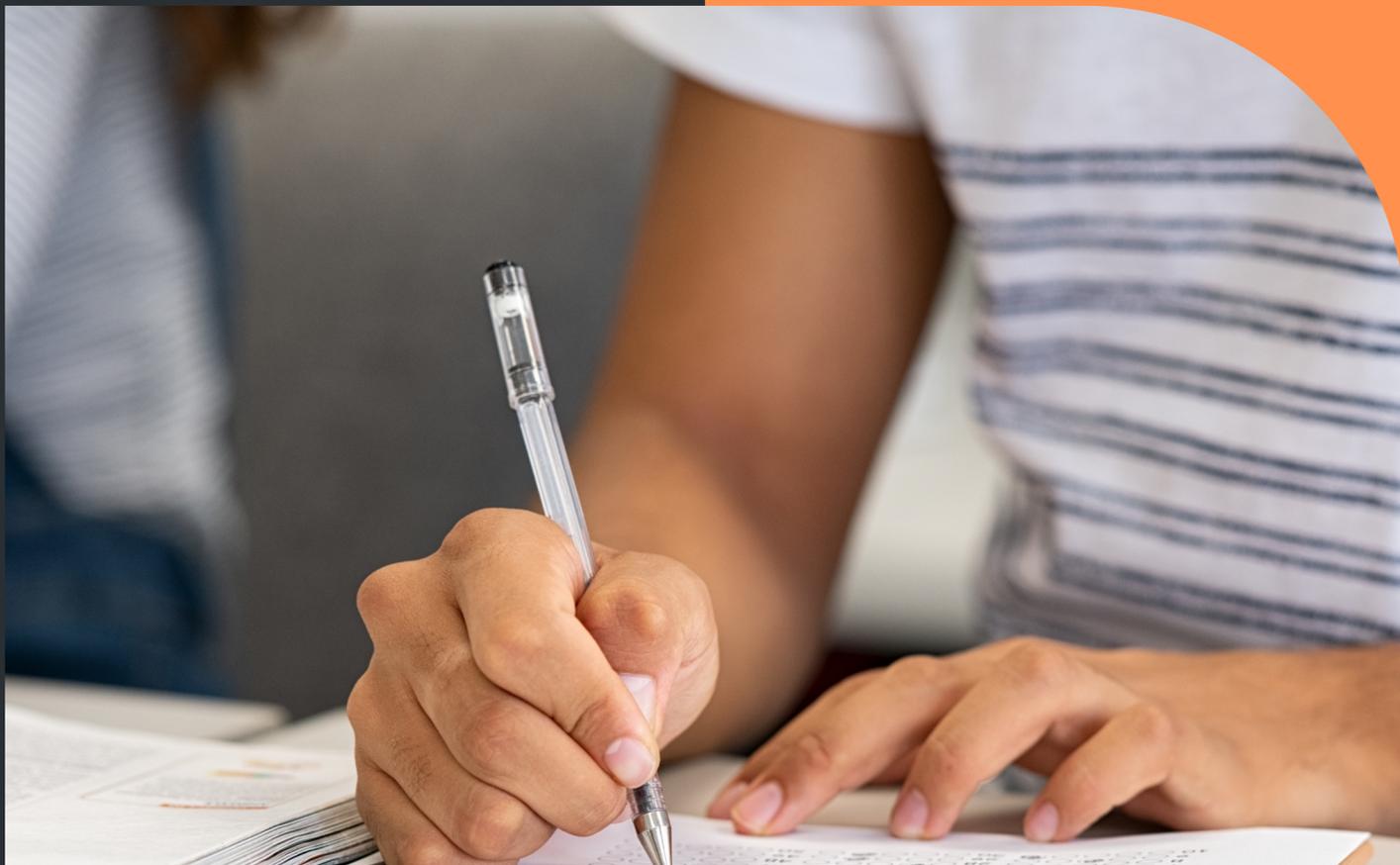2023

KEY BOOK
Exam Preparation
COMPUTER XII
BY NAVA RAJ HEKA

Includes : Exam tips, notes of all chapters, sample question set with answer, MCQs

A BASIC TIPS FOR EXAM PREPARATION

1. Give yourself enough time to study

Don't leave it until the last minute. While some students do seem to flourish on last-minute 'force', it's widely accepted that for most of us, this is not the best way to approach an exam. Set out a timetable for your study. Write down how many exams you have and the days on which you have to sit them. Then organize your study accordingly. You may want to give some exams more study time than others, so find a balance that you feel comfortable with.

2. Organize your study space

Make sure you have enough space to spread your textbooks and notes out. Have you got enough light? Is your chair comfortable? Are your computer games out of sight?

Try and get rid of all distractions, and make sure you feel as comfortable and able to focus as possible. For some people, this may mean almost complete silence; for others, background music helps. Some of us need everything completely tidy and organized in order to concentrate, while others thrive in a more cluttered environment. Think about what works for you, and take the time to get it right.

3. Use flow charts and diagrams

Visual aids can be really helpful when revising. At the start of a topic, challenge yourself to write down everything you already know about a topic - and then highlight where the gaps lie. Closer to the exam, condense your revision notes into one-page diagrams. Getting your ideas down in this brief format can then help you to quickly recall everything you need to know during the exam.

4. Practice on old exams

One of the most effective ways to prepare for exams is to practice taking past versions. This helps you get used to the format of the questions, and - if you time yourself - can also be good practice for making sure you spend the right amount of time on each section.

5. Explain your answers to others

Parents and little brothers and sisters don't have to be annoying around exam time! Use them to your advantage. Explain an answer to a question to them. That will help you to get it clear in your head, and also to highlight any areas where you need more work.

6. Organize study groups with friends

Get together with friends for a study session. You may have questions that they have the answers to and vice versa. As long as you make sure you stay focused on the topic for an agreed amount of time, this can be one of the most effective ways to challenge yourself.

7. Take regular breaks

While you may think it's best to study for as many hours as possible, this can actually be counterproductive. If you were training for a marathon, you wouldn't try and run 24 hours a day! Likewise studies have shown that for long-term retention of knowledge, taking regular breaks really helps.

Everyone's different, so develop a study routine that works for you. If you study better in the morning, start early before taking a break at lunchtime. Or if you're more productive at nighttime, take a larger break earlier on so you're ready to settle down come evening.

8. Snack on 'brain food'

Keep away from junk food! You may feel like you deserve a treat, or that you don't have time to cook, but what you eat can really have an impact on energy levels and focus. Keep your body and brain well-fuelled by choosing nutritious foods that have been proven to aid concentration and memory, such as fish, nuts, seeds, yogurt and blueberries. The same applies on exam day - eat a good meal before the test, based on foods that will provide a slow release of energy throughout. Sugar may seem appealing, but it won't help when your energy levels crash an hour or so later.

9. Plan your exam day

Make sure you get everything ready well in advance of the exam - don't leave it to the day before to suddenly realize you don't know the way, or what you're supposed to bring. Check all the rules and requirements, and plan your route and journey time. If possible, do a test run of the trip; if not, write down clear directions.

Work out how long it will take to get there - then add on some extra time. You really don't want to arrive having had to run halfway or feeling frazzled from losing your way. You could also make plans to travel to the exam with friends or classmates, as long as you know they're likely to be punctual!

10. Don't be tired

If you have to stay up all night to do last minute revision, you've already failed. It doesn't work – you end up so tired in the exam you can't work anything out. It might work for the first one or two exams in a year, but you won't be able to keep it up throughout a whole series of exams.

11. Eat protein before long exams – not carbohydrates

An exam is just as much a physical exercise as a race. Well, OK, perhaps not quite as much, but you can't ignore your body if you want your brain to work at its best. Stuffing it full of sugar, or some Red-Bull type drink just before will work fine for the first hour or so, but by the end of a three-hour exam you'll have completely run out of energy. You need some food that will slowly release energy. Try pasta, fish or eggs.

12. Drink plenty of water

As a final tip, remember that being well hydrated is essential for your brain to work at its best. Make sure you keep drinking plenty of water throughout your revision, and also on the exam day.

Writing examination answers
you can increase your marks by applying good technique

Choosing Your Questions

1. Make sure you understand the instructions

2. Read all the questions first and look for topics you have prepared

3. Make sure you understand the questions

4. Underline key words in the question to remind you to stick to the point

5. You could roughly sketch out answer plans, to help you decide which questions to answer, and/or to check later that you have not left anything out

6. Allocate your time in blocks, to avoid spending too much time on earlier questions and not enough on later ones

7. Whilst time planning, check the marks allocations per question

8. You might note down start and finish times against your chosen questions

9. Remember you'll need a few minutes at the end of the exam for checking through

10. Don't be put off by others who might start writing immediately.

Writing Your Answers

1. Do the Easiest Questions First

There is absolutely no reason to do the questions in the order they are printed in the exam. I would recommend doing the easiest one(s) first.

There are two reasons for this. Firstly, getting one question safely under your belt at the start of an exam is a wonderful boost to confidence, and can help reduce any feelings of panic that might arise when looking at the harder questions.

The second reason is that the easiest question is likely to take less time than the average. That means you'll be ahead of schedule from the start – another good confidence boost. It also means that when you get round to the most difficult question, you are free to spend all the time you have left on it, without having to drop it half-way through and come back to it later, if time permits – not a good idea if it can be avoided.

2. Picture is Worth a 1000 Words

Picture is worth a 1000 words: You have heard this before in many contexts, but it's very true in exams, particularly exams in which diagrams can really showcase your understanding like science, geography etc.

3. Make the key concepts easily visible:

Use highlighting, indentations, underlines so the key concepts are easily visible. This is very useful. In a 100 word answer, there are probably just 20 words that are key ideas. The remaining words are supporting words, add no value.

4. Correct Answer

A good answer should help someone who genuinely wants to know the answer to the question. So, the first thing a good answer should be is truthful, authentic, and correct whenever possible.

An answer that's wrong is not a good answer. To be clear, I like answers that are well-written and fun to read. And I like many answers that are funny, joyful, passionate. But if the answer is incorrect—or likely incorrect—then it's not helpful.

5.   Don't get Stuck. Move On.

Avoid writer's block, you haven't got time for it. If you get stuck on a question, move on. Start doing another one. Staring at a question you don't know how to answer is a waste of time, and you'd be amazed how often, when coming back to a question after half-an-hour, it suddenly becomes clear.

6.   Clear handwriting, organized thoughts and practice are your weapons.

7.   Keep your stuffs with you

Always bring a pencil, eraser and ruler to all exams. It shows that you are taking the exam seriously and are trying your best to convey your thoughts clearly.

8.   Write to the point

People like reading answers that are short, sharp and to the point. No need to take 100 words to write what could be said in 10.

9.   Write the question number clearly in the margin.

10.   Keep handwriting legible – there may be penalties if you don't, even failure

11.   Use a clear written style – short sentences are preferable

12.   Pay attention to layout and paragraphing

13.   Leave a few lines between answers – for clarity, or for any last minute additions

14.   Keep the question in mind as you write

15.   Be careful not to spend so long on the first question that you can't do justice to later ones, which might be more challenging

16. Read the question when you have finished your answer, to check for relevance

17.   Go for quality over quantity of words – you need to give your ideas without waffling

18.   Be aware of whether (and how) you must show your rough work

19.   Cross out anything you don't wish the examiner to read

20.   Don't miss out part of a multipart question

Towards the end of the exam

1.   If possible, reread your answers and clarify where necessary

2.   Incorporate any new ideas if appropriate

3.   Make sure answers are correctly numbered

4.   Stay to the end – if you leave early you will think of something you could have added.

Contents

Unit-1 DBMS

Database

A database is a collection of related information about a subject organized in a useful manner that provides a base or foundation for procedure, such as retrieving information, drawing conclusion and make decision.

DBMS

A DBMS is a set of programs that manages the database files. The DBMS allows accessing the files, updating the records, and retrieving data as requested. Examples: Microsoft Access, Oracle, MySQL, SQL Server etc.

Why Database?

Traditional file system have been used from the beginning for managing data in a computer. In the traditional file system, the data can be duplicated, they cannot be shared and security and integrity cannot be maintained very well. It is also very difficult to search data. So, it is not easy to work in file system where everything is kept in file.

Problems with File system.

      a. Data Duplication

      b. Data dependence

      c. Lack of data integration

DBMS (Database Management System)

A DBMS is a set of programs that manages the database files. The DBMS allows to access the files, update the records, and retrieve data as requested. The DBMS acts as an interface between the application program and the data in the database.

Objectives of DBMS

1. To provide storage area for mass amount of relevant data.
2. To make access to the data easy for the end user.
3. To provide prompt response to users request for data
4. To make the latest modification to the database available immediately.
5. To eliminate data redundancy (duplication of data)
6. To allow multiple user to be active at one time
7. To protect the data from the physical harm and unauthorized access.

Advantage of DBMS

1. **Data Sharing:** Data stored in a database can be shared. For example, with a DBMS the data for the entire company is effectively made available to all managers and end users, which need them

2. **Reduced data Redundancy:** In traditional file processing the same data may be duplicated at many times or places is also called data redundancy. A DBMS reduces the duplication of data from a database.

3. **Integrity can be maintained:** Integrity ensures that the data stored in a database is correct or accurate. So, the problem of integrity is the problem of ensuring that the data in the database is correct.

4. **Data Independence**: The DBMS keeps the description of data separate from applications that use the data. Thus, changes in the data definition can occur without requiring modifications in every application program that uses the data.

5. **Data Security:** Security can be enforced In an organization, there should be many confidential data, such data should not be available to all users. In a DBMS, specific restrictions can be applied for security by giving different authorities to different users.

6. **Providing multiple user interfaces:** DBMS provides variety of interfaces for various users.

Disadvantage of DBMS

1. Initial investment is high for implementing DBMS

2. Proper training is required for staff to work properly in the database system

3. When some fault occurs in one part of the database it affects the other parts as well.. It is complex to understand and implement

4. Overhead cost for providing security, recovery, and integrity functions.

5. Cost for the maintenance of the hardware, software, backup, recovery and its upgrade remain forever.

Database Model

Data model describes the structure of a database. Database model is collection of conceptual tools for describing data, relationship etc.

Types of Database Model

1. Hierarchical Database Model

In a hierarchical database model records are logically organized into a hierarchy of relationships. It is arranged logically in an inverted tree pattern. It is based on parent child.
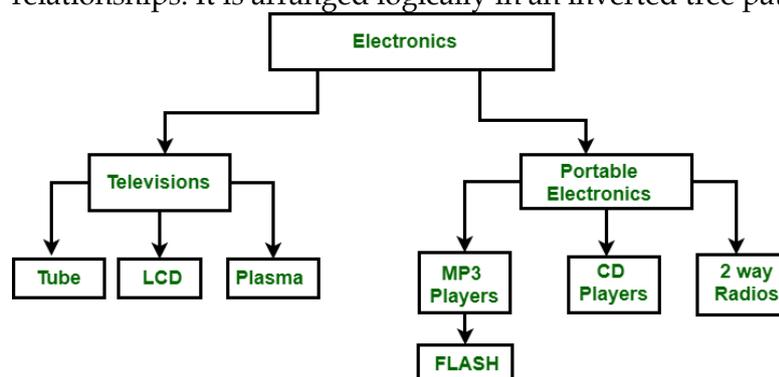
a) The hierarchical data model is the oldest type of data model, developed by IBM in 1968.

b) Records are inter-related through hierarchical or tree-like structures.

c) A parent can have several children, but a child can have only one parent.

d) One to one and one to many relationships.

Advantages

    a) It is the easiest model of database.

    b) database owner is more secured because nobody else can see and modify a child without consulting its parent.

    c) Searching is fast and easy, if parent is known.

    d) It is very efficient in handling 'One-to-many' relationship.

    e) It helps to build complex system from simple components.

Disadvantages

    a) It is old fashioned, outdated database model.

    b) It is non-flexible database model (Modification and addition of child without consulting the parent is impossible or very complex process).

    c) It can't handle 'Many- to-Many' relationships.

    d) It increases data redundancy as same data can be saved in different places.

    e) When parent node is deleted, all the children nodes are deleted automatically.

2. Network Data Model

    a) Network Database Model Network database model is a modified version of the hierarchical database.

    b) In network database structure each node may have several parents.

    c) Operation and maintenance of this structure becomes complicated, as the number of points in the network increases.

    d) It is less user-friendly when compared to the hierarchical structure.

    e) It Support Many to Many Relationship
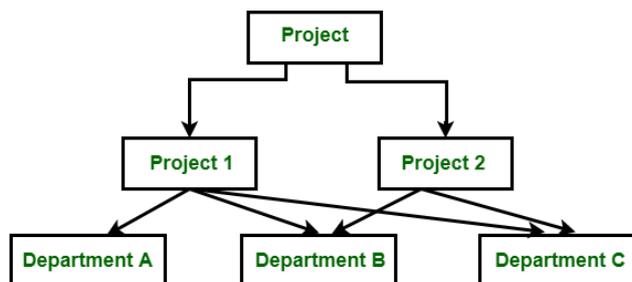
Advantages

    a) It is more flexible than hierarchical model because accepts 'many-to-many' relationship.

    b) It reduces redundancy because data shouldn't be repeated if same data is needed.

    c) Searching is fast because of multidirectional pointers.

Disadvantage

    a) It is one of the complex database models.

    b) It needs larger programs to handle the relationships.

    c) It is less secured compared to hierarchical model, as it is open to all.

3. Entity Relation Data Model

➢ The ER data models is based on a perception of real world that consist of a collection of basic objects called entities and relationship among these objects.

➢ Overall logical structure of a database can be expressed graphically by E-R diagram.
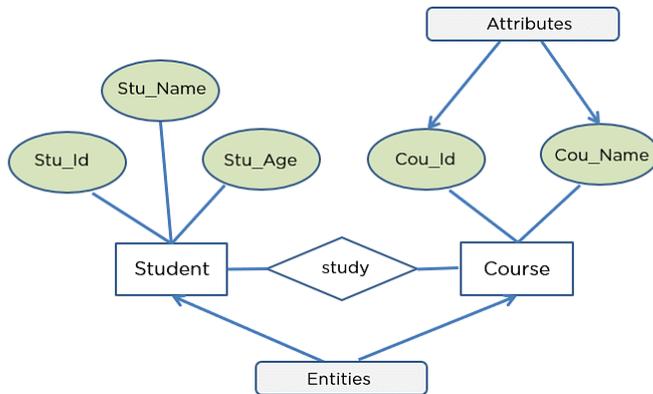
Advantage:

Flexibility: The ER model is highly flexible and allows designers to create new relationships between entities

Easy to Understand: The ER model is easy to understand and can be used to create conceptual diagrams that can be easily communicated to stakeholders and users.

Disadvantages:

Complexity: The ER model can become very complex when dealing with large and complex data structures, which can make it difficult to manage.

Implementation: The ER model requires more implementation effort and expertise compared to other database models

4. Relational Database Model

In a relational Database model, data are arranged in two dimensional table, which are easy for a user to develop and understand. This type of model can also be described mathematically. Because many managers often work with tabular form data, it is easy for most of them to understand the structure used in a relational database.

Advantages:

    a.   Since on table is linked with other, some common fields and rules implemented on one table can easily be implemented to another.

    b.   It is very less data redundancy

    c.   Normalization of the database is possible

    d.   Rapid processing of database is possible

Disadvantage:

    a.   It is more complex than other models

    b.   Too many rules makes database non-user-friendly

Database Language

DDL (Data Definition Language) and DML (Data Manipulation Language) are two important categories of SQL (Structured Query Language) statements used to create and manage databases.

Data Definition Language (DDL)

DDL statements are used to define or modify the structure of the database schema, including creating, altering, and dropping database

Create Statement

Eg. :

CREATE TABLE account(
Account-number CHAR (10)
Balance INTEGER,
Branch CHAR (10)
)

Drop Statement

Eg: Drop database account;

Alter Statement

Eg:

ALTER TABLE account
ADD Email varchar(255);

Data Manipulation Language (DML)

DML statements are used to manipulate or retrieve data within the database schema. DML statements are used to insert, update, delete, and query data within tables.

Structured Query Language (SQL) supports following DML statements:

Insert statement: The INSERT statement is used to insert new data into a table.

Delete Statement: The DELETE statement is used to remove one or more rows of data from a table.

Update Statement: The UPDATE statement is used to modify existing data in a table.

Select Statement: The SELECT statement is used to retrieve data from one or more tables in the database.

Eg. INSERT INTO Employee VALUES ("A01", 7676, "Patan");

Eg. DELETE * FROM Employee where id="101";

Eg. SELECT * FROM Employee;

Normalization

Normalization is a database design process in which complex database table is broken down into simple separate tables.

Benefits

a) Dependency between the data fields is identified

b) The redundancy in database is minimized

c) Data model is made more flexible and easier to maintain

d) It improves faster sorting and index creation

e) It improves the performance of the database system

f) It avoids the loss of information

Types of Normalization

First Normal Form

First Normal Form is defined in the definition that :

➢ All the attributes in a relation must have atomic domains.

➢ The values in an atomic domain are indivisible units.

Course	Content
Programming	Java, c++
Web	HTML, PHP, ASP

We re-arrange the relation (table) as below, to convert it to First Normal Form.

Course	Content
Programming	Java
Programming	c++
Web	HTML
Web	PHP
Web	ASP

Each attribute must contain only a single value from its pre-defined domain.

Second Normal Form

Before we learn about the second normal form, we need to understand the following −

- **Prime attribute** − An attribute, which is a part of the candidate-key, is known as a prime attribute.

- **Non-prime attribute** − An attribute, which is not a part of the prime-key, is said to be a non-prime attribute.

If we follow second normal form, then every non-prime attribute should be fully functionally dependent on prime key attribute. That is, if X → A holds, then there should not be any proper subset Y of X, for which Y → A also holds true.

Student_Project

| Stu_ID | Proj_ID | Stu_Name | Proj_Name |

We see here in Student_Project relation that the prime key attributes are Stu_ID and Proj_ID. According to the rule, non-key attributes, i.e. Stu_Name and Proj_Name must be dependent upon both and not on any of the prime key attribute individually. But we find that Stu_Name can be identified by Stu_ID and Proj_Name can be identified by Proj_ID independently. This is called **partial dependency**, which is not allowed in Second Normal Form.

Student

| Stu_ID | Stu_Name | Proj_ID |

Project

| Proj_ID | Proj_Name |

We broke the relation in two as depicted in the above picture. So there exists no partial dependency.

Third Normal Form

For a relation to be in Third Normal Form, it must be in Second Normal form and the following must satisfy −

- No non-prime attribute is transitively dependent on prime key attribute.

- For any non-trivial functional dependency, X → A, then either −

  - X is a superkey or,

  - A is prime attribute.

Student_Detail

Stu_ID	Stu_Name	City	Zip

We find that in the above Student_detail relation, Stu_ID is the key and only prime key attribute. We find that City can be identified by Stu_ID as well as Zip itself. Neither Zip is a superkey nor is City a prime attribute. Additionally, Stu_ID → Zip → City, so there exists **transitive dependency**.

To bring this relation into third normal form, we break the relation into two relations as follows −

Student_Detail

Stu_ID	Stu_Name	Zip

ZipCodes

Zip	City

1NF

– The table should have a primary key

–No single attribute (column) have multiple values

–The non-key attributes (columns) should depend on the primary key.

2NF

– The table should be in first normal form

– Should not be partially depend on candidate keys.

3NF

– The table should be in Second Normal form

– No non-prime attribute is transitively dependent on prime key attribute.

Centralized Database

A centralized database (sometimes abbreviated CDB) is a database that is located, stored, and maintained in a single location.

Advantages

1. Manageability

2. Speed of operation

3. Portability

4. Integration is easy

5. Upgrades, backups, mirroring is a lot easier.

Disadvantages:

1. If center goes down, everything is down.

Distributed Database System

–A distributed database is a database that is under the control of a central database management system (DBMS) in which storage devices are not all attached to a common CPU. It may be stored in multiple computers located in the same physical location, or may be dispersed over a network of interconnected computers.
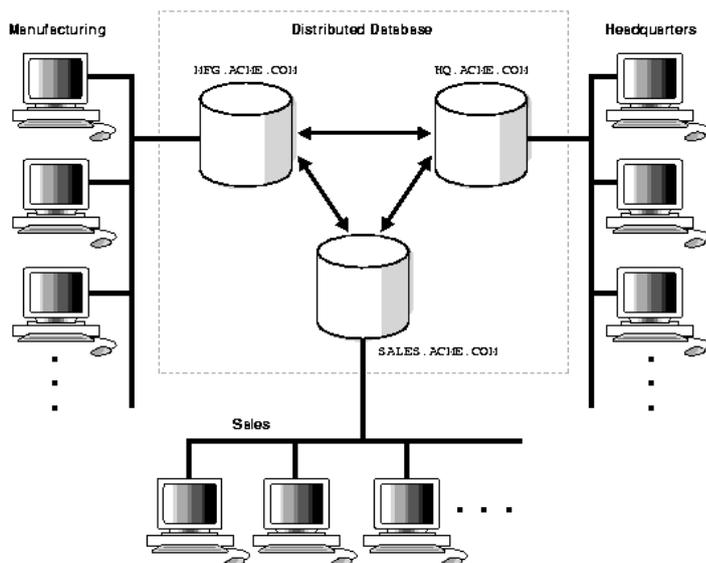
Advantages:

a) **Reliability**, if one of the sites crashes, the system will keep running with the other sites.
b) **Speed**, it is faster because the information is distribute and not packed as a whole.
c) **Open system**, the system could connect to other networks to make it bigger and accessible everywhere.

Disadvantages:

a) **Networking**, if there is a problem with the network, then problems may arise from using the database.
b) **Proper hardware and software**, the database needs proper hardware and software to run properly, this is expensive to get.
c) **Troubleshooting**, there might be connection error that could affect the use of the database by other users.

Difference between Centralized and Distributed Database

Centralized database system	Distributed database system
•Simple type	•Complex type
•Located on particular location	•Located in many geographical locations.
•Consists of only one server	•Contains servers in several locations
•Suitable for small organizations	•Suitable for large organizations
•Less chance of data lost	•More chances of data hacking, lost
•Maintenance is easy and security is high	•Maintenance is not easy and security is low
•Failure of system makes whole system down	•Failure of one server does not make the whole system down
•There is no feature of load balancing	•There is feature of load balancing
•Data traffic rate is high	•Data traffic rate is low
•Cost of centralized database system is low	•Cost of distributed database system is high

Database Administrator (DBA)

- Short for Database Administrator, Database Analyst Database Architect. DBA is the individual responsible for maintaining, analyzing, or updating a computer database.
- DBA is the most responsible person in an organization with sound knowledge of DBMS. He/she is the overall administrator of the system.

DBA Responsibilities

a) Installation, configuration and upgrading of DBMS
b) Establish and maintain sound backup and recovery policies and procedures.
c) Take care of the Database design and implementation.

d) Implement and maintain database security (create and maintain users and roles, assign privileges).
e) Database tuning and performance monitoring.
f) Setup and maintain documentation and standards.
g) Plan growth and changes (capacity planning).
h) Work as part of a team and provide 7×24 supports when required.
i) Do general technical trouble shooting and give consultation to development teams.

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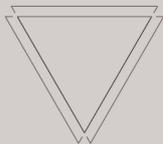
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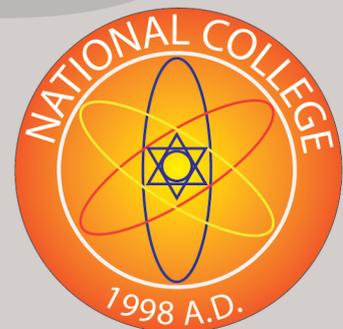
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Unit 2 Computer Network

A computer network is a group of computers and other devices connected together to share resources and communicate with each other. Computer networks can be used for a variety of purposes, such as sharing files, printers, and internet access, as well as for communication and collaboration among users.

Type of Network

Depending upon the network architecture, computer network can be classified into:

☐☐Peer – to Peer architecture

☐☐Client/Server architecture

Peer – to Peer architecture

A peer-to-peer (P2P) network is a decentralized network architecture in which individual devices, called peers, connect directly to each other to share resources, such as files, data, and computing power, without the need for a central server or authority.

Advantages

a) It has simple architecture and easy to install.
b) It doesn't require additional servers and network devices so it is inexpensive architecture.
c) Each node has equal privileges to access the resources of its own and other nodes connected to the network.
d) It is suitable for small sized network which has maximum 10 nodes.

Disadvantages

a) Its performance becomes very poor for large size network (more than 10 nodes).
b) There is no central administration and monitoring mechanism for the network.
c) Network security problems due to equal privileges of the nodes.
d) There is no central backup and recovery mechanism, each node has responsibility to maintain its own backup.

Client Server Network Architecture

A centralized server network is a network architecture in which all devices are connected to a central server or group of servers that provide access to resources and control network traffic. In this architecture, the server is responsible for storing data and applications and managing user access to those resources.

Advantages:

• It is easier for centralized administration, controlling and monitoring the entire network from server.
• It provides centralized backup and recovery features so it is considered as more secure and reliable architecture.
• It is easier for managing the large size network (more than 10 computers).

Disadvantages

• Resources are centralized to the server, so if any problem occurs in the server the entire network will down.
• There may be maximum data traffic at server so there may be chances of data collision.

- It is more expensive due to dedicated server and additional network utilities and network operating system such as MS Windows Server, UNIX or Linux etc.

Network On the Basis of Geographical Area

On the basis of size or geographical area that means how much area it covers, computer networks are

classified into three categories: local area network (LAN), metropolitan area network (MAN) and wide area network (WAN).

Local Area Network

A local area network (LAN) is privately owned small size network. It spans only in small geographical area such as within a room, office, buildings or up to few kilometers (2KM or 3KM). It connects the network resources such as computers, faxes, printers, and various networking devices.

Features of LAN

a) LAN is small privately owned network that covers only few kilometers (up to 3KM).
b) It has higher speed data transfer rate maximum up to 1000Mbps i.e. 1Gbps.
c) It is highly secured network and it has least error rate than others.
d) It is least expensive type of network because it requires least expensive devices such as NIC, Hub, Bridge, Modem and Switches, etc.
e) Common LAN topologies are bus, ring, star, tree, mesh, and hybrid.

Metropolitan Area Network

A metropolitan area network (MAN) can be either public or privately owned network. Its size is bigger than LAN and smaller than WAN. It spans within one metropolitan city or larger geographical area. It can connect large number of computers and heterogeneous multiple LANs. Common examples of MAN are Cable TV network, Internet Service Provider (ISP) in a city etc.

Features of MAN

a) MAN is complex and heterogeneous (different) type of network and it may be either public or privately own.
b) The size of MAN is bigger than LAN and it covers maximum up to 100KM.
c) It is less secured network and higher error rate than LAN.
d) It is more expensive than IAN because it requires repeater, router, gateway, and microwave station etc.
e) It uses different types of media such as coaxial cable, optical fiber, microwave etc.

Wide Area Network

A wide area network (WAN) is basically public type heterogeneous network. It is the largest sized network and connects millions of computers, thousands of LANs, hundreds of MANs around the countries, continents and even the whole world. Example of WAN is Internet where we can share information around the world. Communication is done through public channels such as telephone line, optical fiber and microwave and satellite.

Features of WAN

a) WAN is basically public network that covers millions of kilometers around the world.
b) It has low speed data transfer 64Kbps to 10Mbps or more.

c) It is less secured network and it has highest error rate.
d) It is the most expensive type of network because it requires large amount of expensive devices such as router, gateway, microwave station, satellite, etc.
e) It uses various types of transmission media such as telephone line, optical fiber, radio wave, microwave, satellite, etc.

LAN Topologies

Network topology refers to the physical layout of the network. It shows the eometrical representation of all the links and linking devices, also called nodes. Simply, it reflects the computers in the network and how they are interconnected to each other. The main objective of the network topology is to find out the most economical and efficient way of transmission channel. The most common LAN topologies are bus, star, ring, tree, mesh and hybrid.

Bus Topology

Bus topology is a type of network architecture in which all devices on the network are connected to a common communication pathway or "bus." In a bus topology, all devices share the same communication channel, and data is transmitted from one device to another along this shared medium.

Advantages

a) It is simple and easy to setup and extend the network.
b) It is inexpensive topology because it requires Is amount of cable and no additional network devices.
c) If any computer in the network downs, then it does not affect other computers.
d) It is more flexible because we can easily connect and disconnect any number of computers in the bus.

Disadvantages

a) Data traffic is very high in bus so there may be chances of data collision.
b) The length of bus should be small otherwise the performance of the network goes down.
c) If there is problem in bus then the entire network goes down.
d) It is very difficult to find out the fault in the bus.

Star Topology

Star topology is a type of network architecture in which all devices on the network are connected to a central device, typically a switch or hub. In a star topology, each device has a dedicated connection to the central device, and data is transmitted between devices through the central hub.

Advantages

a) It is simple, reliable and easy to set up and re-configuration.
b) It is flexible to connect new computer and remove existing computer in the network.
c) It is very easy to find out fault because of the use of hub or switch.
d) If any computer in the network goes down, then other computers can continue their functions.

Disadvantages

a) It requires very large amount of cables.
b) It is expensive topology because of cables and networking device hub or switch.

c) If there is any problem in central device hub or switch then the entire network will be down.

d) The data traffic is high in central device hub so there may be chances of data collision.

Ring Topology

Ring topology is a type of network architecture in which all devices on the network are connected in a closed loop or ring. In a ring topology, data is transmitted in one direction around the ring, with each device receiving and transmitting data to the device next to it.

Advantages

a) It is simple and inexpensive topology.
b) There is less chance of data collision because of unidirectional data transmission.
c) There is no server so each computer has equal access facilities to the resources.
d) Its performance is better than bus topology for small size network.

Disadvantages

a) It is not flexible topology so it is difficult for adding and removing new nodes.
b) It is not suitable for large size network (not more than 10 nodes).
c) If there is problem in any computer or connection then the entire network goes down.
d) It is very difficult to find out the errors in the network.

Mesh Topology

Mesh topology is a type of network architecture in which each device on the network is connected to every other device through a series of point-to-point connections. In a mesh topology, each device acts as a relay for data, sending and receiving data from other devices on the network. This allows data to be transmitted quickly and efficiently between devices, as multiple paths are available for data to travel.

Advantages

a) It is the fastest and robust type of topology.
b) It is considered as the most reliable topology because of multiple connections between any two nodes.
c) Failure in any computer or transmission media does not affect the rest of the network.
d) There is less amount of data traffic due to multiple paths.

Disadvantages

a) It is very much complex and most expensive topology.
b) It is difficult to find an error in the network.
c) It requires maximum amount of cables and multiport connecters.
d) It is difficult to add and remove nodes in the network so it is not flexible.

Tree Topology

Tree topology is the extension of bus or star topology. So it extends the branches of bus or star topology allowing more stations to access the bus.

Advantages

a) It is easy to manage network as per our needs because of many sub networks or units.
b) It is very flexible so we can add and remove any number of nodes.
c) It is easier to find the fault nodes or hubs in the network.

Disadvantages

a) The failure of root node will cause the failure of entire network.

b) It is expensive because of large amount of cables and network devices- hubs or switch.

c) The data traffic is high at root node so there may be chances of data collision.

Transmission Media

Transmission media refers to the wires, cables and other means through which data travels from its source to destination.

Types of Transmission Media

Bounded Media (also known as guided media) includes:

> i. Twisted pair cable
>
> ii. Coaxial cable and
>
> iii. Fiber optics cable

Unbounded media (also known as unguided media) includes:

> i. Microwave system
>
> ii. Satellite communication
>
> iii. Infrared technology

Twisted Pair Cable

Twisted pair cable is a type of copper cable that is commonly used in networking to transmit data between devices. It consists of two or more insulated copper wires twisted together in a helix pattern, which helps to reduce interference and crosstalk between wires.

There are two main types of twisted pair cable: unshielded twisted pair (UTP) and shielded twisted pair (STP).

Advantages

> i. It is light and thin, so it more flexible to fit in a LAN.
>
> ii. It is cheaper than other cables.
>
> iii. It can transmit data at a higher bandwidth for short distance.

Disadvantages

> i. It cannot be used for long distance transmission.
>
> ii. It is slower for data transmission than other cables.
>
> iii. It can be affected by electrical and magnetic field.

Coaxial Cable (COAX)

Coaxial cable is a type of transmission media that is used to transmit data between devices. It consists of a central conductor made of copper, surrounded by an insulating layer, which in turn is surrounded by a braided shield and an outer jacket. The shield helps to reduce electromagnetic interference (EMI) and crosstalk between the wires.

Coaxial cable is commonly used for cable TV, as well as for Ethernet networks in certain environments. It is capable of transmitting data at higher speeds and over longer distances than twisted pair cable, but is typically more expensive.

Advantages

> i. It provides faster data transmission than the twisted pair cable.

ii. It can transmit data for medium range distance. iii. It is easier to install, modify and manage thenetwork.

Disadvantages

i. It is expensive to install.

ii. It is not appropriate for long distance transmission.

iii. It is rarely used at present for computer network.

Fiber Optics Cable

Fiber optic cable is a type of transmission media that uses thin strands of glass or plastic to transmit data using light signals. It is capable of transmitting data over longer distances and at higher speeds than copper cables, making it a popular choice for high-speed data transmission in networking.

Advantages

i. It provides fastest data transmission than other transmission media.

ii. It can be used for both short to long distance transmission.

iii. It provides error free and highly secured transmission.

iv. It can transmit multiple data at a same time due to the use of multiple fibers in a cable.

Disadvantages

i. It is highly expensive and difficult to install.

ii. It is not appropriate for short distance transmission due to its thickness and difficult to bend.

iii. Skilled technical manpower is required to install and are rare.

iv. It is not prefer to use hillside area; like up and down field connection among stations.

Radio Wave

Radio waves are a type of electromagnetic radiation that are used for wireless communication. They are a form of energy that travels through the air and can be used to transmit information over long distances without the need for physical cables.

Radio waves have a wide range of frequencies, from a few kilohertz to several gigahertz. They are commonly used for radio broadcasting, mobile communication, Wi-Fi, and other wireless networking technologies.

Advantages

a) Radio waves allow for wireless transmission of data, which eliminates the need for physical cables, making it more flexible and mobile.
b) Radio waves can be transmitted over long distances without the need for physical cables, which makes it ideal for remote communication and sensing applications.
c) Radio wave technology is often less expensive than other forms of transmission media, such as fiber optic cables or satellite technology.

Disadvantages

a) Radio waves are susceptible to interference from other devices operating in the same frequency range, which can reduce the quality of the signal and affect performance.
b) If you have a large amount of radio waves people say it can cause disorders like cancer, leukemia.

Microwave System

Microwave systems are a type of wireless communication technology that use high-frequency electromagnetic waves to transmit data over long distances. These systems typically operate in the range of 1-300 GHz and use a directional antenna to transmit and receive signals.

Microwave systems are commonly used for long-distance communication, such as between cell towers, satellite communication, and point-to-point communication between buildings. They are also used in radar systems for detecting and tracking objects.

Advantages:

a) No cables needed
b) Multiple channels available
c) Wide bandwidth

Disadvantages:

a) Line-of-sight will be disrupted if any obstacle, such as new buildings, are in the way
b) Signal absorption by the atmosphere. Microwaves suffer from attenuation due to atmospheric conditions.
c) Towers are expensive to build

Satellite Communication

Satellite communication is a type of wireless communication that uses artificial satellites to transmit and receive data over long distances. These satellites orbit the Earth and act as repeaters, receiving signals from Earth-based transmitters, amplifying them, and retransmitting them back to Earth.

Satellite communication is commonly used for a wide range of applications, including telecommunications, broadcasting, military and government communication, and navigation. It is particularly useful for applications that require long-distance communication, such as between continents or remote areas where physical cables are not practical.

Advantages:

a) High bandwidth
b) Coverage over a large geographical area
c) Can be cheaper over long distances

Disadvantages:

a) Huge initial cost
b) Noise and interference
c) Propagation (Broadcasting) delay

OSI (Open System Interconnection) Reference Model:
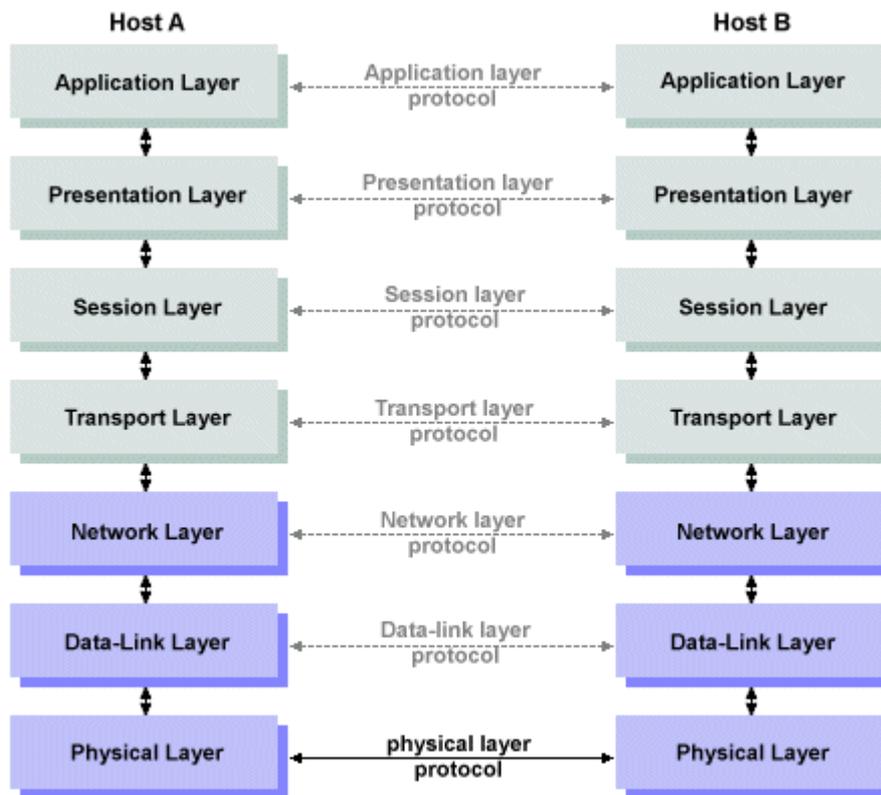
The OSI (Open Systems Interconnection) reference model is a conceptual framework that provides a standard way of understanding and describing the functions of a network communication system. The model is divided into seven layers, each with its own specific set of functions and protocols:

Physical layer: This layer defines the physical means of transmitting data over the network, such as the type of cable, the connectors, and the signaling method.

Data link layer: This layer provides reliable transmission of data over the physical layer by establishing a link between two devices and ensuring that data is transmitted without errors.

Network layer: This layer is responsible for addressing and routing data between devices on different networks.

Transport layer: This layer provides end-to-end communication between devices, ensuring that data is transmitted reliably and efficiently.

Session layer: This layer establishes and manages sessions between applications running on different devices.

Presentation layer: This layer is responsible for formatting and presenting data in a format that can be understood by the receiving device.

Application layer: This layer provides network services to applications running on different devices, such as email, file transfer, and web browsing.

The OSI reference model provides a standard way of understanding the functions of a network communication system and enables different hardware and software components to work together in a standardized way. It also helps to identify and isolate problems within the network communication system, making it easier to troubleshoot and resolve issues.

Network IP Address

An IP address is a numbered address provided to computer and other devices attached to the internet to identity them uniquely.

There are two versions of Internet :

> a. IP Version 4 (IPv4)

> b. IP Version 6 (IPv6)

IPV4 Address

IPv4 address consists of 32 bits and often shown as 4 octets of number from 0-255 represented in decimal.

Every IP address has two parts:

> 1. Identifying the network and

> 2. Identifying the node, or a host.

IPv4 divide networks into five classes

> a. Class A b. Class B c. Class C d. Class D e. Class E
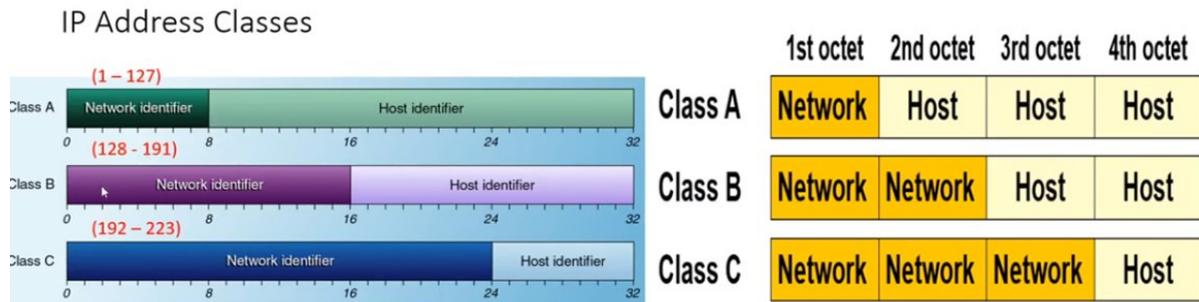
IP Address Classes

First octet decides the class of IP address

Class	Network ID Bits	Host ID Bits	Number of Networks	Number of Hosts
A	8	24	126	16,777,214 Used for large networks
B	16	16	16,384	65,534 Used for medium sized networks
C	24	8	2,097,152	254 Used for small networks

Class	First Bits	First Byte Values
A	0	1–127
B	10	128–191
C	110	192–223

Class A Network

- First Octet can be anywhere from 1 to 126.
- The first octet identifies the network and the remaining 24 bits indicate the host within the network
- Example:
  102.168.212.226 (102 identifies the network and "168.212.226" identifies the host on the network

Class B Network

- First Octet can be anywhere from 128 to 191.
- The two octets (16 bits) identify the network and the remaining 16 bits indicate the host within the network
- Example:
  168.212.226.204 (168.212 identifies the network and "226.204" identifies the host on the network

Class C Network

- First Octet can be anywhere from 192 to 223.
- The first three octet (24 bits) identify the network and the remaining 8 bits indicate the host within the network
- Example:
  200.168.212.226 (200.168.212 identifies the network and "226" identifies the host on the network

Class D Network

- First Octet can be anywhere from 224 to 239.
- The first octet (8 bits) identify the network and the remaining 24 bits indicate the host within the network
- Example:
  225.168.212.226 (225 identifies the network and "168.212.226" identifies the host on the network

Class E Network

- First Octet can be anywhere from 240 to 255.
- They are reserved for future use.

How do you implement Class C IP address in your network?

To implement Class C IP addressing in your network, you can follow these steps:

Determine the network size: Class C addresses are used for small networks, as they allow for a maximum of 254 hosts per network. Determine how many hosts you will need to support on your network and choose a Class C address range accordingly.

Choose an IP address range: Within the Class C range, choose an IP address range that will be used for your network. For example, you might choose the range 192.168.1.0 - 192.168.1.255.

Determine the subnet mask: The default subnet mask for a Class C address is 255.255.255.0, which allows for up to 256 IP addresses (254 usable). However, you can create subnets within

your network by using a different subnet mask. Determine the subnet mask that will work best for your network.

Assign IP addresses: Assign IP addresses to each device on your network, ensuring that each device has a unique IP address within the IP address range you've chosen.

Configure network devices: Configure your network devices, such as routers and switches, with the appropriate IP address settings, subnet masks, and gateway addresses.

Test the network: Once you've configured your network, test it to ensure that all devices are able to communicate with each other and with external networks.

It's important to plan your IP addressing scheme carefully to avoid conflicts and ensure that your network runs smoothly. You may want to consider using DHCP (Dynamic Host Configuration Protocol) to automatically assign IP addresses to devices on your network, which can simplify IP address management.

Unit 3 Web Technology II

JavaScript

JavaScript is a dynamic computer programming language. It is lightweight and most commonly used as a part of web pages, whose implementations allow client-side script to interact with the user and make dynamic pages.

a) JavaScript is a lightweight, cross-platform, and interpreted scripting language.
b) It is well-known for the development of web pages, many non-browser environments also use it.
c) JavaScript can be used for Client-side developments as well as Server-side developments.

Advantages

a) JavaScript executed on the user's browsers not on the webserver so it saves bandwidth and load on the webserver.
b) The JavaScript language is easy to learn it offers syntax that is close to English language.
c) It does not require a compilation process so no compiler is needed user's browsers do the task.
d) JavaScript is easy to debug, and there are lots of frameworks available that you can use and become master on that.

Disadvantages

a) JavaScript codes are visible to the user so user can place some code into the site that compromises the security of data over the website. That will be security issue.
b) All browsers interpret JavaScript that is correct, but they interpret differently to each other.
c) It only supports single inheritance, so in few cases may require the object-oriented language characteristic.
d) A single error in code can totally stop the website's code rendering on the website.

Why JavaScript is to use?

a) Building Websites
b) Web Servers
c) Game Development
d) 3D Drawings
e) Mobile Apps
f) Smartwatch Apps

Where to put JavaScript in an HTML Document?

JavaScript in body or head: Scripts can be placed inside the body or the head section of an HTML page or inside both head and body.

JavaScript in head: A JavaScript function is placed inside the head section of an HTML page and the function is invoked when a button is clicked.

JavaScript in body: A JavaScript function is placed inside the body section of an HTML page and the function is invoked when a button is clicked.

External JavaScript: JavaScript can also be used as external files. JavaScript files have file extension .js.

Client Side and Server-Side Scripting Language

Client-side scripting	Server-side scripting
Runs on the client's web browser	Runs on the web server
Typically written in JavaScript	Can be written in multiple languages such as PHP, Python, Ruby, etc.
Used to enhance user experience on the client-side	Used to generate dynamic web pages on the server-side
Executes on the client's device and does not require a server response for every action	Executes on the server and requires a server response for every action
Can be viewed and manipulated by the client	Cannot be viewed or manipulated by the client
Limited access to system resources and data	Has access to server resources and databases
Examples: validating forms, creating animations, and DOM manipulation	Examples: database queries, user authentication, and generating dynamic HTML content

JavaScript Practical Programs

1. Develop a program in JavaScript to exchange/swap the values of any two variables.

```
<script>

    // Declare two variables

    var a = 10;

    var b = 20;

    // Display the original values

    document.write('Before swapping: a = ' + a + ', b = ' + b);

    // Swap the values using a temporary variable

    var temp = a;

    a = b;

    b = temp;

    // Display the swapped values

    document.write('After swapping: a = ' + a + ', b = ' + b);


</script>
```

Before swapping: a = 10, b = 20

After swapping: a = 20, b = 10

2. Write a JavaScript to find the factorial of n number using function.

```
<script>

        let n=5;
        let i;
        let fact=1;
        for (i=1; i<=n; i++)
        {
            fact=fact*i;
        }
        document.write("Factorial of given number is "+fact);
</script>
```

3. JavaScript Form Validation

```html
<html>
<head>
<script>
function validateForm() {
  let x = document.getElementById('fname').value;
  if (x == "") {
    alert("Name must be filled out");
  }
}
</script>
</head>
<body>
<h2>JavaScript Validation</h2>
<form name="myForm" action="" onsubmit="return validateForm()" method="post">
```

```html
  Name: <input type="text" id="fname">
  <input type="submit" value="Submit">
</form>
</body>
</html>
```

OR

```html
<html>
<head>
    <title>Document</title>
</head>
<body>
    <form action="">
    <label for=""> First Name</label>
    <input type="text" id="name">

    </form>
    <button onclick="validate()"> Submit Now </button>
    <h3 id="show"> ok </h3>
    <script>
        function validate()
        {
        let firstname=document.getElementById("name").value;
        if(firstname=="")
        {
            window.alert("Enter the Value !");
        }


        }

    </script>
</body>
</html>
```

4. **Write a function to add any two numbers in JavaScript.**

```
<script>

    function add(a, b)
    {
     let c = a + b;
     return c;
    }
    document.write(add(10,20));
</script>
```

PHP

PHP (Hypertext Preprocessor) is a popular server-side scripting language that is primarily used for web development. It is an open-source language that was originally created in 1994 by Rasmus Lerdorf.

PHP is often used in conjunction with HTML to create dynamic web pages and web applications.

Advantage of using php

Easy to Learn: PHP is a simple language to learn, especially for developers who have prior experience with C, Java or Perl. It has a simple and intuitive syntax, and it is easy to get started with.

Open-Source: PHP is an open-source language, which means that it is free to use and modify. It also has a large and active community of developers who contribute to its development, update its libraries and provide support.

Platform Independent: PHP can run on multiple operating systems, including Windows, Linux, and macOS. This makes it easy to deploy PHP applications on a variety of platforms and servers.

Large Community and Resources: PHP has a large and active community of developers, which means that there is a wealth of resources available online, including documentation, tutorials, and forums. This makes it easy to get help when you need it.

Scalable: PHP is highly scalable, and it can handle large volumes of traffic without compromising performance. It is also easy to add new features and functionality to PHP applications as they grow and evolve.

Fast Development: PHP has a range of frameworks and libraries that make it easy to develop web applications quickly. This means that developers can build applications faster, which can reduce development costs and time to market.

Integration with Databases: PHP can integrate with a wide range of databases, including MySQL, PostgreSQL, and Oracle. This makes it easy to build dynamic web applications that store and retrieve data from databases.

PHP has several built-in data types, including:

String: A string is a sequence of characters enclosed in single or double quotes.

      Example: $name = "John Doe";

Integer: An integer is a whole number, either positive or negative.

      Example: $age = 25;

Float: A float is a decimal number.

Example: $price = 9.99;

Boolean: A boolean represents a true or false value.

Example: $is_valid = true;

Array: An array is a collection of values, indexed by keys or numeric indices.

Example: $colors = array("red", "green", "blue");

Object: An object is an instance of a class.

Example: $car = new Car();

NULL: NULL is a special value that represents a variable with no value assigned to it.

Example: $city = NULL;

PHP Loops

In PHP, there are four types of loops available: for, foreach, while, and do-while. These loops allow you to execute a block of code repeatedly, based on a condition or a set of conditions. Here are some examples of how to use each of these loops in PHP:

Foreach loop: A foreach loop is used to iterate over the elements in an array.

```
EG:

$fruits = array("apple", "banana", "cherry");

foreach ($fruits as $fruit) {

  echo $fruit;

}
```

Practical PHP

Basic Program in php

```php
<?php

    $num1 = 10;

    $num2 = 5;

    $sum = $num1 + $num2;

    $diff = $num1 - $num2;

    $prod = $num1 * $num2;

    $quot = $num1 / $num2;

    echo "Sum: " . $sum . "<br>";

    echo "Difference: " . $diff . "<br>";

    echo "Product: " . $prod . "<br>";

    echo "Quotient: " . $quot;

?>
```

PHP Database Connection

Connecting to a database in PHP requires the use of the appropriate functions and credentials to establish a connection. Here's an example of how to connect to a MySQL database using PHP:

```php
<?php
// database credentials
$servername = "localhost";
$username = "username";
$password = "password";
$dbname = "database_name";
// create connection
$conn = mysqli_connect($servername, $username, $password, $dbname);
// check connection
if (!$conn) {
    die("Connection failed: " . mysqli_connect_error());
}
echo "Connected successfully";
?>
```

Creating database in PHP Mysql

```php
<?php
// database credentials
$servername = "localhost";
$username = "username";
$password = "password";
// create connection
$conn = mysqli_connect($servername, $username, $password);
// check connection
if (!$conn) {
    die("Connection failed: " . mysqli_connect_error());
}
// create database
$sql = "CREATE DATABASE myDatabase";
if (mysqli_query($conn, $sql)) {
    echo "Database created successfully";
} else {
    echo "Error creating database: " . mysqli_error($conn);
}
// close connection
mysqli_close($conn);
?>
```

Unit 4 C Programming

Introduction of C

[Note: theories from c before 'function' is just for revision from grade XI]

a) C is a powerful general-purpose programming language. It is fast, portable and available on all platforms.
b) If you are new to programming, C is a good choice to start your programming journey.
c) This is a comprehensive guide on how to get started in C programming language, why you should learn it and how you can learn it.
d) C is a general-purpose programming language used for wide range of applications from Operating systems like Windows and iOS to software that is used for creating 3D movies.
e) C programming is highly efficient. That's the main reason why it's very popular despite being more than 40 years old.
f) Standard C programs are portable. The source code written in one system works in another operating system without any change.

C token

C tokens are the basic buildings blocks in C language which are constructed together to write a C program.Each and every smallest individual units in a C program are known as C tokens.

C tokens are of six types. They are

1.	Keywords	(eg: int, while)
2.	Identifiers	(eg: main, total)
3.	Constants	(eg: 10, 20)
4.	Strings	(eg: "total", "hello")
5.	Special symbols	(eg: (), {})
6.	Operators	(eg: +, /,-,*)

Operators

The data item which acts upon operator are called operands. The portion which indicates the action to be performed on operands is called operators.

There are different types of operators

a) Arithmetic operators b) Relational operators

c) Equality operator d) Logical operators

e) Assignment operatorsf) Unary operators

g) Conditional operatorsh) Size of the operator

i) Comma operator

Control Structure

A statement that is used to control the flow of execution in a program is called a control structure.

It combines instruction into a logical unit. The logical unit has one entry point and one exit point.

Types of control structures

- Sequence
- Selection
- Repetition/Looping/Iteration

a.   Sequence

Statements are executed in a specified order. No statement is skipped and no statement is

executed more than once.

b.   Selection

It selects a statement to execute on the basis of condition. Statement is executed when the condition is true and ignored when it is false. Eg. if, if else, switch structures.

Syntax:

if (condition)

{

instruction1;

}

else

{

instruction2;

}

C.   Looping/Iteration/ Repetition

In this structure the statements are executed more than one time. It is also known as iteration or loop.Eg. while loop, for loop,do-while loops etc

Differences between for loop and while loop

SN	for loop	while loop
1	It is known as definite loop.	It may not be definite or indefinite.
2	The loop expression is within a block.	The loop expression is scattered throughout the program.
3	It uses keyword for.	It uses keyword while.
4	It contains three expressions.	It contains only one expression.
5	Syntax: for (initialization; condition; increment/decrement) { statement;	Syntax Initialization; while (condition) { statement; increment/decrement; }

}	

Difference between break & continue

SN	Break	Continue
1.	It's keyword is break	It's keyword is continue
2.	The loop expression is terminate after break.	The loop expression is not terminate after continue.
3.	Syntax break; statement;	Syntax continue; statement;

4.	Example:
	int n;
	for (n=0;n<10;n++)
	{ if(n==2) break;
	printf("%d",n);
	}
		Example:
		int n;
		for (n=0;n<10;n++)
		{
		if(n==2) continue; printf("%d",n);
		}

5.	Output: 0 1	Output: 0 1 3 4 5 6 7 8 9

Differences between while loop and do while loop.

SN	while	do while
1.	It is entry control loop	It is exit control loop
2.	condition is checked before execution	condition is checked at the end of loop
3.	never execute loop if condition is false	executes false condition at least once since condition is checked later
4.	there is no semicolon at the end of while statement	there is semicolon at the end of while statement.

5.	Syntax initialization; while (condition)
	{
	statement; increment/decrement;
	}
		Syntax initialization; do
		{
		statement; increment/decrement;
		} while (condition);

6.	Example:	Example:
	int n=1;	int n=1; do
	while (n<10)	{
	{	printf("Nepal");
	printf("Nepal");	n++;
	n++;	} while (n<10);
	}	

Array

An array is a collection of similar data type which is stored in consecutive memory location in a single variable. It is a derived data type in C, which is constructed from fundamental data type of C language. The individual values in an array are called elements. If it contains int data type, then all the data of the array must be int, if float then all the data must be float.

Advantage of array

- **Code Optimization**: Less code is required, one variable can store numbers of value.
- **Easy to traverse data:** By using array easily retrieve the data of array.
- **Easy to sort data**: Easily short the data using swapping technique
- **Random Access**: With the help of array index you can randomly access any elements from array.

Types of Array

There are two types array

a.   One dimensional array

An array which has only one subscript is known as one dimensional array. We must define the type of array name and dimension of the array.

> *Syntax:*
>
> *data_type arrayname[size];*
>
> *Example 3*
>
> *int marks[200];*
>
> *char name[20];*

b. Two-dimensional array

An array of arrays is known as 2D array. The two dimensional (2D) array is also known as matrix. A matrix can be represented as a table of rows and columns.

> *Syntax:*
>
> *data_type arrayName[SIZE][SIZE];*
>
> *Examples 4*
>
> *int matrix[3][2]; char name[20][10];*

Function [*syllabus starts for grade XII*]

A function is a self-contained subprogram, which is meant to do some specific, well-defined task.

Advantages:

a) Function increases code reusability
b) The length of the source program can be reduced by using functions at appropriate places
c) The program development will be faster
d) The program debugging will be easier
e) Large number of programmer can be involved
f) The program can be developed in short period of time
g) The program can be developed in different places
h) The program can be tested and compiled independently by different member of a programming team

Basically, there are two types of functions in C on basis of whether it is defined by user or not.

Library function:

Library functions are the in-built function in C programming system. For example:

main()

- The execution of every C program starts from this main() function.

printf()

- prinf() is used for displaying output in C.

scanf()

- scanf() is used for taking input in C.

User defined function:

C allows programmer to define their own function according to their requirement. These types of functions are known as user-defined functions. Suppose, a programmer wants to find factorial of a number and check whether it is prime or not in same program. Then, he/she can create two separate user-defined functions in that program: one for finding factorial and other for checking whether it is prime or not. Its types are as follows:

• Function with no arguments and no return value
• Function with no arguments and return value
• Function with arguments but no return value
• Function with arguments and return value.

Library functions	User defined functions
These are Predefined functions.	These are the function which r created by user as per his own requirements.
These are part of header file (such as MATH.h) which is called runtime.	These are part of the program which compile runtime
In this, id of function is given by developers.	In this, the name of function id decided by user

Name of function can't be changed.	In this name of function can be changed any time
Example : SIN, COS, Power, etc.	Example : fibo, mergeme, etc.

Structure

Structure is collection of heterogeneous data items treated as a single unit. Each data item is called member of structure. The keyword struct is used to declare structure variable and type of structure variable is defined by the tag_name of the structure.

Syntax:

struct tag_name

{

data_type member1;

data_type member2;

..

..

..

data_type memberN;

}

struct tag_name var1,var2, var3, .., varM;

Example:

```
struct student
{
    int roll;
    char name[10];
    char address[20];
}
struct student S1, S2, S3;
```

Union

Union is similar to structure but is differs only in its storage location. The union keyword is used to define union. In structure, each member has its own memory block whereas all members of union can share the same memory location. Therefore, union can take less amount of memory than structure and it can access only one member at a time.

Syntax:

union tag_name

{

data_type member1;

data_type member2;

..

..

..

data_type memberN;

}

union tag_name var1,var2, var3, .., varM;

Example:

```
union data

{

    char x;

    int y;

    float z;

} var;
```

Structure	Union
It is the collection of data items of dissimilar data types	Same as structure but it differs in its storage class
Memory size is determined by sum of memories allocated to all the members	Memory size is determined by the memory allocated to the largest member
Multiple members can be simultaneously accessed at a time	Only one member can be accessed at a time.
The struct keyword is used to define structure	The union keyword is used to define union

Syntax:
 	
 struct tag_name
 	
 {
 	
 data_type member1;
 	
 data_type member2;
 	
 ..
 	
 data_type memberN;
 	
 }
	Syntax:
	
	 union tag_name
	
	 {
	
	 data_type member1;
	
	 data_type member2;
	
	 ..
	
	 data_type memberN;
	
	 }

Example: struct student { int roll;	Example: union data { char x;

char name[10];	int y;
char address[20];	float z;
}	}
Struct student S1, S2, S3;	var;

Difference between array and structure

Array	Structure
It is the collection of data items having similar data types	It is the collection of data items having dissimilar data types.
Each data type item is called elements	Each data item is called member
It is built in data type	It is user defined data type
It is not possible to define array of array or structure of array	It is possible to define array of structure

Syntax:
 	
data_type array_name[size];
	Syntax:
	
	struct tag_name
	
	{
	
	data_type member1;
	
	data_type member2;
	
	..
	
	data_type memberN;
	
	}

Example:
 	
Int x[10];
	Example:
	
	struct student
	
	{
	
	int roll;
	
	char name[10];
	
	char address[20];
	
	}
	
	Struct student S1, S2, S3;

Practical C:

1. Write a program in C to store mark obtained by 'n' students and count the number of students who obtained mark greater than 70. Also count the number of students who are failed. (<35)

```
#include<stdio.h>

#include<conio.h>
```

```c
void main()
{
    int n,i,c=0,cf=0;
    float m[100];
    printf("\nEnter how many students?");
    scanf("%d",&n);
    printf("\n Enter marks for %d students: ",n);
    for(i=0;i<n;i++)
    scanf("%f",&m[i]);
    for(i=0;i<n;i++)
    if(m[i]>70)
    c=c+1;
    else if(m[i]<35)
    cf=cf+1;
    printf("\n Total no. of students scoring more than 70 are %d ",c);
    printf("\nTotal no. of students who are fail are %d ",cf);
}
```

2. Write a C Program to enter name of students and age of ten different students in array and arrange them in descending order according to the age and print them.

```c
#include<stdio.h>
#include<conio.h>
#include<string.h>
struct student
{
    char name [25];
    int age;
}std[10];

void main()
{
    char temp[25];
    int i,j,tm;
    printf("Enter 10 names and age of students\n");
```

```c
    for(i=0;i<10;i++)

    {

        scanf("%s",std[i].name);

        scanf("%d",&std[i].age);

    }

    for(i=0;i<10;i++)

    {

        for(j=i+1;j<10;j++)

        {

            if(std[i].age<std[j].age)

            {

                tm=std[i].age;

                std[i].age=std[j].age;

                std[j].age=tm;

                strcpy(temp,std[i].name);

                strcpy(std[i].name,std[j].name);

                strcpy(std[j].name,temp);

            }

        }

    }

    printf("\nThe sorted names and age in descending order according to
age are\n");

    for(i=0;i<10;i++)

    printf("\n%s\t%d",std[i].name,std[i].age);

}
```

3. Write a program to find the sum of n integer numbers using function.

```c
        #include<stdio.h>

        #include<conio.h>

        int sum(int);

        void main()

        {

            int n,a;

            printf("\nEnter how many numbers: ");

            scanf("%d",&n);
```

40

```c
        a=sum(n);

        printf("\n Sum of %d numbers= %d",n,a);

    }

    int sum(int n)

    {

        int i,s=0;

        for(i=1;i<=n;i++)

        s=s+i;

        return s;

    }
```

4. Write a program to calculate the factorial of a given number using function.

```c
    #include<stdio.h>

    #include<conio.h>

    int fact(int);

    void main()

    {

        int n,a;

        printf("\nEnter any number: ");

        scanf("%d",&n);

        a=fact(n);

        printf("\n factorial= %d",a);

    }

    int fact(int n)

    {

        int i,f=1;

        for(i=1;i<=n;i++)

        f=f*i;

        return f;

    }
```

5. Write a program to calculate the factorial of a given number using recursive function.

```c
    #include<stdio.h>

    #include<conio.h>

    int fact(int);
```

```c
void main()
{
    printf ("Enter any number: ");
    scanf("%d",&n);
    a=fact(n);
    printf("\n factorial= %d",a);
}
int fact(int n)
    {
    if(n<=1)
    return 1;
    else
    return(n*fact(n-1));
    }
```

6. Write a program that reads different names and addresses into the computer and rearrange them into alphabetical order using the structure variables.

#include<stdio.h>

```c
#include<conio.h>
#include<string.h>
struct student
{
    char name[30];
    char add [30];
}std[100];

void main()
{
    char tname[30],tadd[30];
    int i,j,n;
    printf("\n Enter how many students: ");
    scanf("%d",&n);
    printf("Enter names and addresses for %d srudents: ",n);
    for(i=0;i<n;i++)
    scanf("%s%s",std[i].name, std[i].add);
```

```c
        for(i=0;i<n;i++)
        {
            for(j=i+1;j<n;j++)
            {
                if (strcmp(std[i].name,std[j].name)>0)
                {
                strcpy(tname,std[i].name);
                strcpy(std[i].name,std[j].name);
                strcpy(std[j].name,tname);
                strcpy(tadd,std[i].add);
                strcpy(std[i].add,std[j].add);
                strcpy(std[j].add,tadd);
                }
            }
        }
    printf("\n Sorted names in alphabetical order according to names
    are:\n");
    for(i=0;i<n;i++)
    printf("\n %s\t %s",std[i].name,std[i].add);
    }
```

7. Write a program to show data writing and reading operation to/from a data file.

```c
    #include<stdio.h>
    #include<conio.h>
    struct
    {
        int roll;
        char name[25];
        float mark;
    }std;
    void main()
    {
        int n,i;
        FILE *fp;
        fp=fopen("student.txt","w");
```

```c
        printf("\n Enter how many records: ");

        scanf("%d",&n);

        printf("enter student number name and marks for %d
    students",n);

        for(i=0;i<n;i++)

        {

            scanf("%d%s%f",&std.roll,std.name,&std.mark);

            fwrite(&std,sizeof(std),1,fp);

        }

        fclose(fp);

        fp=fopen("student.txt","r");

        printf("\nRoll\tName\tMarks Obtained\n");

        while(fread(&std,sizeof(std),1,fp))

            printf("%d\t%s\t%f\n",std.roll,std.name,std.mark);

        fclose(fp);

    }
```

8. **Write a program to enter name, roll-number and marks of 10 students and store them in a file display.**

```c
# include<stdio.h>

# include<conio.h>

struct

{

    int roll;

    char name[25];

    float mark;

}std;


void main()

{

    int i;

    FILE *fp;

    fp=fopen("student.txt","w");

    printf("enter student roll number name and marks for 10 students");

    for(i=0;i<10;i++)
```

```c
    {
        scanf("%d%s%f",&std.roll,std.name,&std.mark);
        fwrite(&std,sizeof(std),1,fp);
    }
    while(fread(std, sizeof(std),1,fp)!=NULL)
    {
        printf ("%d \t %s \t %f \n", std.roll, std.name. std.mark);
    }
    fclose(fp);

}
```

9. Write a program to store std-no, name and mark of 'n' students in a data file. Display the records in appropriate format reading from the file.

```c
#include<stdio.h>
#include<conio.h>
struct
{
    int roll;
    char name[25];
    float mark;
}std;
void main()
{
    int n,i;
    FILE *fp;
    fp=fopen("student.txt","w");
    printf("\n Enter how many records: ");
    scanf("%d",&n);
    printf("enter student number name and marks for %d students",n);
    for(i=0;i<n;i++)
    {
        scanf("%d%s%f",&std.roll,std.name,&std.mark);
        fprintf(fp,"%d\t%s\t%f\n",std.roll,std.name,std.mark);
    }
```

45

```c
        fclose(fp);
        fp=fopen("student.txt","r");
        printf("\nRoll\tName\tMarks Obtained\n");
        while(fscanf(fp,"%d%s%f",&std.roll,std.name,&std.mark)!=EOF)
            printf("%d\t%s\t%f\n",std.roll,std.name,std.mark);
        fclose(fp);
    }
```

10. Write a program to rename and delete a data file using rename and remove command.

```c
        #include<stdio.h>
        #include<conio.h>
        void main()
        {
            char filename[20];
            char oldfilename[20],newfilename[20];
            printf("\n Enter the file name to be removed: ");
            gets(filename);
            if(remove(filename)==0)
                printf("File %s is removed",filename);
            else
                printf("File %s cannot be removed",filename);

            printf("\n Enter old file name: ");
            gets(oldfilename);
            printf("\n Enter new file name: ");
            gets(newfilename);

            if(rename(oldfilename,newfilename)==0)
                printf("\n File %s is renamed to %s",oldfilename, newfilename);
            else
                printf("\n file %s cannot be renamed",oldfilename);
        }
```

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Unit-5 Object Oriented Programing

Object Oriented Programming (OOP)

OOP technique allows us to decompose a complex and large problem into a number of entities called objects and then builds data and functions around these objects. The data cannot be accessed directly, they are only accessible through member function. OOP provides the best ideas of structured programming and combined them with several powerful new concepts that encourage us to perform task of programming in new way. The data structure is designed such a way that they characterized the object. All the data is hidden in OOPs and cannot be accessed by external functions. The objects may communicate with each other through function. The new data and functions can be added easily in OOPs. It follows bottom up approach in program design.

Advantages of OOP

a) It is very easy for **managing** complex and large programs.
b) The codes can be reused through inheritance feature of OOP.
c) The individual objects and functions code can be tested debug separately.
d) It supports bottom-up approach in program designing.
e) It takes very less time for the development and maintenance of the program.
f) We can eliminate redundant codes through inheritance.
g) It can be implemented in the field of object-oriented database management system.
h) We can eliminate redundant codes by using inheritance feature of OOP.
i) It is very easy for managing complex and large size problems.
j) The most important is the reusability of codes by using the features inheritance.
k) It takes very less time for the development and maintaining the software.
l) It is efficient for testing and implementation of the system.

Features of OOP

a) Object
b) Class
c) Data Abstraction and Encapsulation
d) Inheritance
e) Polymorphism
f) Here are some of the key differences between OOP and POP:

Object-Oriented Programming (OOP)	Procedure-Oriented Programming (POP)
Programs are based on objects that encapsulate data and behavior.	Programs are based on procedures or functions that perform specific tasks.
Emphasis is on data and its manipulation as objects with properties and methods.	Emphasis is on the sequence of procedures and functions that perform a task.
Supports concepts such as inheritance, polymorphism, and encapsulation.	Does not support the concepts of inheritance, polymorphism, or encapsulation.
Programs are easier to maintain, modify and extend.	Programs can be difficult to maintain, modify and extend as the code can be lengthy and complex.
Code is reusable as objects can be used in other parts of the program or in other programs.	Code may not be as reusable as procedures or functions are specific to the task they perform.
OOP languages include C++, Java, Python, and Ruby.	POP languages include C, Fortran, Pascal, and BASIC.

Application of OOP

a) Object Oriented Database Management System
b) Internet and Web Development
c) Mobile Apps Development like Android, iOS apps
d) Data Warehouse and Data Mining
e) Digital Electronics
f) Computer Aided Design and Manufacturing
g) Image Processing and Pattern Recognition

Object

An object is any entity, thing or organization that exits in real world.

- An Object is an instance (representative) of a class. Classes are created to define objects
- An object is a software bundle of variables and related methods

Classes

A class is a blueprint or template for creating objects that have similar properties and behavior.

- Classes provide the structure for objects
- Set of attributes represented by variables and properties
- A class defines the methods and types of data associated with an object

Inheritance

The process of creating a new class form an existing class in which objects of the new class inherit the attributes and behaviors of the existing class is known as inheritance.

- A class can extend another class, inheriting all its data members and methods
- A class can implement an interface, implementing all the specified methods
- Inheritance implements the relationship between Objects.

Data abstraction: Abstraction is the act of representing essential features without including the background details. It focuses the outside view of an object, separating its essential behavior from its implementation.

Encapsulation: Encapsulation is a fundamental concept in object-oriented programming (OOP) that refers to the practice of bundling data and behavior (methods) that operate on that data within a single unit, known as a class. Encapsulation allows for the data to be hidden from external access and modification, and instead only be accessed and manipulated through the methods of the class.

Polymorphism

Polymorphism is a concept in object-oriented programming that allows objects of different classes to be used interchangeably. It means that an object can take on many forms, depending on the context in which it is used.

Unit 6 Software Process Management

Software Project

The complete Procedure of software development from requirement gathering to testing and maintenance, carried out according to the execution methodologies, in a specified period of time to achieve intended software product

Concept of Software Development Process

Term Which describes the complete process of developing a software product. Most Development processes include the following activities:

1. Needs Identification
2. Requirement analysis
3. Design
4. Development & Implementation
5. Testing
6. Deployment and maintenance

SDLC (Software Development lifecycle)

Software Development Life Cycle (SDLC) is a process used by the software industry to design, develop and test high quality software.

Importance and Necessity of SDLC

a) It breaks down the entire life cycle of software
b) The development makes it easier to evaluate each part of software development
c) It also makes it easier for a programmer to work concurrently on each phase
d) Provide a rough time when the software will be available for use.

The system development life cycle is a project management model that defines the stages involved in bringing a project from start to completion.

System Study/Planning

-Study of Project

-Find out the scope of the problem and determine solutions.

- Resources, costs, time, benefits and other items should be considered at this stage.

System Analysis

SYSTEMS ANALYSIS IS "THE PROCESS OF STUDYING A PROCEDURE TO IDENTIFY ITS GOAL AND PURPOSES.

Feasibility Study

- Feasibility study explores system requirements to determine project feasibility.
- The goal is to determine whether the system can be implemented or not.

Types of Feasibility Study

- Technical Feasibility
- Operational Feasibility
- Economic Feasibility
- Legal Feasibility
- Schedule feasibility

- Resources feasibility

System Design

- Most Creative and challenging phase of the system life cycle.
- The flow of data processing is developed into charts and diagrams.
- Blue Print of System

System Designing tools

- Algorithms
- Flowchart
- Pseudocode
- Context Diagram
- Data flow diagram
- ER Diagram
- Decision Tree
- Decision Table
- Use Case
- UML

System Development

- Once the system design phase is over, the next phase is coding.
- In this phase, developers start build the entire system by writing code using the chosen programming language.
- In the coding phase, tasks are divided into units or modules and assigned to the various developers.
- It is the longest phase of the Software Development Life Cycle process.

Testing

- In this Phase the testing team starts testing the functionality of the entire system
- During this phase, QA and testing team may find some bugs/defects which they communicate to developers.
- This process continues until the software is bug-free, stable, and working according to the business needs of that system.

Types of System Testing

- Black box Testing
- White box Testing
- Unit Testing
- Integration Testing
- Functional Testing

System Implementation

- Deployment
- User Training
- Site Preparation
- File conversion

Types of System Implementation

- Parallel
- Phased
- Direct
- Pilot

System Maintenance

The process of monitoring, evaluating, and modifying of existing information systems to make required or desirable improvements.

Roles and Responsibilities of SA

Duties and Responsibilities of System Analysts:

The duty of the system analyst is to co-ordinate the efforts of all groups to effectively develop and operate computer-based information systems. The major duties and responsibilities of a system analyst are as follows:

a. Defining User's Requirements:

This particular duty is the most difficult and analyst will have to use several fact-finding techniques like interview, questionnaire, observation and automation.

b. Prioritizing requirements by agreement:

By conducting common meeting and arriving at a agreement or consensus, analyst can prioritize the requirements.

c. Analysis and Evaluation:

On the basis of facts and opinions, system analyst finds the best characteristics of the new or modified system which will meet the user's stated information needs.

d. Solving Problems:

System analyst is basically a problem solver. He must study the problem in depth and suggest alternate solutions to management.

e. Drawing up functional specifications:

The main duty of the analyst is to obtain the functional specifications of the system to be designed and specification must be non-technical so that users and managers can understand.

f. Designing System:

One of the major duties of the analyst is to design the system and it must be understandable to the system implementer.

g. Evaluating System:

It is analyst critical duty to evaluate a system after it has been in operation for certain period of time.

Role of a System Analyst:

Success of every development depends on the role of system analyst. The major roles of system analyst are:

- Plan and develop new system or device ways to apply existing system resources to additional operations.
- Keep constant track of the system and constant interaction with management, middle level manager and working level personnel to achieve the logical and accurate perspective of the system.
- Use techniques like structured analysis, data modeling, information engineering, mathematical model building, sampling and cost accounting to plan the system.
- Specify the inputs to be accessed by the system design the processing steps and format the output to meet the users need.

- Prepare the cost benefit and return on investment analysis to help the management decide whether implementing the propose system will be financially feasible.
- Co-ordinates tests and observes initial use of the system to ensure that it performs as planned.
- Prepare specification, work diagrams and structure charts for computer programmers to follow and then work with them to 'debug' or eliminate errors from the system.
- Diagnose problems, recommend solutions and determine if the program requirements have been met.

Feasibility Study

Feasibility analysis is the study of whether the system is feasible or not to design. It consists of different level of feasibility analysis like technical feasibility, economic feasibility, operational feasibility, legal feasibility and behavior feasibility.

Types of feasibility analysis

Technical feasibility analysis

It deals with the availability of the technical components like hardware, software, technical manpower and the technical equipment's for the complete development of the system. It consists of different technical devices like uninterruptible power supply, network devices and internet connections.

Economic feasibility analysis

It deals with the approximate cost for the development of the system, operational cost for the system and the benefit from the system. It is also known as cost benefit analysis.

Operational feasibility analysis

It deals with the smooth operation of the system. The smooth operation of the system includes different factors like accuracy, time, security, services, efficiency and response time. The system should be user friendly and reliable.

Behavior feasibility analysis

It deals with the behavior of the users and the society towards the newly developed system. Whether the newly developed system is feasible to upgrade the existing system or not.

Legal feasibility analysis

It deals with the legal issue of the system. If the system is illegal then the system design is meaningless. So, system design should be legal to implement. It consists of different laws like copyright law, foreign trade law, tax, etc.

System Development Models / SDLC

Waterfall Model

The waterfall model is a linear sequential software development approach that follows a systematic, sequential design process. It is a traditional approach to software development that has been used for decades.

The waterfall model consists of the following phases, each of which must be completed before moving on to the next:
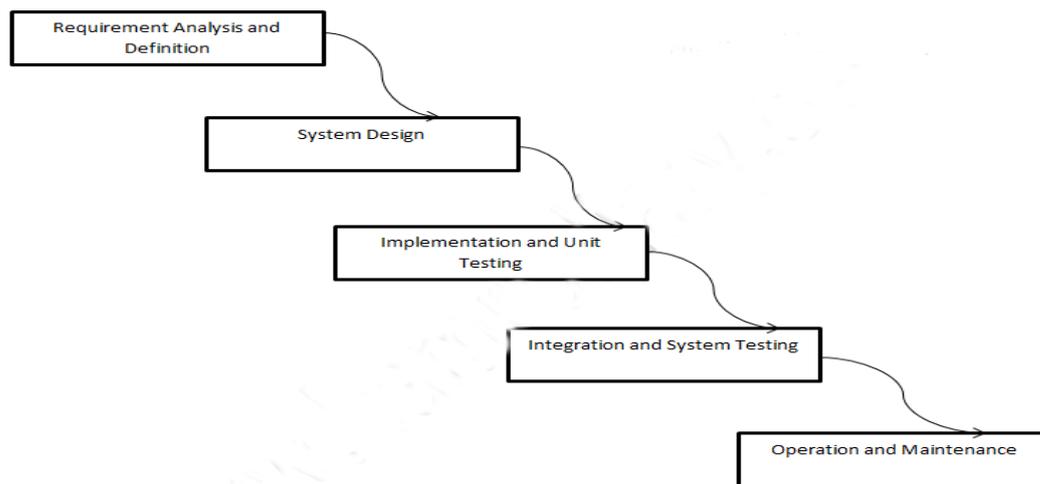
Fig: Waterfall Model

Requirements gathering and analysis: This phase involves gathering and analyzing the requirements for the software. It includes identifying the stakeholders, gathering their requirements, and analyzing the feasibility of the project.

Design: In this phase, the software is designed based on the requirements identified in the first phase. This includes developing a software architecture, creating a detailed design of the software, and specifying the hardware and software requirements.

Implementation: In this phase, the software is developed and implemented based on the design specifications. The coding and testing of individual software components are carried out in this phase.

Testing: In this phase, the software is tested to ensure that it meets the requirements and specifications outlined in the first two phases. This includes testing individual components of the software, as well as the system as a whole.

Deployment: In this phase, the software is deployed to the production environment, and the users begin to use it.

Maintenance: Once the software has been deployed, it requires ongoing maintenance to ensure that it continues to meet the changing needs of the users and the organization. This includes fixing any bugs, addressing any performance issues, and adding new features as needed.

Agile Model

The Agile model is an iterative and incremental software development approach that emphasizes flexibility, collaboration, and customer satisfaction. It is a modern software development methodology that is widely used in the industry today.

The Agile model consists of the following phases:

Requirements: In this phase, the project team identifies the requirements, defines the scope of the project, and develops a plan for the project.

Design: In this phase, the project team designs the software based on the requirements identified in the planning phase.

Development: In this phase, the project team develops the software using an iterative and incremental approach. The software is developed in small, incremental pieces, with each piece being tested and integrated into the system as it is developed.

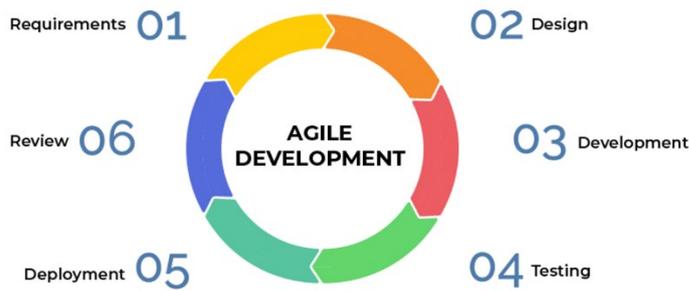**Testing**: In this phase, the software is tested to ensure that it meets the requirements and specifications outlined in the planning phase.

Deployment: In this phase, the software is deployed to the production environment, and the users begin to use it.

Maintenance: Once the software has been deployed, it requires ongoing maintenance to ensure that it continues to meet the changing needs of the users and the organization. This includes fixing any bugs, addressing any performance issues, and adding new features as needed.

The Agile model is an iterative and incremental approach, which means that the software is developed in small, incremental pieces, with each piece being tested and integrated into the system as it is developed.

Prototype Model

The Prototype model is a software development approach that involves creating an initial, working version of the software as quickly as possible. The prototype model is often used for projects where the requirements are not well understood or where there is a high degree of uncertainty.

Fig: Prototype Model
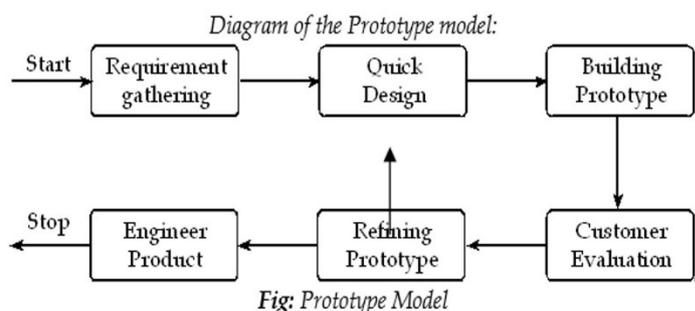
The Prototype model consists of the following phases:

Requirements gathering: In this phase, the project team identifies the requirements for the software and develops a rough plan for the project.

Prototype design: In this phase, the project team develops a basic design for the prototype, which includes the key features and functionality of the software.

Prototype construction: In this phase, the project team builds the prototype using the design specifications developed in the previous phase. The prototype is built quickly and with a minimum of documentation.

Prototype testing: In this phase, the project team tests the prototype to ensure that it meets the requirements and specifications outlined in the first phase. The prototype is tested by both the development team and the users.

Refinement: Based on the feedback received during the testing phase, the project team refines the prototype, adding new features and functionality, and addressing any issues that were identified during testing.

Deployment: Once the prototype has been refined and tested, it is deployed to the production environment, and the users begin to use it.

Maintenance: Once the software has been deployed, it requires ongoing maintenance to ensure that it continues to meet the changing needs of the users and the organization.

DFD (Data Flow Diagram)

The dataflow diagram is the diagrammatic representation of the flow of data through a process/system or sub system process. It shows what happens to the data as it goes through a process. Like a flow chart DFD also uses standard symbols and notations.

Fig. Data Flow Diagram
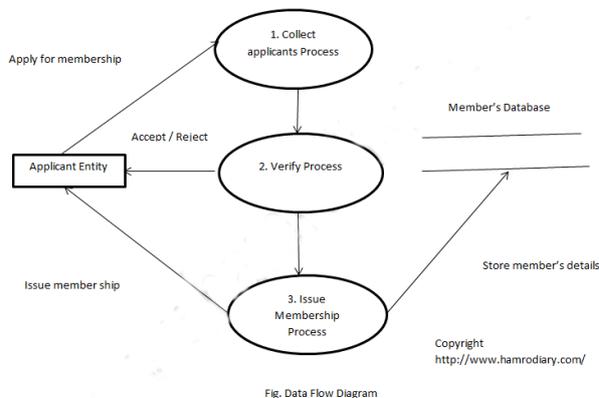
Entity Relationship Diagram (ER Diagram)

The diagrammatic representation of entities attributes and their relationship is described by E-R Diagram. The E-R Diagram is an overall logical structure of a database that can be expressed graphically.

The basic components of ER-Diagram are

Entity – An entity is a thing or object in the real word that is distinguishable from other objects. Example each person is an entity. It is represented by rectangle.

Attribute – Attribute are properties possessed by on entity or relationship. For example, student name, roll no, id card no etc. it is represented by oval.

Relationship – A relationship is an association among several entities and represents meaningful dependences between them. For example, the relationship between student and teacher. It is represented by diamond.

Line – The flow of information is indicated by the lines in ER-Diagram. It is simply a line. It is a connector of entities, attributes and relationship.
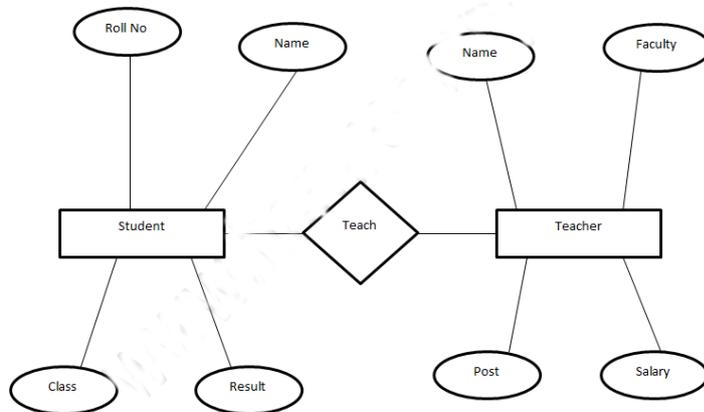
Fig: Entity Relationship Diagram

System Security

System security refers to the protection of computer systems and networks from unauthorized access, theft, damage, or disruption of computer hardware, software

Some of the key components of system security include:

Access control: This ensures that only authorized users can access sensitive data or perform specific actions.

Authentication: This refers to verifying the identity of a user or system before granting access to resources or data.

Encryption: This involves using cryptographic techniques to protect data and communications from unauthorized access. Encryption can be used to protect data at rest or in transit.

Firewalls: Firewalls are software or hardware devices that control traffic between networks and prevent unauthorized access.

Antivirus and anti-malware software: These programs protect systems from viruses, worms, Trojan horses, and other forms of malicious software that can harm or compromise a system.

Regular system updates and patches: This is important for fixing security vulnerabilities in operating systems, applications, and other software components.

Software Quality

Quality software is software that meets the needs and expectations of its users, stakeholders, and the organizations it serves.

Quality software has the following characteristics:

Functionality: The software should perform the tasks for which it was designed accurately and efficiently.

Usability: The software should be easy to use and understand, with a user-friendly interface.

Reliability: The software should be dependable and produce consistent and accurate results, with minimal downtime or errors.

Performance: The software should perform well in terms of speed, responsiveness, and scalability.

Security: The software should be secure from external threats such as hacking, viruses, and data breaches.

Maintainability: The software should be easily maintainable and updatable, with clear and organized code.

Portability: The software should be able to run on different platforms and devices.

Flexibility: The software should be flexible and adaptable to changing user requirements and environments.

Documentation

Documentation is the process of collecting, organizing, storing, and manipulating a complete historical record of program and other documents used or prepared during the different phases of the life cycle of software.

1. Project Documentation

2. User Documentation

3. System Documentation

4. Test Documentation

5. Team Documentation

Unit 7 Recent Trends in Technology

AI

- Artificial Intelligence (AI) is a branch of science which deals with helping machines find solutions to complex problems in a more human-like fashion.
- This generally involves borrowing characteristics from human intelligence, and applying them as algorithms in a computer friendly way.
- It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence

There are several components of AI, including:

1. **Machine learning:** This is a subfield of AI that involves the development of algorithms that enable computers to learn from data and make predictions or decisions without being explicitly programmed.
2. **Natural Language Processing (NLP):** This component of AI focuses on enabling computers to understand, interpret, and generate human language.
3. **Computer Vision:** This area of AI deals with enabling computers to interpret and understand visual information from the world, such as images and videos.

4. **Robotics:** This component of AI involves the design and development of robots and intelligent systems that can perform tasks in a physical environment.
5. **Knowledge representation and reasoning:** This area of AI focuses on how computers can represent and manipulate knowledge, as well as make logical inferences based on that knowledge.
6. **Planning and decision making:** This component of AI involves the development of algorithms that enable computers to make decisions and plan actions based on a given set of objectives and constraints.

Application of AI

Artificial Intelligence (AI) has a wide range of applications in various industries and domains. Some of the most prominent applications of AI include:

1. **Healthcare**: AI is being used to improve patient outcomes, reduce healthcare costs, and enhance the accuracy of diagnoses and treatments. AI-powered tools are being used in areas such as medical imaging, drug discovery, and precision medicine.
2. **Finance**: AI is being used to improve fraud detection, credit scoring, portfolio management, and algorithmic trading.
3. **Retail**: AI is being used to personalize shopping experiences, optimize pricing and inventory management, and improve supply chain efficiency.
4. **Transportation**: AI is being used to optimize logistics, improve traffic management, and develop autonomous vehicles.
5. **Manufacturing**: AI is being used to improve production processes, reduce waste and inefficiencies, and enhance quality control.
6. **Customer service**: AI is being used to improve the efficiency and effectiveness of customer service operations through the use of chatbots and virtual assistants.
7. **Education**: AI is being used to personalize learning, improve student outcomes, and enhance the efficiency of educational systems.
8. **Security**: AI is being used to improve cyber security, enhance physical security, and improve the efficiency of surveillance systems.

ROBOTICS

Robotics is the intersection of science, engineering and technology that produces machines, called robots, that substitute for (or replicate) human actions.

Manufacturing - Robotics is used in factories for tasks such as assembly line production, welding, and packaging.

Healthcare - Robotics is used for surgical procedures, rehabilitation, and assisted living.

Agriculture - Robotics is used for tasks such as harvesting, planting, and monitoring crops.

Construction - Robotics is used for tasks such as bricklaying, demolition, and hazardous material handling.

Logistics and Warehousing - Robotics is used for tasks such as order picking, packing, and transporting goods.

Defense - Robotics is used for tasks such as explosive ordinance disposal, surveillance, and military operations.

Service - Robotics is used for tasks such as cleaning, security, and customer service.

Space Exploration - Robotics is used for tasks such as Mars rovers, satellite maintenance, and space station operations.

Domestic - Robotics is used for tasks such as cleaning, lawn care, and home automation.

Underwater - Robotics is used for tasks such as ocean exploration, monitoring, and oil rig maintenance.

CLOUD COMPUTING

Cloud computing is the delivery of computing services—including servers, storage, databases, networking, software, analytics, and intelligence—over the Internet

Cost Savings: Cloud computing can reduce the need for capital expenditures on hardware, software, and infrastructure, allowing organizations to shift to a more flexible and scalable operating expense model.

Scalability: Cloud computing allows organizations to quickly and easily scale up or down their computing resources as needed, without having to make significant investments in new hardware or software.

Improved Performance: Cloud computing often provides improved performance and reliability compared to traditional on-premise computing solutions, due to the use of highly optimized and scalable infrastructure.

Accessibility: Cloud computing allows for remote access to computing resources from anywhere with an Internet connection, enabling more flexible and mobile working arrangements.

Enhanced Collaboration: Cloud computing can facilitate collaboration by making it easier for team members to access and share files and applications from anywhere.

Disaster Recovery: Cloud computing can provide organizations with improved disaster recovery options, as critical data and applications can be stored and run from the cloud, reducing the risk of data loss in the event of a disaster.

Security: Many cloud computing providers offer advanced security measures, such as encryption, to protect sensitive data and applications, potentially providing a higher level of security than organizations could achieve with their own on-premise infrastructure.

BIG DATA

- Big Data is a collection of data that is huge in volume, yet growing exponentially with time.
- It refers to a massive amount of data that keeps on growing exponentially with time.
- It is so voluminous that it cannot be processed or analyzed using conventional data processing techniques.
- It includes data mining, data storage, data analysis, data sharing, and data visualization.

Advantage of Big Data

Improved Decision Making: With the ability to process and analyze vast amounts of data, organizations can make more informed decisions and respond more quickly to changing conditions.

Increased Efficiency: Big data can help organizations streamline their operations and automate processes, reducing costs and increasing efficiency.

Customer Insights: Big data can provide organizations with deeper insights into customer behavior and preferences, allowing for more targeted marketing and improved customer experiences.

New Product Development: Big data can be used to identify new product and service opportunities, as well as to improve existing offerings.

Fraud Detection: Big data can be used to detect and prevent fraud by analyzing patterns and anomalies in large datasets.

Risk Management: By analyzing large amounts of data, organizations can identify and mitigate potential risks in a more efficient and effective manner.

Competitive Advantage: Big data can provide organizations with a competitive advantage by giving them access to valuable insights and information that can inform business strategy and decision making.

Improved Operations: Big data can be used to optimize supply chain management, improve energy efficiency, and enhance logistics and distribution.

Virtual Reality (VR)

Virtual Reality (VR) refers to a computer-generated simulation of a three-dimensional environment that can be interacted with in a seemingly real or physical way. The user is typically immersed in the environment using a headset or other VR device, allowing them to experience and interact with the virtual world in a lifelike manner.

Some of the key applications of VR include:

Gaming: VR has become a popular platform for gaming, allowing players to immerse themselves in virtual environments and interact with the game in a more natural and intuitive way.

Training and Simulation: VR is being used in a variety of training and simulation applications, including military, medical, and aviation training, as well as architecture and design visualization.

Education: VR is being used to create immersive and interactive learning experiences, allowing students to explore virtual environments and learn in a more engaging and interactive way.

Therapy: VR is being used in the field of mental health to provide therapy for conditions such as anxiety and post-traumatic stress disorder (PTSD).

Marketing and Advertising: VR is being used to create immersive marketing experiences, allowing consumers to engage with products and brands in a more interactive and memorable way.

Remote Collaboration: VR is being used to facilitate remote collaboration, allowing people to meet and work together in a virtual environment, regardless of their physical location.

E-COMMERCE

- E-commerce refers to the buying and selling of goods and services over the internet.
- It has become a popular way for consumers to purchase products and for businesses to reach a larger market.

The most common forms of e-commerce include online retail websites, electronic auctions, and online marketplaces.

Business-to-Consumer (B2C) - This type of e-commerce involves a business selling products or services directly to consumers. Online retail websites, such as Amazon and Walmart, are examples of B2C e-commerce.

Consumer-to-Consumer (C2C) - This type of e-commerce involves individuals selling goods or services to other individuals. Online marketplaces, such as eBay and Etsy, are examples of C2C e-commerce.

Business-to-Business (B2B) - This type of e-commerce involves businesses selling products or services to other businesses. Wholesale suppliers, such as Alibaba and ThomasNet, are examples of B2B e-commerce.

Consumer-to-Business (C2B) - This type of e-commerce involves individuals selling products or services to businesses. Freelance websites, such as Upwork and Fiverr, are examples of C2B e-commerce.

Mobile Commerce (m-commerce) - This type of e-commerce involves the buying and selling of goods and services using mobile devices, such as smartphones and tablets. Mobile retail websites and mobile apps are examples of m-commerce.

Social Commerce - This type of e-commerce involves using social media platforms, such as Facebook and Instagram, to buy and sell products.

E-Governance

E-governance refers to the use of information and communication technologies (ICTs) to improve the delivery of government services, increase citizen engagement, and enhance the overall effectiveness and transparency of governance processes.

The following are some of the key reasons why e-governance is important:

Improved Service Delivery: E-governance can help improve the delivery of government services by making it easier for citizens to access information and complete transactions online. This can increase efficiency, reduce corruption, and improve the overall quality of government services.

Increased Citizen Engagement: E-governance can increase citizen engagement by providing a platform for citizens to share their opinions, provide feedback, and participate in governance processes.

Enhanced Transparency: E-governance can enhance transparency by making government processes and data more accessible to citizens, reducing the risk of corruption and improving accountability.

Better Data Management: E-governance can improve data management by digitizing government records and making them more easily accessible and searchable.

Streamlined Processes: E-governance can streamline government processes by automating manual tasks, reducing the need for paper-based transactions, and improving the overall efficiency of governance processes.

Improved Access to Information: E-governance can improve access to information by making government data and information more readily available to citizens, allowing for more informed decision making and public participation.

MOBILE COMPUTING

Mobile computing refers to the use of computer technology and internet connectivity on mobile devices such as smartphones, tablets, and laptops.

Business: Mobile computing has transformed the way businesses operate, by enabling employees to work from anywhere and access company data and applications on the go.

Healthcare: Mobile computing has improved the delivery of healthcare services, allowing doctors and nurses to access patient information and perform remote consultations using smartphones and tablets.

Education: Mobile computing has revolutionized the way students learn, by providing access to online educational resources and allowing teachers to create and distribute multimedia content.

Entertainment: Mobile computing has transformed the way people consume entertainment, by allowing them to stream videos, music, and games on their mobile devices.

Retail: Mobile computing has changed the way people shop, by providing access to online shopping platforms and allowing retailers to offer mobile-based loyalty programs and personalized recommendations.

Transportation: Mobile computing has improved the efficiency of transportation systems, by providing real-time traffic information, enabling passengers to book and pay for trips using mobile devices, and improving the coordination of logistics operations.

Finance: Mobile computing has made it easier for people to manage their finances, by providing access to online banking services, enabling mobile payments, and facilitating the tracking of expenses.

Internet of Things (IoT)

The Internet of Things (IoT) refers to the interconnected network of physical devices, vehicles, home appliances, and other items embedded with electronics, software, sensors, and connectivity that enable these objects to collect and exchange data.

Some of the key benefits and applications of IoT include:

Improved Efficiency: IoT can improve efficiency in various industries, including manufacturing, healthcare, transportation, and energy, by enabling real-time monitoring and control of processes and systems.

Predictive Maintenance: IoT can be used to monitor the performance of equipment and machines, allowing for early detection of issues and predictive maintenance to prevent downtime and improve reliability.

Smart Home: IoT can be used to create smart homes, allowing homeowners to control and monitor various systems and devices remotely, such as lighting, heating, and security.

Connected Cars: IoT can be used to create connected cars, allowing for real-time monitoring of vehicle performance, enhanced safety features, and improved driving experiences.

Healthcare: IoT can be used to improve healthcare by enabling remote monitoring of patients, real-time tracking of medical equipment, and more efficient and effective medical treatments.

Agriculture: IoT can be used to improve agriculture by enabling precision farming, real-time monitoring of crops and livestock, and improved food safety.

Environmental Monitoring: IoT can be used to monitor and track environmental conditions, such as air and water quality, allowing for early detection of issues and improved environmental sustainability.

Overall, IoT offers a wide range of opportunities for improved efficiency, better decision making, and enhanced safety and security across various industries and applications.

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NEB Grade XII Computer Science
Model question 2079
Set A (With Sample Answer)

Time: 2 hrs   Full Marks:50

Attempt all the questions.
Group A (MCQ)

A. Choose the correct answer.   **(9x1=9)**

1. In which normal form of database, atomicity is introduced?

   A) First   B) Second   C) Third   D) Fourth.

2. Which of the following techniques is NOT implemented to protect a database?
   A) **Rollback**   B) Backup   C) Recovery   D) Firewall

3. Which one of the following SQL commands is executed to display all the records having a second letter in the lname (LAST NAME) as "A" from the customer table?
   A) SELECT * FROM CUSTOMER WHERE LNAME LIKE "?A%";
   B) SELECT * FROM CUSTOMER WHERE LNAME LIKE "_A%";
   C) SELECT * FROM CUSTOMER WHERE LNAME LIKE "A%";
   D) SELECT * FROM CUSTOMER WHERE LNAME LIKE "%A";

4. Which of the following is an incorrect IP address?
   A) 192.168.0.1   **B)192.168.1**   C)172.255.0.0   D)202.10.79.4

5. Which of the following is a server-side scripting language?

   A) JavaScript   B) MySql   **C) PHP**   D) Jquery.

6. Which of the following keywords are used to declare a variable in JavaScript?

   A) int or var   B) float or let   **C) var or let**   D) char or var

7. Which of the following commands is executed in PHP to concatenate the variables $x with $y?
   A) $x + $y   B) $x=$y   C) concat ($x,$y)   **D) $x.$y**

8. Which statement is incorrect about the object-oriented approach?
   A) Emphasis is on data rather than procedure.
   B) Data is hidden and cannot be accessed.
   C) Objects communicate through functions.
   D) It supports abstract data but not the class.

9. Which of the following feasibility study is concerned with cost-benefit analysis?
   A) Technical feasibility.   **B) Economic feasibility**
   C) Operational feasibility.   D) Schedule feasibility

B. Give short answers to the following questions. [5x5=25]

10. Which type of database system (centralized or distributed) is mostly preferred by commercial organizations like a bank? Give any four suitable reasons. [1+4]

ANS.

Commercial organizations like banks typically prefer a distributed database system over a centralized one for the following reasons:

High availability and reliability: Distributed databases are designed to provide high availability and reliability. By replicating data across multiple nodes, distributed databases can ensure that data is always available and that any single point of failure does not bring the entire system down.

Scalability: Distributed databases are easier to scale than centralized databases. As the amount of data grows, more nodes can be added to the system to handle the load, without causing any significant performance issues.

Geographic distribution: Banks often have multiple branches in different locations, and a distributed database system can support multiple locations and enable real-time data sharing across branches. This helps improve the overall customer experience and operational efficiency.

Security: Distributed databases can provide better security than centralized databases. With distributed databases, sensitive data can be replicated and stored in multiple locations, making it more difficult for attackers to compromise the system.

Overall, distributed database systems offer numerous benefits that make them a better choice for commercial organizations like banks, where high availability, reliability, scalability, security, and geographic distribution are essential requirements.

OR

Nowadays most business organizations prefer applying a relational model for database design in comparison to other models. Justify the statement with your arguments. **5**

ANS

The relational model is a popular choice for database design in modern business organizations due to several reasons:

- Since on table is linked with other, some common fields and rules implemented on one table can easily be implemented to another.
- It is very less data redundancy
- Normalization of the database is possible
- Rapid processing of database is possible
- The relational model allows for flexible and dynamic data storage and retrieval.
- The relational model provides a powerful set of tools for querying and reporting on data.
- The relational model enforces data integrity rules that help to ensure the accuracy and consistency of data.
- The relational model provides robust security features that allow organizations to control access to their data. These features can include encryption, access controls, and auditing.

Overall, the relational model provides a well-established, flexible, and scalable approach to database design that is widely supported and understood. These benefits make it a popular choice for modern business organizations.

11. Develop a program in JavaScript to exchange/swap the values of any two variables. 5

ANS:

JavaScript to swap the values of two variables:

```
<script>
    // define two variables
    let a = 5;
    let b = 10;
    // print their initial values
    document.write ("Before swapping:");
    document.write ("a =", a);
    document.write ("b =", b);
    // swap the values using a temporary variable
    let temp = a;
    a = b;
    b = temp;
    // print their new values after swapping
    document.write ("After swapping:");
    document.write ("a =", a);
    document.write ("b =", b);
</script>
```

OR

How can you connect a database with PHP? Demonstrate with an example. 5

ANS

To connect a database with PHP, you can use the built-in mysqli extension.

```
<?php
    // database connection settings
    $host = "localhost";
    $user = "username";
    $password = "password";
    $database = "database_name";
```

```
// create a connection to the database

$conn = new mysqli($host, $user, $password, $database);


// check for connection errors

if ($conn->connect_error) {

    die("Connection failed: " . $conn->connect_error);

}

echo "Connected successfully";

?>
```

12. Describe the concept of Object Oriented and Procedure Oriented Programming in brief.

2+3

ANS

Object Oriented Programming (OOP) and Procedure Oriented Programming (POP) are two different paradigms of programming.

In Procedure Oriented Programming, the program is organized around procedures or functions, which are collections of code that perform specific tasks. whereas Object Oriented Programming is based on the concept of objects, which encapsulate both data and behavior.

Here are some of the key differences between OOP and POP:

Object-Oriented Programming (OOP)	Procedure-Oriented Programming (POP)
Programs are based on objects that encapsulate data and behavior.	Programs are based on procedures or functions that perform specific tasks.
Emphasis is on data and its manipulation as objects with properties and methods.	Emphasis is on the sequence of procedures and functions that perform a task.
Supports concepts such as inheritance, polymorphism, and encapsulation.	Does not support the concepts of inheritance, polymorphism, or encapsulation.
Programs are easier to maintain, modify and extend.	Programs can be difficult to maintain, modify and extend as the code can be lengthy and complex.
Code is reusable as objects can be used in other parts of the program or in other programs.	Code may not be as reusable as procedures or functions are specific to the task they perform.
OOP languages include C++, Java, Python, and Ruby.	POP languages include C, Fortran, Pascal, and BASIC.

13. Write down the qualities of good software.

5

ANS

Quality software is software that meets the expectations and requirements of its users.

Here are some qualities of good software:

Reliability: A good software should be reliable, which means it should perform consistently.

Usability: The software should be user-friendly and easy to use.

Efficiency: It should be able to perform its tasks quickly and efficiently, without consuming excessive amounts of memory or processing power.

Maintainability: The software should be easy to maintain and update.

Scalability: The software should be scalable, which means it should be able to handle an increasing amount of data or users without compromising its performance or reliability.

Security: The software should be secure and protect the user's data and information from unauthorized access or attack.

14. Explain mobile computing with its advantages and disadvantages.   5

ANS

Mobile computing refers to the use of mobile devices such as smartphones, tablets, and laptops, to access and use computer resources and data from anywhere at any time.

Advantages of Mobile Computing:

- **Portability**: Mobile devices are portable and can be carried anywhere.
- **Flexibility**: Mobile devices can be used to access different types of resources such as email, social media, and business applications, making it a versatile technology.
- **Improved communication**: Mobile computing enables improved communication through instant messaging, video conferencing, and voice calls.

Disadvantages of Mobile Computing:

- **Limited battery life**: Mobile devices have a limited battery life.
- Security risks: Mobile devices are more vulnerable to security risks such as malware and data theft.
- **Limited processing power**: Mobile devices have limited processing power compared to desktop computers
- **Limited storage capacity**: Mobile devices have limited storage capacity compared to desktop computers
- Dependence on wireless networks

Group C (Long Answer Questions)

C. Give the long answers to the following questions.   [2x8=16]

15. Why do most business organizations prefer setting their network with the client-server architecture? Discuss its pros and cons.   [2+6]

ANS

Most business organizations prefer setting their network with the client-server architecture because it offers several advantages over other network architectures. The client-server architecture is a model in which a client computer or device requests data or services from a

server computer or device that provides the data or services. The server manages shared resources and services, while the client requests and uses those resources.

Advantages of client-server architecture:

Centralized control: The server is the central point of control for the network, which simplifies management and administration tasks.

Scalability: The client-server architecture is scalable, meaning that it can be easily expanded more users and devices.

Improved security: The server can provide security measures such as authentication and access control to protect data and resources from unauthorized access.

Shared resources: The server can manage shared resources such as files, printers, and databases, which reduces duplication and ensures consistency.

Reliability: The client-server architecture is designed to be reliable and fault-tolerant, with backup servers and redundant hardware and software.

However, the client-server architecture also has some disadvantages:

Cost: Setting up and maintaining a client-server network can be expensive, requiring dedicated hardware and software.

Complexity: The client-server architecture is more complex than other network architectures, requiring specialized knowledge and expertise to manage and administer.

Network congestion: The server can become a bottleneck if too many clients are accessing it at the same time, which can cause network congestion and slow down the system.

Dependence on the server: The client devices are dependent on the server for access to resources, which can be a disadvantage if the server goes down or becomes unavailable.

In conclusion, the client-server architecture is a popular choice for business organizations because it offers centralized control, scalability, improved security, shared resources, and reliability.

16. Develop a program in C using structure to ask for the information of any 12 students with roll_number, name, and marks scored in sub1, sub2, and sub3. Also, display them in proper format along with the calculation of total and percentage. [Note: the marks should be between 0 and 100].

```c
#include <stdio.h>
void main()
{
    struct student
    {
        int roll;
        int name[20];
        float eng;
        float comp;
        float acc;
        float total;
        float percentage;
    }std[12];
    int i;
        for (i=0; i<12; i++)
```

```c
    {
        printf ("Enter roll number of student\t");
        scanf ("%d", &std[i]);
        printf ("Enter name of the student\t");
        scanf ("%s", std[i].name);
    }
    for (i=0; i<12; i++)
    {
        printf ("student : %s\n", std[i].name);
        printf ("Enter marks for English [between 0-100] \t");
        scanf ("%f", &std[i].eng);
        printf ("Enter marks for Computer [between 0-100] \t");
        scanf ("%f", &std[i].comp);
        printf ("Enter marks for Account [between 0-100] \t");
        scanf ("%f", &std[i].acc);
        std[i].total=std[i].eng+std[i].comp+std[i].acc;
        std[i].percentage=std[i].total/300*100;
    }
    for (i=0; i<12; i++)
    {
        printf ("===Student Marks Ledger=====\n\n");
        printf ("Name : %s \n", std[i].name);
        printf ("English : %.2f\n", std[i].eng);
        printf ("Computer : %.2f\n", std[i].comp);
        printf ("Account : %.2f\n", std[i].acc);
        printf ("Total : %.2f\n", std[i].total);
        printf ("Percentage : %.2f\n", std[i].percentage);
    }
}
```

Demonstrate a program in C to create a data file named score.dat to store students' information with Reg_no, name, gender, and address. The program should prompt the user to continue or not. When finished, the program should also display all the records in the proper format.

ANS

```c
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
struct student {
    int reg_no;
    char name[50];
    char gender[10];
    char address[100];
}s;

int main() {
    char ch;
    FILE *fp;

    // Open the file in write mode
    fp = fopen("score.dat", "wb");

 do {
        // Input student details
        printf("Enter Registration Number: ");
        scanf("%d", &s.reg_no);
        printf("Enter Name: ");
        scanf("%s", s.name);
        printf("Enter Gender: ");
        scanf("%s", s.gender);
        printf("Enter Address: ");
        scanf("%s", s.address);
        // Write student details to file
        fwrite(&s, sizeof(s), 1, fp);
        printf("Do you want to continue (y/n)? ");
        scanf(" %c", &ch);
    } while (ch == 'y' || ch == 'Y');

    // Close the file
    fclose(fp);
    // Open the file in read mode
    fp = fopen("score.dat", "rb");

    if (fp == NULL) {
        printf("Error opening file\n");
        exit(1);
    }
    // Display student details
    printf("\n%-10s %-20s %-10s %-50s\n", "Reg No", "Name", "Gender", "Address");
    while (fread(&s, sizeof(s), 1, fp) == 1) {
        printf("%-10d %-20s %-10s %-50s\n", s.reg_no, s.name, s.gender, s.address);
    }

    // Close the file
    fclose(fp);

    return 0;
}
```

~Best of Luck~

NEB Grade XII Computer Science
Model question 2079
Set B

Time: 2 hrs   Full Marks:50

Attempt all the questions.

Group A (MCQ)

A. Choose the correct answer.   (9x1=9)

1. Which of the following does give a logical structure to the database graphically?
   A) Database diagram.   B) Relational diagram.
   C) Entity relationship diagram.   D) Architecture diagram.

2. Which statement is appropriate to create a table in SQL?
   A) CREATE TABLE table_name (column datatype);
   B) CREATE TABLE table_name (column);
   C) CREATE TABLE table_name (datatype);
   D) CREATE TABLE table_name (column datatype constant);

3. Which of the following is a group of one or more attributes that uniquely identify a row?
   A) Key.   B) Tuple.   C) Relation.   D) Determinant.

4. Which one is a standard way to show pop-up in JavaScript?
   A) window.alert("CPP") ; B) print.alert("CPP"); C) window(CPP);   D) show.alert(CPP);

5. The meaning of int (*ptr)[5]; ptr is
   A) an array of 5 integers.   B) an array of pointers to 5 integers.
   C) a pointer to an array of 5 integers.   D) a pointer to an array.

6. Child class is derived from a base class in ....
   A) Inheritance.   B) Polymorphism.   C) Encapsulation.   D) Data abstraction

7. Which syntax is used for opening and closing a PHP script?
   A) <php> . . . </php>   B) <?php . . .?>   C)? php . . .? php   D) <p> . . . </p>

8. What output will be obtained from the following JavaScript?
   var a=10;
   var b=0;
   console.log(a/b);
   A) 10 is printed.   B) 0 is printed. C) Infinity is printed. D) Garbage value.

9. Which of the following represents the fastest data transmission speed?
   A) Gbps.   B) Kbps   C) Bps   D) Mbps

Group B (Short Answer Questions)

B. Give short answers to the following questions.   [5x5=25]

10. Suppose you are appointed as a DBA of XYZ company, how will you implement database security in that company?

                                        OR

    Illustrate 2NF and 3NF normalization processes with suitable examples.

11. Write a JavaScript page to find the factorial of n number using function.

                                        OR

    How will you connect the PHP program with the MySQL database, and illustrate the PHP function? [2 + 3]

12. Write down the properties in short:
    i. class.   ii. polymorphism.

13. Describe the software development life cycle (SDLC)?

14. Explain the recent concept of cloud computing.

Group C (Long Answer Questions)

**C. Give the long answers to the following questions.** [2x8=16]

15. Which of the data transmission medium you have studied is appropriate to develop a LAN in your college? Justify your answer with the appropriate reasons.
16. Demonstrate a C program to input the age of any 50 students and count how many students are in the age group between 15 to 20 using an array of structures.

OR

Develop a program in C that read successive records from the new data file and displays each record on the screen in an appropriate format.

~Best of Luck~

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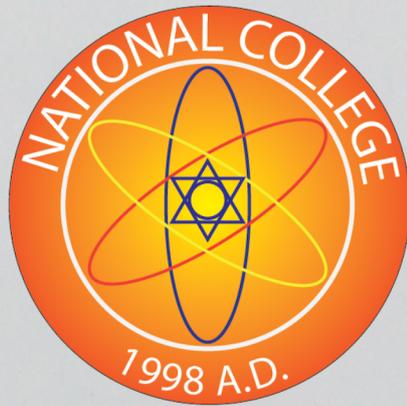
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NEB Grade XII Computer Science
Model question 2079
Set C

Time: 2 hrs   **Full Marks: 50**

Attempt all the questions.

Group A (MCQ)

1.   Which of the following is an example of DML?
        a. CREATE   b. UPDATE   c. DROP   d. ALTER
2.   Which query is used to select records from a table named "students" where value of column name roll_no = 02?
        a. SELECT * FROM students.
        b. SELECT * FROM STUDENTS WHERE roll_no = 02
        c. SELECT * FROM STUDENTS HAVING roll_no = 02
        d. SELECT * FROM roll_no = 02
3.   Which of the following is a programming language to make our webpages dynamic?
        a. JavaScript   b. HTML   c.CSS   d. ActionScript
4.   In OOP the focus is given to which of the following entities?
        a. Data   b. Functions   c. Structure   d. All of the above
5.   What is the tag used to insert links in HTML?
        a. <a> b. <p> c. <h1>   d. <font>
6.   Which of the following is not a proper file operation mode?
        a. close   b. read   c. write   d. append
7.   Which of the following is the first step in SDLC framework?
        a. Feasibility Study   b. Requirement Gathering
        c. Communication   d. System Analysis
8.   MAN Stands for _____.
        a. Metropolitan Area Network
        b. Main Area Network
        c. Metropolitan Access Network
        d. Metro Access Network
9. IOT stands for
        a. Internet of This
        b. Internet of That
        c. Internet of Things
        d. Internet or Thing

Group – B Short Question Answers (5*5=25)

10.   What is normalization. Explain its 1NF and 2NF with example.
        OR
        What do you mean by DDL explain with an example
11.   Write a program to check if a number is even or odd in JavaScript.
        OR
        Explain what you understand by client-side scripting language and server-side scripting language.
12.   Describe the different features of OOP
13.   What do you understand by waterfall model? Explain different stages of Waterfall model.
14.   What do you mean by E-commerce, E-governance, E-medicine, E-banking.

Group – C: Long Question Answers (8*2=16)

15. What are the different network topologies. Explain each with 2 merits and 2 demerits?
16. Write a program that reads name, roll_no, marks and address of 20 students using structure and display them.

~Best of Luck~

NEB Grade XII Computer Science
Model question 2079
Set D

Time: 2 hrs   **Full Marks: 50**
Attempt all the questions.
Group A (MCQ)
Group – A Multiple Choice Questions (1*9=9)
1. Which of the following is not a function of the database?
    a) Managing stored data
    b) manipulating data
    c) Security for stored data
    d) analyzing code
2. Network that covers geographic areas that are larger, such as districts or cities is
    a. LAN   b. MAN   c. WAN   d. None of these
3. What will be the output of the following code snippet?
    <script type="text/javascript">
    a = 5 + "9";
    document.write(a);
    </script>
    a. Compilation Error   b. 14   c. Runtime Error   d. 59
4. Which of the following is the first step in SDLC framework?
    a. Feasibility Study   b. Requirement Gathering
    c. Communication   d. System Analysis
5. In OOP by wrapping up characteristics and behavior into one unit, we achieve
    a. Data Abstraction   b. Data Encapsulation
    c. Data hiding   d. All of these
6. Which of the following is used to insert JavaScript code into HTML page?
    a. <script>..<script>   b. <script>…<//script>
    c. <script>…..</script>   d. </script>
7. What will be the output of the following code snippet?
    #include <stdio.h>
    void swap(int *a, int *b) {
    int t = *a;
    *a = *b;
    *b = t;
    }
    void solve() {
    int a = 3, b = 5;
    swap(&a, &b);
    printf("%d %d", a, b);
    }

```
int main() {
solve();
return 0;
}
```
a. 3 3   b. 3 5   c. 5 3   d. 5 5

8. What is Artificial Intelligence?

　　a) Artificial Intelligence is a field aims to make humans more intelligent

　　b) Artificial Intelligence is a field that aims to improve the security

　　c) Artificial Intelligence is a field that aims to develop intelligent machines

　　d) Artificial Intelligence is a field that aims to mine the data

9. Offers the ability to data and modify, update, and drop tuples.

　　a. Transaction Control Language (TCL)

　　b. Data Control Language (DCL)

　　c. Data Definition Language (DDL)

　　d. Data Manipulation Language (DML)

Group – B Short Question Answers (5*5=25)

10.　　Differentiate between centralize and distributed with example.

　　　　OR

　　　　Who is DBA? Explain his/her roles and responsibilities.

11.　　Differentiate between client-server and peer-to-peer architecture.

12.　　Define form validation. Write example of basic form validation.

　　　　OR

　　　　Write program to illustrate any two methods of adding JavaScript in HTML document.

13.　　Differentiate between procedural and object-oriented programming.

14.　　Define IOT and Big data with its advantage.

Group – C: Long Question Answers (8*2=16)

15.　　WAP to enter roll_no, name, age of 20 students and count students with age > 20 and <25.

　　　　OR

　　　　What do you understand by pointers? Write a program to read and write from and to a file using any file handling functions.

16.　　What is computer network? Write its advantage. What are the different modes of communication? What are the types of networks on the basis of architecture?

NEB Grade XII Computer Science
Model question 2079
Set E

Time: 2 hrs   **Full Marks: 50**

Attempt all the questions.

Group A (MCQ)
Group – A Multiple Choice Questions (1*9=9)

1.   Which language is used by most of DBMSs for helping their users to access data?
        (A) HLL   (B)Query language   (C) SQL   (D) 4 GL
2.   Which of the following items is not used in Local Area Networks(LANs)?
        A. Computer Modem B. Cable   C. Modem   D. Interface card
3.   What is divide by 0 in Javascript?
        var a = 10;
        var b = 0;
        document.write(a/b);
        (A) Nothing is printed (B) 0 is printed
        (C) Infinity is printed (D) Some Garbage Value
4.   PHP scripts are enclosed within _____
        A.<php> . . . </php>   B.<?php . . . ?>
        C.?php . . . ?php   D.<p> . . . </p>
5.   File is a type of?
        A. struct   B. int   C. char *   D. None of the above
6.   If a function can perform more than 1 type of tasks, where the function name remains same, which feature of OOP is used here?
        a) Encapsulation   b) Inheritance c) Polymorphism   d) Abstraction
7.   The waterfall model suggests a systematic ____.
        a. Iterative approach   b. Spiral approach
        c. Sequential approach   d. None of the mentioned above
8.   Robotics is a branch of AI, which is composed of _____.
        A. Electrical Engineering   B. Mechanical Engineering
        C. Computer Science D. All of the above
9.   In how many forms Big Data could be found?
        A. 2   B. 3   C. 4   D. 5

Group – B Short Question Answers (5*5=25)

10.   Define Cloud Computing. Explain about Cloud Computing in detail. (1+4)
11.   Define Software development model. Explain about any two types of Software development model in short. (1+4)
12.   Define OOPs. Explain any three properties of OOPs in detail. (1+4)
13.   Define pointer. Explain the syntax and advantages of pointer in c. (1+4)
        OR
        Define structure. WAP to input name, roll_no and address of 5 students and display the inputs and appropriate form using structure. (1+4)
14.   Define Normalization. Explain the types of Normalization briefly. (1+4)
        OR
        Define Data security. Explain about DDL and DML in short. (1+4)

Group – C: Long Question Answers (8*2=16)

15.   Define Internet Protocol addressing. Explain about Transmission media in detail. (1+7)
16.   Define client side scripting. Explain about variable and Data Types use in JavaScript with example program. (1+7)

OR

Define Server-side scripting. Create the PHP program to display the databases using SQL commands by establishing the connection. (1+7)

MCQ SET 1

1. Which of the statements are used in DDL?

     A) Create, alter and drop B) Create, insert and select

     C) Insert, update and delete D) Delete, alter and drop

2. With SQL, how do you select all the records from a table named "Persons" where the value of the column "FirstName" ends with an "a"?

     A) SELECT * FROM Persons WHERE FirstName="a"

     B) SELECT * FROM Persons WHERE FirstName LIKE „a%"

     C) SELECT * FROM Persons WHERE FirstName LIKE „%a"

     D) SELECT * FROM Persons WHERE FirstName="%a%"

3. Which of the following statements is true about a star network topology?

     A) Each device is connected to a switch or hub

     B) Each device is connected to each other

     C) Each device is connected in a trunk

     D) Each device is connected to a terminal

4. Which of the following is the correct syntax to display "Stay Safe" in an alert box using JavaScript?

     A) alert-box("Stay Safe"); B) confirm("Stay Safe");

     C) msgbox("Stay safe"); D) alert("Stay Safe");

5. What is the use of <A> tag?

     A) To insert an image B) To create a link

     C) To create a hyperlink D) To create a list

6. What is the output of given C program?

```
void main()
{       char str1[] = "FIRST";
        char str2[20];
        strcpy(str2,str1);
        printf("%s %s ",str1,str2);
        printf("%d", (str1!=str2));
        printf("%d", strcmp(str1,str2));
}
```

     A) FIRST FIRST 0 0   B) FIRST FIRST 1 1

C) FIRST FIRST 1 0   D) FIRST FIRST 0 1

7. Where is a class derived in inheritance?

A) Superclass B) Subclass C) Subsetclass D) Relativeclass

8. Which of these is the correct order of the SDLC?

A) Analysis, Design, Coding, Testing, Implementation

B) Analysis, Design, Testing, Implementation, Coding

C) Implementation, Coding, Analysis, Design, Testing

D) Design, Testing, Implementation, Coding, Analysis

9. Why is cloud computing popular nowadays?

A) Cost-sharing and easily accessible

B) As modern technology and costly

C) Accessible and freely available

D) Affordable to all

MCQ SET 2

1. NIC card is used for LAN connection.

a. True b. False

2. Spiral is a_____.

a. Software

b. Testing phase

c. System Development model

d. None of the above

3. Who carries out the coding part?

a. Programmer b. System Analyst c. Client d. None

4. Physical layout of computer in network is called…

a. Network

b. internet

c. Topology

d. None of the above

5. _____ is a component of multimedia.

a. Speaker c. Monitor

b. Sound card d. All of them

6. _____ data type contains numbers having decimal point.

a. Char b. Int c. Float d. None

7. To use the strcpy() function, which header file should be included?

a. conio b. stdio c. string d. math

8. The last value of the series in looping is called …….

       a. Test Expression b. initialization

       c. Increment/decrement d. All of them

9. Which operator is logical OR operator?

       a. || b. ! c. && d. None

MCQ SET 3

1. Who carries out the analysis phase?

       a. Programmer b. System Analyst c. Client d. None

2. Decision tree is a tool to :

       a. Design System

       b. Test The system

       c. Selling the system

       d. None of the above

3. _____ is message sending through electronic medium.

       a. Internet   c. Post

       b. Email   d. Hardcopy.

4. One- Dimensional array has ___ row or column.

       a. 2   b. 1   c. 4   d. 5

5. To use the strlen() function, which header file should be included?

       a. conio   b. stdio   c. string   d. math

6. Relational Operators are :

       a. Comparison of data   b. addition of variables

       c. Logical treatment   d. All of them

7. Which operator is logical AND operator?

       a. || b. !   c. &&   d. None

8. Which loop is post-test loop?

       a. while loop b. do..while loop   c. for loop   d. None

9. In C, int data type has memory allocation of :

       a. 4 bytes   b. 2 bytes   c. 8 Bytes   d.1 bytes

MCQ SET 4

1. MS-Access is _____.

       a. Relational Database Management System.

       b. Word Processing Software

       c. Presentation Software

       d. None of the above

2. Table is _____ MS-Access.

        a. a Primary Element b. Filtered information c. Data Collection d. None

3. An illegal activity done through internet that harms other intellectual right is :

        a. Murder. b. Suicide. c. Cyber Crime. d. Virus.

4. _____can hold similar data.

        a. array b. structure c. pointer d. variable

5. Which operator is used to compute the integer division?

        a. / b. \ c. % d. None

6. Which loop is pre-test loop?

        a. for loop b. while loop c. do..while loop d. None

7. In C, '7' is a?

        a. Numeric constant b. Character constant c. Number d. None

8. Which of the following falls in control structure?

        a. switch case b. loops c. if else d. All of them

9. Which of the following is valid for JavaScript

        a. Var sname; b. Int sname; c. Char sname; d. None;

MCQ SET 5

1. C is a _____.

        a. Relational Database Management System.

        b. Structured programming language

        c. Presentation Software

        d. None of the above

2. Query is _____ in MS-Access.

        a. Object b. Required output c. Data Collection d. None

3. The component of multimedia is :

        a. Speaker b. Sound card c. Microphone d. All

4. _____can hold dissimilar data.

        a. array b. structure c. pointer d. variable

5. OR logical operator in C is denoted by:

        a. / b. || c. % d. None

6. For menu driven program, we use _____ control structure.

        a. for b. while c. switch d. do

7. A character constant must inside _____.

        a. ' ' b. " " c. { } d. ( )

8. Which data type holds numbers with decimal point?

a. int b. float c. char d. All of them

9. Which of the following displays a box in JavaScript?

a. document.write b. alert c. printf; d. None;

MCQ SET 6

1. Library function pow() belongs to which header file?

a. stdio.h b. conio.h c. math.h d. string.h

2. Which of the following is/are the main goals of a distributed database?

a. Interconnection of database

b. Incremental growth

c. Reduced communication overhead

d. All of the above

3. An unauthorized user is a network _____ issue:

a. Performance b. Reliability c. Security d. All

4. What is the full form of SQL?.

a. Structured Query List

b. Simple Query Language

c. Structured Query Language

d. None

5. PHP is an example of _____ scripting language.

a. Server side b. Client side c. Browser side d. None

6. Using encapsulation data security is _____.

a. Not ensured b. Ensured to some extend c. Purely ensured d. Very low

7. If the mode in file in C includes b after the initial letter, what does it indicate?

a. text file b. big text file c. binary file d. blueprint text

8. Library function getch() belongs to which header file?

a. math.h   b. string.h   c. conio.h   d. ctype.h

9. Which of the following keyword is used for creating a function in JavaScript?

a. Void   b. Int   c. Main   d. Function

MCQ SET 7

1. Who carries out the analysis phase?

a. Programmer b. System Analyst c. Client d. None

2. Decision tree is a tool to :

a. Design System b. Test The system

c. Selling the system d. None of the above

3. _____ is message sending through electronic medium.

a. Internet b. Email c. Post d. Hardcopy.

4. One- Dimensional array has ___ row or column.

a. 2 b. 1 c. 4 d. 5

5. To use the strlen() function, which header file should be included?

a. conio b. stdio c. string d. math

6. Relational Operators are :

a. Comparison of data b. addition of variables

c. Logical treatment d. All of them

7. Which operator is logical AND operator?

a. | | b. ! c. && d. None

8. Which loop is post-test loop?

a. while loop b. do..while loop c. for loop d. None

9. In C, int data type has memory allocation of :

a. 4 bytes b. 2 bytes c. 8 Bytes d.1 bytes

Best of Luck

Please give feedback at heka.nrh@gmail.com

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