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# UNIT 3    OUTPUT SYSTEM DESIGN

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## 3.0 INTRODUCTION

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Presenting the **data** processed by a computer-based information system in an **attractive and usable form** has become very essential these days. Success and acceptance of a system to some extent depends on good presentation. Therefore, system analyst must know fully how to design output report in an attractive way. Many new output devices are being introduced in the market because of recent development in computer technology. System analyst must be aware of these new technology and **try** to use these new output devices if possible. Currently, **excellent graphic** displays are widely available. Speech output systems are also fast emerging.

There are three main reasons why outputs from the computer are required. They are:

- (i) For communicating **to** the persons concerned.
- (ii) For re-input to the computer for being connected with other data and further processing.
- (iii) For permanent storage.

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## 3.1 OBJECTIVES

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After **going** through this unit, you should be able to learn:

- the devices used to output information from a computer
- the design **consideration**
- the form design
- the design of screen output
- **the role of graphics** in output
- the record **structure** and report **layout** consideration.

## 3.2 TYPES OF OUTPUT

Outputs of a system can take different forms. The most common are reports, displays on screen, printed forms etc. The outputs also vary in terms of their contents, type of stationery, frequency and timing etc. Besides, due consideration also need to be given as to who will use the output and for what purpose. **All** these points must be kept in mind while designing outputs so that the objectives of the system are met in the best possible way. Outputs of a data-processing system can be placed into two categories:

- Application Output
- Operating Output

### 3.2.1 Application Output

These are the outputs desired out of the system to meet its objectives. These are of three types:

- (i) Output as a basis for decision making. This type of output is generally required by management for decision making purposes.
- (ii) Output as a **requirement** to meet a functional objective. Invoices, Excise Gate Pass, Purchase Orders are the examples of such output.
- (iii) Statutory Outputs: **All** organisations are required to produce a certain amount of **reports** and forms as required by law. Examples are 'C' forms, '3A' and '6A' forms for provident fund, income tax certificates etc.

### 3.2.2 Operating Output

These **outputs** are mainly generated for use of **E.D.P** staff and give various indications as to how the system operates. System logs, error messages, status indicators etc. are the examples of such output. These types of output are not concerned for the users.

## 3.3 OUTPUT DEVICES

The most important output devices are printers, video display units (VDUs) computer output microfilm (microfiche). Printers are mainly used in the following situations:

- when large volume of output is required
- when output is to be distributed to **various persons inside/outside** the organization
- when batch processing systems are used.

Printer is one of the most common output devices. It provides the user with a permanent visual record of the data output from the computer. Printers can print on ordinary paper or on specially designed forms such as dispatch notes invoices or packing slips. Printers can print 150-2500 lines per minute, each line consisting of as many as 150 characters.

Printers are mainly of two types : impact printers and non- impact printers. In impact printers, a print head strikes a print ribbon which prints a character on paper. Non-impact printers have no mechanical print head. Characters on such printers are printed using either a jet of ink or a laser beam. These printers are little bit costlier, For example, **laser** printers are widely used in Desk Top Publishing (DTP) system because of producing excellent quality prints. Impact printers are of two types: line printers in which a whole line is printed at a time and character printers which allow printing of one character at a time. Line printers are quite impact and fast in printing. Generally these printers print in the **range** of **1000-1200** lines per minute. They are little bit expensive and mainly used for large volume of printing. Character printers are cheaper but slower in speed (around 80 to 90 characters per minute). They are generally used for low volume printing such as in word-processing.

Video display units use Cathode Ray Tubes (CRTs) for display purposes. They have keyboard which is used for **entering data**. Twenty four lines, each 80 characters long, **can** be displayed on the display unit. **VDUs** are widely used in on-line systems to display results and answers to **queries**. Colour display units can display different colours. The information displayed on a VDU may be plotted on a plotter or recorded on a floppy diskette or video tape recorder.

Computer Output **Microfilm**(COM) is an output technique that records output from a computer as microscopic **images** on roll or sheet film. The images stored on COM **are the same as** the images which **would** be printed on paper. **The** COM recording process reduces **the size** of character **24, 42 or 48** times smaller than would be produced from a printer. The information is then recorded on sheet film called **16mm, 35mm microfilm or 105mm microfiche**. The data to be recorded on the microfilm can be retrieved directly from the computer (on-line) or from magnetic tape which is produced by the computer (off-line), The data **is** read into a recorder where, in most of the system, it is displayed internally on a CRT. As data is displayed on CRT, a camera takes a picture of it and keeps it on the film. After this, **the** film is processed, either in the recorder unit or separately. Then it can be **retrieved and** viewed by the user.

**A** new **type** of output unit emerging in the market is an audio output unit. Such **an** output device can be used to announce a result on a **loudspeaker**. Currently, the most **common** audio output gives digits or numbers. Short words are also synthesized by the computer. The pattern of bits **corresponding** to a word is stored in an audio output buffer storage. With the help of speech synthesizer, it is converted to spoken words. Presently, the speech output of synthesizers does not sound in a natural way. **Lot** of improvement is expected in this direction.

The most common audio output unit answers enquiries such as a request for telephone number, balance in one's saving account number in a **particular bank** etc.

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### 3.4 OUTPUT DESIGN CONSIDERATION

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Output to be produced usually depends upon the following consideration:

- Type of user and purpose : Generally different levels of users will have **differept** requirements from the system. Some want exception reports (**e.g.** when sales fall below a certain **level**), some want summary reports (**e.g.** sales quantity and value for each region) while some want details (**e.g.** list of invoices for a period). Again statutory reports will **normally** be as per requirement specified under the law and the designer will not have much flexibility to change the format
- Content : The data that **are** needed to be **included** in the output., These will be related to the purpose of the output.
- Format : This refers to the arrangement of data on the report, size of **the** paper, titles, headlines, colour of the paper **etc.**
- Frequency and timing : At what frequency (daily, weekly, monthly, annually **etc.**) and when (after annual closing of accounts, after the end of the fiscal year, before the last day of every month **etc.**)
- Volume : Often sheer volume of the output deters one from using the output. The sheer bulk of **the** report may also create problems for handling, filing or printing time.
- Sequence : The usefulness of an output very often depends on the sequence of data printed. **A** proper **sequence** will also help distribution of outputs to **different** users (**e.g.** pay-slips printed department-wise facilitates easier payment).
- Quality : This relates to the **content**, appearance and accuracy of the output Outputs generated for external users should be given special attention in respect of its get-up, quality of paper **etc.**
- Type of stationery : Reports can be generated **on** ordinary blank stationery or on specially printed stationery which is useful when most of the contents of the output (**e.g.** Invoice, Pay-slips **etc.**) are constant. This type of **stationery** has the following advantages:

- Saves computer **time**.
- **Attractive** appearance convenient to use by the users.

However, these stationery **will normally** be costlier **than** ordinary stationery.

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### 3.5 DESIGN OF OUTPUT REPORTS

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- A **report** normally has the following structure.
- A **report** heading which generally appears only on the **first** page of the **report**.  
A page heading and sub heading are given at the top of **each** page of the report
  - A set of records containing some common features may be **grouped** together. Such a group is named as control group. **Control** heading can be named as for **this** group.

**Table 1: Illustration of terminology used in defining the structure of reports**

INDIRA GANDHI NATIONAL OPEN UNIVERSITY  
ROLL LIST OF MCA STUDENTS

ROLL LIST OF STUDENTS FOR DIFFERENT SUBJECTS  
OF SEMESTER 1/1994-95

LIST OF STUDENTS IN PASCAL

ROLL NO.	NAME OF STUDENT
1001	Pankaj Kumar Goel
1002	Dinesh Kumar
1003	Upma Rani
1004	Rajesh K. Aggarwal
1005	Shoba
1006	Devender Garg
1007	Suman

1049	Bimla Devi
1050	Hari Om
1051	Chand Aggarwal
1052	BL. Goel

TOTAL NO. OF STUDENTS IN PASCAL = 52.

LIST OF STUDENTS IN 'C' LANGUAGE

ROLL NO.	NAME OF STUDENT
1070	KRISHNA GUPTA
1071	NARENDER KR. GUPTA
1072	ATMA RAM

1073	RAM KUMAR
1074	RAMESH KUMAR
1075	KUSHUM RANI
1076	ANITA KUMARI
1077	SNEH LATA
1078	SURENDER KUMAR
1079	PRADIP KUMAR

1088	ANGURI DEVI
1089	PYARE LAL

TOTAL NUMBER OF STUDENTS IN 'C' LANGUAGE = 20

TOTAL NO. OF STUDENTS IN SEMESTER 1/1994-95 = 570

END OF IGNOU ROLL LIST FOR SEMESTER 1/1994-95

Using table 1, we will explain the terminology:

- (i) The **report** heading appearing once for the report is :  
**INDIRA GANDHI NATIONAL OPEN UNIVERSITY – ROLL LIST OF MCA STUDENTS**
- (ii) The page heading which will appear **on** top of each page is:  
**ROLL LIST OF STUDENTS FOR DIFFERENT SUBJECTS OF SEM. 111994- 95**
- (iii) The control headings and sub headings are as follows:

**LIST OF STUDENTS IN PASCAL**

<b>ROLL NO.</b>	<b>NAME OF STUDENT</b>
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Another **control** heading and sub **headings** in the same table are:

**LIST OF STUDENTS IN C LANGUAGE**

<b>ROLL NO.</b>	<b>NAME OF STUDENT</b>
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- (iv) In the **above** table the line

<b>1001</b>	<b>Pankaj Kumar Goel</b>
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appearing below the heading

<b>ROLL NO.</b>	<b>NAME OF STUDENT</b>
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is called a detailed line.

- (v) Abstract of the information at the end of a control group is called the control footing. In the **above** table, the following lines

TOTAL NO. OF **STUDENTS** IN PASCAL = 50

TOTAL NO. OF STUDENTS IN 'C' LANGUAGE = 20

are control footings.

We have final control footing also in the **report**.

The line

TOTAL NO. OF STUDENTS IN SEMESTER 1/1994-95 = 570

is called final control footing.

(vi) Information written in the end of each page is called page footing.

(vii) **Information** printed in the end of **each** report is called report footing. The report footing in the said report is

END OF IGNOU ROLL LIST FOR SEMESTER 1/1994-95.

Having decided what report groups should appear in a report, an analyst decides the layout of the report in a print chart which depicts the no. of column; and lines in a report. A sample is shown in Fig. 1. **The** chart has a number of columns normally equal to that in a printer. The report headings, **etc.** are **entered** on the chart by the analyst to examine the way in which the printed output will appear. The most important consideration in designing the print chart is proper form layout for easy readability. The **print** chart helps in selecting appropriate headings, entering headings, picking control headings, **etc.** Once a **form** layout is determined using a print chart, it may be handed over to a programmer who may use an appropriate report generator program. For example, COBOL has a report generation program with its own rules of syntax and semantics. In the **print** chart, the no. of columns reserved for each detail line to be printed by the program, including **control** footing and report footing, is indicated. One may use a convention **used** in a **language** such as **COBOL** to describe the format of the individual fields. In the Fig. 1, for example, the convention used is 9 for digits, X for **characters**, B for Blank, Z for digit or leading zeros and \$ for currency symbol.

The general principles to be used in designing outputs reports are:

- The design must be such **that** it can be read from left to right and **from** top to bottom.
- The most important item, such as the key field, should be easily available.
- All pages must have a heading and a page number. The date on which the report was prepared should also be printed.
- All columns must be labelled with meaningful labels.
- Too many details should be avoided.
- Control footing **abstracts** information about groups of detail lines **must** be effectively used.
- Similarly, page and report footings must be properly defined.

Reports are often sent to government **agencies** such as the **tax** department periodically. The format for such reports are specified by government agencies and must be **strictly** followed.

There **are** situations in which a large number of forms are **to** be printed, **e.g.** the **marks** record of high school **examination** may have to be printed for 10 **lakh** candidates. In such a case, the name of the board which **conducted** the examination, Subjects offered, etc. can be pre-printed in the form and only marks obtained by the candidates are printed by the computer. Similarly, to print documents like **share** certificates, dividend warrant, etc., **pre-printed** special stationery is used and only amounts, name, **etc.** are printed by a program.

PRINT CHART FOR THE PAY REPORT EXAMPLE  
PAY REPORT

EMPLOYEE - NO.	NAME	DAY MON YR	TOTALPAY
xx99999	xxxxxxxxxxxxxx	99B99B99	99,999.99
1	1	1	1
1	1	1	1
1	1	1	1
1	1	1	1
1	1	1	1
** PAY-TOTALS **			999,999.99

Fig 1: A Sample for Print Chart

Check Your Progress 1

1. Fill in the blanks.
- (i) Outputs of a system can take different forms. They are ..... , ..... and .....

(ii) Outputs of a data processing system can be categorised as ..... and .....

(iii) Two types of printers are ..... and .....

(iv) ..... are widely used in DeskTop Publishing system because of producing excellent quality prints.

(v) ..... is an output technique that records output from a computer as microscopic images on roll or sheet film.
2. List out various considerations on which output to be produced usually depends.
- .....

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3. What are the general principles to be used in designing output reports?
- .....

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3.6 DESIGNING SCREEN OUTPUT

Most of the principles for designing printed outputs as discussed in the previous section are valid for **displaying** screen **output** also. However, some **differences** are there. A video display screen has normally 80 columns and 24 **rows**. Active involvement of the **user** is required **as** it is displayed on-line.. User must be given proper instructions for **retrieving** the required **information**.

A screen layout for **MCA student** information system is **given** below:

SCREEN FOR MCA STUDENT INFORMATION			
INDIRA GANDHI NATIONAL OPEN UNIVERSITY MCA STUDENT INFORMATION SYSTEM			
ROLL NO.	NAME	SUBJECTS TAKEN	SEMESTER
1001	PANKAJ KR. GOEL	PASCAL	I
1060	RAJ RANI JINDAL	SADP	II
1230	SURENDER KUMAR	ORACLE	IV
1231	NITIN	C++	III
-	-	-	-
PRESS D FOR DETAILS OF A STUDENT			
PRESS C TO CONTINUE			
PRESS X TO QUIT			

As we have seen in a printed report, it has a screen heading and headings for various fields. At the bottom of the screen, instructions are given to help the user in getting the next screen. By following these instructions, he can exit the system also. The system should be in a position to recover if the user presses the wrong key by mistake. For example, in the above case (MCA student information system), if a user presses E by mistake, the system should give a message that a wrong key is pressed and provide the alternatives again to the user. Now we illustrate a screen for detailed information about a particular student.

Screen for Detailed Student Information	
INDIRA GANDHI NATIONAL OPEN UNIVERSITY MCA STUDENT INFORMATION SYSTEM	
ROLL NO.	1001
NAME	PANKAJ KR. GOEL
DEPTT.	COMPUTER SCIENCE
YEAR	1994-95
ADDRESS	162 K. VIHAR PITAM PURAM, NEW DELHI.
PRESS D FOR MORE DETAILS	
PRESS ANY KEY TO COME TO MAIN MENU	

### 3.7 MENU DESIGN

Designing menu for a system is relatively easy exercise. However, following points should be kept in mind while designing menu:

- (i) Hierarchical: Menu should be designed in a structured hierarchical manner from higher level of functions to lower levels. For example, in an order-processing system, the menu should look like as given below:

ORDER PROCESSING	
1.	DATAENTRY
2.	FILE MAINTENANCE
3.	PROCESSING
4.	INQUIRY
5.	MIS REPORTS
6.	EXIT
WHICH ONE ?	



Depending on the **selection**, the **next** level will be **displayed**. For example, if we select 2, the screen **may** be as follows:

**ORDER PROCESSING**  
**(FILE MAINTENANCE)**

1. **CUSTOMER MASTER**
2. **PRODUCT MASTER**
3. **DISCOUNT MASTER**
4. **EXIT**

**WHICH ONE ?**

Again depending on the **selection**, the screen for the **next** level **will** be displayed. For example, if we select 1, the screen may be as follows:

**FILE MAINTENANCE**  
**(CUSTOMER MASTER )**

1. **ADD A RECORD**
2. **MODIFY**
3. **DELETE**
4. **EXIT**

**WHICH ONE?**

Depending on the selection of option, the next level of screen can also be displayed.

- (ii) **Termination:** When a **particular** program under the control of a menu is over, the **menu screen** from which the program was initiated should be displayed again. The principle to be followed is that termination **from** one level should lead to the menu of **the** next level. However, it is desirable to provide an option in each menu **screen** to terminate the **setting** completely or to revert to the highest level screen. This makes the processing faster and operation becomes easier.
- (iii) **Skipping Menu:** Sometimes it happens that certain functions **are** restricted to particular individual. In such situations, navigating through levels of menu may be **irritating** and may affect efficiency of operation. In such **cases**, it is desirable **to** provide facilities for jumping to the particular screen directly depending on the user-code.
- (iv) **Security control:** Generally, all the individuals will not be allowed **to** carry out all the functions. For example, a clerk in the Income **Tax Deptt.** may be allowed only **to** enter income **tax** returns. In such cases, menu may be segmented by function to control access to the system functions.

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## 3.8 FORM DESIGN AND CONTROL

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### 3.8.1 Form Design

We **know that** data provide the **basis for** information systems. Without **data there** is no **system, but data** must be fed in correct way so that the **information** produced **must** be in a format acceptable to the user. In either case, it is still **data** - the basic element of a printed form.

### 3.8.2 What is Form?

**People** read **from forms**, write on **forms**, and spend many hours in handling forms and filing forms. The data the **forms** carry come **from** people, and the informational output of the **system goes** to people. So the form is a tool with a message; it is the physical **carrier** of data - of information. It also can constitute authority for action. For example, a purchase order says **BUY** a customer's order says **SHIP**, and a paycheck says **PAY TO THE ORDER OF**. Each form is a request for action. It provides information for **making** decisions and improving operations.

With this in mind, it is hard to imagine a business operating without using **forms**. They **are** the vehicles for most communications and the blueprint for many activities. As **important** as a printed form is, however, the majority of forms **are** designed by poorly **trained** people. People are puzzled by confusing forms; they **ask** for directions on how **to** read them **and** how to fill them out. **When** a form is **poorly** designed, it is a **poor** (and costly) **administrative** tool.

3.8.3 Classification of Forms

A **printed form** is generally classified by what it does in the system. There are three primary classifications: action, memory, and report forms. An action form **requests** the user to do something - get action. (Examples are purchase orders and shop orders.) A memory **form** is a record of historical data that remains in a file, **is used** for reference, and serves **as** control on key details. (Examples are inventory records, purchase records, and bond registers.) A report form guides supervisors and other administrators in their activities. It provides data on a project or a job. (Examples are profit and loss statements and sales analysis reports,) Fig. 2 is a summary of the characteristics and examples of these forms.

Class	Characteristics	Examples
Action	1. Orders, instructs, authorizes	Application <b>form</b>
	2. Achieves results	Purchase order
	3. Goes from one <b>place(person)</b> to another	Sales slip Shop order Time card
Memory	1. Represents historical <b>data</b>	Bond register
	2. Data generally used for reference	Inventory <b>record</b>
	3. Stationary and remains in one place, usually in a file	<b>Journal</b> sheet Purchase record
	4. Serves as control on <b>certain details</b>	<b>Stock</b> ledger
Report	1. Summary picture of a project	Balance sheet
	2. Provides information about job or details that need attention	Operating statement  Profit, and loss statement
	3. Used by a manager with authority to effect change	Sales analysis Trial balance
	4. Used as a basis for <b>decision</b> making	

Fig 2: Three Classes of Forms - A Summary

3.8.4 Factors to be Considered in Form Design

Form design plays an important role in **data processing**. **Form** must have the appearance of a well conceived and attractive design. Some of the important **factors** which should be taken care of are given below:

- (i) Size and shape of the form should be such that it is convenient for handling, filing, sorting **etc.**
- (ii) Arrange **the material** in a logical order so that it becomes **easy** to fill it up.
- (iii) The form title **must** clearly identify its purpose. Columns and rows should be labelled to avoid confusion.
- (iv) **Precise** contents **should** be recorded. Adequate and compact space should be provided for items to be **recorded**. Pre-printed entries should be **taken** care of.
- (v) Special features like security and control are to **be** considered.
- (vi) Introduce emphasis by shading columns, heavy lines, **etc.** If the **form** is to be used for **specific** clerical operation, for example copying or checking, see **that** the detail is arranged and spaced to provide maximum help to the operation.
- (vii) **The** form designer should design the form in such a way so as to cover the specific needs of the purpose for which it is designed.

3.8.5 Form Control

Controlling **the number** as well as the quality of **forms** in an **organisation** can be a substantial work. **Forms** have a tendency to multiply and unless they are checked, it can be a costly affair in **many organisations**. To control this type of situation, most large organisations establish a **formal** forms control program.

The first objective of this form control **program** is **to** establish **standards**. **Different** departments using different **forms** to accomplish the same task is **an** unnecessary expense. The job of forms control **specialist** is to eliminate redundancies **among forms** to **reduce** clerical **cost**.

**The** forms **control** specialist also seeks to reduce the number of copies of each **form** used. Routing one copy of a form through several departments is probably the best **way** to achieve this.

**Forms** should be titled, numbered and **contain** the **date** of the most recent revision. It is quite helpful to have the form numbers **organised** so that all forms in a given system **can easily** be located when that system is under study.

Normally, a **form** is **designed originally** by a systems **analyst** working with the users. When the original supply of the form is reduced to a reorder level, a forms control specialist is generally responsible for **its** reorder **and** possible revision. **The** form is routed **to** the users for comments and suggested changes. The **forms** controller **coordinates** these suggestions and orders the most **economical** list. For routine office **forms** which are not likely to change frequently, a reorder of one year's supply is normal.

Check Your Progress 2

1. List out various points to be considered in designing new

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2. List out three primary classification of forms.

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3. Describe various factors to be considered in Form Design briefly.

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4. What do you understand by 'Form Control'? Explain briefly.

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## 3.9 COMPUTER GRAPHICS

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When designing an information system, it should be considered carefully about how the output can best be presented. Text output in many cases is O.K. But for many applications it does not look nice to present the user with pages and pages of **textual** output. It may **take** hours together to go through such a large output.

When it is not desired to present volumes of textual **data** but only summary of **data** is required, the data are often best presented in graphical form.

Presentation of data in graphics forms was little bit difficult in earlier computer systems. But with the advent of end-user computing, **DBMS**, electronic spreadsheets, **sophisticated** graphics software and high-resolution output devices, the use of graphics has increased tremendously.

Presentation of output in graphics format has the following benefits:

- More effective conversion of data into information
- Easier recognition of relationships and trends
- Quick decisions can be taken to make decisions
- Better presentation of output
- Ability to focus attention on important issues
- Capability of presenting ideas in an attractive format that may readily receive attention.

Behind these benefits lies the **fact** that the mind can absorb information more rapidly **from** an effective picture than it can from words **or** numbers. If they are used when appropriate, computer graphics can bridge the gap between computer data and the **human** mind. To the business professional this means more information in less time.

Using the graphic capabilities provided by integrated spreadsheet packages, **data** can be graphed in different ways. But some users need more. For example, it can be helpful to construct graphs from the company's **central** databases, to design more customized graphics than those offered by standard packages, and to use graphics for a wider range of applications than merely spreadsheets. And indeed, a host of more sophisticated computer graphics packages is available. Computer graphics **software** can be divided into two categories, presentation graphics and decision support graphics. We will briefly describe how each is used.

### 3.9.1 Presentation Graphic.

Presentation graphics are used to communicate ideas to those who might be unfamiliar with a situation or who need a simple but highly effective overview of a topic. For example presentation graphics might be used by a sales person to show a customer how several insurance policies compare, by a marketing manager at a long range planning session to show the change in market share between competitive products, or by manufacturing management at a budget session to give an overview of **the** expected work load in the next quarter,

**Those** who used presentation graphics need a system that can

- Produce high-quality illustrations.
- **Produce** a range of colors.
- **Allow** the user to choose among a variety of print styles or "fonts".
- Reduce and enlarge illustrations.

Produce high-quality 35-millimeter slides or transparencies.

The data used in presentation graphics may come from different databases in the organisation, from non-computer sources in the organization, and from outside sources. Most illustrations are accompanied by explanatory text, and so any graphics system must be capable of mixing text with graphics,

A simple example illustrates how a pie chart is constructed. The user first types the title for the chart on the keyboard and then enters the following information for each "slice" of the pie : label, value, whether or not the slice should be "exploded" out of the pie for attention purposes, color, and design code (texture). Provided with this input, the graphics software does the rest.

3.9.2 Decision Support Graphics

The second computer graphics category is decision support graphics or analytical graphics. Here graphics are used as a vehicle for understanding patterns, trends or relationships in data. Because the objective in using decision support graphics is to learn something about data, the demands made on the quality of the graphics, the type of presentation, and the source of data are quite different from the demands made on presentation graphics.

First, the quality of the illustration is not nearly so important as its ability to present the information in a way that can support the problem solving and decision making process. Second, the color and special graphical effects are not usually necessary. Third, the data for decision support graphics usually come from spreadsheets, local databases, or the firm's central database. If the data are stored centrally, then the graphics system must be able to access the data and use them to produce graphs with a minimum of user involvement. The effective use of graphics offers finely "distilled" information for quick comprehension by decision makers. The speed of comprehension is not merely a matter of convenience but also of being able to make timely decisions.

3.9.3 Graphics Hardware/Software

The hardware used in a graphics system falls into several categories, including graphics terminals, graphics boards, graphics printers, and interface devices.

In addition to hardware, a graphics system needs software. It is, the software that provides the capability of using different fonts, adjusting the size of the fonts, selecting colors, moving the image from one location on the screen to another, incorporating graphics into the text, and supporting the use of interface devices.

A wide variety of software packages is available in the market. Many provide a standard set of line, bar and pie charts, some offer the option of displaying these in three dimensions; and others allow several charts to be graphed on a single plot

Check Your Progress 3

- 1. List out various benefits for presenting the output in graphic format.

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- 2. Define the following terms briefly.
  - (a) Presentation Graphics
  - (b) Decision support Graphics

3.10 SUMMARY

In this unit, we have discussed the responsibility of system analyst for output system design. Different type of output devices have been discussed. Output to be produced usually

depends upon many considerations. They have been explained in **details**. Designing screen output or menu design play quite significant role in business applications. Computer graphics are also very helpful in presenting the output in an effective way,

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## 3.11 MODEL ANSWERS

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### Check Your Progress 1

1. (i) Report, display on screen and printed forms  
 (ii) Application output and Operating output  
 (iii) Impact printer and **non-impact** printer  
 (iv) Laser printers  
 (v) Computer Output Microfilm
2. Various considerations are:
  - (i) **Type** of user and purpose
  - (ii) Contents
  - (iii) **Format**
  - (iv) Frequency and timing
  - (v) **Volume**
  - (vi) Sequence
  - (vii) Quality
  - (viii) **Type** of stationary
3. The general principles are:
  - (i) The design must be such that it can be read from left to right and **from** top to bottom.
  - (ii) An important item, such as the key field, should be easiest to find.
  - (iii) All pages must have a heading and a page number.
  - (iv) All columns must be labelled with meaningful labels.
  - (v) **Too many** details should be avoided.
  - (vi) Control footing abstracts information about groups **of** detail lines must be effectively used.

### Check Your Progress 2

1. Various points to be considered in menu design are:
  - (i) Hierarchical
  - (ii) Termination
  - (iii) Skipping menu
  - (iv) Security control
2. Three primary classifications are:
  - (i) Action
  - (ii) Memory
  - (iii) Report
3. Various factors to be considered in **form** design are:
  - (i) Size and shape of the form should be such that it is easy in handling, filing, sorting, **etc.**
  - (ii) Arrange the material in a logical order so that it is easily filled up,
  - (iii) The form title must clearly identify its purpose.
  - (iv) Precise contents should be recorded.
  - (v) Special **features** like security and control are to be considered.
  - (vi) Introduce emphasis by sharing columns, heavy lines, **etc.**

4. Form control is a procedure for (i) providing improved and effective forms (ii) reducing printing **costs**, and **(iii)** securing adequate stock for all times.

### Check Your Progress 3

1. Various benefits are:
  - (i) More effective conversion of data **into** information
  - (ii) Easier recognition of relationships and **trends**
  - (iii) Quick decision is possible
  - (iv) **Better** presentation of output
  - (v) Important issues can be **highlighted**
2. **(a)** Presentation graphics **are** used to **communicate** ideas to those who might be unfamiliar with a situation or who **need** a simple but highly affective overview of a topic.  
**(b)** These graphics are used as a vehicle for understanding patterns, **trends** or relationships in data.