QUESTION 1

i. WIMP
ii. GUI
iii. EEPROM
iv. OCR
v. GIGO
vi. Gb
vii. DVD
viii. VLSI
ix. CRT
x. MODEM
xi. SQL
xii. COBOL
xiii. LED
xiv. UTP
xv. CD ROM
xvi. ALU
xvii. OMR
xviii. BIT
xix. MS DOS
xx. TDM [20]

QUESTION 2

a) State the components which constitute the CPU.Outline briefly the role of each component in processing [9]
b) What are the three differences between main memory and backing storage [6]
c) Give any reasons why backing storage is usually needed [5]

QUESTION 3

a) Illustrate the data processing cycle [12]
b) Outline the following data processing methods
    i. Online
    ii. Batch [4]

C) You have been promoted to the position of a database administrator in a local insurance company. Outline your four principal duties in the insurance company [4]

QUESTION 4

a) Give two uses of the following application packages
    i. Desktop Publishing
    ii. Spreadsheet

iii. Database [6]

b) Give any two examples of specific programs that fall under each of (i) to (ii) [6]

c) Explain the following terms as used in spreadsheet

i. Label

ii. Value

d) What do the terms field and record mean as used in a database [4]

QUESTION 5

a) User departments have complained that their machines have as of late become very slow in processing. By either purchasing new machines, upgrading or otherwise, suggest recommendations that may improve processing speed. [10]

b) The Word Processing department of your organization has been losing a lot of data because floppy disks are mishandled. Write five guidelines which may help typists [10]

QUESTION 6

a) Define data security [2]

b) What do you understand by posture [3]

c) Give and explain any five conditions ideal for optimum operation of users and maximum performance of machines in a computer room [15]

QUESTION7

a) Differentiate between a transaction file and a master file. Explain their relationship [6]

b) Describe the following methods of performing file back ups

i. Full back up [2]

ii. Selective back up [2]

iii. Incremental back up [2]

c) What is site licensing [2]

d) Give three advantages of non impact printers over impact printers [6]

ANSWERS

QUESTION 1

i. WIMP - windows icons menus and procedures/pointers

ii. GUI - graphical user interface

iii. EEPROM- electrically erasable programmable read only memory

iv. OCR - optical character reader

v. GIGO - garbage in garbage out

vi. Gb - gigabytes

vii. DVD - digital versatile disc

viii. VLSI - very large scale integration

ix. CRT - cathode ray tube
x. MODEM - modulator demodulator
xi. SQL - sequential query language
xii. COBOL - common business oriented language
xiii. LED - light emitting diode
xiv. UTP - untwisted pair cable
xv. CD ROM - compact disc read only memory
xvi. ALU - arithmetic logic unit
xvii. OMR - optical mark reader
xviii. BIT - binary digit
xix. MS DOS - Microsoft disk operating system
xx. TDM - time division multiplexor

QUESTION 2

a) State the components which constitute the CPU.Outline briefly the role of each component in processing [9]

A. CONTROL UNIT(CU)

ROLES

- The Control Unit manages input/output to and from the main memory and to and from auxiliary storage units and output devices.
- It interprets instructions in their sequence, It determines what is to be done to follow the instruction and, transmits to the appropriate device directions specifying the work to be done.

B. ARITHMETIC LOGIC UNIT(ALU)

ROLES

- It perform calculations
- It perform logic operations. Logic operations compare values for greater, smaller or equal.

C. REGISTERS

ROLES

- Stores data currently being worked on by the CPU
- Stores results of immediate processing.

b) What are the three differences between main memory and backing storage [6]

MAIN MEMORY	**BACKING STORAGE**
Stores programs and data while computer is running for current use	Store data or programs for later use
Main memory is fast and limited in capacity	Slow and capacity vary
Cannot retain information when the computer is switched	Non volatile

off - Volatile	
Memory directly connected to the CPU - not portable	Portable- can be transported from one machine to another.
Computer cannot do or work without	Can do or work without

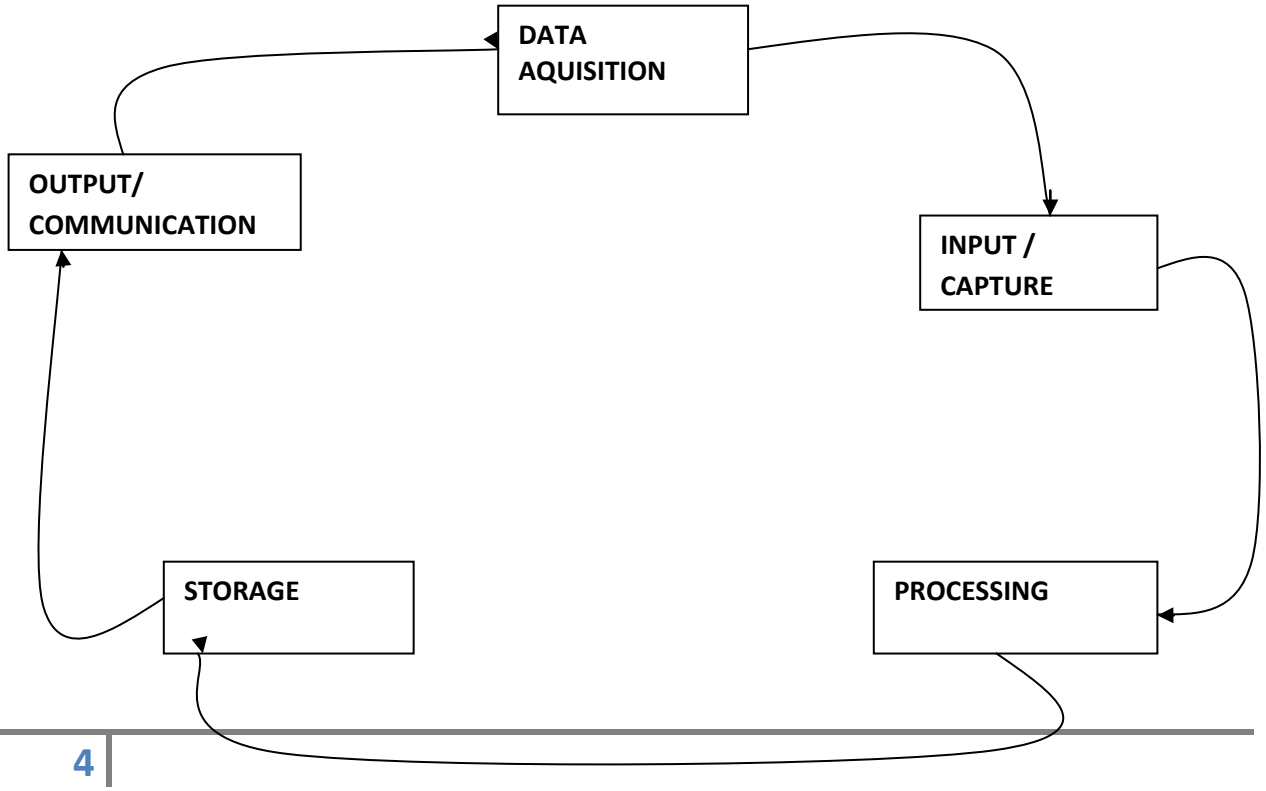
c) Give any reasons why backing storage is usually needed [5]

REASONS

- For permanent storage of data.
- For reference purposes.
- As a form of insurance against unforeseen circumstances that may destroy the integrity of data.
- Enables data to be moved from one location to another, in other words you can carry it around.
- Huge memory capacity. Backing storage enables huge amount of data to be stored than would have been possible.

QUESTION 3

c) Illustrate the data processing cycle [12]



- **Data Acquisition:**this is the collection of data from source documents into the computer.
- **Input / Capture:**this is the putting of the required data into the system e.g. through typing, scanning. Validation occurs at the second stage were quality of data is checked before entered or processed. Also at this stage verification occurs were data is checked for mistakes in copying.
- **Processing:**this is the key part of the cycle were data is converted into information .Calculations, logical and manipulative operations are done at this stage in the cycle.
- **Storage :** information is stored on various storage media e.g. disks, magnetic tapes
- **Output / Communication :** the processed information is eventually displayed for use through output system like printers

d) Outline the following data processing methods

i. Online

- This is a method that utilizes Internet connections and equipment directly attached to a computer. It is used mainly for information recording and research.

ii. Batch

- This is a method where the information to be organized is sorted into groups to allow for efficient and sequential processing.

C) You have been promoted to the position of a database administrator in a local insurance company. Outline your four principal duties in the insurance company [4]

ROLES:

- The design of the database
- After the initial design, the DBA must monitor the performance of the database, and if problems surface (such as a particular report taking an unacceptably long time to produce), appropriate changes must be made to the database structure.
- Keeping users informed of changes in the database structure that will affect them; for example, if the size or format of a particular field is altered or additional fields added
- Maintenance of the data dictionary for the database, and responsibility for establishing conventions for naming tables, columns, indexes 7 so on.
- Implementing access privileges for all users of the database; that is, specifying which items can be accessed and / or changed by each user.
- Allocating passwords to each user.
- Providing training to users in how to access and use the database.

QUESTION 4

b) Give two uses of the following application packages

i. Desktop Publishing:also known as **DTP**) is the creation of documents using page layoutsoftware on a personal computer.

USES:

Graphic Design. This is the number one use for desktop publishing and can be held accountable for why the term has changed so much over the years. Professional graphic designers use DTP programs such as QuarkXPress, Adobe PageMaker, and Adobe Photoshop to create webpages, the front pages of newspapers, and a variety of other visual documentation. Thanks to DTP, graphic design has become more than just pencil and paper. The introduction of desktop publishing has taken graphic design to greater heights. Without desktop publishing, there is no graphic design, and vice versa.

Education. In the education field, teachers and students use a variety of DTP programs to complete assignments and projects. Whether it's an Intro to Desktop Publishing course and the program of choice is QuarkXPress, or a Technical Writing Course that takes an in-depth look at Microsoft Word, the use of DTP in educational institutions is very prevalent.

Business. Today, desktop publishing is pretty much used to handle all of the "paperwork" of a business. Although it's possible to run a business without the help of DTP, it isn't the smartest business decision. From sole-proprietorships to Fortune 500 companies, DTP software is a lifesaver and money saver. Examples of DTP use in businesses are business cards, legal documentation, and advertising materials.

Crafts and Personal Projects. Desktop publishing is the crafter's dream come true. Across homes all over the world, parents are looking for easy, cheap, and fun crafts to create with their children, teachers need ideas for students, and the interior decorator could use an origami template. Those who use DTP software for personal use normally stay away from the more advanced DTP software and stick with the more user friendly programs. Examples of desktop publishing projects for personal use are greeting cards, postcards, and invitations**.**

ii. Spreadsheet:A **spreadsheet** is a computer application with tools that increase the user's productivity in capturing, analyzing, and sharing tabular data sets. It displays multiple cells usually in a two-dimensional matrix or grid consisting of rows and columns (in other words, a table, hence "tabular"). Each cell contains alphanumeric text, numeric values, or formulas. A formula defines how the content of that cell is to be calculated from the contents of any other cell (or combination of cells) each time any cell is updated. A pseudo third dimension to the matrix is sometimes applied as another layer, or layers/sheets, of two-dimensional data

USES:

Lists

- You can create lists, from shopping lists to contact lists, on a spreadsheet. For example, if you entered store items to a spreadsheet along with their corresponding aisles, you could sort by aisle and print before your shopping trip. Your list would provide an aisle-by-aisle overview. The sorting power of spreadsheets becomes more evident when entering more data. Maintaining personal or professional contacts allows you to sort by every field. For example, a salesperson might enter all clients and then sort by zip code allowing him to plan his day with geographic efficiency.

Accounting

- Beyond sorting, spreadsheets are invaluable calculators. By entering the appropriate mathematical functions into cells, you can turn a simple spreadsheet into an accounting page. You can list credits in one column and debits in another. The auto-sum feature speeds calculations and can be set up to maintain running totals. And with the flexibility of spreadsheet programs, data used in equations can be anywhere on the sheet or in the workbook. Adding additional pages (sometimes called worksheets) allows you to organize information to suit your needs. Data from anywhere in the workbook can be used in your calculations.

Time Sheets

- Besides adding and subtracting integers, spreadsheets can also perform those calculations on time-based numbers. Formatting cells to reflect data as a time (as opposed to simple integers) can allow you to use the spreadsheet as a time sheet. Additionally, you can include descriptions of assorted job functions, employee names, etc. giving you the ability to sort by those to time incurred for any of your chosen fields.

Database Use

- Although spreadsheets are not true relational databases, they can be designed and formatted to function as simplified ones. For example, if you need to track pricing of a particular product, enter its price only one time. For all subsequent references to that price, point to the original entry as opposed to re-entering the price. When you need to change the price, change it in its original cell and all corresponding references will update automatically.

Chart Creation

- Charts and graphs create better depictions of trends and percentages than raw numbers. As they say, "A picture's worth a thousand words." Spreadsheet programs can automatically convert your data into the visual depiction of your choice, whether it's a pie chart, bar chart or line graph.

iii. Database: A database is a collection of data arranged for easy and quick searching and retrieval. There are databases in every aspect of everyday living. You can create a database to keep track of just about anything---from your video game collection, recipes, contacts and the inventory for a business.
USES:

Forms

- Database software includes the option of creating user-friendly forms to make the task of entering data easier on the operator's eyes. Workers have the power to adapt forms to suit their needs. Using customizable templates for forms makes the creation process faster and easier.

To help those entering data into the form, the use of messages gives guidance. For instance, when those entering data need to choose from a drop-down menu for a given field, the creator of the database has the option of adding a pop-up message when that field gets selected, reminding users to select from the drop-down menu.Reports

- Database programs include report creation functions. Reports allow users to manipulate their data in numerous ways. Users can insert functions into reports to help in analyzing the data. For instance, a sales department can create a report that shows only their first quarter data while giving totals for each month separately.

Report creation typically allows creativity in designing the appearance of the report. Visual aspects, such as font choices, field locations, insertion of graphics and manipulation of colors allow the designer of the report to make it visually pleasing and professional.

Data Functions

- Database software provides users with features to organize their information simply and specifically. For example, using sorting functions allows for alpha or reverse-alpha sequence, usually by simply clicking an icon. Filtering functions let users draw out information by specified criteria.

b) Give any two examples of specific programs that fall under each of (i) to (ii) [6]

i. Desktop Publishing

- Adobe InDesign
- Adobe PageMaker, was Aldus Pagemaker; supplanted by InDesign
- Corel Draw
- QuarkXPress
- FlippingBook – software for creating online publications, magazines, photo albums and flip books with the real page turning effect.
- FrameMaker, now owned by Adobe
- Greenstreet Publisher Home and Publisher Business
- InPage - DTP which works with English + Urdu, Arabic, Persian, Pashto etc.
- Interleaf/QuickSilver
- iStudio Publisher - Desktop publishing and design software for Mac OS X
- Microsoft Publisher
- Microsoft Word 2008 - This Word release contains a DTP mode

ii. Spreadsheet
- Ms Excel
- Lotus

iii. Database
- Ms Access
- Oracle

*c) Explain the following terms as used in spreadsheet

iii. Label
- Row title or column title.

iv. Value
- When a cell contains a formula, the resulting number shown on the screen is called a value.

d) What do the terms field and record mean as used in a database [4]

- **Field :** is the smallest collection of data that has meaning e.g. name, surname etc
- **Record:** is a collection of logically related set of fields.

QUESTION 5

c) User departments have complained that their machines have as of late become very slow in processing. By either purchasing new machines, upgrading or otherwise, suggest recommendations that may improve processing speed. [10]

Recommendations:

- Increase the RAM size.
- Increase the WORD size
- Install an operating system with multi processing/parallel processing capability.
- Re train users.
- Buy new application programs with a higher throughput.
- Faster processors
- Distributed processing

d) The Word Processing department of your organization has been losing a lot of data because floppy disks are mishandled. Write five guidelines which may help typists [10]

- Don't put the diskette near any magnetic field.
- Don't put the diskette near any electronic motor.
- Don't expose the diskette to direct sunshine or heat.
  the drive in reading from and writing 4. Store the diskette in a cool dry dust-free environment.
- Don't spill liquid onto the diskette.
- Don't use any diskette which has had liquids spilled on it.
- Don't bend or fold a diskette.
- Don't staple labels onto the diskette.
- Use a soft pencil or felt-tip pen when writing on diskette labels, as the pressure of a ballpoint may leave indentations on the magnetic surface.
- Don't touch the magnetic surface (the black plastic like plate) of the disk, as your fingerprints may hinder to the disk .

QUESTION 6

a. Define data security [2]

- These are mechanism that is put in place to ensure data integrity and or only authorized access is made.

b. What do you understand by posture [3]

- Posture is the sitting position of a computer user.

c. Give and explain any five conditions ideal for optimum operation of users and maximum performance of machines in a computer room [15]

CONDITIONS:

- Air conditioners, which control the room temperature and humidity levels.
- It should be dust free; dust is the biggest "killer" of hard drives.
- No carpets, they caught fire more easily.
- No magnetic material should be in the computer room.
- The computer room should be located in such a way that computers are not exposed to direct sunlight or hot environments, use curtains if otherwise.
- The computer room should be fitted with burglar bars, alarm systems, or guarded 24hours to ensure security.
- The computer room should have surge protectors or suppressors to guard against electrical faults and high voltages.
- The computer room should have UPS [uninterrupted power supply] in case of power failures, which may be fatal.

QUESTION7

e) Differentiate between a transaction file and a master file. Explain their relationship [6]

Master file

Holds descriptive data; the actual data that is supposed to be processed and holds the resultant data after the process is completed (ex. names, addresses, sales, etc.). The data can be organized using keys.

Transaction file

Contains the transactions; changes that are supposed to be made to the data in the master file.

- In batch processing all transactions are collected in the transaction file and the changes are applied to the master file sequentially in a single pass. For this to be possible, both the master and transaction file have to be sorted first.
- In an online system the changes are applied to the master file the moment the transactions occur or are recorded.

Relationship

The transaction file is used to update the master file.

f) Describe the following methods of performing file back ups

Backing up: When organizations rely on computer-stored data (large companies, banks, government branches, etc…), their systems are thoroughly protected. They create daily backups for each action of the day. Typically, the backups are well protected (fireproof case, and other such measures) and kept in a different location than the data for security reasons, since that information is key to running the business. There are two types of backups:

- Full backups save a new copy of every file in the system.
- Incremental backups save only new files or others that have been modified.

Most commonly, backups are stored in tape, due to the medium's cheap price and large storage capabilities.

g) What is site licensing [2]

A **site license** is a type of software license and a legal agreement that allows users to run the software package simultaneously. The name originally derives from the practice of restricting the use of a particular piece of software by physical site rather than by, for instance, the number of copies in use. However, the term "site license" is now commonly used to describe licensing of software to a particular entity which is unrestricted by number, regardless of the physical locations where the software may be used.

h) Give three advantages of non impact printers over impact printers

- High quality print output
- Noiseless
- Faster

Questions:

QUESTION 1

a) Differentiate the following terms as used in computers by giving and fully explaining two distinct reasons.

i. Primary storage and secondary storage [4]
ii. Micro computer and main frame computer [4]
iii. Data and Information [4]
iv. Floppy disk and Harddisk [4]
v. Impact and Non Impact printers [4]

QUESTION 2

a) Arrange the following in their logical order and briefly explain each item

i. Byte [2]
ii. File [2]
iii. Field [2]
iv. Record [2]
v. Bit [2]
vi. Character [2]

b) Write brief notes on the following

i. Assembler [2]
ii. Interpreter [2]
iii. Machine code [2]
iv. 4GL [2]

QUESTION 3

a) What do the following abbreviations stand for as used in computers?
   i. WWW [1]
   ii. LCD [1]
   iii. OMR [1]
   iv. WAN [1]
   v. LAN [1]
   vi. MODEM [1]

b) Though computer networking has a number of advantages such as speed in transfer of files, minimised costs due to resource sharing, centralized control and monitoring of computer resources use which is easier and more convenient. There are a number of drawbacks of networking computers .Outline any four such disadvantages [4]

c) Explain the following terms as used in data communication
   i. Simplex transmission mode [2]
   ii. Synchronous transmission [2]
   iii. Circuit switching [2]
   iv. Dumb terminal [2]
   v. Full duplex [2]

QUESTION 4

a) Define
   i. Operating system [2]
   ii. Application software [2]

b) State the two types /major classes of application software [2]

c) Your organization is planning to have a new application software .As a computer expert you have been consulted on what type of software the organization must go for between the two main categories of application software. Suggest with justification the application software type you would recommend [8]

d) State any three types of operating systems and give three examples of any operating system programs
   i. Menu [2]
   ii. Footer [2]
   iii. Soft return [2]
   iv. Edit [2]
   v. Cell [2]
   vi. Label [2]
   vii. Chart [2]
   viii. Mail merging [2]
   ix. Print preview [2]
   x. Worksheet [2]

QUESTION 6

a) Define the term computer peripheral [2]

b) State the device used for the following

i. Printing using heat
ii. Used for fast clearance of cheques in banks
iii. An input device that is sensitive to touch
iv. Used in playing games
v. Its contents can be erased only by exposure to ultra violet light
vi. Can be used to determine name of product,supplier,size,price and quantities left at appoint of sale system
vii. It squirts/sprays droplets of ink that are directed by the electric field to paper and form characters when printing
viii. Is responsible for interpretation of instructions and regulates the flow of signals
ix. It is used to input signals into the computer without retyping
x. Detects pencil or ink marks made on certain locations of a document and is mainly used for marking multiple choice exam papers, questionnaires and lotto
xi. A drive used to read an optical disk but cannot write on it
xii. A machine that can transmit documents containing both text and graphics over telephone lines [12]

QUESTION 7

a) State the job title for the personnel responsible for the following:
i. Coding of programs using a programming languages
ii. Filing back up disks and tapes in a room far away from the main computer room
iii. Punching data into the computer
iv. The process of computerizing a manual system
v. Preparing and checking batch totals [10]

b) Give any five attributes of good information [10]

ANSWERS

QUESTION 1

b) Differentiate the following terms as used in computers by giving and fully explaining two distinct reasons.
vi. Primary storage and secondary storage [4]

PRIMARY STORAGE	**SECONDARY STORAGE**
Volatile	Non Volatile
Stores programs and data while computer is running for current use	Store data or programs for later use
Memory directly connected to the CPU - not portable	Portable- can be transported from one machine to another

vii. Micro computer and main frame computer [4]

Micro computer	Main frame computer
Mostly used as terminal in a network. They are also multi-purpose in terms of applications run on them	Used as a server in a network.
Physically smaller than Main frame computers	Physically larger than Micros
Relatively slower to Main frame computer	Relatively faster than Micros

viii. Data and Information [4]

Data	information
Raw facts and figures	Processed data that has meaning
Cannot be used for decision making and control	Used for decision making and control in an organisation
It is used as input into the computer system	It is the output of a computer system

ix. Floppy disk and Harddisk [4]

Floppy disk	Hard disk
Smaller storage capacity	Huge storage capacity
Primarily used to store data and information	Primarily used to store programs and the operating system
Referred to as the A: drive	Referred to as the C: drive

x. Impact and Non Impact printers [4]

Impact printer	Non Impact printer
Makes contact with the paper when printing	Does not make contact with paper when printing
cannot print graphics and colour	Print graphics and colour
Uses cartridge	Uses toner

QUESTION 2

c) Arrange the following in their logical order and briefly explain each item

vii. Byte [2]

viii. File [2]

ix. Field [2]

x. Record [2]

xi. Bit [2]

xii. Character [2]

Bit; byte; character; field; record; file

d) Write brief notes on the following

v. Assembler [2]

- An assembler converts basic computer instructions written in assembly language into a pattern of bits which can be easily understood by the computer and the processor can use it to perform its basic operations

vi. Interpreter [2]

- In computer science, an **interpreter** normally means a computer program that executes, i.e. *performs*, instructions written in a programming language. An *interpreter* may be a program that either
  - executes the source code directly
  - translates source code into some efficient intermediate representation (code) and immediately executes this
  - explicitly executes stored precompiled code made by a compiler which is part of the interpreter system

vii. Machine code [2]

- **Machine code** or **machine language** is a system of impartible instructions executed directly by a computer's central processing unit (CPU). Each instruction performs a very specific task, typically either an operation on a unit of data (in a register or in memory, e.g. add or move), or a jump operation (deciding which instruction executes next, often conditional on the results of a previous instruction). Every executable program is made up of a series of these atomic instructions. Machine code may be regarded as a primitive (and cumbersome) programming language or as the lowest-level representation of a compiled and/or assembledcomputer program. While it is possible to write programs in machine code, because of the tedious difficulty in managing CPU resources, it is rarely done any more, except for situations that require the most extreme optimization.

viii. 4GL: is a programming language or programming environment designed with a specific purpose in mind, such as the development of commercial business software [2]

QUESTION 3

d) What do the following abbreviations stand for as used in computers?

vii.	WWW	-	world wide web	[1]
viii.	LCD	-	liquid crystal display	[1]
ix.	OMR	-	optical mark reader	[1]
x.	WAN	-	wide area network	[1]
xi.	LAN	-	local area network	[1]
xii.	MODEM	-	modulator demodulator	[1]

e) Though computer networking has a number of advantages such as speed in transfer of files, minimised costs due to resource sharing, centralized control and monitoring of computer

resources use which is easier and more convenient. There are a number of drawbacks of networking computers .Outline any four such disadvantages [4]

Disadvantages:

Following are some of the major disadvantages of computer networks.

- **Security Issues**: One of the major drawbacks of computer networks is the security issues involved. If a computer is a standalone, physical access becomes necessary for any kind of data theft. However, if a computer is on a network, a computer hacker can get unauthorized access by using different tools. In case of big organizations, various network security software are used to prevent the theft of any confidential and classified data.
- **Rapid Spread of Computer Viruses**: If any computer system in a network gets affected by computer virus, there is a possible threat of other systems getting affected too. Viruses get spread on a network easily because of the interconnectivity of workstations. Such spread can be dangerous if the computers have important database which can get corrupted by the virus.
- **Expensive Set Up**: The initial set up cost of a computer network can be high depending on the number of computers to be connected. Costly devices like routers, switches, hubs, etc., can add up to the bills of a person trying to install a computer network. He will also have to buy NICs (Network Interface Cards) for each of the workstations, in case they are not inbuilt.
- **Dependency on the Main File Server**: In case the main File Server of a computer network breaks down, the system becomes useless. In case of big networks, the File Server should be a powerful computer, which often makes it expensive.

f) Explain the following terms as used in data communication

vi. Simplex transmission mode [2]

Simplex communication refers to communication that occurs in one direction only.

vii. Synchronous transmission [2]

Synchronous transmission uses no start and stop bits, but instead synchronizes transmission speeds at both the receiving and sending end of the transmission using clock signal(s) built into each component. A continual stream of data is then sent between the two nodes. Due to there being no start and stop bits the data transfer rate is quicker although more errors will occur, as the clocks will eventually get out of sync, and the receiving device would have the wrong time that had been agreed in the protocol for sending/receiving data, so some bytes could become corrupted (by losing bits). Ways to get around this problem include re-synchronization of the clocks and use of check digits to ensure the byte is correctly interpreted and received

viii. Circuit switching [2]

Circuit switching is a methodology of implementing a telecommunications network in which two network nodes establish a dedicated communications channel (circuit) through the network before the nodes may communicate. The circuit guarantees the full bandwidth of the channel and remains connected for the duration of the

communication session. The circuit functions as if the nodes were physically connected as with an electrical circuit.

ix. Dumb terminal [2]

A display monitor that has no processing capabilities. A dumb terminal is simply an output device that accepts data from the CPU. In contrast, a *smart/ intelligent terminal* is a monitor that has its own processor for special features, such as bold and blinking characters. Dumb terminals are not as fast as smart terminals, and they do not support as many display features, but they are adequate for most applications.

x. Full duplex [2]

A *full-duplex* (FDX), or sometimes *double-duplex* system, allows communication in both directions, and, unlike half-duplex, allows this to happen simultaneously. Land-line telephone networks are full-duplex, since they allow both callers to speak and be heard at the same time. A good analogy for a *full-duplex* system would be a two-lane road with one lane for each direction.

Examples: Telephone, Mobile Phone, etc.

QUESTION 4

e) Define

iii. Operating system [2]

- Is a suite of programs that are used to manage the resources of a computer.

iv. Application software [2]

- Application software is a term for software created for a specific purpose. Typically it is based on customer requirements but there are classes'general applications. These would be examples like:
  Quicken and Quickbooks - financial applications
  Word, Excel, powerpoint - office applications.

  Software such as video drivers, browsers, games, etc. are not considered applications.

f) State the two types /major classes of application software [2]

- **Packages/off-the-shelf and Tailor made/bespoke** software.

g) Your organization is planning to have a new application software .As a computer expert you have been consulted on what type of software the organization must go for between the two main categories of application software. Suggest with justification the application software type you would recommend [8]

The Pros and Cons of Off-the-shelf Software

Large software companies such as Microsoft and Adobe produce a massive range of off-the-shelf software for a variety of different purposes and audiences. Packaged software, as with anything, has its pros and cons.

The PROS of Off-the-shelf Software

- The software tends to be relatively cheap as the cost of development can be spread over a large number of users
- The software can be very sophisticated (e.g. Excel or Word) as the revenues from a very large numbers of users means that a lot of resources can be applied to it's development
- It is easy to get support and literature is usually widely available as there are many other users using exactly the same software
- It is easy to share files produced by the software with others as chances are they also have the software available to open the file
- You don't have to dedicate any of your time to the development process (e.g. helping with specifications, testing etc.)

The CONS of Off-the-shelf Software

- The software can be highly complex and will usually include large sections that you will never use (the average Word user is reputed to only use about 10% of the available facilities).
- It tends to be a compromise. By it's nature it is designed for many different types of users, each of whom will have different requirements
- As the software tends to be large and complicated it may take a long time to learn properly (some of the most asked for additions to later versions of Word were ones that already existed in the previous version!)
- You may have to alter the way that you work in order to fit in with the way that the software has been designed
- There will probably be operations that you require that you simply cannot do with the software
- As one small voice amongst many others your requests will not carry much weight
- If you have problems you are usually at the mercy of a large and faceless organisation who may not be quite as concerned as you are if you have a major problem that absolutely MUST be fixed before tomorrow morning!
- As the same system can be bought by your competitors it is very difficult to gain any competitive advantage from it's use

The Pros and Cons of Bespoke Software

On the flip side, bespoke software has its own unique set of pros and cons that should be considered.

The PROS of Bespoke Software

- It has been specifically designed for your particular requirements and can be tailored to fit in exactly with the way that your business or organisation wishes to operate.
- It can be customised to interface with other software that you operate with the potential to provide you with a fully integrated IT infrastructure across your whole organisation
- Users will usually find it easier and more intuitive to use as it should not contain unnecessary or superfluous facilities and should operate in the way that they are used to working

- It is much more flexible than packaged software and can be modified and changed over time as your requirements and business practices change
- You will receive much better support and can in many cases talk directly to the developers concerned (Hero provide a full range of support services)
- If you are lucky and find a good developer (we suggest Hero Solutions!) then they can significantly add value to your company by suggesting alternatives, improvements and by acting as a source of IT advice and information
- The use of professionally developed bespoke software applications can give you a significant business advantage over your competition
- As an alternative to the point above, you have the option, assuming you own the rights to the application (with Hero Solutions you do), to sell the application to others and recoup some or all of your investment.

The CONS of Bespoke Software

- If you do not have the source code you are dangerously exposed and are wholly dependent upon the developer's continuing existence and good will. To avoid this problem make sure you choose a developer who provides you with the source code.
- If you pick the wrong developer you could end up with an application that is unstable, unreliable and full of bugs (but then again so is some packaged software!). Selecting a developer who works to Best Practice and industry standards should counteract this.
- The investment required will usually be much higher than with packaged software. This is usually the biggest reason for not going down the custom route - you need to undertake a business justification exercise and compare the costs against the expected benefits and commercial advantages.
- A large investment in your time is required during the development process and a bespoke application will take longer to implement.
- It can be difficult to get support for bespoke software, unless the developers themselves offer support services.
- An unacceptable proportion of developers are either incompetent, unprofessional or are 'cowboys' and it can be difficult to sort out the good guys from the bad.

Conclusion

Having a bespoke application developed for you can potentially provide you with major business and commercial benefits and allow you to gain significant competitive advantage. Bespoke applications are generally easier to use and can work around the way you do business, rather than the other way round. However, you have to expect to pay more for it than for a packaged solution (both in time and money) and it is also essential that you use a professional developer who works to industry standards and who is happy to provide you with the source code to your application and on-going support for the package.

h) State any three types of operating systems and give three examples of any operating system programs

- **Batch Processing Operating System**
  In a batch processing operating system interaction between the user and processor is limited or there is no interaction at all during the execution of work. Data and programs that need to be processed are bundled and collected as a 'batch' and executed together.
  Batch processing operating systems are ideal in situations where:
  - There are large amounts of data to be processed.
  - Similar data needs to be processed.
  - Similar processing is involved when executing the data.
  The system is capable of identifying times when the processor is idle at which time 'batches' maybe processed. Processing is all performed automatically without any user intervention.
- **Real-time Operating System**
  A real-time operating system processes inputs simultaneously, fast enough to affect the next input or process. Real-time systems are usually used to control complex systems that require a lot of processing like machinery and industrial systems.
- **Single User Operating System**
  A single user OS as the name suggests is designed for one user to effectively use a computer at a time.
- **Multi-Tasking Operating System**
  In this type of OS several applications maybe simultaneously loaded and used in the memory. While the processor handles only one application at a particular time it is capable of switching between the applications effectively to apparently simultaneously execute each application. This type of operating system is seen everywhere today and is the most common type of OS, the Windows operating system would be an example.
- **Multi-User Operating System**
  This type of OS allows multiple users to simultaneously use the system, while here as well, the processor splits its resources and handles one user at a time, the speed and efficiency at which it does this makes it apparent that users are simultaneously using the system, some network systems utilize this kind of operating system.
- **Distributed Operating System**
  In a distributed system, software and data maybe distributed around the system, programs and files maybe stored on different storage devices which are located in different geographical locations and maybe accessed from different computer terminals.
  While we are mostly accustomed to seeing multi-tasking and multi-user operating systems, the other operating systems are usually used in companies and firms to power special systems.

i) Define the following terms:

- **Menu**: The menu bar contains the names of Word's menus and is used to navigate through their commands.
- Footer: A footer is the contents of an area located within the bottom margin of a page

- **Soft return**: When text is wrapped to the next line, Word enters a soft return at the end of the first line.

- Edit: It allows you to change the contents of the active cell, such as formulas, numbers, and text

- **Cell**: A cell is the intersection of a row and a column. A cell can contain a label, a numeric value, or a formula.

- **Label**: A label is any cell entry other than a numeric value or a formula. A text entry in a cell is called a label. A range of values will often have a label to identify it.
- Chart: Charts are graphic presentations of data from a worksheet

- **Mail merging**: Mail Merge refers to the process of combining a data source, and a main document to produce a unique output.
- Print preview: Print Preview in Word allows you to see how your document will look on the page before it is printed.

- **Worksheet**: A worksheet is an electronic spreadsheet that lets you enter, analyze, and calculate data. Within a workbook, worksheets can share information, and calculations pertaining to several worksheets can be performed at one time. The default number of worksheets in a new workbook is three.

QUESTION 6

c) Define the term computer peripheral [2]

d) State the device used for the following

xiii. Printing using heat:**Thermal printer**

xiv. Used for fast clearance of cheques in banks :**MICR**

xv. An input device that is sensitive to touch: **TOUCH SENSITIVE SCREEN**

xvi. Used in playing games: **JOY STICK**

xvii. Its contents can be erased only by exposure to ultra violet light : **EPROM**

xviii. Can be used to determine name of product,supplier,size,price and quantities left at appoint of sale system: **BAR CODE READER**

xix. It squirts/sprays droplets of ink that are directed by the electric field to paper and form characters when printing: **INK JET PRINTER**

xx. Is responsible for interpretation of instructions and regulates the flow of signals: **CONTROL UNIT**

xxi. It is used to input signals into the computer without retyping: **SCANNER**

xxii. Detects pencil or ink marks made on certain locations of a document and is mainly used for marking multiple choice exam papers, questionnaires and lotto: **OPTICAL MARK READER(OMR)**

xxiii. A drive used to read an optical disk but cannot write on it: **READ ONLY MEMORY(ROM)**

xxiv. A machine that can transmit documents containing both text and graphics over telephone lines : **FASCIMILE (FAX)** [12]

QUESTION 7

c) State the job title for the personnel responsible for the following:

vi. Coding of programs using a programming languages: **PRORAMMER**

vii. Filing back up disks and tapes in a room far away from the main computer room: **MEDIA LIBRARIAN**

viii. Punching data into the computer: **DATA CAPTURE CLERK**

ix. The process of computerizing a manual system: **SYSTEM ANALYST**

x. Preparing and checking batch totals: [10]

d) Give any five attributes of good information [10]

- **Relevant**
- **Timely**
- **Understandable**
- **Precise and concise**
- **Accurate**
- **Reliable**
- **Not ambiguous**
- **detailed**

QUESTIONS

QUESTION 1

Define the following terms as they are used in information communication technology

1. Computer [2]
2. Hardware [2]
3. Software [2]
4. Network [2]
5. Network topology [2]
6. Virus [2]
7. CPU [2]
8. Computer system [2]
9. Multi tasking [2]
10. Information technology [2]

QUESTION 2

a) Describe the following input devices and state the appropriate application of each:

i. MICR [3]

ii. Light Pen [3]

iii. Keyboard [3]

iv. Touch Sensitive Screen [3]

v. Bar Code Reader [3]

b) Compare and contrast primary memory and secondary storage [5]

QUESTION 3

Application software can be classified as:

a) Word processing
b) Spreadsheet
c) Databases
d) Graphics

Describe in detail each of the above application software giving two examples of each category [20]

QUESTION 4

a) There are three sources of application software .Explain these three sources of application software giving two advantages and two disadvantages of each [15]
b) List any five points to consider when selecting application software [5]

QUESTION 5

a) Explain the following modes of communication giving an example of where the mode is appropriately used:
   i. Simplex transmission [4]
   ii. Half duplex transmission [4]
   iii. Full duplex transmission [4]
b) Highlight the following ways of transmitting data
   i. Asynchronous transmission [4]
   ii. Synchronous transmission [4]

QUESTION 6

Explain any four data processing methods stating any two disadvantages and advantages of each [20]

QUESTION 7

a) Define data security [2]
b) Describe any four requirements for a good computer room environment [8]
c) List any five symptoms of a computer virus [5]
d) Computers can affect the health of users .Name any five known side effects of computers on users [5]

ANSWERS

QUESTION 1

Define the following terms as they are used in information communication technology

i. **Compute**r: Is an electronic device that accepts data as input and processes it(works on it) to produce information(processed data) [2]
ii. **Hardware**: these are the tangible or physical parts of a computer [2]
iii. **Software**: these are the intangible parts of a computer. These are basically programs [2]
iv. **Network**: is a connection of two or more computers [2]
v. **Network topology**: is the physical configuration or layout of a network [2]
vi. **Virus**: is a man-made harmful program intentionally developed to harm the proper functioning of a computer. [2]
vii. **CPU**: stands for Central Processing Unit. It is the "brain" or "engine" of the computer. [2]

viii. Computer system: is a set of interrelated components, thatis, hardware and software that work together to produce information from data. [2]

ix. **Multi tasking**: In this type of OS several applications maybe simultaneously loaded and used in the memory. While the processor handles only one application at a particular time it is capable of switching between the applications effectively to apparently simultaneously execute each application. This type of operating system is seen everywhere today and is the most common type of OS, the Windows operating system would be an example. [2]

x. **Information technology** : is a general expression covering the use of computers, telecommunications and electronics. [2]

QUESTION 2

c) Describe the following input devices and state the appropriate application of each:

vi. **MICR**: Stands for Magnetic Ink Character Reader. It is an input device capable of reading characters written using magnetic ink. These characters are used because they are very difficult to forge or damage. Banks use MICR to read the magnetic ink numbers from the bottom of cheques to obtain data such as account numbers and bank sort codes. [3]

vii.

Light Pen: This is an Input device. It has the shape of an ordinary pen. One writes on a monitor or a pad with it and it senses the light from the position on the screen/ pad and transmits the signals to the computer. [3]

viii. Keyboard

The keyboard is an input device with an arrangement of keys, like those on a typewriter, and an additional set of keys that fall into 5 basic categories:

1. **Function keys**- keys form the first row of keys. They perform special operations in applications e.g. F7 activates Spell Checking Program in word processing and F1 activates the Help facility in any application.
2. **Alphanumeric keys** (like those on typewriter) are arranged in a QWERTY series. First is a row of numbers with some characters like %^&*()@!~ above them, then letters of the alphabet, the spacebar at the bottom, the Shift key on both the left and right side of the Spacebar.
3. **Numeric keypad**- serves 2 functions. At the top of the keypad is the NumLock key, which locks the keypad into Number mode when, pressed. When in Number mode, the keys function as number keys arranged like a standard calculator, otherwise it is in Cursor control mode, which allows you to move the cursor up, down, forward or backward by pressing the appropriate arrow key. When in cursor mode you can also use the home, page up, page down, end, delete and insert keys from Num Lock pad.
4. **Cursor control keys** are the arrow keys as well as Home, End, Ins, Page Up etc. Their major function is to place the cursor in an appropriate position for reading, appending or editing text.
5. **Combination keys** are the Shift Ctrl and Alt keys. On their own they are ineffective but combined with other keys they work. E.G. The Shift key, can be used to type to type the $ sign (you would keep Shift pressed as you press the $ sign key once). [3]

ix. **Touch Sensitive Screen** : it is an input device. The user simply touches the screen at the point of interest to activate a functionality .Some smart phones make use of a touch sensitive screen to operate it. [3]

x. **Bar CodeReader**: Barcodes are zebra-striped identifiers on store products. Each product is stocked on the basis of its bar code, such that when it is being sold the Bar Code Reader is used to retrieve the details of the product through its bar code. Details include price, quantity, brand name etc [3]

d) Compare and contrast primary memory and secondary storage [5]

PRIMARY STORAGE	SECONDARY STORAGE
Volatile	Non Volatile
Stores programs and data while computer is running for current use	Store data or programs for later use
Memory directly connected to the CPU - not portable	Portable- can be transported from one machine to another

QUESTION 3

Application software can be classified as:

e) Word processing

- Is a collection of software that permits the user tocreate, edit and print documents. Most word processing packages come with spell-checkers, grammar checkers and thesaurus programs for creating drawings and table contents. Word, Word Perfect, Word Pro are examples of word processing software.

f) Spreadsheet

- Allows managers to prepare budgets, tax analysis sales and profit projections. Managers can design templates which contain formulas used to create columns or row averages. Spreadsheets allow managers to simulate various solutions. A user may enter a number of different values and see the effect on the results such as profit margins. Excel and Lotus 1-2-3 are examples of spreadsheets

g) Databases

- Allows the user to prepare reports based on data found in different records. Access and oracle are examples.

h) Graphics

- Graphics software allows managers to prepare slides containing charts, text and images. Presentation graphics software usually provides libraries of clip images that can be cut and pasted into slides to make the slide look more attractive and informative. Powerpoint is an example

[20]

QUESTION 4

c) There are three sources of application software .Explain these three sources of application software giving two advantages and two disadvantages of each [15]

- General purpose: people in different industries and at different levels can use this software.eg Ms office
- Function specific: addresses certain specific functions within an organization, for example an accounting package.
- Industrial specific: includes programs tailored to the problems and needs of particular industry for example job estimation programs are available for construction industries.

d) List any five points to consider when selecting application software [5]

- Portability, can it be installed on one type of hardware or a variety
- Relevance of the software to the task at hand.
- Compatibility with existing hardware & software. Will the package run on existing hardware? Can files be easily transferred from existing systems without rekeying?
  Can files created in the package be exported to other systems in use in the company?
- It should be on a media compatible with your computer i.e. if you purchase software on CD media your computer should have compact disk drive.
- Sophistication, simple programs are usually easy to learn, cost less and are appropriate for those who use the software infrequently.
- Cost. This includes the original cost of the package, technical support, and upgrades.
- Should include enough documentation such as installation instructions, system requirements e.g. Pentium 4, reference manual, registration information, supplier details and user manual.
- Standard software, which is well supported locally i.e. used by most people in that area
- Is the application upgradeable and does it support future upgrades.
  - Easiness of installation
  - Technical support. Is support available? Is it very costly? Often, technical support contract can add 50% or more to the price of a package, but without it no support at all will be given by the manufacturer

QUESTION 5

c) Explain the following modes of communication giving an example of where the mode is appropriately used:

iv. Simplex transmission [4]

- Transmission occurs in one direction only. These include broadcast systems, where one station transmits and the others just "listen", and some missile guidance systems, where the launcher needs only to command the missile where to go, and the launcher does not need to receive any information from the missile. Also, there are spacecraft such as satellites and space probes that have lost their capability to receive any commands, but they can continue to transmit radio signals through their antennas. Some early satellites (such as Sputnik 1) were designed as transmit-only spacecraft. Pioneer 6 has transmitted for decades without being able to receive anything.

v. Half duplex transmission [4]

- A *half-duplex* (HDX) system provides communication in both directions, but only one direction at a time (not simultaneously). Typically, once a party begins receiving a signal, it must wait for the transmitter to stop transmitting, before replying (antennas are of trans-receiver type in these devices, so as to transmit and receive the signal as well).
  An example of a half-duplex system is a two-party system such as a "walkie-talkie" style two-way radio, wherein one must use "Over" or another previously designated command to indicate the end of transmission, and ensure that only one party transmits at a time, because both parties transmit and receive on the same frequency.
  A good analogy for a half-duplex system would be a one-lane road with traffic controllers at each end. Traffic can flow in both directions, but only one direction at a time, regulated by the traffic controllers.
  In automatically run communications systems, such as two-way data-links, the time allocations for communications in a half-duplex system can be firmly controlled by the hardware. Thus, there is no waste of the channel for switching. For example, station A on one end of the data link could be allowed to transmit for exactly one second, and then station B on the other end could be allowed to transmit for exactly one second. And then this cycle repeats over and over again.

vi. Full duplex transmission

- A *full-duplex* (FDX), or sometimes *double-duplex* system, allows communication in both directions, and, unlike half-duplex, allows this to happen simultaneously. Land-line telephone networks are full-duplex, since they allow both callers to speak and be heard at the same time. A good analogy for a *full-duplex* system would be a two-lane road with one lane for each direction.

  Examples: Telephone, Mobile Phone, etc.

[4]

d) Highlight the following ways of transmitting data

iii. Asynchronous transmission [4]

Asynchronous transmission uses start and stop bits to signify the beginning bit ASCII character would actually be transmitted using 10 bits. For example, "0100 0001" would become "**1** 0100 0001 **0**". The extra one (or zero, depending on parity bit) at the start and end of the transmission tells the receiver first that a character is coming and secondly that the character has ended. This method of transmission is used when data are sent intermittently as opposed to in a solid stream. In the previous example the start and stop bits are in bold. The start and stop bits must be of opposite polarity. This allows the receiver to recognize when the second packet of information is being sent.

iv. Synchronous transmission [4]

Synchronous transmission uses no start and stop bits, but instead synchronizes transmission speeds at both the receiving and sending end of the transmission using

clock signal(s) built into each component. A continual stream of data is then sent between the two nodes. Due to there being no start and stop bits the data transfer rate is quicker although more errors will occur, as the clocks will eventually get out of sync, and the receiving device would have the wrong time that had been agreed in the protocol for sending/receiving data, so some bytes could become corrupted (by losing bits). Ways to get around this problem include re-synchronization of the clocks and use of check digits to ensure the byte is correctly interpreted and received

QUESTION 6

Explain any four data processing methods stating any two disadvantages and advantages of each [20]

Batch Processing

•This is a method where the information to be organized is sorted into groups to allow for efficient and sequential processing.

Online Processing

•This is a method that utilizes Internet connections and equipment directly attached to a computer. It is used mainly for information recording and research.

Real-Time Processing

•This technique has the ability to respond almost immediately to various signals in order to acquire and process information.

Distributed Processing

•This method is commonly utilized by remote workstations connected to one big central workstation or server. ATMs are good examples of this data processing method.

QUESTION 7

e) Define data security [2]

- Refers to mechanism that are put in place to ensure data is safe from unauthorized access and malicious violation.

f) Describe any four requirements for a good computer room environment [8]

- Cleanliness [books, manuals not encouraged] because they bring dust & caught fire easily.

- Air conditioners, which control the room temprature.
- It should be dust free; dust is the biggest “killer” of hard drives.
- No carpets, they caught fire more easily.
- You are not allowed to eat, smoke or drink in the computer room.
- No magnetic material should be in the computer room.
    - The computer room should be located in such a way that computers are not exposedto direct sunlight or hot environments, use curtains if otherwise.
- The computer room should be fitted with burglar bars, alarm systems, or guarded 24hours to ensure security.
- The computer room should have surge protectors or suppressors to guard against

electrical faults and high voltages.

- The computer room should have UPS [uninterrupted power supply] in case of power failures, which may be fatal.
- Computer room should be well ventilated, to allow for air circulation,
- Foreign media, such as floppy diskettes, flash disks should not be allowed in order to minimize virus spread.
- Always switch off machines if not in use.
- Avoid overloading circuits.
- All cabling and wiring should not be exposed; it should be covered and should not criss cross the room.

List any five symptoms of a computer virus [5]

- **Windows Shooting Alone.**
  You are browsing the Internet and come up windows for advertisements or different Web sites, without you having anything tight, make no mistake, you're infected.
- **Performance Degradation.**
  Computer does not turn over the command of Windows, just take the socket. Lock all the time. It is too slow. Resumes alone, you're infected.
- **Suddenly Pop Up Error Messages.**
  When many messages begin to appear out of memory, disk space, it fails in application, etc., is a clear sign that a virus may be behind them.
- **Home Of The Browser is Changed.**
  Pay attention when the home page of your favorite browser is changed for no apparent reason, as many spyware do this.
- **Social Networking Profiles, or Your Email Account Automatically Send Messages With the Virus to Your Contacts.**
  If your friends start to complain that they are getting your messages with viruses, it is certain that your computer is infected.
- **The Command CTRL+ALT+DEL No Longer Works.**
  In any version of Windows, one of the simplest ways to check for viruses is simultaneously pressing the CTRL+ALT+DEL, as the most important virus disables this command to initiate the task manager.
- **Antivirus No Longer Update.**
  If your anti-virus begins to acknowledge failure update, even if its connection to the Internet is operating normally, is a great sign of a virus installed.
- **Social Networks Hacked.**
  When your Orkut, Twitter, Facebook, etc are hacked, surely there is virus on your computer.

g) Computers can affect the health of users .Name any five known side effects of computers on users [5]

Problem Area: Lower back Pain
Causes: Wrong type of chair or desk, Right chair an desk but wrong posture, Sitting on the edge of the chair, sitting with all the weight on one buttock by sitting cross legged.
Corrective Measures: Always go for a chair that has a mechanism for lowering and raising the height of the backrest. Never buy a computer chair that has arms rest.

Problem Area: Neck Pain
Causes: While typing when one is moving the neck up and down, left and right too much it causes neck pain. Use of wrong type of glasses (like bifocals), Height of screen. It may sound strange to some of you but some people sit on the computer with mouthpiece of phone hanging around their neck. This casual attitude is not cool at all!
Corrective Measures: A document holder is a must to restrict neck movement. Take opticians advice and go for special glasses that you can use while in front of the computer. Screen's height should be adjusted parallel to eyesight – not too high and not too low.

Problem Area: Pain In Wrists & Fingers
Causes: Height of the chair not adjusted properly. If you have bought the right chair you might a well make use of it! Striking the keys too hard. Mouse is not close to the body.
Corrective Measures: Height of the chair should make a perfect L between the shoulder, elbow and wrist. This ensures fingers and keys or mouse are at a perfect horizontal. Clicking finger is also horizontal for that perfect wrist support. Mouse should be placed right in front of the shoulder, close to our body.

Problem Area: Strain In the Eyes
Causes: Glare from monitor, sun glare directly coming in straight on to the monitor from windows, lighting arrangement of the room are some causes that put strain on the eyes.
Corrective Measures: The correct thing to do is to place the computer table between lights and not directly under them. The best alternative is to switch off the overhead light and switch on the angle poise lamp. Ask your optician to put slight tint coat on your glasses. Adjust monitor's contrast and brightness. Make sure the distance is right. Opt for a 17inch SVGA or XGA screen

QUESTIONS

QUESTION1

Explain a,e f I and j ; expand the rest ,as used in computers

a) Bluetooth
b) VLSI
c) DVD
d) USB
e) Posture
f) Intelligent terminal
g) GUI
h) LCD
i) Micro computer

j) Light pen [20]

QUESTION 2

a) Explain why the choice of an operating system is of great importance to management [4]

b) State the components that constitute the CPU . Outline briefly the role of each component in processing[9]

c) Highlight any three differences between the main memory and the backing storage [6]

d) Briefly explain what you understand by the term "portability" as used in computer programs[1]

QUESTION 3

a) Give any two differences between machine code and assembly language [4]

b) Highlight any three advantages of 4 GLS over high level languages [6]

c) Explain any five factors that are likely to influence the data processing methods to be adopted by an organization [10]

QUESTION 4

a) Highlight the roles of the following data processing personnel in an organization .Give at least two roles for each personnel

i. System analyst [4]

ii. Computer programmer [4]

iii. Database administrator [4]

b) The word processing department of your organization has been losing a lot of data because floppy diskettes are mishandled. Write four guidelines to help typists in safeguarding the information on floppy disks [8]

QUESTION 5

a) Differentiate between a transaction file and a master file. Explain their relationship [6]

b) Describe the following methods of file back ups

i. Full back up [2]

ii. Increament back up [2]

iii. Selective back up [2]

c) Define site licensing [2]

d) Give three advantages of non impact printer over impact printer [2]

QUESTION 6

a) Illustrate the following topologies

i. Star [2]

ii. Ring [2]

iii. Bus [2]

iv. Mesh [2]

b) A computer network has a number of disadvantages .These include; rapid spreading of viruses when any machine is infected ,potential loss of privacy , data corruption and destruction by other users amongst others

Explain why managers implement computer networks and data communication [8]

c) Explain the following terms as used in computer networks and data communication.

i. Signal Multiplexing [2]

ii. Circuit switching [2]

ANSWER

QUESTION1

Explain a, e f I and j ; expand the rest ,as used in computers

k) Bluetooth: **Bluetooth** is a proprietaryopenwireless technology standard for exchanging data over short distances (using short wavelength radio transmissions in the ISM band from 2400-2480 MHz) from fixed and mobile devices, creating personal area networks (PANs) with high levels of security

l) VLSI - VERY LARGE SCALE INTEGRATION

m) DVD - DIGITAL VERSATILE DISC

n) USB - UNIVERSAL SERIAL BUS

o) Posture - The sitting position of a computer user.

p) Intelligent terminal: Intelligent terminals include memory and a processor to perform special display operations. In contrast, a *dumb terminal* has no processing capabilities; it must rely entirely on the central computer. A *smart terminal* has some processing capabilities, but not as much as an intelligent terminal.

q) GUI - GRAPHICAL USER INTERFACE

r) LCD - LIQUID CRYSTAL DISPLAY

s) Micro computer: The term *microcomputer* is generally synonymous with personal computer (PC), or a computer that depends on a microprocessor. Microcomputers are designed to be used by individuals, whether in the form of PCs, workstations or notebook computers. A microcomputer contains a central processing unit (CPU) on a microchip (the microprocessor), a memory system (typically read-only memory and random access memory), a bus system and I/Oports, typically housed in a motherboard.

t) Light pen: A **light pen** is a computerinput device in the form of a light-sensitive wand used in conjunction with a computer's CRT TV set or monitor. It allows the user to point to displayed objects or draw on the screen in a similar way to a touch screen but with greater positional accuracy. It was long thoughtthat a light pen can work with any CRT-based display

[20]

QUESTION 2

e) Explain why the choice of an operating system is of great importance to management [4]

The operating system is a collection of programs which, together, manage all the basic functions of a computer. The operating system runs other programs (such as a word processor or graphics editor), manages the storage of your own documents, and coordinates the functions of the computer itself and all the devices connected to the computer. Windows Me, Mac OS and Linux are three examples of operating systems. A program written to work under one operating system will not work on another operating system (a different version must be written for each operating system - such as Microsoft Office for Windows and Office for the Mac.)

The important thing about an OS is that it provides an interface for application developers to be able to interact with hardware and to allocate system resources

QUESTION 3

d) Give any two differences between machine code and assembly language [4]

An **assembly language** is a low-level programming language for computers, microprocessors, microcontrollers, and other programmable devices in which each statement corresponds to a single machine languageinstruction. An assembly language is thus specific to a certain physical (or virtual) computer architecture, in contrast to most high-level programming languages, which, ideally, are portable.
Assembly language allows the use of symbolic representation for machine *operation codes* (usually called mnemonics), memory locations, registers and other parts of an instruction.
A utility program called an *assembler* is used to translate assembly language statements into the target computer's machine code.
Many advanced assemblers offer additional mechanisms to facilitate program development, control the assembly process, and aid debugging. In particular, most modern assemblers include a macro facility (described below), and are called *macro assemblers*.

Machine code or **machine language** is a system of impartible instructions executed directly by a computer's central processing unit (CPU). Each instruction performs a very specific task, typically either an operation on a unit of data (in a register or in memory, e.g. add or move), or a jump operation (deciding which instruction executes next, often conditional on the results of a previous instruction). Every executable program is made up of a series of these atomic instructions. Machine code may be regarded as a primitive (and cumbersome) programming language or as the lowest-level representation of a compiled and/or assembledcomputer program. While it is possible to write programs in machine code, because of the tedious difficulty in managing CPU resources, it is rarely done any more, except for situations that require the most extreme optimization.
Almost all executable programs are written in higher-level languages, and translated to executable machine code by a compiler and linker. Machine code is sometimes called **native code** when referring to platform-dependent parts of language features or libraries.[1]
Programs in interpreted languages are **not** represented by machine code; however, their *interpreter* (which may be seen as a processor executing the higher-level program) often is.
Machine code should not be confused with so-called "bytecode", which is executed by an interpreter.

e) Explain any five factors that are likely to influence the data processing methods to be adopted by an organization [10]

- Nature of the organization

- Processing speed constraints
- Nature of data
- Resources available in terms of hardware, human and software
- Control

QUESTIONS

QUESTION1

a) Expand the following abbreviations as used in information technology
   i. USB
   ii. BIT
   iii. GIGO
   iv. DVD
   v. LCD
   vi. LED
   vii. SRAM
   viii. MICR
   ix. TCP/IP
   x. WIMP [10]

b) ATMs are now very popular with bank customers. Give at least three reasons explaining why they have become so popular [6]

c)
   i. What is prototyping? [2]
   ii. Give two reasons why software developers are using prototyping [2]

QUESTION 2

a) Differentiate between RAM and ROM of the main memory [4]

b) Explain briefly why it is usually necessary to have both RAM and ROM when a computer system is being designed [4]

c) What are the roles of the following IT personnel in an organization of your choice
   i. System Analyst [4]
   ii. Computer programmer [4]
   iii. Database administrator [4]

QUESTION 3

a) Your organization tasked you to purchase a package to meet new challenges. Outline any four factors that are likely to influence your choice of package [8]

b) Advise the marketing manager of your organization on how Information Technology can support the marketing function [6]

c) Briefly explain the following terms:
   i. Data verification [2]
   ii. Audit trail software [2]
   iii. Information system [2]

QUESTION4

a) Explain how the following systems implementation methods can be carried out
   i. Direct conversion [4]
   ii. Parallel implementation [4]
   iii. Phase implementation [4]
b) Explain the roles of users in system development lifecycle [4]
c) Define "system flow chart" [4]

QUESTION 5

a) Using a word processor program that you are familiar with explain how the following operation are performed:
   i. Dotted underlining [4]
   ii. Moving text from one location to another [4]
   iii. Saving a modified document but using a different filename [4]
b) Explain the following terms as used in a spreadsheet package
   i. Legend [2]
   ii. Value [2]
   iii. Label [2]
   iv. Cell [2]

QUESTION 6

a) Using a high level programming language of your choice, describe what you consider to be its four main advantages and two disadvantages compared to other generations of programming languages [12]
b) Distinguish between an interpreter and a complier [4]
c) It is claimed that 4 GLs have made computer applications easier to develop .State two distinct reasons to support this claim [4]

ANSWERS

QUESTION1

d) Expand the following abbreviations as used in information technology
   xi. USB - UNIVERSAL SERIAL PORT
   xii. BIT - BINARY DIGIT
   xiii. GIGO - GARBAGE IN GARBAGE OUT
   xiv. DVD - DIGITAL VERSATILE DISC
   xv. LCD - LIQUID CRYSTAL DISPLAY
   xvi. LED - LIGHT EMITTING DIODE
   xvii. SRAM - STATIC RANDOM ACCESS MEMORY
   xviii. MICR - MAGNETIC INK CHARACTER READER
   xix. TCP/IP - TRANSMISSION CODE PROTOCOL/ INTERNET PROTOCOL
   xx. WIMP - WINDOWS ICONS MENUS AND PROCEDURES/POINTERS [10]
e) ATMs are now very popular with bank customers. Give at least three reasons explaining why they have become so popular [6]

- Convenient, that is , you can withdraw your money on 24 hour basis and on any day of the week.
- Online processing means you can access your money from any part of the country as long as there is an ATM machine
- ATM machines have also been combined with ZimSwitchfacility which enables bank customers to buy goods in supermarkets and settle utility bills.

iii. What is prototyping? [2]

- **prototyping**, refers to the activity of creating prototypes of software applications, A prototype typically simulates only a few aspects of, and may be completely different from, the final product.

iv. Give two reasons why software developers are using prototyping [2]

Reduced time and costs: Prototyping can improve the quality of requirements and specifications provided to developers. Because changes cost exponentially more to implement as they are detected later in development, the early determination of *what the user really wants* can result in faster and less expensive software.

Improved and increased user involvement: Prototyping requires user involvement and allows them to see and interact with a prototype allowing them to provide better and more complete feedback and specifications. The presence of the prototype being examined by the user prevents many misunderstandings and miscommunications that occur when each side believe the other understands what they said. Since users know the problem domain better than anyone on the development team does, increased interaction can result in final product that has greater tangible and intangible quality. The final product is more likely to satisfy the users desire for look, feel and performance.

It can be used to validate the requirements of the user. The user can judge the prototype before things have gone too far to be changed.

It makes it possible for programmers to present a 'mock-up' version of an envisaged system to users before a substantial amount of time and money has been committed

The process facilitates the production of 'custom built' application software rather than off- the- shelf packages which may or may not suit user needs.

It makes efficient use of programmer time by helping programmers to develop programs more quickly. Programmer time by helping programmers to develop programs more quickly. Prototyping may speed up the 'design' stage of the systems development lifecycle.

A prototype does not necessarily have to be written in the language of what it is prototyping. So prototyping is not only a tool, but a design technique.

QUESTION 2

d) Differentiate between RAM and ROM of the main memory [4]

RAM	ROM
Volatile	Non volatile
Temporary storage	Permanent storage
Used to store programs currently being used on a computer	Used to store firmware
Can be read and written	Can only be read

e) Explain briefly why it is usually necessary to have both RAM and ROM when a computer system is being designed [4]

ROM is "built-in" computer memory containing data that normally can only be read, not written to. ROM contains the programming that allows your computer to be "booted up" or regenerated each time you turn it on. Unlike a computer's random access memory (RAM), the data in ROM is not lost when the computer power is turned off. The ROM is sustained by a small long-life battery in your computer.

- RAM is a type of memory that stores data temporarily. Unlike the memory on a hard drive, all of the information held in RAM is lost when the computer is turned off. Your computer uses RAM to store data until it can be processed. Most programs are loaded into RAM while you're using them, since accessing this type of memory is much faster than reading hard drive data.
  Benefits
- Since accessing data stored in RAM is faster than accessing data on the hard drive, computers can run much more quickly. Running programs from your computer's RAM allows them to function with little to no lag. Some types of RAM also have mechanisms that make sure data has not been corrupted. They check the data as it's transferred and are often used on systems that store important information, such as servers. Ordinary chips do not perform this check.

f) What are the roles of the following IT personnel in an organization of your choice

iv. System Analyst [4]

☐ Collect information to analyze and evaluate existing or proposed systems.

☐ Research, plan, install, configure, troubleshoot, maintain and upgrade operating systems.

☐ Research, plan, install, configure, troubleshoot, maintain and upgrade hardware and software interfaces with the operating system. Analyze and evaluate present or proposed business procedures or problems to define data processing needs.

☐ Prepare detailed flow charts and diagrams outlining systems capabilities and processes.
☐ Research and recommend hardware and software development, purchase, and use.
☐ Troubleshoot and resolve hardware, software, and connectivity problems, including user access and component configuration.
☐ Select among authorized procedures and seek assistance when guidelines are inadequate, significant deviations are proposed, or when unanticipated problems arise.
☐ Record and maintain hardware and software inventories, site and/or server licensing, and user access and security.
☐ Install, configure, and upgrade desktop hardware and peripherals to include; network cards, printers, modems, mice and add-in boards.
☐ Work as a team member with other technical staff, such as networking to ensure connectivity and compatibility between systems.
☐ Write and maintain system documentation.
☐ Conduct technical research on system upgrades to determine feasibility, cost, time required, and compatibility with current system.
☐ Maintain confidentiality with regard to the information being processed, stored or accessed by the network.
☐ Document system problems and resolutions for future reference.
☐ Other duties as assigned.

v. Computer programme [4]

Specific Duties of a Computer Programmer

There are a number of specific duties which go along with the job position of computer programmer. The primary duty of a computer programmer is to develop computer programs

Another specific duty of a computer programmer is to perform monitoring tasks to ensure that the programs which they develop work as they are supposed to. This is done by reviewing programs on a frequent basis and making adjustments as are necessary to ensure the proper working of a computer program. The computer programmer may perform this specific duty on their own or in conjunction with others.

Some computer programmers may also be in a supervisory position. This means that the computer programmer may oversee the work of coworkers and subordinates on a daily basis. Those who fill a supervisory role may have to hire new computer programmers and others who work in the computer department as well as fire those who do not work out. Computer programmers who are supervisors may also perform scheduling and payroll tasks.

The maintenance of computer databases is another type of specific duty which a computer programmer may find themselves responsible. The size of the database will depend on the computer department which a computer programmer works within and the company which a computer programmer works for in their job position.

Computer programmers may also find themselves possessing the responsibility for preparing graphs, tables and analytical data displays which show the progress of a computer program. This is important as it follows the working of a program and can be used to relay this information to other individuals within the company or the general public as a whole.

The computer programmer may also be the individual who is responsible for providing technical support to those who use the computer programs developed by the individual and his/her company. This relates not only to those individuals who work for the company but outside parties as well. The computer programmer may use phone, email or in person correspondence to aid individuals in using the computer programs and enabling them to work as efficiently as possible.

vi. Database administrator [4]

Depending on the company and the department, this role can either be highly specialized or incredibly diverse. The primary role of the Database Administrator is to administer, develop, maintain and implement the policies and procedures necessary to ensure the security and integrity of the corporate database. Sub roles within the Database Administrator classification may include security, architecture, warehousing and/or business analysis. Other primary roles will include:

- Implementation of data models
- Database design
- Database accessibility
- Performance issues
- Capacity issues
- Data replication
- Table Maintainence

QUESTION 3

d) Your organization tasked you to purchase a package to meet new challenges. Outline any four factors that are likely to influence your choice of package [8]

- Does the version of the product that I am considering run on my personal computer system? Is it compatible with my platform (PC, Macintosh, Sun, and so on)? with the processor used in my computer (486, Pentium, Motorola 6040, PowerPC, and so on)? and with the operating system that I am running (DOS, Windows, NeXT Step, UNIX)?
- Is the product compatible with other programs, such as extensions and device drivers, that I have on my personal computer system?
- Does the product do all that I want it to do? Is it simple enough to use immediately but powerful enough to provide the capabilities that I will want as my familiarity with the program increases?
- Is the product an up-to-date, current version or release?
- Does the product have a clear, step-by-step tutorial? Is the product easy to learn?
- Is the product accompanied by clear, easy-to-follow instructions or documentation?

- Does the manufacturer provide technical assistance? Is a toll-free technical assistance number included in the software documentation? Does the manufacturer have a bulletin board or Internet address for technical assistance questions? Does the manufacturer charge for technical assistance? for product revisions or upgrades?
- Can I find instruction or training in the use of the product?
- Is the product from a respected, well-known manufacturer?
- Does the program have any known problems or bugs, and will these affect my use of the program?
- Does the product come with a warranty, and what are the conditions of that warranty?
- Does the product cost more or less than comparable products on the market?

e) Advise the marketing manager of your organization on how Information Technology can support the marketing function[6]

Information Technology support the marketing function in three basic ways

- Supports strategies for competitive advantage
- Support decision making
- Supports business processes and transactions

f) Briefly explain the following terms:

iv. Data verification [2]

Data Verification is a process wherein the data is checked for accuracy and inconsistencies after data migration is done

It helps to determine whether data was accurately translated when data is transported from one source to another, is complete, and supports processes in the new system. During verification, there may be a need for a parallel run of both systems to identify areas of disparity and forestall erroneous data loss.

v. Audit trail software [2]

Is a program which generate an audit trail .An audit trail is : a record showing who has accessed a computer system and what operations he or she has performed during a given period of time. Audit trails are useful both for maintaining security and for recovering lost transactions. Most accounting systems and database management systems include an audit trail component. In addition, there are separate audit trail software products that enable network administrators to monitor use of network resources.

vi. Information system [2]

A combination of hardware, software, infrastructure and trained personnel organized to facilitate planning, control, coordination, and decision making in an organization.

QUESTION4

d) Explain how the following systems implementation methods can be carried out

iv. Direct conversion [4]

v. Parallel implementation [4]

vi. Phase implementation [4]

Direct changeover, in which the old is topped and the new is introduced. Usually this is over a weekend or some other slack time. The advantage is that there is a minimum of duplication. The drawback is there can be serious disruption if the new system has errors in it.

· **Parallel conversion** where the two systems are run alongside each other, minimizing disruption due to errors. However this does involve duplication of the work.

· **Phased conversion** where bits of the new system are introduced, one at a time.

· **Pilot conversion** where the system is implemented initially in a few branches.

e) Explain the roles of users in system development lifecycle [4]

- Provide user requirements to the system
- Test the system functionality to see if it meets their requirements
- Participate in the implementation of the system

f) Define "system flow chart" [4]

A **flowchart** is a type of diagram that represents an algorithm or process, showing the steps as boxes of various kinds, and their order by connecting these with arrows. This diagrammatic representation can give a step-by-step solution to a given problem. Process operations are represented in these boxes, and arrows connecting them represent flow of control. Data flows are not typically represented in a flowchart, in contrast with data flow diagrams; rather, they are implied by the sequencing of operations. Flowcharts are used in analyzing, designing, documenting or managing a process or program in various fields.

QUESTION 5

c) Using a word processor program that you are familiar with explain how the following operation are performed:

iv. Dotted underlining [4]

- Highlight text
- Underline options on U icon
- Select dotted underline

v. Moving text from one location to another [4]

- Highlight text
- Right click on text , select cut
- Paste on new loction

vi. Saving a modified document but using a different filename [4]

- Select save as on file menu

- Write a new file name on file name text box
- Click save

d) Explain the following terms as used in a spreadsheet package

v. Legend [2]

The key to a graph

vi. Value [2]

When a cell contains a formula, the resulting number shown on the screen is called a value.

vii. Label [2]

A label is any cell entry other than a numeric value or a formula. A text entry in a cell is called a label. A range of values will often have a label to identify it.

viii. Cell [2]

A cell is the intersection of a row and a column. A cell can contain a label, a numeric value, or a formula

QUESTION 6

d) Using a high level programming language of your choice, describe what you consider to be its four main advantages and two disadvantages compared to other generations of programming languages [12]

Following are the advantages of a high level language:

- User-friendly
- Similar to English with vocabulary of words and symbols
- Therefore it is easier to learn.
- They require less time to write.
- They are easier to maintain.
- Problem oriented rather than 'machine' based.
- Program written in a high-level language can be translated into many machine language and therefore can run on any computer for which there exists an appropriate translator.
- It is independent of the machine on which it is used i.e.Programs developed in high level language can be run on any Computer

Disadvantages of High Level Language

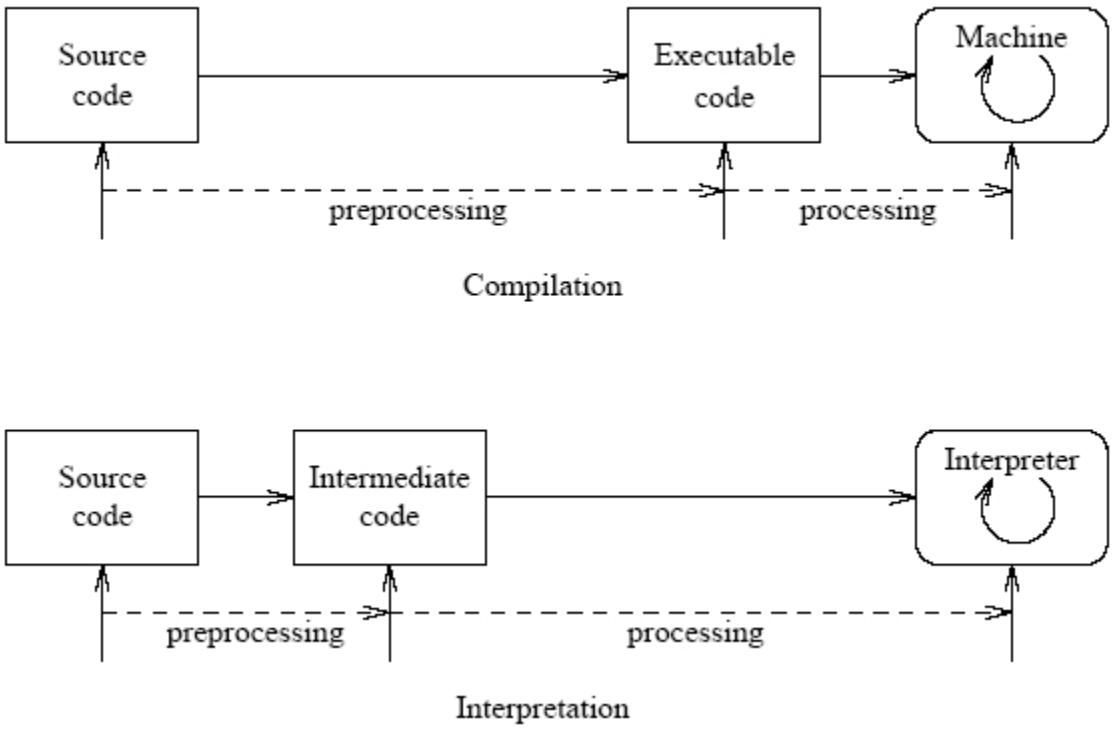
- A high-level language has to be translated into the machine language by a translator and thus a price in computer time is paid.
- The object code generated by a translator might be inefficient Compared to an equivalent assembly language program

e) Distinguish between an interpreter and a complier [4]

compiler takes the entire source code as input and convert in to machine level language and if there is any error it is displayed but interpreter does the conversion line by line and there is any error at particular line the it won't go to next line.

Compiler vs. Interpreter

The following diagram shows one representation of the differences.



f) It is claimed that 4 GLs have made computer applications easier to develop .State two distinct reasons to support this claim [4]

- Simplified the programming process.
- Use nonprocedural languages that encourage users and programmers to specify the results they want, while the computers determines the sequence of instructions that will accomplish those results.
- Use natural languages that impose no rigid grammatical rules

QUESTIONS

QUESTION

Explain the meaning of the following terms as used in computers

a) Byte
b) Hard copy
c) Bit
d) ASCII

e) WYSIWIG[10]

QUESTION2

a) What is the difference between data and information [4]

b) Explain the following:

i. Application software [3]

ii. System software [3]

QUESTION 3

State and explain any five functions of the operating system [10]

QUESTION4

Explain the following giving an example of each

i. Secondary storage

ii. Primary storage [10]

QUESTION5

Computer and data security is an area that demands heavy investment of financial and at times human resources. Give five measures that can be taken to ensure that computer and data security is maintained. [10]

QUESTION 6

a) Give the name of a word processing package that you know [2]

b) List any five functions performed by that package [5]

c) Take one function from above and give the practical steps to perform that function[3]

QUESTION7

a) Differentiate between a package and user programs giving examples [10]

b) List any five things to consider before buying a package [10]

QUESTION8

Write brief notes on the following methods of processing

i. Distributed processing

ii. Real time processing

iii. Batch processing

iv. Centralized processing

v. Online processing [20]

ANSWERS

QUESTION

Explain the meaning of the following terms as used in computers

f) Byte : consist of 8 bits it is a measurement of computer memory.

g) Hard copy : printed material

h) Bit: binary digit ; it is the smallest unit of computer memory

i) ASCII : American standard code for information interchange ; its basically a table with all the characters usable on a computer system as well as their decimal and binary equivalents.

j) WYSIWIG: what you see is what you get

[10]

QUESTION2

c) What is the difference between data and information[4]

Data	information
Used as input into a computer system	It is the output of a computer system
Cannot be used for decision making-meaningless	Used for decision making-meaningful

d) Explain the following:

iii. Application software [3]

Application software, also known as an **application** or an "**app**", is computer software designed to help the user to perform specific tasks. Examples include enterprise software, accounting software, office suites, graphics software and media players. Many application programs deal principally with documents. Apps may be bundled with the computer and its system software, or may be published separately. Some users are satisfied with the bundled apps and need never install one.

iv. System software [3]

System software is computer software designed to operate the computer hardware and to provide a platform for running application software.

The most basic types of system software are:

- Device drivers such as computer BIOS and device firmware, provides basic functionality to operate and control the hardware connected to or built into the computer.
- The operating system (prominent examples being Microsoft Windows, Mac OS X and Linux), which allows the parts of a computer to work together by performing tasks like transferring data between memory and disks or rendering output onto a display device. It also provides a platform to run high-level system software and application software.
- Servers, in this context, are computer programs running to serve the requests of other programs, the "clients". The server performs some computational task on behalf of clients which may run on either the same computer or on other computers connected through a network.
- Utility software, which helps to analyze, configure, optimize and maintain the computer.
- Window systems are components of a graphical user interface (GUI), and more specifically of a desktop environment, which supports the implementation of window managers, and provides basic support for graphics hardware, pointing devices such as mice, and keyboards. The mouse cursor is also generally drawn by the windowing system.

QUESTION 3

State and explain any five functions of the operating system [10]

1. Processor management, that is, assignment of processor to different tasks being performed by the computer system.
2. Memory management, that is, allocation of main memory and other storage areas to the system programmes as well as user programmes and data.
3. Input/output management, that is, co-ordination and assignment of the different output and input

device while one or more programmes are being executed.
4. File management, that is, the storage of file of various storage devices to another. It also allows all files to be easily changed and modified through the use of text editors or some other files manipulation routines.

5. Establishment and enforcement of a priority system. That is, it determines and maintains the order in which jobs are to be executed in the computer system.
6. Automatic transition from job to job as directed by special control statements.
7. Interpretation of commands and instructions.
8. Coordination and assignment of compilers, assemblers, utility programs, and other software to the various user of the computer system.
9. Facilities easy communication between the computer system and the computer operator (human). It also establishes data security and integrity

QUESTION4

Explain the following giving an example of each

iii. Secondary storage

Secondary storage (also known as external memory or auxiliary storage), differs from primary storage in that it is not directly accessible by the CPU. The computer usually uses its input/output channels to access secondary storage and transfers the desired data using intermediate area in primary storage. Secondary storage does not lose the data when the device is powered down—it is non-volatile. Per unit, it is typically also two orders of magnitude less expensive than primary storage. Consequently, modern computer systems typically have two orders of magnitude more secondary storage than primary storage and data are kept for a longer time there.

In modern computers, hard disk drives are usually used as secondary storage. The time taken to access a given byte of information stored on a hard disk is typically a few thousandths of a second, or milliseconds. By contrast, the time taken to access a given byte of information stored in random access memory is measured in billionths of a second, or nanoseconds. This illustrates the significant access-time difference which distinguishes solid-state memory from rotating magnetic storage devices: hard disks are typically about a million times slower than memory. Rotating optical storage devices, such as CD and DVD drives, have even longer access times. With disk drives, once the disk read/write head reaches the proper placement and the data of interest rotates under it, subsequent data on the track are very fast to access. As a result, in order to hide the initial seek time and rotational latency, data are transferred to and from disks in large contiguous blocks.

When data reside on disk, block access to hide latency offers a ray of hope in designing efficient external memory algorithms. Sequential or block access on disks is orders of magnitude faster than random access, and many sophisticated paradigms have been developed to design efficient algorithms based upon sequential and block access. Another way to reduce the I/O bottleneck is to use multiple disks in parallel in order to increase the bandwidth between primary and secondary memory.[3]

Some other examples of secondary storage technologies are: flash memory (e.g. USB flash drives or keys), floppy disks, magnetic tape, paper tape, punched cards, standalone RAM disks, and Iomega Zip drives.

The secondary storage is often formatted according to a file system format, which provides the abstraction necessary to organize data into files and directories, providing also additional information (called metadata) describing the owner of a certain file, the access time, the access permissions, and other information.

Most computer operating systems use the concept of virtual memory, allowing utilization of more primary storage capacity than is physically available in the system. As the primary memory fills up, the system moves the least-used chunks (*pages*) to secondary storage devices (to a swap file or page file), retrieving them later when they are needed. As more of these retrievals from slower secondary storage are necessary, the more the overall system performance is degraded.

iv. Primary storage[10]

Primary storage (or **main memory** or **internal memory**), often referred to simply as **memory**, is the only one directly accessible to the CPU. The CPU continuously reads instructions stored there and executes them as required. Any data actively operated on is also stored there in uniform manner.

- Processor registers are located inside the processor. Each register typically holds a word of data (often 32 or 64 bits). CPU instructions instruct the arithmetic and logic unit to perform various calculations or other operations on this data (or with the help of it). Registers are the fastest of all forms of computer data storage.
- Processor cache is an intermediate stage between ultra-fast registers and much slower main memory. It's introduced solely to increase performance of the computer. Most actively used information in the main memory is just duplicated in the cache memory, which is faster, but of much lesser capacity. On the other hand, main memory is much slower, but has a much greater storage capacity than processor registers. Multi-level hierarchical cache setup is also commonly used—*primary cache* being smallest, fastest and located inside the processor; *secondary cache* being somewhat larger and slower.
  Main memory is directly or indirectly connected to the central processing unit via a *memory bus*. It is actually two buses (not on the diagram): an address bus and a data bus. The CPU firstly sends a number through an address bus, a number called memory address, that indicates the desired location of data. Then it reads or writes the data itself using the data bus. Additionally, a memory management unit (MMU) is a small device between CPU and RAM recalculating the actual memory address, for example to provide an abstraction of virtual memory or other tasks.
  As the RAM types used for primary storage are volatile (cleared at start up), a computer containing only such storage would not have a source to read instructions from, in order to start the computer. Hence, non-volatile primary storage containing a small startup program (BIOS) is used to bootstrap the computer, that is, to read a larger program from non-volatile *secondary* storage to RAM and start to execute it. A non-volatile technology used for this purpose is called ROM, for read-only memory (the terminology may be somewhat confusing as most ROM types are also capable of *random access*).

Many types of "ROM" are not literally *read only*, as updates are possible; however it is slow and memory must be erased in large portions before it can be re-written. Some embedded systems run programs directly from ROM (or similar), because such programs are rarely changed. Standard computers do not store non-rudimentary programs in ROM, rather use large capacities of secondary storage, which is non-volatile as well, and not as costly.
Recently, *primary storage* and *secondary storage* in some uses refer to what was historically called, respectively, *secondary storage* and *tertiary storage*

QUESTION5
Computer and data security is an area that demands heavy investment of financial and at times human resources. Give five measures that can be taken to ensure that computer and data security is maintained. [10]

QUESTION 6

d) Give the name of a word processing package that you know [2]
   - ✓ MS Word

e) List any five functions performed by that package [5]

Word processors have various functions that allow a person to revise text without retyping an entire document. As the text is entered or after it has been retrieved, sections ranging from words and sentences to paragraphs and pages can be moved, copied, deleted, altered, and added to while displayed. As word processors have become more sophisticated, such functions as word counting, spell checking, footnoting, and index generation have been added. In addition, a document's format—type size, line spacing, margins, page length, and the like—usually can be easily altered. To aid in these alterations, the text is displayed as it will appear when printed with indented paragraphs and lists, multiple columns, tables, etc; this is called a what-you-see-is-what-you-get (WYSIWYG) display.

Take one function from above and give the practical steps to perform that function [3]
✓

QUESTION7

c) Differentiate between a package and user programs giving examples [10]

The Pros and Cons of Off-the-shelf Software

Large software companies such as Microsoft and Adobe produce a massive range of off-the-shelf software for a variety of different purposes and audiences. Packaged software, as with anything, has its pros and cons.

The PROS of Off-the-shelf Software

- The software tends to be relatively cheap as the cost of development can be spread over a large number of users
- The software can be very sophisticated (e.g. Excel or Word) as the revenues from a very large numbers of users means that a lot of resources can be applied to it's development
- It is easy to get support and literature is usually widely available as there are many other users using exactly the same software

- It is easy to share files produced by the software with others as chances are they also have the software available to open the file
- You don't have to dedicate any of your time to the development process (e.g. helping with specifications, testing etc.)

The CONS of Off-the-shelf Software

- The software can be highly complex and will usually include large sections that you will never use (the average Word user is reputed to only use about 10% of the available facilities).
- It tends to be a compromise. By it's nature it is designed for many different types of users, each of whom will have different requirements
- As the software tends to be large and complicated it may take a long time to learn properly (some of the most asked for additions to later versions of Word were ones that already existed in the previous version!)
- You may have to alter the way that you work in order to fit in with the way that the software has been designed
- There will probably be operations that you require that you simply cannot do with the software
- As one small voice amongst many others your requests will not carry much weight
- If you have problems you are usually at the mercy of a large and faceless organisation who may not be quite as concerned as you are if you have a major problem that absolutely MUST be fixed before tomorrow morning!
- As the same system can be bought by your competitors it is very difficult to gain any competitive advantage from it's use

The Pros and Cons of Bespoke Software

On the flip side, bespoke software has its own unique set of pros and cons that should be considered.

The PROS of Bespoke Software

- It has been specifically designed for your particular requirements and can be tailored to fit in exactly with the way that your business or organisation wishes to operate.
- It can be customised to interface with other software that you operate with the potential to provide you with a fully integrated IT infrastructure across your whole organisation
- Users will usually find it easier and more intuitive to use as it should not contain unnecessary or superfluous facilities and should operate in the way that they are used to working
- It is much more flexible than packaged software and can be modified and changed over time as your requirements and business practices change
- You will receive much better support and can in many cases talk directly to the developers concerned (Hero provide a full range of support services)
- If you are lucky and find a good developer (we suggest Hero Solutions!) then they can significantly add value to your company by suggesting alternatives, improvements and by acting as a source of IT advice and information
- The use of professionally developed bespoke software applications can give you a significant business advantage over your competition

- As an alternative to the point above, you have the option, assuming you own the rights to the application (with Hero Solutions you do), to sell the application to others and recoup some or all of your investment.

The CONS of Bespoke Software

- If you do not have the source code you are dangerously exposed and are wholly dependent upon the developer's continuing existence and good will. To avoid this problem make sure you choose a developer who provides you with the source code.
- If you pick the wrong developer you could end up with an application that is unstable, unreliable and full of bugs (but then again so is some packaged software!). Selecting a developer who works to Best Practice and industry standards should counteract this.
- The investment required will usually be much higher than with packaged software. This is usually the biggest reason for not going down the custom route - you need to undertake a business justification exercise and compare the costs against the expected benefits and commercial advantages.
- A large investment in your time is required during the development process and a bespoke application will take longer to implement.
- It can be difficult to get support for bespoke software, unless the developers themselves offer support services.
- An unacceptable proportion of developers are either incompetent, unprofessional or are 'cowboys' and it can be difficult to sort out the good guys from the bad.

Conclusion

Having a bespoke application developed for you can potentially provide you with major business and commercial benefits and allow you to gain significant competitive advantage. Bespoke applications are generally easier to use and can work around the way you do business, rather than the other way round. However, you have to expect to pay more for it than for a packaged solution (both in time and money) and it is also essential that you use a professional developer who works to industry standards and who is happy to provide you with the source code to your application and on-going support for the package.

d) List any five things to consider before buying a package [10]

- Does the version of the product that I am considering run on my personal computer system? Is it compatible with my platform (PC, Macintosh, Sun, and so on)? with the processor used in my computer (486, Pentium, Motorola 6040, PowerPC, and so on)? and with the operating system that I am running (DOS, Windows, NeXT Step, UNIX)?
- Is the product compatible with other programs, such as extensions and device drivers, that I have on my personal computer system?
- Does the product do all that I want it to do? Is it simple enough to use immediately but powerful enough to provide the capabilities that I will want as my familiarity with the program increases?
- Is the product an up-to-date, current version or release?

- Does the product have a clear, step-by-step tutorial? Is the product easy to learn?
- Is the product accompanied by clear, easy-to-follow instructions or documentation?
- Does the manufacturer provide technical assistance? Is a toll-free technical assistance number included in the software documentation? Does the manufacturer have a bulletin board or Internet address for technical assistance questions? Does the manufacturer charge for technical assistance? for product revisions or upgrades?
- Can I find instruction or training in the use of the product?
- Is the product from a respected, well-known manufacturer?
- Does the program have any known problems or bugs, and will these affect my use of the program?
- Does the product come with a warranty, and what are the conditions of that warranty?
- Does the product cost more or less than comparable products on the market?

QUESTION8

Write brief notes on the following methods of processing

vi. Distributed processing
vii. Real time processing
viii. Batch processing
ix. Centralized processing
x. Online processing [20]

Batch Processing

•This is a method where the information to be organized is sorted into groups to allow for efficient and sequential processing.

Online Processing

•This is a method that utilizes Internet connections and equipment directly attached to a computer. It is used mainly for information recording and research.

Real-Time Processing

•This technique has the ability to respond almost immediately to various signals in order to acquire and process information.

Distributed Processing

•This method is commonly utilized by remote workstations connected to one big central workstation or server. ATMs are good examples of this data processing method.

Centralized data processing is a Computer data processing architecture where data processing support is provided by one or a cluster of computers, generally a large. dedicated computers, located in a central data processing facility. In a centralized architecture, each person is provided with a local terminal that is connected by a communications facility to the central data processing facility.

A fully centralized data processing has following features:

1. Centralized computers
2. Centralized processing
3.Centralized Data
4.Centralized Control
5. Centralized Staff Support

A Distributed data processing facility is one in which computers, usually smaller computers, are dispersed throughout the organization. The objective of such disperse is to process information in a way that is most effective based on operational.

Therefore, DDP (Distributed Data Processing) features:
1. A collection of terminals link together by some kind of communication link and has no main central computer or not fully (minimal) depend on central computer.
2. Processing of information is happening on each terminal and send results to a main server for store and retrieval purposes.
3. Data may duplicate as data may store in locally or in remote server.
4. Local computer operator can control the machine in his premises.
5. Separate staff will maintain central computer (if there any) where other terminals may control by one or few other members.

QUESTIONS

QUESTION

a) Explain how data is organized using the following file organization methods
   i. Indexed sequential organization
   ii. Random or direct organization [6]
b) Describe the following transmission modes
   i. Full duplex
   ii. Simplex [4]
c) What is data protection act? [2]
d) State two principles of data protection act [4]
e) What is a computer virus [2]
f) Write down two symptoms of viruses on a computer [2]

QUESTION2

a) Define the following terms as they are used in data communications
   i. Internet
   ii. Intranet
   iii. Topology
   iv. E commerce [8]
b) Give two advantages of networking [4]
c) Diagrammatically explain the following network topologies
   i. Bus
   ii. Ring
d) Write down two benefits of e commerce [2]

QUESTION

a) Define the following:
   i. Utility software
   ii. Cache memory
   iii. Virtual memory [6]

b) Write down four utility programs [4]

c) As used in MS Access define the following terms:
   i. Record
   ii. Keyfield
   iii. File[6]

d) Define the following:
   i. Icon
   ii. Password [4]

QUESTION

A. Categorize the following

Eg MS Word - word processor

a) MsPowerpoint
b) MsAcess
c) Lotus Approach
d) Fox Pro
e) Sage
f) Turbo Cash
g) Pastel
h) Word Perfect 6.0
i) Lotus 123 [10]

B. Classify whether it is an input or output device
   a) Keyboard
   b) Light Pen
   c) Printer
   d) Plotter
   e) Scanner
   f) Joystick
   g) Voice synthesis
   h) Visual display unit
   i) Touch sensitive screen
   j) Tape drive [10]

QUESTION

a) Define the following terms
   i. A cell
   ii. Worksheet
   iii. Absolute cell reference

iv. Relative reference [8]

b) List down steps involved in the copying of data in worksheet[2]

	T	U	V	W	X	Y	Z	AA
4999	SALARIES							
5000	1234	22	344	444	555	333		
5001	345	555	555	555	555	333		
5002	2345	566	878	456	3333	6565		
5003	789	43434	5464	656	444	4545		
5004								

c) Write down the formulae that could be used in column **Z** to calculate the following for rows:

i. 5000: the total salaries
ii. 5001: the total number of entries on the row
iii. 5002: the highest value
iv. 5003: the standard deviation
v. 5004: the sum of all numeric entries in the worksheet [10]

QUESSTION

a) Give the major difference between a WAN and a LAN [2]
b) What is the purpose of a MODEN on a computer network [3]
c) State all three major network topologies and for each state four advantages and four disadvantages [15]

ANSWERS

QUESTION

g) Explain how data is organized using the following file organization methods

- single-level indexing structure is the simplest one where a file, whose records are pairs, contains a key pointer. This *pointer* is the position in the data file of the record with the given key. A subset of the records, which are evenly spaced along the data file, is indexed, in order to mark intervals of data records
- Records are placed randomly through out the file. Records are accessed by addresses that specify their disc location. Also, this type of file organization requires a disk storage rather than tape. It has an excellent search retrieval performance, but care must be taken to maintain the indexes. If the indexes become corrupt, what is left may as well go to the bit-bucket, so it is as well to have regular backups of this kind of file just as it is for all stored valuable data

h) Describe the following transmission modes

iii. Full duplex
iv. Full duplex [2]

A *full-duplex* (FDX), or sometimes *double-duplex* system, allows communication in both directions, and, unlike half-duplex, allows this to happen simultaneously. Land-

line telephone networks are full-duplex, since they allow both callers to speak and be heard at the same time. A good analogy for a *full-duplex* system would be a two-lane road with one lane for each direction.

Examples: Telephone, Mobile Phone, etc.

v. Simplex [4]

vi. **Simplex communication** refers to communication that occurs in one direction only.

i) What is data protection act? [2]

To make provision for the protection of individuals against the violation of their privacy by the processing of personal data and for matters connected therewith or ancillary thereto.

j) State two principles of data protection act [4]

Data protection principles

1. Personal data shall be processed fairly and lawfully and, in particular, shall not be processed unless-
    1. at least one of the conditions in Schedule 2 is met, and
    2. in the case of sensitive personal data, at least one of the conditions in Schedule 3 is also met.
2. Personal data shall be obtained only for one or more specified and lawful purposes, and shall not be further processed in any manner incompatible with that purpose or those purposes.
3. Personal data shall be adequate, relevant and not excessive in relation to the purpose or purposes for which they are processed.
4. Personal data shall be accurate and, where necessary, kept up to date.
5. Personal data processed for any purpose or purposes shall not be kept for longer than is necessary for that purpose or those purposes.
6. About the rights of individuals e.g. You have the right to have data about you removed.[7]
7. Appropriate technical and organisational measures shall be taken against unauthorised or unlawful processing of personal data and against accidental loss or destruction of, or damage to, personal data.
8. Personal data shall not be transferred to a country or territory outside the European Economic Area unless that country or territory ensures an adequate level of protection for the rights and freedoms of data subjects in relation to the processing of personal data.

k) What is a computer virus [2]

is a man-made harmful program intentionally developed to harm the proper functioning of a computer.

l) Write down two symptoms of viruses on a computer [2]

- **Windows Shooting Alone.**
  You are browsing the Internet and come up windows for advertisements or different Web sites, without you having anything tight, make no mistake, you're infected.
- **Performance Degradation.**
  Computer does not turn over the command of Windows, just take the socket. Lock all the time. It is too slow. Resumes alone, you're infected.
- **Suddenly Pop Up Error Messages.**
  When many messages begin to appear out of memory, disk space, it fails in application, etc., is a clear sign that a virus may be behind them.
- **Home Of The Browser is Changed.**
  Pay attention when the home page of your favorite browser is changed for no apparent reason, as many spyware do this.
- **Social Networking Profiles, or Your Email Account Automatically Send Messages With the Virus to Your Contacts.**
  If your friends start to complain that they are getting your messages with viruses, it is certain that your computer is infected.
- **The Command CTRL+ALT+DEL No Longer Works.**
  In any version of Windows, one of the simplest ways to check for viruses is simultaneously pressing the CTRL+ALT+DEL, as the most important virus disables this command to initiate the task manager.
- **Antivirus No Longer Update.**
  If your anti-virus begins to acknowledge failure update, even if its connection to the Internet is operating normally, is a great sign of a virus installed.
- **Social Networks Hacked.**
  When your Orkut, Twitter, Facebook, etc are hacked, surely there is virus on your computer.

QUESTION2

e) Define the following terms as they are used in data communications
   v. Internet
      ✓ It is an information resource found on the world wide web
   vi. Intranet
      ✓ It is localized internet usually within an organisation
   vii. Topology
      ✓ The physical configuration or layout of a network set up
   viii. E commerce [8]
      ✓ Buying and selling of goods on the internet

f) Give two advantages of networking [4]

g) Diagrammatically explain the following network topologies
   iii. Bus
   iv. Ring

h) Write down two benefits of e commerce [2]

QUESTION

e) Define the following:

iv. Utility software: is system software designed to help analyze, configure, optimize or maintain a computer. A single piece of utility software is usually called a **utility** or **tool**.

v. Cache memory: Cache memory is random access memory (RAM) that a computer microprocessor can access more quickly than it can access regular RAM. As the microprocessor processes data, it looks first in the cache memory and if it finds the data there (from a previous reading of data), it does not have to do the more time-consuming reading of data from larger memory

vi. Virtual memory:is a memory management technique developed for multitaskingkernels. This technique virtualizes a computer architecture's various forms of computer data storage (such as random-access memory and disk storage), allowing a program to be designed as though there is only one kind of memory, "virtual" memory, which behaves like directly addressable read/write memory (RAM). [6]

f) Write down four utility programs [4]

- **Backup** utilities can make a copy of all information stored on a disk, and restore either the entire disk (e.g. in an event of disk failure) or selected files (e.g. in an event of accidental deletion).
- **Data compression** utilities output a shorter stream or a smaller file when provided with a stream or file.
- **Disk checkers** can scan the contents of a hard disk to find files or areas that are corrupted in some way, or were not correctly saved, and eliminate them for a more efficiently operating hard drive.
- **Disk cleaners** can find files that are unnecessary to computer operation, or take up considerable amounts of space. Disk cleaner helps the user to decide what to delete when their hard disk is full.
- **Disk compression** utilities can transparently compress/uncompress the contents of a disk, increasing the capacity of the disk.
- **Disk defragmenters** can detect computer files whose contents are broken across several locations on the hard disk, and move the fragments to one location to increase efficiency.
- **Disk partitions** can divide an individual drive into multiple logical drives, each with its own file system which can be mounted by the operating system and treated as an individual drive.
- **Disk space analyzers** for the visualization of disk space usage by getting the size for each folder (including sub folders) & files in folder or drive. showing the distribution of the used space.
- **Disk storage** utilities
- **Archive** utilities output a stream or a single file when provided with a directory or a set of files. Archive utilities, unlike archive suites, usually do not include compression or encryption capabilities. Some archive utilities may even have a separate un-archive utility for the reverse operation.
- **File managers** provide a convenient method of performing routine data management tasks, such as deleting, renaming, cataloging, uncataloging, moving, copying, merging, generating and modifying data sets.
- **Cryptographic** utilities encrypt and decrypt streams and files.
- **Hex editors** directly modify the text or data of a file. These files could be data or an actual program.
- **Memory testers** check for memory failures.
- **Network utilities** analyze the computer's network connectivity, configure network settings, check data transfer or log events.

- **Registry cleaners** clean and optimize the Windows registry by removing old registry keys that are no longer in use.
- **Screensavers** were desired to prevent phosphor burn-in on CRT and plasma computer monitors by blanking the screen or filling it with moving images or patterns when the computer is not in use. Contemporary screensavers are used primarily for entertainment or security.
- **System monitors** for monitoring resources and performance in a computer system.
- **System profilers** provide detailed information about the software installed and hardware attached to the computer.

g) As used in MS Access define the following terms:

iv. Record- is a collection of logically related set of fields

v. Keyfield-is a field which uniquely indentifies the occurrence of a record

vi. File- is a collection of logically related records [6]

h) Define the following:

iii. Icon-The icon itself is a small picture or symbol serving as a quick, intuitive representation of a software tool, function or a data file accessible on the system. It functions as an electronic hyperlink or file shortcut to access the program or data. Computer icons, in conjunction with computer windows, menus and a pointing device, form the graphical user interface (GUI) of the computer system, and enable the user to easily and intuitively navigate the system. Computer icons belong to the much larger topic of the history of the graphical user interface.

iv. Password-is a secret word or string of characters that is used for authentication, to prove identity or gain access to a resource (example: an access code is a type of password). The password should be kept secret from those not allowed access. [4]

QUESTION

C. Categorize the following

Eg MS Word - word processor

j) MsPowerpoint- presentation

k) MsAcess- database management system

l) Lotus Approach- spreadsheet

m) Fox Pro-database

n) Sage-accounting

o) Turbo Cash-accounting

p) Pastel- accounting

q) Word Perfect 6.0- word processor

r) Lotus 123 [10]

D. Classify whether it is an input or output device

k) Keyboard

l) Light Pen

m) Printer

n) Plotter

o) Scanner
p) Joystick
q) Voice synthesis
r) Visual display unit
s) Touch sensitive screen
t) Tape drive [10]

Input	output
Keyboard	Printer
Light pen	Plotter
scanner	
Joy stick	
Voice synthesis	Visual display unit
Touch sensitive screen	
Tape drive	

QUESTION

d) Define the following terms

v. A cell-A box formed by the intersection of a row and column in a worksheet or a table, in which you enter information.

vi. Worksheet-The primary document that you use in Excel to store and work with data. Also called a spreadsheet. A worksheet consists of cells that are organized into columns and rows; a worksheet is always stored in a workbook.

vii. Absolute cell reference-The set of coordinates that a cell occupies on a worksheet. For example, the reference of the cell that appears at the intersection of column B and row 3 is B3.

viii. Relative reference-The set of coordinates that a cell occupies on a worksheet. For example, the reference of the cell that appears at the intersection of column B and row 3 is B3. [8]

e) List down steps involved in the copying of data in worksheet [2]

	T	U	V	W	X	Y	Z	AA
4999	SALARIES							
5000	1234	22	344	444	555	333		
5001	345	555	555	555	555	333		
5002	2345	566	878	456	3333	6565		
5003	789	43434	5464	656	444	4545		
5004								

f) Write down the formulae that could be used in column **Z** to calculate the following for rows:

vi. 5000: the total salaries : SUM(T5000:Y5000)

vii. 5001: the total number of entries on the row: COUNT(T5001:Y5001)
viii. 5002: the highest value: MAX(T5002:Y5002)
ix. 5003: the standard deviation :
x. 5004: the sum of all numeric entries in the worksheet:sum(t5000:y5003)

[10]

QUESSTION

d) Give the major difference between a WAN and a LAN [2]

LAN - Local Area Network

A LAN connects network devices over a relatively short distance. A networked office building, school, or home usually contains a single LAN, though sometimes one building will contain a few small LANs (perhaps one per room), and occasionally a LAN will span a group of nearby buildings. In TCP/IP networking, a LAN is often but not always implemented as a single IP subnet.

In addition to operating in a limited space, LANs are also typically owned, controlled, and managed by a single person or organization. They also tend to use certain connectivity technologies, primarily Ethernet and Token Ring.

WAN - Wide Area Network

As the term implies, a WAN spans a large physical distance. The Internet is the largest WAN, spanning the Earth.A WAN is a geographically-dispersed collection of LANs. A network device called a router connects LANs to a WAN. In IP networking, the router maintains both a LAN address and a WAN address.

A WAN differs from a LAN in several important ways. Most WANs (like the Internet) are not owned by any one organization but rather exist under collective or distributed ownership and management. WANs tend to use technology like ATM, Frame Relay and X.25 for connectivity over the longer distances.

e) What is the purpose of a MODEM on a computer network [3]

Different Functions of the Modem

In addition to converting digital signals into analog signals, the modems carry out many other tasks. Modems minimize the errors that occur while the transmission of signals. They also have the functionality of compressing the data sent via signals. Modems also do the task of regulating the information sent over a network.

- **Error Correction**: In this process the modem checks if the information they receive is undamaged. The modems involved in error correction divide the information into packets called frames. Before sending this information, the modems tag each of the frames with checksums. Checksum is a method of checking redundancy in the data present on the computer. The

modems that receive the information, verify if the information matches with checksums, sent by the error-correcting modem. If it fails to match with the checksum, the information is sent back.

- **Compressing the Data**: For compressing the data, it is sent together in many bits. The bits are grouped together by the modem, in order to compress them.
- **Flow Control**: Different modems vary in their speed of sending signals. Thus, it creates problems in receiving the signals if either one of the modems is slow. In the flow control mechanism, the slower modem signals the faster one to pause, by sending a 'character'. When it is ready to catch up with the faster modem, a different character is sent, which in turn resumes the flow of signals.

f) State all three major network topologies and for each state four advantages and four disadvantages

Network Topology:

Topology refers to arrangement of the nodes in the network. Topology is the geometrical representation of linking devices (usually called nodes) to each other in LAN. Possible topologies which are being used are mesh, bus, star, tree and ring.

Mesh topology: In this type of topology, every node has a dedicated point to point link to every other node in the network. This means each link carries traffic only between the two nodes it connects. If n is total no of nodes in network No. of links to connect these nodes in mesh = N (N-1)/2 Each node should have (N-1) I/O ports as it require connection to every another node.

Advantages: No traffic problem as there are dedicated links.

Robust as failure of one link does not affect the entire system.

Security as data travels along a dedicated line.

Points to point links make fault identification easy.

Disadvantages: The hardware is expansive as there is dedicated link for any two nodes and each device should have (n-1) I/O ports.

There is mesh of wiring which can be difficult to manage.

Installation is complex as each node is connected to every node.

Star Topology: in this type of arrangement, each node has dedicated point to point connection to a central controller hub. As there are no dedicated links between nodes this topology does not allow direct traffic between nodes.

Advantages: Star topology is less expensive than a mesh topology as there are no dedicated links between nodes and each device needs only one link and one I/O ports to connect it to any number of nodes.

Easy to install and make configurations.

Robust as failure of one link does not affect the entire system. The remaining system will be active.

Disadvantage: More cabling is required in a star than in other topologies (except mesh). Entire network collapse if central controller fails.

Tree Topology: As its name implies in this topology devices make a Tree structure. This is an advanced version of star topology as central controllers of star topology work as secondary hub. All these Secondary Hubs gets connected to Central hub or Primary Hub that controls the traffic to the network. Most Devices are connected to secondary hubs. The central contains a repeater, which is a hardware device that regenerates the received bit patterns.

Advantages: Central hub (repeater) increases the distance a signal can travel between devices.

Disadvantages: More cabling is required in a tree than in other topologies (except mesh).

Entire network collapse if central Hub fails.

Bus Topology: In such type of topology, long backbone cable is used to link all the devices in the network. Drop lines and taps are used to connect node to this backbone. A drop line is a connection between the node and the Backbone. A tap is the connector.

Advantages: Requires less cabling compared to mesh, star and tree topologies.

Easy to install.

Disadvantages: It's Difficult to add new devices.

Difficult reconfiguration and fault isolation.

A fault in Backbone stops all transmission, even between devices on the same side of the problem because of noise generated by faulty point.

Ring Topology: All nodes are connected in ring structure. Each node contains repeater. A signal passes node to node, until it reaches its destination. If a node receives a signal intended for another node its repeater regenerates the signal and passes it.

Advantages: Relatively easy to install and reconfigure.

Easy to add new node as only two connections need changes.

Disadvantages: A fault in the ring can disable the entire network. This weakness can be solved by using a dual ring.

[15]

PROGRAM	EXAMPLE
Word processor	MS Word
Spreadsheet	…….
Database	…….
Desktop publishing	……
Operating system	……

[4]