

CS1302 COMPUTER NETWORKS

PART A

UNIT – I

DATA COMMUNICATION

1. What is mean by data communication?

Data communication is the exchange of data (in the form of 1s and 0s) between two devices via some form of transmission medium (such as a wire cable).

2. 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.

3. What are the three fundamental characteristics determine the effectiveness of the data communication system?

The effectiveness of the data communication system depends on three fundamental characteristics:

Delivery: The system must deliver data to the correct destination.

Accuracy: The system must deliver data accurately.

Timeliness: The system must deliver data in a timely manner.

4. What are the advantages of distributed processing?

Advantages of distributed processing include security/encapsulation, distributed databases, faster problem solving, security through redundancy and collaborative processing.

5. Why are protocols needed?

In networks, communication occurs between the entities in different systems. Two entities cannot just send bit streams to each other and expect to be understood. For communication, the entities must agree on a protocol. A protocol is a set of rules that govern data communication.

6. Why are standards needed?

Co-ordination across the nodes of a network is necessary for an efficient communication. If there are no standards, difficulties arise. A standard provides a model

or basis for development to which everyone has agreed.

7. For n devices in a network, what is the number of cable links required for a mesh and ring topology?

Mesh topology – $n(n-1)/2$

Ring topology – n

8. What is the difference between a passive and an active hub?

An active hub contains a repeater that regenerates the received bit patterns before sending them out. A passive hub provides a simple physical connection between the attached devices.

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9. Distinguish between peer-to-peer relationship and a primary-secondary relationship.

Peer-to-peer relationship: All the devices share the link equally.

Primary-secondary relationship: One device controls traffic and the others must transmit through it.

10. Assume 6 devices are arranged in a mesh topology. How many cables are needed? How many ports are needed for each device?

Number of cables= $n(n-1)/2=6(6-1)/2=15$

Number of ports per device= $n-1=6-1=5$

11. Group the OSI layers by function.

The seven layers of the OSI model belonging to three subgroups. Physical, data link and network layers are the network support layers; they deal with the physical aspects

of moving data from one device to another. Session, presentation and application layers

are the user support layers; they allow interoperability among unrelated software systems. The transport layer ensures end-to-end reliable data transmission.

12. What are header and trailers and how do they get added and removed?

Each layer in the sending machine adds its own information to the message it receives from the layer just above it and passes the whole package to the layer just below it. This information is added in the form of headers or trailers. Headers are added

to the message at the layers 6,5,4,3, and 2. A trailer is added at layer2. At the receiving

machine, the headers or trailers attached to the data unit at the corresponding sending

layers are removed, and actions appropriate to that layer are taken.

13. The transport layer creates a communication between the source and destination. What are the three events involved in a connection?

Creating a connection involves three steps: connection establishment, data transfer and connection release.

14. What is the DC component?

Direct current is a zero-frequency signal with constant amplitude.

15. How does NRZ-L differ from NRZ-I?

In the NRZ-L sequence, positive and negative voltages have specific meanings: positive for 0 and negative for 1. in the NRZ-I sequence, the voltages are meaningless.

Instead, the receiver looks for changes from one level to another as its basis for recognition of 1s.

16. Using HDB3, encode the bit stream 1000000000100. Assume the number of 1s

so far is odd and the first 1 is positive.

17. What are the functions of a DTE? What are the functions of a DCE?

Data terminal equipment is a device that is an information source or an information sink. It is connected to a network through a DCE.

Amplitude

Time

1 0 0 0 0 0 0 0 0 0 1 0 0

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Data circuit-terminating equipment is a device used as an interface between a DTE and

a network.

18. What does the electrical specification of EIA-232 describe?

The electrical specification of EIA-232 defines that signals other than data must be sent using OFF as less than -3 volts and ON as greater than +3 volts. The data must be

transmitted using NRZ-L encoding.

19. Discuss the mode for propagating light along optical channels.

There are two modes for propagating light along optical channels, multimode and single mode.

Multimode: Multiple beams from a light source move through the core in different paths.

Single mode: Fiber with extremely small diameter that limits beams to a few angles, resulting in an almost horizontal beam.

20. What is refraction?

The phenomenon related to the bending of light when it passes from one medium to another.

UNIT-II

DATA LINK LAYER

1. 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

2. Mention the types of errors.

There are 2 types of errors

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

3. 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.

4. 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.

5. List out the available detection methods.

There are 4 types of redundancy checks are used in data communication.

- a) Vertical redundancy checks (VRC).
- b) Longitudinal redundancy checks (LRC).
- c) Cyclic redundancy checks (CRC).
- d) Checksum.

6. Write short notes on VRC.

The most common and least expensive mechanism for error detection is the vertical

redundancy check (VRC) often called a parity check. In this technique a redundant bit

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called a parity bit, is appended to every data unit so, that the total number of 0's in the unit

(including the parity bit) becomes even.

7. Write short notes on LRC.

In longitudinal redundancy check (LRC), a block of bits is divided into rows and a redundant row of bits is added to the whole block.

8. Write short notes on CRC.

The third and most powerful of the redundancy checking techniques is the cyclic redundancy checks (CRC) CRC is based on binary division. Here a sequence of redundant

bits, called the CRC remainder is appended to the end of data unit.

9. Write short notes on CRC generator.

A CRC generator uses a modulo-2 division.

° In the first step, the 4-bit divisor is subtracted from the first 4 bit of the dividend.

° Each bit of the divisor is subtracted from the corresponding bit of the dividend without disturbing the next higher bit.

10. Write short notes on CRC checker.

A CRC checker functions exactly like a generator. After receiving the data appended with the CRC it does the same modulo-2 division. If the remainder is all 0's the CRC is

dropped and the data accepted. Otherwise, the received stream of bits is discarded and the data are resent.

11. Give the essential properties for polynomial.

A polynomial should be selected to have at least the following properties.

- a) It should not be
- b) It should be divisible by $(x+1)$.

12. Define checksum.

The error detection method used by the higher layer protocol is called checksum. Checksum is based on the concept of redundancy.

13. What are the steps followed in checksum generator?

The sender follows these steps

- a) The units are divided into k sections each of n bits.
- b) All sections are added together using 2's complement to get the sum.
- c) The sum is complemented and become the checksum.
- d) The checksum is sent with the data.

14. List out the steps followed is checksum checker side.

The receiver must follow these steps

- a) The unit is divided into k section each of n bits.
- b) All sections are added together using 1's complement to get the sum.
- c) The sum is complemented.
- d) If the result is zero.

15. Write short notes on 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 errors.

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16. Mention the types of error correcting methods.

There are 2 error-correcting methods.

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

17. 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.

18. Define flow control.

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

19. What is a buffer?

Each receiving device has a block of memory called a buffer, reserved for storing incoming data until they are processed.

20. Mention the categories of flow control.

There are 2 methods have been developed to control flow of data across communication links.

- a) Stop and wait- send one from at a time.
- b) Sliding window- send several frames at a time.

UNIT III

NETWORK LAYER

1. What are the network support layers and the user support layers?

Network support layers:

The network support layers are Physical layer, Data link layer and Network layer. These

deals with electrical specifications, physical connection, transport timing and reliability.

User support layers:

The user support layers are: Session layer, Presentation layer, Application layer. These

allow interoperability among unrelated software system.

2. With a neat diagram explain the relationship of IEEE Project to the OSI model?

The IEEE has subdivided the data link layer into two sub layers:

- * Logical link control (LLC)
- * Medium access control (MAC)

LLC is non-architecture specific. The MAC sub layer contains a number of distinct

modules, each carries proprietary information specific to the LAN product being used.

3. What are the functions of LLC?

The IEEE project 802 models takes the structure of an HDLC frame and divides it into 2 sets of functions. One set contains the end user portion of the HDLC frame - the

Other layers

Network

Data link

Physical

Other layers

Network

Logical Link Control

Media Access Control

Physical

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logical address, control information, and data. These functions are handled by the IEEE

802.2 logical link control (LLC) protocol.

4. 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.

5. What is protocol data unit?

The data unit in the LLC level is called Protocol Data Unit (PDU). It contains four fields.

- Destination Service Point Address (DSAP)
- Source Service Access Point
- Control field
- Information field

6. What are headers and trailers and how do they get added and removed?

The control data added to the beginning of a data is called headers. The control data added to the end of a data is called trailers. At the sending machine, when the message

passes through the layers each layer adds the headers or trailers. At the receiving machine,

each layer removes the data meant for it and passes the rest to the next layer.

7. What are the responsibilities of network layer?

The network layer is responsible for the source-to-destination delivery of packet across

multiple network links. The specific responsibilities of network layer include the following:

- Logical addressing.
- Routing.

8. What is a virtual circuit?

A logical circuit made between the sending and receiving computers. The connection is made after both computers do handshaking. After the connection, all packets follow the same route and arrive in sequence.

9. What are data grams?

In datagram approach, each packet is treated independently from all others. Even when one packet represents just a place of a multipacket transmission, the network treats it

although it existed alone. Packets in this technology are referred to as datagram.

10. What are the two types of implementation formats in virtual circuits?

Virtual circuit transmission is implemented in 2 formats.

- Switched virtual circuit
- Permanent virtual circuit.

11. What is meant by switched virtual circuit?

Switched virtual circuit format is comparable conceptually to dial-up line in circuit switching. In this method, a virtual circuit is created whenever it is needed and exits

only for the duration of specific exchange.

12. What is meant by Permanent virtual circuit?

Permanent virtual circuits are comparable to leased lines in circuit switching.

In this method, the same virtual circuit is provided between two uses on a continuous basis.

The circuit is dedicated to the specific uses.

13. Define Routers.

DSAP SSAP Control Information

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Routers relay packets among multiple interconnected networks. They Route packets from one network to any of a number of potential destination networks on Internet routers

operate in the physical, data link and network layer of OSI model.

14. What is meant by hop count?

The pathway requiring the smallest number of relays, it is called hop-count routing, in

which every link is considered to be of equal length and given the value one.

15. How can the routing be classified?

The routing can be classified as,

- Adaptive routing
- Non-adaptive routing.

16. What is time-to-live or packet lifetime?

As the time-to-live field is generated, each packet is marked with a lifetime, usually the number of hops that are allowed before a packet is considered lost and accordingly,

destroyed. The time-to-live determines the lifetime of a packet.

17. What is meant by brouter?

A brouter is a single protocol or multiprotocol router that sometimes act as a router and sometimes act as a bridge.

18. Write the keys for understanding the distance vector routing.

The three keys for understanding the algorithm are

- Knowledge about the whole networks
- Routing only to neighbors
- Information sharing at regular intervals

19. Write the keys for understanding the link state routing.

The three keys for understanding the algorithm are

- Knowledge about the neighborhood.
- Routing to all neighbors.
- Information sharing when there is a range.

20. How the packet cost referred in distance vector and link state routing?

In distance vector routing, cost refer to hop count while in case of link state routing, cost is a weighted value based on a variety of factors such as security levels, traffic or the state of the link.

UNIT IV

TRANSPORT LAYER

1. What is function of transport layer?

The protocol in the transport layer takes care in the delivery of data from one application program on one device to an application program on another device. They act as a link between the upper layer protocols and the services provided by the lower layer.

2. What are the duties of the transport layer?

The services provided by the transport layer

End-to- end delivery

Addressing

Reliable delivery

Flow control

Multiplexing

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3. What is the difference between network layer delivery and the transport layer delivery?

Network layer delivery Transport layer delivery

The network layer is responsible for the the source-to-destination delivery of packet across multiple network links.

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

4. What are the four aspects related to the reliable delivery of data?

The four aspects are,

Error control

Sequence control

Loss control

Duplication control

5. What is meant by segment?

At the sending and receiving end of the transmission, TCP divides long transmissions into smaller data units and packages each into a frame called a segment.

6. What is meant by segmentation?

When the size of the data unit received from the upper layer is too long for the network layer datagram or data link layer frame to handle, the transport protocol divides

it into smaller usable blocks. The dividing process is called segmentation.

7. What is meant by Concatenation?

The size of the data unit belonging to single sessions are so small that several can fit together into a single datagram or frame, the transport protocol combines them

into a single data unit. The combining process is called concatenation.

8. What are the types of multiplexing?

The types of multiplexing are,

Upward multiplexing

Downward multiplexing

9. What are the two possible transport services?

Two basic types of transport services are,

Connection service

Connectionless services

10. The transport layer creates the connection between source and destination.

What are the three events involved in the connection?

For security, the transport layer may create a connection between the two end ports. A connection is a single logical path between the source and destination that is associated with all packets in a message. Creating a connection involves three steps:

- Connection establishment
- Data transfer & Connection release.

11. What is meant by congestion?

Congestion in a network occurs if user sends data into the network at a rate greater than that allowed by network resources.

12. Why the congestion occurs in network?

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Congestion occurs because the switches in a network have a limited buffer size to store arrived packets.

13. What is meant by quality of service?

The quality of service defines a set of attributes related to the performance of the connection. For each connection, the user can request a particular attribute each service class is associated with a set of attributes.

14. What are the two categories of QoS attributes?

The two main categories are

User Oriented

Network Oriented

15. List out the user related attributes?

User related attributes are

SCR – Sustainable Cell Rate
PCR – Peak Cell Rate
MCR- Minimum Cell Rate
CVDT – Cell Variation Delay Tolerance

16. What are the networks related attributes?

The network related attributes are,
Cell loss ratio (CLR)
Cell transfer delay (CTD)
Cell delay variation (CDV)
Cell error ratio (CER)

17. What is the difference between service point address, logical address and physical address?

Service point addressing

Logical addressing Physical addressing

The transport layer header includes a type of address called a service point address or port address, which makes a data delivery from a specific process on one computer to a specific process on another computer.

If a packet passes the network boundary we need another addressing to differentiate the source and destination systems.

The network layer adds a header, which indicate the logical address of the sender and receiver.

If the frames are to be distributed to different systems on the network, the data link layer adds the header, which defines the source machine's address and the destination machine's address.

17. What are the rules of nonboundary-level masking?

- The bytes in the IP address that corresponds to 255 in the mask will be repeated in the subnetwork address
- The bytes in the IP address that corresponds to 0 in the mask will change to

0 in the subnetwork address

□ For other bytes, use the bit-wise AND operator

19. Define Gateway.

A device used to connect two separate networks that use different communication protocols.

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20. What is LSP?

In link state routing, a small packet containing routing information sent by a router to all other router by a packet called link state packet.

UNIT – V

APPLICATION LAYER

1. What is the purpose of Domain Name System?

Domain Name System can map a name to an address and conversely an address to name.

2. Discuss the three main division of the domain name space.

Domain name space is divided into three different sections: generic domains, country domains & inverse domain.

Generic domain: Define registered hosts according to their generic behavior, uses generic suffixes.

Country domain: Uses two characters to identify a country as the last suffix.

Inverse domain: Finds the domain name given the IP address.

3. Discuss the TCP connections needed in FTP.

FTP establishes two connections between the hosts. One connection is used for data transfer, the other for control information. The control connection uses very simple

rules of communication. The data connection needs more complex rules due to the variety of data types transferred.

4. Discuss the basic model of FTP.

The client has three components: the user interface, the client control process, and the client data transfer process. The server has two components: the server control

process and the server data transfer process. The control connection is made between

the control processes. The data connection is made between the data transfer processes.

5. 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 e-mail addresses. SMTP provides mail exchange between users on the same or different computers.

6. What is the difference between a user agent (UA) and a mail transfer agent (MTA)?

The UA prepares the message, creates the envelope, and puts the message in the envelope. The MTA transfers the mail across the Internet.

7. 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 transformed back to the original data.

8. 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

11 messages from the server, the SMTP client still needed on the desktop to forward messages from the workstation user to its SMTP mail server.

9. Give the format of HTTP request message.

10. Give the format of HTTP response message.

11. Write down the three types of WWW documents.

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

Static: Fixed-content documents that are created and stored in a server.

Dynamic: Created by web server whenever a browser requests the document.

Active: A program to be run at the client side.

12. What is the purpose of HTML?

Status Line

Headers

A Blank Line

Body

(present only in some messages)

Request Line

Headers

A Blank Line

Body

(present only in some messages)

12

HTML is a computer language for specifying the contents and format of a web document. It allows additional text to include codes that define fonts, layouts, embedded graphics and hypertext links.

13. Define CGI.

CGI is a standard for communication between HTTP servers and executable programs. It is used in creating dynamic documents.

14. Name four factors needed for a secure network.

Privacy: The sender and the receiver expect confidentiality.

Authentication: The receiver is sure of the sender's identity and that an imposter has not sent the message.

Integrity: The data must arrive at the receiver exactly as it was sent.

Non-Reputation: The receiver must be able to prove that a received message came from a specific sender.

15. How is a secret key different from public key?

In secret key, the same key is used by both parties. The sender uses this key and an encryption algorithm to encrypt data; the receiver uses the same key and the corresponding decryption algorithm to decrypt the data.

In public key, there are two keys: a private key and a public key. The private key is kept by the receiver. The public key is announced to the public.

16. What is a digital signature?

Digital signature is a method to authenticate the sender of a message. It is similar to that of signing transactions documents when you do business with a bank. In network

transactions, you can create an equivalent of an electronic or digital signature by the way you send data.

17. What are the advantages & disadvantages of public key encryption?

Advantages:

a) Remove the restriction of a shared secret key between two entities. Here each entity

can create a pair of keys, keep the private one, and publicly distribute the other one.

b) The no. of keys needed is reduced tremendously. For one million users to communicate, only two million keys are needed.

Disadvantage:

If you use large numbers the method to be effective. Calculating the cipher text using the long keys takes a lot of time. So it is not recommended for large amounts of text.

18. What are the advantages & disadvantages of secret key encryption?

Advantage:

Secret Key algorithms are efficient: it takes less time to encrypt a message. The reason

is that the key is usually smaller. So it is used to encrypt or decrypt long messages.

Disadvantages:

a) Each pair of users must have a secret key. If N people in world want to use this method, there needs to be $N(N-1)/2$ secret keys. For one million people to communicate, a half-billion secret keys are needed.

b) The distribution of the keys between two parties can be difficult.

19. Define permutation.

Permutation is transposition in bit level.

Straight permutation: The no. of bits in the input and output are preserved.

Compressed permutation: The no. of bits is reduced (some of the bits are dropped).

Expanded permutation: The no. of bits is increased (some bits are repeated).

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20. Define substitutional & transpositional encryption.

Substitutional: A character level encryption in which each character is replaced by another character in the set.

Transpositional: A Character level encryption in which the characters retain their plaintext but the position of the character changes.

PART B

UNIT I

Data communications

1. Explain ISO/OSI reference model.

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

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 coaxial cable & fiber optics.

- _ Coaxial cable
- _ Coaxial cable standards
- _ Coaxial cable connectors
- _ Fiber optics
- _ Propagation modes
- _ Fiber sizes
- _ Cable composition
- _ Light sources for optical cable
- _ Fiber optic connectors
- _ Advantages & disadvantages of optical fiber

5. Explain line coding (digital to digital conversion).

- _ Unipolar
- _ DC component
- _ Synchronization
- _ Polar
- _ Non return to zero(NRZ)
- _ NRZ-L
- _ NRZ-I

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- _ Return to zero
- _ Biphasic
- _ Manchester
- _ Differential Manchester
- _ Bipolar
- _ Alternate Mark Inversion(AMI)

- _ Bipolar 8-zero substitution(B8ZS)
- _ High-Density Bipolar 3(HDB3)

UNIT II

Data link layer

1. 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

2. Explain error control mechanism.

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

3. Explain the flow control mechanism

- _ Stop and wait
- _ Sliding window.

4. Explain the timers and time registers in FDDI.

Time registers

- _ Synchronous allocation(SA)
- _ Target token rotation time(TTRT)
- _ Absolute maximum time(AMT)
- _ Timers
- _ Token rotation timer(TRT)
- _ Token holding timer(THT)

5. Explain about Ethernet.

- _ Access method :CSMA/CD
- _ Addressing
- _ Electrical specification
- _ Frame format
- _ Implementation:

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- _ 10 base 5 :Thick Ethernet
- _ 10 base 2 :Thin Ethernet
- _ 10 base T :Twisted-pair Ethernet
- _ 1 base 5 :Star LAN

UNIT III

Network layer

1. Explain the two approaches of packet switching techniques.

- _ Datagram approach
- _ Virtual circuit approach
- _ Switched virtual circuit(SVC)
- _ Permanent virtual circuit(PVC)
- _ Circuit – switched connection versus virtual – circuit connection
- _ Path versus route
- _ Dedicated versus shared

2. Explain IP addressing method.

- _ Internetwork protocol (IP)
- _ Datagram
- _ Addressing
- _ Classes
- _ Dotted decimal notation
- _ A sample internet

3. 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

4. Define bridge and explain the type of bridges.

- _ Bridges
- _ Types of bridges
- _ Simple bridge
- _ Multiport bridge
- _ Transparent bridge

5. Explain subnetting

- _ Subnetting
- _ Three levels of hierarchy
- _ Masking
- _ Masks without subnetting

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- _ Masks with subnetting
- _ Finding the subnetwork address
- _ Boundary level masking
- _ Non-boundary level masking

UNIT IV

Transport layer

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 socket in detail.

Introduction

Explanation

program

3. 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

4. Explain about congestion control.

_ Congestion avoidance

_ BECN

_ FECN

_ Four situations

_ Discarding

5. Explain leaky bucket and token bucket algorithm

_ Leaky bucket algorithm

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_ Leaky bucket

_ Switch controlling the output rate

_ Flowchart

UNIT V

Application Layer

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 the type of encryption/decryption method.

Conventional Methods:

- Character-Level Encryption: Substitutional & Transpositional
- Bit-Level Encryption: Encoding/Decoding, Permutation, Substitution, Product, Exclusive-Or & Rotation

THEORY OF COMPUTATION(CS1303)

2 marks Questions and Answers

1. Why are switching circuits called as finite state systems?

A switching circuit consists of a finite number of gates, each of which can be in any one of the two conditions 0 or 1. Although the voltages assume infinite set of values,

the electronic circuitry is designed so that the voltages corresponding to 0 or 1 are stable

and all others adjust to these value. Thus control unit of a computer is a finite state system.

2. Give the examples/applications designed as finite state system.

Text editors and lexical analyzers are designed as finite state systems. A lexical

analyzer scans the symbols of a program to locate strings corresponding to identifiers,

constants etc, and it has to remember limited amount of information .

3. Define: (i) Finite Automaton (FA) (ii) Transition diagram

FA consists of a finite set of states and a set of transitions from state to state that occur on input symbols chosen from an alphabet Σ . Finite Automaton is denoted by a

5-tuple $(Q, \Sigma, \delta, q_0, F)$, where Q is the finite set of states, Σ is a finite input alphabet, q_0 in

Q is the initial state, F is the set of final states and δ is the transition mapping function

$Q \times \Sigma \rightarrow Q$.

Transition diagram is a directed graph in which the vertices of the graph correspond to the states of FA. If there is a transition from state q to state p on input a ,

then there is an arc labeled ' a ' from q to p in the transition diagram.

4. What are the applications of automata theory?

- _ In compiler construction.
- _ In switching theory and design of digital circuits.
- _ To verify the correctness of a program.
- _ Design and analysis of complex software and hardware systems.
- _ To design finite state machines such as Moore and mealy machines.

5. What is Moore machine and Mealy machine?

A special case of FA is Moore machine in which the output depends on the state of the machine.

An automaton in which the output depends on the transition and current input is called Mealy machine.

6. What are the components of Finite automaton model?

The components of FA model are Input tape, Read control and finite control.

(a) The input tape is divided into number of cells. Each cell can hold one i/p symbol.

(b) The read head reads one symbol at a time and moves ahead.

(c) Finite control acts like a CPU. Depending on the current state and input symbol

read from the input tape it changes state.

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7. Differentiate NFA and DFA

NFA or Non Deterministic Finite Automaton is the one in which there exists many paths for a specific input from current state to next state. NFA can be used in

theory of computation because they are more flexible and easier to use than DFA.

Deterministic Finite Automaton is a FA in which there is only one path for a specific input from current state to next state. There is a unique transition on each input

symbol. (Write examples with diagrams).

8. What is Σ -closure of a state q_0 ?

$\bar{_}$ -closure(q_0) denotes a set of all vertices p such that there is a path from q_0 to p labeled $_$. Example :

$$\bar{_}\text{-closure}(q_0) = \{q_0, q_1\}$$

9. What is a : (a) String (b) Regular language

A string x is accepted by a Finite Automaton $M = (Q, _, q_0, F)$ if $_(q_0, x) = p$, for some p in F . FA accepts a string x if the sequence of transitions corresponding to the

symbols of x leads from the start state to accepting state.

The language accepted by M is $L(M)$ is the set $\{x \mid _(q_0, x) \text{ is in } F\}$. A language is regular if it is accepted by some finite automaton.

10. What is a regular expression?

A regular expression is a string that describes the whole set of strings according to certain syntax rules. These expressions are used by many text editors and utilities to

search bodies of text for certain patterns etc. Definition is: Let $_$ be an alphabet. The

regular expression over $_$ and the sets they denote are:

i. $_$ is a r.e and denotes empty set.

ii. $_$ is a r.e and denotes the set $\{_\}$

iii. For each 'a' in $_$, a_+ is a r.e and denotes the set $\{a\}$.

iv. If 'r' and 's' are r.e denoting the languages R and S respectively then $(r+s)$, (rs) and (r^*) are r.e that denote the sets $R \cup S$, RS and R^* respectively.

11. Differentiate L^* and L_+

$\bar{_}$
 L^* denotes Kleene closure and is given by $L^* = \bigcup_{i=0}^{\infty} L^i$

example : $0^* = \{_, 0, 00, 000, \dots\}$

Language includes empty words also.

$\bar{_}$
 L_+ denotes Positive closure and is given by $L_+ = \bigcup_{i=1}^{\infty} L^i$

$q_0 q_1$

Theory of Computation 3

12. What is Arden's Theorem?

Arden's theorem helps in checking the equivalence of two regular expressions.

Let P and Q be the two regular expressions over the input alphabet $_$. The regular

expression R is given as :

$$R = Q + RP$$

Which has a unique solution as $R = QP^*$.

13. Write a r.e to denote a language L which accepts all the strings which begin or end with either 00 or 11.

The r.e consists of two parts:

$$L_1 = (00 + 11) \text{ (any no of 0's and 1's)}$$

$$= (00 + 11)(0 + 1)^*$$

$$L_2 = (\text{any no of 0's and 1's})(00 + 11)$$

$$=(0+1)^*(00+11)$$

Hence r.e $R=L1+L2$

$$=[(00+11)(0+1)^*] + [(0+1)^* (00+11)]$$

14. Construct a r.e for the language which accepts all strings with atleast two c's over

the set $_ = \{c,b\}$

$$(b+c)^* c (b+c)^* c (b+c)^*$$

15. Construct a r.e for the language over the set $_ = \{a,b\}$ in which total number of a's are divisible by 3

$$(b^* a b^* a b^* a b^*)^*$$

16. what is: (i) $(0+1)^*$ (ii) $(01)^*$ (iii) $(0+1)$ (iv) $(0+1)^+$

$$(0+1)^* = \{ _ , 0 , 1 , 01 , 10 , 001 , 101 , 101001 , \dots \}$$

Any combinations of 0's and 1's.

$$(01)^* = \{ _ , 01 , 0101 , 010101 , \dots \}$$

All combinations with the pattern 01.

$(0+1) = 0$ or 1 , No other possibilities.

$$(0+1)^+ = \{ 0, 1, 01, 10, 1000, 0101, \dots \}$$

17. Reg exp denoting a language over $_ = \{1\}$ having

(i) even length of string (ii) odd length of a string

(i) Even length of string $R = (11)^*$

(ii) Odd length of the string $R = 1(11)^*$

18. Reg exp for:

(i) All strings over $\{0,1\}$ with the substring '0101'

(ii) All strings beginning with '11' and ending with 'ab'

(iii) Set of all strings over $\{a,b\}$ with 3 consecutive b's.

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(iv) Set of all strings that end with '1' and has no substring '00'

$$(i) (0+1)^* 0101(0+1)^*$$

$$(ii) 11(1+a+b)^* ab$$

$$(iii) (a+b)^* bbb (a+b)^*$$

$$(iv) (1+01)^* (10+11)^* 1$$

19. What are the applications of Regular expressions and Finite automata

Lexical analyzers and Text editors are two applications.

Lexical analyzers: The tokens of the programming language can be expressed using regular expressions. The lexical analyzer scans the input program and separates the

tokens. For eg identifier can be expressed as a regular expression as:

$$(letter)(letter+digit)^*$$

If anything in the source language matches with this reg exp then it is recognized as an identifier. The letter is $\{A,B,C, \dots, Z, a,b,c, \dots, z\}$ and digit is $\{0,1, \dots, 9\}$. Thus reg exp identifies token in a language.

Text editors: These are programs used for processing the text. For example UNIX text editors uses the reg exp for substituting the strings such as:

$$S/bbb^*/b/$$

Gives the substitute a single blank for the first string of two or more blanks in a given line. In UNIX text editors any reg exp is converted to an NFA with $_ -$ transitions,

this NFA can be then simulated directly.

20. Reg exp for the language that accepts all strings in which 'a' appears tripled over

the set $\Sigma = \{a\}$

reg exp = $(aaa)^*$

21. What are the applications of pumping lemma?

Pumping lemma is used to check if a language is regular or not.

(i) Assume that the language(L) is regular.

(ii) Select a constant 'n'.

(iii) Select a string(z) in L, such that $|z| > n$.

(iv) Split the word z into u,v and w such that $|uv| \leq n$ and $|v| \geq 1$.

(v) You achieve a contradiction to pumping lemma that there exists an 'i' such that $uv^i w$ is not in L. Then L is not a regular language.

22. What is the closure property of regular sets?

The regular sets are closed under union, concatenation and Kleene closure.

$r_1 \cup r_2 = r_1 + r_2$

$r_1.r_2 = r_1r_2$

$(r)^* = r^*$

The class of regular sets are closed under complementation, substitution, homomorphism and inverse homomorphism.

23. Reg exp for the language such that every string will have atleast one 'a' followed

by atleast one 'b'.

$R = a^+b^+$

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24. Write the exp for the language starting with and has no consecutive b's

reg exp = $(a+ab)^*$

25. What is the relationship between FA and regular expression.

26. What are the applications of Context free languages?

Context free languages are used in :

- _ Defining programming languages.
- _ Formalizing the notion of parsing.
- _ Translation of programming languages.
- _ String processing applications.

27. What are the uses of Context free grammars?

- _ Construction of compilers.
- _ Simplified the definition of programming languages.
- _ Describes the arithmetic expressions with arbitrary nesting of balanced parenthesis $\{ (,) \}$.

_ Describes block structure in programming languages.

_ Model neural nets.

28. Define a context free grammar

A context free grammar (CFG) is denoted as $G = (V, T, P, S)$ where V and T are finite

set of variables and terminals respectively. V and T are disjoint. P is a finite set of productions each is of the form $A \rightarrow _$ where A is a variable and $_$ is a string of symbols

from $(V \cup T)^*$.

29. What is the language generated by CFG or G?

*

The language generated by G ($L(G)$) is $\{w \mid w \text{ is in } T^* \text{ and } S \Rightarrow w\}$. That is a

string is in $L(G)$ if:

(1) The string consists solely of terminals.

(2) The string can be derived from S.

Regular

Expression

NFA with ϵ -

moves

NFA without

ϵ -moves

Deterministic

Finite

Automata

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30. What is : (a) CFL (b) Sentential form

L is a context free language (CFL) if it is $L(G)$ for some CFG G.

A string of terminals and variables α is called a sentential form if:

*

$S \Rightarrow \alpha$, where S is the start symbol of the grammar.

6. What is the language generated by the grammar $G=(V,T,P,S)$ where

$P=\{S \rightarrow aSb, S \rightarrow ab\}$?

$S \Rightarrow aSb \Rightarrow aaSbb \Rightarrow \dots \Rightarrow a^n b^n$

Thus the language $L(G)=\{a^n b^n \mid n \geq 1\}$. The language has strings with equal number of a's and b's.

7. What is : (a) derivation (b) derivation/parse tree (c) subtree

(a) Let $G=(V,T,P,S)$ be the context free grammar. If $A \rightarrow \alpha$ is a production of P and β and γ are any strings in $(V \cup T)^*$ then $\beta A \gamma \Rightarrow \beta \alpha \gamma$.

G

(b) A tree is a parse \ derivation tree for G if:

(i) Every vertex has a label which is a symbol of $V \cup T \cup \{\epsilon\}$.

(ii) The label of the root is S.

(iii) If a vertex is interior and has a label A, then A must be in V.

(iv) If n has a label A and vertices n_1, n_2, \dots, n_k are the sons of the vertex n in order

from left

with labels X_1, X_2, \dots, X_k respectively then $A X_1 X_2 \dots X_k$ must be in P.

(v) If vertex n has label ϵ , then n is a leaf and is the only son of its father.

(c) A subtree of a derivation tree is a particular vertex of the tree together with all its descendants, the edges connecting them and their labels. The label of the root may

not be the start symbol of the grammar.

8. If $S \rightarrow aSb \mid aAb$, $A \rightarrow bAa$, $A \rightarrow ba$. Find out the CFL

soln. $S \rightarrow aAb \Rightarrow abab$

$S \rightarrow aSb \Rightarrow a aAb b \Rightarrow a a ba b b$ (sub $S \rightarrow aAb$)
 $S \rightarrow aSb \Rightarrow a aSb b \Rightarrow a a aAb b \Rightarrow a a a ba b bb$

Thus $L = \{a^n b^m a^n, \text{ where } n, m \geq 1\}$

9. What is an ambiguous grammar?

A grammar is said to be ambiguous if it has more than one derivation trees for a sentence or in other words if it has more than one leftmost derivation or more than one

rightmost derivation.

10. Consider the grammar $P = \{S \rightarrow aS \mid aSbS \mid _ \}$ is ambiguous by constructing:

(a) two parse trees (b) two leftmost derivation (c) rightmost derivation

Consider a string aab :

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(a)

(b) (i) $S \Rightarrow aS$ (ii) $S \Rightarrow aSbS$

$\Rightarrow aaSbS \Rightarrow aaSbS$

$\Rightarrow aabS \Rightarrow aabS$

$\Rightarrow aab \Rightarrow aab$

(c) (i) $S \Rightarrow aS$ (ii) $S \Rightarrow aSbS$

$\Rightarrow aaSbS \Rightarrow aSb$

$\Rightarrow aaSb \Rightarrow aaSbS$

$\Rightarrow aab \Rightarrow aaSb$

$\Rightarrow aab$

11. Find CFG with no useless symbols equivalent to : $SAB \mid CA, BBC \mid AB, Aa, CaB \mid b$.

$S \rightarrow AB$

$S \rightarrow CA$

$B \rightarrow BC$

$B \rightarrow AB$

$A \rightarrow a$

$C \rightarrow aB$

$C \rightarrow b$ are the given productions.

* *

A symbol X is useful if $S \Rightarrow _X_ \Rightarrow w$

The variable B cannot generate terminals as $B \rightarrow BC$ and $B \rightarrow AB$.

Hence B is useless symbol and remove B from all productions.

Hence useful productions are: $S \rightarrow CA, A \rightarrow a, C \rightarrow b$

12. Construct CFG without $_$ production from : $S a \mid Ab \mid aBa, A b \mid _ ,$

$B b \mid A$.

$S \rightarrow a$

$S \rightarrow Ab$

$S \rightarrow aBa$

$A \rightarrow b, A \rightarrow _, B \rightarrow b, B \rightarrow A$ are the given set of production.

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$A \rightarrow _$ is the only empty production. Remove the empty production

$S \rightarrow Ab$, Put $A \rightarrow _$ and hence $S \rightarrow b$.

If $B \rightarrow A$ and $A \rightarrow _$ then $B \rightarrow _$

Hence $S \rightarrow aBa$ becomes $S \rightarrow aa$.

Thus $S \rightarrow a \mid Ab \mid b \mid aBa \mid aa$

$A \rightarrow b$

$B \rightarrow b$

Finally the productions are: $S \rightarrow a \mid Ab \mid b \mid aBa \mid aa$

$A \rightarrow b$

$B \rightarrow b$

13. What are the three ways to simplify a context free grammar?

_ By removing the useless symbols from the set of productions.

_ By eliminating the empty productions.

_ By eliminating the unit productions.

14. What are the properties of the CFL generated by a CFG?

_ Each variable and each terminal of G appears in the derivation of some word in L

_ There are no productions of the form $A \rightarrow B$ where A and B are variables.

15. Find the grammar for the language $L = \{a^{2n}bc, \text{ where } n > 1\}$

let $G = (\{S, A, B\}, \{a, b, c\}, P, \{S\})$ where P :

$S \rightarrow Abc$

$A \rightarrow aaA \mid _$

16. Find the language generated by: $S \rightarrow 0S1 \mid 0A \mid 0 \mid 1B \mid 1$

$A \rightarrow 0A \mid 0, B \rightarrow 1B \mid 1$

The minimum string is $S \rightarrow 0 \mid 1$

$S \rightarrow 0S1 \Rightarrow 001$

$S \rightarrow 0S1 \Rightarrow 011$

$S \rightarrow 0S1 \Rightarrow 00S11 \Rightarrow 000S111 \Rightarrow 0000A1111 \Rightarrow 00000111$

Thus $L = \{0^n 1^m \mid m \text{ not equal to } n, \text{ and } n, m \geq 1\}$

17. Construct the grammar for the language $L = \{a_n b a_n \mid n \geq 1\}$.

The grammar has the production P as:

$S \rightarrow aAa$

$A \rightarrow aAa \mid b$

The grammar is thus: $G = (\{S, A\}, \{a, b\}, P, S)$

18. Construct a grammar for the language L which has all the strings which are all

palindrome over $_ = \{a, b\}$.

$G = (\{S\}, \{a, b\}, P, S)$

$P: \{S \rightarrow aSa, \$

$S \rightarrow bSb, \$

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$S \rightarrow a, \$

$S \rightarrow b, \$

$S \rightarrow _ \}$ which is in palindrome.

19. Differentiate sentences Vs sentential forms

A sentence is a string of terminal symbols.

A sentential form is a string containing a mix of variables and terminal symbols or all variables. This is an intermediate form in doing a derivation.

20. What is a formal language?

Language is a set of valid strings from some alphabet. The set may be empty, finite or infinite. $L(M)$ is the language defined by machine M and $L(G)$ is the language defined by Context free grammar. The two notations for specifying formal languages are:

Grammar or regular expression (Generative approach)

Automaton (Recognition approach)

21. (a) CFL are not closed under intersection and complementation – True.
- (b) A regular grammar generates an empty string – True.
- (c) A regular language is also context free but not reverse – True.
- (d) A regular language can be generated by two or more different grammar – True.
- (e) Finite State machine (FSM) can recognize only regular grammar – True.

22. What is Backus-Naur Form (BNF)?

Computer scientists describe programming languages by a notation called Backus-Naur Form. This is a context free grammar notation with minor changes in

format and some shorthand.

23. Let $G = (\{S, C\}, \{a, b\}, P, S)$ where P consists of $S \rightarrow aCa$, $C \rightarrow aCa \mid b$. Find $L(G)$.

$S \rightarrow aCa \Rightarrow aba$

$S \rightarrow aCa \Rightarrow a aCa \Rightarrow aabaa$

$S \rightarrow aCa \Rightarrow a aCa a \Rightarrow a a aCa a \Rightarrow aaabaaa$

Thus $L(G) = \{ a_n b a_n, \text{ where } n \geq 1 \}$

24. Find $L(G)$ where $G = (\{S\}, \{0, 1\}, \{S \rightarrow 0S1, S \rightarrow _ \}, S)$

$S \rightarrow _ , _ \text{ is in } L(G)$

$S \rightarrow 0S1 \Rightarrow 0 _ 1 \Rightarrow 01$

$S \rightarrow 0S1 \Rightarrow 0 0S11 \Rightarrow 0011$

Thus $L(G) = \{ 0_n 1_n \mid n \geq 0 \}$

25. What is a parser?

A parser for grammar G is a program that takes as input a string w and produces as output either a parse tree for w , if w is a sentence of G or an error message indicating

that w is not a sentence of G .

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UNIT III Pushdown Automata

1. Define Pushdown Automata.

A pushdown Automata M is a system $(Q, _, _, q_0, Z_0, F)$ where Q is a finite set of states.

$_$ is an alphabet called the input alphabet.

$_$ is an alphabet called stack alphabet.

q_0 in Q is called initial state.

Z_0 in $_$ is start symbol in stack.

F is the set of final states.

$_$ is a mapping from $Q \times (_ \cup \{ _ \}) \times _$ to finite subsets of $Q \times _^*$.

2. Compare NFA and PDA.

NFA PDA

1. The language accepted by NFA is the

regular language.

The language accepted by PDA is

Context free language.

2.NFA has no memory. PDA is essentially an NFA with a stack(memory).

3. It can store only limited amount of information.

It stores unbounded limit of information.

4.A language/string is accepted only by reaching the final state.

It accepts a language either by empty Stack or by reaching a final state.

3.Specify the two types of moves in PDA.

The move dependent on the input symbol(a) scanned is:

$\delta(q,a,Z) = \{ (p_1, \alpha_1), (p_2, \alpha_2), \dots, (p_m, \alpha_m) \}$

where q and p are states, a is in Σ , Z is a stack symbol and α_i is in Σ^* .

PDA is in state q, with input symbol a and Z the top symbol on state enter state p_i

Replace symbol Z by string α_i .

The move independent on input symbol is (δ -move):

$\delta(q,\epsilon,Z) = \{ (p_1, \alpha_1), (p_2, \alpha_2), \dots, (p_m, \alpha_m) \}$.

Is that PDA is in state q, independent of input symbol being scanned and with Z the top symbol on the stack enter a state p_i and replace Z by α_i .

4.What are the different types of language acceptances by a PDA and define them.

For a PDA $M=(Q, \Sigma, \Gamma, q_0, Z_0, F)$ we define :

$L(M)$ Language accepted by final state $L(M)$ as:

*

$\{ w \mid (q_0, w, Z_0) \vdash^* (p, \epsilon, \gamma) \text{ for some } p \text{ in } F \text{ and } \gamma \text{ in } \Gamma^* \}$.

$N(M)$ Language accepted by empty / null stack $N(M)$ is:

*

$\{ w \mid (q_0, w, Z_0) \vdash^* (p, \epsilon, \epsilon) \text{ for some } p \text{ in } Q \}$.

5.Is it true that the language accepted by a PDA by empty stack and final states are

different languages.

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No, because the languages accepted by PDA's by final state are exactly the languages accepted by PDA's by empty stack.

6. Define Deterministic PDA.

A PDA $M=(Q, \Sigma, \Gamma, q_0, Z_0, F)$ is deterministic if:

δ For each q in Q and Z in Γ , whenever $\delta(q,\epsilon,Z)$ is nonempty, then

$\delta(q,a,Z)$ is empty for all a in Σ .

δ For no q in Q, Z in Γ , and a in $\Sigma \cup \{ \epsilon \}$ does $\delta(q,a,Z)$ contains more than one element.

(Eg): The PDA accepting $\{wcw^R \mid w \text{ in } (0+1)^*\}$.

7.Define Instantaneous description(ID) in PDA.

ID describe the configuration of a PDA at a given instant. ID is a triple such as (q, w, γ) , where q is a state, w is a string of input symbols and γ is a string of stack symbols.

If $M = (Q, \Sigma, \Gamma, q_0, Z_0, F)$ is a PDA we say that

$(q, aw, Z_0) \vdash_M^* (p, w, \gamma)$ if γ contains $(p, _)$.

'a' may be $_$ or an input symbol.

Example: (q_1, BG) is in $_ (q_1, 0, G)$ tells that $(q_1, 011, GGR) \vdash^* (q_1, 11, BGGR)$.

8. What is the significance of PDA?

Finite Automata is used to model regular expression and cannot be used to represent non regular languages. Thus to model a context free language, a Pushdown Automata is used.

9. When is a string accepted by a PDA?

The input string is accepted by the PDA if:

_ The final state is reached.

_ The stack is empty.

10. Give examples of languages handled by PDA.

(1) $L = \{ a^n b^n \mid n \geq 0 \}$, here n is unbounded, hence counting cannot be done by finite

memory. So we require a PDA, a machine that can count without limit.

(2) $L = \{ w w^R \mid w \in \{a,b\}^* \}$, to handle this language we need unlimited counting capability.

11. Is NPDA (Nondeterministic PDA) and DPDA (Deterministic PDA) equivalent?

The languages accepted by NPDA and DPDA are not equivalent.

For example: $w w^R$ is accepted by NPDA and not by any DPDA.

12. State the equivalence of acceptance by final state and empty stack.

_ If $L = L(M_2)$ for some PDA M_2 , then $L = N(M_1)$ for some PDA M_1 .

_ If $L = N(M_1)$ for some PDA M_1 , then $L = L(M_2)$ for some PDA M_2 .

where $L(M) =$ language accepted by PDA by reaching a final state.

$N(M) =$ language accepted by PDA by empty stack.

13. State the equivalence of PDA and CFL.

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_ If L is a context free language, then there exists a PDA M such that $L = N(M)$.

_ If $L = N(M)$ for some PDA m , then L is a context free language.

14. What are the closure properties of CFL?

CFL are closed under union, concatenation and Kleene closure.

CFL are closed under substitution, homomorphism.

CFL are not closed under intersection, complementation.

Closure properties of CFL's are used to prove that certain languages are not context free.

15. State the pumping lemma for CFLs.

Let L be any CFL. Then there is a constant n , depending only on L , such that if z is in L and $|z| \geq n$, then $z = uvwxy$ such that :

(i) $|vx| \geq 1$

(ii) $|vwx| \leq n$ and

(iii) for all $i \geq 0$ uv^iwx^iy is in L.

16. What is the main application of pumping lemma in CFLs?

The pumping lemma can be used to prove a variety of languages are not context free. Some examples are:

$L_1 = \{ a^i b^i c^i \mid i \geq 1 \}$ is not a CFL.

$L_2 = \{ a^i b^j c^i d^j \mid i \geq 1 \text{ and } j \geq 1 \}$ is not a CFL.

17. What is Ogden's lemma?

Let L be a CFL. Then there is a constant n such that if z is any word in L, and we mark any n or more positions of z "distinguished" then we can write $z = uvwxy$ such

that:

(1) v and x together have at least one distinguished position.

(2) vwx has at most n distinguished positions and

(3) for all $i \geq 0$ uv^iwx^iy is in L.

18. Give an example of Deterministic CFL.

The language $L = \{ a^n b^n \mid n \geq 0 \}$ is a deterministic CFL

19. What are the properties of CFL?

Let $G = (V, T, P, S)$ be a CFG

_ The fanout of G, $f(G)$ is largest number of symbols on the RHS of any rule in R.

_ The height of the parse tree is the length of the longest path from the root to some leaf.

20. Compare NPDA and DPDA.

NPDA DPDA

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1. NPDA is the standard PDA used in automata theory.

1. The standard PDA in practical situation is DPDA.

2. Every PDA is NPDA unless otherwise specified.

2. The PDA is deterministic in the sense, that at most one move is possible from any ID.

21. What are the components of PDA ?

The PDA usually consists of four components:

_ A control unit.

_ A Read Unit.

_ An input tape.

_ A Memory unit.

22. What is the informal definition of PDA?

A PDA is a computational machine to recognize a Context free language.

Computational power of PDA is between Finite automaton and Turing machines.

The

PDA has a finite control, and the memory is organized as a stack.

23. Give an example of NonDeterministic CFL

The language $L = \{ w^R w \mid w \in \{a,b\}^+ \}$ is a nondeterministic CFL.

24. What is a Dyck language?

A Dyck language is a language with k-types of balanced parenthesis.

For ex: $[1 [2 [1] 1 [2] 2] 2] 1$ is in the Dyck language with two kinds of parenthesis.

25. What is a CYK algorithm?

*

Let V_{ij} be the set of variables A such that $A \Rightarrow x_{ij}$ iff there is some production $A \rightarrow BC$ and some k , $1 \leq k \leq j$ such that B derives the first symbols of x_{ij} and C derives the last $j-k$ symbols of x_{ij} .

UNIT IV Turing Machine

1. What is a Turing machine?

Turing machine is a simple mathematical model of a computer. TM has unlimited and unrestricted memory and is a much more accurate model of a general purpose

computer. The Turing machine is a FA with a R/W Head. It has an infinite tape divided

into cells, each cell holding one symbol.

2. What are the special features of TM?

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In one move, TM depending upon the symbol scanned by the tape head and state

of the finite control:

_ Changes state.

_ Prints a symbol on the tape cell scanned, replacing what was written there.

_ Moves the R/w head left or right one cell.

3. Define Turing machine.

A Turing machine is denoted as $M = (Q, \Sigma, \Gamma, \delta, q_0, B, F)$

Q is a finite set of states.

Σ is set of i/p symbols, not including B .

Γ is the finite set of tape symbols.

q_0 in Q is called start state.

B in Γ is blank symbol.

F is the set of final states.

δ is a mapping from $Q \times \Sigma$ to $Q \times \Gamma \times \{L, R\}$.

4. Define Instantaneous description of TM.

The ID of a TM M is denoted as $_1 q _2$. Here q is the current state of M is in Q ;

$_1 _2$ is the string in Γ^* that is the contents of the tape up to the rightmost nonblank

symbol or the symbol to the left of the head, whichever is the rightmost.

5. What are the applications of TM?

TM can be used as:

_ Recognizers of languages.

_ Computers of functions on non negative integers.

_ Generating devices.

6. What is the basic difference between 2-way FA and TM?

Turing machine can change symbols on its tape, whereas the FA cannot change symbols on tape. Also TM has a tape head that moves both left and right side, whereas

the FA doesn't have such a tape head.

7. What is (a) total recursive function and (b) partial recursive function

If $f(i_1, i_2, \dots, i_k)$ is defined for all i_1, \dots, i_k then we say f is a total recursive function. They are similar to recursive languages as they are computed by TM that

always halt.

A function $f(i_1, \dots, i_k)$ computed by a Turing machine is called a partial recursive function. They are similar to r.e languages as they are computed by TM that may or may

not halt on a given input.

8. Define a move in TM.

Let $X_1 X_2 \dots X_{i-1} q X_i \dots X_n$ be an ID.

The left move is: if $_ (q, X_i) = (p, Y, L)$, if $i > 1$ then

$X_1 X_2 \dots X_{i-1} q X_i \dots X_n \mid \text{---} X_1 X_2 \dots X_{i-2} p X_{i-1} Y X_{i+1} \dots X_n$.

M

The right move is if $_ (q, X_i) = (p, Y, R)$, if $i > 1$ then

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$X_1 X_2 \dots X_{i-1} q X_i \dots X_n \mid \text{---} X_1 X_2 \dots X_{i-1} Y p X_{i+1} \dots X_n$.

M

9. What is the language accepted by TM?

The language accepted by M is $L(M)$, is the set of words in $_*$ that cause M to enter a final state when placed, justified at the left on the tape of M , with M at q_0 and

the tape head of M at the leftmost cell. The language accepted by M is:

$\{ w \mid w \text{ in } _ * \text{ and } q_0 w \mid \text{---} _1 p _2 \text{ for some } p \text{ in } F \text{ and } _1, _2 \text{ in } _ * \}$.

10. Give examples of total recursive functions.

All common arithmetic functions on integers such as multiplication, $n!$, $\lceil \log_2 n \rceil$ and 2^{2n} are total recursive functions.

11. What are (a) recursively enumerable languages (b) recursive sets?

The languages that is accepted by TM is said to be recursively enumerable (r. e) languages. Enumerable means that the strings in the language can be enumerated by

the TM. The class of r. e languages include CFL's.

The recursive sets include languages accepted by at least one TM that halts on all inputs.

12. What are the various representation of TM?

We can describe TM using:

_ Instantaneous description.

_ Transition table.

_ Transition diagram.

13. What are the possibilities of a TM when processing an input string?

_ TM can accept the string by entering accepting state.

_ It can reject the string by entering non-accepting state.

_ It can enter an infinite loop so that it never halts.

14. What are the techniques for Turing machine construction?

Storage in finite control.

- Multiple tracks.
- Checking off symbols.
- Shifting over
- Subroutines.

15. What is the storage in FC?

The finite control(FC) stores a limited amount of information. The state of the Finite control represents the state and the second element represent a symbol scanned.

16. When is checking off symbols used in TM?

Checking off symbols is useful method when a TM recognizes a language with repeated strings and also to compare the length of substrings.

(eg) : $\{ ww \mid w _ _ * \}$ or $\{ a_i b_i \mid i \geq 1 \}$.

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This is implemented by using an extra track on the tape with symbols Blank or $_$.

17. When is shifting over Used ?

A Turing machine can make space on its tape by shifting all nonblank symbols a finite number of cells to the right. The tape head moves to the right , repeatedly storing the symbols in the FC and replacing the symbols read from the cells to the left.

The TM can then return to the vacated cells and prints symbols.

18. What is a multihead TM?

A k-head TM has some k heads. The heads are numbered 1 through k, and move

of the TM depends on the state and on the symbol scanned by each head. In one move, the heads may each move independently left or right or remain stationary.

19. What is a 2-way infinite tape TM?

In 2-way infinite tape TM, the tape is infinite in both directions. The leftmost square is not distinguished. Any computation that can be done by 2-way infinite tape

can also be done by standard TM.

20. Differentiate PDA and TM.

PDA TM

1. PDA uses a stack for storage.

1. TM uses a tape that is infinite .

2. The language accepted by PDA is CFL.

2. Tm recognizes recursively enumerable languages.

21. How can a TM used as a transducer?

A TM can be used as a transducer. The most obvious way to do this is to treat the entire nonblank portion of the initial tape as input , and to treat the entire blank

portion of the tape when the machine halts as output. Or a TM defines a function $y=f(x)$

for strings $x , y _ _ *$ if: $q_0 X \mid _ _ _ q_f Y$, where q_f is the final state.

22. What is a multi-tape Turing machine?

A multi-tape Turing machine consists of a finite control with k -tape heads and k tapes; each tape is infinite in both directions. On a single move depending on the state of finite control and symbol scanned by each of tape heads, the machine can change state, print a new symbol on each cell scanned by tape head, move each of its tape head independently one cell to the left or right or remain stationary.

23. What is a multidimensional TM?

The device has a finite control, but the tape consists of a k -dimensional array of cells infinite in all 2^k directions, for some fixed k . Depending on the state and symbol scanned, the device changes state, prints a new symbol and moves its tapehead in one of the 2^k directions, either positively or negatively, along one of the k -axes.

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24. When a recursively enumerable language is said to be recursive? Is it true that the

language accepted by a non-deterministic Turing machine is different from recursively enumerable language?

A language L is recursively enumerable if there is a TM that accepts L and recursive if there is a TM that recognizes L . Thus r.e language is Turing acceptable and recursive language is Turing decidable languages.

No, the language accepted by non-deterministic Turing machine is same as recursively enumerable language.

25. What is Church's Hypothesis?

The notion of computable function can be identified with the class of partial recursive functions is known as Church-hypothesis or Church-Turing thesis. The Turing machine is equivalent in computing power to the digital computer.

UNIT V Undecidability

1. When we say a problem is decidable? Give an example of undecidable problem?

A problem whose language is recursive is said to be decidable.

Otherwise the problem is said to be undecidable. Decidable problems have an algorithm that takes as input an instance of the problem and determines whether the answer to that instance is "yes" or "no".

(eg) of undecidable problems are (1) Halting problem of the TM.

2. Give examples of decidable problems.

1. Given a DFSA M and string w , does M accept w ?
2. Given a DFSA M is $L(M) = _$?
3. Given two DFSA M_1 and M_2 is $L(M_1) = L(M_2)$?
4. Given a regular expression $_$ and a string w , does $_$ generate w ?
5. Given a NFSM M and string w , does M accept w ?

3. Give examples of recursive languages?

i. The language L defined as $L = \{ \langle M \rangle, w : M \text{ is a DFSA that accepts } w \}$ is recursive.

ii. L defined as $\{ \langle M_1 \rangle \cup \langle M_2 \rangle : \text{DFSA } M_1 \text{ and } M_2 \text{ and } L(M_1) = L(M_2) \}$ is recursive.

4. Differentiate recursive and recursively enumerable languages.

Recursive languages

Recursively enumerable languages

1. A language is said to be recursive if and only if there exists a membership algorithm for it.

1. A language is said to be r.e if there exists a TM that accepts it.

2. A language L is recursive iff there is a TM that decides L .

2. L is recursively enumerable iff there is a TM that semi-decides L .

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(Turing decidable languages). TMs that decide languages are algorithms.

(Turing acceptable languages). TMs that semi-decides languages are not algorithms.

5. What are UTMs or Universal Turing machines?

Universal TMs are TMs that can be programmed to solve any problem, that can be solved by any Turing machine. A specific Universal Turing machine U is:
Input to U : The encoding " $\langle M \rangle$ " of a TM M and encoding " w " of a string w .

Behavior : U halts on input " $\langle M \rangle$ " " w " if and only if M halts on input w .

6. What are the crucial assumptions for encoding a TM?

There are no transitions from any of the halt states of any given TM .
Apart from the halt state , a given TM is total.

7. What properties of recursively enumerable sets are not decidable?

- _ Emptiness
- _ Finiteness
- _ Regularity
- _ Context-freeness.

8. Define L . When is L a trivial property?

L is defined as the set $\{ \langle M \rangle \mid L(M) \in L \}$

L is a trivial property if L is empty or it consists of all r.e languages.

9. What is a universal language L_u ?

The universal language consists of a set of binary strings in the form of pairs (M, w) where M is TM encoded in binary and w is the binary input string.

$L_u = \{ \langle M, w \rangle \mid M \text{ accepts } w \}$.

10. What is a Diagonalization language L_d ?

The diagonalization language consists of all strings w such that the TM M whose code is w does not accept when w is given as input.

11. What properties of r.e sets are recursively enumerable?

$L = \emptyset$

L contains at least 10 members.

w is in L for some fixed w .

$L = L^u$

12. What properties of r.e sets are not r.e?

$L = \emptyset$

$L = \emptyset^*$.

L is recursive

L is not recursive.

L is singleton.

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L is a regular set.

$L = L^u$

13. What are the conditions for L to be r.e?

L is recursively enumerable iff L satisfies the following properties:

i. If L is in Σ^* and L is a subset of L' , then L' is in Σ^* (containment property)

ii. If L is an infinite language in Σ^* , then there is a finite subset of L in Σ^* .

iii. The set of finite languages in Σ^* is enumerable.

14. What is canonical ordering?

Let Σ^* be an input set. The canonical order for Σ^* as follows. List words in order of size, with words of the same size in numerical order. That is let $\Sigma = \{x_0, x_1, \dots, x_{t-1}\}$ and x_i is the digit i in base t .

(e.g) If $\Sigma = \{a, b\}$ the canonical order is $\emptyset, a, b, aa, ab, \dots$

15. How can a TM acts as a generating device?

In a multi-tape TM, one tape acts as an output tape, on which a symbol, once written can never be changed and whose tape head never moves left. On that output

tape, M writes strings over some alphabet Σ , separated by a marker symbol $\#$, $G(M)$ (where $G(M)$ is the set w in Σ^* such that w is finally printed between a pair of $\#$'s on the output device).

16. What are the different types of grammars/languages?

Unrestricted or Phase structure grammar. (Type 0 grammar). (for TMs)

Context sensitive grammar or context dependent grammar (Type 1) (for Linear Bounded Automata)

Context free grammar (Type 2) (for PDA)

Regular grammar (Type 3) (for Finite Automata).

This hierarchy is called as Chomsky Hierarchy.

17. What is a PS or Unrestricted grammar?

A grammar without restrictions is a PS grammar. Defined as $G = (V, T, P, S)$

With P as :

$A \rightarrow \alpha$ where A is variable and α is replacement string.

The languages generated by unrestricted grammars are precisely those accepted by

Turing machines.

18. State a single tape TM started on blank tape scans any cell four or more

times is decidable?

If the TM never scans any cell four or more times, then every crossing sequence is of length at most three. There is a finite number of distinct crossing sequences of length 3 or less. Thus either TM stays within a fixed bounded number

of tape cells or some crossing sequence repeats.

19. Does the problem of "Given a TM M , does M make more than 50 moves

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on input B "?

Given a TM M means given enough information to trace the processing of a fixed string for a certain fixed number of moves. So the given problem is decidable.

20. Show that AMBIGUITY problem is un-decidable.

Consider the ambiguity problem for CFGs. Use the "yes-no" version of AMB.

An algorithm for FIND is used to solve AMB. FIND requires producing a word with

two or more parses if one exists and answers "no" otherwise. By the reduction of AMB to FIND we conclude there is no algorithm for FIND and hence no algorithm for AMB.

21. State the halting problem of TMs.

The halting problem for TMs is:

Given any TM M and an input string w , does M halt on w ?

This problem is undecidable as there is no algorithm to solve this problem.

22. Define PCP or Post Correspondence Problem.

An instance of PCP consists of two lists, $A = w_1, w_2, \dots, w_k$

and $B = x_1, \dots, x_k$ of strings over some alphabet Σ . This instance of PCP has a solution if there is any sequence of integers i_1, i_2, \dots, i_m with $m \geq 1$ such that

$$w_{i_1} w_{i_2} \dots w_{i_m} = x_{i_1} x_{i_2} \dots x_{i_m}$$

The sequence i_1, i_2, \dots, i_m is a solution to this instance of PCP.

23. Define MPCP or Modified PCP.

The MPCP is: Given lists A and B of k strings from Σ^* , say

$A = w_1, w_2, \dots, w_k$ and $B = x_1, x_2, \dots, x_k$

does there exist a sequence of integers i_1, i_2, \dots, i_r such that

$$w_{i_1} w_{i_2} \dots w_{i_r} = x_{i_1} x_{i_2} \dots x_{i_r}$$

24. What is the difference between PCP and MPCP?

The difference between MPCP and PCP is that in the MPCP, a solution is required to start with the first string on each list.

25. What are the concepts used in UTMs?

_ Stored program computers.

_ Interpretive Implementation of Programming languages.

_ Computability.

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16 marks

1. Prove that, if L is accepted by an NFA with ϵ -transitions, then L is accepted by an NFA

without ϵ -transitions.

Refer page no:26, Theorem 2.2

2. Prove that for every regular expression there exist an NFA with ϵ -transitions.
Refer page no:30, Theorem 2.3

3. Construct the NFA with ϵ -transitions from the given regular expression.

– If the regular expression is in the form of ab then NFA is

$a \quad b$

– If the regular expression is in $a+b$ form then NFA is

– $a \quad _$

– $b \quad _$

– If the regular expression is in a^* form then NFA is

– $a \quad _$

4. conversion of NFA to DFA

– Draw the NFA's transition table

– Take the initial state of NFA be the initial state of DFA.

– Transit the initial state for all the input symbols.

– If new state appears transit it again and again to make all state as old state.

– All the new states are the states of the required DFA

– Draw the transition table for DFA

– Draw the DFA from the transition table.

–

5. Conversion of DFA into regular expression.

Arden's theorem is used to find regular expression from the DFA.

using this theorem if the equation is of the form $R=Q+RP$, we

can write this as $R=QP^*$.

– Write the equations for all the states.

– Apply Arden's theorem and eliminate all the states.

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– Find the equation of the final state with only the input symbols.

– Made the simplifications if possible

– The equation obtained is the required regular expression.

6. Leftmost and rightmost derivations.

If we apply a production only to the leftmost variable at every step to derive the required string then it is called as leftmost derivation.

If we apply a production only to the rightmost variable at every step to derive the required string then it is called as rightmost derivation.

Example:

Consider G whose productions are $S \rightarrow aAS|a$, $A \rightarrow SbA|SS|ba$. For the string $w=aabbaa$ find the leftmost and rightmost derivation.

LMD: $S \Rightarrow aAS$

$\Rightarrow aSbAS$

$\Rightarrow aabAS$

$\Rightarrow aabbaS$

$\Rightarrow aabbaa$

RMD: $S \Rightarrow aAS$

$\Rightarrow aAa$

$\Rightarrow aSbAa$

$\Rightarrow aSbbaa$

$\Rightarrow aabbaa$

7. Prove that for every derivations there exist a derivation tree.

Refer page no: 84, Theorem 4.1

8. Construction of reduced grammar.

□ Elimination of null productions

- In a CFG, productions of the form $A \rightarrow _$ can be eliminated, where A is a variable.

□ Elimination of unit productions.

- In a CFG, productions of the form $A \rightarrow B$ can be eliminated, where A and B are variables.

□ Elimination of Useless symbols.

- these are the variables in CFG which does not derive any terminal or not reachable from the start symbols. These can also be eliminated.

-

9. Chomsky normal form (CNF)

If the CFG is in CNF if it satisfies the following conditions

- All the production must contain only one terminal or only two variables in the right hand side.

Example: Consider G with the production of $S \rightarrow aAB$, $A \rightarrow bC$, $B \rightarrow b$, $C \rightarrow c$.

G in CNF is $S \rightarrow EB$, $E \rightarrow DA$, $D \rightarrow a$, $A \rightarrow FC$, $F \rightarrow b$, $B \rightarrow b$, $C \rightarrow c$.

10. Conversion of CFL in GNF.

Refer page no: 97, Example 4.10

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11. Design a PDA that accepts the language $\{w^R \mid w \in (0+1)^*\}$.

Refer page no: 112, Example 5.2

12. Prove that if L is $L(M_2)$ for some PDA M_2 , then L is $N(M_1)$ for some PDA M_1 .

Refer page no: 114, Theorem 5.1

13. If L is a context-free language, then prove that there exists a PDA M such that $L = N(M)$.

Refer page no: 116, Theorem 5.3

14. Conversion of PDA into CFL.

Theorem: refer page no: 117

Example: refer page no: 119

15. State and prove the pumping lemma for CFL

Refer page no: 125, Theorem 6.1

16. Explain the various techniques for Turing machine construction.

- storage in finite control

- multiple tracks

- checking off symbols

- shifting over

- subroutines.

For explanation refer page no 153-158

17. Briefly explain the different types of Turing machines.

- two way finite tape TM

- multi tape TM

- nondeterministic TM

- multi dimensional TM

- multihead TM

For explanation refer page no 160-165

18. Design a TM to perform proper subtraction.

Refer page no: 151, Example 7.2

19. Design a TM to accept the language $L = \{0^n 1^n \mid n \geq 1\}$

Refer page no: 149, Example 7.1

20. Explain how a TM can be used to determine the given number is prime or not?

It takes a binary input greater than 2, written on the first track, and determines whether it is a prime. The input is surrounded by the symbol \$ on the first track.

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To test if the input is a prime, the TM first writes the number 2 in binary on the second track and copies the first track on to the third. Then the second track is subtracted

as many times as possible, from the third track effectively dividing the third track by the

second and leaving the remainder.

If the remainder is zero, the number on the first track is not a prime. If the remainder is non zero, the number on the second track is increased by one. If the second

track equals the first, the number on the first track is the prime. If the second is less than

first, the whole operation is repeated for the new number on the second track.

21. State and explain RICE theorem.

Refer page no: 188, Theorem 8.6

22. Define L_u and prove that L_u is recursive enumerable.

Refer page no: 183, Theorem 8.4

23. Define L_d and prove that L_d is undecidable.

Refer page no: 182.

24. Prove that if a language L and its complement are both recursively enumerable, then L is recursive.

Refer page no: 180, Theorem 8.3

25. Prove that the halting problem is undecidable.

Refer page no: 187

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1. Introduction to automata theory, languages, and computation
by John E. Hopcroft, Jeffery D. Ullman

CS 1304-MICROPROCESSORS

1. What is Microprocessor? Give the power supply & clock frequency of 8085

A microprocessor is a multipurpose, programmable logic device that reads binary instructions from a storage device called memory, accepts binary data as input, and processes data according to those instructions and provides result as

output. The power supply of 8085 is +5V and clock frequency is 3MHz.

2. List few applications of microprocessor-based system.

It is used:

- i. For measurements, display and control of current, voltage, temperature, pressure, etc.
- ii. For traffic control and industrial tool control.
- iii. For speed control of machines.

3. What are the functions of an accumulator?

The accumulator is the register associated with the ALU operations and sometimes I/O operations. It is an integral part of ALU. It holds one of data to be processed by ALU. It also temporarily stores the result of the operation performed by the ALU.

4. List the 16 – bit registers of 8085 microprocessor.

Stack pointer (SP) and Program counter (PC).

5. List the allowed register pairs of 8085.

- B-C register pair
- D-E register pair
- H-L register pair

6. Mention the purpose of SID and SOD lines

SID (Serial input data line):

It is an input line through which the microprocessor accepts serial data.

SOD (Serial output data line):

It is an output line through which the microprocessor sends output serial data.

7. What is an Opcode?

The part of the instruction that specifies the operation to be performed is called the operation code or opcode.

8. What is the function of IO/M signal in the 8085?

It is a status signal. It is used to differentiate between memory locations and I/O operations. When this signal is low (IO/M = 0) it denotes the memory related operations. When this signal is high (IO/M = 1) it denotes an I/O operation.

9. What is an Operand?

The data on which the operation is to be performed is called as an Operand.

10. How many operations are there in the instruction set of 8085 microprocessor?

There are 74 operations in the 8085 microprocessor.

11. List out the five categories of the 8085 instructions. Give examples of the instructions for each group.

- Data transfer group – MOV, MVI, LXI.
- Arithmetic group – ADD, SUB, INR.
- Logical group –ANA, XRA, CMP.

- Branch group – JMP, JNZ, CALL.
- Stack I/O and Machine control group – PUSH, POP, IN, HLT.

12. Explain the difference between a JMP instruction and CALL instruction.

A JMP instruction permanently changes the program counter. A CALL instruction leaves information on the stack so that the original program execution sequence can be resumed.

13. Explain the purpose of the I/O instructions IN and OUT.

The IN instruction is used to move data from an I/O port into the accumulator.

The OUT instruction is used to move data from the accumulator to an I/O port.

The IN & OUT instructions are used only on microprocessor, which use a separate address space for interfacing.

14. What is the difference between the shift and rotate instructions?

A rotate instruction is a closed loop instruction. That is, the data moved out at one end is put back in at the other end. The shift instruction loses the data that is moved out of the last bit locations.

15. How many address lines in a 4096 x 8 EPROM CHIP?

12 address lines.

16. Control signals used for DMA operation are _____

HOLD & HLDA.

17. What is meant by Wait State?

This state is used by slow peripheral devices. The peripheral devices can transfer the data to or from the microprocessor by using READY input line. The microprocessor remains in wait state as long as READY line is low. During the wait state, the contents of the address, address/data and control buses are held constant.

18. List the four instructions which control the interrupt structure of the 8085

microprocessor.

- DI (Disable Interrupts)
- EI (Enable Interrupts)
- RIM (Read Interrupt Masks)
- SIM (Set Interrupt Masks)

19. What is meant by polling?

Polling or device polling is a process which identifies the device that has interrupted the microprocessor.

20. What is meant by interrupt?

Interrupt is an external signal that causes a microprocessor to jump to a specific subroutine.

21. Explain priority interrupts of 8085.

The 8085 microprocessor has five interrupt inputs. They are TRAP, RST 7.5, RST 6.5, RST 5.5, and INTR. These interrupts have a fixed priority of interrupt service.

If two or more interrupts go high at the same time, the 8085 will service them on priority basis. The TRAP has the highest priority followed by RST 7.5,

RST 6.5, RST 5.5. The priority of interrupts in 8085 is shown in the table.

Interrupts Priority

TRAP

RST 7.5

RST 6.5

RST 5.5

INTR

1

2

3

4

5

22. What is a microcomputer?

A computer that is designed using a microprocessor as its CPU is called microcomputer.

23. What is the signal classification of 8085

All the signals of 8085 can be classified into 6 groups

- Address bus
- Data bus
- Control and status signals
- Power supply and frequency signals
- Externally initiated signals
- Serial I/O ports

24. What are operations performed on data in 8085

The various operations performed are

- Store 8-bit data
- Perform arithmetic and logical operations
- Test for conditions
- Sequence the execution of instructions
- Store data temporarily during execution in the defined R/W memory locations called the stack

25. Steps involved to fetch a byte in 8085

- i. The PC places the 16-bit memory address on the address bus
- ii. The control unit sends the control signal RD to enable the memory chip
- iii. The byte from the memory location is placed on the data bus
- iv. The byte is placed in the instruction decoder of the microprocessor and the task is carried out according to the instruction

26. How many interrupts does 8085 have, mention them

The 8085 has 5 interrupt signals; they are INTR, RST7.5, RST6.5, RST5.5 and TRAP

27. Basic concepts in memory interfacing

The primary function of memory interfacing is that the microprocessor should be able to read from and write into a given register of a memory chip. To perform these operations the microprocessor should

- Be able to select the chip

- Identify the register
- Enable the appropriate buffer

28. Define instruction cycle, machine cycle and T-state

Instruction cycle is defined, as the time required completing the execution of an instruction. Machine cycle is defined as the time required completing one operation of accessing memory, I/O or acknowledging an external request.

Tcycle

is defined as one subdivision of the operation performed in one clock period

29. What is an instruction?

An instruction is a binary pattern entered through an input device to command the microprocessor to perform that specific function

30. What is the use of ALE

The ALE is used to latch the lower order address so that it can be available in T2 and T3 and used for identifying the memory address. During T1 the ALE goes high, the latch is transparent ie, the output changes according to the input data, so the output of the latch is the lower order address. When ALE goes low the

lower order address is latched until the next ALE.

31. How many machine cycles does 8085 have, mention them

The 8085 have seven machine cycles. They are

- Opcode fetch
- Memory read
- Memory write
- I/O read
- I/O write
- Interrupt acknowledge
- Bus idle

32. Explain the signals HOLD, READY and SID

HOLD indicates that a peripheral such as DMA controller is requesting the use of address bus, data bus and control bus. READY is used to delay the microprocessor read or write cycles until a slow responding peripheral is ready to send or accept data. SID is used to accept serial data bit by bit

33. Mention the categories of instruction and give two examples for each category

The instructions of 8085 can be categorized into the following five

- Data transfer MOV Rd,Rs STA 16-bit
- Arithmetic ADD R DCR M
- Logical XRI 8-bit RAR
- Branching JNZ CALL 16-bit
- Machine control HLT NOP

34. Explain LDA, STA and DAA instructions

LDA copies the data byte into accumulator from the memory location specified by the 16-bit address. STA copies the data byte from the accumulator in

the memory location specified by 16-bit address. DAA changes the contents of the accumulator from binary to 4-bit BCD digits.

35. Explain the different instruction formats with examples

The instruction set is grouped into the following formats

- One byte instruction MOV C,A
- Two byte instruction MVI A,39H
- Three byte instruction JMP 2345H

36. What is the use of addressing modes, mention the different types

The various formats of specifying the operands are called addressing modes, it is used to

access the operands or data. The different types are as follows

- Immediate addressing
- Register addressing
- Direct addressing
- Indirect addressing
- Implicit addressing

37. What is the use of bi-directional buffers?

It is used to increase the driving capacity of the data bus. The data bus of a microcomputer system is bi-directional, so it requires a buffer that allows the data to flow in both directions.

38. Give the register organization of 8085

39. Define stack and explain stack related instructions

The stack is a group of memory locations in the R/W memory that is used for the temporary storage of binary information during the execution of the program. The stack related instructions are PUSH & POP

40. Why do we use XRA A instruction

The XRA A instruction is used to clear the contents of the Accumulator and store the value 00H.

41. Compare CALL and PUSH instructions

CALL PUSH

When CALL is executed the microprocessor automatically stores the 16-bit address of the instruction next to CALL on the stack

The programmer uses the instruction PUSH to save the contents of the register pair on the stack

When CALL is executed the stack pointer is decremented by two

When PUSH is executed the stack pointer register is decremented by two

W(8)

Temp. Reg

Z(8)

Temp. Reg

B(8)

Register

C(8)

Register

D(8)

Register

E(8)

Register

H(8)

Register

L(8)

Register

Stack Pointer(16)

Program Counter(16)

42. What is Microcontroller and Microcomputer

Microcontroller is a device that includes microprocessor; memory and I/O signal lines on a single chip, fabricated using VLSI technology. Microcomputer is a computer that is designed using microprocessor as its CPU. It includes microprocessor, memory and I/O.

43. Define Flags

The flags are used to reflect the data conditions in the accumulator. The 8085 flags are S-Sign flag, Z-Zero flag, AC-Auxiliary carry flag, P-Parity flag, CYCarry flag

D7 D6 D5 D4 D3 D2 D1 D0

S Z AC P CY

44. How does the microprocessor differentiate between data and instruction

When the first m/c code of an instruction is fetched and decoded in the instruction register, the microprocessor recognizes the number of bytes required to fetch the entire instruction. For example MVI A, Data, the second byte is always considered as data. If the data byte is omitted by mistake whatever is in that memory location will be considered as data & the byte after the "data" will be treated as the next instruction.

45. Compare RET and POP

RET POP

RET transfers the contents of the top two locations of the stack to the PC

POP transfers the contents of the top two locations of the stack to the specified register pair

When RET is executed the SP is incremented by two

When POP is executed the SP is incremented by two

Has 8 conditional RETURN instructions No conditional POP instructions

46. What is assembler

The assembler translates the assembly language program text which is given as input to the assembler to their binary equivalents known as object code. The time required to translate the assembly code to object code is called access time. The assembler checks for

syntax errors & displays them before giving the object code.

47. What is loader

The loader copies the program into the computer's main memory at load time and begins the program execution at execution time.

48. What is linker

A linker is a program used to join together several object files into one large object file. For large programs it is more efficient to divide the large program modules into smaller modules. Each module is individually written, tested & debugged. When all the modules work they are linked together to form a large functioning program.

49. Explain ALIGN & ASSUME

The ALIGN directive forces the assembler to align the next segment at an address divisible by specified divisor. The format is ALIGN number where number can be 2, 4, 8 or 16. Example ALIGN 8.

The ASSUME directive assigns a logical segment to a physical segment at any given time. It tells the assembler what address will be in the segment registers at execution time. Example ASSUME CS: code, DS: data, SS: stack

50. Explain PTR & GROUP

A program may contain several segments of the same type. The GROUP directive collects them under a single name so they can reside in a single segment, usually a data segment. The format is Name GROUP Seg-name,.....Seg-name

PTR is used to assign a specific type to a variable or a label. It is also used to override the declared type of a variable.

51. Explain about MODEL

This directive provides short cuts in defining segments. It initializes memory model before defining any segment. The memory model can be SMALL, MEDIUM, COMPACT or LARGE.

Model Code segments Data segments

Small One One

Medium Multiple One

Compact One Multiple

Large Multiple Multiple

52. Explain PROC & ENDP

PROC directive defines the procedures in the program. The procedure name must be unique. After PROC the term NEAR or FAR are used to specify the type of procedure. Example FACT PROC FAR. ENDP is used along with PROC and defines the end of the procedure.

53. Explain SEGMENT & ENDS

An assembly program in .EXE format consists of one or more segments. The starts of these segments are defined by SEGMENT and the end of the segment is indicated by ENDS directive. Format Name SEGMENT

Name ENDS

54. Explain TITLE & TYPE

The TITLE directive helps to control the format of a listing of an assembled program. It causes a title for the program to print on line 2 of each page of the program listing. Maximum 60 characters are allowed. Format TITLE text.

TYPE operator tells the assembler to determine the type of specified variable in bytes. For bytes the assembler gives a value 1, for word 2 & double word 4.

55. Define SOP

The segment override prefix allows the programmer to deviate from the default segment

Eg : MOV CS : [BX] , AL

56. Define variable

A variable is an identifier that is associated with the first byte of data item. In assembly language statement: COUNT DB 20H, COUNT is the variable.

57. What are procedures

Procedures are a group of instructions stored as a separate program in memory and it is called from the main program whenever required. The type of procedure depends on where the procedures are stored in memory. If it is in the same code segment as that of the main program then it is a near procedure otherwise it is a far procedure.

58. Explain the linking process

A linker is a program used to join together several object files into one large object file. The linker produces a link file which contains the binary codes for all the combined modules. It also produces a link map which contains the address information about the link files. The linker does not assign absolute addresses but only relative address starting

from zero, so the programs are relocatable & can be put anywhere in memory to be run.

59. Explain about passing parameters using registers with example

Procedures process some data or address variable from the main program, for processing it is necessary to pass the address variables or data. This is called passing parameters to procedures. In passing parameters using registers the data to be passed is

stored in registers & these registers are accessed in the procedure to process the data.

```
CODE SEGMENT
MOV AL, DATA
CALL PRO1
PRO1 PROC NEAR
MOV INPUT, AL
RET
PRO1 ENDP
CODE ENDS
```

60. What is recursive procedures

A recursive procedure is a procedure, which calls itself. Recursive procedures are used to work with complex data structures called trees. If the procedure is called with N=3, then the N is decremented by 1 after each procedure CALL and the procedure is called until N=0.

61. What are libraries

Library files are collection of procedures that can be used in other programs. These procedures are assembled and compiled into a library file by the LIB program. The library file is invoked when a program is linked with linker program. when a library file is linked only the required procedures are copied into the program. Use of library files increase s/w reusability & reduce s/w development time.

62. What are Macros

Macro is a group of instruction. The macro assembler generates the code in the program each time where the macro is called. Macros are defined by MACRO & ENDM directives. Creating macro is similar to creating new opcodes that can be used in the program

```
INIT MACRO
MOV AX, data
MOV DS
MOV ES, AX
ENDM
```

63. How do 8086 interrupts occur

An 8086 interrupt can come from any of the following three sources

- External signals
- Special instructions in the program
- Condition produced by instruction

64. What are the 8086 interrupt types

Dedicated interrupts

- Type 0: Divide by zero interrupt
- Type 1: Single step interrupt
- Type 2: Non maskable interrupt
- Type 3: Breakpoint
- Type 4: Overflow interrupt

Software interrupts

- Type 0-255

65. What is interrupt service routine

Interrupt means to break the sequence of operation. While the CPU is executing a program an interrupt breaks the normal sequence of execution of instructions & diverts its execution to some other program. This program to which the control is transferred is called the interrupt service routine.

66. Define BIOS

The IBM PC has in its ROM a collection of routines, each of which performs some specific function such as reading a character from keyboard, writing character to CRT. This collection of routines is referred to as Basic Input Output System or BIOS.

67. Explain PUBLIC

For large programs several small modules are linked together. In order that the modules link together correctly any variable name or label referred to in other modules must be declared public in the module where it is defined. The PUBLIC directive is used to tell the assembler that a specified name or label will be accessed from other modules. Format PUBLIC Symbol.

68. Explain DUP

The DUP directive can be used to initialize several locations & to assign values to these locations. Format Name Data_Type Num DUP (value)

Example TABLE DW 10 DUP (0). Reserves an array of 10 words of memory and initializes all 10 words with 0. array name is TABLE.

69. Compare Procedure & Macro

Procedure Macro

Accessed by CALL & RET instruction Accessed during assembly with name given during program execution to macro when defined

Machine code for instruction is put only once in the memory

Machine code is generated for instruction each time when macro is called

With procedures less memory is required With macro more memory is required

Parameters can be passed in registers, memory locations or stack

Parameters passed as part of statement which calls macro

70. What is the purpose of segment registers in 8086?

There are 4 segment registers present in 8086. They are

1. Code Segment (**CS**) register
2. Data Segment (**DS**) register
3. Stack Segment (**SS**) register

4. Extra Segment (ES) register

The **code segment** register gives the address of the current code segment. ie. It will point out where the instructions, to be executed, are stored in the memory. The **data segment** register points out where the operands are stored in the memory.

The **stack segment** registers point out the address of the current stack, which is used to store the temporary results.

If the amount of data used is more the **Extra segment** register points out where the large amount of data is stored in the memory.

71. Define pipelining?

In 8086, to speedup the execution of program, the instructions fetching and execution of instructions are overlapped each other. This technique is known as pipelining.

In pipelining, when the n^{th} instruction is executed, the $n+1^{\text{th}}$ instruction is fetched and thus the processing speed is increased.

72. Discuss the function of instruction queue in 8086?

In 8086, a 6-byte instruction queue is presented at the Bus Interface Unit (BIU). It is used to prefetch and store at the maximum of 6 bytes of instruction code from the memory. Due to this, overlapping instruction fetch with instruction execution increases the processing speed.

73. What is the maximum memory size that can be addressed by 8086?

In 8086, an memory location is addressed by 20 bit address and the address bus is 20 bit address and the address bus is 20 bits. So it can address up to one mega

byte (2^{20}) of memory space.

74. What is the function of the signal in 8086?

BHE signal means Bus High Enable signal. The BHE signal is made low when there is some read or write operation is carried out. ie . When ever the data bus of

the system is busy i.e. whenever there is some data transfer then the BHE signal is

made low.

75. What are the predefined interrupts in 8086?

The various predefined interrupts are,

DIVISION BY ZERO (type 0) Interrupt.

SINGLE STEP (type 1) Interrupt.

NONMASKABLE (type 2) Interrupt.

BREAK POINT (type 3) Interrupt.

OVER FLOW (type 4) Interrupt.

76. What are the different flag available in status register of 8086?

There are 6 one bit flags are present. They are,

AF - Auxiliary Carry Flag

CF - Carry Flag

OF - Overflow Flag

SF - Sign Flag

PF - Parity Flag

ZF - Zero Flag

77. List the various addressing modes present in 8086?

There are 12 addressing modes present in 8086. They are,

(a) Register and immediate addressing modes

_ Register addressing modes

_ Immediate addressing mode

(b) Memory addressing modes.

_ Direct addressing modes

_ Register indirect addressing modes

_ Based addressing modes

_ Indexed addressing modes

_ Based Indexed addressing modes

_ String addressing modes

(c) I/O addressing modes

_ Direct addressing mode

_ Indirect addressing mode

(d) Relative addressing mode

(e) Implied addressing mode

78. How single stepping can be done in 8086?

By setting the Trace Flag (TF) the 8086 goes to single-step mode. In this mode, after

the execution of each instruction s 8086 generates an internal interrupt and by writing

some interrupt service routine we can display the content of desired registers and memory locations. So it is useful for debugging the program.

79. State the significance of LOCK signal in 8086?

If 8086 is working at maximum mode, there are multiprocessors are present. If the system bus is given to a processor then the LOCK signal is made low. That means the system bus is busy and it cannot be given of any other processors. After the use of the system bus again the LOCK signal is made high. That means it is ready to give the system bus to any processor.

80. What are the functions of bus interface unit (BIU) in 8086?

(a) Fetch instructions from memory.

(b) Fetch data from memory and I/O ports.

(c) Write data to memory and I/O ports.

(d) To communicate with outside world.

(e) Provide external bus operations and bus control signals.

81. What is the clock frequency of 8086?

8086 8086-2 8086-4

Internal clock Frequency 5 MHz 8MHz 4MHz

External Clock Frequency 15MHZ 24MHZ 12MHZ

82. What are the two modes of operations present in 8086?

i. Minimum mode (or) Uniprocessor system

ii. Maximum mode (or) Multiprocessor system

84. Explain the process control instructions

STC – It sets the carry flag & does not affect any other flag

CLC – it resets the carry flag to zero & does not affect any other flag

CMC – It complements the carry flag & does not affect any other flag
STD – It sets the direction flag to 1 so that SI and/or DI can be decremented automatically after execution of string instruction & does not affect other flags
CLD – It resets the direction flag to 0 so that SI and/or DI can be incremented automatically after execution of string instruction & does not affect other flags
STI – Sets the interrupt flag to 1. Enables INTR of 8086.
CLI – Resets the interrupt flag to 0. 8086 will not respond to INTR.

85. Explain REPEAT-UNTIL statements

REPEAT-UNTIL statements allow executing a series of instructions repeatedly until some condition occurs. The REPEAT defines the start of the loop & UNTIL the end of the loop. UNTIL has a condition when the condition is true the loop is terminated

86. What is multiprogramming?

If more than one process is carried out at the same time, then it is known as multiprogramming. Another definition is the interleaving of CPU and I/O operations among several programs is called multiprogramming.

To improve the utilization of CPU and I/O devices, we are designing to process a set of independent programs concurrently by a single CPU.

This technique is known as multiprogramming

87. Differentiate between absolute and linear select decoding?

Absolute decoding Linear decoding

All higher address lines are defined to select the memory or I/O device
Few higher address lines are decoded to select the memory or I/O device

More h/w is required to design decoding logic

Hardware required to design decoding logic is less

Higher cost for decoding circuit Less cost for decoding circuit

No multiple address

Has a disadvantage of multiple addressing

Used in large systems Used in small systems

88. What are the three classifications of 8086 interrupts?

- (1) Predefined interrupts
- (2) User defined Hardware interrupts
- (3) User defined software interrupts.

89. What are the functions of status pins in 8086?

S2 S1 S0

0 0 0 ---- Interrupt acknowledge

0 0 1 ---- Read I/O

0 1 0 ---- Write I/O

0 1 1 ---- Halt

1 0 0 ---- Code access

1 0 1 ---- Read memory

1 1 0 ---- Write memory

1 1 1 ---- inactive
S4 S3
0 0 --I/O from extra segment
0 1 --I/O from Stack Segment
1 0 --I/O from Code segment
1 1 --I/O from Data segment
S5 --Status of interrupt enable flag
S6 --Hold acknowledge for system bus
S7 --Address transfer.

90. What are the schemes for establishing priority in order to resolve bus arbitration problem?

There are three basic bus access control and arbitration schemes

1. Daisy Chaining
2. Independent Request
3. Polling

91. What is the use of 8251 chip?

Intel's 8251A is a universal synchronous asynchronous receiver and transmitter compatible with Intel's Processors. This may be programmed to operate in any of the serial communication modes built into it. This chip converts the parallel data into a serial stream of bits suitable for serial transmission. It is also able to receive a serial stream of bits and converts it into parallel data bytes to be read by a microprocessor.

92. What are the different types of methods used for data transmission?

The data transmission between two points involves unidirectional or bi-directional transmission of meaningful digital data through a medium. There are basically three modes of data transmission

- (a) Simplex
- (b) Duplex
- (c) Half Duplex

In simplex mode, data is transmitted only in one direction over a single communication channel. For example, a computer (CPU) may transmit data for a CRT display unit in this mode.

In duplex mode, data may be transferred between two transreceivers in both directions simultaneously.

In half duplex mode, on the other hand, data transmission may take place in either direction, but at a time data may be transmitted only in one direction. For example, a computer may communicate with a terminal in this mode. When the terminal sends data (i.e. terminal is sender). The message is received by the computer (i.e. the computer is receiver). However, it is not possible to transmit data from the computer to terminal and from terminal to the computer simultaneously.

93. What are the various programmed data transfer methods?

- ii) Synchronous data transfer
- iii) Asynchronous data transfer
- iv) Interrupt driven data transfer

94. What is synchronous data transfer?

It is a data method which is used when the I/O device and the microprocessor match in speed. To transfer a data to or from the device, the user program issues a suitable instruction addressing the device. The data transfer is completed at the

end of the execution of this instruction.

95. What is asynchronous data transfer?

It is a data transfer method which is used when the speed of an I/O device does not match with the speed of the microprocessor. Asynchronous data transfer is

also called as Handshaking.

96. What are the functional types used in control words of 8251a?

The control words of 8251A are divided into two functional types.

1. Mode Instruction control word
2. Command Instruction control word

Mode Instruction control word :-This defines the general operational characteristics of 8251A.

Command Instruction control word:-The command instruction controls the actual operations of the selected format like enable transmit/receive, error reset and modem control.

97. What are the basic modes of operation of 8255?

There are two basic modes of operation of 8255, viz.

1. I/O mode.
3. BSR mode.

In I/O mode, the 8255 ports work as programmable I/O ports, while

In BSR mode only port C (PC0-PC7) can be used to set or reset its individual port bits. Under the IO mode of operation, further there are three modes of operation of 8255, So as to support different types of applications, viz. mode 0, mode 1 and mode 2.

Mode 0 - Basic I/O mode

Mode 1 - Strobed I/O mode

Mode 2 - Strobed bi-directional I/O

98. Write the features of mode 0 in 8255?

1. Two 8-bit ports (port A and port B) and two 4-bit ports (port C upper and lower) are available. The two 4-bit ports can be combined used as a third 8-bit port.
2. Any port can be used as an input or output port.
3. Output ports are latched. Input ports are not latched.
4. A maximum of four ports are available so that overall 16 I/O configurations are possible.

99. What are the features used mode 1 in 8255?

Two groups – group A and group B are available for strobed data transfer.

1. Each group contains one 8-bit data I/O port and one 4-bit control/data port.
2. The 8-bit data port can be either used as input or output port. The inputs and outputs both are latched.
3. Out of 8-bit port C, PC0-PC2 is used to generate control signals for port B and PC3=PC5 are used to generate control signals for port A. The lines PC6, PC7 may be used as independent data lines.

100. What are the signals used in input control signal & output control signal?

Input control signal

STB (Strobe input)

IBF (Input buffer full)

INTR(Interrupt request)

Output control signal

OBF (Output buffer full)

ACK (Acknowledge input)

INTR(Interrupt request)

101. What are the features used mode 2 in 8255?

The single 8-bit port in-group A is available.

1. The 8-bit port is bi-directional and additionally a 5-bit control port is available.
2. Three I/O lines are available at port C, viz PC2-PC0.
3. Inputs and outputs are both latched.
4. The 5-bit control port C (PC3=PC7) is used for generating/accepting handshake signals for the 8-bit data transfer on port A.

102. What are the modes of operations used in 8253?

Each of the three counters of 8253 can be operated in one of the following six modes of operation.

1. Mode 0 (Interrupt on terminal count)
2. Mode 1 (Programmable monoshot)
3. Mode 2 (Rate generator)
4. Mode 3 (Square wave generator)
5. Mode 4 (Software triggered strobe)
6. Mode 5 (Hardware triggered strobe)

103. What are the different types of write operations used in 8253?

There are two types of write operations in 8253

- (1) Writing a control word register
- (2) Writing a count value into a count register

The control word register accepts data from the data buffer and initializes the counters, as required. The control word register contents are used for

- (a) Initializing the operating modes (mode 0-mode4)
- (b) Selection of counters (counter 0- counter 2)
- (c) Choosing binary /BCD counters
- (d) Loading of the counter registers.

The mode control register is a write only register and the CPU cannot read its contents.

104. Give the different types of command words used in 8259a?

The command words of 8259A are classified in two groups

1. Initialization command words (ICWs)
2. Operation command words (OCWs)

105. Give the operating modes of 8259a?

- (a) Fully Nested Mode
- (b) End of Interrupt (EOI)
- (c) Automatic Rotation
- (d) Automatic EOI Mode
- (e) Specific Rotation
- (f) Special Mask Mode
- (g) Edge and level Triggered Mode
- (h) Reading 8259 Status
- (i) Poll command
- (j) Special Fully Nested Mode
- (k) Buffered mode
- (l) Cascade mode

106. Define scan counter?

The scan counter has two modes to scan the key matrix and refresh the display. In

the encoded mode, the counter provides binary count that is to be externally decoded to provide the scan lines for keyboard and display. In the decoded scan mode, the counter internally decodes the least significant 2 bits and provides a decoded 1 out of 4 scan on SL0-SL3. The keyboard and display both are in the same mode at a time.

107. What is the output modes used in 8279?

8279 provides two output modes for selecting the display options.

1. Display Scan

In this mode, 8279 provides 8 or 16 character-multiplexed displays those can be organized as dual 4-bit or single 8-bit display units.

2. Display Entry

8279 allows options for data entry on the displays. The display data is entered for display from the right side or from the left side.

108. What are the modes used in keyboard modes?

1. Scanned Keyboard mode with 2 Key Lockout.
2. Scanned Keyboard with N-key Rollover.
3. Scanned Keyboard special Error Mode.
4. Sensor Matrix Mode.

109. What are the modes used in display modes?

1. Left Entry mode

In the left entry mode, the data is entered from the left side of the display unit..

2. Right Entry Mode

In the right entry mode, the first entry to be displayed is entered on the rightmost display.

110. What is the use of modem control unit in 8251?

The modem control unit handles the modem handshake signals to coordinate the communication between the modem and the USART.

111. Give the register organization of 8257?

The 8257 perform the DMA operation over four independent DMA channels. Each of the four channels of 8257 has a pair of two 16-bit registers. DMA address

register and terminal count register. Also, there are two common registers for all the channels; namely, mode set registers and status register. Thus there are a total

of ten registers. The CPU selects one of these ten registers using address lines A₀-

A₃.

112. What is the function of DMA address register?

Each DMA channel has one DMA address register. The function of this register is to store the address of the starting memory location, which will be accessed by the

DMA channel. Thus the starting address of the memory block that will be

accessed by the device is first loaded in the DMA address register of the channel.

Naturally, the device that wants to transfer data over a DMA channel, will access the block of memory with the starting address stored in the DMA Address Register.

113. What is the use of terminal count register?

Each of the four DMA channels of 8257 has one terminal count register. This 16-bit register is used for ascertaining that the data transfer through a DMA channel ceases or stops after the required number of DMA cycles.

114. What is the function of mode set register in 8257?

The mode set register is used for programming the 8257 as per the requirements of the system. The function of the mode set register is to enable the DMA channels individually and also to set the various modes of operation.

115. Distinguish between the memories mapped I/O peripheral I/O?

SL: NO Memory Mapped I/O Peripheral I/O

1 16-bit device address 8-bit device address

2

Data transfer between any general-purpose register and I/O port.

Data is transfer only between accumulator and I.O port

3

The memory map (64K) is shared between I/O device and system memory.

The I/O map is independent of the memory map; 256 input device and 256 output device can be connected

4

More hardware is required to decode 16-bit address

Less hardware is required to decode 8-bit address

5

Arithmetic or logic operation can be directly performed with I/O data

Arithmetic or logical operation cannot be directly performed with I/O data

116. List the operation modes of 8255

a) I.O Mode

i. Mode 0-Simple Input/Output.

ii. Mode 1-Strobed Input/Output (Handshake mode)

iii. Mode 2-Strobed bidirectional mode

b) Bit Set/Reset Mode.

117. What is a control word?

It is a word stored in a register (control register) used to control the operation of a program digital device.

118. What is the purpose of control word written to control register in 8255?

The control words written to control register specify an I/O function for each I.O port. The bit D₇ of the control word determines either the I/O function of the BSR function.

119. What is the size of ports in 8255?

Port-A : 8-bits

Port-B : 8-bits

Port-C_U : 4-bits

Port-C_L : 4-bits

120. What is interfacing?

An interface is a shared boundary between the devices which involves sharing information. Interfacing is the process of making two different systems communicate with each other.

121. What is memory mapping?

The assignment of memory addresses to various registers in a memory chip is called as memory mapping.

122. What is I/O mapping?

The assignment of addresses to various I/O devices in the memory chip is called as I/O mapping.

123. What is an USART?

USART stands for universal synchronous/Asynchronous Receiver/Transmitter. It is a programmable communication interface that can communicate by using either synchronous or asynchronous serial data.

123. What is the use of 8251 chip?

8251 chip is mainly used as the asynchronous serial interface between the processor and the external equipment.

125. The 8279 is a programmable _____ interface.

Keyboard/Display

126. List the major components of the keyboard/Display interface.

a. Keyboard section

b. Scan section

c. Display section

d. CPU interface section

127. What is Key bouncing?

Mechanical switches are used as keys in most of the keyboards. When a key is pressed the contact bounce back and forth and settle down only after a small time

delay (about 20ms). Even though a key is actuated once, it will appear to have been actuated several times. This problem is called Key Bouncing.

128. Define HRQ?

The hold request output requests the access of the system bus. In non-cascaded 8257 systems, this is connected with HOLD pin of CPU. In cascade mode, this pin of a slave is connected with a DRQ input line of the master 8257, while that of the master is connected with HOLD input of the CPU.

129. What is the use of stepper motor?

A stepper motor is a device used to obtain an accurate position control of rotating shafts. A stepper motor employs rotation of its shaft in terms of steps, rather than continuous rotation as in case of AC or DC motor.

130. What is TXD?

TXD- Transmitter Data Output

This output pin carries serial stream of the transmitted data bits along with other information like start bit, stop bits and priority bit.

131. What is RXD?

RXD- Receive Data Input

This input pin of 8251A receives a composite stream of the data to be received by 8251A.

132. Draw the status word format for 8254.

OUT

NULL

COUNT

RW1 RW0 M2 M1 M0 BCD

133. What is meant by key bouncing?

Microprocessor must wait until the key reaches a steady state; this is known as Key bounce.

134. Write the function of crossbar switch?

The crossbar switch provides the interconnection paths between the memory module and the processor. Each node of the crossbar represents a bus switch.

All

these nodes may be controlled by one of these processors or by a separate one altogether.

135. What is a data amplifier?

Transceivers are the bi-directional buffers; sometimes they are called as data amplifiers. They are required to separate the valid data from the time multiplexed address data signal. They are controlled by 2 signals i.e. DEN & DT/R.

136. What are the different interconnection topologies?

- Shared bus
- Multipoint Memory
- Linked Input/Output
- Bus window
- Crossbar Switching.

137. What are the configurations used for physical interconnections?

- Star Configuration

- Loop configuration
- Complete interconnection
- Regular topologies
- Irregular topologies

138. Give the instruction set of 8087?

1. Data Transfer Instructions
2. Arithmetic Instructions
3. Comparison Instructions.
4. Transcendental Operations.
5. Constant Operations.
6. Coprocessor Control Operations.

139. Write the advantages of loosely coupled system over tightly coupled systems?

1. More number of CPUs can be added in a loosely coupled system to improve the system performance
2. The system structure is modular and hence easy to maintain and troubleshoot.
3. A fault in a single module does not lead to a complete system breakdown.

140. What is the different clock frequencies used in 80286?

Various versions of 80286 are available that run on 12.5MHz, 10MHz and 8MHz clock frequencies.

141. Define swapping in?

The portion of a program is required for execution by the CPU, it is fetched from the secondary memory and placed in the physical memory. This is called 'swapping in' of the program.

142. What are the different operating modes used in 80286?

The 80286 works in two operating modes

1. Real addressing mode
2. Protected virtual address mode.

143. What are the CPU contents used in 80286?

The 80286 CPU contains almost the same set of registers, as in 8086

- Eight 16-bit general purpose register
- Four 16-bit segment registers
- Status and control register
- Instruction pointer.

144. What is status flag bit?

The flag register reflects the results of logical and arithmetic instructions. The flag register digits D0, D2, D4, D6, D7 and D11 are modified according to the result of the execution of logical and arithmetic instruction. These are called as status flag bits.

145. What is a control flag?

The bits D8 and D9 namely, trap flag (TF) and interrupt flag (IF) bits, are used for controlling machine operation and thus they are called control flags.

146. What is instruction pipelining?

Major function of the bus unit is to fetch instruction bytes from the memory. In fact, the instructions are fetched in advance and stored in a queue to enable faster

execution of the instructions. This concept is known as instruction pipelining.

147. What is swapping?

The procedure of fetching the chosen program segments or data from the secondary storage into the physical memory is called 'swapping'.

148. What is mean by microcontroller?

A device which contains the microprocessor with integrated peripherals like memory, serial ports, parallel ports, timer/counter, interrupt controller, data acquisition interfaces like ADC,DAC is called microcontroller.

149. Explain DJNZ instructions of intel 8051 microcontroller?

a) DJNZ Rn, rel

Decrement the content of the register Rn and jump if not zero.

b) DJNZ direct , rel

Decrement the content of direct 8-bit address and jump if not zero.

150. State the function of RS1 and RS0 bits in the flag register of intel 8051 microcontroller?

RS1 , RS0 – Register bank select bits

RS1 RS0 Bank

Selection

0

0

1

1

0

1

0

1

Bank 0

Bank 1

Bank 2

Bank 3

151. Write a program using 8051 assembly language to change the date 55H

stored in the lower byte of the data pointer register to AAH using rotate instruction.

MOV DPL,#55H

MOV A, DPL

RL A

Label :SJMP label

152. Give the alternate functions for the port pins of port3?

RD WR T1

T

0

INT1 INT0 TXD RXD

RD – Read data control output.

WR – Write data control output.

T1 – Timer / Counter1 external input or test pin.

T0 – Timer / Counter0 external input or test pin.

INT1- Interrupt 1 input pin.

INT 0 – Interrupt 0 input pin.

TXD – Transmit data pin for serial port in UART mode.

RXD - Receive data pin for serial port in UART mode.

153. Specify the single instruction, which clears the most significant bit of B

register of 8051, without affecting the remaining bits.

Single instruction, which clears the most significant bit of B register of 8051, without affecting the remaining bits is CLR B.7.

154. Explain the function of the pins PSEN and EA of 8051.

PSEN: PSEN stands for program store enable. In 8051 based system in which an external ROM holds the program code, this pin is connected to the OE pin of the ROM.

EA :EA stands for external access. When the EA pin is connected to Vcc, program fetched to addresses 0000H through 0FFFH are directed to the internal ROM and program fetches to addresses 1000H through FFFFH are directed to external ROM/EPROM. When the EA pin is grounded, all addresses fetched by program are directed to the external ROM/EPROM.

155. Explain the 16-bit registers DPTR and SP of 8051.

DPTR:

DPTR stands for data pointer. DPTR consists of a high byte (DPH) and a low byte (DPL). Its function is to hold a 16-bit address. It may be manipulated as a 16-bit data register or as two independent 8-bit registers. It serves as a base register in indirect jumps, lookup table instructions and external data transfer.

SP:

SP stands for stack pointer. SP is a 8- bit wide register. It is incremented before data is stored during PUSH and CALL instructions. The stack array can reside anywhere in on-chip RAM. The stack pointer is initialised to 07H after a reset. This causes the stack to begin at location 08H.

156. Name the special functions registers available in 8051.

- Accumulator
- B Register
- Program Status Word.
- Stack Pointer.
- Data Pointer.
- Port 0
- Port 1
- Port 2
- Port 3
- Interrupt priority control register.
- Interrupt enable control register.

157.Explain the register IE format of 8051.

E

A

-
E
T
2
E
S

ET1 EX1 ET0 EX0

EA- Enable all control bit.

ET2- Timer 2 interrupt enable bit.

ES – Enable serial port control bit.

ET1 – Enable Timer1 control bit.

EX1- Enable external interrupt1 control bit.

ET0 – Enable Timer0 control bit.

EX0- Enable external interrupt0 control bit.

158. Compare Microprocessor and Microcontroller.

Sl.No Microprocessor Microcontroller

1 Microprocessor contains

ALU,general purpose

registers,stack pointer,

program counter, clock timing

circuit and interrupt circuit.

Microcontroller contains the circuitry

of microprocessor and in addition it

has built- in ROM, RAM, I/O

devices, timers and counters.

2 It has many instructions to

move data between memory

and CPU.

It has one or two instructions to move

data between memory and CPU.

3 It has one or two bit handling

instructions.

It has many bit handling instructions.

4 Access times for memory and I/O

devices are more.

Less access times for built-in memory

and I/O devices.

5 Microprocessor based system

requires more hardware.

Microcontroller based system requires

less hardware reducing PCB size and

increasing the reliability.

159.Name the five interrupt sources of 8051?.

The interrupts are:

Vector address

External interrupt 0 : IE0 : 0003H

- Timer interrupt 0 : TF0 : 000BH
 - External interrupt 1 : IE1 : 0013H
 - Timer Interrupt 1 : TF1 : 001BH
 - Serial Interrupt
- Receive interrupt : RI : 0023H
 Transmit interrupt: TI : 0023H

160. Explain the contents of the accumulator after the execution of the following

program segments:

```
MOV A,#3CH
MOV R4,#66H
ANL A,R4
A 3C
R4 66
A 24
```

161. Write a program to load accumulator A, DPH and DPL with 30H.

```
MOV A,#30
MOV DPH,A
MOV DPL,A
```

162. Write a program to subtract the contents of R1 of Bank0 from the contents of R0 of Bank2.

```
MOV PSW,#10
MOV A,R0
MOV PSW,#00
SUBB A,R1
```

163. How the RS -232C serial bus is interfaced to 1TL logic device?

The RS-232C signal voltage levels are not compatible with TTL logic levels. Hence for interfacing TTL devices to RS-232C serial bus, level converters are

used. The popularly used level converters are MC 1488 & MC 1489 or MAX 232.

164. List some of the features of 8096 microcontroller.

- a. The 8096 is a 16-bit microcontroller.
- b. The 8096 is designed to use in applications which require high speed calculations and fast I/O operations.
- c. The high speed I/O section of an 8096 includes a 16-bit timer, a 16-bit counter, a 4 input programmable edge detector, 4 software timers and a 6-output programmable event generator.
- d. It has 100 instructions, which can operate on bit, byte, word, and double words.
- e. The bit operations are possible and these can be performed on any bit in the register file or in the special function register.

165. List the features of 8051 microcontroller?

The features are

- *single_ supply +5 volt operation using HMOS technology.
- *4096 bytes program memory on chip(not on 8031)

- *128 data memory on chip.
- *Four register banks.
- *Two multiple mode,16-bit timer/counter.
- *Extensive Boolean processing capabilities.
- *64 KB external RAM size
- *32 bi-directional individually addressable I/O lines.
- *8 bit CPU optimized for control applications.

166. What is the function of NEU?

The numeric execution unit executes all the instructions including arithmetic, logical transcendental, and data transfer instructions.

The numeric execution unit executes all the numeric processor instructions while the control unit (CU) receives, decodes instructions, reads and writes memory operands and executes the 8087 control instructions.

167. Give the disadvantages of bus window technique?

The numeric execution unit executes all the instructions including arithmetic, logical transcendental, and data transfer instructions.

The numeric execution unit executes all the numeric processor instructions while the control unit (CU) receives, decodes instructions, reads and writes memory operands and executes the 8087 control instructions.

168. What is swapping out?

A portion of the program or important partial results required for further execution may e saved back on secondary storage to make the physical memory free for further execution of another required portion of the program.

This is called 'swapping out' of the executable program.

UNIT I

1. With neat sketch explain the architecture of 8085 Processor

- _ Block Diagram
- _ Registers Available
- _ Function Of Accumulator
- _ Explanation about all blocks in the block diagram

2. Draw the Pin Diagram of 8085 and explain the function of various signals.

- _ Pin Diagram
- _ Explanation about all signals

3. List the various Instructions available in 8085 processor.

- _ Data Transfer Instructions
- _ Arithmetic Instructions
- _ Logical Instructions
- _ Branch Instructions
- _ Machine Control Instructions

4. Write a program to sort the numbers in ascending and descending order.

- _ Program
- _ Result Verification

5. Draw the timing diagram of the following Instructions

- a) PUSH
- b) IN Port A
- c) STA 5000

d) MVI A, 08

_ Explain the machine cycles needed for every Instructions and draw the timing diagram

6. Draw and explain the interrupt structure of 8085 microprocessor. Show clearly priority, input triggering, masking, vector locations, enabling, disabling.

_ Types of interrupt

_ Interrupt structure

_ Priority: TRAP, RST 7.5, RST 6.5, RST 5.5, and INTR

_ Masking & Unmasking Interrupt: EI, DI, SIM

_ Pending Interrupt: SIM

_ Vector Address Table

UNIT II

1. With neat sketch explain the architecture of 8086 processor.

_ Block Diagram

_ Explanation about all blocks in the block diagram

2. Draw the Pin Diagram of 8086 and explain the function of various signals.

_ Pin Diagram

_ Explanation about all signals

3. List the various Instructions available in 8086 processor.

_ Data Transfer Instructions

_ Arithmetic Instructions

_ Bit Manipulation Instructions

_ String Instructions

_ Program Execution Transfer Instructions

_ Processor Control Instructions

4. Write a program to find sum of numbers in the array.

_ Program

_ Result Verification

5. What are the sources of Interrupt in 8086?

_ External signal

_ Special instruction in the program

_ Condition produced by instruction

UNIT III

1. Sketch and explain a block diagram showing in Maximum mode and minimum mode configurations

_ Pin Diagram for minimum and maximum mode

_ Explanation about minimum and maximum mode pins

2. Draw the Pin Diagram of 8088 and explain the function of various signals.

_ Pin Diagram

_ Explanation about all signals

3. Draw and explain the Timing diagrams of 8086 maximum and minimum mode.

_ Draw the timing diagram for Minimum mode in Read and Write operation

_ Draw the timing diagram for Maximum mode in Read and Write operation

4. With neat sketch explain the architecture of NDP 8087

- _ Block Diagram
 - _ Explanation about all blocks in the block diagram
5. With neat sketch explain the architecture of 8089
- _ Block Diagram
 - _ Explanation about all blocks in the block diagram

UNIT IV

1. With neat sketch explain the functions of 8255 PPI.

- _ Block Diagram
- _ Explanation about all the ports available.
- _ Explanation about the modes of transfer
- _ Explain the control Word Register

2. With neat sketch explain the functions of 8251.

- _ Block Diagram
- _ Types of data transfer
- _ Explanation about all the blocks.
- _ Explain the control Word Register, Status Register

3. With neat sketch explain the function of DMA controller.

- _ Block Diagram
- _ Explanation about all blocks in the block diagram

4. With neat sketch explain the function of Programmable Interrupt Controller.

- _ Block Diagram
- _ Explanation about all blocks in the block diagram

5. With neat sketch explain the function of Keyboard and display controller.

- _ Block Diagram
- _ Types of Display Available
- _ Types of keys available
- _ Explanation about all blocks in the block diagram

6. With neat sketch explain the function of Programmable Timer.

- _ Block Diagram
- _ Explanation about all blocks in the block diagram

UNIT V

1. With neat sketch explain the architecture of 8051 processor.

- _ Block Diagram
- _ Explanation about all blocks in the block diagram

2. Draw the Pin Diagram of 8051 and explain the function of various signals.

- _ Pin Diagram
- _ Explanation about all signals

3. List the various Instructions available in 8051 processor.

- _ Data Transfer Instructions
- _ Arithmetic Instructions
- _ Logical Instructions
- _ Boolean variable Instructions
- _ Program and Machine Control Instructions

4. Explain the interrupt 8051.

- _ Reset
 - _ Timer Interrupt
 - _ External Interrupt
 - _ Serial communication Interrupt
5. Explain about SFR?
- _ Timer/Counter 0 and 1
 - _ Serial port
 - _ Interrupt
 - _ Power control

DATABASE MANAGEMENT SYSTEMS

TWO MARKS:

UNIT: 1

INTRODUCTION AND CONCEPTUAL MODELLING

1. Define database management system?

Database management system (DBMS) is a collection of interrelated data and a set of programs to access those data.

2. List any eight applications of DBMS.

- a) Banking
- b) Airlines
- c) Universities
- d) Credit card transactions
- e) Tele communication
- f) Finance
- g) Sales
- h) Manufacturing
- i) Human resources

3. What are the disadvantages of file processing system?

The disadvantages of file processing systems are

- a) Data redundancy and inconsistency
- b) Difficulty in accessing data
- c) Data isolation
- d) Integrity problems
- e) Atomicity problems
- f) Concurrent access anomalies

4. What are the advantages of using a DBMS?

The advantages of using a DBMS are

- a) Controlling redundancy
- b) Restricting unauthorized access
- c) Providing multiple user interfaces
- d) Enforcing integrity constraints.
- e) Providing back up and recovery

5. Give the levels of data abstraction?

- a) Physical level

- b) logical level
- c) view level

6. Define instance and schema?

Instance: Collection of data stored in the data base at a particular moment is called an Instance of the database.

Schema: The overall design of the data base is called the data base schema.

7. Define the terms 1) physical schema 2) logical schema.

Physical schema: The physical schema describes the database design at the physical level, which is the lowest level of abstraction describing how the data are actually stored.

Logical schema: The logical schema describes the database design at the logical level, which describes what data are stored in the database and what relationship exists among the data.

8. What is conceptual schema?

The schemas at the view level are called subschemas that describe different views of the database.

9. Define data model?

A data model is a collection of conceptual tools for describing data, data relationships, data semantics and consistency constraints.

10. What is storage manager?

A storage manager is a program module that provides the interface between the low level data stored in a database and the application programs and queries submitted to the system.

11. What are the components of storage manager?

The storage manager components include

- a) Authorization and integrity manager
- b) Transaction manager
- c) File manager
- d) Buffer manager

12. What is the purpose of storage manager?

The storage manager is responsible for the following

- a) Interaction with the file manager
- b) Translation of DML commands into low level file system commands
- c) Storing, retrieving and updating data in the database

13. List the data structures implemented by the storage manager.

The storage manager implements the following data structure

- a) Data files
- b) Data dictionary
- c) indices

14. What is a data dictionary?

A data dictionary is a data structure which stores meta data about the structure of

the database ie. the schema of the database.

15. What is an entity relationship model?

The entity relationship model is a collection of basic objects called entities and relationship among those objects. An entity is a thing or object in the real world that is

distinguishable from other objects.

16. What are attributes? Give examples.

An entity is represented by a set of attributes. Attributes are descriptive properties

possessed by each member of an entity set.

Example: possible attributes of customer entity are customer name, customer id, customer street, customer city.

17. What is relationship? Give examples

A relationship is an association among several entities.

Example: A depositor relationship associates a customer with each account that he/she has.

18. Define the terms

i) Entity set

ii) Relationship set

Entity set: The set of all entities of the same type is termed as an entity set.

Relationship set: The set of all relationships of the same type is termed as a relationship set.

19. Define single valued and multivalued attributes.

Single valued attributes: attributes with a single value for a particular entity are called single valued attributes.

Multivalued attributes: Attributes with a set of value for a particular entity are called multivalued attributes.

20. What are stored and derived attributes?

Stored attributes: The attributes stored in a data base are called stored attributes.

Derived attributes: The attributes that are derived from the stored attributes are called derived attributes.

21. What are composite attributes?

Composite attributes can be divided in to sub parts.

22. Define null values.

In some cases a particular entity may not have an applicable value for an attribute

or if we do not know the value of an attribute for a particular entity. In these cases null

value is used.

23. Define the terms

i) Entity type

ii) Entity set

Entity type: An entity type defines a collection of entities that have the same attributes.

Entity set: The set of all entities of the same type is termed as an entity set.

24. What is meant by the degree of relationship set?

The degree of relationship type is the number of participating entity types.

25. Define the terms

i) Key attribute

ii) Value set

Key attribute: An entity type usually has an attribute whose values are distinct from each individual entity in the collection. Such an attribute is called a key attribute.

Value set: Each simple attribute of an entity type is associated with a value set that specifies the set of values that may be assigned to that attribute for each individual entity.

26. Define weak and strong entity sets?

Weak entity set: entity set that do not have key attribute of their own are called weak entity sets.

Strong entity set: Entity set that has a primary key is termed a strong entity set.

27. What does the cardinality ratio specify?

Mapping cardinalities or cardinality ratios express the number of entities to which another entity can be associated. Mapping cardinalities must be one of the following:

- One to one
- One to many
- Many to one
- Many to many

28. Explain the two types of participation constraint.

Total: The participation of an entity set E in a relationship set R is said to be **total** if every entity in E participates in at least one relationship in R.

Partial: if only some entities in E participate in relationships in R, the participation of entity set E in relationship R is said to be **partial**.

29. Define the terms

i) DDL

ii) DML

DDL: Data base schema is specified by a set of definitions expressed by a special language called a data definition language.

DML: A data manipulation language is a language that enables users to access or manipulate data as organized by the appropriate data model.

30. Write short notes on relational model

The relational model uses a collection of tables to represent both data and the relationships among those data. The relational model is an example of a record based model.

31. Define tuple and attribute

- Attributes:** column headers
- Tuple:** Row

32. Define the term relation.

Relation is a subset of a Cartesian product of list domains.

33. Define tuple variable

Tuple variable is a variable whose domain is the set of all tuples.

34. Define the term Domain.

For each attribute there is a set of permitted values called the *domain* of that attribute.

35. What is a candidate key?

Minimal super keys are called *candidate keys*.

36. What is a primary key?

Primary key is chosen by the database designer as the principal means of identifying an entity in the entity set.

37. What is a super key?

A *super key* is a set of one or more attributes that collectively allows us to identify uniquely an entity in the entity set.

38. Define- relational algebra.

The relational algebra is a procedural query language. It consists of a set of operations that take one or two relation as input and produce a new relation as output.

39. What is a SELECT operation?

The *select* operation selects tuples that satisfy a given predicate. We use the lowercase letter σ to denote selection.

40. What is a PROJECT operation?

The project operation is a unary operation that returns its argument relation with certain attributes left out. Projection is denoted by pie (π).

41. Write short notes on tuple relational calculus.

The tuple relational calculation is an non procedural query language. It describes the desired information with out giving a specific procedure for obtaining that information.

A query or expression can be expressed in tuple relational calculus as

$\{t \mid P(t)\}$

which means the set of all tuples 't' such that predicate P is true for 't'.

Notations used:

$\square t[A] \rightarrow$ the value of tuple 't' on attribute, A

$\square t \in r \rightarrow$ tuple 't' is in relation 'r'

$\square \exists \rightarrow$ there exists

Definition for 'there exists' (\exists):

$\exists t \in r(Q(t))$

which means there exists a tuple 't' in relation 'r' such that predicate Q(t) is true.

$\square \forall \rightarrow$ for all

Definition for 'for all' (\forall):

$\forall t \in r(Q(t))$

which means Q(t) is true for all tuples 't' in relation 'r'.

$\square _ \rightarrow$ Implication

Definition for Implication ($_$):

P_Q means if P is true then Q must be true.

42. Write short notes on domain relational calculus

The domain relational calculus uses domain variables that take on values from an attribute domain rather than values for entire tuple.

43. Define query language?

A query is a statement requesting the retrieval of information. The portion of DML that involves information retrieval is called a query language.

44. Write short notes on Schema diagram.

A database schema along with primary key and foreign key dependencies can be depicted pictorially by schema diagram. Each relation appears as a box with attributes listed inside it and the relation name above it.

45. What is foreign key?

A relation schema r1 derived from an ER schema may include among its attributes the primary key of another relation schema r2. this attribute is called a **foreign key** from r1 referencing r2.

UNIT: 2

RELATIONAL MODEL

1. What are the parts of SQL language?

The SQL language has several parts:

- _ data - definition language
- _ Data manipulation language
- _ View definition
- _ Transaction control
- _ Embedded SQL
- _ Integrity
- _ Authorization

2. What are the categories of SQL command?

SQL commands are divided in to the following categories:

1. data - definition language
2. data manipulation language
3. Data Query language
4. data control language
5. data administration statements
6. transaction control statements

3. What are the three classes of SQL expression?

SQL expression consists of three clauses:

- _ Select
- _ From
- _ where

4. Give the general form of SQL query?

Select A₁, A₂....., A_n

From R₁, R₂....., R_m

Where P

5. What is the use of rename operation?

Rename operation is used to rename both relations and a attributes.

It uses the as clause, taking the form:

Old-name **as** new-name

6. Define tuple variable?

Tuple variables are used for comparing two tuples in the same relation. The tuple variables are defined in the **from** clause by way of the **as** clause.

7. List the string operations supported by SQL?

- 1) Pattern matching Operation
- 2) Concatenation
- 3) Extracting character strings
- 4) Converting between uppercase and lower case letters.

8. List the set operations of SQL?

- 1) Union
- 2) Intersect operation
- 3) The except operation

9. What is the use of Union and intersection operation?

Union: The result of this operation includes all tuples that are either in r1 or in r2 or in both r1 and r2. Duplicate tuples are automatically eliminated.

Intersection: The result of this relation includes all tuples that are in both r1 and r2.

10. What are aggregate functions? And list the aggregate functions supported by SQL?

Aggregate functions are functions that take a collection of values as input and return a single value.

Aggregate functions supported by SQL are

- _ Average: avg
- _ Minimum: min
- _ Maximum: max
- _ Total: sum
- _ Count: count

11. What is the use of group by clause?

Group by clause is used to apply aggregate functions to a set of tuples. The attributes given in the **group by** clause are used to form groups. Tuples with the same value on all attributes in the **group by** clause are placed in one group.

12. What is the use of sub queries?

A sub query is a select-from-where expression that is nested with in another query. A common use of sub queries is to perform tests for set membership, make

set comparisons, and determine set cardinality.

13. What is view in SQL? How is it defined?

Any relation that is not part of the logical model, but is made visible to a user as a virtual relation is called a view.

We define view in SQL by using the **create view** command. The form of the **create view** command is

Create view v as <query expression>

14. What is the use of with clause in SQL?

The **with** clause provides a way of defining a temporary view whose definition is available only to the query in which the **with** clause occurs.

15. List the table modification commands in SQL?

- _ Deletion
- _ Insertion
- _ Updates
- _ Update of a view

16. List out the statements associated with a database transaction?

- _ Commit work
- _ Rollback work

17. What is transaction?

Transaction is a unit of program execution that accesses and possibly updated various data items.

18. List the SQL domain Types?

SQL supports the following domain types.

- 1) Char(n) 2) varchar(n) 3) int 4) numeric(p,d)
- 5) float(n) 6) date.

19. What is the use of integrity constraints?

Integrity constraints ensure that changes made to the database by authorized users

do not result in a loss of data consistency. Thus integrity constraints guard against

accidental damage to the database.

20. Mention the 2 forms of integrity constraints in ER model?

- _ Key declarations
- _ Form of a relationship

21. What is trigger?

Triggers are statements that are executed automatically by the system as the side

effect of a modification to the database.

22. What are domain constraints?

A domain is a set of values that may be assigned to an attribute .all values that appear in a column of a relation must be taken from the same domain.

23. What are referential integrity constraints?

A value that appears in one relation for a given set of attributes also appears for a

certain set of attributes in another relation.

24. What is assertion? Mention the forms available.

An assertion is a predicate expressing a condition that we wish the database always to satisfy.

- _ Domain integrity constraints.
- _ Referential integrity constraints

25. Give the syntax of assertion?

Create assertion <assertion name>**check**<predicate>

26. What is the need for triggers?

Triggers are useful mechanisms for alerting humans or for starting certain tasks automatically when certain conditions are met.

27. List the requirements needed to design a trigger.

The requirements are

- _ Specifying when a trigger is to be executed.
- _ Specify the actions to be taken when the trigger executes.

28. Give the forms of triggers?

- _ The triggering event can be insert or delete.
- _ For updated the trigger can specify columns.
- _ The referencing old row as clause
- _ The referencing new row as clause
- _ The triggers can be initiated before the event or after the event.

29. What does database security refer to?

Database security refers to the protection from unauthorized access and malicious destruction or alteration.

30. List some security violations (or) name any forms of malicious access.

- _ Unauthorized reading of data
- _ Unauthorized modification of data
- _ Unauthorized destruction of data.

31. List the types of authorization.

- _ Read authorization
- _ Write authorization
- _ Update authorization
- _ Drop authorization

32. What is authorization graph?

Passing of authorization from one user to another can be represented by an authorization graph.

33. List out various user authorization to modify the database schema.

- _ Index authorization
- _ Resource authorization
- _ Alteration authorization
- _ Drop authorization

34. What are audit trails?

An audit trail is a log of all changes to the database along with information such as which user performed the change and when the change was performed.

35. Mention the various levels in security measures.

- _ Database system
- _ Operating system
- _ Network
- _ Physical
- _ human

36. Name the various privileges in SQL?

- _ Delete
- _ Select
- _ Insert

_ update

37. Mention the various user privileges.

- _ All privileges directly granted to the user or role.
- _ All privileges granted to roles that have been granted to the user or role.

38. Give the limitations of SQL authorization.

_ The code for checking authorization becomes intermixed with the rest of the application code.

_ Implementing authorization through application code rather than specifying it declaratively in SQL makes it hard to ensure the absence of loopholes.

39. Give some encryption techniques?

- _ DES
- _ AES
- _ Public key encryption

40. What does authentication refer?

Authentication refers to the task of verifying the identity of a person.

41. List some authentication techniques.

- _ Challenge response scheme
- _ Digital signatures
- _ Nonrepudiation

42. Define Boyce codd normal form

A relation schema R is in BCNF with respect to a set F of functional dependencies if, for all functional dependencies in F

+

of the form. $X \rightarrow Y$, where X

43. List the disadvantages of relational database system

- _ Repetition of data
- _ Inability to represent certain information.

44. What is first normal form?

The domain of attribute must include only atomic (simple, indivisible) values.

45. What is meant by functional dependencies?

Consider a relation schema R and $X \subset R$ and $Y \subset R$. The functional dependency

—

$X \rightarrow Y$ holds on relational schema R if in any legal relation $r(R)$, for all pairs of tuples t_1 and t_2 in r such that $t_1[X] = t_2[X]$, and also $t_1[Y] = t_2[Y]$.

46. What are the uses of functional dependencies?

- _ To test relations to see whether they are legal under a given set of functional dependencies.
- _ To specify constraints on the set of legal relations.

47. Explain trivial dependency?

Functional dependency of the form $X \rightarrow X$ is trivial if $X \subset R$. Trivial functional dependencies are satisfied by all the relations.

48. What are axioms?

Axioms or rules of inference provide a simpler technique for reasoning about functional dependencies.

49. What is meant by computing the closure of a set of functional dependency?

The closure of F denoted by F^+ is the set of functional dependencies logically

implied by F.

50. What is meant by normalization of data?

It is a process of analyzing the given relation schemas based on their Functional Dependencies (FDs) and primary key to achieve the properties

- _ Minimizing redundancy
- _ Minimizing insertion, deletion and updating anomalies.

51. Define canonical cover?

A canonical cover F_c for F is a set of dependencies such that F logically implies all dependencies in F_c and F_c logically implies all dependencies in F. F_c must have the following properties.

52. List the properties of canonical cover.

F_c must have the following properties.

- _ No functional dependency in F_c contains an extraneous attribute.
- _ Each left side of a functional dependency in F_c is unique.

53. Explain the desirable properties of decomposition.

- _ Lossless-join decomposition
- _ Dependency preservation
- _ Repetition of information

54. What is 2NF?

A relation schema R is in 2NF if it is in 1NF and every non-prime attribute A in R is fully functionally dependent on primary key.

UNIT: 3

DATA STORAGE AND QUERY PROCESSING

1. What is an index?

An index is a structure that helps to locate desired records of a relation quickly, without examining all records

.

2. Define query optimization.

Query optimization refers to the process of finding the lowest –cost method of evaluating a given query.

3. What are called jukebox systems?

Jukebox systems contain a few drives and numerous disks that can be loaded into

one of the drives automatically.

4. What are the types of storage devices?

- _ Primary storage
- _ Secondary storage
- _ Tertiary storage
- _ Volatile storage
- _ Nonvolatile storage

5. What is called remapping of bad sectors?

If the controller detects that a sector is damaged when the disk is initially formatted, or when an attempt is made to write the sector, it can logically map the sector

to a different physical location.

6. Define access time.

Access time is the time from when a read or write request is issued to when data transfer begins.

7. Define seek time.

The time for repositioning the arm is called the seek time and it increases with the distance that the arm is called the seek time.

8. Define average seek time.

The average seek time is the average of the seek times, measured over a sequence of random requests.

9. Define rotational latency time.

The time spent waiting for the sector to be accessed to appear under the head is called the rotational latency time.

10. Define average latency time.

The average latency time of the disk is one-half the time for a full rotation of the disk.

11. What is meant by data-transfer rate?

The data-transfer rate is the rate at which data can be retrieved from or stored to the disk.

12. What is meant by mean time to failure?

The mean time to failure is the amount of time that the system could run continuously without failure.

13. What is a block and a block number?

A block is a contiguous sequence of sectors from a single track of one platter. Each request specifies the address on the disk to be referenced. That address is in the form of a block number.

14. What are called journaling file systems?

File systems that support log disks are called journaling file systems.

15. What is the use of RAID?

A variety of disk-organization techniques, collectively called redundant arrays of independent disks are used to improve the performance and reliability.

16. What is called mirroring?

The simplest approach to introducing redundancy is to duplicate every disk. This technique is called mirroring or shadowing.

17. What is called mean time to repair?

The mean time to failure is the time it takes to replace a failed disk and to restore the data on it.

18. What is called bit-level striping?

Data striping consists of splitting the bits of each byte across multiple disks. This is called bit-level striping.

19. What is called block-level striping?

Block level striping stripes blocks across multiple disks. It treats the array of disks as a large disk, and gives blocks logical numbers.

20. What are the two main goals of parallelism?

_ Load –balance multiple small accesses, so that the throughput of such

accesses increases.

_ Parallelize large accesses so that the response time of large accesses is reduced

21. What are the factors to be taken into account when choosing a RAID level?

- Monetary cost of extra disk storage requirements.
- Performance requirements in terms of number of I/O operations
- Performance when a disk has failed.
- Performances during rebuild.

22. What is meant by software and hardware RAID systems?

RAID can be implemented with no change at the hardware level, using only software modification. Such RAID implementations are called software RAID systems

and the systems with special hardware support are called hardware RAID systems.

23. Define hot swapping?

Hot swapping permits the removal of faulty disks and replaces it by new ones without turning power off. Hot swapping reduces the mean time to repair.

24. What are the ways in which the variable-length records arise in database systems?

- _ Storage of multiple record types in a file.
- _ Record types that allow variable lengths for one or more fields.
- _ Record types that allow repeating fields.

25. What is the use of a slotted-page structure and what is the information present in the header?

The slotted-page structure is used for organizing records within a single block. The header contains the following information.

- _ The number of record entries in the header.
- _ The end of free space
- _ An array whose entries contain the location and size of each record.

26. What are the two types of blocks in the fixed-length representation? Define them.

- Anchor block: Contains the first record of a chain.
- Overflow block: Contains the records other than those that are the first record of a chain.

27. What is known as heap file organization?

In the heap file organization, any record can be placed anywhere in the file where there is space for the record. There is no ordering of records. There is a single file for each relation.

28. What is known as sequential file organization?

In the sequential file organization, the records are stored in sequential order,

according to the value of a “search key” of each record.

29. What is hashing file organization?

In the hashing file organization, a hash function is computed on some attribute of each record. The result of the hash function specifies in which block of the file the record should be placed.

30. What is known as clustering file organization?

In the clustering file organization, records of several different relations are stored in the same file.

31. What are the types of indices?

- _ Ordered indices
- _ Hash indices

32. What are the techniques to be evaluated for both ordered indexing and hashing?

- _ Access types
- _ Access time
- _ Insertion time
- _ Deletion time
- _ Space overhead

33. What is known as a search key?

An attribute or set of attributes used to look up records in a file is called a search key.

34. What is a primary index?

A primary index is an index whose search key also defines the sequential order of the file.

35. What are called index-sequential files?

The files that are ordered sequentially with a primary index on the search key, are called index-sequential files.

36. What are the two types of indices?

- _ Dense index
- _ Sparse index

37. What are called multilevel indices?

Indices with two or more levels are called multilevel indices.

38. What is B-Tree?

A B-tree eliminates the redundant storage of search-key values .It allows search key values to appear only once.

39. What is a B+-Tree index?

A B+-Tree index takes the form of a balanced tree in which every path from the root of the root of the root of the tree to a leaf of the tree is of the same length.

40. What is a hash index?

A hash index organizes the search keys, with their associated pointers, into a hash file structure.

41. What is called query processing?

Query processing refers to the range of activities involved in extracting data from a database.

42. What are the steps involved in query processing?

The basic steps are:

- _ parsing and translation
- _ optimization
- _ evaluation

43. What is called an evaluation primitive?

A relational algebra operation annotated with instructions on how to evaluate is called an evaluation primitive.

44. What is called a query evaluation plan?

A sequence of primitive operations that can be used to evaluate a query is a query evaluation plan or a query execution plan.

45. What is called a query –execution engine?

The query execution engine takes a query evaluation plan, executes that plan, and returns the answers to the query.

46. What are called as index scans?

Search algorithms that use an index are referred to as index scans.

47. What is called as external sorting?

Sorting of relations that do not fit into memory is called as external sorting.

48. What is called as recursive partitioning?

The system repeats the splitting of the input until each partition of the build input fits in the memory. Such partitioning is called recursive partitioning.

49. What is called as an N-way merge?

The merge operation is a generalization of the two-way merge used by the standard in-memory sort-merge algorithm. It merges N runs, so it is called an N-way merge.

50. What is known as fudge factor?

The number of partitions is increased by a small value called the fudge factor, which is usually 20 percent of the number of hash partitions computed.

UNIT: 4

TRANSACTION PROCESSING

1. What is transaction?

Collections of operations that form a single logical unit of work are called transactions.

2. What are the two statements regarding transaction?

The two statements regarding transaction are of the form:

- _ Begin transaction
- _ End transaction

3. What are the properties of transaction?

The properties of transactions are:

- _ Atomicity
- _ Consistency
- _ Isolation

_ Durability

4. What is recovery management component?

Ensuring durability is the responsibility of a software component of the base system called the recovery management component.

5. When is a transaction rolled back?

Any changes that the aborted transaction made to the database must be undone. Once the changes caused by an aborted transaction have been undone, then the transaction has been rolled back.

6. What are the states of transaction?

The states of transaction are

- _ Active
- _ Partially committed
- _ Failed
- _ Aborted
- _ Committed
- _ Terminated

7. What is a shadow copy scheme?

It is simple, but efficient, scheme called the shadow copy schemes. It is based on making copies of the database called shadow copies that one transaction is active at a

time. The scheme also assumes that the database is simply a file on disk.

8. Give the reasons for allowing concurrency?

The reasons for allowing concurrency is if the transactions run serially, a short transaction may have to wait for a preceding long transaction to complete, which can lead

to unpredictable delays in running a transaction.

So concurrent execution reduces the unpredictable delays in running transactions.

9. What is average response time?

The average response time is that the average time for a transaction to be completed after it has been submitted.

10. What are the two types of serializability?

The two types of serializability is

- _ Conflict serializability
- _ View serializability

11. Define lock?

Lock is the most common used to implement the requirement is to allow a transaction to access a data item only if it is currently holding a lock on that item.

12. What are the different modes of lock?

The modes of lock are:

- _ Shared
- _ Exclusive

13. Define deadlock?

Neither of the transaction can ever proceed with its normal execution. This situation is called deadlock.

14. Define the phases of two phase locking protocol

- _ Growing phase: a transaction may obtain locks but not release any lock.
- _ Shrinking phase: a transaction may release locks but may not obtain any new locks.

15. Define upgrade and downgrade?

It provides a mechanism for conversion from shared lock to exclusive lock is known as upgrade.

It provides a mechanism for conversion from exclusive lock to shared lock is known as downgrade.

16. What is a database graph?

The partial ordering implies that the set D may now be viewed as a directed acyclic graph, called a database graph.

17. What are the two methods for dealing deadlock problem?

The two methods for dealing deadlock problem is deadlock detection and deadlock recovery.

18. What is a recovery scheme?

An integral part of a database system is a recovery scheme that can restore the database to the consistent state that existed before the failure.

19. What are the two types of errors?

The two types of errors are:

- _ Logical error
- _ System error

20. What are the storage types?

The storage types are:

- _ Volatile storage
- _ Nonvolatile storage

21. Define blocks?

The database system resides permanently on nonvolatile storage, and is partitioned into fixed-length storage units called blocks.

22. What is meant by Physical blocks?

The input and output operations are done in block units. The blocks residing on the disk are referred to as physical blocks.

23. What is meant by buffer blocks?

The blocks residing temporarily in main memory are referred to as buffer blocks.

24. What is meant by disk buffer?

The area of memory where blocks reside temporarily is called the disk buffer.

25. What is meant by log-based recovery?

The most widely used structures for recording database modifications is the log. The log is a sequence of log records, recording all the update activities in the database.

There are several types of log records.

26. What are uncommitted modifications?

The immediate-modification technique allows database modifications to be output to the database while the transaction is still in the active state. Data modifications written by active transactions are called uncommitted modifications.

27. Define shadow paging.

An alternative to log-based crash recovery technique is shadow paging. This technique needs fewer disk accesses than do the log-based methods.

28. Define page.

The database is partitioned into some number of fixed-length blocks, which are referred to as pages.

29. Explain current page table and shadow page table.

The key idea behind the shadow paging technique is to maintain two page tables during the life of the transaction: the current page table and the shadow page table. Both

the page tables are identical when the transaction starts. The current page table may be

changed when a transaction performs a write operation.

30. What are the drawbacks of shadow-paging technique?

- Commit Overhead
- Data fragmentation
- Garbage collection

30. Define garbage collection.

Garbage may be created also as a side effect of crashes. Periodically, it is necessary to find all the garbage pages and to add them to the list of free pages.

This

process is called garbage collection.

32. Differentiate strict two phase locking protocol and rigorous two phase locking protocol.

In **strict two phase locking protocol** all exclusive mode locks taken by a transaction is held until that transaction commits.

Rigorous two phase locking protocol requires that all locks be held until the transaction commits.

33. How the time stamps are implemented

- Use the value of the system clock as the time stamp. That is a transaction's time stamp is equal to the value of the clock when the transaction enters the system.
- Use a logical counter that is incremented after a new timestamp has been assigned; that is the time stamp is equal to the value of the counter.

34. What are the time stamps associated with each data item?

- W-timestamp (Q) denotes the largest time stamp if any transaction that executed WRITE (Q) successfully.
- R-timestamp (Q) denotes the largest time stamp if any transaction that executed READ (Q) successfully.

UNIT: 5

CURRENT TREND

1. What is meant by object-oriented data model?

The object-oriented paradigm is based on encapsulation of data and code related to an object in to a single unit, whose contents are not visible to the outside world.

2. What is the major advantage of object-oriented programming paradigm?

The ability to modify the definition of an object without affecting the rest of the system is the major advantage of object-oriented programming paradigm.

3. What are the methods used in object-oriented programming paradigm?

*read-only

*update

4. What is the main difference between read-only and update methods?

A read-only method does not affect the values of a variable in an object, whereas an update method may change the values of the variables.

5. What is the use of keyword ISA?

The use of keyword ISA is to indicate that a class is a specialization of another class.

6. Differentiate sub-class and super-class?

The specialization of a class is called subclasses.eg: employee is a subclass of person and teller is a subclass of employee. Conversely, employee is a super class

of teller, and person is a super class of employee.

7. What is substitutability?

Any method of a class-say A can equally well be invoked with any object belonging to any subclasses B of A. This characteristic leads to code reuse, since

the messages, methods, and functions do not have to be written again for objects of class B.

8. What is multiple inheritance?

Multiple inheritance permits a class to inherit variables and methods from multiple super classes.

9. What is DAG?

The class-subclass relationship is represented by a directed acyclic graph.eg: employees can be temporary or permanent. we may create subclasses temporary

and permanent, of the class employee.

10. What is disadvantage of multiple inheritance?

There is potential ambiguity if the same variable or method can be inherited from more than one superclass.eg: student class may have a variable dept identifying a

student's department, and the teacher class may correspondingly have a variable dept identifying a teacher's department.

11. What is object identity?

An object retains its identity even if some or all the values of variables or definitions of methods change overtime.

12. What are the several forms of identity?

*Value

*Name

*Built-in

13. What is a value?

A data value is used for identity. This form of identity is used in relational

systems.eg: The primary key value of a tuple identifies the tuple.

14. What is a Name?

A user-supplied name is used for identity. This form of identity is used for files in file systems. The user gives each file a name that uniquely identifies it, regardless of its contents.

15. What is a Built-in

A notation of identity is built-into the data model or programming language and no user-supplied identifier is required. This form of identity is used in object-oriented systems.

16. What is meant by object identifiers?

Object-oriented systems use an object identifier to identify objects. Object identifiers are unique: that is each object has a single identifier, and no two objects have the same identifier.

17. What are composite objects?

Objects that contain other objects are called complex objects or composite objects.

18. What is object containment?

References between objects can be used to model different real-world concepts.

19. Why containment is important in oosystems?

Containment is an important concept in oosystems because it allows different users to view data at different granularities.

20. Define object-relational systems?

Systems that provide object-oriented extensions to relational systems are called object-relational systems.

21. How persistent programming languages differ from traditional programming languages?

Database languages differ from traditional programming languages in that they directly manipulate data that are persistent-that is, data that continue to exist even after the program terminated. Relation in a database and tuples in a relation are examples of persistent data. In contrast, the only persistent data that traditional programming languages directly manipulate are files.

22. Define atomic domains?

A domain is atomic if elements of the domain are considered to be indivisible units.

23. Define 1NF?

First normal form is one which requires that all attributes have atomic domains.

24. What is nested relational model?

The nested relational model is an extension of relational model in which domains may be either atomic or relation valued.

25. List some instances of collection types?

- *sets
- *arrays
- *multisets

26. How to create values of structured type?

Constructor functions are used to create values of structured types. A function with the same name as a structured type is a constructor function for the structured type.

27. Write a query to define tables students and teachers as sub tables of people?

Create table students of student under people
Create table teachers of teacher under people

28. What is a homogeneous distributed database?

In homogeneous distributed databases, all sites have identical database management system software, are aware of one another, and agree to cooperate in processing user's requests.

29. What is a heterogeneous distributed database?

In a heterogeneous distributed database, different sites may use different schemas, and different dbms s/w. The sites may not be aware of one another, and they may provide only limited facilities for cooperation in transaction processing.

30. What are the two approaches to store relations in distributed database?

- *Replication
- *Fragmentation

31. What are the two different schemes for fragmenting a relation?

- *horizontal
- *vertical

32. What is horizontal fragmentation?

Horizontal fragmentation splits the relation by assuming each tuple of r to one or more fragments.

33. What is vertical fragmentation?

Vertical fragmentation splits the relation by decomposing the scheme R of relation r.

34. What are the various forms of data transparency?

- *fragmentation transparency
- *replication transparency
- *location transparency

35. Define decision tree classifiers?

As the name suggests decision tree classifiers use a tree: each leaf node has an associated class, and each internal node has a predicate associated with it.

16 MARK QUESTIONS

UNIT: 1

1. EXPLAIN ABOUT DATABASE SYSTEM STRUCTURE?

Storage manager

- Authorization and integrity manager

- Transaction manager
- File manager
- Buffer manager

Storage manager implements several data structure as a part of physical system implementation

- Data function
- Data dictionary
- Indices

The query processor

- DDL interpreter
- DML
- Query evaluation engine

2. DESCRIBE RELATIONAL MODEL?

Structure of relational data base

- _ Basic structure
- _ Database schema
- _ Keys
- _ Schema diagram
- _ Query languages

3. BRIEFLY EXPLAIN RELATIONAL ALGEBRA?

Fundamental operations

- Unary operations
- Binary operations

Select operations

`_branchname='perryridge' (loan)`

The project operation

`_loannumber,amount (loan)`

Composition of relational operations

- Relational algebra expressions

Union operations

`r _ s`

r and s must be a same arity.

They must have the same no of attributes.

The set difference operations

r-s produce a relation containing those tuples in r but not in s.

The Cartesian product operations

The rename operations

4. WHAT IS DATA MODELS? EXPLAIN IT DETAIL?

Entity relationship model

- Rectangles
- Ellipse
- Diamonds
- Lines

Relational model

Relational model use a collection of tables to represent both data and the

relationships among those data. Each table has a multiple columns and each columns has unique name

Other data models

- Object oriented data model
- Object relational data model
- Network data model
- Hierarchical data model

5. BRIEFLY DESCRIBE RELATIONAL CALCULUS?WITH SOME EXAMPLES?

The tuple relational calculus

A query in a tuple relational calculus is expressed as $\{t \mid P(t)\}$

- Example Queries
- Formal definition
- Safety of expressions
- Expressive power of languages

The domain relational calculus

- Example Queries
- Formal definition
- Safety of expressions
- Expressive power of languages

UNIT-2

1. DESCRIBE INTEGRITY AND SECURITY?

- Domain constraint**

Referential integrity

A value that appears in one relation for a given set of attributes also appear for a certain set of attributes in another relation. This condition is called referential integrity.

- Referential integrity and E-R models**
- Database modification**
- Referential integrity in SQL**

2. WHAT IS AGGREGATE FUNCTION?BRIEFLY DESCRIBE IT?

Aggregate functions are functions that take a collection of values as input and return a single value. SQL offers 5 built-in aggregate functions:

- Average: **avg**
- Minimum: **min**
- Maximum: **max**
- Total: **sum**
- Count: **count**

Average: **avg**

Select avg (balance)

From account

Where branch-name='perryridge'

Count :**count**

select branch-name,**count**(distinct customer-name)

from depositor,account

where depositor.account-number=account.account-number

groupby branch-name

3. WHAT IS DATA DEFINITION LANGUAGE?EXPLAIN IT IN DETAIL?

The SQL DDL allows specification of not only a set of relations, but also information after each relation, including

- The schema for each relation
- The domain of values associated with each attribute
- The integrity constraints
- The set of indices to be maintained for each relation
- The security and authorization information for each relation
- The physical storage structure of each relation on disk

Domain Types in SQL

Char(n),

varchar(n), int, small int, numeric(p,d), real, double, precision, float(n), date, time, timestamp.

Schema Definition in SQL

Primary key

Check

4. EXPLAIN MECHANISM OF NESTED QUERIES?

SQL provides a mechanism for nesting subqueries. A subquery is a select from where expression that is nested within another query. A common use of subqueries is to perform tests for set membership, make set comparisons, and determine set cardinality.

Set membership

(select customer-name

from depositor)

Set comparison

select distinct T.branch-name

from branch as T,branch as S

where T.assets > S.assets **and** S.branch-city='Brooklyn'

Test for Empty Relations

Select customer-name

from borrower

where exists (select *

from depositor

where depositor.customername=
borrower.customer-name)

Test for the Absence of Duplicate Tuples

5. WRITE SHORT NOTES ON MODIFICATION OF THE DATA BASE?

Definition

delete from r

where P

Insertion

insert into account
values ('A-9732', 'perryridge', 1200)

Updates

update account
set balance=balance*1.05

Update of a view

Transaction

UNIT-3

1. DESCRIBE FILE ORGANISATION?

A file is organized logically as a sequence of records. These records are mapped onto disk blocks.

Fixed-Length Records

type deposit=**record**
Accountnumber:char(10);
branch name:char(22);
balance: real;
end

Variable length records

- *storage of multiple record types in a file
- * Record types that allow variable lengths for one or more fields
- *Record types that allow repeating fields

- _ Byte string Representation
- _ Fixed length representation
- Reserved space
- List representation

2. DEFINE RAID? BRIEFLY EXPLAIN IT?

A variety of disk organization techniques, collectively called redundant arrays of independent disks (RAID)

- Improvement of reliability via redundancy.
- Improvement in performance via parallelism
- 1. Bit level striping
- 2. Block level striping
- _ RAID levels
- RAID level 0
- RAID level 1
- RAID level 2(memory style error correcting code)
- RAID level 3 (Bit interleaved parity organization)
- RAID level 4 (Block interleaved parity organization)
- RAID level 5 (Block interleaved distributed parity)
- RAID level 6 (P+Q redundancy)

3WRITE SHORT NOTES ON INDEX STRUCTURE OF FILES?

There are two basic kinds of indices

- Ordered indices**
- Hash indices**

Each technique must be evaluated on the basis of these factors:

- Access types**
- Access time**
- Insertion time**
- Deletion time**
- Space overhead**
- _ **Ordered indices**
- _ **Primary index**
- _ **Dense and sparse indices**
- _ **Multilevel index**
- _ **Index update**
- _ **Secondary indices**

B+-Tree index files

B+-Tree index structure is the most widely used of several index structures that maintain their efficiency despite insertion and deletion of data.

- _ **Structure of B+-Tree**
- _ **Queries on B+-Tree**
- _ **Update on B+-Tree**
- _ **B+-Tree file organization**
- _ **B-Tree index files**

4. EXPLAIN HASH FILE ORGANIZATION?

Hash functions

- The distribution is uniform**

Hash functions assign each bucket the same number of search-key values from the set of all possible search-key values

- The distributed in random**

In the average case each bucket will have nearly same no of values assigned to it, regardless of the actual distribution of search-key values

Handling of bucket overflows

- Insufficient buckets**
- Skew**

Open hashing

Under an alternative approach called open hashing

Close hashing

The form of hash structure that we have just described is something referred to as close hashing.

Hash indices

5. WHAT IS MAGNETIC DISKS? EXPLAIN IT?

Magnetic disk provides the bulk of secondary storage of modern computer system. The disk capacity is growing at over 50% per year. But the storage requirements of large applications has also been growing very fast and in some case

every faster than the growth rate of disk capacities. A large data base may require 100 of disks.

- Physical characteristics of disk

Physical disks are relatively simple. Each disc platter has a flat circular shape

We can call magnetic disk as

- **hard disk**
- **Floppy disk**

The read write head store information on a sector magnetically as reversals of the direction of magnetization of the magnetic material. There may be hundreds of

concentric tracks on a disc surface, containing thousands of sectors.

Unit 4

1. DESCRIBE LOG BASED RECOVERY

The most usable structure for recording data base modification is the LOG the log is a sequence of log records recording all the update activities in the data base.

There are several types of log records. An update log records describes a single data base

write it has these fields

- **Transaction identifier**
- **Data item identifier**
- **Old value**
- **New value**

The various types log records as.

- **< T_i start >**. Transaction T_i has started
- **< T_i, T_x v₁, v₂ >**. Transaction T_i has performed a right on data item
- **< T_i commit >** Transaction T_i has committed
- **< T_i about >** Transaction T_i has aborted

_ **Deferred data base modification**

_ **Immediate data base modification**

_ **Check point**

_ **Shadow paging**

2. WHAT IS SERIALIZABILITY? EXPLAIN ITS TYPES?

The data base system must control concurrent execution of transactions, to ensure that the data base state remains consistent. There are different forms of schedule equivalence they lead to the notions of

- **Conflict serializability**
- **View serializability**

Conflict serializability

We say that i_i and i_j conflict if they are operations by different transaction on the same data item and at least one of these instruction is a write

operations

View serializability

The concept of view equivalence leads to the concept of View

serializability we say that a schedules S is view serializable if it is view equivalent to a serial scheduler

3. WRITE SHORT NOTES ON TRANSACTION STATE?

A transaction may not always complete its execution successfully such a transaction is termed aborted

A transaction must be in one of the following states

- Active
- Partially committed
- Failed
- Aborted
- Committed

4. BRIEFLY DESCRIBE CONCURRENCY EXECUTION?

- Lock – based protocols
- Locks

There are various modes in which a data item may be locked in this section we restrict our attention to two modes

- Shared
- Exclusive

T₁: lock – x(B);

read(B);

B:=B-50;

write(B);

unlock(B);

Lock-x(A);

read(A);

A:=A+50;

write(A);

unlock(A).

5. EXPLAIN CONCURRENCY CONTROL?

Concurrency control

Oracles multiversion concurrency control differs from the concurrency mechanism used by some other data base vendors. Read only queries are

given a read –consistent snapshot which is view if the data base as it existed at the

specific point in time, containing all update that we were committed by that point in time

and not containing any updates that were not committed at any point in time thus read

clock are not used in read only queries don't interfere with other data base activity in

term of locking.

Managed stand by data base

To ensure high availability oracle provide a managed stand by data base

future A stand by data base is a copy of the regular data base ie in solved on the separate

system. If a catastrophic failure occur on the primary system, the stand by system is

activate and take over there by minimizing effect on failure on a availability.

Oracle

keeps the stand by data base up to date by constantly applying archived redo logs that are

shipped from the primary data base the back up data base can be brought online in readonly

mode and used for reporting and decision support queries

UNIT 5

1. WRITE SHORT NOTES ON DATA WARE HOUSING?

Data ware housing applications requires the transformation of data from many sources into a cohesive consistent step set of data configured appropriately for use in data

ware house operation.

Distributed Transformation services

Data ware housing is an approach to manage data in which heterogeneous data sources are migrated to a separate homogeneous data base

Online Analytical processing services

OLAP services provide server and client capabilities to create and manage multidimensional OLAP data .

2. EXPLAIN NESTED RELATIONS?

Nested relations

The assumption of INF is a natural one in the bank examples we have considered. However, not all applications are best modeled by INF relations.

The nested relational model is an extension of the relational model in which domains may be either atomic or relation valued.

We illustrate nested relations by an example from a library. Suppose we store for each book the following in formations

- Book title
- Set of authors
- Publishers
- Set of keywords

We can see that if we define a relation for the preceding information, several domains will be monatomic

Authors

Keywords

Publishers

Complex types

Collection and large object types

Create table books(

...
Keyword-set **setoff(varchar(20))**

...
)

Structure types

Creation of values of complex types

3. WHAT IS INHERITANCE? DESCRIBE IT IN DETAIL?

Inheritance

Inheritance can be at the levels of types, or at the level of tables We first consider inheritance of types, then inheritance at the level of labels.

Type inheritance

Suppose that we have the following type definition for people

create type person
(name **varchar**(20)
address **varchar**(20))

Table inheritance

Create table people **of** person

The consistency requirements for sub tables are

1. Each tuple of the sub table can correspond to at most one tuple in each of its immediate sub tables.
2. SQL:1999 has an additional constraint that all the tuples corresponding to each other must be derived from one tuple .

Overlapping sub tables

4 WHAT ARE THE TYPES OF REFERENCE?EXPLAIN IT WITH SUITABLE EXAMPLES?

Object oriented language provided the ability to refer the object attribute of the type can be referred to the specified type. We can define the type dept with a field

name and a field head which is reference to the type person and a table dept of the type dept as followed

Create type dept(
Name **varchar**(20),
Head **ref**(person)**scope** people
)

Create table dept **of** dept

The table definition must specify that the reverence is derived and must still specify a self referential attribute name. When interesting a tuple for dept we can then use

Insert into dept
Values('CS','john')

5. DESCRIBE QUERIES WITH COMPLEX TYPES?

The present extension of the SQL query language deal with the complex type Let us start with the simple example:

Find the title and the name of the publisher of each book this query carries out the task:

Select title, publisher.name

From books

□ **path expression**

The reference are dereference in 1999 by the → simple

Select head-> name, head->address

From dept

An expression such as "head->name" is called the path expression.

□ **Collection valued attributes**

□ **Nesting and unnesting**

The transformation of the nested relation in to a form with fewer (or no) the relation –valued attribute value is called unnesting

The reverse process of transformation a INF relation into a nested relation is called nesting.

MG 1351 - PRINCIPLES OF MANAGEMENT

20 Essay Questions and Answers

1. Define Management. What are the functions managers perform to attain the set goals?

Management is the art of getting things done through the people

1. Planning 2. Organizing 3. Staffing 4. Directing 5. Controlling

2. What are different types of Plans? Explain

1. Mission or purpose 2. Goals and Objectives 3. Strategies 4.

Policies, procedures, rules 5 Programmes and projects 6. Budget.

A brief discussion about all types of plans are required.

3. What is Planning? Explain the steps involved in Planning

Decision making for the future is called Planning.

Steps in Planning : 1. Being aware of opportunity 2. Establishing goals

and objectives 3. consideration of Planning Premises 4. Identification

of alternatives 5. Evaluation of Alternatives 6. Selection of the best

alternative 7. making supportive plans 8. Number zing the plans.

4. What is MBO? Explain the steps involved in MBO Comprehensive

management function it has wider applications like planning, motivation, performance evaluation.

Steps in MBO

1. Establishing enterprise objectives 2. Considering Planning Premises

3. Key Result Areas 4. Appropriate Organization 5. Setting objectives

for superiors 6. superiors Recommendation of subordinates objectives

7. subordinates statement of their own objectives 8. Matching with

resources. 9. Setting subordinates objectives 10. Actual performance

11. Performance Review 12. Corrective Action.

5. Discuss in detail the "Selection Process"

1. Screening Application Forms 2. Selection Tests 3. Interviews 4.

Checking References 5. Physical Examination 6. Approval By

appropriate authority 7. Placement.

6. Explain the concept of functional authority. How do you delegate it? Departmental level authority. It should be delegated through proper manner.

7. Discuss the merits and demerits of centralization and decentralization
i. responsibility ii. Communication iii. Decision making iv. Involvement v. Motivation.

8. What are different types of Decisions? Explain rational decision making process.

Rational decision, emotional, lateral programmed non programmed decisions., etc.

1. experimentation 2. Experience 3. Research and analysis

9. Discuss 14 principles of management

1. Division of Labour 2. Unity of Command 3. Authority and Responsibility 4. Discipline 5. Unity of Direction 6. Centralization 7. Remuneration 8. Scalar Chain 9. Order 10. Equity 11. Stability in tenure 12. Initiative ness 13. Esprit decorps 14. Subordination of individual interest to general interest.

10. Explain the concept of Formal and informal organization

Differences are arises based on Purpose, flow of Communication, Rules and regulation, term, Relationship

(ii) Discuss the merits and demerits of Process based departmentation
more advantages and disadvantages are required.

11. What is Selection? What are the different selection tests?

Choosing the best candidate among several applicants

1. Achievement Test 2. Intelligence Test 3. Personality Test 4. Aptitude Test 5. Interest test

12. Explain the basic control process

i. Establishment of standards

ii. Actual Performance

iii. Measurement of actual Performance

iv. Comparison between Actual performance with standard

v. Making corrective action.

13. Explain how does operations research helps to enhance Productivity

i. Project scheduling ii. Optimization functions iii. Assignment

Problems iv. Linear Programming v. Simulation Models.

14. What do you understand by principles of Preventive control? Explain its advantages

i. Continuity in operation ii. Attainment of Quality iii. Less

maintenance cost iv. Job Satisfaction v. Safety and Security.

15. What are the important tools and techniques available for system design and improvement?

i. Operations research model ii. LPP iii. Inventory Planning and

Control iv. Distribution Logistics v. Time-event Analysis vi. Q.C. vii.

CAD/CAM/MAP etc.

16. Explain different styles of leadership based on authority?

Explanation on i. Autocratic ii. Benevolent autocratic iii. Democratic

iv. free rein

17. What are the different types of Communication? Discuss in detail all the above methods?

I Based on organization Structure

1. upward Communication 2. Downward Communication 3. Horizontal Communication 4. Diagonal Communication

II Based on Mode of Communication

1. Written Communication 2. Oral Communication 3. Gesture 4. Audio Visual Communication

18. What is departmentation? What are the different bases of departmentation? Grouping related activities together is called departmentation.

1. Functions 2. Territory 3. Customers 4. Process 6. Product 5.

Matrix

19. Discuss in detail any four methods of performance appraisal Ranking, Grading, Forced Choice, Descriptive Writing

20. What is organizing? Explain line and staff relationship Identification of activities, grouping related activities together, forming departments, providing authority and coordinating departmental activities together

View Point of Line People

View Point of Staff

Nature of line and Staff Relationship

21. What is leadership? Explain characteristics of different leadership styles

MG 1351 - PRINCIPLES OF MANAGEMENT

Two mark questions and Answers

1. What do you understand by management science theory?

Management science theory utilises various quantitative techniques to maximise resources. Quantitative Management, Operations Management, Total Quality Management and Management Information System are coming under Management Science Theory.

2. Why is it important to study the various management theories that have been developed?

i. To make a unified global theory of management

ii. To utilise the experiences of pioneers.

3. What are the functions of managers?

Planning, organising, staffing, directing and controlling are the functions of management.

4. Mention the three approaches generally adopted by managers in selecting an alternative.

Experience, Experimentation and Research analysis.

5. Explain chain of command.

Unbroken line of authority is known as chain of command. The line of authority flows from top to bottom through the chain of command.

6. What are the benefits of management by objectives?
- Employees can be motivated because they participate in the goal setting process.
 - Performance can be improved because MBO concentrates on objectives.
 - Unnecessary efforts will be minimised because objectives are set clearly.
 - MBO helps managers to exercise better control over employees.

7. What do you mean by a strategy?

Strategy is defined as the determination of long-term objectives of an organisation. Making the best choices for the future and allocating the resources necessary to accomplish the objectives.

8. What is decision making?

Decision making is defined as the selection of a course of action among alternative courses of action. Decision making should be rational. Decision making involves a choice among alternatives.

9. What is the purpose of planning?

- To determine the direction of an organisation
- To provide a basis for team work
- to minimise wastages in the future
- To facilitate decision making
- To improve morale of the employees.

10. State any two decision making strategies.

- Decision tree method
- Operations research
- Break even analysis
- Simulation or stochastic techniques

11. What are the objectives of planning

- To determine the direction of an organisation
- To minimise wastages
- To reduce the risk or uncertainty
- To facilitate control

12. What do you term 'bounded rationality' in decision making?

If people are having time and cognitive ability for making decision,s it is said to be bounded rationality.

13. What are the various types of decision making models?

- Classical decision making models
- Administrative decision making models
- Political decision making models.

14. Define the term 'Planning Premises'?

Planning premises are define as the anticipated environment in which plans are expected to operate. Premises are the assumptions on which plans are formulated.

15. What do you mean by planning?

Planning is a process by which a manager looks to the future and

discovers alternative courses of action. In other words, planning is anticipatory decision making. Planning is the process used by managers to identify and select goals and courses of action of the organisation.

16. Why is informal organisation needed?

The speed of communication flow through the informal channels is faster than formal channels. Many tasks which cannot be accomplished by formal organisation can be completed by informal organisation. Informal organisation encourages cooperation between people. Informal organisation provides job satisfaction, personal attachment and status to workers. Thus, informal organisation is needed for any organisation.

17. Give two examples for line organisation.

- a. Military
- b. Small enterprises

18. State the Maslow's hierarchy of needs.

Maslow viewed human needs in the form of hierarchy. The hierarchy of needs are

- i. Physiological needs
- ii. Safety needs
- iii. Social needs
- iv. Esteem needs
- v. Self actualisation needs

19. Distinguish between motivation and satisfaction

Motivation Satisfaction

1. Motivation is the process of inspiring and actuating the workers to accomplish the objectives of the organisation.

2. Satisfaction is the end result of motivation. It makes levels of productivity. changes in the behaviour of employees.

20. Explain leading

Leading is the process of instructing, counselling, guiding and motivating the human factor to achieve organisational goals effectively.

21. Mention the various types of leadership styles.

- a. Autocratic leadership
- b. Democratic or participative leadership
- c. Laissez-faire leadership
- d. Benevolent autocratic leadership
- e. Supportive leadership.

22. What are the different bases of departmentation?

Time 2. Functional 3. Product 4. Process 4. Geography 5. Matrix 6. Customers etc.

23. What is Le plan?

In France, All business units will follow the centralized plan of the government. Such plans are formulated with the view of Maximization

of national resources and avoidance of uneconomical areas.

24. What are the way internationalization is takes place?

1. Exporting 2. Licensing 3. Management contracts 4. Joint Ventures
5. Multinational Companies.

25. What is MNC Company?

MNC company is accompany having business operations more than one country but its headquarters is located at its home country.

26. What is Economic environment?

Various economic activities affecting business of a nation is known as Economic environment. Economic environment includes economic conditions, economic system and economic policies.

27. Distinguish between goals and objectives

Goals are specific and short term oriented one.

Objectives are general and long term oriented one.

28. What is Budget?

Budget is a type of plan which is expressed in numerical data.

29. What are the different types of inventories?

1. Raw materials 2. Work in Progress 3. Finished Products 4.
Spares and components.

30. What is Job enrichment?

Making the jobs more interesting and challenging one is known as job enrichment. It is used to motivate and satisfy the workforces in the work place.

31. Distinguish between decision under risk and uncertainty?

Making decision for the unknown state is decision under uncertainty

Making decisions without considering the consequence is decision under risk.

32. Define : Leadership

Leadership is the ability to influence others and enthusiastically making them to achieve the desired results.

33. What are the importance of planning?

To Offset uncertainties, To Integrate Resources & Achieving
Productivity.

34. What are the external Sources of recruitment?

Advertisement, Employment Agencies, Campus Recruitment, Websites.

35. Define : Communication

communication is the process of exchanging ideas, opinions feelings through an medium and getting feed back for the same.

36. What is MBO?

Comprehensive management System. It is used for goal setting, Motivation and performance appraisal.

37. What is motivation?

Motivation is the process of inducting human efforts by altering internal and external variables which are affecting one's workability

Motivation = Valence X Expectancy

38. What is BCG Matrix?

It is tool used for the strategy formulation. It analysis Industry growth rate and market share of the company and indicates different business positions and strategies like cash cow, dog, Question mark, star.

39. What are the different types of decision?

Logical, emotional, lateral, Programmed, Non programmed etc.

40. Distinguish between Policies and Procedures

Policy is the prevailing condition and understating

Procedure is the sequence of a proposed activities

41. Define : Directing

It is the act of instructing, guiding, inspiring people in an organization to achieve organizational results.

42. What is Organizing?

Identification of activities, grouping related activities together, forming departments, providing authority and coordinating departmental activities together

43. What are the nature of planning?

Dynamic, Goal oriented one, Process, Primary to other management functions

44. What are the Internal Sources of recruitment?

Employees, Union, Gate Hiring, Deputation

45. What is recruitment?

Recruitment is the process of inducing potential candidates applying for a job position in an organization.

46. What is formal organization?

An organization is created deliberately with common goal and purpose. It has a well established authoritative relationship among members.

47. Define : Decision Making

Decision making involves selection of best course of action among different alternatives courses of action.

48. Distinguish between centralization and decentralization

Based on delegation of authority organizations are classified into two types Centralization: Entire Power is vested in the hands of few selected persons, normally top managers are holding the power of the organization.

Decentralization: Organizational authority is shared one. All the members are having some amount of freedom in their work based on their position in the organizational structure.

49. What is Human resource Management?

Planning and executing all those activities are associated with recruitment, selection, training, and Performance appraisal and career development in known as human resource management.

50. What are the different sources of power?

1. Legitimate Power 2. Expert Power 3. Referent Power 4. Reward Power 5. Coercive power

51. What are the importance of Decentralization?

1. Work autonomy 2. Quick decisions 3. Self responsibility 4.

Continuous involvement 5. Better control.

52. What you mean by organizational effectiveness?

Organizational effectiveness is measured in terms of structural flexibility, productivity, Employee involvement, Job satisfaction etc.

53. What is informal organization?

Organization are created for personal interest and satisfaction of the people.

54. What are the importance of Career development?

Job satisfaction, Contentious Improvement, Less employee turnover, organizational development.

55. What is delegation of authority?

Sharing organizational authority to different levels and positions of an organization.

56. Distinguish between Power and authority

Power is capacity to command

Authority is the right to command

57. What are the Internal Sources of recruitment?

Employees, Union, Gate Hiring, Deputation

58. What is social responsibility?

Business has the responsibility to fulfill its stake holders interest, such a obligation is know as social responsibility of business.

59. What are the different techniques used to offset risk and uncertainty in decision making?

Decision tree analysis, Simulation, Game theory, Probabilistic models.

60. Define : Organizing

Identification of required activities, grouping of related activities together and forming departments and coordinating various departments with the established goals and objectives.

61. What do you mean by the term 'bounded rationality in decision making'?

Maximizing the results of a decision is an ideal stage. Normally it is an impossible thing. The reason is our decisions are disturbed by lot of constraints, to reduce the effect of these constraints some of our efforts become waste. So we can't reach maximum.

62. What is strategic planning?

Formulation of business plans with the due consideration of environmental analysis and organizational appraisal is know as strategic planning.

63. What is sensitivity training?

It is an informal gathering of all employees and freely express their feeling and opinions about themselves and others.

64. What you mean by career development?

Career development is the programmes designed by the organizations for the Growth in Job Position and Personal Life of the employees.

65. What is Productivity?

Ratio between input and output during a specified period with the due

consideration of quality

66. What are the sources of conflict?

1. Authority 2. Responsibility 3. Organizational Policy 4. Status Relationship etc.

67. Define : Controlling

Controlling is the process of measurement and correction of performance in order to achieve desired results

68. What are the dangers in Budgeting?

1. Over budgeting 2. Deviation from the goals 3. Under estimation

69. What is span of control?

Span of control tells the ratio between superiors and subordinates.

Usually organizations are having two different types of spans. They are

1. Wide Span 2. Narrow span

70. What are the different types of training?

Organizations are used to give training to their employees to enhance their skills and abilities. Those trainings are broadly classified into two types. They are 1. On the job training 2. Off the job training.

71. What is planning Premises?

Consideration of various environmental factors which are affecting the performance of formulated plan.

72. What you mean by organizational Change?

Making modifications in the functions and practices of an organization is known as organizational change. Change results employee well being and overall organizational effectiveness.

73. What are the importance of Strategic Planning?

It is used for taking key business decision like stability, growth, retrenchment and divestment decisions are arrived. It is the top management function. These plans are used for long term decision making.

74. What is Job Design?

Making a job with its detailed description on duties and authorities are known as job design.

75. Distinguish between Strategies and tactics

Strategies is the Basic Plan

Tactics is the way to achieve the strategy

76. What are the functions of management?

1. Planning 2. Organizing 3. Staffing 4. Directing 5. Controlling

77. Distinguish between line and staff people?

Line people are directly related with the achievement of organizational goals. Staff people are indirectly related with the achievement of organizational goals.

78. What are different types of selection tests?

1. Achievement test 2. Intelligence Test 3. Personality Test 4. Interest Test 5. Aptitude test.

79. What are the different types of budgets?

1. Master Budget 2. Functional budget 3. Flexible budget 4. Zero

based budgeting.

80. Define : Organization

81. What are the principles of preventive control?

1. Professional managers commit minimum errors 2. Managers performance also undergoes evaluation 3. Management fundamentals are utilized.

82. What is JIT?

JIT is the Japanese Manufacturing technology. It works based in the concept of inventory less operations.

83. What are the advantages of preventive control?

1. More productivity 2. Self control 3. Less managerial burden 4.

Psychological advantages.

84. Define : Organization

Group of people doing some purposeful and profitable activities. Such activities include industrial, trading and Commercial Activities and also some charitable activities.

85. What are the importance of Motivation?

1. Increase Productivity 2. Reduce Absenteeism 3. Reduces Labour turn over 4. Increases morale of the employees 5. Increases job satisfaction

86. What are the advantages of written communication?

1. Permanent Record 2. Legal Validity 3. Clarity 4. Better understanding etc.

87. Distinguish between Policies and procedures

Policies is a basic guidelines for actions

Sequential arrangement of an program

88. What is brainstorming?

This kind of training are given to increase peoples creativity and decisional ability. This type of training individual participants are encouraged to give their own ideas to resolve the existing problem.

89. What is Theory Z?

Theory Z suggests interpersonal relation is vital for organizational success.

90. What is grapevine Communication?

1. It is an informal unofficial flow of communication between the organizational members through rammers and gossip.

91. What is Managerial grid?

Blake and molten explained leadership with the mangers concern on people and production. On the bases of above criteria they suggested five different types of leaders. They are 1. Task leader 2. Team leader 3. Country club 4. Middle road 5. Impoverishd.

92. What are the methods available to resolve conflict?

1. Problem solving 2. Super ordinate goals 3. expansion of resources 4. withdrawals 5. Compromise 6. Smoothing 7. Using appropriate authority 8. Altering human variables 9. Altering structural variable.

93. What are the different types Modern controlling techniques?

1. PERT/CPM 2. Human resource Accounting 3. Social audit 4. ROI Analysis Wide Span 5. Quality Circle etc.

94. What are the characteristics of good listening?

1. Stop talking 2. Put the talker at ease 3. Attention 4. Hold your temper 4. Stop arguments 5. Avoid criticism etc.

95. What are the different types conventional controlling techniques?

1. Budgetary control 2. Breakeven analysis 3. Statistical data analysis 4. Auditing 5. Personal observation etc.

96. What is Unity of Command?

Unity of command tells the reporting relationship between a superior and a subordinate. A subordinate is always having a only one superior.

97. What is performance Appraisal?

Performance appraisal is the system of measuring Employee performance and giving feedback to the employee regarding his performance.

98. What are the advantages of performance Appraisal?

1. Getting performance Feedback 2. Identifying training needs 3. Motivating Personnel 4. Promotional consideration 5. Pay fixation.

99. What is Globalization?

Doing business without geographical boundaries are known as globalization.

100. What is Decision tree analysis?

This is the method used for making decisions under uncertainty and risk. In this model before arriving a decision different option are considered and its probabilistic models are developed and analyzed.