains synchronization, flag, flow and error control specifications necessary to move information from one place to another, as well as the physical address of the next station to receive and route a packet.

9. Define the term medium access control mechanism

The protocol that determines who can transmit on a broadcast channel are called medium access control (MAC) protocol. The MAC protocols are implemented in the Mac sub-layer which is the lower sub-layer of the data link layer.

10. What is bridge?

Bridge is a hardware networking device used to connect two LANs. A bridge operates at data link layer of the OSI reference model.

11. What is a repeater?

Repeater is a hardware device used to strengthen signals being transmitted on a network.

12. Define router

A network layer device that connects networks with different physical media and translates between different network architecture.

13. What is a switch?

A switch is a networking device that manages networked connections between devices on a star networks.

14. What is mean by Ethernet?

Ethernet is a networking technology developed in 1970 which is governed by the IEEE 802.3 specifications.

15. Advantages of Ethernet

1. Inexpensive
2. Easy to install
3. Supports various wiring technologies.

16. Identify the class and default subnet mask of the IP address 217.65.10.7.

IP Address 217.65.10.7 belongs to Class C. Its subnet mask is 255.255.255.0.

17. What are the limitations of bridges?

1. Scale
2. Heterogeneity

18. Define Bluetooth.

Bluetooth is a wireless technology standard for exchanging data over short distances (using short-wavelength UHF radio waves in the ISM band from 2.4 to 2.485 GHz) from fixed and mobile devices and building personal area networks (PANs).

20. What are the 3 levels of hierarchy in IP Addressing?

1. Netid
2. Subnetid
3. Hostid

21. What are the functions of bridge?

1. Connecting networks
2. Filtering information so that network traffic for one portion of the network does not congest the rest of the network.

22. Define sub-netting

Sub-netting is a technique that allows a network administrator to divide one physical network into smaller logical networks and thus control the flow of traffic for security or efficiency reasons.

UNIT - III

1. What is routing?

Routing is a process of selecting paths in a network through which network traffic is sent.

2. Define an internetwork.

A collection of interconnected network is called an internetwork.

3. What does routing metric mean?

A routing metric is a unit calculated by a routing algorithm for selecting or rejecting a routing path for transferring data/traffic.

4. What are the metrics used in determining the best path for a routing protocol?

- Bandwidth
- Delay
- Load
- Reliability
- Cost
- Hop count

- MTU
- Ticks

5. What is multicasting?

Multicasting is the delivery of information to a group of destinations simultaneously using the most efficient strategy to deliver the messages over each link of the network only once.

6. What are different types of multicast routing?

1. Reverse path multicasting
2. Reverse path broadcasting

7. What is multicast? What is the motivation for developing multicast?

Multicasting means delivering the same packet simultaneously to a group of clients. Motivation for developing multicast is that there are applications that want to send a packet to more than one destination hosts.

8. Define RIP.

RIP is a dynamic protocol used for finding the best route or path from one-to-end over a network by using a routing metric/ hop count algorithm.

9. What is OSPF?

OSPF protocol is a router protocol used within larger autonomous system networks in preference to the Routing Information Protocol (RIP).

10. What are the features of OSPF?

- Authentication of routing messages
- Additional hierarchy
- Load balancing

11. Mention any four applications of multicasting

- Broad casts of audio and video
- Video conferencing
- Shared Applications.
- IGMP is used by multicast routers to keep track of membership in a multicast group.

12. Describe the process of routing packets

Routing is the act of moving information across an internetwork from a source to a destination.

13. What are the some routing algorithm types?

The routing types are static, dynamic, flat, hierarchical, host-intelligent, router- intelligent, intra-domain, inter-domain, link state and distance vector.

14. What is a benefit of DHCP?

- Simplicity: clients need to manual configuration.
- Mobility and hosts: Hosts may move between networks without reconfiguring.

- Mobility of network: Possible for internet service providers to reconfigure customers address transparently.
- Save address space if individual clients are not always active.

15. What are the 3 types of routing performed by BGP?

- Inter-autonomous system routing
- Intra-autonomous system routing
- Pass through autonomous system routing

16. What are the different kinds of multicast routing?

- DVMRP
- PIM
- MSDP
- MOSPF
- MBGP

17. Write the types of PIM.

- PIM Sparse mode
- PIM Dense mode
- Bidirectional PIM
- Source Specific Multicast (SSM)

18. How can the routing be classified?

The routing can be classified as,

- Adaptive routing
- Non-adaptive routing.

19. What are the salient features of IPv6?

Salient features are:

- Efficient and hierarchical addressing and routing infrastructures.
- IPv6 networks provide auto configuration capabilities.
- Better support for QOS.
- Large Address space.
- Stateless and stateful address configuration.

20. Write the BGP Message types.

- Open
- Update
- Notification
- Keep-alive

UNIT- IV**1. What are the fields on which the UDP checksum is calculated? Why?**

UDP checksum includes a pseudo header, the UDP header and the data coming from the application layer.

2. What are the advantages of using UDP over TCP?

- UDP does not include the overhead needed to detect reliability
- It does not need to maintain the unexpected deception of data flow
- UDP requires less processing at the transmitting and receiving of hosts.
- It is simple to use for a network
- The OS does not need to maintain UDP connection information.

2. What is TCP?

TCP provides a connection oriented, reliable byte stream service. The connection oriented means the two applications using TCP must establish a TCP connection with each other before they can exchange data.

3. Define congestion

When too many packets rushing to a node or a part of network, the network performance degrades. This situation is called as congestion.

4. List the flag used in TCP header.

TCP header contains six flags. They are URG, ACK, PSH, RST, SYN, FIN

5. Give the approaches to improve the QoS.

Fine grained approaches, which provide QoS to individual applications or flows. Integrated services, QoS architecture developed in the IETE and often associated with RSVP.

6. What do you mean by QoS?

Quality of Service is used in some organizations to help provide an optimal end user experience for audio and video communications. QoS is most commonly used on networks where bandwidth is limited with a large number of network packets competing for a relatively small amount of available and width.

7. What is multiplexing?

The job of gathering data chunks at the sources host from different sockets, encapsulating each data chunks with header information to create segments, and passing the segments to the network layer is called multiplexing.

8. What is de-multiplexing?

The job of delivering the data in a transport layer segment to the correct socket is called de-

multiplexing.

9. What is RTT?

RTT is an acronym for Round Trip Time: it is a measure of the time it takes for a packet to travel from a computer, across a network to another computer, and back.

10. What is the segment?

Transport layer protocols send data as a sequence of packets. In TCP/IP these packets are called segments.

11. What is a port?

Applications running on different hosts communicate with TCP with the help of a concept called as ports. A port is a 16 bit unique number allocated to a particular application.

12. List the services of end to end services.

- Guarantee message delivery.
- Delivery messages in the same order they are sent.
- Deliver at most one copy of each message.
- Support arbitrarily large message.
- Support synchronization.

13. What is congestion?

When load on network is greater than its capacity, there is congestion of data Packets. Congestion occurs because routers and switches have queues or buffers.

14. What are the functions of transport layer?

- Breaks messages into packets.
- Connection control.
- Addressing.
- Provide reliability.

15. What are the types of QoS tools?

Classification Congestion management,

- Congestion avoidance
- Shaping/policing
- Link efficiency

16. List some ways to deal with congestion

- packet elimination
- Flow control
- Buffer allocation

- Choke packets

17. Define network congestion?

When two or more nodes would simultaneously try to transmit packets to one node there is a high probability that the number of packets would exceed the packet handling capacity of the network and lead to congestion.

18. List the three types of addresses in TCP/IP.

Three types of addresses are used by systems using the TCP/IP protocol: the physical address, the internetwork address (IP address), and the port address.

19. What is the flow characteristics related to QoS?

The flow characteristics related to QoS are

- Reliability
- Delay
- Jitter
- Bandwidth

20. What are the techniques to improve QoS?

The techniques to improve QoS are

- Scheduling
- Traffic shaping
- Resource reservation
- Admission control

21. Define Socket address.

The combination of IP address and port address is called Socket address.

22. What are the two types of protocols used in Transport layer?

The two types of protocols used in Transport layer are

- TCP
- UDP

23. Define Throughput.

It is defines as a number of packets passing through the network in a unit of time.

24. Define UDP

User datagram protocol is a Unreliable, connectionless protocol, used along with the IP protocol.

25. What is the need of port numbers?

Port numbers are used as an addressing mechanism in transport layer.

26. What are the types of port numbers used in transport layer?

- Well-known port
- Registered port
- Dynamic port

27. Why TCP services are called Stream delivery services?

TCP allows the sending process to deliver data as a stream of bytes and the receiving process to deliver data as a stream of bytes. So it is called as stream of bytes.

28. Define jitter

Jitter is defined as a variation in the delay of received packets. The sending side transmits packets in a continuous stream and spaces them evenly apart. Because of network congestion, improper queuing, or configuration errors, the delay between packets can vary instead of remaining constant.

29. Compare connectionless service & connection oriented service

In connection less service there is no connection between transmitter & receiver Ex: UDP

In connection oriented service there is a connection between transmitter & receiver Ex: TCP

30. What is Unicast & Multicast communication?

- **Unicast communication** is one source sending a packet to one destination.
- **Multicast communication** is one source sending a packet to multiple destinations.

UNIT - V**1. Define the two types of user agents in the electronic mail system**

- Command driven: It normally accepts a one character command from the keyboard to perform its task.
- GUI based: They contain GUI components that allow the user to interact with the software by using both the keyword and mouse.

2. What is DNS?

DNS is a client/server application that identifies each host on the internet with a unique user friendly name.

3. What is the purpose of inverse domain?

The inverse domain is used to map an address to a name.

4. What is SMTP?

Simple Mail Transfer Protocol is a standard and reliable host to host mail transport protocol that operates over the TCP port 25.

5. State the Purpose of SNMP

The primary purpose of SNMP is to allow the network administrator to monitor and configure devices on the network, remotely via the network. These configuration and monitoring capabilities are collectively referred to as management.

6. What is the Domain name system responsible for?

The Domain Name system converts domain names (of the form www.vtubooks.com) into IP numbers.

7. What are the four main properties of HTTP?

- Global Uniform Resource Identifier
- Request response exchange.
- Statelessness.
- Resource meta data

8. What is SMTP used for?

SMTP is used when email is delivered from an email client, such as Outlook Express, to an email server or when email is delivered from one email server to another.

9. What is virtual terminal?

A virtual terminal is a data structure maintained by either the application software or a local terminal.

10. What are the basic functions of email?

Composition, Transfer, Reporting, Displaying and Disposition of mails.

11. Define WWW?

It is an internet application that allows users to view web pages and move from one web page to another.

12. What is the web browser?

Web browser is a software program that interprets and displays the contents of HTML web pages.

13. What is URL?

URL is a string identifier that identifies a page on the World Wide Web.

14. What do you mean by TELNET?

TELNET is used to connect remote computers and issue commands on those computers.

15. What are the responsibilities of Application Layer?

The Application Layer enables the user, whether human or software, to access the network. It provides user interfaces and support for services such as e-mail, shared database management and other types of distributed information services

- Network virtual Terminal,

- File transfer, access and Management (FTAM),
- Mail services,
- Directory Services

16. **Write down the three types of WWW documents.**

The documents in the WWW can be grouped into three broad categories: static, dynamic and active.

- A) *Static*: Fixed-content documents that are created and stored in a server.
- B) *Dynamic*: Created by web server whenever a browser requests the document.
- C) *Active*: A program to be run at the client side.

17. **What is fully Qualified Domain Name?**

If a label is terminated by a null string is called a Fully Qualified Domain Name.

18. **What is Generic Domains?**

Generic domain defines registered hosts according to their generic behavior. Each node in the tree defines a domain, which is an index to the domain name space database. Eg.-

com – Commercial organizations,
 edu - Educational institutions,
 gov – Government Institutions.

19. **What is simple mail transfer protocol?**

The TCP/IP protocol that supports electronic mail on the internet is called Simple Mail Transfer Protocol (SMTP). It is a system for sending messages to other computer users based on email addresses.

20. **What do you mean by File transfer protocol?**

It is a standard mechanism provided by the internet for copying a file from one host to another.

21. **What are the two types of connections in FTP?**

The two types of connections in FTP are

- Control connection
- Open connection

22. **Define HTTP.**

It is used mainly to access data on the World Wide Web. The protocol transfers data in the form of plaintext, hypertext, audio, video and soon.

23. **What are the types of messages in HTTP transaction?**

The types of messages in HTTP transaction are

- Request messages
- Response messages

24. What are the parts of a browser?

The parts of a browser are

- A controller
- A client program
- Interpreter

25. Name the four aspects of security.

- Privacy
- Authentication
- Integrity
- Non-repudiation

26. What is POP?

Post Office Protocol, version3 (POP3) and Internet Mail Access Protocol version4 (IMAP4) are protocol used by a mail server in conjunction with SMTP to receive and hold mail for hosts.

27. What is the function of SMTP?

The TCP/IP protocol supports electronic mail on the Internet is called Simple Mail Transfer (SMTP). It is a system for sending messages to other computer users based on email addresses. SMTP provides mail exchange between users on the same or different computers.

28. How does MIME enhance SMTP?

MIME is a supplementary protocol that allows non-ASCII data to be sent through SMTP. MIME transforms non-ASCII data at the sender site to NVT ASCII data and delivers it to the client SMTP to be sent through the Internet. The server SMTP at the receiving side receives the NVT ASCII data and delivers it to MIME to be transforming feed back to the original data.

29. Why is an application such as POP needed for electronic messaging?

Workstations interact with the SMTP host, which receives the mail on behalf of every host in the organization, to retrieve messages by using a client-server protocol such as Post Office Protocol, version 3(POP3). Although POP3 is used to download messages from the server, the SMTP client still needed on the desktop to forward messages from the workstation user to its SMTP mail server.

STUCOR APP

IMPORTANT 16 MARKS WITH KEY POINTS**UNIT -I****1. Explain ISO/OSI reference model.**

- Physical layer
- Data link layer
- Network layer
- Transport layer
- Session layer
- Presentation layer
- Application layer

D
N
T
S
P
A

2. Explain the topologies of the network.

- Mesh topology
- Star topology
- Tree topology
- Bus topology
- Ring topology

3. Explain the categories of networks.

- Local Area Network(LAN)
- Metropolitan Area Network(MAN)
- Wide Area Network(WAN)

4. Explain error detection and error correction techniques.

Types of errors

- Single bit error
- Burst error

Error detection

- Vertical redundancy check(VRC)
- Longitudinal redundancy check(LRC)
- Cyclic redundancy check(CRC)
- Checksum

Error correction

- Single-bit error correction
- Hamming code

- Burst error correction

5. Explain error control mechanism.

- Stop and wait ARQ
- Sliding window ARQ
- Go back-n
- Selective-reject

UNIT - II

1. Explain detail about IEEE 802.3 MAC sub-layer

Frame format
 Frame length
 Ethernet specifications
 Manchester encoding
 Binary exponential Back off algorithm
 Ethernet performance

2. Explain detail about Bluetooth architecture

Radio layer
 Baseband layer
 Frame format
 L2CAP
 Hidden Station Problem

3. Explain about IPv4 address

Classful addressing
 Special IP addressing
 Classless addressing
 Header format
 IP fragmentation Options
 Sub-netting a network

4. Explain about Address resolution protocol Packet format

Encapsulation
 Proxy ARP

5. Explain about RARP

Frame Format of RARP
 Encapsulation

6. Explain about Internet Control Message Protocol

Message types
 Message format
 Error Reporting
 Echo Request and reply
 Time stamp request and reply

Address mask request and reply message.

7. Explain about Ethernet.

Access method : CSMA/CD Addressing

Electrical specification

Frame format Implementation:

10 base 5:Thick Ethernet

10 base 2: Thin Ethernet,

10 base T : Twisted-pair Ethernet

1 base 5 : Star LAN

UNIT – III

1.Explain IP addressing method.

Internetwork protocol (IP) Datagram

Addressing Classes

Dotted decimal notation

2. Define routing & explain distance vector routing and link state routing.

Distance vector routing

Sharing information

Routing table:

Creating the table

Updating the table:

Updating algorithm

Link state routing:

Information sharing

Packet cost

Link state packet:

Getting information about neighbors

Initialization Link state database

3.Define bridge and explain the type of bridges.

Bridges:

Types of bridges

Simple bridge

Multi-port bridge

Transparent bridge

4.Explainsub-netting

Three levels of hierarchy masking

Masks without sub-netting

Masks with sub-netting

Finding the sub-network address

Boundary level masking
Non-boundary level masking

5. Write short notes about repeaters, routers and gateways.

Repeaters
Routers: Routing concepts
Least-cost routing
Non adaptive routing
Adaptive routing
Packet lifetime
Gateways

UNIT- IV

1. Explain the duties of transport layer.

End to end delivery
Addressing
Reliable delivery
Error control
Sequence control
Loss control
Duplication control
Flow control
Multiplexing

2. Explain UDP & TCP.

User Datagram Protocol (UDP)

Source port address
Destination port address
Total length
Checksum

Transmission Control Protocol (TCP)

Source port address
Destination port address
Sequence number
Acknowledgement number
Header length
Reserved Control
Window size
Check sum
Urgent pointer
Options and padding

3. Explain about congestion control.

Congestion Control

BECN

FECN

Four situations

Discarding

4. Explain about Congestion Avoidance

DECbit scheme

RED

5. Explain detail about QoS Policing

Integrated service

Traffic Shaping

Admission Control

RSVP

Differentiated Services/Qos

UNIT-V

1. Explain the functions of SMTP.

System for sending messages to other computer users based on e-mail addresses.

SMTP provides mail exchange between users on the same or different computers.

User Agent

Mail Transfer Agent

Multipurpose Internet Mail Extensions

Post Office Protocol

2. Write short notes on FTP.

Transfer a file from one system to another.

TCP connections

Basic model of FTP

3. Explain about HTTP.

HTTP transactions

HTTP messages

URL

4. Explain the WWW in detail.

Hypertext & Hypermedia

Browser Architecture

Categories of Web Documents

HTML

CGI Java

5. Explain about Electronic mail

Email addressing

Message headers

Formatted email

Functions of email

User agent and message transfer agent

Simple mail Transfer protocol

Multipurpose internet mail extensions

Post Office Protocol (POP)

IMAP

6. Explain detail about Domain Name System

Components of DNS

DNS in the internet Name space

Domain name Space Resolution

Message format Resource records

Name servers

Dynamic Domain Name system (DDNS)

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MC1704 Computer Graphics and Multimedia System**2 Marks Questions**

1. What is scan conversion?

A major task of the display processor is digitizing a picture definition given in an application program into a set of pixel-intensity values for storage in the frame buffer. This digitization process is called scan conversion.

2. Write the properties of video display devices?

Properties of video display devices are persistence, resolution, and aspect ratio.

3. What is rasterization?

The process of determining the appropriate pixels for representing picture or graphics object is known as rasterization.

4. Define Computer graphics.

Computer graphics remains one of the most existing and rapidly growing computer fields. Computer graphics may be defined as a pictorial representation or graphical representation of objects in a computer.

5. Name any four input devices.

Four input devices are keyboard, mouse, image scanners, and trackball.

6. Write the two techniques for producing color displays with a CRT?

Beam penetration method, shadow mask method

7. What is vertical retrace of the electron beam?

In raster scan display, at the end of one frame, the electron beam returns to the left top corner of the screen to start the next frame, is called vertical retrace of the electron beam.

8. Short notes on video controller?

Video controller is used to control the operation of the display device. A fixed area of the system is reserved for the frame buffer, and the video controller is given direct access to the frame buffer memory.

9. What is bitmap?

Some system has only one bit per pixel; the frame buffer is often referred to as bitmap.

10. Differentiate plasma panel display and thin film electro luminescent display?

In plasma panel display, the region between two glass plates is filled with neon gas. In thin film electro luminescent display, the region between two glasses plates are filled with phosphor, such as zinc sulphide doped with manganese.

11. What is resolution?

The maximum number of points that can be displayed without overlap on a CRT is referred to as the resolution.

12. What is horizontal retrace of the electron beam?

In raster scan display, the electron beam return to the left of the screen after refreshing each scan line, is called horizontal retrace of the electron beam.

13. What is filament?

In the CRT, heat is applied to the cathode by directing a current through a coil of wire, is called filament.

14. What is pixmap?

Some system has multiple bits per pixel, the frame buffer is often referred to as pixmap.

15. Write the types of clipping?

Point clipping, line clipping, area clipping, text clipping and curve

clipping.

16. What is meant by scan code?

When a key is pressed on the keyboard, the keyboard controller places a code carry to the key pressed into a part of the memory called as the keyboard buffer. This code is called as the scan code.

17. List out the merits and demerits of Penetration techniques?

The merits and demerits of the Penetration techniques are as follows

- It is an inexpensive technique
- It has only four colors
- The quality of the picture is not good when it is compared to other techniques
- It can display color scans in monitors
- Poor limitation etc.

18. List out the merits and demerits of DVST?

The merits and demerits of direct view storage tubes [DVST] are as follows

- It has a flat screen
- Refreshing of screen is not required
- Selective or part erasing of screen is not possible
- It has poor contrast

Performance is inferior to the refresh CRT.

19. What do you mean by emissive and non-emissive displays?

The emissive display converts electrical energy into light energy. The plasma panels, thin film electro-luminescent displays are the examples.

The Non-emissive are optical effects to convert the sunlight or light from any other source to graphic form. Liquid crystal display is an example.

20. List out the merits and demerits of Plasma panel display?

Merits

- Refreshing is not required
- Produce a very steady image free of Flicker
- Less bulky than a CRT.

Demerits

- Poor resolution of up to 60 d.p.i
- It requires complex addressing and wiring
- It is costlier than CRT.

21. What is persistence?

The time it takes the emitted light from the screen to decay one tenth of its original intensity is called as persistence.

22. What is Aspect ratio?

The ratio of vertical points to the horizontal points necessary to produce length of lines in both directions of the screen is called the Aspect ratio. Usually the aspect ratio is $\frac{3}{4}$.

23. What is the difference between impact and non-impact printers?

Impact printer press formed character faces against an inked ribbon on to the paper. A line printer and dot-matrix printer are examples.

Non-impact printer and plotters use Laser techniques, inkjet sprays, Xerographic process, electrostatic methods and electro thermal methods to get images onto the papers. Examples are: Inkjet/Laser printers.

24. Define pixel?

Pixel is shortened forms of picture element. Each screen point is referred to as

pixel or pel.

25. What is frame buffer?

Picture definition is stored in a memory area called frame buffer or refresh buffer.

26. Where the video controller is used?

A special purpose processor, which is used to control the operation of the display device, is known as video controller or display controller.

27. What is run length encoding?

Run length encoding is a compression technique used to store the intensity values in the frame buffer, which stores each scan line as a set of integer pairs. One number each pair indicates an intensity value, and second number specifies the number of adjacent pixels on the scan line that are to have that intensity value.

28. What is point in the computer graphics system?

The point is a most basic graphical element & is completely defined by a pair of user coordinates (x, y).

29. Write short notes on lines?

A line is of infinite extent can be defined by an angle of slope q and one point on the line $P=P(x,y)$. This can also be defined as $y=mx+C$ where C is the Yintercept.

30. Define Circle?

Circle is defined by its center x_c, y_c and its radius in user coordinate units.

The equation of the circle is $(x-x_c) + (y-y_c) = r^2$.

31. What are the various attributes of a line?

The line type, width and color are the attributes of the line. The line type include solid line, dashed lines, and dotted lines.

32. What is antialiasing?

The process of adjusting intensities of the pixels along the line to minimize the effect of aliasing is called antialiasing.

33. What is Transformation?

Transformation is the process of introducing changes in the shape size and orientation of the object using scaling rotation reflection shearing & translation etc.

34. What is translation?

Translation is the process of changing the position of an object in a straight-line path from one coordinate location to another. Every point (x, y) in the object must under go a displacement to (x|,y|). the transformation is:

$$x| = x + tx ; y| = y + ty$$

35. What is rotation?

A 2-D rotation is done by repositioning the coordinates along a circular path, in the x-y plane by making an angle with the axes. The transformation is given by: $X| = r \cos (q + f)$ and $Y| = r \sin (q + f)$.

36. What is scaling?

A 2-D rotation is done by repositioning the coordinates along a circular path, in the x-y plane by making an angle with the axes. The transformation is given by: $X| = r \cos (q + f)$ and $Y| = r \sin (q + f)$.

37. What is shearing?

The shearing transformation actually slants the object along the X direction or the Y direction as required. ie; this transformation slants the shape of an object along a required plane.

38. What is reflection?

The reflection is actually the transformation that produces a mirror image of an object. For this use some angles and lines of reflection.

39. What are the two classifications of shear transformation?

X shear, y shear.

40. A point (4,3) is rotated counterclockwise by an angle of 45° . Find the rotation matrix and the resultant point.

41. Name any three font editing tools.

ResEdit, FONTographer,

42. Differentiate serif and sans serif fonts. Give one example

Serif fonts has a little decoration at the end of the letter, but serif font has not. Times, new century schoolbook is the examples of serif fonts. Arial, potima are examples for sans serif fonts.

43. Distinguish between window port & view port?

A portion of a picture that is to be displayed by a window is known as window port. The display area of the part selected or the form in which the selected part is viewed is known as view port.

44. Define clipping?

Clipping is the method of cutting a graphics display to neatly fit a predefined graphics region or the view port

45. What is the need of homogeneous coordinates?

To perform more than one transformation at a time, use homogeneous coordinates or matrixes. They reduce unwanted calculations intermediate steps saves time and memory and produce a sequence of transformations.

46. Distinguish between uniform scaling and differential scaling?

When the scaling factors s_x and s_y are assigned to the same value, a uniform scaling is produced that maintains relative object proportions. Unequal values for s_x and s_y result in a differential scaling that is often used in design application

47. What is fixed point scaling?

The location of a scaled object can be controlled by a position called the fixed point that is to remain unchanged after the scaling transformation.

48. What is Bezier Basis Function?

Bezier Basis functions are a set of polynomials, which can be used instead of the primitive polynomial basis, and have some useful properties for interactive curve design.

49. What is surface patch

A single surface element can be defined as the surface traced out as two parameters (u, v) take all possible values between 0 and 1 in a two-parameter representation. Such a single surface element is known as a surface patch.

50. Define B-Spline curve?

A B-Spline curve is a set of piecewise(usually cubic) polynomial segments that pass close to a set of control points. However the curve does not pass through these control points, it only passes close to them.

51. What is a spline?

To produce a smooth curve through a designed set of points, a flexible strip called spline is used. Such a spline curve can be mathematically described with a piecewise cubic polynomial function whose first and second derivatives are continuous across various curve section.

52. What are the different ways of specifying spline curve?

- Using a set of boundary conditions that are imposed on the spline.

- Using the state matrix that characteristics the spline
- Using a set of blending functions that calculate the positions along the curve path by specifying combination of geometric constraints on the curve

53. What are the important properties of Bezier Curve?

- It needs only four control points
- It always passes through the first and last control points
- The curve lies entirely within the convex half formed by four control points.

54. Define Projection?

The process of displaying 3D into a 2D display unit is known as projection. The projection transforms 3D objects into a 2D projection plane

55. What are the steps involved in 3D transformation?

- Modeling Transformation
- Viewing Transformation
- Projection Transformation

Workstation Transformation

56. What do you mean by view plane?

A view plane is nothing but the film plane in camera which is positioned and oriented for a particular shot of the scene.

57. Define projection?

The process of converting the description of objects from world coordinates to viewing coordinates is known as projection

58. What you mean by parallel projection?

Parallel projection is one in which z coordinates is discarded and parallel lines from each vertex on the object are extended until they intersect the view plane.

59. What do you mean by Perspective projection?

Perspective projection is one in which the lines of projection are not parallel. Instead, they all converge at a single point called the center of projection.

60. What is Projection reference point?

In Perspective projection, the lines of projection are not parallel. Instead, they all converge at a single point called Projection reference point.

61. Define computer graphics animation?

Computer graphics animation is the use of computer graphics equipment where the graphics output presentation dynamically changes in real time. This is often also called real time animation.

62. What is tweening?

It is the process, which is applicable to animation objects defined by a sequence of points, and that change shape from frame to frame.

63. Define frame?

One of the shape photographs that a film or video is made of is known as frame.

64. What is key frame?

One of the shape photographs that a film or video is made of the shape of an object is known initially and for a small no of other frames called keyframe

65. Define Multimedia

Multimedia is the use of the computer to present and combine text, graphics, audio and video with links and tools that lets the user to navigate,

interact, create and communicate.

66. What is multimedia PC:

A multimedia PC is a computer that has a CD-ROM or DVD drive and supports 8-bit and 16-bit waveform audio recording and playback, MIDI sound synthesis, and MPEG movie watching, with a central processor fast enough and a RAM large enough to enable the user to play and interact with these media in real time, and with a hard disk large enough to store multimedia works that the user can create.

67. Where to use multimedia?

Multimedia improves information relation. Multimedia applications includes the following:

- _ Business
- _ Schools
- _ Home
- _ Public place

68. List out the benefits of multimedia

Benefits of multimedia are

- _ Training
- _ Sales
- _ Communications
- _ Medicines

69. What is hypermedia?

A set of documents in which a given document can contain text, graphics video and audio clips as well as embedded references to other documents world wide web pages are hypermedia documents.

70. What is hypertext?

Hyper text is an application of indexing text to provide a rapid search of specific text strings in one or more documents. Hypertext is an integral part of hypermedia documents. In multimedia applications, a hypermedia documents is the basic complex object of which text is a sub-object. Other sub-objects in the basic object include images, sound, and full-motion video.

71. List out the building blocks of multimedia.

- _ Text
- _ Image
- _ Sound
- _ Animation
- Video

72. What are the main functions of a multimedia development system?

Multimedia development system must perform main three functions as follows:

- _ Input data
- _ Development
- _ Data output

Data input from sources such as cameras or musical instruments, application development, and data output to some delivery medium such as a videodisk or CD-ROM.

73. Define Typeface

Typeface is measured in point sizes, where one point is approximately 1/72 of an inch. It is a measure of the height of the metal blocks containing letters.

74. Define the following:

(i) X-height (ii) Set (iii) Kerning

X-height: The X-height is the measurement of the height of the character X, in other words of the middle bit without any ascender or descender.

(ii) Set: The width of the letters is called the set and is fixed relative to the point-size.

(iii) Kerning: The spaces between letters in one word (tracking) can be adjusted in a process called kerning.

75. Define the following respective to sound:

(i) Waveform (ii) Frequency (iii) Amplitude

i) Waveform

Sound is produced by the vibration of matter. During the vibration pressure variation are created in the air surrounding it. The pattern of the oscillation is called a waveform.

(ii) Frequency

The frequency of the sound is the reciprocal value of the period. It represents the number of period s in a second and it is measured in Hertz (Hz) or cycles per second.

(iii) Amplitude

A sound also has amplitude. The amplitude of a sound is a measure of the displacement of the air pressure wave from its, or quiescent state.

76. Define quantization (or) resolution?

The resolution (or) quantization of a sample value depends on the number of bits used in measuring the height of the waveform. An 8-bit quantization yields 256 possible values, 16-bit CD-quadra quantization results in over 65536 values.

77. What are the types of sound objects that can be used in multimedia production?

There are four types of sound objects that can be used in multimedia production:

- _ Waveform audio
- _ MIDI sound tracks
- _ Compact disc (CD) audio
- _ MP3 files

78. What is MIDI?

Musical Instrument Digital Interface (MIDI) is the interface between electronic musical instruments and computers is a small piece of equipment that plugs directly into the computer's serial port and allows the transmission of music signal. MIDI is considered to be the most compact interface that allows full-scale output.

79. List out the components of MIDI interface.

A MIDI interface has two different components:

- _ Hardware
- _ Data format

Hardware connects the equipment. It specifies the physical connection between musical instruments, stimulate that a port MIDI port is built into an instrument, specifies a MIDI cable and deals with electronic signals t that are sent over the cable.

Data format encodes the information traveling through the hardware

MIDI data format includes an instrument –connected data format. The encoding includes, besides the instrument specification, the notion of the beginning and end

of a note, basic frequency and sound volume; MIDI data allow an encoding of about 10 octaves, which corresponds to 128 notes.

80. Define the term flicker in video.

A periodic fluctuation of brightness perception is called flicker effect.

81. Define Random scan/Raster scan displays?

Random scan is a method in which the display is made by the electronic beam which is directed only to the points or part of the screen where the picture is to be drawn.

The Raster scan system is a scanning technique in which the electrons sweep from top to bottom and from left to right. The intensity is turned on or off to light and unlight the pixel.

82. What is an MPC?

The MPC computer is not a hardware unit but rather a standard that includes minimum specifications to turn Intel microprocessor-based computers into multimedia computers.

83. List all the MPC standards

There are currently three MPC standards as follows

- _ MPC Level 1
- _ MPC Level 2
- _ MPC Level 3

The standards apply not only to desktop computers but also to increasingly more powerful multimedia laptops.

84. What is configuration of MPC level 1 standards?

The MPC level 1 minimum standard workstation consisted of a 16MHz 386SX microprocessor, atleast 2MB of RAM, a 30MB Hard disk, a CD-ROM drive, VGA video (16 colors), an 8-bit audio board, speakers and/or headphones, and Microsoft windows software with the Multimedia Extensions package.

85. Write the configuration of MPC level 2 standards.

MPC level 2 minimum standard consisted of a 25MHz 486SX microprocessor with atleast 4MB of RAM, a 3.5-inch high density, a 160 MB or larger hard disk drive, and a CD-ROM drive capable of sustained 300k per second transfer rate with CD-DA outputs and volume control, 16-bit sound capability with microphone input, and a color monitor with display resolution of atleast 640 X 480 with 65,536(64k) colors.

86. List out the input devices of multimedia.

Input devices for a multimedia system are as follows:

- _ Keyboards
- _ Mouse
- _ Trackball
- _ Touch screen
- _ Magnetic card Encoders and Readers
- _ Graphics Tablets
- _ Scanners
- _ Optical Character Recognition (OCR) devices
- _ Voice Recognition Systems
- _ Digital cameras

87. What is a Video disk?

Video disk serves as the output of motion pictures and audio. The data are stored in an analog-coded format on the disk. The reproduced data meet the

highest quality requirements. Video disk has a diameter of approximately 30cm and stores approximately 2.6 Giga bytes.

88. What is synchronization?

Integration of the different media is given through a close relation between information units. This is called synchronization.

89. What is meant by Multimedia User Interface?

Multimedia user interface is a computer interface that communicates with users multiple media.

90. Define the following terms:

(i) Compression Ratio (ii) Image Quality

(i) Compression Ratio: The Compression Ratio represents the size of the original image divided by the size of the compressed image.

(ii) Image Quality: Compression ratio typically affects picture quality, the higher the compression ratio, the lower the quality of the decompressed image.

91. What are the higher levels of multimedia communication system (MCS)?

The higher layers of the multimedia communication system are divided into two architectural subsystems:

- Application subsystem
- Transport subsystem.

92. Define collaborative computing environment?

The recent infrastructure of networked workstations and pcs, and the availability of audio and video at these end points, makes it easier to people to cooperate and bridge space and time. In this way, network connectivity and endpoint integration of multimedia provide users with a collaborative computing environment. It is generally known as computer supported cooperative work (CSCW).

93. List out the tools for collaborative computing

The tools used for collaborative computing are as follows:

- Electronic mail
- Bulletin boards(e.g. Usenet news)
- Screen sharing tools(e.g. show me from sunsoft)
- Text-based conferencing systems (e.g. Internet relay chat, CompuServe, America online).
- Telephone conference systems.
- Conference rooms(e.g. video window from Bellcore)
- Video conference systems(e.g.,Mbone tools)

94. What is group communication (GC)?

Group communication (GC) involves the communication of multiple users in a synchronous or an asynchronous mode with centralized or distributed control.

95. What are the consistent of a group communication?

Group communication architecture consists of the following:

- Support model
- System model
- Interface model

The GC support model includes group communication agents that communicate via a multi-point multi-cast communication network.

96. Define the term Group Rendezvous?

Group rendezvous denotes a method, which allows one to organize meetings and to get information about the group, ongoing meetings and other

static and dynamic information.

97. List out some examples for interface model protocols.

Synchronous rendezvous methods use:

- Directory services
- Explicit invitations

Directory services access information stored in a knowledge base about the conference, such as the name of the conference, registered participants, authorized users and name and role of the participants

98. What are the advantages and disadvantages of replicated architecture?

The advantages of replicated architecture are:

- Low network traffic
- Low response times

Low network traffic is because only input events are distributed among the sites and low response times, since all participants get their output from local copies of the application.

The disadvantages are the requirement of the same execution environment for the application of each site, and the difficulty in maintaining consistency.

99. What are the advantages and disadvantages of centralized conference control?

The advantage of the centralized conference control is guaranteed consistency of the conference state. The disadvantage is that when a new participant (outside of the invited group) wants to join, explicit exchange of the conference state must be performed among all participants, which causes large delays.

100. What are the advantages of distributed conference control?

Advantages of distributed conference control are:

- Inherent fault tolerance-If a network connection breaks down in the middle of a conference and it is repaired, it is easier to re-establish the shared conference state since there is no strict consistency requirement.
- Scaling properties-At some point refresh periodicity needs to adapt to the size and scope of the conference, otherwise, the conference may be in danger of flooding itself with session reports.

101. What is a session manager?

Session management architecture is built around an entity session manager, which separates the control from the transport. By creating a reusable session manager, which is separated from the user interface, conference oriented tools avoid a duplication of their effort.

102. List the various functionalities of session manager

Session manager includes local and remote functionalities. Local functionalities include:

- Membership control management
- Floor control
- Media control management
- Configuration management
- Conference control management

103. What are the contents of synchronization?

Synchronization in multimedia systems comprises of content, spatial and temporal relations between media objects.

104. What is presentation requirement?

Presentation requirements consist of intra-object synchronization, the

accuracy concerning delays in the presentation of LDUs and, for inter-object synchronization, the accuracy in the parallel presentation of media objects.

Part- B (16 marks Questions)

1. Briefly explain about video display devices with necessary diagram? (16)

Video display devices: CRT, raster scan display, random scan display. (16)

Explain: CRT: basic design of CRT, electron gun-heated metal cathode, control grid, focusing system.

raster scan display, random scan display.

-Draw the necessary diagrams.

Properties of video display devices- persistence, resolution, aspect ratio.

2. Explain Bresenham's Line Drawing Algorithm with Example.

1) Input two line end points and store the left endpoint in (X_o, Y_o)

2) Load (X_o, Y_o) in to the frame buffer

ie) Plot in the first point

3) Calculate constants Δx , Δy , $2\Delta y$, $2\Delta y - 2\Delta x$ and obtain the starting value for the decision parameter as

$$P_o = 2\Delta y - \Delta x$$

4) At each X_k along the line, starting at $k=0$ perform the following test

ie) If $P_k < 0$ the next point to plot is $X_k + 1$, Y_k and

$$P_{k+1} = P_k + 2\Delta y$$

Otherwise, the next point to plot is

$$(X_k + 1, Y_k + 1) \text{ and } P_{k+1} = P_k + 2\Delta y - 2\Delta x$$

5) Repeat step 4 Δx times

Example

$$X_1 = 5$$

$$Y_1 = 10$$

$$X_2 = 10$$

$$Y_2 = 20$$

$$\Delta x = 5$$

$$\Delta y = 10$$

$$P = 2\Delta y - \Delta x = 2 \times 10 - 5 = 20 - 5 = 15$$

Increments for the successive decision parameter is

$$2\Delta y = 2 \times 10 = 20$$

$$2\Delta y - 2\Delta x = 2 \times 10 - 2 \times 5 = 20 - 10 = 10$$

If $5 > 10$ (false)

$$X = 5$$

$$Y = 10$$

$$X_{end} = 10$$

Setpixel(5,10)

While $5 < 10$

$$X = 6$$

If $(15 < 0)$ then (false)

$$P += 2\Delta y$$

$$Y = 10 + 1 = 11$$

$$P = 10 + 2 \times (15 - 10) = 10 + 10 = 20$$

Setpixel (6, 11)

Etc

....

Procedure

Procedure linebres(xa , ya ,xb ,yb : integer)

Var

dx, dy, x, y, xEnd, p : integer ;

begin

dx := abs(xa - xb) ;

dy := abs(ya - yb) ;

p := 2* dy - dx ;

if xa > xb then

be gin

x := xb ;

y := yb ;

xEnd := xa;

end

else

begin

x := xa ;

y := ya ;

xEnd := xb;

end

setpixel (x, y, 1);

While x < xEnd do

Begin

x := x + 1 ;

if p < 0 then p := p + 2 * dy;

else

Begin

y := y+1;

p := p + 2 * (dy - dx);

End

Setpixel (x, y, 1);

End

End (Line Bres)

3. Define Clipping. Write and explain Cohen – Sutherland line clipping algorithm.

A Procedure that identifies those portions of a picture that are either inside or outside of a specified region of space is referred to as a Clipping

In this method processing of line segments by performing initial tests that reduce the number of intersections that must be calculated. Every line endpoint in a picture

is assigned a four-digit binary code , called region code that identifies the location of the point relative to the boundaries of the clipping rectangle. Regions are setup in reference to the boundaries . Each bit position in the region code is used to indicate one of the four relative coordinate positions of the point with respect to the clip window: to the left ,right, top or bottom. By numbering the bit positions in the region code as 1 through 4 from right to left, the coordinate regions can be correlated with the bit positions are

bit 1 : left

bit 2 : right

bit 3 : below

bit 4 : above

pic

A value of 1 in any bit position indicates that the point is in relative position;
Otherwise the bit position is set to 0. If a point is within the clipping rectangle,
The region code is 0000. A point that is below and to the left of the rectangle has a region
code of 0101.

Bit values in the region code are determined by comparing endpoint coordinate values
(x,y) to the clip boundaries. Pic.

Bit 1 is set to 1 if $x < x_{wmin}$. The other three bit values are determined using similar
comparisons.

Region code bit values can be determined with following 2 steps

- 1) Calculate differences between endpoint coordinates and clipping boundaries.
- 2) Use the resultant sign bit of each difference calculation to set the corresponding
value in the region code.

Bit 1 is the sign bit of $x - x_{wmin}$

Bit 2 $x_{wmax} - x$

Bit 3 $y - y_{wmin}$

Bit 4 $y_{wmax} - y$

Pic)

Intersection points with a clipping boundary can be calculated using the slope intercept
form of the line equation. for a line with endpoint coordinates (x_1, y_1) and (x_2, y_2)
the y coordinate of the intersection point with a vertical boundary can be obtained with
the calculation

$$y = y_1 + m(x - x_1)$$

where x value is set either to x_{wmin} or to x_{wmax} and the slope of the line is calculated as

$$m = (y_2 - y_1) / (x_2 - x_1)$$

similarly, the x coordinate can be calculated as

$$x = x_1 + (y - y_1) / m$$

with y set either to y_{wmin} to y_{wmax}

Algorithm for line clipping for Cohen Sutherland line clipping method.

4. Explain Reflection and shearing.

A reflection is a transformation that produces a mirror image of an object. The
mirror image for a two dimensional reflection is generated relative to an axis of reflection
by rotating the object 180° about the reflection axis. We can choose an axis of reflection
in the xy plane or perpendicular to xy plane. When the reflection axis is a line in the xy
plane, the rotation path about this axis is in a plane perpendicular to the xy plane, the
rotation path is in the xy plane.

Pic.

Reflection about the line $y = 0$, the x axis, is accomplished with the transformation

matrix

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

pic

A reflection about the y axis flips x coordinates while keeping y coordinates the same.

The matrix for this transformation is

$$\begin{bmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

pic

We flip both the x and y coordinates of a point by reflecting relative to an axis that is perpendicular to the xy plane and that passes through the coordinate origin. This transformation has the matrix representation

$$\begin{bmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 1 \end{bmatrix}$$

pic

If we choose the reflection axis as a diagonal line $y = x$ the reflection matrix is

$$\begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 1 \end{bmatrix}$$

pic

To obtain a transformation matrix for reflection about the diagonal $y = -x$

We could concatenate the matrices for the transformation sequence

1. Clockwise rotation by 45°

2. reflection about y axis and

3. counter clockwise rotation by 45°

the resulting transformation matrix is

$$\begin{bmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} -1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 1 \end{bmatrix}$$

Shearing

A transformation that distorts the shape of an object such that the transformed shape appears as if the object were composed of internal layers that had been caused to slide over each other is called a shear.

pic

An x- direction shear relative to the x axis is produced with the transformation matrix

$$\begin{bmatrix} 1 & shx & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 1 \end{bmatrix}$$

which transforms coordinate positions as

$$x' = x + shx \cdot y$$

$$y' = y$$

An real number can be assigned to the shear parameter shx. A coordinate position (x,y) is then shifted horizontally by an amount proportional to its distance (y value) from the x axis (y=0) Setting shx to 2 for example, changes the square into parallelogram.

Pic

Negative values for shx shift coordinate positions to the left.

We can generate x – direction shears relative to other reference lines with

$$\begin{bmatrix} 1 & shx & -shx \cdot y_{ref} \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 1 \end{bmatrix}$$

with coordinate positions transformed as

$$x' = x + shx(y - y_{ref})$$

$$y' = y$$

pic

A Y direction shear relative to the line $x = x_{ref}$ generated with the transformation matrix

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 1 \end{bmatrix}$$

shy 1 -shy . xref

0 0 1

pic

which generates transformed coordinate positions

$x' = x$

$y' = \text{shy}(x - x_{\text{ref}}) + y$

This transformation shifts a coordinate position vertically by an amount proportional to its distance from the reference line $x = x_{\text{ref}}$

5. Explain Basic Transformations with procedure

Transformation

Changes in orientation, size, and shape are accomplished with geometric

Transformations that alter the coordinate descriptions of the object

The basic transformations are

a) Translation

b) Rotation

c) Scaling

Translation

A translation is applied to an object by repositioning it along a straight line path from one coordinate location to another. We translate a 2 dimensional point by adding translation distances t_x and t_y , to the original coordinate position (x, y) to move the point to a new position (x', y')

$x' = x + t_x$

$y' = y + t_y$

The translation distance pair (t_x, t_y) is called translation vector or shift vector.

We can express the translation equations as a single matrix equation by using column vectors to represent coordinate positions and the translation vector

$P = \begin{bmatrix} x \\ y \end{bmatrix}$ $P' = \begin{bmatrix} x' \\ y' \end{bmatrix}$ $T = \begin{bmatrix} t_x \\ t_y \end{bmatrix}$

$x_2 \ x_2' \ t_y$

Therefore $P' = P + T$

Fig

Rotation

A 2 dimensional rotation is applied to an object by repositioning it along a circular path in the xy plane. To generate a rotation, we specify a rotation angle θ and the position (x_r, y_r) of the rotation point about which the object is to be rotated.

We first determine the transformation equations for rotation of a point position P when the pivot point is at coordinate origin. Fig

Using the standard trigonometric identities, we can express the transformed coordinates in terms of angles θ and ϕ is

$x' = r \cos(\theta + \phi) = r \cos \theta \cos \phi - r \sin \theta \sin \phi$

$y' = r \sin(\theta + \phi) = r \cos \theta \sin \phi + r \sin \theta \cos \phi$ -----I

The original coordinates of the point in polar coordinates are

$x = r \cos \theta$ and $y = r \sin \theta$ -----II

Substituting the values of II to I we obtain the transformation equations for rotating a point at position (x, y) through an angle θ about the origin

$x' = x \cos \theta - y \sin \theta$

$y' = x \sin \theta + y \cos \theta$

Therefore,

$P' = R \cdot P$

Scaling

Scaling transformation alters the size of an object. This operation can be carried out for polygons by multiplying the coordinate values (x, y) of each vertex by scaling factors s_x and s_y to produce the transformed coordinates (x', y')

$$x' = x \cdot s_x$$

$$y' = y \cdot s_y$$

Scaling factor s_x scales objects in the x direction, which s_y scales in the y direction.

The matrix form of transformation is

$$x' = s_x \cdot x$$

$$y' = s_y \cdot y$$

$$P' = S \cdot P$$

When s_x and s_y are assigned the same value, a uniform scaling is produced that maintains relative object proportions. Unequal values for s_x and s_y result in a differential scaling that is often used in design applications.

We can control the location of a scaled object by choosing a position, called the fixed point that is to remain unchanged after the scaling transformation.

Pic

Coordinates for the fixed point (x_f, y_f) can be chosen as one of the vertices.

For a vertex with coordinates (x, y) the scaled coordinates (x', y') are calculated as

$$x' = x_f + (x - x_f) s_x$$

$$y' = y_f + (y - y_f) s_y$$

We can rewrite these scaling transformations to separate the multiplicative and additive terms.

$$x' = x \cdot s_x + x_f(1 - s_x)$$

$$y' = y \cdot s_y + y_f(1 - s_y)$$

where the additive terms $x_f(1 - s_x)$ and $y_f(1 - s_y)$ are constant for all points in the object.

6. Explain i) LCD

ii) LED

i) LCD (Liquid Crystal Display)

Used in TV, calculator, etc.

Produce picture by passing polarized light from the surrounding or from an internal light source through a liquid crystal materials

Liquid crystal refers the fact that these compounds have a crystalline arrangement of molecules. They flow like a liquid. So it called LCD.

Requires two glass plates. Each contains a light polarized at right angles to each other.

Rows of horizontal transparent conductor contains one glass plate. Columns of vertical transparent conductor contains another glass plate.

Intersections of two defines a pixel position. Molecules are aligned on —On Statel.

Polarized light passing through the material is twisted. So that it passes to the opposite polarizer. Then light is reflected back to the view. To

Turn off the pixel apply voltage to the two intersecting conductors so that the light is not twisted. This is referred as passive matrix.

Pixel is stored in frame buffer. Refresh at a rate of 60 frames/ sec

Another Method for constructing LCD's

Place a transistor at each pixel position using thin film transistor. Transistors are used to control the voltage at pixel locations to prevent charge from leaking out of the liquid crystal.

ii) LED (Light Emitting Diodes)

A matrix of diodes are arranged to form the pixel positions to display. The picture definition is stored in refresh buffer Just like scan line , it need data from the refresh buffer and convert into voltage level depends upon the intensity value that are applied to diodes.

7. Explain projections in detail

Projection is mainly classified as

- a. Parallel projection
- b. Perspective projection

Parallel projection

Co-ordinate positions are transformed to the view along the parallel line.

We can specify a parallel projection with a projection vector that defines the direction for the projection lines.

Orthographic Parallel Projection

When the projection is perpendicular to the plane it is called Orthographic Parallel Projection

It is used to produce front , rear and top views of an object. Front and rear are called elevations. And top view is called plane view.

We can also form orthographic projections that display more than one face of an object. Such views are called Axonometric Projections.

Eg. Isometric Projections

Isometric Projection

Aligning the projection plane so that it intersects each coordinate axis in which the object is defined at the same distance from the origin.

If the view plane is placed in the Zvp along Zv axis and any point (x,y,z) in viewing coordinate is transformed to projection co ordinates as

$$X_p = x$$

$$Y_p = y$$

Where Z - > depth Information

Pic

Oblique projection

View plane is not perpendicular to projected line

Oblique projection is specified with two angles α , β

Point x,y,z is projected to (xp, yp) to the viewplane.

Orthographic projection is (x,y)

α is angle with the line on the projection plane.

L is Line length

β is angle of the line on the projection plane.

Projection co ordinates are

$$X_p = x + L \cos \alpha$$

$$Y_p = y + L \sin \alpha$$

The position of the point on Z axis is

$$\tan \beta = Z/L$$

$$L = Z / \tan \beta = Z \cot \beta$$

Perspective Projection

Object positions are transformed to the view plane along lines that converge to a point called projection.

We transform points along projection lines that meet at the PRP

We set the projection reference point at position Zprp along Zv axis and the view plane at Zvp

Let x' , y' , z' be any of point on the projection line then the eqns are

$$X' = x - xu$$

$$Y' = y - yu$$

$$Z' = z - (z - z_{prp})U$$

U can have values from 0 to 1

When $U = 0$, position $P = (x, y, z)$

When $U = 1$, Position $P = (0, 0, Z_{prp})$

8. Explain Bezier Curves in detail

Bezier curve uses spline approximation method and widely used in CAD. This was developed by French Engineer Pierre Bezier

Bezier Curves

Curve section is approximated and their relative position determine the degree of polynomial

Blending Function specification is convenient

$N+1$ control points, $P_k = (x_k, y_k, z_k)$ with K From 0 to n . They can be blended to $P(U)$ which describes path between P_0 and P_n

$$P(U) = \sum_{k=0}^n$$

$$P_k \text{ BEZ}_{k,n}(U)$$

Bezier blending functions $\text{BEZ}_{k,n}(U)$ are the Bernstein Polynomials

$$\text{BEZ}_{k,n}(U) = C(n,k) U^k (1-U)^{n-k}$$

We can define Bezier Blending functions with recursive calculation

$$\text{BEZ}_{k,n}(U) = (1-U) \text{BEZ}_{k,n-1} + U \text{BEZ}_{k-1,n-1}(U)$$

With $\text{BEZ}_{k,k} = U^k$ and $\text{BEZ}_{0,k} = (1-U)^k$

The curve lies within the convex hull. The blending functions are all positive and their sum is always 1

Convex Rule property ensures the polynomial smoothly follows the control point.

Cubic Bezier Curves

Many graphics packages provide only cubic spline function. They are generated with four control points.

Four blending functions for cubic Bezier Curve is obtained by putting $n=3$

$$\text{BEZ}_{0,3}(U) = (1-U)^3$$

$$\text{BEZ}_{1,3}(U) = 3U(1-U)^2$$

$$\text{BEZ}_{2,3}(U) = 3U^2(1-U)$$

$$\text{BEZ}_{3,3}(U) = U^3$$

Properties of Bezier Curves

Always passes through the first and last control point

The boundary conditions at two ends are

$$P(0) = P_0$$

$$P(1) = P_n$$

9. Explain animation in detail

The term computer animation generally refers to any time sequence of visual changes in a scene

Design of animation sequence

Steps are

1. Story board layout
2. Object definitions
3. Key frame specification
4. generation of in between frames

For frame by frame animation, each frame of the scene is separately generated and

stores. The story board is an outline of the action. It defines the motion sequence as a set of basic events that are to take place. Depending on the type of animation to be produced. The story board is an outline of the action.

An Object definition is given for each participant in the action. Objects can be defined in terms of basic shapes such as polygons or splines.

A key frame is a detailed drawing of the scene at a certain time in the Animation sequence.

There are several other tasks that may be required, depending on the application. They include motion verification, editing and production

And synchronization of a sound track.

General computer animation Functions

Object manipulations and rendering, camera motions and the generation of in between. One function available in animation package is provided to store and manage the object data base

Another typical function stimulates camera movements.

Raster Animations

A simple method for translation in the xy plane is to transfer a rectangular block of pixel values from one location to another

To rotate a block of pixels, we need to determine the percent of area coverage for those pixels that overlap the rotated block.

10. Explain i) Back face Detection method

ii) Depth buffer method for detection

i. Back Face Detection Method

A fast and simple object space method for identify the backface of a polyhedron is based on the inside outside tests.

A point (x, y, z) is inside the polygon surfaces with plane parameters A,B,C, & D if $Ax + By + Cz + D < 0$

When an inside point is along the line of sight to the surface, the polygon must be a backface.

If N is normal vector to the polygon surface, V is a vector viewing direction from eye or camera then this polygon is a backface

$V \cdot N > 0$

ii) Depth Buffer Method (Z – Buffer Method)

Image space approach for polygon surfaces. Each pixel position (x,y) on view plane, object depth can be compared by compared Z values. Z ranges from 0 to Zmax, z max can be set to 0 or to the largest value.

Two buffers are necessary. A depth buffer is used to store depth values of each (x,y) position and refresh buffer to store intensity for each position. Intensity buffer is set to 0(min) and refresh buffer is initialized to background intensity.

The depth is calculated for each position. If it is greater than value stored in depth buffer, the new value is stored.

The Algorithm is

1. Initialize the depth buffer & refresh buffer. So that depth (x,y) =0 refresh (x,y)=1
2. For each position on each polygon surface compare depth values to previously stored values in the depth buffer to determine visibility.

Calculate the depth z for each (x, y) position on the polygon

If $Z < \text{depth}(x,y)$ then set $\text{depth}(x,y) = Z$

refresh (x, y) = Isurf (x, y)

I is the value for background intensity.

11. Explain applications of Computer graphics

- Image Processing
- Computer Aided Design (CAD)
- Education
- Entertainment
- Graphical User Interface (GUI)
- Morphing
- Animation
- Visual Programming

12. Explain a. Depth Cueing b. Surface Rendering**a. Depth Cueing**

A simple method for indicating depth with wire frame displays is to vary the intensity of objects according to their distance from the viewing position

- Line closest to the viewing position are displayed with highest intensities
- Lines Farther - > Decreasing Intensities

Uses

Choosing maximum and minimum intensities

Range of distances over which the intensities are to vary

Modeling the effect of atmosphere

b. Surface Rendering

Realism is attained by setting the surface intensity of objects according to

1. Lighting conditions in the scene

- The intensity and positions of light sources
- The general background illumination required for a scene

2. Assigned surface characteristics

- Degree of transparency
- How rough or how smooth the surfaces to be.

13. Explain 3D transformations in detail

Inclusion of Z coordinates

Translation

Explanation

Matrix form

Rotation

Explanation

Matrix Form

Scaling

Explanation

Matrix Form

14. Explain the classification of Visible surface Detection methods with example.

Broadly classified in to 2 categories

i. Object space methods

Compare objects and part of objects to each other within the scene

definition to which surfaces as a whole should label as visible

Eg. Back face detection

Back Face Detection Method

A fast and simple object space method for identify the backface of a polyhedron is based on the inside outside tests.

A point (x, y, z) is inside the polygon surfaces with plane parameters A,B,C, & D if

$$Ax + By + Cz + D < 0$$

When an inside point is along the line of sight to the surface, the polygon must be a backface.

If N is normal vector to the polygon surface, V is a vector viewing direction from eye or camera then this polygon is a backface

$$V \cdot N > 0$$

ii. Image space methods

Visibility is decided point by point at each pixel position on the projection plane

Eg. Depth buffer method

ii) Depth Buffer Method (Z – Buffer Method)

Image space approach for polygon surfaces. Each pixel position (x,y) on view plane, object depth can be compared by compared Z values. Z ranges from 0 to Z_{max} , z_{max} can be set to 0 or to the largest value.

Two buffers are necessary. A depth buffer is used to store depth values of each (x,y) position and refresh buffer to store intensity for each position. Intensity buffer is set to 0(min) and refresh buffer is initialized to background intensity.

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The Algorithm is

3. Initialize the depth buffer & refresh buffer. So that $depth(x,y) = 0$ refresh $(x,y) = 1$

4. For each position on each polygon surface compare depth values to previously stored values in the depth buffer to determine visibility.

Calculate the depth z for each (x, y) position on the polygon

If $Z < depth(x,y)$ then set $depth(x,y) = Z$

refresh $(x, y) = I_{surf}(x, y)$

I is the value for background intensity.

15. Explain about the following.

(i). Flat panel displays (10)

(ii).Graphics Software (6)

(i).Explain: Flat panel display- (10)

emissive display-plasma panel, thin film electro luminescent display, light emitting diode.

non emissive display- liquid crystal display.

(ii). Short notes on graphics software (6)

16. (i).Show how the shear transformation may be expressed in terms of rotation and scaling.(8)

(ii). Scale the polygon with coordinates $A(2,5)$, $B(7,10)$ and $C(10,2)$ by two units in x direction and two units in y direction. (8)

17. Briefly explain about DDA line drawing algorithm .Give one example using this algorithm.(16)

Explain about DDA line drawing algorithm. Write algorithm and give one example using this algorithm.(16)

18. Explain about the following.

(i).Shadow mask method (8)

(ii).Liquid crystal display(8)

Explain about the following

(i).Shadow mask method (8)

(ii).Liquid crystal display(8)

19. Explain the basic Building blocks of multimedia?

_ Text

- _ Image
- _ Sound
- _ Video
- _ Animation

20. How will you manipulate images and graphics in multimedia? Explain in detail.

Images

Making still images

Bitmaps

Graphics

21. What are the various aspects of video signal? Explain in detail. Give details about computer video formats also.

_ Recording formats

_ Digital Video

22. What are the basic tools that are required for the multimedia Software? Explain in detail.

o Text Editing & Word Processing Tools

o Painting & Drawing Tools

o Image – Editing Tools

o Sound Editing Tools

o Animation, video & Digital Movie Tools

23. What are the various input and output devices that can be used in a Multimedia PC? Explain in detail.

Input devices

- Keyboards
- Mouse
- Trackball
- Touch screens
- Magnetic card Encoders & Readers
- Graphic tablets
- Flat – bed scanner
- Optical Character Recognition
- Infrared Remote
- Voice Recognition
- Digital Cameras

Output devices

- Audio devices
- Amplifier & Speaker
- Monitors
- Video Devices
- Projectors
- Printers

24. Explain the Multimedia communication in detail?

_ Collaborative Computing.

_ GC Architecture.

_ Conferencing.

_ Session management.

_ Centralized and distributed architecture

_ Layer's protocols

25. Explain the presentation requirements

- _ Lip synchronization requirements.
- _ Pointer synchronization requirements.
- _ Elementary media synchronization.

STUCOR APP

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING CS6502-OBJECT ORIENTED ANALYSIS AND DESIGN**UNIT-I****UML DIAGRAMS**

Introduction to OOAD – Unified Process - UML diagrams – Use Case – Class Diagrams– Interaction Diagrams

– State Diagrams – Activity Diagrams – Package, component and Deployment Diagrams.

PART-A**1. What is Object-Oriented Analysis?**

During object-oriented analysis there is an emphasis on finding and describing the objects or concepts in the problem domain. For example, in the case of the flight information system, some of the concepts include Plane, Flight, and Pilot.

2. What is Object-Oriented Design?

During object-oriented design (or simply, object design) there is an emphasis on defining software objects and how they collaborate to fulfill the requirements. The combination of these two concepts shortly known as object oriented analysis and design.

3. What is Object-Oriented Analysis and Design? APRIL/MAY-2011

During object-oriented analysis there is an emphasis on finding and describing the objects or concepts in the problem domain. For example, in the case of the flight information system, some of the concepts include Plane, Flight, and Pilot.

During object-oriented design (or simply, object design) there is an emphasis on defining software objects and how they collaborate to fulfill the requirements. The combination of these two concepts shortly known as object oriented analysis and design.

4. What is Analysis and Design?

Analysis emphasizes an investigation of the problem and requirements, rather than a solution. Design emphasizes a conceptual solution (in software and hardware) that fulfills the requirements, rather than its implementation. For example, a description of a database schema and software objects.

5. Define Design Class Diagrams

A static view of the class definitions is usefully shown with a design class diagram. This illustrates the attributes and methods of the classes.

6. What is the UML? MAY/JUNE 2012

The Unified Modeling Language is a visual language for specifying, constructing and documenting the artifacts of systems.

7. What are the three ways and perspectives to Apply UML?

Ways - UML as sketch, UML as blueprint, UML as programming language

Perspectives-Conceptual perspective, Specification (software) perspective, Implementation (Software) perspective.

10. Define Requirements and mention its types.

Requirements are capabilities and conditions to which the system and more broadly, the project must conform.

1. Functional
2. Reliability
3. Performance
4. Supportability

11. What are Actors?

An actor is something with behavior, such as a person (identified by role), computer system, or organization; for example, a cashier.

12. What is a scenario?

A scenario is a specific sequence of actions and interactions between actors and the system; it is also called a use case instance. It is one particular story of using a system, or one path through the use case; for example, the scenario of successfully purchasing items with cash, or the scenario of failing to purchase items because of a credit payment denial.

13. Define Use case.

A use case is a collection of related success and failure scenarios that describe an actor using a system to support a goal. Use cases are text documents, not diagrams, and use-case modeling is primarily an act of writing text, not drawing diagrams.

14. What are Three Kinds of Actors?

Primary actor, Supporting actor, offstage actor.

15. What Tests Can Help Find Useful Use Cases?

1. The Boss test
2. The EBP test
3. The Size test

16. What are Use Case Diagrams?

A use case diagram is an excellent picture of the system context; it makes a good context diagram that is, showing the boundary of a system, what lies outside of it, and how it gets used. It serves as a communication tool that summarizes the behavior of a system and its

actors.

17. What are Activity Diagrams?

A diagram which is useful to visualize workflows and business processes. These can be a useful alternative or adjunct to writing the use case text, especially for business use cases that describe complex workflows involving many parties and concurrent actions.

18. What is an object?

An object is a combination of data and logic; the representation of some real-world entity.

19. What is the main advantage of object-oriented development?

- High level of abstraction
- Seamless transition among different phases of software development
- Encouragement of good programming techniques.
- Promotion of reusability.

20. What is Object Oriented System development methodology?

Object oriented system development methodology is a way to develop software by building self-contained modules or objects that can be easily replaced, modified and reused.

21. Distinguish between method and message in object.

Method Message

- i) Methods are similar to functions, procedures or subroutines in more traditional programming languages. Message essentially are non-specific function calls.
- ii) Method is the implementation. Message is the instruction.
- iii) In an object oriented system, a method is invoked by sending an object a message. An object understands a message when it can match the message to a method that has the same name as the message.

22. What is an activity diagram?

A UML activity diagram shows sequential and parallel activities in a process. They are useful for modeling business processes, workflows, data flows, and complex algorithms. Basic UML activity diagram notation illustrates an action, partition, fork, join, and object node. In essence, this diagram shows a sequence of actions, some of which may be parallel. Most of the notation is self-explanatory; two subtle points:

- once an action is finished, there is an automatic outgoing transition
- the diagram can show both control flow and data flow

23. What is meant by interaction diagram?

Diagram

is a generalization of two more specialized UML diagram types;

both can be used to express similar message interactions:

- . Collaboration diagrams
- . Sequence diagrams

24. What is meant by link?

A **link** is a connection path between two objects; it indicates some form of navigation And visibility between the objects is possible . More formally, a link is an instance of an association. For example, there is a link or path of navigation from a *Register* to a *Sale*, along which messages may flow, such as the *make 2 Payment* message.

25. What is meant by Messages?

Each message between objects is represented with a message expression and small arrow indicating the direction of the message. Many messages may flow along this link. A sequence number is added to show the sequential order of messages in the current thread of control.

26. How to create an instance?

Any message can be used to create an instance, but there is a convention in the UML to use a message named *create* for this purpose. If another (perhaps less obvious) message name is used, the message may be annotated with a special feature called a UML stereotype, like so: «*create*».

The *create* message may include parameters, indicating the passing of initial values. This indicates, for example, a constructor call with parameters in Java.

27. List the relationships used in class diagram? APRIL/MAY-2011

Generalization(class to class)
 Association (object to object)
 Aggre gation (object to object)
 Composition (object to object)

28. Define Events, States, and Transitions. APRIL/MAY-2011

An event is a significant or noteworthy occurrence. For example:

A telephone receiver is taken off the hook.

A state is the condition of an object at a moment in time—the time between events. For example:

- A telephone is in the state of being "idle" after the receiver is placed on the hook and until it is taken off the hook.

A transition is a relationship between two states that indicates that when an event occurs, the Object moves from the prior state to the subsequent state.

For example:

- When the event "off hook" occurs, transition the telephone from the "idle" to "active" state.

29. What is meant by State chart Diagrams?

A UML state chart diagram, illustrates the interesting events and states of an object, and the behavior of an object in reaction to an event. Transitions are shown as arrows, labeled with their event. States are shown in rounded rectangles. It is common to include an initial pseudo-state,

which automatically transitions to another state when the instance is created.

30. State chart Diagrams in the UP?

There is not one model in the UP called the "state model." Rather, any element in any model (Design Model, Domain Model, and so forth) may have a state chart to better understand or communicate its dynamic behavior in response to events. For example, a state chart associated with the *Sale* design class of the Design Model is itself part of the Design Model.

31. Utility of Use Case State chart Diagrams.

- Hard-coded conditional tests for out-of-order events
- Use of the *State* pattern (discussed in a subsequent chapter)
- disabling widgets in active windows to disallow illegal events (a desirable approach)
- A state machine interpreter that runs a state table representing a use case State chart diagram.

32. List out the types of Events.

External event
Internal event
Temporal event

33. Define External event.

External event—also known as a system event, is caused by something (for example, an actor) outside our system boundary. SSDs illustrate external events. Noteworthy external events precipitate the invocation of system operations to respond to them.

- When a cashier presses the "enter item" button on a POS terminal, an external event has occurred.

34. Define internal event.

Internal event—caused by something inside our system boundary. In terms of software, an internal event arises when a method is invoked via a message or signal that was sent from another internal object. Messages in interaction diagrams suggest internal events.

- When a *Sale* receives a *make Line item message*, an internal event has occurred.

35. Define temporal event.

Temporal event—caused by the occurrence of a specific date and time or passage of time. In terms of software, a temporal event is driven by a real time or simulated-time clock.

- Suppose that after an *end Sale* operation occurs, a *make Payment* operation must occur within five minutes, otherwise the current sale is automatically purged.

PART- B

- Iterative Development
- UP Practices and Concepts
- The UP Phases and Schedule
- The UP Disciplines (was Workflows)
- The Agile UP
- The Sequential "Waterfall"

2. Explain about Use-Case Model and its Writing Requirements in Context. APRIL/MAY-2011 -Background

- Use Cases and Adding Value
- Use Cases and Functional Requirements
- Use Case Types and Formats
- Fully Dressed Example: Process Sale
- Relating use cases- Include, Exclude, Generalize
- Example with diagram-ATM, Library Management System etc

3. List out the components of Object-Oriented Analysis and Design.

- Applying UML and Patterns in OOA/D
- Assigning Responsibilities -What Is Analysis and Design?
- What Is Object-Oriented Analysis and Design? -An Example
- The UML

4. What is activity diagram? Explain about its applications briefly? APRIL/MAY-2011

- UML Activity Diagram Notation
- Guidelines for activity modeling
- Example
- Next Gen Activity Diagram

5. Explain about Interaction Diagram Notation? APRIL/MAY-2011

- Sequence and Collaboration Diagrams
- Collaboration Diagram -Sequence Diagram
- Common Interaction Diagram Notation
- Basic Collaboration Diagram
- Notation
- Basic Sequence Diagram Notation

6. Design the Model and Creating Design Class Diagrams. -When to Create DCDs

- Example DCD
- DCD and UP
- Domain Model vs. Design Model
- Classes
- DCDs, Drawing, and CASE Tools
- DCDs within the UP

7. Illustrate with an example, the relationship between sequence diagram and use cases. APRIL/MAY-2011

- Sequence diagram- definition, example
- Use Cases- definition, example
- Relationship diagram

8. Explain UML State Machine Diagrams and Modeling.

- Definition -

How to
 apply -
 Example -
 Process

9. What is operation of UML Deployment and Component Diagram? Draw the diagram for a banking application. APRIL/MAY-2011

-Deployment Diagram
 -Component Diagram

UNIT-II

DESIGN PATTERNS

GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion – Controller - Design Patterns – creational - factory method - structural – Bridge – Adapter - behavioral – Strategy – observer.

PART-

A 1. How to Choosing the Initial Domain Object?

Choose as an initial domain object a class at or near the root of the containment or aggregation hierarchy of domain objects. This may be a facade controller, such as *Register*, or some other object considered to contain all or most other objects, such as a *Store*.

2. How to Connecting the UI Layer to the Domain Layer?

- An initializing routine (for example, a Java *main* method) creates both a UI and a domain object, and passes the domain object to the UI.
- A UI object retrieves the domain object from a well-known source, such as a factory object that is responsible for creating domain objects.

3. Mention the Interface and Domain Layer Responsibilities.

The UI layer should not have any domain logic responsibilities. It should only be responsible for user interface tasks, such as updating widgets. The UI layer should forward requests for all domain-oriented tasks on to the domain layer, which is responsible for handling them.

5. Define patterns.

A pattern is a named problem/solution pair that can be applied in new context, with advice on how to apply it in novel situations and discussion of its trade-offs.

6. How to Apply the GRASP Patterns?

The following sections present the first five GRASP patterns:

- . Information Expert
- . Creator
- . High Cohesion
- . Low Coupling
- . Controller

7. Define Responsibilities and Methods.

The UML defines a responsibility as "a contract or obligation of a classifier" [OMG01]. Responsibilities are related to the obligations of an object in terms of its behavior. Basically, these responsibilities are of the following two types:

- knowing
- doing

Doing responsibilities of an object include:

- doing something itself, such as creating an object or doing a calculation
- initiating action in other objects

-controlling and coordinating activities in other objects
Knowing responsibilities of an object include:

- knowing about private encapsulated data
- knowing about related objects
- knowing about things it can derive or calculate

8. Who is creator?

Solution Assign class B the responsibility to create an instance of class A if one or more of the following is true:

- . B *aggregates* an object.
- . B *contains* an object.
- . B *records* instances of objects.
- . B *closely uses* objects.

. B *has the initializing data* that will be passed to A when it is created (thus B is an Expert with respect to creating A).

B is a *creator* of an object.

If more than one option applies, prefer a class B which *aggregates* or *contains* class A.

9. List out some scenarios that illustrate varying degrees of functional cohesion.

- Very low cohesion
- low cohesion -
- High cohesion -
- Moderate cohesion

10. Define Modular Design.

Coupling and cohesion are old principles in software design; designing with objects does not imply ignoring well-established fundamentals. Another of these. Which is strongly related to coupling and cohesion? is to promote modular design.

11. What are the advantages of Factory objects?

- Separate the responsibility of complex creation into cohesive helper objects.
- Hide potentially complex creation logic.
- Allow introduction of performance-enhancing memory management strategies, such as object caching or recycling.

12. Designing for Non-Functional or Quality Requirements.

Interestingly—and this a key point in software architecture—it is common that the large-scale themes, patterns, and structures of the software architecture are shaped by the designs to resolve the non-functional or quality requirements, rather than the basic business logic.

13. Abstract for Factory (GoF) for Families of Related Objects.

The Java POS implementations will be purchased from manufacturers. For example5:

// IBM's drivers

```
com.ibm.pos.jpos.CashDrawer (implements jpos.CashDrawer)
com.ibm.pos.jpos.CoinDispenser (implements
jpos.CoinDispenser) // NCR's drivers
com.ncr.posdrivers.CashDrawer (implements
jpos.CashDrawer) com.ncr.posdrivers.CoinDispenser
(implements jpos.CoinDispenser)
```

14. What is meant by Abstract Class Abstract Factory?

A common variation on Abstract Factory is to create an abstract class factory that is accessed using the Singleton pattern, reads from a system property to decide which of its subclass factories to create, and then returns the appropriate subclass instance. This is used, for example, in the Java libraries with the *java.awt.Toolkit* class, which is an abstract class abstract factory for creating families of GUI widgets for different operating system and GUI subsystems.

15. What is meant by Fine-Grained Classes?

Consider the creation of the *Credit Card*, *Drivers License*, and *Check* software objects. Our first impulse might be to record the data they hold simply in their related payment classes, and eliminate such fine-grained classes. However, it is usually a more profitable strategy to use them; they often end up providing useful behavior and being reusable. For example, the *Credit Card* is a natural Expert on telling you its credit company type (Visa, MasterCard, and so on). This behavior will turn out to be necessary for our application.

16. Define coupling. APIRAL/MAY-2011

The degree to which components depend on one another. There are two types of coupling, "tight" and "loose". Loose coupling is desirable for good software engineering but tight coupling may be necessary for maximum performance. Coupling is increased when the data exchanged between components becomes larger or more complex.

17. What is meant by Low Coupling?

Coupling is a measure of how strongly one element is connected to, has knowledge of, or relies on other elements. An element with low (or weak) coupling is not dependent on too many other elements; "too many" is context-dependent, but will be examined. These elements include classes, subsystems, systems, and so on.

18. What is meant by High COHESION?

Cohesion (or more specifically, functional cohesion) is a measure of how strongly related and focused the responsibilities of an element are. An element with highly related responsibilities, and which does not do a tremendous amount of work, has high cohesion. These elements

include classes, subsystems, and so on.

19. Define Controller.

Assign the responsibility for receiving or handling a system event message to a class representing one of the following choices:

- Represents the overall system, device, or subsystem (*facade controller*).
- Represents a use case scenario within which the system event occurs, often named <UseCaseName>Handler, <UseCaseName>Coordinator, or <UseCaseName>Session (*use-case or session controller*).
- Use the same controller class for all system events in the same use case scenario. -Informally, a session is an instance of a conversation with an actor.
- Sessions can be of any length, but are often organized in terms of use cases (use case sessions).

PART- B

1. Explain Grasp: designing objects with responsibilities.

-Responsibilities and Methods -Responsibilities and Interaction Diagrams -Patterns

2. Explain GRASP: Patterns of General Principles in Assigning Responsibilities. APIRL/MAY-2011

-The UML Class Diagram Notation -Information Expert (or Expert) -Creator
 -low coupling -high cohesion -controller
 -object design and CRC CARDS

3. How to Determining the Visibility of the Design Model?

-Visibility between Objects -Visibility

4. Explain about Patterns for Assigning Responsibilities. -Polymorphism

-Pure Fabrication -Indirection -Protected Variations

5. Designing the Use-Case Realizations with GoF Design Patterns. APRIL/MAY-2011

-Analysis" Discoveries during Design: Domain Model -Factory
 -Singleton
 -Conclusion of the External Services with Varying Interfaces Problem 3 -Strategy
 -Composite -Facade

UNIT III CASE STUDY

Case study – the Next Gen POS system, Inception -Use case Modeling - Relating Use cases – include, extend and generalization - Elaboration - Domain Models - Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class Hierarchies - Aggregation and Composition

1. What is Inception? APIRAL/MAY-2011

Inception is the initial short step to establish a common vision and basic scope for the Project. It will include analysis of perhaps 10% of the use cases, analysis of the critical non-Functional requirement, creation of a business case, and preparation of the development Environment so that programming can start in the elaboration phase. Inception in one Sentence: Envision the product scope, vision, and business case.

2. What Artifacts May Start in Inception?

Some sample artifacts are Vision and Business Case, Use-Case Model, Supplementary Specification, Glossary, Risk List & Risk Management Plan, Prototypes and proof-of-concepts etc.

3. What Artifacts May Start in Elaboration?

Domain Model	This is a visualization of the domain concepts; it is similar to a static information model of the domain entities.
Design Model	This is the set of diagrams that describes the logical design. This includes software class diagrams, object interaction diagrams, package diagrams, and so forth.
Software Architecture Document	A learning aid that summarizes the key architectural issues and their resolution in the design. It is a summary of the outstanding design ideas and their motivation in the system.
Data Model	This includes the database schemas, and the mapping strategies between object and non-object representations.
Use-Case Storyboards, UI Prototypes	Descriptions of the user interface, paths of navigation, usability models, and so forth.

4. What are the key ideas for Planning the Next Iteration?

Organize requirements and iterations by risk, coverage, and criticality.

5. What is a Domain Model? APIRAL/MAY-2011

A domain model is a visual representation of conceptual classes or real-situation objects in a domain. The term "Domain Model" means a representation of real-situation conceptual classes, not of software objects. The term does not mean a set of diagrams describing software classes, the domain layer of a software architecture, or software objects with responsibilities.

6. How the domain model is illustrated?

Applying UML notation, a domain model is illustrated with a set of class diagrams in which no operations (method signatures) are defined. It provides a conceptual perspective. It may show:

- domain objects or conceptual classes
- associations between conceptual classes
- attributes of conceptual classes

7. Why Call a Domain Model a "Visual Dictionary"?

The information it illustrates could alternatively have been expressed in plain text. But it's easy to understand the terms and especially their relationships in a visual language, since our brains are good at understanding visual elements and line connections. Therefore, the domain model is a visual dictionary of the noteworthy abstractions, domain vocabulary, and information content of the domain.

8. What are the elements not suitable in a domain model?

The following elements are not suitable in a domain model

- Software artifacts, such as a window or a database, unless the domain being modeled is of software concepts, such as a model of graphical user interfaces.
- Responsibilities or methods

9. What are Conceptual Classes?

The domain model illustrates conceptual classes or vocabulary in the domain. Informally, a conceptual class is an idea, thing, or object. More formally, a conceptual class may be considered in terms of its symbol, intension, and extension

- Symbol words or images representing a conceptual class.
- Intension the definition of a conceptual class.
- Extension the set of examples to which the conceptual class applies

10. How to Create a Domain Model?

The current iteration requirements under design:

1. Find the conceptual classes (see a following guideline).
2. Draw them as classes in a UML class diagram.
3. Add associations and attributes.

11. How to Find Conceptual Classes?

1. Reuse or modify existing models. This is the first, best, and usually easiest approach, and where I will start if I can. There are published, well-crafted domain models and data models (which can be modified into domain models) for many common domains, such as inventory, finance, health, and so forth. Example books that I'll turn to include Analysis Patterns by Martin Fowler, Data Model Patterns by David Hay, and the Data Model Resource Book (volumes 1 and 2) by Len Silverton.
2. Use a category list.
3. Identify noun phrases.

12. Mention some Conceptual Class Category.

Conceptual Class Category	Examples
business transactions	Sale, Payment Reservation
transaction line items	Sales Line Item
product or service related to a transaction or transaction line item	Item Flight, Seat, Meal
where is the transaction recorded?	Register, Ledger Flight Manifest
roles of people or organizations related to the transaction; actors in the use case	Cashier, Customer, Store Monopoly Player Passenger, Airline
place of transaction; place of service	Store Airport, Plane, Seat

13. Define Association.

An **association** is a relationship between classes (more precisely, instances of those classes) that indicates some meaningful and interesting connection.

14. Why Should We Avoid Adding Many Associations?

We need to avoid adding too many associations to a domain model. Digging back into our discrete mathematics studies, you may recall that in a graph with n nodes, there can be associations to other nodes a potentially very large number. A domain model with 20 classes could have 190 associations' lines! Many lines on the diagram will obscure it with "visual noise." Therefore, be parsimonious about adding association lines. Use the criterion guidelines suggested in this chapter, and focus on "need-to-remember" associations.

15. How to Name an Association in UML?

Name an association based on a Class Name-Verb Phrase-Class Name format where the verb phrase creates a sequence that is readable and meaningful.

16. What is Aggregation? APRIL/MAY-2011

Aggregation is a vague kind of association in the UML that loosely suggests whole-part relationships (as do many ordinary associations). It has no meaningful distinct semantics in the UML versus a plain association, but the term is defined in the UML.

17. What is composition? APRIL/MAY-2011

Composition, also known as composite aggregation, is a strong kind of whole-part aggregation and is useful to show in some models. A composition relationship implies that 1) an instance of the part (such as a Square) belongs to only one composite instance (such as one Board) at a time, 2) the part must always belong to a composite (no free-floating Fingers), and 3) the composite is responsible for the creation and deletion of its parts either by itself creating/deleting the parts, or by collaborating with other objects.

18. Mention the guidelines that suggest when to show aggregation.

- The lifetime of the part is bound within the lifetime of the composite there is a create-delete dependency of the part on the whole.
- There is an obvious whole-part physical or logical assembly.
- Some properties of the composite propagate to the parts, such as the location.
- Operations applied to the composite propagate to the parts, such as destruction, movement, and recording.

19. What is Elaboration?

Elaboration is the initial series of iterations during which the team does serious investigation, implements (programs and tests) the core architecture, clarifies most requirements, and tackles the high-risk issues. In the UP, "risk" includes business value. Therefore, early work may include implementing scenarios that are deemed important, but are not especially technically risky.

20. What are the tasks performed in elaboration?

- the core, risky software architecture is programmed and tested
- the majority of requirements are discovered and stabilized
- the major risks are mitigated or retired

21. What are the key ideas and best practices that will manifest in elaboration?

- do short time boxed risk-driven iterations
- start programming early

- adaptively design, implement, and test the core and risky parts of the architecture
- test early, often, realistically
- adapt based on feedback from tests, users, developers
- write most of the use cases and other requirements in detail, through a series of workshops, once per elaboration iteration

PART- B

1. Explain about POS generation systems.

- The Next Gen POS System
- Architectural Layers and Case Study Emphasis
- Iterative Development and Iterative Learning

2. Define Inception.

Explain about artifacts of Inception

- Inception: An Analogy
- What Artifacts May Start in Inception
- You Didn't Understand Inception When...

3. Write briefly about elaboration and discuss the differences between Elaboration and Inception with examples.

- Iteration 1 Requirements and Emphasis: Core OOA/D Skills
- Inception and Elaboration
- Planning the Next Iteration

4. Illustrate the concept of Domain model with examples. APRIL/MAY-2011 -Definitions

- Guidelines for creating domain model -Examples

5. Explain the guidelines for finding Conceptual Classes with neat diagrams

- Three Strategies
- Find and Draw Conceptual Classes

6. Explain about Aggregations and compositions -Definitions

- Identify Composition & Aggregations
- Example: the Next Gen Domain Model

UNIT IV

APPLYING DESIGN PATTERNS

System sequence diagrams - Relationship between sequence diagrams and use cases Logical architecture and UML package diagram – Logical architecture refinement - UML class diagrams – UML interaction diagrams - Applying GoF design patterns.

1. What is meant by System Sequence Diagrams? APRIL/MAY-2011

A system sequence diagram (SSD) is a picture that shows, for a particular scenario of a use case, the events that external actors generate their order, and inter-system events. All systems are treated as a black box; the emphasis of the diagram is events that cross the system boundary from actors to systems.

2. What is meant by System Behavior?

System behavior is a description of *what* a system does, without explaining how it does it. One Part of that description is a system sequence diagram. Other parts include the Use cases, and system contracts (to be discussed later).

3. What is meant by Inter-System SSDs?

SSDs can also be used to illustrate collaborations between systems, such as between the Next Gen POS and the external credit payment authorizer. However, this is deferred until a later iteration in the case study, since this iteration does not include remote systems collaboration.

4. Define System Events and the System Boundary.

To identify system events, it is necessary to be clear on the choice of system boundary, as discussed in the prior chapter on use cases. For the purposes of software development, the system boundary is usually chosen to be the software system itself; in this context, a system event is an external event that directly stimulates the software.

5. How to Naming System Events and Operations?

System events (and their associated system operations) should be expressed at the level of intent rather than in terms of the physical input medium or interface widget level.

It also improves clarity to start the name of a system event with a verb Thus "enter item" is better than "scan" (that is, laser scan) because it captures the intent of the operation while remaining abstract and noncommittal with respect to design choices about what interface is used to capture the system event.

6. What is meant by interaction diagram?

The term *interaction diagram* is a generalization of two more specialized UML diagram types; both can be used to express similar message interactions:

- . Collaboration diagrams
- . Sequence diagrams

7. What is meant by link?

A **link** is a connection path between two objects; it indicates some form of navigation And visibility between the objects is possible . More formally, a link is an instance of an association. For example, there is a link or path of navigation from a *Register* to a *Sale*, along which messages may flow, such as the *make 2 Payment* message.

8. What is meant by Messages?

Each message between objects is represented with a message expression and small arrow indicating the direction of the message. Many messages may flow along this link. A sequence number is added to show the sequential order of messages in the current thread of control.

9. How to create an instance?

Any message can be used to create an instance, but there is a convention in the UML to use a message named *create* for this purpose. If another (perhaps less obvious) message name is used, the message may be annotated with a special feature called a UML stereotype, like so: «*create*».

The *create* message may include parameters, indicating the passing of initial values. This indicates, for example, a constructor call with parameters in Java.

10. What is meant by Low Coupling?

Coupling is a measure of how strongly one element is connected to, has knowledge of, or relies on other elements. An element with low (or weak) coupling is not dependent on too many other elements; "too many" is context-dependent, but will be examined. These elements include classes, subsystems, systems, and so on.

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12. Define Controller.

Assign the responsibility for receiving or handling a system event message to a class representing one of the following choices:

- Represents the overall system, device, or subsystem (*facade controller*).
- Represents a use case scenario within which the system event occurs, often named <UseCaseName>Handler, <UseCaseName>Coordinator, or <Use-CaseName>Session (*use-case or session controller*).
- Use the same controller class for all system events in the same use case scenario.
- Informally, a session is an instance of a conversation with an actor.
- Sessions can be of any length, but are often organized in terms of use cases (use case sessions).

13. What is meant by CRC card?

CRC cards are index cards, one for each class, upon which the responsibilities of the class are briefly written, and a list of collaborator objects to fulfill those responsibilities. They are usually developed in a small group session. The GRASP patterns may be applied when considering the design while using CRC cards.

14. What is meant by Pure Fabrication?

This is another GRASP pattern. A Pure Fabrication is an arbitrary creation of the designer, not a

software class whose name is inspired by the Domain Model. A use-case controller is a kind of Pure Fabrication.

15. List the relationships used in class diagram? APRIL/MAY-2011

Generalization(class to class)
 Association (object to object)
 Aggregation (object to object)
 Composition (object to object)

PART- B

1. How to Adding New SSDs and Contracts?

-New System Sequence Diagrams
 -New System Operations
 -New System Operation Contracts

2. Explain about Interaction Diagram Notation? APRIL/MAY 2011

3. -Sequence and Collaboration Diagrams

-Collaboration Diagram -
 Sequence Diagram
 -Common Interaction Diagram Notation -
 Basic Collaboration Diagram -Notation
 -Basic Sequence Diagram Notation

4. Design the Model and Creating Design Class Diagrams.

-When to Create DCDs -
 Example DCD
 -DCD and UP
 -Domain Model vs. Design Model Classes -
 DCDs, Drawing, and CASE Tools -DCDs
 within the UP

4. What are concepts involved in domain refinement?

-Generalization
 -Defining Conceptual Super classes and
 Subclasses -Class Hierarchies and Inheritance
 -Aggregation and
 Composition -Examples

UNIT V

CODING AND TESTING

Mapping design to code – Testing: Issues in OO Testing – Class Testing – OO Integration
 Testing – GUI Testing – OO System Testing.

PART A

1. What are the steps in mapping design to code?

Implementation in an object-oriented programming language requires writing
 source code for: Class and interface definitions
 Method definitions

2. How will you create Class Definitions from DCDs?

At the very least, DCDs depict the class or interface name, super classes, method signatures, and simple attributes of a class. This is sufficient to create a basic class definition in an object-oriented programming language. Later discussion will explore the addition of interface and namespace (or package) information, among other details.

3. What are the Benefits of Iterative Development?

- ☐ Early rather than late mitigation of high risks (technical, requirements, objectives, usability, and so forth)
- ☐ Early visible progress
- ☐ Early feedback, user engagement, and adaptation, leading to a refined system that more closely meets the real needs of the stakeholders
- ☐ managed complexity; the team is not overwhelmed by "analysis paralysis" or very long and complex steps
- ☐ The learning within iteration can be methodically used to improve the development process itself, iteration by iteration

4. Specify the issues in OO testing.

- Unit of testing
- Implications of encapsulation and composition
- Implications of inheritance
- Implications of Polymorphism

5. List the levels of object oriented testing.

- ☐ Operation / Method
- ☐ Class
- ☐ Integration
- ☐ System Testing

6. Define unit.

- ☐ a single, cohesive function
- ☐ a function which, when coded, fits on one page
- ☐ the smallest separately compilable segment of code
- ☐ the amount of code that can be written in 4 to 40 hours
- ☐ a task in a work breakdown structure
- ☐ code that is assigned to one person

7. What is the purpose of unit testing?

The goal of unit testing is to verify that, taken by itself, the unit functions correct.

8. Define integration testing.

Integration testing (sometimes called integration and testing, abbreviated I&T) is the phase in software testing in which individual software modules are combined and tested as a group. It occurs after unit testing and before validation testing.

9. What is meant by thread?

- ☐ a sequence of machine instructions
- ☐ a sequence of source instructions
- ☐ a scenario of normal usage
- ☐ a system-level test case
- ☐ a stimulus/response pair
- ☐ the behavior that results from a sequence of system-level inputs
- ☐ an interleaved sequence of system inputs (stimuli) and outputs (responses)

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10. Define MM- path.

A Method/Message Path (MM-Path) is a sequence of method executions linked by messages. An MM-Path starts with a method and ends when it reaches a method which does not issue any messages of its own.

11. Define ASF.

An Atomic System Function (ASF) is an input port event, followed by a set of MM-Paths, and terminated by an output port event. An atomic system function is an elemental function visible at the system level.

12. Mention the five distinct levels of OO testing.

- ☐ Method
- ☐ Message Quiescence
- ☐ Event Quiescence
- ☐ Thread Testing
- ☐ Thread Interaction Testing

13. Define EMDPNs.

An Event and Message Driven Petrinet (EMDPN) is a quadripartite directed graph(P,D,M,In,Out) composed of four set of nodes P,D,M and S and two mappings In and Out.

14. Define GUI testing.

GUI testing is the process of ensuring proper functionality of the graphical **user interface** (GUI) for a given application and making sure it conforms to its written specifications.

15. List out the types of Events.

External event Internal event Temporal event

16. Define External event.

External event—also known as a system event, is caused by something (for example, an actor) outside our system boundary. SSDs illustrate external events. Noteworthy external events precipitate the invocation of system operations to respond to them.

17. Define internal event.

Internal event—caused by something inside our system boundary. In terms of software, an internal event arises when a method is invoked via a message or signal that was sent from another internal object. Messages in interaction diagrams suggest internal events.

18. Define temporal event.

Temporal event—caused by the occurrence of a specific date and time or passage of time. In terms of software, a temporal event is driven by a real time or simulated-time clock.

19. What are the difficulties in GUI testing.

- ☐ GUI test automation is difficult
- ☐ Often GUI test automation is technology-dependent
- ☐ Observing and trace GUI states is difficult
- ☐ UI state explosion problem
- ☐ Controlling GUI events is difficult
- ☐ GUI test maintenance is hard and costly

20. How would you identify methods?

- ☐ The sequence diagrams assist us in defining services that the objects must provide. These services are implemented as the methods for your objects.
- ☐ In a sequence diagram the events that occur between objects are drawn between the vertical object lines. An event is considered to be an action that transmits information; therefore these actions are the operations that the objects must perform.
- ☐ Methods also can be derived from the scenario testing.

21. Why do we need methods and messages in object-oriented system?

Objects not only describe abstract data but also must provide some services. Methods and messages are the workhorses of object-oriented systems. In an object-oriented environment, every piece of data or object is surrounded by a rich set of routines called methods. Methods are responsible for managing the value of attributes such as query, updating, reading and writing.

PART B**1. Explain the operation of Mapping Designs to Code. APRIL/MAY 2011**

- Programming and the Development Process

- -Mapping Designs to Code
- -Creating Class Definitions from DCDs - Creating Methods from Interaction Diagrams -Container/Collection Classes in Code -Exceptions and Error Handling
- -Defining the Sale--makeLineItem Method -Order of Implementation
- -Test-First Programming

2. Explain UML state diagrams with an example?

- State machine diagrams
- When to Use: State Diagrams
- How to Draw: State Diagrams
- Elements of state machine diagrams

3. Explain Operation contracts with an example?

- Operation Contracts:
- Sections of a contract
- Preconditions

4. Explain Mapping design to code with an Example?

- Implementation Model
- In Design
- Design Codes
- Connecting the Nodes

5. Explain guidelines for how to create and write contracts?

- Identify system operations from the SSDs
- To describe the postconditions, use the following categories:
- Writing Contracts

6. Explain UML deployment diagrams

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- Deployment diagram
- Artifact
- URI.
- Associations Between Artifacts
- Dependency Between Artifacts
- Artifact Manifestation
- Elements in deployment diagram
- There are two types of nodes
- Device Node
- Execution Environment node

7. Explain UML Component Diagram

- Overview
- Purpose
- How to draw Component Diagram?
- Where to use Component Diagrams?

8. Explain Deployment Specification

- Deployment Specification Dependency
- Deployment Specification Association
- Deployment
- Deployment Diagram Example

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UNIT 1

16 MARKS

1. Explain the Fundamental HTML Elements

- What is HTML?
- HTML Tags
- HTML Documents
- HTML Elements
- HTML Element Syntax
- Nested HTML Elements
- HTML Document Example
- EMPTY HTML ELEMENTS
- HTML Attributes
- HTML HEADINGS
- HTML Formatting Tags

2. Explain the various methodologies by which you can retrieve data from Internet.

Internet Search Engine

Protocols used to retrieve the Data

i)FTP –Concepts

Commands &Semantics

Anonymous FTP

ii)TELNET

Network Virtual Terminal

Commands *Control Functions

Negotiable Options

iii)HTTP

iv)TFTP

3. Explain about <TABLE> &<FRAME> tags in Detail.

Code for Basic HTML Table

```
<TABLE>
```

```
<TR>-----</TR> <!--Row1-->
```

```
<TR>-----</TR> <!--Row2-->
```

```
-----
```

```
<TR>-----</TR> <!--Rowm-->
```

```
</TABLE>
```

Creating a Table cell.

i)Header cell

ii)Data cell

Table Alifnment

i)Aligning the Entiere Table

ii)Alignment within a row.

ii) Alignment within a cell.

Spanning Multiple Rows & Columns

<FRAMES>

Creating the <FRAMESET> tag

Creating the <FRAME> tag

Eg:<FRAMESET Rows=||10%,80%,10%||>

<FRAME name=||top|| src=||a.html||>

<FRAME name=||mid||src=||b.html||>

<FRAME name=||bot|| src=||c.html||>

</FRAMESET>

4. Discuss the various HTML tags in detail.

[<html>](#)

[](#)

[](#)

[<base>](#)

[<base font>](#)

[<i>](#)

[<big>](#)

[<body>](#)

[
](#)

[<button>](#)

[<caption>](#)

[<center>](#)

[<dd>](#)

[<dialog>](#)

[<dir>](#)

[<div>](#)

[<dl>](#)

[<dt>](#)

[](#)

5. CSS Background Properties

Property	Description	Values	CSS
<u>background</u>	Sets all the background properties in one declaration	background-color background-image background-repeat background-attachment background-position inherit	1
<u>background-attachment</u>	Sets whether a background image is fixed or scrolls with the rest of the page	Scroll, fixed, inherit	1
<u>background-color</u>	Sets the background color of an element	color-rgb color-hex color-name transparent inherit	1
<u>background-image</u>	Sets the background image for an	url(URL), none, inherit	1

	element		
<u>background-position</u>	Sets the starting position of a background image	left top left center left bottom right top right center right bottom center top center center center bottom	1
<u>background-repeat</u>	Sets if/how a background image will be repeated	Repeat,repeat-x repeat-y,no-repeat,inherit	1

6. Types of CSS.

There are three ways of inserting a style sheet:

- External style sheet
- Internal style sheet
- Inline style

7. Explain the various event handlers in java script. Give an example.

Event	Description
onchange	An HTML element has been changed
onclick	The user clicks an HTML element
onmouseover	The user moves the mouse over an HTML element
onmouseout	The user moves the mouse away from an HTML element
onkeydown	The user pushes a keyboard key
onload	The browser has finished loading the page

8. List out objects available in JavaScript.

- ☐ Math
- ☐ String
- ☐ Date
- ☐ document
- ☐ window
- ☐ cookies

9. Explain in detail about Text properties.

- Font families.
- Length specifications in CSS.
- Font properties.
- Line boxes.
- Text formatting and color.

10. Explain the Normal flow box layout in detail.

- Basic box layout.
- Display property.
- Margin collapse.
- Block box width and height.
- Simple inline boxes.
- Nested inline boxes.

11. Discuss the beyond the normal flow.

- Properties for positioning.
- Relative positioning.
- Float positioning.
- Absolute positioning.
- Positioning related properties.

Unit-II
16-MARKS

1.Explain the features of Java.

1. Simple
2. Object-Oriented
3. Platform independent
4. Secured
5. Robust
6. Architecture neutral
7. Portable
8. Dynamic
9. Interpreted
10. High Performance
11. Multithreaded
12. Distributed

2.Describe the structure of Java program.

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- A program is made up of one or more *classes*
- A class contains one or more *methods*
- A method contains program *statements*

A Java application always contains a method called main

3. Write about the control statements in Java .

Java has very flexible three looping mechanisms. You can use one of the following three loops:

- while Loop
- do...while Loop
- for Loop

4. Write a Java program to perform matrix operations.

```
import java.util.Scanner;
public class MatrixAddition {

    public static void main(String[] args) {
        Scanner s = new Scanner(System.in);
        System.out.print("Enter number of rows: ");
        int rows = s.nextInt();
        System.out.print("Enter number of columns: ");
        int columns = s.nextInt();
        int[][] a = new int[rows][columns];
        int[][] b = new int[rows][columns];
        System.out.println("Enter the first matrix");
        for (int i = 0; i < rows; i++) {
            for (int j = 0; j < columns; j++) {
                a[i][j] = s.nextInt();
            }
        }
        System.out.println("Enter the second matrix");
        for (int i = 0; i < rows; i++) {
            for (int j = 0; j < columns; j++) {
                b[i][j] = s.nextInt();
            }
        }
        int[][] c = new int[rows][columns];
        for (int i = 0; i < rows; i++) {
            for (int j = 0; j < columns; j++) {
                c[i][j] = a[i][j] + b[i][j];
            }
        }
        System.out.println("The sum of the two matrices is");
        for (int i = 0; i < rows; i++) {
            for (int j = 0; j < columns; j++) {
                System.out.print(c[i][j] + " ");
            }
        }
        System.out.println();
    }
}
```

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```
}
}
```

Here is a sample execution.

```
Enter number of rows: 2
Enter number of columns: 3
Enter the first matrix
3 4 7
1 8 4
Enter the second matrix
3 2 1
1 0 4
The sum of the two matrices is
6 6 8
2 8 8
```

5.Explain the concept of inheritance with suitable example.

Inheritance in java is a mechanism in which one object acquires all the properties and behaviors of parent object.

Single inheritance

Multitple inheritance

Multilevel inheritance

Hybrid inheritance

6.What is a package ?Write down the steps in creating a package and using it in Java program with an example.

A Package can be defined as a grouping of related types(classes, interfaces, enumerations and annotations) providing access protection and name space management.

Some of the existing packages in Java are::

- **java.lang** - bundles the fundamental classes
- **java.io** - classes for input , output functions are bundled in this package

Creating a package:

The **package** statement should be the first line in the source file. There can be only one package statement in each source file, and it applies to all types in the file.

Put an interface in the package *animals*:

```
/* File name : Animal.java */
package animals;

interface Animal {
    public void eat();
    public void travel();
}
```

Now, put an implementation in the same package *animals*:

package animals;

```
/* File name : MammalInt.java */
public class MammalInt implements Animal{

    public void eat(){
        System.out.println("Mammal eats");
    }

    public void travel(){
        System.out.println("Mammal travels");
    }

    public int noOfLegs(){
        return 0;
    }

    public static void main(String args[]){
        MammalInt m = new MammalInt();
        m.eat();
        m.travel();
    }
}
```

Now, you compile these two files and put them in a sub-directory called **animals** and try to run as follows:

```
$ mkdir animals
$ cp Animal.class MammalInt.class animals
$ java animals/MammalInt
Mammal eats
Mammal travels
```

7.Explain the concept of interface with suitable example.

An interface is a collection of abstract methods. A class implements an interface, thereby inheriting the abstract methods of the interface.

Declaring Interfaces:

The **interface** keyword is used to declare an interface. Here is a simple example to declare an interface:

Example:

Let us look at an example that depicts encapsulation:

```
/* File name : NameOfInterface.java */
import java.lang.*;
//Any number of import statements

public interface NameOfInterface
```

```
{
  //Any number of final, static fields
  //Any number of abstract method declarations\
}
```

Interfaces have the following properties:

- An interface is implicitly abstract. You do not need to use the **abstract** keyword when declaring an interface.
- Each method in an interface is also implicitly abstract, so the abstract keyword is not needed.
- Methods in an interface are implicitly public.

8.Explain the throwing and catching the exception in java.

An exception is a problem that arises during the execution of a program. An exception can occur for many different reasons, including the following:

- A user has entered invalid data.
- A file that needs to be opened cannot be found.
- A network connection has been lost in the middle of communications or the JVM has run out of memory.
- **Checked exceptions:** A checked exception is an exception that is typically a user error or a problem that cannot be foreseen by the programmer. For example, if a file is to be opened, but the file cannot be found, an exception occurs. These exceptions cannot simply be ignored at the time of compilation.
- **Runtime exceptions:** A runtime exception is an exception that occurs that probably could have been avoided by the programmer. As opposed to checked exceptions, runtime exceptions are ignored at the time of compilation.
- **Errors:** These are not exceptions at all, but problems that arise beyond the control of the user or the programmer. Errors are typically ignored in your code because you can rarely do anything about an error. For example, if a stack overflow occurs, an error will arise. They are also ignored at the time of compilation.

9.Explain string handling classes in Java with examples.

The java.lang.String class provides a lot of methods to work on string. By the help of these methods, we can perform operations on string such as trimming, concatenating, converting, comparing, replacing strings etc.

Java String is a powerful concept because everything is treated as a string if you submit any form in window based, web based or mobile application.

1. String s="Sachin";
2. System.out.println(s.toUpperCase());//SACHIN
3. System.out.println(s.toLowerCase());//sachin
4. System.out.println(s);//Sachin(no change in original)

10.Describe about the different input and output streams and their classes.

A stream is a sequence of data. In Java a stream is composed of bytes. It's called a stream because it's like a stream of water that continues to flow.

In java, 3 streams are created for us automatically. All these streams are attached with console.

- 1) **System.out:** standard output stream
- 2) **System.in:** standard input stream
- 3) **System.err:** standard error stream

Unit-III 16-MARKS

1.Explain JDBC architecture in detail.

2.Discuss about the JDBC driver types.

- Type 1: JDBC-ODBC Bridge Driver
- Type 2: JDBC-Native API
- Type 3: JDBC-Net pure Java
- Type 4: 100% Pure Java

3.Explain about TCP sockets.

TCP is a two-way communication protocol, so data can be sent across both streams at the same time. There are following useful classes providing complete set of methods to implement sockets.

ServerSocket Class Methods:

The **java.net.ServerSocket** class is used by server applications to obtain a port and listen for client requests

The ServerSocket class has four constructors:

SN

Methods with Description

public ServerSocket(int port) throws IOException

- 1 Attempts to create a server socket bound to the specified port. An exception occurs if the port is already bound by another application.

public ServerSocket(int port, int backlog) throws IOException

- 2 Similar to the previous constructor, the backlog parameter specifies how many incoming clients to store in a wait queue.

public ServerSocket(int port, int backlog, InetAddress address) throws IOException

- 3 Similar to the previous constructor, the InetAddress parameter specifies the local IP address to bind to. The InetAddress is used for servers that may have multiple IP addresses, allowing the server to specify which of its IP addresses to accept client requests on

- 4 **public ServerSocket() throws IOException**

Creates an unbound server socket. When using this constructor, use the `bind()` method when you are ready to bind the server socket

If the `ServerSocket` constructor does not throw an exception, it means that your application has successfully bound to the specified port and is ready for client requests.

4. Write notes on UDP sockets.

DatagramSocket's are Java's mechanism for network communication via UDP instead of TCP. UDP is still layered on top of IP. You can use Java's `DatagramSocket` both for sending and receiving UDP datagrams.

Sending Data via a DatagramSocket

To send data via Java's `DatagramSocket` you must first create a `DatagramPacket`. Here is how that is done:

```
byte[] buffer = new byte[65508];
InetAddress address = InetAddress.getByName("jenkov.com");
DatagramPacket packet = new DatagramPacket(
    buffer, buffer.length, address, 9000);
```

The byte buffer (the byte array) is the data that is to be sent in the UDP datagram. The length of the above buffer, 65508 bytes, is the maximum amount of data you can send in a single UDP packet. The length given to the `DatagramPacket` constructor is the length of the data in the buffer to send. All data in the buffer after that amount of data is ignored.

The `InetAddress` instance contains the address of the node (e.g. server) to send the UDP packet to. The `InetAddress` class represents an IP address (Internet Address). The `getByName()` method returns an `InetAddress` instance with the IP address matching the given host name.

The port parameter is the UDP port the server to receive the data is listening on. UDP and TCP ports are not the same. A computer can have different processes listening on e.g. port 80 in UDP and in TCP at the same time.

To send the `DatagramPacket` you must create a `DatagramSocket` targeted at sending data. Here is how that is done:

```
DatagramSocket datagramSocket = new DatagramSocket();
```

To send data you call the `send()` method, like this:

```
datagramSocket.send(packet);
```

5. Write a short notes on JavaBeans classes and JSP

- o JavaBeans Component Design Conventions
- o Why Use a JavaBeans Component?
- o Creating and Using a JavaBeans Component
- o Setting JavaBeans Component Properties

6. Discuss the concept of RMI.

The **RMI** (Remote Method Invocation) is an API that provides a mechanism to create distributed application in java. The RMI allows an object to invoke methods on an object running in another JVM.

The RMI provides remote communication between the applications using two objects *stub* and *skeleton*.

Steps to write the RMI program

1. Create the remote interface

2. Provide the implementation of the remote interface
3. Compile the implementation class and create the stub and skeleton objects using the rmic tool
4. Start the registry service by rmiregistry tool
5. Create and start the remote application
6. Create and start the client application

7.Explain jdbc-odbc data base connectivity program.

```

Class.forName("sun.jdbc.odbc.JdbcOdbcDriver");
System.out.println("Driver loaded");

connection = DriverManager.getConnection("jdbc:odbc:Lab3.accdb");
System.out.println("Database connected");

statement = connection.createStatement();
ResultSet resultSet = statement.executeQuery("");

while (resultSet.next()) {
    output.write("<p>" + resultSet.getString(1) + "\t" +
        resultSet.getString(2) + "\t" + resultSet.getString(3) + "</p>");
}

```

Unit-IV 16-MARKS

1.Explain the life cycle of applet.

public void init(): is used to initialize the Applet. It is invoked only once.

public void start(): is invoked after the init() method or browser is maximized. It is used to start the Applet.

public void stop(): is used to stop the Applet. It is invoked when Applet is stop or browser is minimized.

public void destroy(): is used to destroy the Applet. It is invoked only once.

2.List the methods available in the graphics for COLOR.

Graphics() () Constructs a new Graphics object.

abstract void clearRect(int x, int y, int width, int height)

Clears the specified rectangle by filling it with the background color of the current drawing surface.

abstract void clipRect(int x, int y, int width, int height)

Intersects the current clip with the specified rectangle.

abstract void copyArea(int x, int y, int width, int height, int dx, int dy)

Copies an area of the component by a distance specified by dx and dy.

void drawPolygon(Polygon p)

Draws the outline of a polygon defined by the specified Polygon object.

abstract void drawString(String str, int x, int y)

Draws the text given by the specified string, using this graphics context's current font and color.

3.How frames are created in Java?

1. Create the frame.

```
JFrame frame = new JFrame("FrameDemo");
```

2. Optional: What happens when the frame closes?

```
frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
```

3. Create components and put them in the frame.

```
//...create emptyLabel...
```

```
frame.getContentPane().add(emptyLabel, BorderLayout.CENTER);
```

4. Size the frame.

```
frame.pack();
```

5. Show it.

```
frame.setVisible(true);
```

4.Explain the various event handling in detail.

Event Handling is the mechanism that controls the event and decides what should happen if an event occurs.

Foreground Events - Those events which require the direct interaction of user.

Background Events - Those events that require the interaction of end user are known as background events.

- **Source** - The source is an object on which event occurs. Source is responsible for providing information of the occurred event to it's handler. Java provide as with classes for source object.
- **Listener** - It is also known as event handler.Listener is responsible for generating response to an event. From java implementation point of view the listener is also an object. Listener waits until it receives an event. Once the event is received , the listener process the event an then returns.

5.Discuss mouse listener and mouse motion listener. Give an example.

MouseMotionListener will enable you to performactions when the mouse moves over

a hotspot. You can also use this to drag things, that will require `MouseListener` and `MouseMotionListener` at the same time.

This applet will show a rectangle that will change color when the mouse moves over it.

```
import java.awt.*;
```

```
import java.applet.*;
```

```
import java.awt.event.*;
```

```
public class MouseMotionExample extends Applet implements MouseMotionListener
{
```

```
    int xpos;
```

```
    int ypos;
```

```
    int rect1xco, rect1yco, rect1width, rect1height;
```

```
    boolean rect1Active;
```

```
    public void init()
```

```
    {
```

```
        rect1xco = 20;
```

```
        rect1yco = 20;
```

```
        rect1width = 100;
```

```
        rect1height = 50;
```

```
        addMouseMotionListener(this);
```

```
    }
```

```
    public void paint(Graphics g)
```

```
    {
```

```
        if (rect1Active) g.setColor(Color.green);
```

```
        else g.setColor(Color.red);
```

```
        g.fillRect(rect1xco, rect1yco, rect1width, rect1height);
```

```
        g.setColor(Color.blue);
```

```
        g.drawString("(" + xpos + ", " + ypos + ")", xpos, ypos);
```

```
    }
```

```
    public void mouseMoved(MouseEvent me)
```

```
    {
```

```
        xpos = me.getX();
```

```
        ypos = me.getY();
```

```
        if (xpos > rect1xco && xpos < rect1xco + rect1width && ypos > rect1yco
            && ypos < rect1yco + rect1height)
```

```
            rect1Active = true;
```

```
        else
```

```
            rect1Active = false;
```

```
        repaint();
```

```
    }
```



```

public void mouseDragged(MouseEvent me)
{
}

```

6. Discuss the various types of layout supported by java.

The BorderLayout arranges the components to fit in the five regions: east, west, north, south and center.

The CardLayout object treats each component in the container as a card. Only one card is visible at a time.

The FlowLayout is the default layout. It layouts the components in a directional flow.

The GridLayout manages the components in form of a rectangular grid.

7. Explain Servlet life cycle in detail.

Methods:

- Init()
- Service()
- Destroy()

8. Discuss the Servlets and concurrency concept.

- Concurrency in web servers.
- Threads.
- Threading issues.
- Thread synchronization.
- Servlet Synchronization.

9. Explain about sessions in detail.

- Creating a session.
- Storing and retrieving attributes.
- Session termination

10. Discuss the parameter data concept.

- Parameter data and query strings.
- Servlets and parameter data.
- Forms and parameter data.

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UNIT-5
16-MARKS

1. Explain the java web service in detail.

- Currency conversion service.
- Writing server software.
- Packaging server software.

2. Explain in detail about XML Schema.

- Built in data types.
- User defined simple types.
- User defined complex types.
- Xml schema with in instance documents.

3. Explain WSDL in detail.

- WSDL stands for Web Services Description Language
- WSDL is written in XML
- WSDL is an XML document
- WSDL is used to describe Web services
- WSDL is also used to locate Web services
- WSDL is a W3C recommendation

4. Explain Soap Concepts.

- SOAP elements.
- RPC representation.
- SOAP encoding of data.
- SOAP encoding of arrays.
- SOAP and HTTP.
- Java support for SOAP.

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5. Explain Web Services Architecture.

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