



**Agri-Informatics  
Practical Manual  
Course Code, CC-AGP 320, Credits 2(1+1)**

**Prepared by**



**Dr. Parvez Mallick**

**Department of Agriculture Economics, Computer Science**

**School of Agriculture and Allied Sciences**

**The Neotia University**

**Sarisha, Jhinga - 743368, D. H. Road South 24 Parganas, West Bengal**

**TABLE OF CONTENTS**

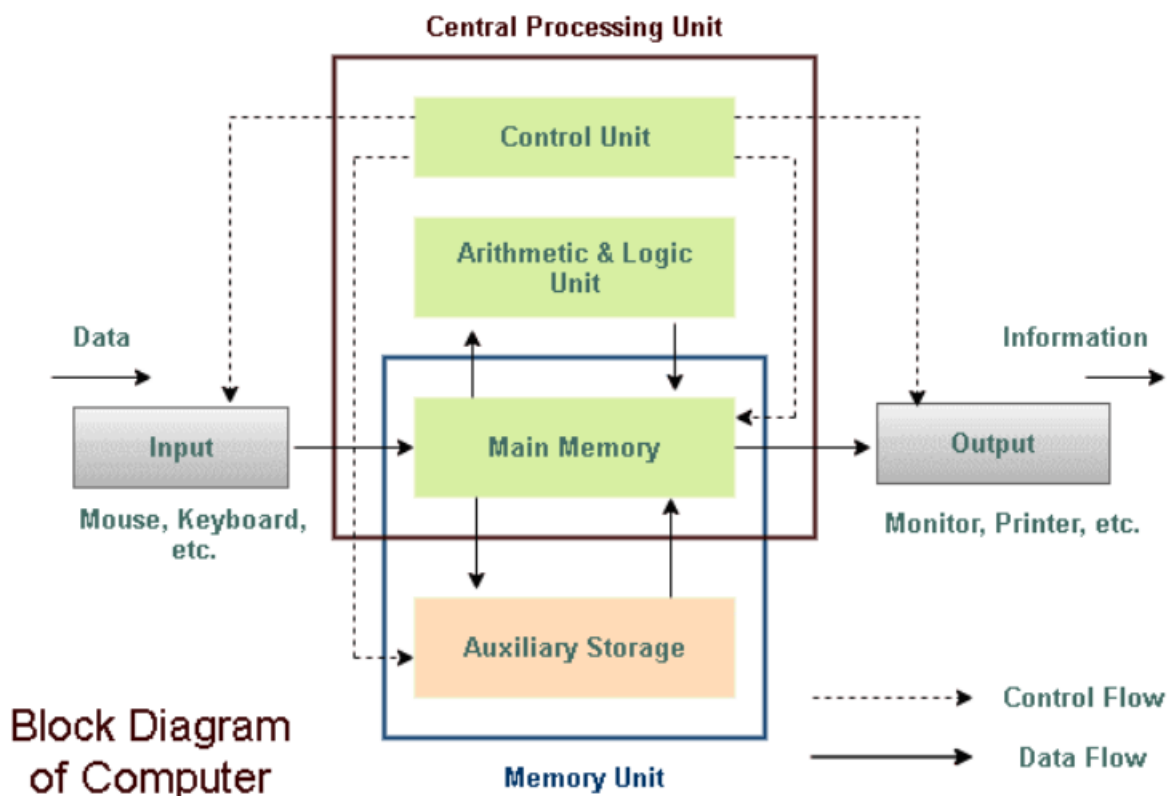
<b>Practical No.</b>	<b>NAME OF EXPERIMENT IN LAB</b>	<b>Page No.</b>
Practical 1	Study of computer components and accessories	1-4
Practical 2	Practice of important DOS commands	5-9
Practical 3	Introduction to different operating systems such as MS-Windows, Unix/ Linux, Creating Files and Folders, File Management	10-17
Practical 4	Use of Microsoft Word	18-23
Practical 5	MS Excel Mathematical calculations, Preparation of Spread Sheets	24-34
Practical 6	MS Excel chart –Line, XY, Bar and Pie	35-41
Practical 7	MS-Access: Creating Database, Preparation of queries, reports and forms	42-50
Practical 8	Microsoft PowerPoint	51-59
Practical 9	Basic concept of HTML for creating a Web page	60-68
Practical 10	Demonstration of Agri-information Systems	69-75
Practical 11	Introduction to Programing Language : C	76-85
Practical 12	Hands on Decision Support System and Crop Simulation Model: DSSAT	86-87
Practical 13	Introduction to Geospatial Technology for generating valuable information for Agriculture	88-93
Practical 14	Computation of water requirement of crop using CROPWAT 8.0 and CLIMWAT 2.0	94-97
Practical 15	Preparation of contingent crop plan	98-100

## Practical 1: Study of computer components and accessories

- **Objective:** to analyze a problem, and identify and define the computing requirements appropriate to its solution
- **Requirements:** Desktop, Keyboard, Mouse, CPU, Printer
- **Computer:** A computer is a machine or device that performs processes, calculations and operations based on instructions provided by a software or hardware program. It has the ability to accept data (input), process it, and then produce outputs.
- **Features of a computer:**
  1. High speed
  2. Reliability and Accuracy
  3. Storage and Retrieval of Large volumes of data/Information
  4. Ability to Communicate with other Computers

A Block diagram of a computer displays a structural representation of a computer system.

The following diagram represents a block diagram of the computer system:



- **Memory:**

- **Measurement of Memory:**

The memory required to store a word formed with 8 Bits of data/Information is called a BYTE.

Normally One byte of memory is required to store one Character

$$1 \text{ Kilo Byte (KB)} = 2^{10} \text{ Bytes} = 1024 \text{ Bytes}$$

$$1 \text{ Mega Byte (MB)} = 2^{10} \text{ KB} = 1024 \text{ KB}$$

$$1 \text{ Giga Byte (GB)} = 2^{10} \text{ MB} = 1024 \text{ MB}$$

- **Memory Devices:**

1) **Semiconductor Memory:** This type of memory is in the form of semiconductor IC's. The advantages of this type of memory include compact size, high speed operation, low cost etc. But as these are fixed on the computer motherboard itself, there are limitations to the amount of memory which can be put on the motherboard. Semiconductor memory are of two types:

- **RAM (Random Access Memory):** This is a read and writes type of Memory which is used by the computer as a scratch pad.

- **ROM (Read Only Memory):** This is only read type of memory. This memory is used for purposes like storing basic programs required by the computer at the time of startup (called BIOS)

2) **Storage Media:**

Mainly Magnetic or semiconductor type of media, (except CD which is an optical type of media) is used as Memory for storage of Data/Information. Variety of storage media types is used depending on the amount of information to be stored.

- **Input Devices:**

Some commonly used input devices are listed below:

1. Key Board
2. Mouse
3. Optical Scanner
4. Magnetic Card Reader.

- **Output Devices:**

1. VDU (Video Display Unit)
2. Printer
3. Plotter
4. Speaker

**Exercise:**

1) Write Functions of units and some example devices of each :

	Unit	Functions
1.	Central Processing Unit  a) ALU  b) Control Unit	
2.	Memory	
3.	Input device	
4.	Output device	

2) Fill the capacity column in the following table :

Sl. no.	Type	Capacity
1.	Floppy Diskettes	
2.	Hard Disk	
3.	Magnetic Tape (Cassette)	
4.	Compact Disc (CD)	
5.	Pen Drive	

3) Fill type of device and description column in the following table:

Sl. No.	Device	Type of Device	Description (function)
1.	RAM		
2.	Hard Disc		
3.	Floppy Disk		
4.	Mouse		
5.	Compact Disc		
6.	Key Board		

7.	Visual Display Unit		
8	Printer		
9	Plotter		
10	Scanner		

**4) Write configuration of Computers / Terminals available in the laboratory:**


**Conclusion:**

**Video Link: <https://www.youtube.com/watch?v=5OHx1SxS8C0>**

## Practical 2: Practice of Important DOS Commands

- **Objective:** To learn about important DOS commands.
- **Requirements:** MS-DOS.
- **What is a disk operating system?**

A DOS, or disk operating system, is an operating system that runs from a disk drive.  
Most commonly used DOS is MS-DOS or Microsoft DOS.
- **Getting into MS DOS:**
  - ✓ Start button and choose Run or click Windows+R.
  - ✓ In the Run dialog box, type CMD or COMMAND which is the extension file for MS-DOS.
  - ✓ Click on the OK button and command prompt will open.



**Figure 1: Command Prompt**

- **Command:** A command is a set of instructions used to perform a specific work. Command interpreted by the OS interpreter to a machine language.
- **Types of DOS Commands:**
  - a) **Internal Command:** Internal commands are more commonly used and important. These commands are already loaded in the COMMAND.COM file because they can be quickly accessed and always available in MS-DOS and to Windows when needed.
  - b) **External command:** These external commands are for performing advanced tasks and they do need some external file support as they are not stored in COMMAND.COM.

- **Internal commands:**
- **CLS:** To clear the screen.  
**Syntax:** CLS, **Example:** C:\> CLS
- **CD:** To change directory or move to a specific folder.  
**Syntax:** CD[d:][path][dir name], **Example:** C:\> CD DESKTOP
- **CD..:** Go to previous directory.  
**Syntax:** CD..[d:][path][dir name], **Example:** C:\> DESKTOP>CD..
- **COPY CON:** To create a file through the command line.  
**Syntax:** COPY CON [d:][path][name.ext], **Example:** C:\> desktop\ COPY CON Ram.txt
- **DIR:** It displays a list of files and folders.  
**Syntax:** DIR [d:][path], **Example:** C:\> desktop> DIR.
- **MD or MKDIR:** To create new folders or directory.  
**Syntax:** MD or MKDIR [d:][path][dir name], **Example:** C:\> desktop> MD INDIA
- **RD:** To delete folder or directory(s).  
**Syntax:** RD [d:][path][dirname], **Example:** C:\> desktop> RD INDIA
- **REN:** To rename a file or files  
**Syntax:** REN [d:][path][name.ext] [d:][path][new name.ext]  
**Example:** C:\> desktop> REN INDIA BHARAT
- **MOVE:** To move files from one folder to another.  
**Syntax:** MOVE [d:][ source path][name.ext] [d:][ destination path][name.ext]  
**Example:** C:\> desktop> MOVE Ram.txt BHARAT
- **TYPE:** It displays the contents of a text file.  
**Syntax:** TYPE [d:][path][name.ext], **Example:** C:\> desktop> TYPE Ram.txt
- **VER:** It displays version information.  
**Syntax:** VER, **Example:** C:\> VER.
- **VOL:** To display a disk label.  
**Syntax:** VOL [drive:], **Example:** C:\> VOL
- **DEL:** To delete files.  
**Syntax:** DEL [d:][path][name. ext], **Example:** C:\> desktop>DEL Ram.txt
- **COLOR:** It changes color of the prompt  
**Syntax:** color [value], **Example:** C:\> color 1
- **DATE:** To display or set the date.



**Syntax:** DATE, **Example:** C:\> DATE

- **TIME:** To display or set the date.

**Syntax:** time, **Example:** C:\> TIME

- **External commands:**

- **EDIT:** This command is used to modify or change the data of a file.

**Syntax:** EDIT [filename], **Example:** C:\> desktop> EDIT Ram.txt

- **DISKCOPY:** This command makes an exact copy of a disk, including hidden system files if they are present.

**Syntax:** DISKCOPY [d1:] [d2:], **Example:** DISKCOPY C: E:,

- **CHKDSK:** This command is used to check a disk and display a status report with properties of disk like serial number, volume label, memory and other properties.

**Syntax:** CHKDSK [d:], **Example:** CHKDSK C:

- **FORMAT:** This command is used to erase off information of a computer disk or fixed drive.

**Syntax:** FORMAT [d:], **Example:** FORMAT E:

- **LABEL:** This command is used to see the volume label and to change the volume label.

**Syntax:** LABEL [d:], **Example:** LABEL C:

- **SCANDISK:** This utility is used to repair and check various disk errors.

**Syntax:** SCANDISK [d:], **Example:** SCANDISK C:

- **PRINT:** This command prints a text file.

**Syntax:** PRINT [d:][path][name.ext], **Example:** C:\> desktop> PRINT Ram.txt

- **TREE:** This command displays list of directories and sub directories.

**Syntax:** TREE [d:], **Example:** TREE C:

- **DELTREE:** This command is used to delete files a directories same as DEL and RD.

**Syntax:** DELTREE [d:][path][name.ext],

**Example:** C:\>desktop> DELTREE Ram.txt

- **FIND:** This command searches for a specific text string in a file or files.

**Syntax:** FIND "STRING"[name.ext],

**Example:** C:\>desktop> FIND "MY" Ram.txt

- **SORT:** This command is used to arrange the data of a file in alphabetical order or reverse alphabetical order.

**Syntax:** SORT [name.ext]

**Example:** C:\>desktop> SORT Ram.txt

- **BACKUP:** The Backup command backs up one or more files from one disk to another.

**Syntax:** BACKUP [d1:][d2:]

**Example:** BACKUP C: D:

- **XCOPY:** This command is used to copy files and directory trees from one disk to another disk.

**Syntax:** XCOPY source [destination]

**Example:** C:\>desktop> XCOPY INDIA NATION

**Exercise:**

1. Which command lists the current directory of disk?
  - a) COPY.
  - b) CD.
  - c) TREE.
  - d) DIR.
2. If you don't know the time, which command you will use to display?
  - a) DATE.
  - b) TIME.
  - c) CD.
  - d) NONE.
3. While working with MS-DOS which command transfers one specific file from one disk to another?
  - a) COPY.
  - b) DISKCOPY.
  - c) Time.
  - d) Rename.
4. If you need to copy entire disk, which command you will use?
  - a) COPY.
  - b) DISKCOPY.
  - c) CHKDSK.
  - d) FORMAT.
5. Which command used to clear the screen?
  - a) Clear.
  - b) CLS.
  - c) Clear screen.
  - d) All of the above.
6. The command used to copy a file name temp.doc from drive C: to drive A:

- a) Copy temp.doc to a:
  - b) Copy c:\> temp.doc a:
  - c) Copy a:\> temp.doc c:
  - d) Copy temp a: c:
7. External command DOS are:
- a) Copy, edit, format.
  - b) Edit, chkdsk, xcopy.
  - c) Chkdsk, xcopy, del.
  - d) Del, format, edit.
8. \_\_\_\_\_ command moves to previous directory?
9. DOS is an \_\_\_\_\_ software?
10. To remove directory the \_\_\_\_\_ command is used.
11. Write difference between internal commands and external commands?
12. Write the use of COPY, XCOPY, DISKCOPY commands?

**Conclusion:**

**Video Link:**

[https://www.youtube.com/watch?v=F7kXXsEq2Vc&t=122s&ab\\_channel=SelfAdhyanGuruji](https://www.youtube.com/watch?v=F7kXXsEq2Vc&t=122s&ab_channel=SelfAdhyanGuruji)

### **Practical 3: Introduction to different operating systems such as MS-Windows, Unix/ Linux, Creating Files and Folders, File Management**

- **Objective:** To learn about different operating systems like Windows and Unix/Linux and how to create and manage files in those operating systems.
- **Requirements:** Windows and Unix/Linux operating system in PC or laptop.
- **Windows OS**
  - Microsoft introduced an operating environment named Windows on November 20, 1985, as a graphical operating system shell for MS-DOS.
  - It is the most popular and simplest operating system; it can be used by any person who can read and understand Basic English.
- **Elements of Windows OS:**
  - Graphical User Interface,
  - Icons (pictures, documents, application, program icons, etc.),
  - Taskbar,
  - Start button,
  - Windows explorer,
  - Mouse button,
  - Hardware compatibility,
  - Software compatibility,
  - Help etc.
- **Versions of Windows Operating System:**

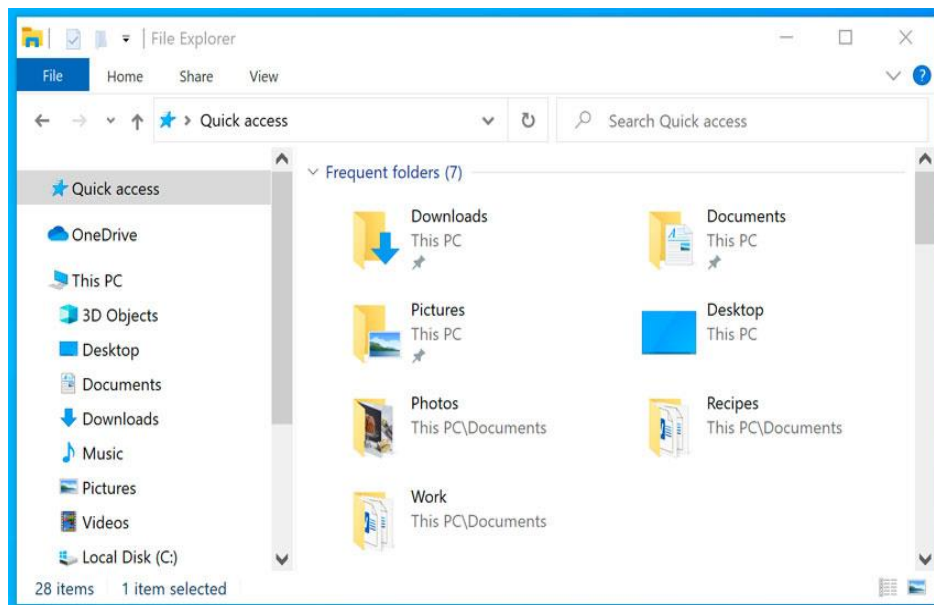
Windows 1.0(1985), Windows 2.0(1987), Windows 3.0(1990), Windows 95(1995), Windows 98(1998), WindowsME(2000), Windows NT(1993), Windows 2000(2000), Windows XP(2001), Windows Vista(2006), Windows 7(2009), Windows 8/8.1(2012), Windows 10(2015) and Windows 10 S(2017).
- **Creating File and Folders, File management:**

File Explorer is the file management application used by Windows operating systems to browse folders and files.

There are a couple of ways to open File Explorer.

  1. The shortcut Win+E will open File Explorer.
  2. It can also be opened by clicking the Start button and typing “File Explorer”

3. Right-click any folder and then select Open.



- **To open a folder:**

From File Explorer, double-click a folder to open it or select the folder, right click and select open from the menu. You can then see all of the files stored in that folder. Notice that you can also see the location of a folder in the address bar near the top of the window.

- **To open a file:**

Find the file on your computer and double-click it or select the file, then right click, then select open from the menu. This will open the file in its default application.

Or

Open the application, and then use the application to open the file. Once the application is open, you can go to the File menu at the top of the window and select Open.

- **To move a file or folder:**

1. Click and drag the file to the desired location. If you drag the file or folder one drive to another drive it will copy and if you drag it with in two same drive irwil move
2. Release the mouse. The file will appear in the new location.

You can use this same technique to move an entire folder. Note that moving a folder will also move all of the files within that folder.

- **To create a new folder:**

Within File Explorer, locate and select the New folder button.

Or

In Windows 7, there is a New folder button near the top of the window. In Windows 10, you can also click the Home tab, then the New Folder button.

Or

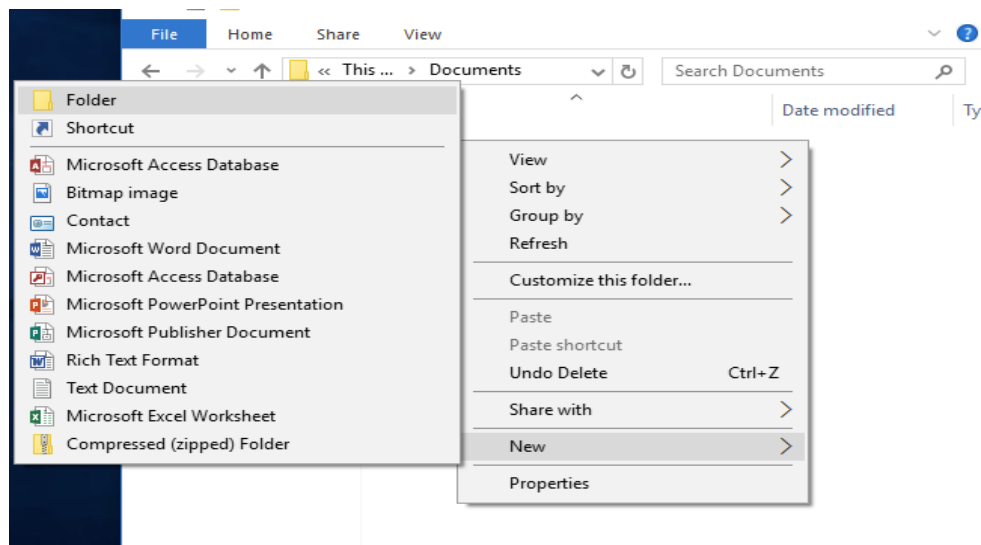
You can also right-click where you want the folder to appear, then select New >

Folder

Or

You can use CTRL+SHIFT+N

The new folder will appear. Type the desired name for the folder and press Enter. The new folder will be created. You can now move files into this folder.



- **To create a new file:**

To create a file in a folder, first right-click, then select New after that select which file you want to create like word file, text file, excel file etc.

- **To rename a file or folder:**

1. Click the file or folder, wait about one second, and click again. An editable text field will appear.

Or

You can also right-click the folder or file and select Rename from the menu. An editable text field will appear.

2. Type the desired name on your keyboard and press Enter. The name will be changed.

- **To delete a file or folder:**

When you delete a file, it is moved to the Recycle Bin. If you change your mind, you can move the file from the Recycle Bin back to its original location and to delete a file permanently, first right-click the Recycle Bin icon and then select Empty Recycle Bin. All files in the Recycle Bin will be permanently deleted.

Click and drag the file to the Recycle Bin icon on the desktop.

Or

You can also click the file to select it and press the Delete key on your keyboard.

Or

You can also right-click the folder or file and select Delete from the menu.

- **Selecting multiple files or folders:**

If you're viewing your files as icons, you can click and drag the mouse to draw a box around the files you want to select.

Or

To select specific files from a folder, press and hold the Control key on your keyboard, then click the files you want to select.

Or

To select a group of files from a folder, click the first file, press and hold the Shift key on your keyboard, then click the last file. All of the files between the first and last ones will be selected.

- If you want to select all files or folders in a folder at the same time, open the folder in File Explorer and press CTRL+A. All of the files in the folder will be selected.

- **Unix/Linux OS**

- The Unix Operating System is the earliest operating system developed in 1970s.
- Multitasking.
- Multiuser computer operating systems.
- Comparative complex functionality.
- It does not give notice or warn about the consequences of a user's action.

- **Unix Architecture:**

- **Kernel:** The kernel is the heart of the operating system. It interacts with the hardware and most of the tasks like memory management, task scheduling and file management.

- **Shell:** The shell is the utility that processes your requests. When you type in a command at your terminal, the shell interprets the command and calls the program that you want.
- **Commands and Utilities:** There are various commands and utilities to do specific activities. Example: cp, mv, cat etc.
- **Files and Directories:** All the data of Unix is organized into files. All files are then organized into directories. These directories are further organized into a tree-like structure called the File system.

**Linux** is one of popular version of UNIX operating System. It is open source as its source code is freely available. It is free to use. Linux was designed considering Unix compatibility. Its functionality list is quite similar to that of Unix.

- **File management**
- **Creating and Editing Files:**

You can use the **vi** editor to create ordinary files on any Unix system.

**Syntax:** \$ vi filename

The above command will open a file with the given filename. Now, press the key **i** to come into the edit mode. Once you are in the edit mode, you can start writing your content in the file.

Once you are done with the program, follow these steps –

1. Press the key esc to come out of the edit mode.
2. Press Shift + Z to come out of the file completely.

- **Display Content of a File:**

**cat:** cat command is used to see the content of a file.

**Syntax:** \$ cat filename

- **Counting Words in a File:**

**wc:** This command is used to get a count of the total number of lines, words, and characters contained in a file.

**Syntax:** \$ wc filename

x y z filename

Here is the detail of all the four columns –

- **First Column (x)** – Represents the total number of lines in the file.



- **Second Column (y)** – Represents the total number of words in the file.
- **Third Column (z)** – Represents the total number of bytes in the file. This is the actual size of the file.
- **Fourth Column** – Represents the file name.
- **Copying Files:**
  - cp:** To make a copy of a file.
  - Syntax:** \$ cp source\_file destination\_file
- **Renaming Files:**
  - mv:** To change the name of a file.
  - Syntax:** \$ mv old\_filename new\_filename
- **Deleting Files:**
  - rm:** To delete an existing file.
  - Syntax:** \$ rm filename.
- **Listing Files:**
  - ls:** To list the files and directories stored in the current directory.
  - Syntax:** \$ls

The command ls support the -l option which would help you to get more information about the listed files.

**Syntax:** \$ls-l

**\$ls -a:** This command is used to show the hidden files.

We use meta characters\* to match 0 or more characters, a question mark (?) matches with a single character.

For example:

**\$ls \*.doc:** To display all the files ending with just .doc.

- **Directory management:**

**Home Directory:** The directory in which you find yourself when you first login is called your home directory.

**\$cd ~:** To go in home directory anytime.

**\$cd -:** To go Last directory.

**\$cd ~username:** To go in any other user's home directory.

**pwd (point working directory) command:** To determine where you are within the file system hierarchy at any time.

- **Listing Directories:**

**ls:** To list the directories.

**Syntax:** \$lsdirname

- **Creating Directories:**

**mkdir:** To create directories.

**Syntax:** \$mk dir dirname

- **Removing Directories:**

**rmdir:** To delete or remove directories.

**Syntax:** \$rm dir dirname

- **Changing Directories:**

**cd:** You can use it to change to any directory by specifying a valid absolute or relative path.

**Syntax:** \$cd dirname

**\$cd..:** This command is use for taking to the previous directory.

- ✓ A pathname is **absolute**, if it is described in relation to root and absolute pathnames always begin with a /.

Example: / users /chem/notes

- ✓ A pathname can also be relative to your current working directory. Relative pathnames never begin with /.

Example: chem/notes

- **Renaming Directories:**

**mv:** This command used to rename a directory.

**Syntax:** \$mv olddir newdir.

**Exercise:**

1. Which of the following is not an operating system?
  - a) Windows
  - b) Linux
  - c) Oracle
  - d) DOS

2. When were MS windows operating systems proposed?
  - a) 1994
  - b) 1990
  - c) 1992
  - d) 1985
3. Which is the Linux operating system?
  - a) Private operating system
  - b) Windows operating system
  - c) Open-source operating system
  - d) None of these
4. In Unix, which command is use to remove directory?
  - a) rd
  - b) rmdir
  - c) rdir
  - d) All of the above
5. cd command only accepts \_\_\_\_\_ as arguments:
  - a) path
  - b) repository
  - c) Directories
  - d) File
6. Compare Windows, Unix and Linux operating system. ( five points)

**Conclusion:**

**Video Link:**

1. [https://www.youtube.com/watch?v=mej9mQHWMKE&ab\\_channel=AmitThinks](https://www.youtube.com/watch?v=mej9mQHWMKE&ab_channel=AmitThinks)
2. [https://www.youtube.com/watch?v=IVquJh3DXUA&ab\\_channel=sakitech](https://www.youtube.com/watch?v=IVquJh3DXUA&ab_channel=sakitech)
3. [https://www.youtube.com/watch?v=1ROOqJ9vNT0&t=220s&ab\\_channel=AndroidandTechSolutions](https://www.youtube.com/watch?v=1ROOqJ9vNT0&t=220s&ab_channel=AndroidandTechSolutions)

## **Practical 4: Use of Microsoft Word**

- **Objective:** To learn how to create, edit and format any document using Microsoft Word.
- **Requirement:** Microsoft Word in Laptops or PC.
- **Microsoft Word:** Microsoft word or MS Word is a graphical word processor program that users can type with.
- **Where we can find Microsoft Word?**

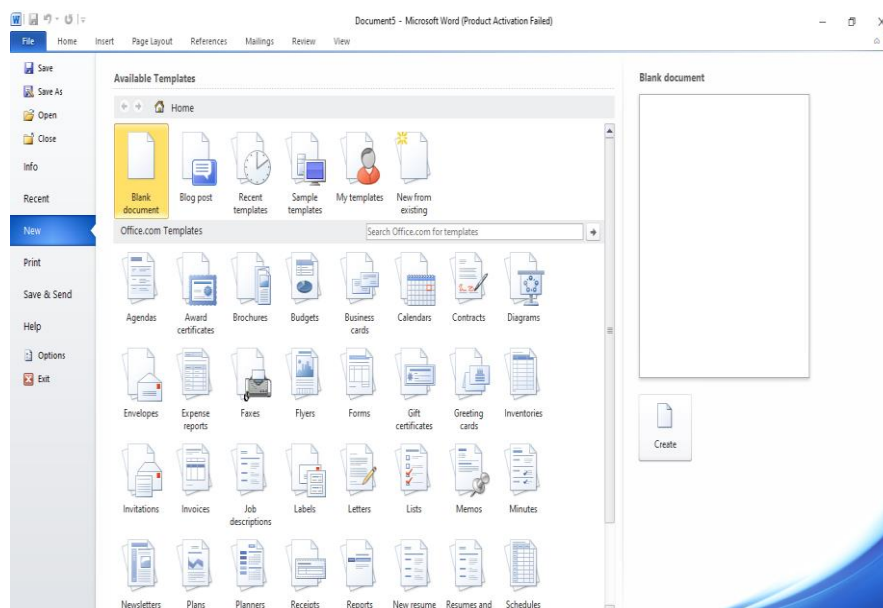
Follow these simple steps to open MS Word on your personal computer:

Start → All Programs → MS Office → MS Word.

- **Creating a new document**

To create a document in MS-Word, follow these steps:

- ✓ **Step 1:** From the menu bar, Click the File tab and select the New option.
- ✓ **Step 2:** Select and Double click on the Blank document, or
- ✓ Press **CTRL+N.**



**Figure 1: Creating a document**

- **Opening existing document**

To open an existing document in MS-Word, follow these steps:

- ✓ **Step 1:** From the menu bar, Click the File tab and select the Open option.
- ✓ **Step 2:** Select the file which you want to open, or
- ✓ Press **CTRL+O.**

- **Saving a document**

To save a document, follow any step among these three steps:

- ✓ Click on the save button on the Tool bar, or
- ✓ From the menu bar, Click the File tab and select the Open option, or
- ✓ Press **CTRL+S**.

- **Printing a document**

To print a document, follow these steps:

- ✓ **Step 1:** From the menu bar, Click the File tab and select the Print option, or
- ✓ Press **CTRL+P**.
- ✓ **Step 2:** Select the Printer and Set different properties.

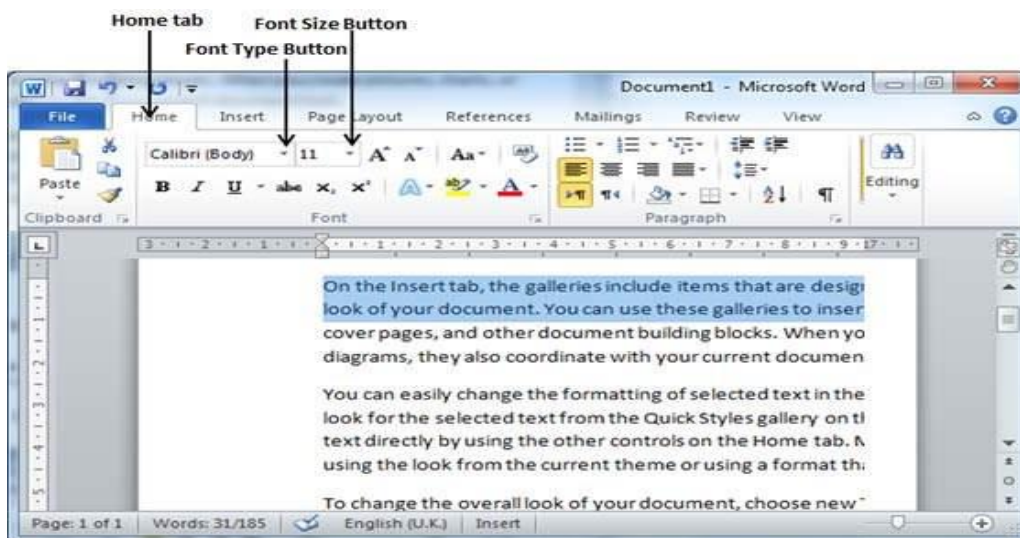
- **Formatting Text**

- **Font and Font size:**

- ✓ **Step 1:** Click Home tab
- ✓ **Step 2:** Next type the name of desired font or font size directly or select from the drop down list.

- **Font Style:**

- ✓ Select the text and click on the bold or italic or underlined button.
- ✓ Alternatively, click on the bold or italic or underlined button and type the text.
- ✓ Select the text and use respective shortcut keys like **CTRL+B** (Bold), **CTRL+I** (Italics), **CTRL+U** (Underlined).



**Figure 2: Changing Font and Font Size**

- **Formatting Paragraph:**

- **Spacing between lines:**

- ✓ **Step 1:** Select the paragraph or paragraphs for which you want to define spacing.
- ✓ **Step 2:** Paragraph Dialog Box launcher available on the Home tab, to the right of the paragraph spacing controls, you find the “Line spacing” tools.
- ✓ **Step 3:** Click the Line and Paragraph Spacing Button triangle to display a list of options to adjust space between the lines

You have different custom settings like: *Single, 1.5 lines, double, At least, Exactly, Multiple.*

➤ **Spacing between lines:**

- ✓ **Step 1:** Select the paragraph or paragraphs for which you want to define spacing and click the Paragraph Dialog Box launcher available on the Home tab.
- ✓ **Step 2:** You will find the “*Before and After*” option in Paragraph Dialog Box. Click the *Before* and *After* spinner to increase or decrease the space before or after the selected paragraph.

● **Alignment of Text**

Click one of the alignment buttons in the Paragraph group on the Home Tab:

- **Left (CTRL+L):** Aligns the lines in the paragraph flush on the left side and ragged on the right.
- **Centered (CTRL+E):** Centres each line in the paragraph, leaving both left and right margins ragged.
- **Right (CTRL+R):** Aligns the lines in the paragraph flush on the right side and ragged on the left.
- **Justified (CTRL+J):** Add space between letters and words so that both the left and right sides of the paragraph are straight and flush with the margins.

● **Formatting Page**

You can set a page from Page Setup section under the Page Layout. In this section you can set **Page margin, Page orientation, Paper size.**

● **CUT, COPY and PASTE**

These edit functions are used to move and copy a selected text from one place to another:

To Cut and Copy:

- ✓ Go to Home Tab>Cut (CTRL + X) or Copy (CTRL+C)
- ✓ Then PASTE (CTRL+V) in desired position.

- **FIND, REPLACE and GOTO**

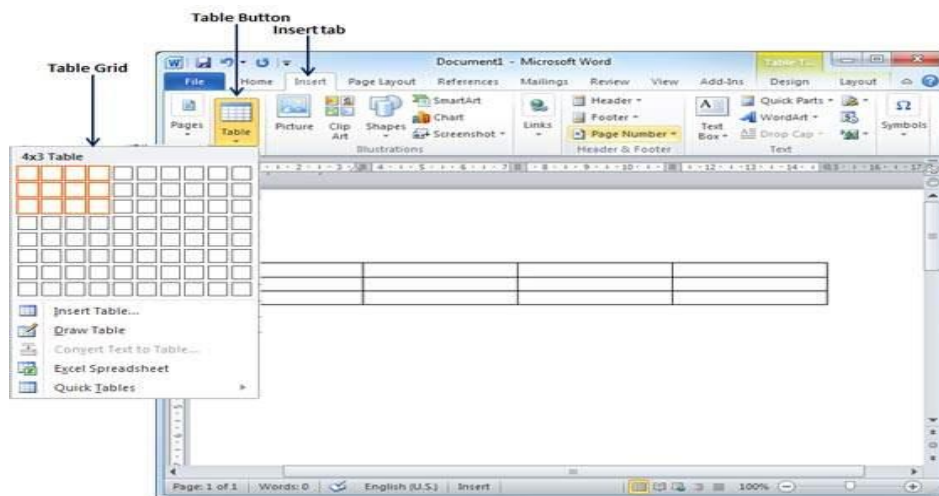
- ✓ **Step 1:** Click on Home tab Replace. A Find And Replace dialog box will be displayed on the screen.
- ✓ **Step 2:** From there you can find any text; you can replace any text by finding text and go to any page, line or section.

- **Headers and Footers**

- ✓ **Step 1:** Click on Insert Tab. You will find Header and Footer options.
- ✓ **Step 2:** You can type your information whatever you want to have in your document header and once you are done, click Close Header and Footer to come out of the header or footer insertion mode.

- **Table**

- ✓ Click the Insert tab followed by the Table button. This will display a simple grid as shown below. When you move your mouse over the grid cells, it makes a table in the table that appears in the document.
- ✓ You can make your table having the desired number of rows and columns.



**Figure 3: Creating a Table**

**Shortcut Keys:**

- Ctrl + A -- Select all contents of the page.
- Ctrl + B -- Bold highlighted selection.
- Ctrl + C -- Copy selected text.
- Ctrl + X -- Cut selected text.
- Ctrl + N -- Open new/blank document.

- Ctrl + O -- Open options.
- Ctrl + P -- Open the print window.
- Ctrl + F -- Open find box.
- Ctrl + I -- Italicise highlighted selection.
- Ctrl + K -- Insert link.
- Ctrl + U -- Underline highlighted selection.
- Ctrl + V -- Paste.
- Ctrl + Y -- Redo the last action performed.
- Ctrl + Z -- Undo last action.

**Exercise:**

1. **Which is the default alignment in word?**
  - (A) Left
  - (B) Right
  - (C) Centre
  - (D) Justify
2. **File extension of word document is:**
  - (A) .xls
  - (B) .doc
  - (C) .word
  - (D) .jpeg
3. **Portrait and Landscape are \_\_\_\_\_ .**
  - (A) Paper size
  - (B) Page layout
  - (C) Page orientation
  - (D) Page margin
4. **Fill in the blanks:**
  - a. \_\_\_\_\_ shows the name of the application and name of the file ?
  - b. \_\_\_\_\_ can be used to select the entire document?



- c. When entering text within a document, the enter key is normally pressed at the end of every \_\_\_\_\_?
  - d. The \_\_\_\_\_ features helps you to avoid typing mistake and speed up your typing?
  - e. Ctrl+V is shortcut for \_\_\_\_\_ operation?
5. How can we set up a page in Microsoft word?
6. Make you curriculum vitae in Microsoft word in one or two pages.

**Conclusion:**

**Video Link:**

[https://www.youtube.com/watch?v=yV4i29Xo0iM&t=7734s&ab\\_channel=LearnitTraining](https://www.youtube.com/watch?v=yV4i29Xo0iM&t=7734s&ab_channel=LearnitTraining)

### **Practical 5: MS Excel Mathematical calculations, Preparation of Spread Sheets**

- **Objective:** To learn how to create, edit and format any document using Microsoft Excel.
- **Requirement:** Microsoft Excel in Laptops or PC.
- **Microsoft Excel:** Microsoft Excel is an example of a program called a “spreadsheet.” Microsoft Office Excel is a powerful tool used to create and format spreadsheets. Spreadsheets allow information to be organized in rows and tables and analyzed with automatic mathematics. Spreadsheets are commonly be used to perform many different types of calculations.
- **Where we can find Microsoft Excel?**

Follow these simple steps to open MS Word on your personal computer:

Start → All Programs → MS Office → MS Excel.

- **Creating a new document**

To create a document in MS- Excel, follow these steps:

- ✓ **Step 1:** From the menu bar, Click the File tab and select the New option.
- ✓ **Step 2:** Select and Double click on the Blank document, or
- ✓ Press **CTRL+N**.

- **Opening existing document**

To open an existing document in MS-Word, follow these steps:

- ✓ **Step 1:** From the menu bar, Click the File tab and select the Open option.
- ✓ **Step 2:** Select the file which you want to open, or
- ✓ Press **CTRL+O**.

- **Saving a document**

To save a document, follow any step among these three steps:

- ✓ Click on the save button on the Tool bar, or
- ✓ From the menu bar, Click the File tab and select the Open option, or
- ✓ Press **CTRL+S**.

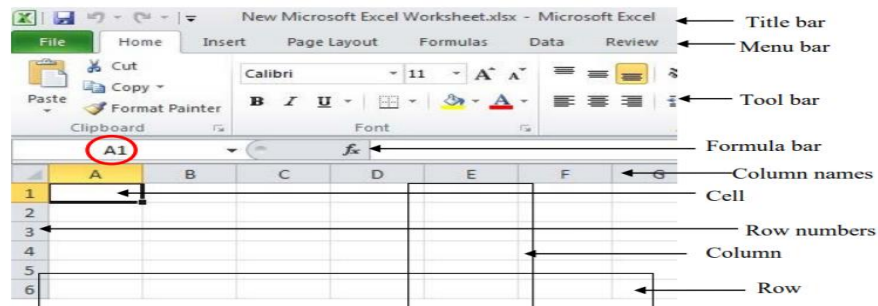


Fig.2. Overview of MS Excel 2010 interface

- **MS Excel Formulas:**

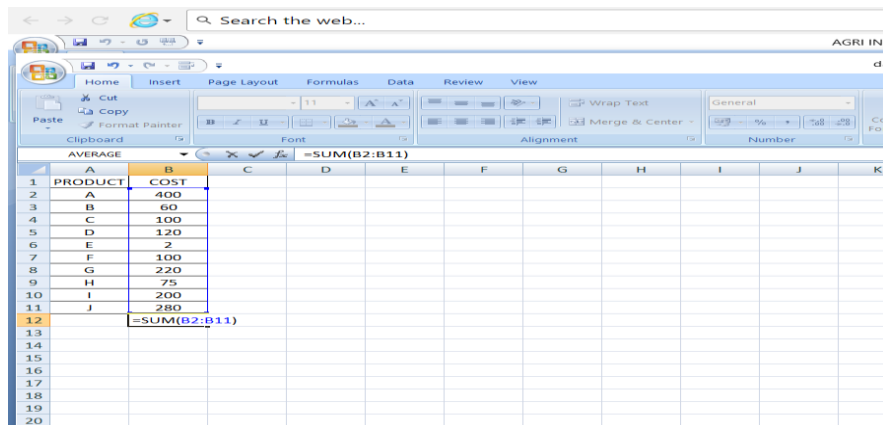
The main function of MS Excel is to perform computations and calculations using the data stored in the worksheets. This is done by replacing actual numbers with references to the cells where they are stored in the table – the cells’ names – in manually written mathematical formulas or Excel specific formulas.

**SUM:** The sum function is another mathematical function used to sum up the selected numbers, whether they are decimals or whole numbers. We can either select the cells containing numbers one by one or directly select the complete range of cells whose sum we need to find.

**Syntax:** = SUM (number1, number2,.....)

or

=SUM (1<sup>st</sup> cell address:last cell address)

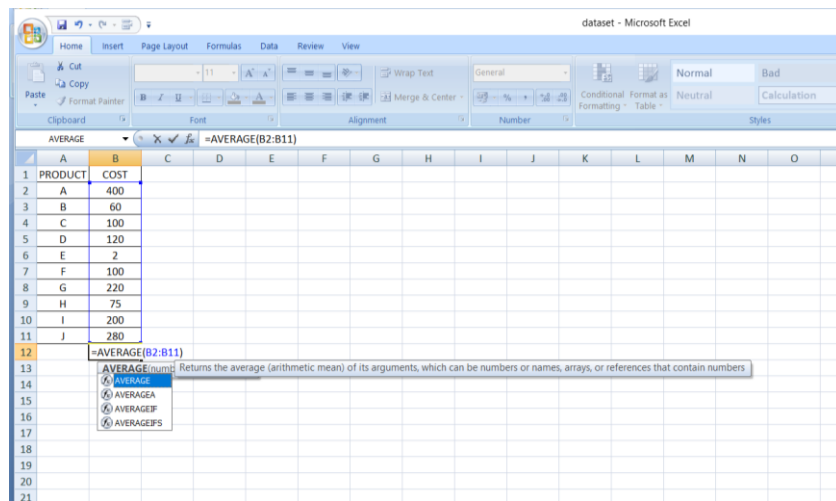


**AVERAGE:** An easier way to do this calculation, especially for a large number of data cells, is to use an Excel formula. The formula for computing the mean is called “AVERAGE”. It uses as parameter the area where the data is located, indicated by the upper left cell and the lower right cell, separated by “:”. Attention: any computation performed in MS Excel must begin with the symbol “=”.

**Syntax:** = AVERAGE (number1, number2,.....)

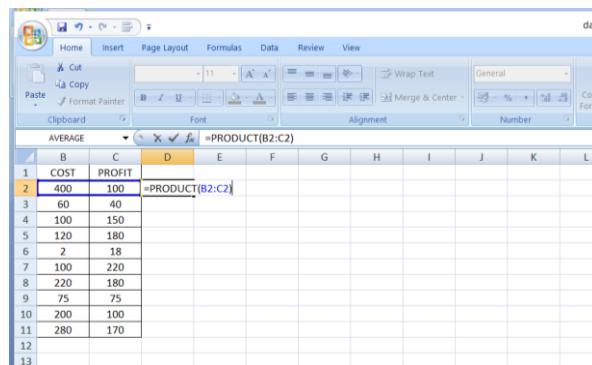
OR

= AVERAGE (1<sup>st</sup> cell address: last cell address)



**Product:** Product excel function is an inbuilt mathematical function which is used to calculate the product or multiplication of the given number provided to this function as arguments, so for example, if we provide this formula arguments as 2 and 3 as =PRODUCT(2,3) then the result displayed is 6, this function multiplies all the arguments.

Syntax: = PRODUCT(number1,number2,.....)



**MAX and MIN:** The MAX and MIN formulas in Excel get the largest and smallest value in a set of numbers, respectively. For our sample data set, the formulas will be as simple as:

**Syntax:** = MAX (number1,number2,.....)

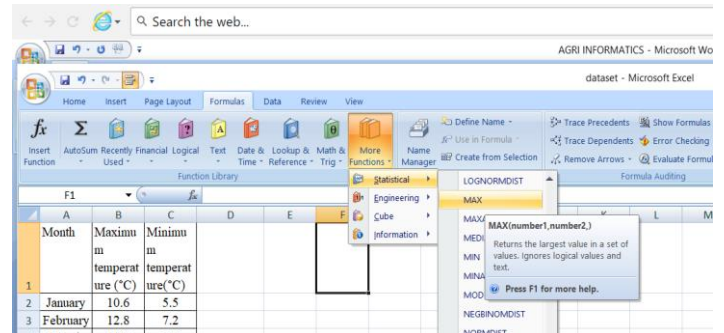
= MIN (number1,number2,.....)

= MAX(B2:B13)

= MIN(B2:B13)

- MAX function - find the highest value.
- MIN function - return the smallest value in a data set.

Month	Maximum temperature (°C)	Minimum temperature (°C)
1		
2	January 10.6	5.5
3	February 12.8	7.2
4	March 15.9	7.8
5	April 18.1	9.2
6	May 19.6	9.6
7	June 21.3	10.2
8	July 21.5	11.3
9	August 21.4	11.2
10	September 21.1	11
11	October 20.8	11
12	November 18.9	9
13	December 15.2	7.9
14		21.5



Month	Maximum temperature (°C)	Minimum temperature (°C)
1		
2	January 10.6	5.5
3	February 12.8	7.2
4	March 15.9	7.8
5	April 18.1	9.2
6	May 19.6	9.6
7	June 21.3	10.2
8	July 21.5	11.3
9	August 21.4	11.2
10	September 21.1	11
11	October 20.8	11
12	November 18.9	9
13	December 15.2	7.9
14		10.6

**COUNT:** If you are curious to know how many cells in a given range contain **numeric values** (numbers or dates), don't waste your time counting them by hand. The Excel COUNT function will bring you the count in a heartbeat:

**Syntax:** COUNT(1<sup>st</sup> cell address : last cell address)

Month	Maximum temperature (°C)	Minimum temperature (°C)
January	10.6	5.5
February	12.8	7.2
March	15.9	7.8
April	18.1	9.2
May	19.6	9.6
June	21.3	10.2
July	21.5	11.3
August	21.4	11.2
September	21.1	11
October	20.8	11
November	18.9	9
December	15.2	7.9

**Median:** The MEDIAN Function is categorized under Excel Statistical functions. The function will calculate the middle value of a given set of numbers. Median can be defined as the middle number of a group of numbers. That is, half the numbers return values that are greater than the median, and half the numbers return values that are less than the median.

**Syntax:** MEDIAN (1<sup>st</sup> cell address : last cell address)

Month	Maximum temperature (°C)	Minimum temperature (°C)
January	10.6	5.5
February	12.8	7.2
March	15.9	7.8
April	18.1	9.2
May	19.6	9.6
June	21.3	10.2
July	21.5	11.3
August	21.4	11.2
September	21.1	11
October	20.8	11
November	18.9	9
December	15.2	7.9

**Mode:** Mode function in excel is another type of function which allows only numbers. Mode function returns the most frequently occurring number from the selected range or value. For example, if there are 3 cells in the range out of 3, 2 cells contain the same number, then the Mode function will return that number repeated 2 times. And if all the 3 cells contain different numbers, then we will get an error message as #N/A, as the Mode function couldn't return anything.

**Syntax:** MODE (1<sup>st</sup> cell address : last cell address)

	A	B	C	D	E	F
	Month	Maximum temperature (°C)	Minimum temperature(°C)			
1						
2	January	10.6	5.5			
3	February	12.8	7.2			
4	March	15.9	7.8			
5	April	18.1	9.2			
6	May	19.6	9.6			
7	June	21.4	10.2			
8	July	21.5	11.3			
9	August	21.4	11.2			
10	September	21.4	11			
11	October	20.8	11			
12	November	18.9	9			
13	December	15.2	7.9			
14		21.4				
15						
16						

**Standard Deviation:** Standard Deviation is a measure which shows how much variation (such as spread, dispersion, spread,) from the mean exists. The standard deviation indicates a “typical” deviation from the mean. Standard deviation calculates the extent to which the values differ from the average. Standard Deviation, the most widely used measure of dispersion, is based on all values.

**Syntax: STDEV** (1<sup>st</sup> cell address : last cell address)

	A	B	C	D	E	F	G	H	I
	Month	Maximum temperature (°C)	Minimum temperature(°C)						
1									
2	January	10.6	5.5						
3	February	12.8	7.2						
4	March	15.9	7.8						
5	April	18.1	9.2						
6	May	19.6	9.6						
7	June	21.4	10.2						
8	July	21.5	11.3						
9	August	21.4	11.2						
10	September	21.4	11						
11	October	20.8	11						
12	November	18.9	9						
13	December	15.2	7.9						
14		3.717118							
15									
16									

## **AND & OR**

These are the two most popular logical functions to check multiple criteria. The difference is how they do this:

- AND returns TRUE if **all conditions** are met, FALSE otherwise.

**Syntax:** = AND(Condition1,Condition2.....)

- OR returns TRUE if **any condition** is met, FALSE otherwise.

**Syntax:** = OR(Condition1,Condition2.....)

## **TODAY & NOW**

To see the current date and time whenever you open your worksheet without having to manually update it on a daily basis, use either:

=TODAY ( ) to insert the today's date in a cell.

=NOW ( ) to insert the current date and time in a cell.

## **How to Create Spreadsheet in Excel?**

Microsoft Excel is a spreadsheet program that is part of Microsoft Office.

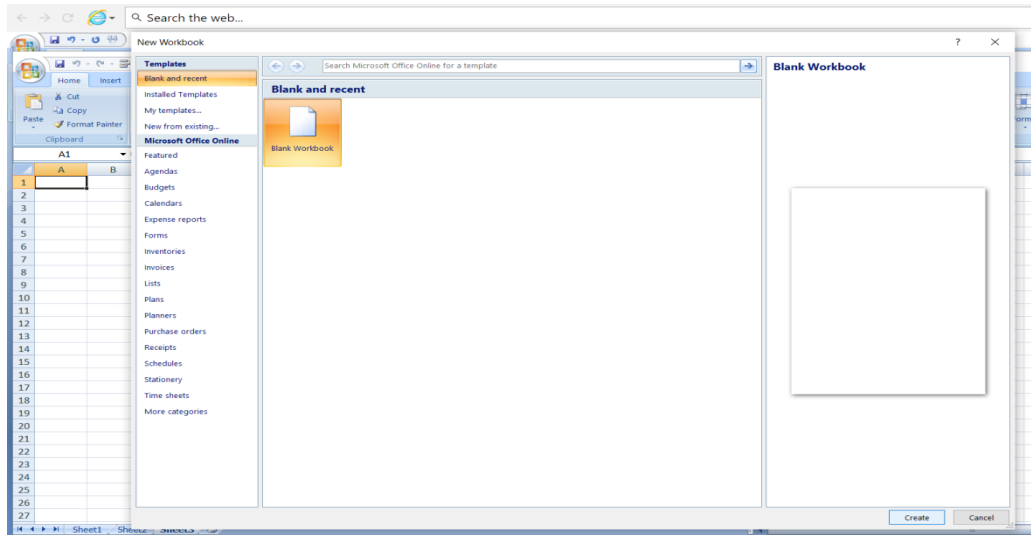
**Step 1:** Open MS Excel.

**Step 2:** Go to Menu and select New >> click on the Blank workbook to create a simple worksheet.

**OR** – Just press Ctrl + N: To create a new spreadsheet.

**Step 3:** By default, Sheet1 will be created as a worksheet in the spreadsheet, and the name of the spreadsheet will be given as Book1 if you are opening it for the first time

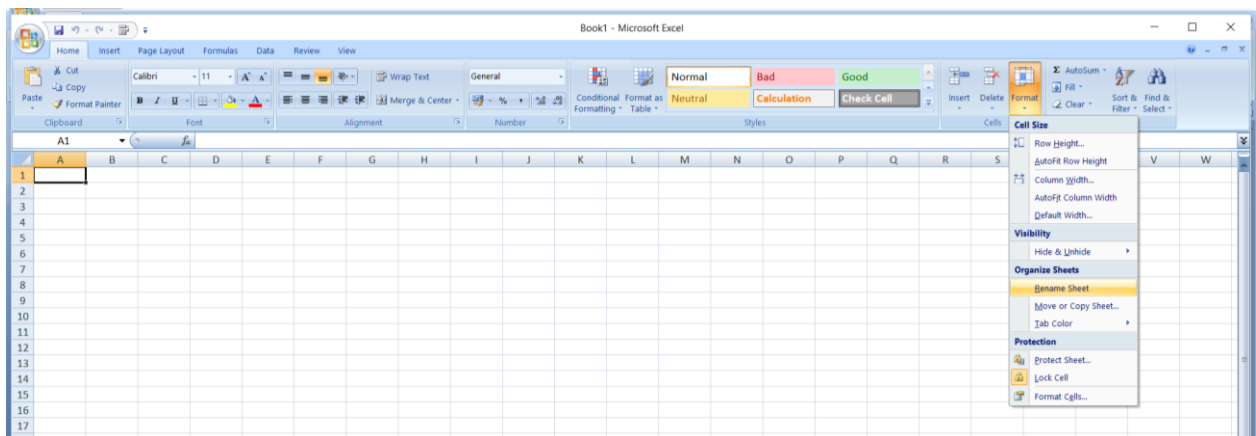




**To Rename a worksheet:**

1. Double click on the tab
2. The name Sheet1 is selected
3. Enter the new name

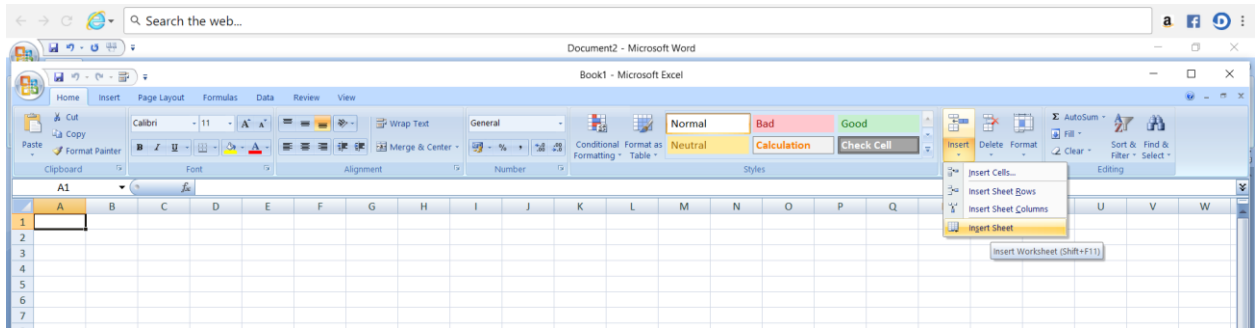
**OR** Worksheet >>Home>>Cell command>>Format>>Rename sheet>>new name type>>Enter key press



**To Insert a worksheet:**

In Excel 2007 click the insert sheet button which is located next to the worksheets(at bottom sheet1,sheet2 etc)

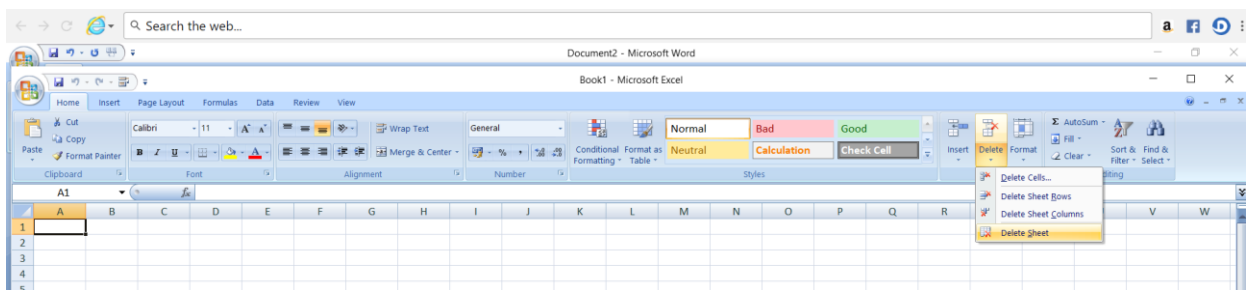
**OR** Home ribbon >> cell command >>Insert >>Insert sheet **OR** Shift+F11



**To Delete a Worksheet:**

To delete a sheet in Excel 2007,use the right click menu>and delete button

OR Worksheet >>Home>>Cells>>Delete>>Delete sheet>>dialog box>>Delete



**Exercise:**

1) MS Excel stands for \_\_\_\_\_

- A. Micromax Excel
- B. Management Excel
- C. Microsoft Excel
- D. Microsoft Excess

2) MS Excel is a \_\_\_\_\_.

- A. Database Management software
- B. Presentation software
- C. Workbook software
- D. Spreadsheet software

3) Microsoft Excel 2007 has column limit of \_\_\_\_\_

- A. 13684
- B. 16384

C. 18634

D. 84163

4) MS Excel 2007 has row limit of \_\_\_\_\_

A. 1,048,576

B. 4,81,0576

C. 16384

D. 1,57,648

5) Formulas in Excel start with \_\_\_\_\_

A. /

B. f

C. –

D. =

6) File that contains one or more worksheets to organize data is known as \_\_\_\_\_

A. Workbook

B. Excelbook

C. Datasheet

D. Spreadsheet

7) The intersection of a column and a row in MS Excel worksheet is known as \_\_\_\_\_

A. Row

B. Cell

C. Column

D. Tab

8) In Microsoft Excel spreadsheets, rows are labelled as \_\_\_\_\_

A. 1,2,3

B. A,B,C

C. A1,B1,C1

D. I,II,III

9) In Microsoft Excel spreadsheets, COLUMNS are labelled as \_\_\_\_\_

A. 1,2,3

*Agri-Inforatics*

B. A,B,C

C. A1,B1,C1

D. I,II,III

10) In Microsoft Excel spreadsheets, CELLS are labelled as \_\_\_\_\_

A. 1,2,3

B. A,B,C

C. A1,B1,C1

D. I,II,III,.....

11) How are data organized in a spreadsheet?

- a. Lines and spaces
- b. Layers and planes
- c. Rows and columns
- d. Height and width

**Conclusion:**

**Video Link:** <https://www.youtube.com/watch?v=Jl0Qk63z2ZY>

<https://www.youtube.com/watch?v=e7xGuGgqg-Q>

## **Practical 6 : MS Excel chart –Line,XY,Bar and PIE**

**Objective:** To learn how to create different type of chart using Microsoft Excel.

**Requirement:** Microsoft Excel in Laptops or PC

**Microsoft Excel:** Microsoft Excel is an example of a program called a “spreadsheet.” Microsoft Office Excel is a powerful tool used to create and format spreadsheets. Spreadsheets allow information to be organized in rows and tables and analyzed with automatic mathematics. Spreadsheets are commonly be used to perform many different types of calculations.

### **Where we can find Microsoft Excel?**

Follow these simple steps to open MS Word on your personal computer:

Start → All Programs → MS Office → MS Excel

### **What is a chart?**

A chart is a visual representative of data in both columns and rows. Charts are usually used to analyse trends and patterns in data sets.

### **What is a bar Chart?**

A bar chart is a graph that shows horizontal bars with the axis values for the bars displayed on the bottom of the graph.

### **How to Create a Bar Chart?**

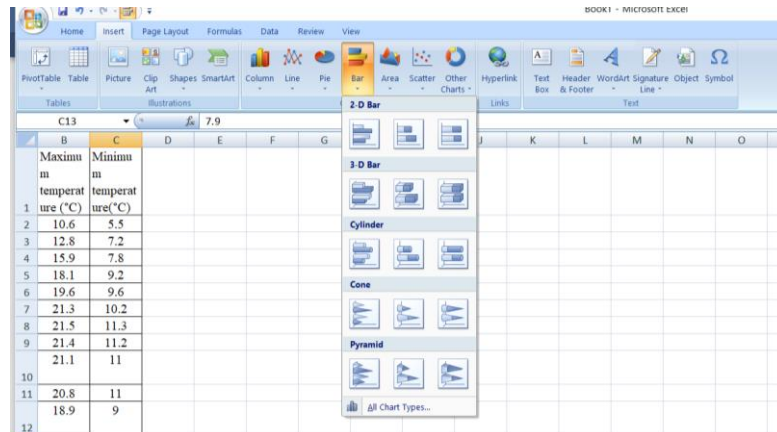
To create a line chart in Excel 2007, you will need to do the following steps:

Steps to Create a Bar Chart

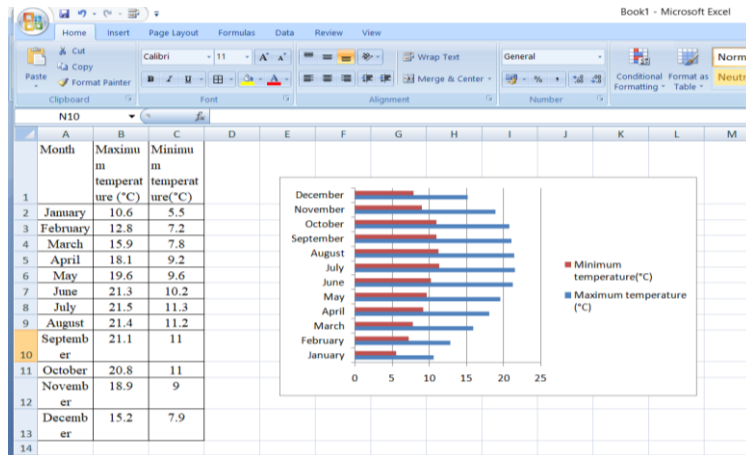
- ✓ Highlight the data that you would like to use for the bar chart. In this example, we have selected the range B2:C13.

	A	B	C	D	E	F	G
	Month	Maximum temperature (°C)	Minimum temperature (°C)				
1							
2	January	10.6	5.5				
3	February	12.8	7.2				
4	March	15.9	7.8				
5	April	18.1	9.2				
6	May	19.6	9.6				
7	June	21.3	10.2				
8	July	21.5	11.3				
9	August	21.4	11.2				
10	September	21.1	11				
11	October	20.8	11				
12	November	18.9	9				
13	December	15.2	7.9				
14							

- ✓ Select the Insert tab in the toolbar at the top of the screen. Click on the Bar button in the Charts group and then select a chart from the drop down menu. In this example, we have selected the first bar chart (called Clustered Bar) in the 2-D Column section.

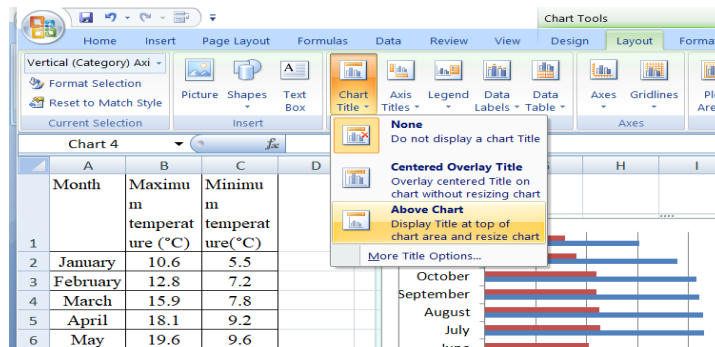


- ✓ Now you will see the bar chart appear in your spreadsheet with horizontal bars to represent both Maximum temperature and Minimum temperature for each month. Maximum temperature (°C) is displayed as blue horizontal bars and Minimum temperature(°C) is displayed as red horizontal bars. You can see the axis values on the bottom of the graph for these horizontal bars.



- ✓ Finally, let's add a title for the bar chart. By default, your chart will be created without a title in Excel 2007.

Year	Rainfall (mm)
2011	91
2012	106
2013	101
2014	122
2015	103
2016	138
2017	88
2018	131
2019	133
2020	130



- ✓ To add a title, select the Layout tab under Chart Tools in the toolbar at the top of the screen (Chart Tools will only appear when you have the chart selected). Click on the Chart Title button in the Labels group and then select "Above Chart" from the drop down menu.
- ✓ Now you should see a title appear at the top of the chart area. Click on the title and it will become editable. Enter the text that you would like to see as the title.

### What is a Line Chart?

A line chart is a graph that shows a series of data points connected by straight lines.

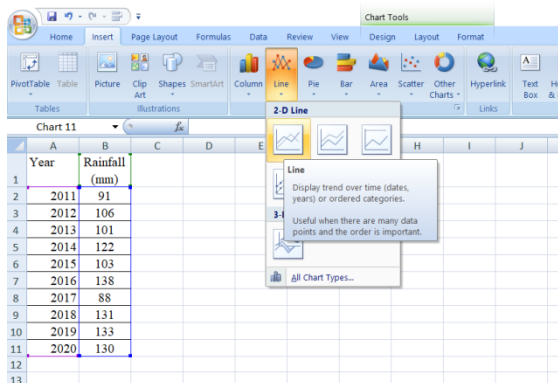
### How to Create a Line Chart?

#### Steps to Create a Line Chart

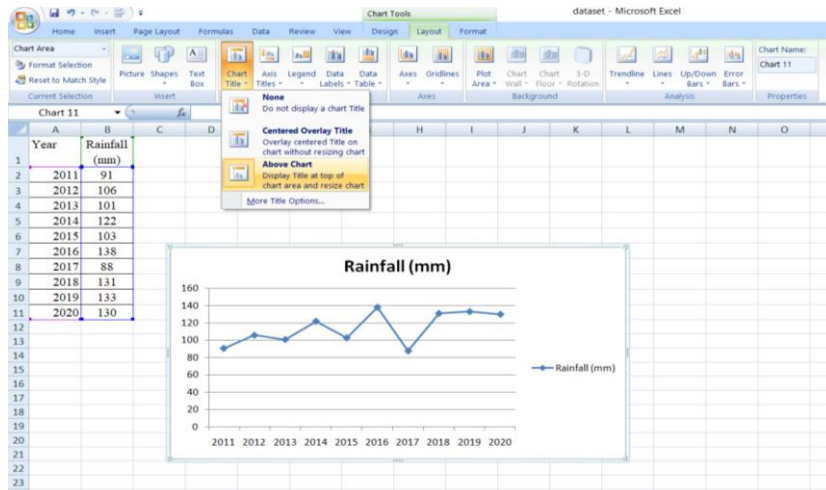
To create a line chart in Excel 2007, you will need to do the following steps:

- ✓ Highlight the data that you would like to use for the line chart. In this example, we have selected the range B2:B11.

- ✓ Select the **Insert tab** in the toolbar at the top of the screen. Click on the **Line** button in the **Charts group** and then select a chart from the drop down menu. In this example, we have selected the fourth line chart (called *Line with Markers*) in the 2-D Line section



- ✓ Now you will see the line chart appear in your spreadsheet showing the trend for one weather data (ie: Rainfall). The blue series of data points represents the trend for Rainfall.

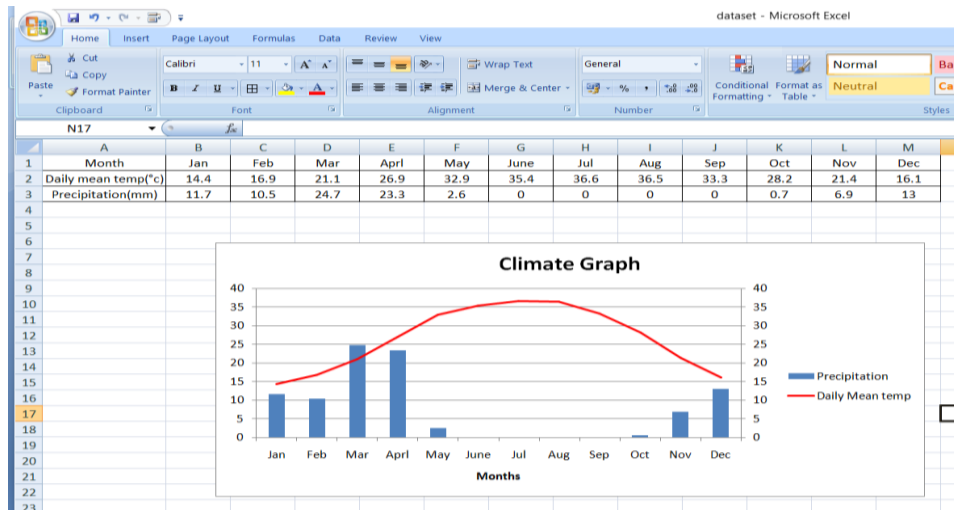


- ✓ Finally, let's add a title for the line chart. By default, your chart will be created without a title in Excel 2007.
- ✓ To add a title, select the **Layout tab** under **Chart Tools** in the toolbar at the top of the screen (Chart Tools will only appear when you have the chart selected). Click on the **Chart Title** button in the **Labels group** and then select "Above Chart" from the drop down menu.
- ✓ Now you should see a title appear at the top of the chart area. Click on the title and it will become editable.



## How to Create a Line and a Bar Chart?

Month	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
Daily mean temp(°C)	14.4	16.9	21.1	26.9	32.9	35.4	36.6	36.5	33.3	28.2	21.4	16.1
Precipitation(mm)	11.7	10.5	24.7	23.3	2.6	0	0	0	0	0.7	6.9	13



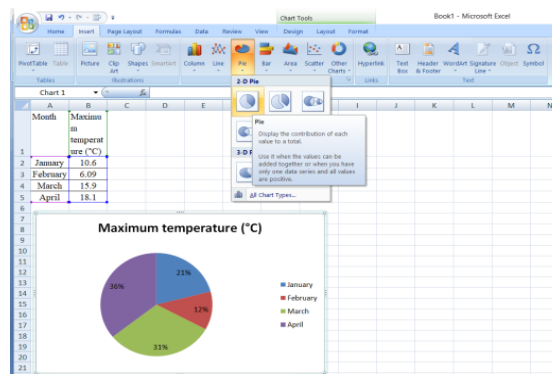
## What is a Pie Chart?

A pie chart is a circle that is divided into slices and each slice represents a proportion of the whole.

### Steps to Create a Pie Chart:

To create a pie chart in Excel 2007, you will need to do the following steps:

- ✓ Highlight the data that you would like to use for the pie chart. In this example, we have selected the range A2:B5.
- ✓ Select the **Insert** tab in the toolbar at the top of the screen. Click on the Pie button in the **Charts group** and then select a chart from the drop down menu. In this example, we have selected the first pie chart (called *Pie*) in the 2-D Pie section.



Month	Maximum temperature (°C)
January	18.6
February	6.09
March	15.9
April	18.1

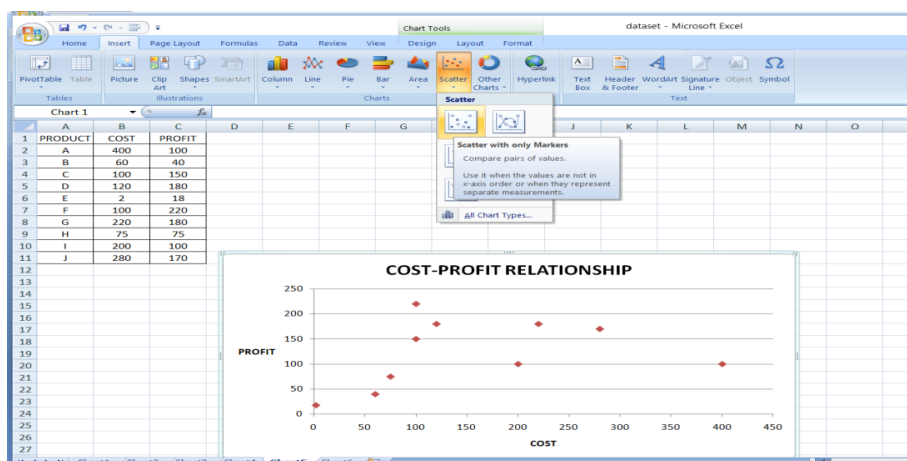
- ✓ Now you will see the completed pie chart. the pie chart has 4 slices (one for each division). Each slice represents the sales as a percentage of the Maximum temp.

### What is a XY graph?

We can use Excel to plot XY graph, also known as scatter chart or XY chart. With such charts, we can directly view trends and correlations between the two variables in our diagram.

A scatter plot or scatter chart is a chart used to show the relationship between two quantitative variables. A scatter chart has a horizontal and vertical axis, and both axes are value axes designed to plot numeric data.

- ✓ Highlight the data that you would like to use for the pie chart. In this example, we have selected the range B2:C11.
- ✓ Select the Insert tab in the toolbar at the top of the screen. Click on the Scatter button in the Charts group and then select a chart from the drop down menu. In this example, we have selected the first scatter chart.
- ✓ Now you will see the completed scatter chart.
- ✓ To add a title, select the Layout tab under Chart Tools in the toolbar at the top of the screen (Chart Tools will only appear when you have the chart selected). Click on the Chart Title button in the Labels group and then select "Above Chart" from the drop down menu.
- ✓ Now you should see a title appear at the top of the chart area. Click on the title and it will become editable.



PRODUCT	COST	PROFIT
A	400	100
B	60	40
C	100	150
D	120	180
E	2	18
F	100	220
G	220	180
H	75	75
I	200	100
J	280	170

**Exercise:**

1) Which of the following Excel charts represents only one value for each variable?

- (A) Bar
- (B) Pie
- (C) Line
- (D) Function

2) What is the extension of saved file in MS Excel?

- (A) .xls
- (B) .xks
- (C) .xos
- (D) .xbs

**Conclusion:**

**Video Link:** <https://youtu.be/Z2gzLYaQatQ>

## **Practical 7: MS-Access: Creating Database, Preparation of queries, reports and forms**

- **Objective:** To learn about how to create database, prepare queries, reports and forms in MS-Access.
- **Requirements:** MS-Access.
- **MS-Access:**  
Microsoft Access is a Database Management System (DBMS) from Microsoft that combines the relational Microsoft Jet Database Engine with a graphical user interface and software development tools.
- **Where we can find Microsoft Access?**  
Follow these simple steps to open MS Access on your personal computer:  
Start → All Programs → MS Office → MS Access.
- Microsoft Access stores information which is called a database. To use MS Access, you will need to follow these four steps-
  - **Database Creation:** Create your Microsoft Access database and specify what kind of data you will be storing.
  - **Data Input:** After your database is created, the data of every business day can be entered into the Access database.
  - **Query:** This is a fancy term to basically describe the process of retrieving information from the database.
  - **Report:** Information from the database is organized in a nice presentation that can be printed in an Access Report.
- ✓ Before MS Access 2007, the file extension was \*.**mdb**, but in MS Access 2007 the extension has been changed to \*.**accdb** extension.
- **MS Access Objects:**  
Databases in Access are composed of many objects but the following are the major objects –
  1. **Table:** Table is an object that is used to define and store data. When you create a new table, Access asks you to define fields which is also known as column headings.
    - ✓ Each field must have a unique name and data type.

- ✓ Tables contain fields or columns that store different kinds of data such as a name or an address and records or rows that collect all the information about a particular instance of the subject such as all the information about a customer or employee etc.
- ✓ You can define a primary key, one or more fields that have a unique value for each record.

2. **Queries:** An object that provides a custom view of data from one or more tables. Queries are a way of searching for and compiling data from one or more tables.

- ✓ Running a query is like asking a detailed question of your database.
- ✓ When you build a query in Access, you are defining specific search conditions to find exactly the data you want.
- ✓ In Access, you can use the graphical query by example facility or you can write Structured Query Language (SQL) statements to create your queries.
- ✓ You can define queries to Select, Update, Insert, or Delete data.

3. **Form:** Forms are used to customize the presentation of data that your application extracts from queries or tables.

Forms are used for entering, modifying, and viewing records.

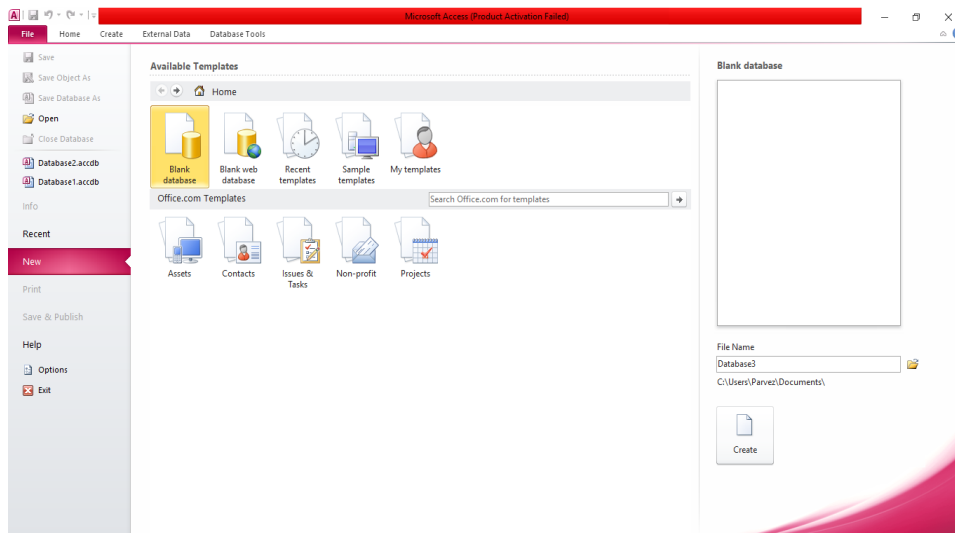
4. **Report:** Report is an object in desktop databases designed for formatting, calculating, printing, and summarizing selected data.

- ✓ You can view a report on your screen before you print it
- ✓ Reports are useful because they allow you to present components of your database in an easy-to-read format.
- ✓ If forms are for input purposes, then reports are for output.
- ✓ Access offers you the ability to create a report from any table or query.

- **Creating a database:**

Open Microsoft Access. Click on the Blank Database icon. Access asks you to enter the new database name near the bottom-right corner of the window. Type in the database name and press the Create button.

Example: Employee\_database.

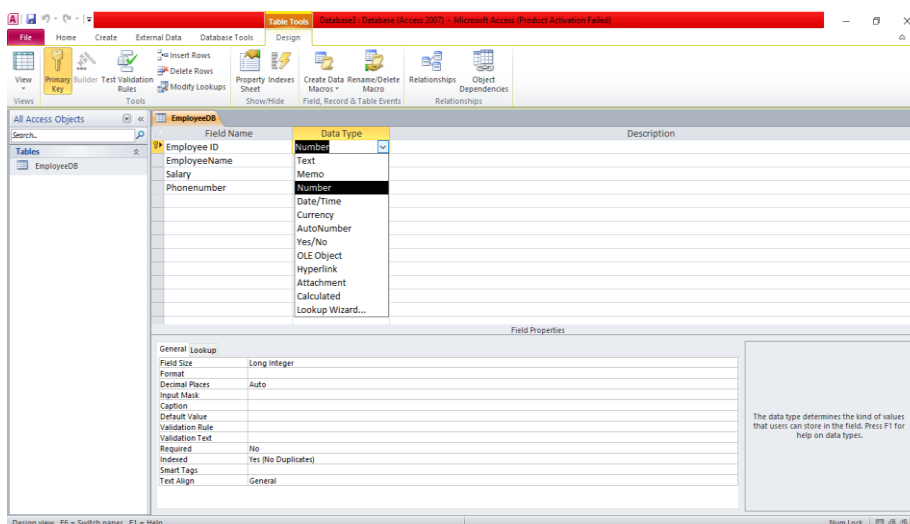


**Figure 1: Creating Database in MS Access**

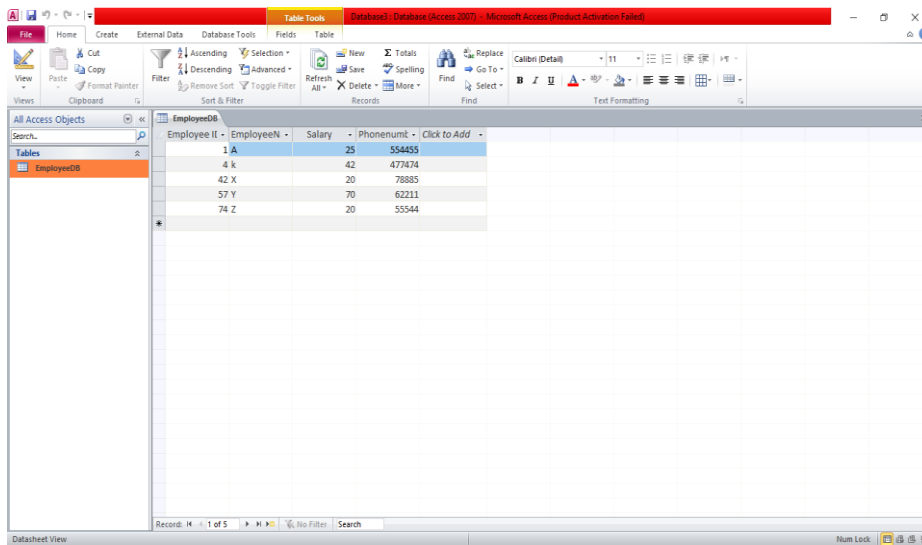
● **Creating Table in Database:**

- ✓ First we you have to add all the fields you need into the table. This is done by clicking on the button in the Views group of the Datasheet tab.
- ✓ You are then prompted to enter a name for your table.
- ✓ In the design view, you will see the field ID, and that it is set as an AutoNumber. Here you can add fields with their data types. Example: Employee Name, Salary etc.
- ✓ **Primary Keys:** A primary key is a field or set of fields used to uniquely identify records in a table. A primary key value is always unique in the table.

Example: Employee\_ID.



**Figure 2: Creating Table: Fields, data types, Primary key**

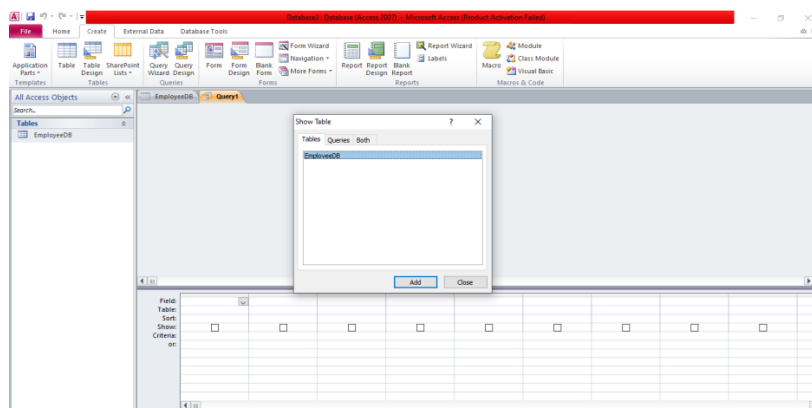


**Figure 3 : The table in datasheet view**

- ✓ A new table can be created by pressing the Table button in the Tables group under the Create tab on the ribbon.

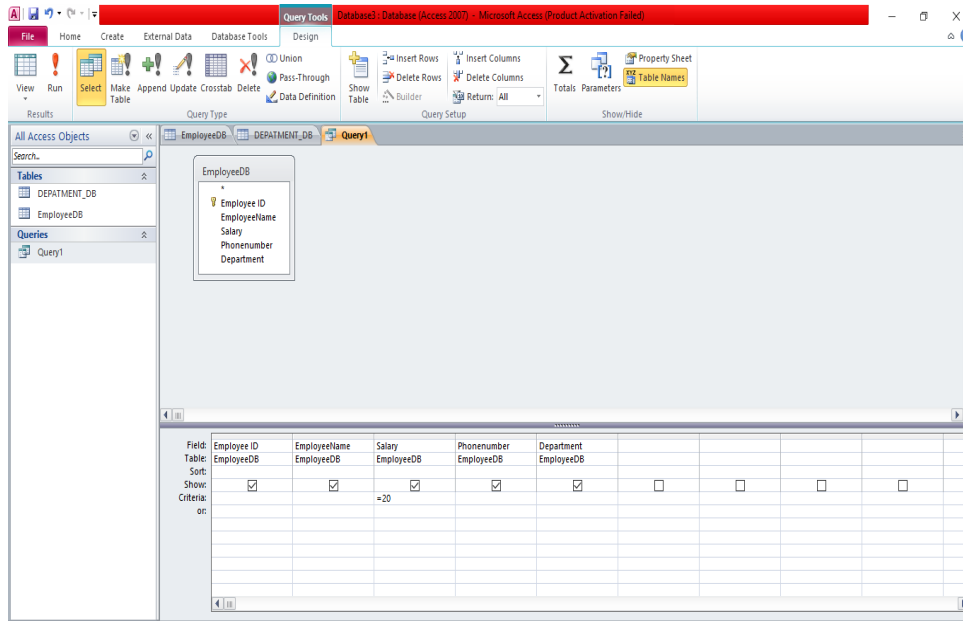
• **Creating Queries:**

- ✓ Under the Create tab, click on the Query Design button from the Queries group.
- ✓ Select which tables you would like to include in the query. You can always bring up the Show Table dialog box either by right-clicking, or by selecting the Show Table button from the Query Setup group.
- ✓ Access now shows you the design view of your query. This form of queries is called query by example or QBE. To add all the fields of the table into the query, double-click the \*.
- ✓ Now, to see the result of your query, click on the Run button under the Results group.



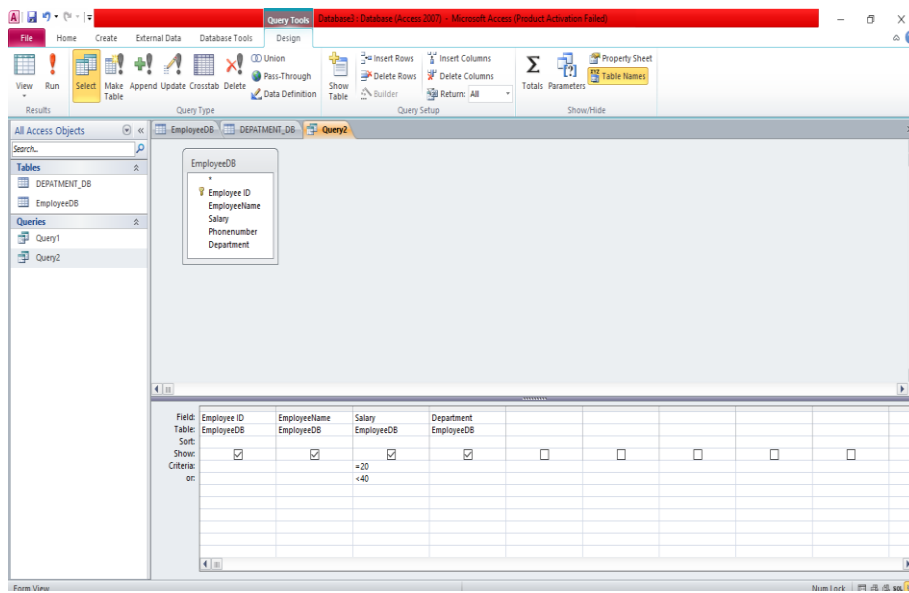
**Figure 4 : Creating Query**

To display the employee details whose salary is 20, go through the following figure:



**Figure 5 : Query Design**

To display the employee details whose salary is 20, or less than 40 go through the following figure:

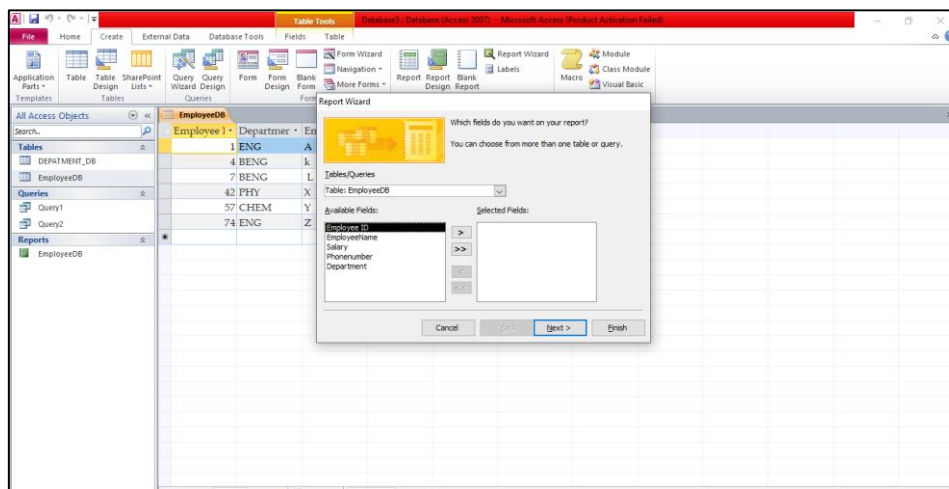


**Figure 6 : Query Design**

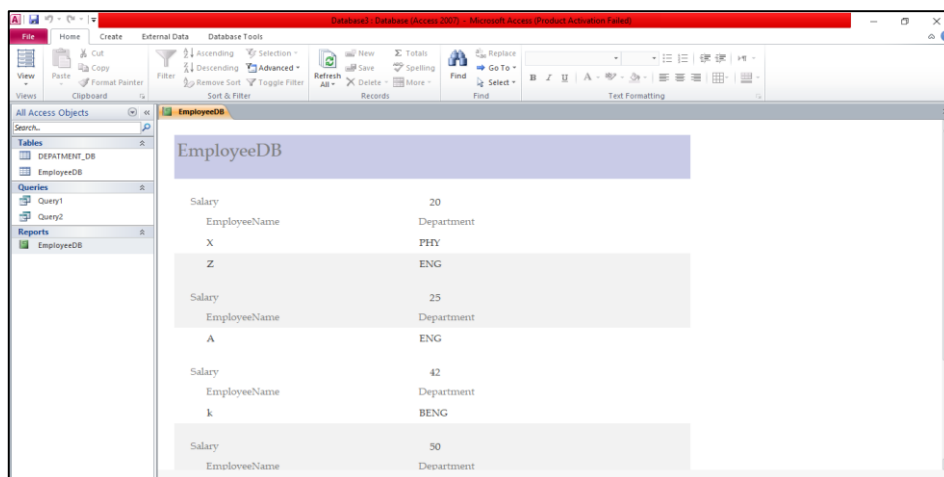


• **Creating Reports:**

- ✓ Go to the Create tab and click on Report Wizard in the Reports Group.
- ✓ The report wizard pops up and allows you to select one or more tables and/or queries you want to include in your report. You can select the fields by using the arrow buttons in the wizard.
- ✓ The next screen allows you to group records based on a particular field.
- ✓ You can also sort records within a group, press Next
- ✓ You can also select different layouts for your report, press Next
- ✓ Finally, type in your report title and press Finish.



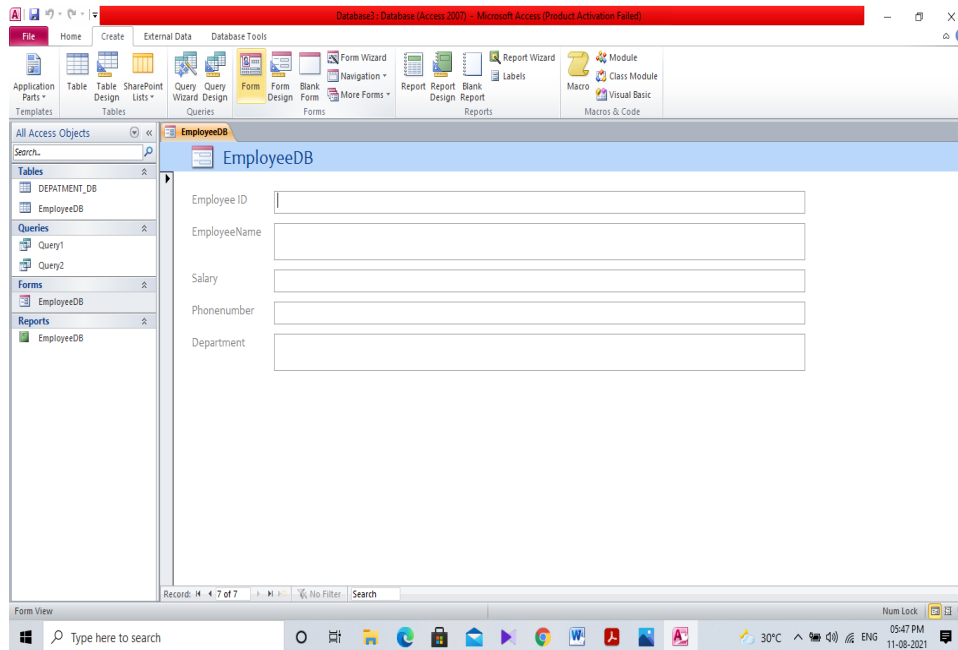
**Figure 7: Creating Report**



**Figure 8: Report Output**

- **Creating Form:**

- ✓ Forms provide a nice interface for entering data into tables and for viewing existing data. To create a form for table, first make sure that the table is open. Navigate to the Create tab, then in the Forms group, click on the Form button.
- ✓ You can drag fields and labels around the form as you wish. You can also change the colors and formatting of the form.



**Figure 9: Form View in MS Access**

**Exercise:**

13. Which of the following is not a database object?
  - e) Form
  - f) Table
  - g) Relationship
  - h) Object
14. What does the show check box in query design window indicate?
  - e) It indicates whether the field is to be used or not.
  - f) It indicates whether the field is to be displayed in query result or not.
  - g) It indicates whether the field names to be displayed in query result or not.
  - h) It indicates whether the field is to be used for grouping result or not.
15. What is a form that we can create in MS Access ?
  - a) It is used to take printout of a form from Access Tables.

- b) It is an input screen for viewing and entering data.
  - c) It is used for storing special data other than text (e.g photo).
  - d) It is optional. We can use Report instead of Form.
16. The columns in a Microsoft access table are also called \_\_\_\_\_
- e) Rows
  - f) Records
  - g) Fields
  - h) Tuple
17. How can we create a query in Microsoft Access?
- e) Drag and drop fields
  - f) Type the SQL
  - g) Use query wizard
  - h) All of the above.
18. The key uniquely identify each record in a table?
- e) Key record
  - f) Primary Key
  - g) Composite Key
  - h) Foreign Key
19. Which of the following database object hold data?
- e) Forms
  - f) Tables
  - g) Reports
  - h) Queries.
20. Which of following is a/are view/views to display a table in database?
- a) Datasheet View
  - b) Design View
  - c) Both
  - d) None
21. Microsoft Access is a \_\_\_\_\_ kind of application?
- a) RDBMS
  - b) OODBMS
  - c) ORDBMS
  - d) None

22. Which of the following shows the final result in a presentable way?

- a) Forms
- b) Reports
- c) Queries
- d) Tables

**Conclusion:**

**Video Link:**

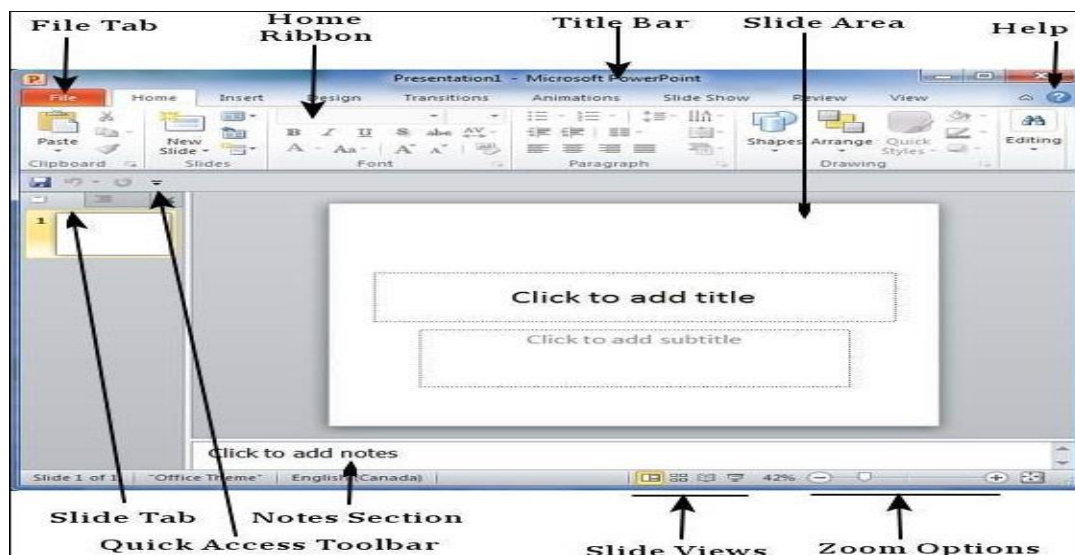
**[https://www.youtube.com/watch?v=1XTXv1V3-ag&ab\\_channel=LearnitTraining](https://www.youtube.com/watch?v=1XTXv1V3-ag&ab_channel=LearnitTraining)**

## Practical 8: Microsoft PowerPoint

- **Objective:** To learn how to create any presentation using Microsoft PowerPoint.
- **Requirement:** Microsoft PowerPoint in Laptops or PC.
- **Microsoft PowerPoint:** PowerPoint is a graphical presentation program used to organize and present information. PowerPoint presentations consist of a number of individual pages or "slides". Slides may contain text, graphics, sound, movies, and other objects that can be freely arranged.
- **Where we can find Microsoft PowerPoint?**

Follow these simple steps to open MS PowerPoint on your personal computer:

Start → All Programs → MS Office → MS PowerPoint.



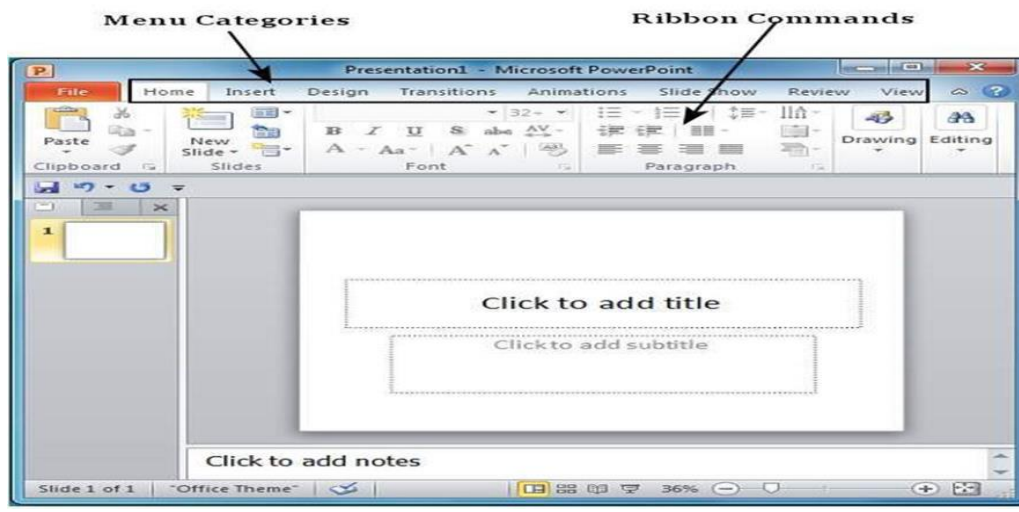
### Various areas in a PowerPoint

- **Ribbon and Menus in PowerPoint**

PowerPoint offers a host of tools that will aid you in creating a presentation. These tools are organized logically into various ribbons in PowerPoint. The table below describes the various commands you can access from the different menus.

Menu Category	Ribbon Commands
Home	Clipboard functions, manipulating slides, fonts, paragraph settings, drawing objects and editing functions
Insert	Insert tables, pictures, images, shapes, charts, special texts, multimedia and symbols
Design	Slide setup, slide orientation, presentation themes and background

Transitions	Commands related to slide transitions
Animations	Commands related to animation within the individual slides
Slideshow	Commands related to slideshow set up and previews
Review	Proofing content, language selection, comments and comparing presentations
View	Commands related to presentation views, Master slides, color settings and window arrangements



### Different Menus and Categories in PowerPoint

- **Creating a new Presentations**

To create a document in MS-PowerPoint, follow these steps:

- ✓ **Step 1:** Click the File tab and select the New option.
- ✓ **Step 2:** Select and Double click on the Blank presentation, or
- ✓ Press **CTRL+N**.

- **Opening existing presentations**

To open an existing presentation in MS-PowerPoint, follow these steps:

- ✓ **Step 1:** Click the File tab and select the Open option.
- ✓ **Step 2:** Select the file which you want to open, or
- ✓ Press **CTRL+O**.
- ✓ Click on Recent, It displays a list of your most recently created presentations and their file locations. Click on the file which you want to open.

- **Saving a presentation**

To save a presentation, follow any step among these steps:

- ✓ Click on the save button on the Tool bar, or
- ✓ Click the File tab and select the Save option, or
- ✓ Press **CTRL+S**.

- **Printing a presentation**

To print a presentation, follow these steps:

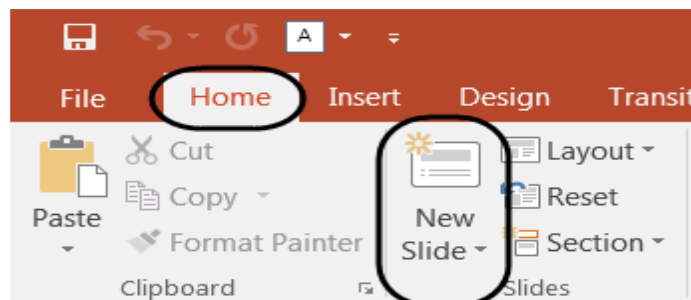
- ✓ **Step 1:** Click the File tab and select the Print option, or
- ✓ Press **CTRL+P**.
- ✓ **Step 2:** Select the Printer and Set different properties.

- **PowerPoint Slides**

- ✓ When you choose to create a blank presentation, PowerPoint will open a presentation with a Title Slide. Once the Title Slide is open, you'll see a slide with two placeholder text boxes for a title and a subtitle.

- ✓ **Adding New Slide:**

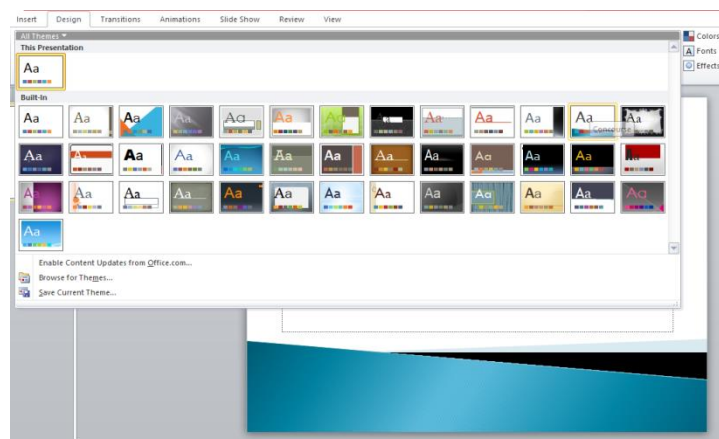
- To add a New Slide, make sure you're on the Home tab. The New Slide button will add slides to your presentation or
- Right-click in the Navigation Pane under any existing slide and click on the New Slide option. Or
- Press Ctrl+M
- To change the slide layout, right-click on the newly inserted slide and go to the Layout option where you can choose from the existing layout styles available to you.



**Adding New Slide in a presentation**

- ✓ **Applying Theme:** PowerPoint has many pre-set designs and themes that include complimentary colors and fonts :

- To add a theme to a presentation, go to the Design tab in the ribbon. There are several themes immediately available. To use one of the built-in themes, just click on its thumbnail.
- If you don't want to use a theme, you can add Background Styles. From this selection, you can add some preset background styles that change according to the colors you've chosen.



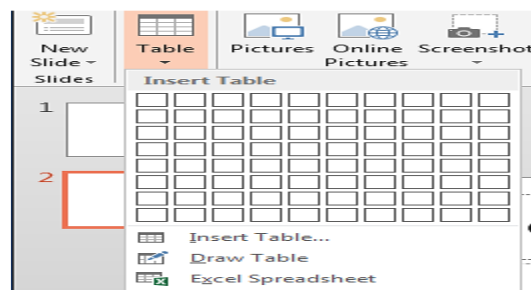
### Themes in PwerPoint

- **Adding Content:**

- ✓ Text is the default content of the slide below. The format for the default text is a bulleted list. To add text, click and begin typing.
- ✓ To add other content, click on the icon within the content group on the new slide.

- **Tables:**

- ✓ Set the number of columns and rows as needed in the Insert Table dialog box and click OK.
- ✓ Methods for editing and the design and layout of your table are located on the Table Tools contextual tab.



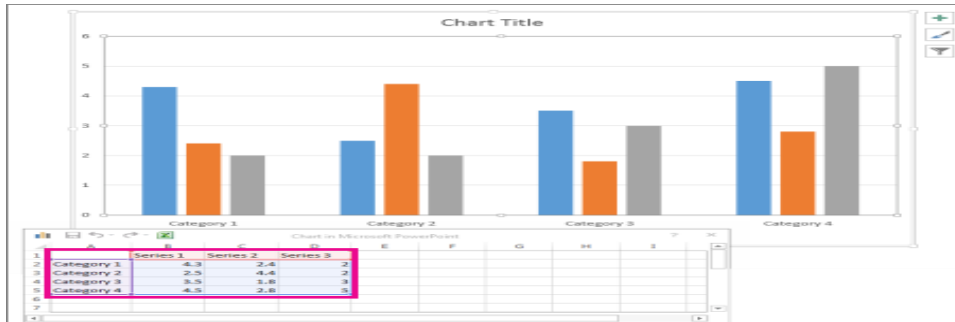
### Table in PowerPoint

- **Charts:**

- ✓ Click **Insert > Chart**.



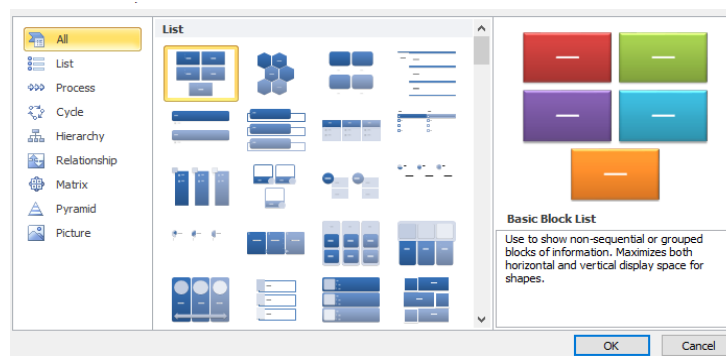
- ✓ Click the chart type and then double-click the chart you want like Column, Bar, Pie, XY etc.
- ✓ In the worksheet that appears, replace the placeholder data with your own information.
- ✓ When you've finished, close the worksheet.



### Charts in PowerPoint

- **SmartArt Graphics:**

- ✓ SmartArt graphics are shapes that are designed to represent the relationship between things or people. You might use SmartArt for an organizational chart or a timeline.
- ✓ Click **Insert > SmartArt**
- ✓ SmartArt styles and layouts can be formatted in the SmartArt Tools contextual tab.



### SmartArt in PowerPoint

- **Shapes:**

Given below are the steps to add a shape in PowerPoint.

- ✓ Go to the Illustrations group under the Insert Tab.
- ✓ Click on the Shapes dropdown to view the available shapes.
- ✓ Select the shape you want to insert. This will change the cursor to a + sign.
- ✓ The shape formatting features in PowerPoint can be accessed from the Format ribbon.

#### **Adding Text in Shape:**

- ✓ Right-click on the shape to which you want to add the text and select the Edit Text option.
- ✓ Start typing the text into the shape. Once you are done, click the cursor anywhere outside the shape.

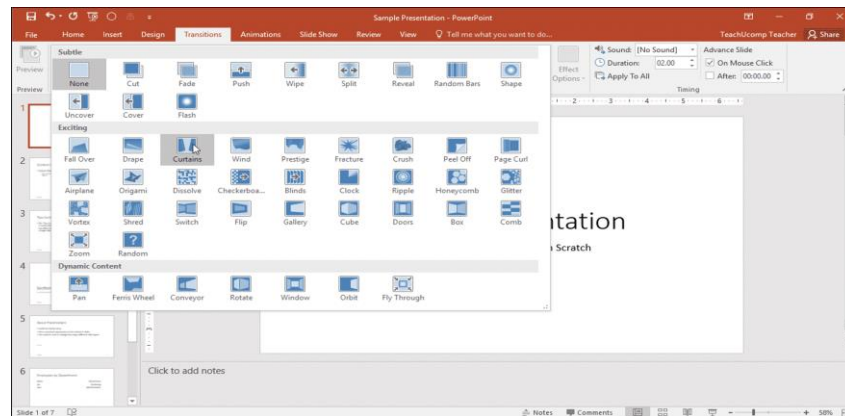
- **Pictures:**

- ✓ Click **Insert > Picture**
- ✓ From the insert tab you can also add any screenshot, photo album, audio, video and symbols.

- **Transitions:**

Add slide transitions to bring your PowerPoint presentation to life.

- ✓ Select the slide you want to add a transition to.
- ✓ Select the Transitions tab and choose a transition.
- ✓ Select a transition to see a preview.
- ✓ Select Effect Options to choose the direction and nature of the transition.
- ✓ To remove a transition, select Transitions > None.

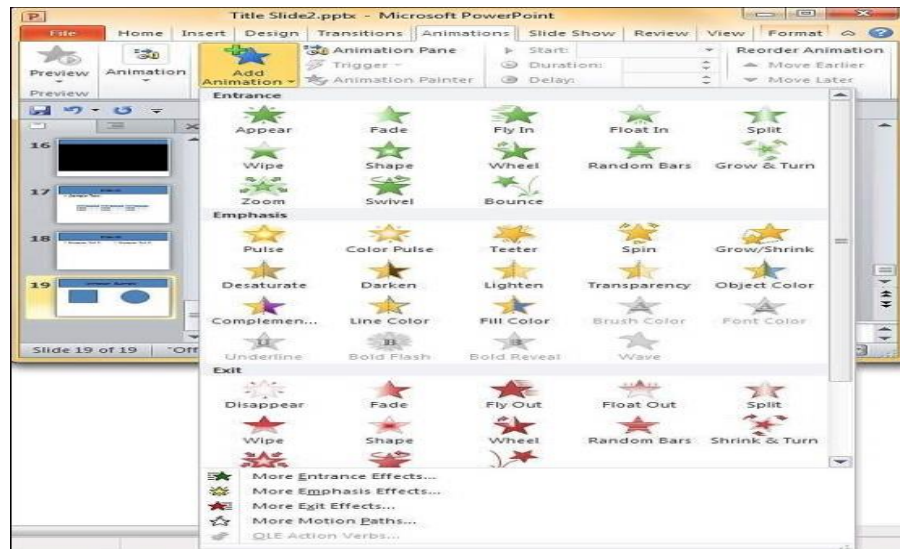


### **Transitions in Power Point**

- **Animations:**

Add animations to text, pictures, shapes, and more in your presentation.

- ✓ Select the object or text you want to animate.
- ✓ Select Animations and choose an animation.
- ✓ Select Effect Options and choose an effect.

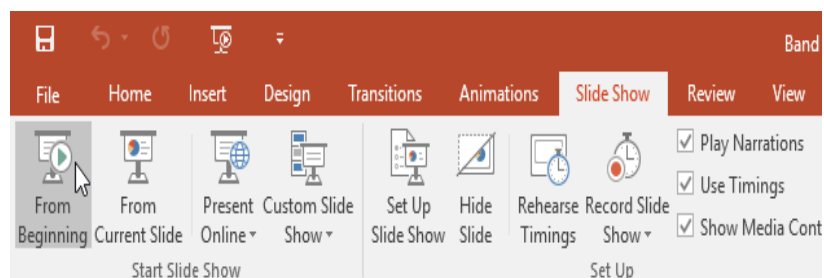


### **Animation option in Power Point**

- **Slide show:**

**To start a slide show:**

- ✓ Click the Start From Beginning command on the Quick Access Toolbar, or press the F5 key at the top of your keyboard. The presentation will appear in full-screen mode.
- ✓ Select the Slide Show view command at the bottom of the PowerPoint window to begin a presentation from the current slide.
- ✓ Go to the Slide Show tab on the Ribbon to access even more options. From here, you can start the presentation from the current slide (Shift+F5) and access advanced presentation options.



### **Slide Show in Power Point**

**To stop a slide show:**

- ✓ You can exit presentation mode by pressing the Esc key on your keyboard. Alternatively, you can click the Slide Show Options button in the bottom-left and select End Show.

- **Copy or Cut and Paste any slide:**

- ✓ Select the slide and right click then choose copy or cut the slide or use Ctrl+C or Ctrl+X.

✓ Then Paste the slide or Ctrl+V in between two slides where you want to paste.

• **Adding Slide number and Date:**

✓ Click on the insert from menu

✓ Select Header & Footer or Slide number or Date & Time under the Text group.

✓ Select the Check Boxes for Date and Time and Slide number from the Header & Footer Dialog box.

**Exercise:**

7. In PowerPoint, the header and footer button can be found on the insert tab in what group?

(A) Tables group

(B) Text group

(C) Object group

(D) Illustrations group

8. What is the default PowerPoint standard layout?

(A) Blank

(B) Title slide

(C) Title only

(D) Comparison

9. Which type of view is not present in MS PowerPoint?

(A) Extreme animation

(B) Slide show

(C) Slide sorter

(D) Normal

10. Which PowerPoint view displays each slide of the presentation as a thumbnail and is useful for rearranging slides?

(A) Slide Master

(B) Slide Show

(C) Slide Sorter

(D) Notes Page

11. To open power point from the Run Dialog Box, type:

(A) PowerPoint

(B) Powerpnt

- (C) Pwrpoint  
(D) Powerpint
12. The page to create presentation in PowrPoint is called:
- (A) Sheet  
(B) Paper  
(C) Slide  
(D) Document
13. Shortcut key for slide show view is:
- (A) F1  
(B) F2  
(C) F5  
(D) F7
14. Fill in the blanks:
- f. File extension for PowerPoint presentation \_\_\_\_\_?
- g. Microsoft PowerPoint is a \_\_\_\_\_ program?
- h. The title of a presentation is displayed in the \_\_\_\_?
- i. The basic unit of any PowerPoint presentation is a(n) \_\_\_\_\_?
- j. \_\_\_\_\_ is a default style of layout?
- k. Elements such as lines, arrows, callouts and banners that can be added to a slide are known as \_\_\_\_\_.
- l. To delete more than one slide simultaneously, select the first slide, hold down the \_\_\_\_ key, and then select each additional slide that you want to delete.

**Conclusion:**

**Video Link:**

[https://www.youtube.com/watch?v=rvh\\_cK3UU0&list=RDCMUCqyBfm\\_H9ugGirk1ufYA2YA&index=2&ab\\_channel=LearnitTraining](https://www.youtube.com/watch?v=rvh_cK3UU0&list=RDCMUCqyBfm_H9ugGirk1ufYA2YA&index=2&ab_channel=LearnitTraining)

## **Practical 9: Basic concept of HTML for creating a Web page**

- **Objective:** To learn how to create any web pages using HTML.
- **Requirement:** Note Pad in Laptops or PC.
- **Web Page:** A web page is a document which is commonly written in HTML and translated by a web browser. A web page can be identified by entering an URL. A Web page can be of the static or dynamic type. **With the help of HTML only, we can create static web pages.**
- **HTML:** HTML is an acronym which stands for *Hyper Text Markup Language* which is used for creating web pages and web applications.
  - ✓ **Hyper Text:** HyperText simply means "Text within Text." A text has a link within it, is a hypertext. Whenever you click on a link which brings you to a new webpage, you have clicked on a hypertext.
  - ✓ **Markup language:** A markup language is a computer language that is used to apply layout and formatting conventions to a text document. Markup language makes text more interactive and dynamic. It can turn text into images, tables, links, etc.
- **How to create a new web page :**

Following are some easy ways to create your first web page with Notepad:

Step 1: Open Notepad

Step 2: Write code in HTML

Step 3: Save the HTML file with .htm or .html extension.

Step 4: Open the HTML page in your web browser.

- **Building blocks of HTML:**

**Tags:** An HTML tag surrounds the content and apply meaning to it. It is written between < and > brackets.

**Attribute:** An attribute in HTML provides extra information about the element, and it is applied within the start tag. An HTML attribute contains two fields: name & value.

```
<tag name attribute_name= " attr_value"> content </ tag name>
```

- **HTML Documents:**
  - ✓ All HTML documents must start with a document type declaration: `<!DOCTYPE html>`.
  - ✓ The HTML document itself begins with `<html>` and ends with `</html>`.
  - ✓ The visible part of the HTML document is between `<body>` and `</body>`.

- **HTML Headings:**

HTML headings are defined with the <h1> to <h6> tags

Ex:- <h1>Heading 1</h1>  
<h2>Heading 2</h2>  
<h3>Heading 3</h3>

- **HTML Paragraphs:**

The HTML <p> element defines a paragraph.

Ex:- <p>This is a paragraph.</p>

- **HTML Styles:**

The HTML style attribute is used to add styles to an element, such as color, font, size, and more.

<tagname style="property:value;">

- Use the style attribute for styling HTML elements.
- Use background-color for background color.

Ex:- <body style="background-color:powderblue;">

- Use color for text colors.

Ex:- <p style="color:red;">This is a paragraph.</p>

- Use font-family for text fonts

Ex:- <p style="font-family:courier;">This is a paragraph.</p>

- Use font-size for text sizes

Ex:- <p style="font-size:160%;">This is a paragraph.</p>

- Use text-align for text alignment

Ex:- <p style="text-align:center;">Centered paragraph.</p>

- **HTML Text Formatting:**

Formatting elements were designed to display special types of text:

- <b> - Bold text
- <strong> - Important text
- <i> - Italic text
- <em> - Emphasized text
- <mark> - Marked text
- <small> - Smaller text
- <del> - Deleted text
- <ins> - Inserted text

- `<sub>` - Subscript text
- `<sup>` - Superscript text

- **HTML Quotation and Citation Elements:**

- `<blockquote>` element defines a section that is quoted from another source. Browsers usually indent `blockquote` elements.

Ex:- `<blockquote >For nearly 60 years</blockquote>`

- `<q>` tag defines a short quotation

Ex:- `<p>WWF's goal is to: <q>Build a future where people live in harmony with nature.</q></p>`

- `<abbr>` tag defines an abbreviation or an acronym

Ex:- `<p>The <abbr title="World Health Organization">WHO</abbr> was founded in 1948.</p>`

- `<cite>` tag defines the title of a creative work. The text in the `<cite>` element usually renders in italic.

Ex:- `<p><cite>The Scream</cite> by Edvard Munch. Painted in 1893.</p>`

- `<address>` tag defines the contact information for the author/owner of a document or an article.

The contact information can be an email address, URL, physical address, phone number, social media handle, etc.

The text in the `<address>` element usually renders in italic, and browsers will always add a line break before and after the `<address>` element.

- **HTML Comments:**

HTML comments are not displayed in the browser, but they can help document your HTML source code.

`<!-- Write your comments here -->`

- **HTML Colors:**

HTML colors are specified with predefined color names like tomato, orange etc.

Background Color, Text Color, Border Color.

- **HTML Links:**

The HTML `<a>` tag defines a hyperlink. The most important attribute of the `<a>` element is the `href` attribute, which indicates the link's destination.

`<a href="url">link text</a>`

Ex:- `<a href=" https://www.google.com/">Visit Google</a>`



- **HTML Images:**

- ✓ `<img>` tag is used to embed an image in a web page.
- ✓ The `<img>` tag has two required attributes:
  - `src` - Specifies the path to the image
  - `alt` - Specifies an alternate text for the image (If user can't see the image)
  - ``
- ✓ **Image Size - Width and Height:** You can use the style attribute to specify the width and height of an image.

Ex:- ``

- **HTML Tables:**

- ✓ A table in HTML consists of table cells inside rows and columns.
- ✓ `<table>` tag Defines a table
- ✓ Each table cell is defined by a `<td>` and a `</td>` tag.
- ✓ Each table row starts with a `<tr>` and end with a `</tr>` tag.
- ✓ `<th>` tag Defines a header cell in a table.

Ex:- `<table>`  
`<tr>`  
`<td>Section A </td>`  
`<td>Section B</td>`  
`<td>Section C</td>`  
`</tr>`  
`</table>`

- **HTML Lists:**

**Unordered HTML List:**

An unordered list starts with the `<ul>` tag. Each list item starts with the `<li>` tag.

Ex:-  
`<ul>`  
`<li>Coffee</li>`  
`<li>Tea</li>`  
`<li>Milk</li>`  
`</ul>`

**Ordered HTML List:**

An ordered list starts with the `<ol>` tag. Each list item starts with the `<li>` tag.

Ex:-

```
<ol>
  <li>Coffee</li>
  <li>Tea</li>
  <li>Milk</li>
</ol>
```

### HTML Description Lists:

- ✓ A description list is a list of terms, with a description of each term.
- ✓ The <dl> tag defines the description list, the <dt> tag defines the term (name), and the <dd> tag describes each term.

Ex:-

```
<dl>
  <dt>Coffee</dt>
  <dd> black hot drink</dd>
  <dt>Milk</dt>
  <dd> white cold drink</dd>
</dl>
```

- **HTML - The Head Element:**

The <title> element is required and it defines the title of the document.

<head> Defines information about the document

- **HTML Styles – CSS:**

Cascading Style Sheets (CSS) is used to format the layout of a webpage.

CSS can be added to HTML documents in 3 ways:

- **Inline** - by using the style attribute inside HTML elements
- **Internal** - by using a <style> element in the <head> section
- **External** - by using a <link> element to link to an external CSS file

- ✓ **Inline CSS:**

- An inline CSS is used to apply a unique style to a single HTML element.
- An inline CSS uses the style attribute of an HTML element.

Ex:- <h1 style="color:blue;">A Blue Heading</h1>

- ✓ **Internal CSS:**

- An internal CSS is used to define a style for a single HTML page.
- An internal CSS is defined in the <head> section of an HTML page, within a <style> element.

Ex:-

```
<head>
  <style>
    body {background-color: powderblue;}
    h1  {color: blue;}
    p   {color: red;}
  </style>
</head>
<body>
  <h1>This is a heading</h1>
  <p>This is a paragraph.</p>
</body>
```

✓ **External CSS:**

- An external style sheet is used to define the style for many HTML pages.
- To use an external style sheet, add a link to it in the <head> section of each HTML page:

Ex:-

```
<head>
  <link rel="stylesheet" href="styles.css">
</head>
<body>
  <h1>This is a heading</h1>
  <p>This is a paragraph.</p>
</body>
```

- ✓ The external style sheet can be written in any text editor. The file must not contain any HTML code, and must be saved with a .css extension.

```
body {
  background-color: powderblue;
}
h1 {
  color: blue;
}
p {
  color: red;
}.
```

**Exercise:**

1. **HTML stands for –**
  - a) HighText Machine Language
  - b) HyperText and links Markup Language
  - c) HyperText Markup Language
  - d) None of these
2. **Which of the following tag is used for inserting the largest heading in HTML?**
  - a) <h3>
  - b) <h1>
  - c) <h5>
  - d) <h6>
3. **Which of the following tag is used to insert a line-break in HTML?**
  - a) <br>
  - b) <a>
  - c) <pre>
  - d) <b>
4. **How to create a hyperlink in HTML?**
  - a) <a href = "www.javatpoint.com"> javaTpoint.com </a>
  - b) <a url = "www.javatpoint.com" javaTpoint.com /a>
  - c) <a link = "www.javatpoint.com"> javaTpoint.com </a>
  - d) <a> www.javatpoint.com <javaTpoint.com /a>
5. **How to create an ordered list (a list with the list items in numbers) in HTML?**
  - a) <ul>
  - b) <ol>
  - c) <li>
  - d) <i>
6. **HTML tags are enclosed in-**
  - a) # and #
  - b) { and }
  - c) ! and ?
  - d) < and >
7. **How to insert an image in HTML?**
  - a) <img href = "jtp.png" />

- b) `<img url = "jtp.png" />`
- c) `<img link = "jtp.png" />`
- d) `<img src = "jtp.png" />`

**8. Which of the following tag is used to add rows in the table?**

- a) `<td>` and `</td>`
- b) `<th>` and `</th>`
- c) `<tr>` and `</tr>`
- d) None of the above

**9. An HTML program is saved by using the \_\_\_\_\_ extension.**

- a) .ht
- b) .html
- c) .hml
- d) None of the above

**10. Which of the following is the correct syntax for referring the external style sheet?**

- a) `<style src = example.css>`
- b) `<style src = "example.css" >`
- c) `<stylesheet> example.css </stylesheet>`
- d) `<link rel="stylesheet" type="text/css" href="example.css">`

**11. The HTML attribute used to define the internal stylesheet is –**

- a) `<style>`
- b) `style`
- c) `<link>`
- d) `<script>`

**12. Markup tags tells the web browser:**

- a) How to organise the page
- b) How to display the page
- c) How to display message box on page
- d) None of these

**Conclusion:**

**Video Link:**

[https://www.youtube.com/watch?v=NAEHbzXMNpA&list=PLWPirh4EWFpFI-w62QiV62FOVHcXnynon&ab\\_channel=TutorialsPoint%28India%29Ltd.](https://www.youtube.com/watch?v=NAEHbzXMNpA&list=PLWPirh4EWFpFI-w62QiV62FOVHcXnynon&ab_channel=TutorialsPoint%28India%29Ltd)

**Tutorial ink:**

<https://www.w3schools.com/html/>

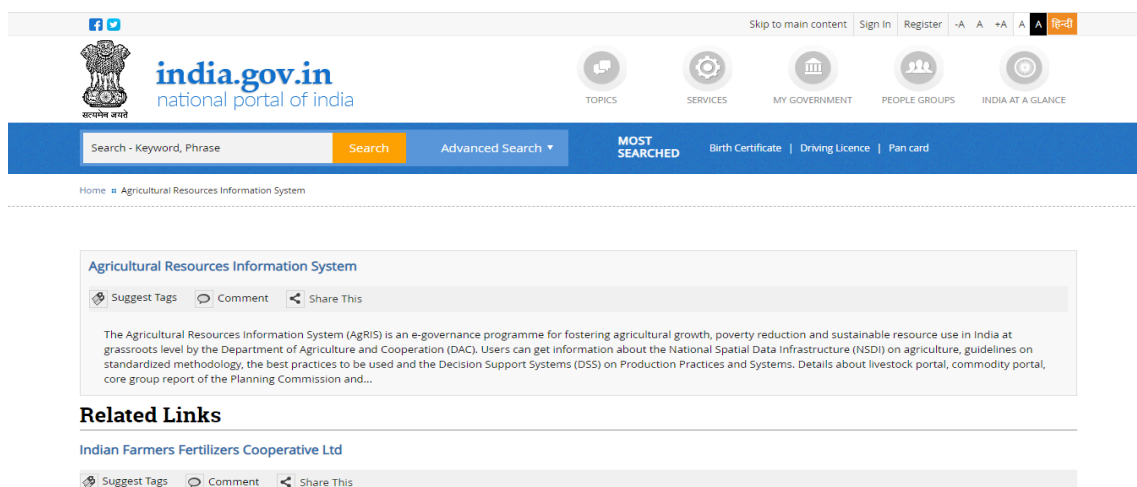
## Practical 10: Demonstration of Agri-information Systems

- **Objective:** To learn about different Agri-information Systems.
- **Agri-information system:** An agricultural information system can be defined as a system, in which agricultural information is generated, transformed, transferred, consolidated and received.
- **Agricultural Resources Information system (AgRIS):**
  - The Agricultural Resources Information System (AgRIS) is an e-governance programme for fostering agricultural growth, poverty reduction and sustainable resource use in India at grassroots level by the Department of Agriculture and Cooperation (DAC).
  - Users can get information about the National Spatial Data Infrastructure (NSDI) on agriculture, guidelines on standardized methodology, the best practices to be used and the Decision Support Systems (DSS) on Production Practices and Systems.

Website: <https://www.india.gov.in/agricultural-resources-information-system>

Here we get various website links for various information related different field of Agriculture like:

- Indian Farmers Fertilizers Cooperative Ltd
- List of agricultural machinery manufacturers
- High yielding rice varieties developed at Central Rice Research Institute
- Contact key officials in Agriculture and Cooperation Department
- Livestock health details by Department of Animal Husbandry
- National Project for Cattle and Buffalo Breeding



The screenshot shows the India.gov.in website interface. At the top, there are social media icons, a search bar, and navigation links like 'Skip to main content', 'Sign In', and 'Register'. Below the header, there are several service icons: 'TOPICS', 'SERVICES', 'MY GOVERNMENT', 'PEOPLE GROUPS', and 'INDIA AT A GLANCE'. A blue navigation bar contains a search bar with the text 'Search - Keyword, Phrase' and a 'Search' button, along with 'Advanced Search' and 'MOST SEARCHED' links. Below the navigation bar, the page title is 'Home Agricultural Resources Information System'. The main content area features a section titled 'Agricultural Resources Information System' with 'Suggest Tags', 'Comment', and 'Share This' options. A paragraph describes the AgRIS program: 'The Agricultural Resources Information System (AgRIS) is an e-governance programme for fostering agricultural growth, poverty reduction and sustainable resource use in India at grassroots level by the Department of Agriculture and Cooperation (DAC). Users can get information about the National Spatial Data Infrastructure (NSDI) on agriculture, guidelines on standardized methodology, the best practices to be used and the Decision Support Systems (DSS) on Production Practices and Systems. Details about Livestock portal, commodity portal, core group report of the Planning Commission and...'. Below this, there is a 'Related Links' section with a link to 'Indian Farmers Fertilizers Cooperative Ltd' and another 'Suggest Tags', 'Comment', and 'Share This' section.

**KRISHI (ICAR research data repository for knowledge management):** Agricultural Knowledge Resources and Information System Hub for Innovations, is an initiative of Indian Council of Agricultural Research (ICAR) to bring its knowledge resources to all stakeholders at one place. The portal is being developed as a centralized data repository system of ICAR consisting of Technology, Data generated through Experiments/ Surveys/ Observational studies, Geo-spatial data, Publications, Learning Resources etc.

**Krishi Website:** <https://krishi.icar.gov.in/>



In this data repository there are various information systems for

- 1. AICRPs & Network Projects:** AICRPs & Network Projects is a scheme of Indian Council of Agricultural Research for development/testing/identification of technologies through multi-location trials.



#### AICRPs & Network Projects

AICRPs & Network Projects is a scheme of Indian Council of Agricultural Research for development/testing/identification of technologies through multi-location trials.

Developed and Hosted under KRISHI:

1. AICRP on Agroforestry
2. AICRP on Arid Zone Fruits
3. AICRP on Castor
4. AICRP on Ergonomics and Safety in Agriculture
5. AICRP on Farm Implements & Machinery, Bhopal
6. AICRP on Fruits, Bengaluru
7. AICRP on Foot and Mouth Diseases, Mukteshwar
8. AICRP on Groundnut
9. AICRP on Goat
10. AICRP on Honeybee Research and Training
11. AICRP on IPM and Biocontrol
12. AICRP on Jute and Allied Fibres
13. AICRP on Long Term Fertilizer Experiments, Bhopal
14. AICRP on Management of Salt Affected Soils and Use of Saline Water in Agriculture
22. AICRP on Plastic Engineering in Agriculture Structures & Environment Management
23. AICRP on Potential Crop
24. AICRP on Potato
25. AICRP on Poultry Breeding, Hyderabad
26. AICRP on Post Harvest Engineering & Technology, Ludhiana
27. AICRP on Soil Test with Crop Response
28. AICRP on Safflower
29. AICRP on Small Millets
30. AICRP on Sunflower
31. AICRP on Sunflower, Safflower, Castor, Hyderabad
32. AICRP on Tobacco
33. AICRP on Utilization of Animal Energy with Enhanced System Efficiency
34. AICRP on Vegetable Crops
35. AICRP on Water Management Research, Bhubaneswar



## 2. Bio-informatics resources.

Information Systems	Bio-informatics Resources
<ul style="list-style-type: none"> <li>AICRP and Network Projects</li> <li>Bio-informatics Resources</li> <li>Crop Specific Knowledge Resources</li> <li>DataBases</li> <li>Experimental Data Resources</li> <li>Genetic Resources Portals</li> <li>Geo Portal</li> <li>Mobile App Gallery</li> <li>Inter Portal Harvester</li> <li>Institutional Publication and Data Inventory Repository</li> <li>Krishni Vigyan Kendras</li> <li>Management Information Systems</li> <li>Museums</li> <li>Other Databases and Portals</li> <li>Statistical Learning and Computing Resources</li> <li>Technologies and Knowledge Resources</li> <li>Zonal Technology Management and Business Planning &amp; Development Unit</li> </ul>	<ul style="list-style-type: none"> <li>Allergen Domain online (ICAR-NBPGR CabGrid)</li> <li>Antimicrobial Prediction Server for Cattle (ICAR-IASRI)</li> <li>Antimicrobial Prediction Server for Fish (ICAR-IASRI)</li> <li>Animal Genetic Resources (ICAR-NBAGR)</li> <li>BioInfoKnowledgeBase (ICAR-NBAIM)</li> <li>Buffalo Micro-satellite (ICAR-IASRI)</li> <li>CardCC &amp; MPbase (ICAR-IISpicesR)</li> <li>EMSGardeN22 (Nagina 22 Mutant Resource Database) (ICAR-NIPB)</li> <li>Fish Barcode Information System (FBIS) (ICAR-NBFGR)</li> <li>Fish Karyome (ICAR-NBFGR)</li> <li>Fish and Shellfish Microsatellite (FishMicrosat) (ICAR-NBFGR)</li> <li>Fish Proteomics database (ICAR-CIFRI)</li> <li>Fish Mitogenome Resource (FMIR) (ICAR-NBFGR)</li> <li>Database of SSR Markers for Fusarium (ICAR-IASRI)</li> <li>Ginger Transcriptome Database (IISpicesR)</li> <li>Goat Microsatellite (ICAR-IASRI)</li> <li>GST Lead Base (IISpicesR)</li> <li>Halophile Protein Database (ICAR-IASRI)</li> <li>HRGFish (ICAR-NBFGR)</li> <li>Insect barcode (ICAR-NBAIR)</li> <li>Insect pest Info Base (ICAR-NBAIR)</li> <li>JuteMarkerdb (ICAR-CRIJAF)</li> <li>Musa Transcriptome SSR Database (ICAR-NRCB)</li> </ul>

14,672 Pageviews  
Sep. 25th - Oct. 25th

## 3. Crop Specific knowledge resources like: AGRIdaksh, Agro-advisory services for rice, Caneinfo, Disease and pest diagnostic system for tuber crops.

Information Systems	Crop Specific Knowledge Resources
<ul style="list-style-type: none"> <li>AICRP and Network Projects</li> <li>Bio-informatics Resources</li> <li>Crop Specific Knowledge Resources</li> <li>DataBases</li> <li>Experimental Data Resources</li> <li>Genetic Resources Portals</li> <li>Geo Portal</li> <li>Mobile App Gallery</li> <li>Inter Portal Harvester</li> <li>Institutional Publication and Data Inventory Repository</li> <li>Krishni Vigyan Kendras</li> <li>Management Information Systems</li> <li>Museums</li> <li>Other Databases and Portals</li> <li>Statistical Learning and Computing Resources</li> <li>Technologies and Knowledge Resources</li> <li>Zonal Technology Management and Business Planning &amp; Development Unit</li> </ul>	<ul style="list-style-type: none"> <li>AGRIdaksh</li> <li>Agro Advisory Services for Rice</li> <li>CAASPS DSS</li> <li>CaneInfo</li> <li>CASSAVA EXPERT SYSTEM</li> <li>CASSAVA PROTECTOR</li> <li>Castor (Market Intelligence Information)</li> <li>Dalhan Gyan Manch</li> <li>Disease and pest diagnostic system for tuber crops</li> <li>e-Pest Surveillance and Advisory Services for Rice in Tripura</li> <li>Expert System on Seed Spices</li> <li>Expert System on Wheat Crop Management</li> <li>HORTSAP-Maharashtra (2016-17)</li> <li>IndoBlightCast-Potato Late Blight forecasting DSS</li> <li>JAFexpert</li> <li>Maize AGRIdaksh</li> <li>Mushroom AGRIdaksh</li> <li>National Mango Database</li> <li>Nutrient Recommendation for Raising Potato in Uttar Pradesh(NRRPUP)</li> <li>Oilseeds All India Area, Production and Productivity</li> <li>ONLINE CASSAVA MARKET</li> <li>Online software on nutrient management in cashew (ICAR-DCR, Puttur)</li> <li>Pest Dynamics in relation to Climate Change</li> </ul>


14,672 Pageviews  
Sep. 25th - Oct. 25th

## 4. Databases like: Agricultural Research Data Book (ICAR-IASRI), Agro-meteorological Data at ICAR-CRIJA (ICAR-CRIJAF), Animal Genetic Resources of India (ICAR-NBAGR) etc.


Information Systems	Databases
<ul style="list-style-type: none"> <li>AICRP and Network Projects</li> <li>Bio-informatics Resources</li> <li>Crop Specific Knowledge Resources</li> <li>DataBases</li> <li>Experimental Data Resources</li> <li>Genetic Resources Portals</li> <li>Geo Portal</li> <li>Mobile App Gallery</li> <li>Inter Portal Harvester</li> <li>Institutional Publication and Data Inventory Repository</li> <li>Krishni Vigyan Kendras</li> <li>Management Information Systems</li> <li>Museums</li> <li>Other Databases and Portals</li> <li>Statistical Learning and Computing Resources</li> <li>Technologies and Knowledge Resources</li> <li>Zonal Technology Management and Business Planning &amp; Development Unit</li> </ul>	<ul style="list-style-type: none"> <li>Agricultural Research Data Book (ICAR-IASRI)</li> <li>Agrometeorological Data at ICAR-CRIJA (ICAR-CRIJAF)</li> <li>Animal Genetic Resources of India (ICAR-NBAGR)</li> <li>AqGRISI - Aquatic Genetic Resource Information System of India (ICAR-NBFGR)</li> <li>CIARI Germplasm Developed (ICAR-CIARI)</li> <li>Cotton Database (ICAR-CICR)</li> <li>Crop Pest DSS (ICAR-CRIDA)</li> <li>Crop Weather Outlook: AICRPAM tools (ICAR-CRIDA)</li> <li>Decision Support System: ICAR-CCARI Goa</li> <li>E-Pulses Data Book (ICAR-IIPR)</li> <li>Equine Breeds of India (ICAR-NRCE)</li> <li>Fish Database (Coastal &amp; Reef): ICAR-CCARI Goa</li> <li>IARI Daily Weather Data (ICAR-IARD)</li> <li>IHWBR Wheat Database (ICAR-IHWBR)</li> <li>Livestock Traceability Database</li> <li>Marine Fish Catch Estimates (ICAR-CMFRI)</li> <li>NBAIR Databases (ICAR-NBAIR)</li> <li>Nutritional Composition of Food Fishes (NutriFishIN) (ICAR-CIFRI)</li> <li>Online Fertilizer Recommendations (ICAR-IISS)</li> <li>Post-Harvest Machinery (ICAR-CIPHET)</li> <li>Rohu Database (ICAR-CIFA)</li> <li>TNAU Agritech Portal (TNAU)</li> <li>Tobacco weed management (ICAR-CTRI)</li> </ul>

14,672 Pageviews  
Sep. 25th - Oct. 25th


## 5. Experimental data resources

Information Systems	Experimental Data Resources
AICRP and Network Projects	<ul style="list-style-type: none"> <li>• AICRP on Vegetable Crops (ICAR-IASRI)</li> <li>• AICSIP Automation System (ICAR-NAARM)</li> <li>• Compendia Volumes of National Index of Agricultural Experiments (ICAR-IASRI)</li> <li>• Information System on Designed Experiments (ICAR-IASRI)</li> </ul>
Bio-informatics Resources	
Crop Specific Knowledge Resources	
DataBases	
Experimental Data Resources	
Genetic Resources Portals	
Geo Portal	
Mobile App Gallery	
Inter Portal Harvester	
Institutional Publication and Data Inventory Repository	
Krishi Vigyan Kendras	
Management Information Systems	
Museums	
Other Databases and Portals	
Statistical Learning and Computing Resources	
Technologies and Knowledge Resources	
Zonal Technology Management and Business Planning & Development Unit	
<b>Latest News</b>	 <p>14,672 Pageviews Sep. 25th - Oct. 25th</p>

## 6. Genetic resource portal:

Information Systems	Genetic Resources Portals
AICRP and Network Projects	<ul style="list-style-type: none"> <li>• Animal Genetic Resources Portal (ICAR-NBAGR)</li> <li>• Cashew Germplasm DBMS (ICAR-DCR)</li> <li>• FisOmics - A Portal of Fish Genomic Resources (ICAR-NBAGR)</li> <li>• Mango Probase (ICAR-CISH)</li> <li>• Microbial Genetic Resources Portal (ICAR-NBAIM)</li> <li>• PGR Database (ICAR-NBPGR)</li> <li>• PGR Portal (ICAR-NBPGR)</li> <li>• Spicegenes (ICAR-IISpicesR)</li> <li>• Sugarcane Genetic Resources (ICAR-SBI)</li> </ul>
Bio-informatics Resources	
Crop Specific Knowledge Resources	
DataBases	
Experimental Data Resources	
Genetic Resources Portals	
Geo Portal	
Mobile App Gallery	
Inter Portal Harvester	
Institutional Publication and Data Inventory Repository	
Krishi Vigyan Kendras	
Management Information Systems	
Museums	
Other Databases and Portals	
Statistical Learning and Computing Resources	
Technologies and Knowledge Resources	
Zonal Technology Management and Business Planning & Development Unit	
<b>Latest News</b>	 <p>14,672 Pageviews Sep. 25th - Oct. 25th</p>

## 7. Geo-Portal:

Information Systems	Geo Portal
AICRP and Network Projects	<ul style="list-style-type: none"> <li>• AICRP ON AM (ICAR-CRIDA)</li> <li>• Bharat Maps- A Multi-layer GIS Platform (MEITY-NIC)</li> <li>• BHOOMI GeoPortal (ICAR-NBSSLUP)</li> <li>• BHUVAN (ISRO)</li> <li>• CREAMS (ICAR-IARI)</li> <li>• e-ATLAS Micronutrients (Indian Soils)(ICAR-IARI)</li> <li>• Fertility Index Maps (DAC)</li> <li>• Fertility Maps (Macronutrients) (DAC)</li> <li>• ICAR-CMFRI Infographics</li> <li>• ICAR Geo-Portal</li> <li>• IIRR Geo-Portal (ICAR-IIRR)</li> <li>• MNCFC Maps</li> <li>• NATIONAL PORTAL OF MAP SERVICES (MEITY-NIC)</li> <li>• Rajdharaa (Govt. of Rajasthan)</li> <li>• Soil and land Use Survey of India (DACFW)</li> <li>• VEDAS (SAC)</li> </ul>
Bio-informatics Resources	
Crop Specific Knowledge Resources	
DataBases	
Experimental Data Resources	
Genetic Resources Portals	
Geo Portal	
Mobile App Gallery	
Inter Portal Harvester	
Institutional Publication and Data Inventory Repository	
Krishi Vigyan Kendras	
Management Information Systems	
Museums	
Other Databases and Portals	
Statistical Learning and Computing Resources	
Technologies and Knowledge Resources	
Zonal Technology Management and Business Planning & Development Unit	
<b>Latest News</b>	 <p>14,672 Pageviews Sep. 25th - Oct. 25th</p>

### 8. Mobile-App Gallery:

The screenshot shows the 'Mobile App Gallery' page. At the top, there's a navigation bar with 'Home', 'Screen Reader', and 'Login English'. Below this is a sidebar menu with categories: Dashboard, Experimental Data Repository, ICAR Geo-Portal, Survey Data Repository, and Publication Data Repository. The main content area has the ICAR logo and the title 'Mobile App Gallery (Agricultural Knowledge Resources and Information System Hub for Innovations)'. It includes a search bar and filters for 'Select SMD', 'Select Institute', 'Select Language', and 'Organization Type'. Below the filters, it says 'SMD: All, Institute: All, Language: All, Organization Type: All' and 'Total (Filtered):'. The 'List of Mobile App' section is currently empty.

### 9. Inter porter harvester:

The screenshot shows the 'IRDRKM-Open Harvester Systems' page. At the top, there's a navigation bar with 'HOME', 'ABOUT', 'BROWSE', 'SEARCH', and 'HELP'. Below this is a search bar and a 'Login' button. The main content area is titled 'IRDRKM-Open Harvester Systems' and contains a welcome message: 'Welcome to the IRDRKM-OHS, to improve the accuracy of searching within the PKP System, authors have been asked to index their work, where applicable, by discipline(s), topics, genre, method, coverage, and sample. This allows you to search for "empirical" versus "historical" studies, for example, under "index terms." You can also view a document's index terms by selecting the complete record from among the search results. This portal only harvests metadata for unified search and for original articles/files user is directed to the respective repositories.' Below this, there's a description of KRISHI: 'KRISHI - Knowledge based Resources Information Systems Hub for Innovations in agriculture, is an initiative of Indian Council of Agricultural Research (ICAR) to bring its knowledge resources to all stakeholders at one place. The portal is being developed as a centralized data repository system of ICAR consisting of Technology, Data generated through Experiments/ Surveys/ Observational studies, Geo-spatial data, Publications, Learning Resources etc.' At the bottom, it says 'Total Records: 606768' and 'Login'.

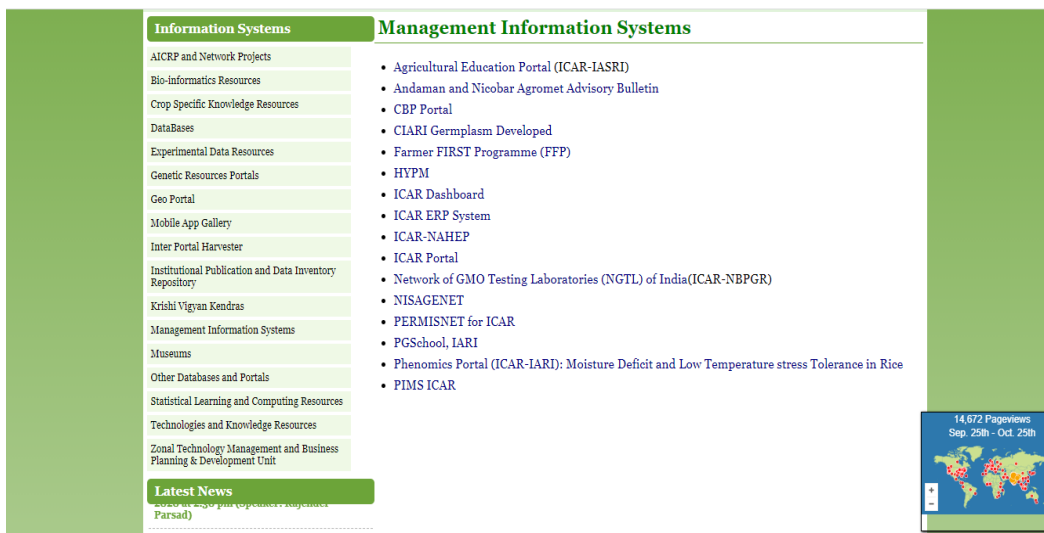
### 10. Institutional Publications and data inventory repository:

The screenshot shows the 'KRISHI Publication and Data Inventory Repository' page. At the top, there's a navigation bar with 'Home', 'Browse', and 'Help'. Below this is a search bar and a 'Sign on to:' button. The main content area is titled 'KRISHI Publication and Data Inventory Repository' and contains a description: 'Publication Repository and Data inventory Repository are part of initiative of ICAR Research Data Repository for Knowledge Management. Publication Repository makes available all types of publications including reports, bulletins, research papers, web resources, media resources etc. from all ICAR Institutions. Data Inventory Repository aims at creating Meta Data Inventory through information related to data availability at Institute level.' Below this, there's a 'Recent Submissions' section with a blue background, showing a submission about 'Climatic water balance, probable rainfall, rice crop water requirements and cold periods in AER 12.0 in India'. To the right, there's an 'IMPORTANT LINKS' section with links to 'ICAR', 'Inter Portal Harvester', 'Experimental Data Repository', 'ICAR Geo-portal', 'Observational Data Repository', and 'Publication Repository'.

11. KVKs:



12. Management information systems:




13. Museums:



## 14. Statistical learning and computing resources:

Information Systems	Statistical Learning and Computing Resources
AICRP and Network Projects	<ul style="list-style-type: none"> <li>• Design Resources Server</li> <li>• Indian NARS Statistical Computing Portal</li> <li>• Online Analysis of Data</li> <li>• Sample Survey Resources Server</li> <li>• Statistical Computing for NARS</li> </ul>
Bio-informatics Resources	
Crop Specific Knowledge Resources	
DataBases	
Experimental Data Resources	
Genetic Resources Portals	
Geo Portal	
Mobile App Gallery	
Inter Portal Harvester	
Institutional Publication and Data Inventory Repository	
Krishi Vigyan Kendras	
Management Information Systems	
Museums	
Other Databases and Portals	
Statistical Learning and Computing Resources	
Technologies and Knowledge Resources	
Zonal Technology Management and Business Planning & Development Unit	
<b>Latest News</b>	
for AICRP on Weed Management on August 18, 2020 at 12.00 noon	

14,672 Pageviews  
Sep. 25th - Oct. 25th



## 15. Technologies and Knowledge resources:

Information Systems	Technologies and Knowledge Resources
AICRP and Network Projects	<ul style="list-style-type: none"> <li>• A collection of selected agricultural technologies</li> <li>• Agricultural Transformation through Public-Private Partnership: An Interface</li> <li>• Agriculturally Important Insects</li> <li>• Agrotech for Spices (IISpicesR)</li> <li>• Aphids of Karnataka</li> <li>• Biocontrol Introductions</li> <li>• Buffalopedia(English):</li> <li>• Buffalopedia(Hindi):</li> <li>• CIARI Package of Practices</li> <li>• CIARI Technology</li> <li>• CIBA Technologies</li> <li>• CIBA-Farmers' Corner</li> <li>• CISH Technologies</li> <li>• CRRI Implements</li> <li>• CSWRI Technologies</li> <li>• CTRI Technologies</li> <li>• Coowler (ICAR-CIRC,Meerut)</li> <li>• Design of Straight Drop Structure</li> <li>• Design of Micro Irrigation systems(DOMIS)</li> <li>• District wise Agricultural Contingency Plans: NICAR (CRIDA)</li> <li>• Factsheets on Agriculturally Important Insects</li> <li>• Feed Chart for Cross Bred Cow and Buffalo</li> <li>• Foot and Mouth Disease: DSS</li> </ul>
Bio-informatics Resources	
Crop Specific Knowledge Resources	
DataBases	
Experimental Data Resources	
Genetic Resources Portals	
Geo Portal	
Mobile App Gallery	
Inter Portal Harvester	
Institutional Publication and Data Inventory Repository	
Krishi Vigyan Kendras	
Management Information Systems	
Museums	
Other Databases and Portals	
Statistical Learning and Computing Resources	
Technologies and Knowledge Resources	
Zonal Technology Management and Business Planning & Development Unit	
<b>Latest News</b>	

14,672 Pageviews  
Sep. 25th - Oct. 25th



### Exercise:

1. Write a short note about KRISHI.

### Conclusion:

## Practical 11: Introduction to Programming Language : C

- **Objective:** To learn programming languages like C
- **Requirement:** Microsoft visual studio code and Mingw-w64 via MSYS2 to install GCC on Windows OS.
- **C-Programming Language:**  
C programming is a general-purpose, procedural, imperative computer programming language developed in 1972 by Dennis M. Ritchie.
- **C Programs**  
A C program can vary from 3 lines to millions of lines and it should be written into one or more text files with extension ".c"; for example-hello.c.
- **C-Program Structure:**  
A C program basically consists of the following parts –
  - Pre-processor Commands
  - Functions
  - Variables
  - Statements & Expressions
  - Comments

### **Example:**

```
#include <stdio.h>

int main() {
    /* my first program in C */
    printf("Hello, World! \n");
    return 0;
}
```

- The first line of the program `#include <stdio.h>` is a preprocessor command, which tells a C compiler to include `stdio.h` file before going to actual compilation.
- The next line `int main ()` is the main function where the program execution begins.
- The next line `/*...*/` will be ignored by the compiler and it has been put to add additional comments in the program. So such lines are called comments in the program.
- The next line `printf (...)` is another function available in C which causes the message "Hello, World!" to be displayed on the screen.

- The next line return 0; terminates the main () function and returns the value 0.

- **Tokens in C:**

A C program consists of various tokens and a token is either a keyword, an identifier, a constant, a string literal, or a symbol.

C Supports Six Types of Tokens:

1. **Identifiers:** Identifiers are names given to different entities such as constants, variables, structures, functions, etc. Ex: int amount; amount is identifier.
2. **Keywords:** You can't use a keyword as an identifier in your C programs, its reserved words in C library and used to perform an internal operation. The meaning and working of these keywords are already known to the compiler. Ex: int, double, return etc.
3. **Constant:** Constants are like a variable, except that their value never changes during execution once defined. It is considered best practice to define constants using only upper-case names.

Syntax: const type constant\_name;

Ex: const int SIDE = 10;

4. **Strings:** In C programming, the one-dimensional array of characters are called strings. Ex: char name[6] = {'C', 'l', 'o', 'u', 'd', '\0'}; or char name[] = "Cloud";
5. **Operators:** C operators are symbols that are used to perform mathematical or logical manipulations. The C programming language is rich with built-in operators. Operators take part in a program for manipulating data and variables and form a part of the mathematical or logical expressions.

**Arithmetic Operators:** Addition (+), Subtraction (-), Multiplication (\*), Division (/), Modulus (%).

**Logical operators:** &&(And), || (Or), ! (not)

**Relational Operators:** Is equal to (=), Is not equal to(!=), Greater than(>), Less than(<), Greater than or equal to(>=), Less than or equal to(<=).

- **C - Data Types**

C provides various types of data-types which allow the programmer to select the appropriate type for the variable to set its value. Data types are void, int, char, double and float.

void	As the name suggests, it holds no value and is generally used for specifying the type of function or what it returns. If the function has a void type, it means that the function will not return any value.
int	Used to denote an integer type.
char	Used to denote a character type.
float, double	Used to denote a floating point type.

**Example:** int age; char letter; float height, width;

- **C- Type Casting**

Type Casting in C is used to convert a variable from one data type to another data type, and after type casting compiler treats the variable as of the new data type.

**Syntax:** (type\_name) expression.

- **C- variables:**

The primary purpose of variables is to store data in memory for later use. Unlike constants which do not change during the program execution, variables value may change during execution.

**Syntax:**

*type variable\_name;*

*or*

*type variable\_name, variable\_name, variable\_name;*

**Example:**

*int width, height=5;*

*char letter='A';*

*float area;*

*double d;*

- **C- Input/output**

Majority of the programs take data as input, and then after processing the processed data is being displayed which is called information. In C programming you can use scanf () and printf () predefined function to read and print data.



**Example:**

```
#include<stdio.h>

int main()
{
    int a,b,c;
    printf("Please enter any two numbers: \n");
    scanf("%d %d", &a, &b);
    c = a + b;
    printf("The addition of two number is: %d", c);
}
```

The easiest and simplest of all I/O operations are taking a character as input by reading that character from standard input (keyboard). `getchar()` function can be used to read a single character.

Syntax: `var_name = getchar();`

- **C-Format Specifier**

<b>Format Specifier</b>	<b>Description</b>
%d	Integer Format Specifier
%f	Float Format Specifier
%c	Character Format Specifier
%s	String Format Specifier

Syntax: `printf("%d", <variable name>);`

- **C-Decision making :**

C conditional statements allow you to make a decision, based upon the result of a condition. These statements are called Decision Making Statements or Conditional Statements.

**if Statement:**

If statements in C is used to control the program flow based on some condition, it's used to execute some statement code block if the expression is evaluated to true.

**Syntax:**

```
if(test_expression)
```

```
{  
    statement 1;  
    statement 2;  
    ...  
}
```

### **If-else Statement:**

If else statements in C is also used to control the program flow based on some condition, only the difference is: it's used to execute some statement code block if the expression is evaluated to true, otherwise execute else statement code block.

### **Syntax:**

```
if(test_expression)  
{ //execute your code  
}else  
{  
    //execute your code  
}
```

### **Nested if-else statements:**

It means you can use conditional statements inside another conditional statement.

### **Syntax:**

```
if(test_expression one)  
{  
    if(test_expression two) {  
        //Statement block Executes when the boolean test expression two is true.  
    }  
}  
else  
    {  
        //else statement block  
    }
```

- **C-Loops:**

Sometimes it is necessary for the program to execute the statement several times. A loop executes a block of commands a specified number of times until a condition is met.

**while loop:**

while loop is a most basic loop in C programming. while loop has one control condition, and executes as long the condition is true. The condition of the loop is tested before the body of the loop is executed, hence it is called an entry-controlled loop.

**Syntax:**

```
While (condition)
{
    statement(s);
    Incrementation;
}
```

**do while:**

C do while loops are very similar to the while loops, but it always executes the code block at least once and furthermore as long as the condition remains true. This is an exit-controlled loop.

**Syntax:**

```
do
{
    statement(s);
}
While ( condition );
```

**for loop:**

C for loops is very similar to a while loops in that it continues to process a block of code until a statement becomes false, and everything is defined in a single line. The for loop is also entry-controlled loop.

**Syntax:**

```
for ( init; condition; increment )  
  
    {  
  
        statement(s);  
  
    }
```

- **C-Function:**

C-function is a self-contained block of statements that can be executed repeatedly whenever we need it.

**Types:**

- **Built-in(Library) Functions**

The system provided these functions and stored in the library. Therefore it is also called Library Functions.e.g. scanf(), printf(), strcpy, strlwr, strcmp, strlen, strcat etc.

To use these functions, you just need to include the appropriate C header files.

- **User Defined Functions** These functions are defined by the user at the time of writing the program

**Syntax:**

```
returnType functionName(Function arguments){  
    //body of the function  
}
```

**Example:**

```
#include<stdio.h>  
  
int main()  
  
    {  
  
        int answer;  
  
        answer = addition(); //calling a function to get addition value.  
  
        printf("The addition of the two numbers is: %d\n",answer);  
  
    }  
  
    //function returning the addition of two numbers  
  
int addition()
```

```
{  
    int num1 = 10, num2 = 5; // local variable definition  
    return num1+num2;  
}
```

**Some examples of C-Program:**

**1. C- Program for sum of two number:**

```
#include <stdio.h>  
  
int main()  
{  
    int a=500, b=30, c;  
  
    c=a+b;  
  
    printf("Sum of two number is: %d", c);  
  
}
```

**2. C program to display the multiplication table of a given number:**

```
#include <stdio.h>  
  
int main() {  
    int num, i = 1;  
    printf("Enter any Number:");  
    scanf("%d", &num);  
    printf("Multiplication table of %d:", num);  
  
    while (i <= 10) {  
        printf("%d x %d = %d", num, i, num * i);  
        i++;  
    }  
    return 0;  
}
```

**3. C-Program for Prime number check.**

```
#include <stdio.h>
```

```
int main() {
    int n, i, c = 0;
    printf("Enter any number n:");
    scanf("%d", &n);
    for (i = 1; i <= n; i++) {
        if (n % i == 0) {
            c++;
        }
    }
    if (c == 2) {
        printf("n is a Prime number");
    }
    else {
        printf("n is not a Prime number");
    }
    return 0;
}
```

**4. C-Program to find the greatest number of three numbers.**

```
#include <stdio.h>

int main(){

    int a, b, c;

    printf("Enter a,b,c: ");

    scanf("%d %d %d", &a, &b, &c);

    if (a > b && a > c) {

        printf("a is Greater than b and c");

    }

    else if (b > a && b > c) {

        printf("b is Greater than a and c");

    }

    else if (c > a && c > b) {
```

```
        printf("c is Greater than a and b");  
    }  
    else {  
        printf("all are equal or any two values are equal");  
    }  
    return 0;  
}
```

**Exercise:**

1. Write a C program C program adds n number of times which will be entered by the user.
2. Write a C program to check whether the given number is even or odd.

**Conclusion:**

**Video Link:**

**1. C-Programming Tutorial:**

<https://www.youtube.com/watch?v=8PopR3x-VMY>

**2. How to Download and Install C Cpp Toolset ( gcc g++ gdb ) in Windows 10 using mingw-w64 and msys2:**

<https://www.youtube.com/watch?v=0HD0pqVtismw>

**3. How to Set up Visual Studio Code for C and C++ Programming:**

[https://www.youtube.com/watch?v=77v-Poud\\_io](https://www.youtube.com/watch?v=77v-Poud_io)

**Installation:**

**1. Microsoft Visual Code: <https://code.visualstudio.com/download>**

**2. MSYS2 installer:**

[https://github.com/msys2/msys2-installer/releases/download/2021-06-04/msys2-x86\\_64-20210604.exe](https://github.com/msys2/msys2-installer/releases/download/2021-06-04/msys2-x86_64-20210604.exe)

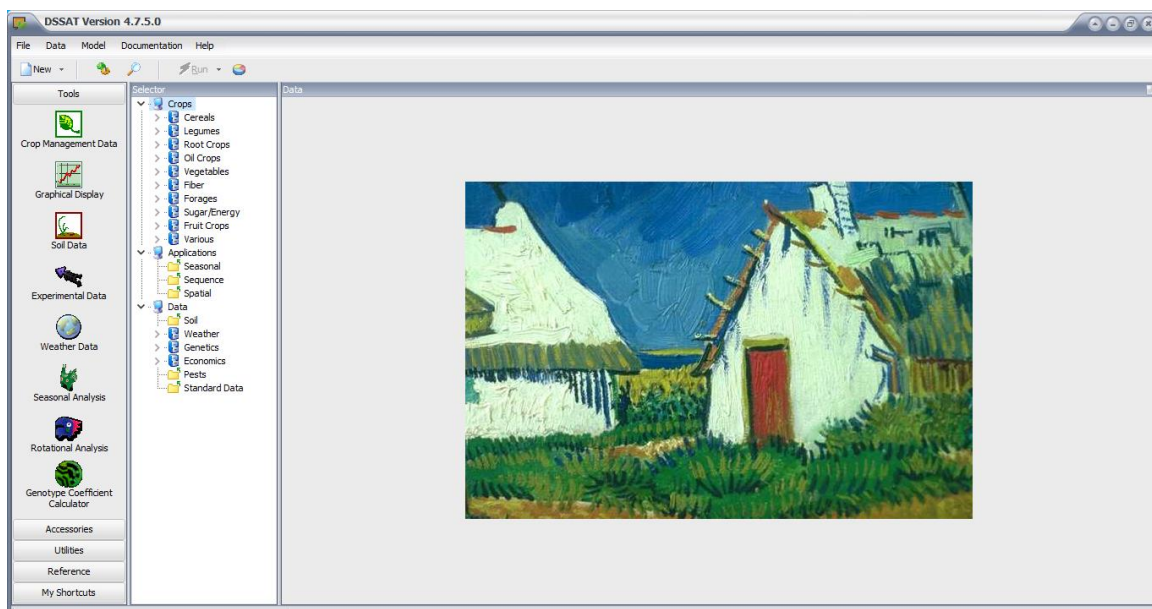
**Tutorial ink:**

<https://www.tutorialspoint.com/cprogramming/index.htm>

## **Practical 12: Hands on Decision Support System and Crop Simulation**

### **Model: DSSAT**

- **Objective:** To learn about how a decision support system works through DSSAT (Decision Support System for Agrotechnology Transfer)
- **Requirement:** Windows OS.
- **DSSAT:** The Decision Support System for Agrotechnology Transfer (DSSAT) is a software application program that comprises crop simulation models for over 42 crops as well as tools to facilitate effective use of the models. The tools include database management programs for soil, weather, crop management and experimental data, utilities, and application programs. The crop simulation models simulate growth, development and yield as a function of the soil-plant-atmosphere dynamics.



- **How to use:**
- **Agronomic Study:**

DSSAT provides at least one real experimental data for each of the crops that can be simulated. This includes the daily weather data, soil surface and profile information, detailed crop management and some observations.

In order to run DSSAT for the example agronomy studies:

- Open the DSSAT Shell from your desktop icon or App.
- In the middle panel you find the Selector for Crops. Select the type of crop you are interested in and then the specific crop. In the panel on the right-hand side a list of one



or more experiments will appear. These are all real experiments that have been conducted in the past.

- Select the experiment you would like to simulate. By default all treatments associated with that experiment are selected.
- Then Click on the Run option on top of the DSSAT panel next to the lightning bolt.
- A new window will open that will show all treatments that will be simulated. Select Run Model and the Cropping System Model of DSSAT will run in the background, starting at planting or the start of simulation date and ending when the model predicts harvest maturity or when the user has defined final harvest.
- Upon completion of all the simulations a “Simulations are completed” window pops up. Select the Analysis Tab and a list of output files will appear.

This Agronomic Studies section of DSSAT represented under the “Crops Selector” panel should only be used for crop model calibration, especially for the cultivar, variety, hybrid, or clone genetic coefficients, and model evaluation in response to different management inputs or environment.

### **Seasonal and Risk Analysis:**

Risk analysis is one of the main applications of DSSAT and allows users to evaluate alternate management practices for single growing seasons that account for both weather and economic uncertainty. Using the seasonal analysis option of DSSAT, a user can compare the interaction of genotype and management for different environments, especially long-term historical weather data. In a standard risk analysis approach a user defines at least two or more management scenarios. Normally for the weather inputs at least 30 years of historical weather data are selected, analogous to climate normals that are based on 30 years of historical weather data.

### **Conclusion:**

**Video Link:** <https://www.youtube.com/watch?v=T0V29FSfZJ4&t=167s>

### **Practical 13: Introduction to Geospatial Technology for generating valuable information for Agriculture**

**Objective:** To acquire data that is referenced to the earth and use it for analysis, modelling ,simulations and visualization.

**Software:** Quantum GIS 3.6.3, Google Earth Pro

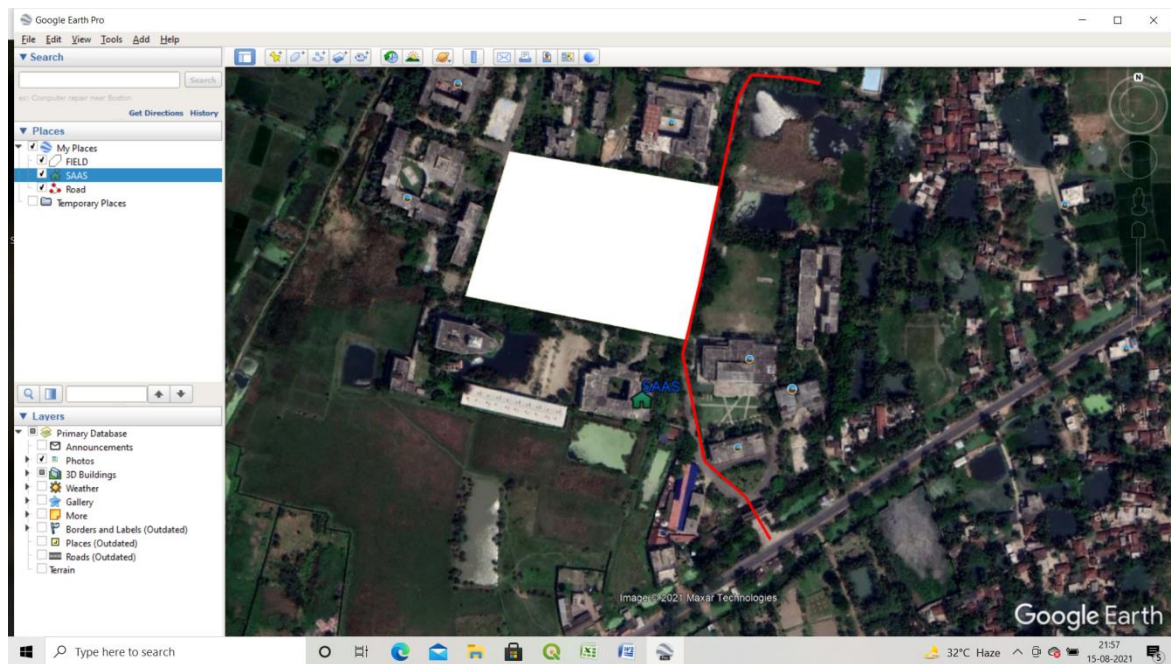
**System/Hardware Requirements:**

- Processor-CPU : core i7 64 bit Processor
- Memory RAM : 8 GB or more
- Hard Disk : SSD de 128 Gb or 500 Gb SATA
- Graphic card : 2 Gb RAM
- Operating System : Windows 10

**Web Browser :** Google Chorme

**Downloading Google Earth Pro:** <https://google-earth-pro.en.lo4d.com/windows>

**Google Earth Pro** is a free to download vast database of 3D imagery of the planet and other geographic information that exists on your desktop. With Google Earth Pro, all users are now allowed to access high-quality and high-resolution aerial photography and ground images



**Downloading QGIS Software:** <http://www.qgis.org/en/site/forusers/download.html>

**Quantum GIS** is an Open Source Geographic Information System. The QGIS software package currently runs on most versions of Unix, Windows and Mac OS X and supports a number of common raster and vector data formats. QGIS is available under the GNU General Public License (GPL).

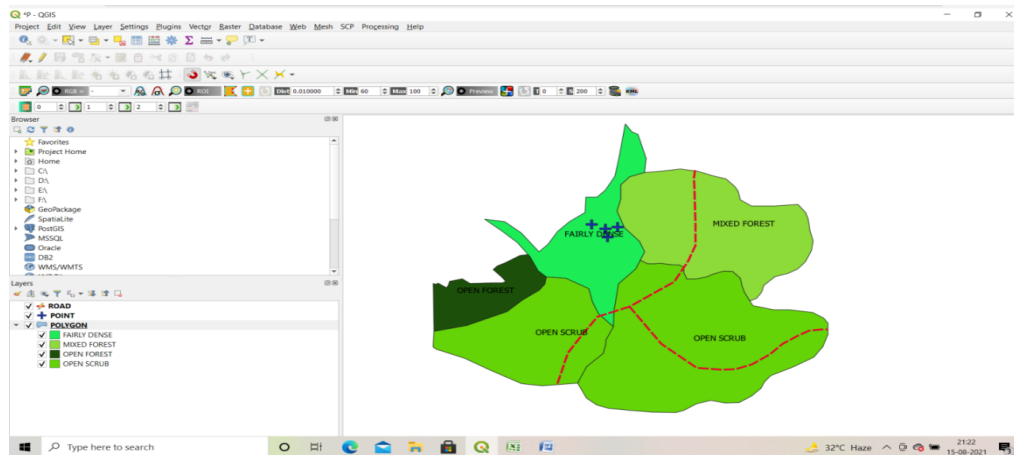
## Methodology:

### Open Raster Data:

1. Open QGIS software
2. Import the raster layer

### Digitization (Vector data creation):

**Digitization** is the process of converting analog data into digital data sets. In GIS context digitization refers to creating vector datasets viz., point, line or polygon from raster datasets. With the help of digitization we can create different set of layers Viz. Rivers, roads, schools, ward boundaries and building blocks from a single map; this process is known as **Vectorization**.

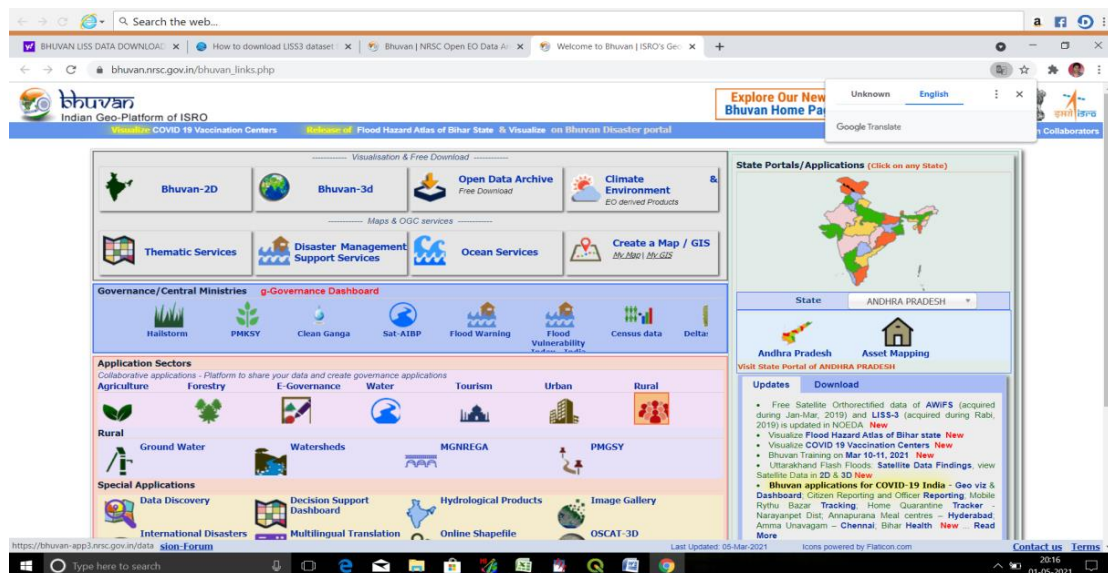


### Vector data is mainly of three types-

- 1) Point, 2) Line and 3) Polygon

## Methodology:

3. Open QGIS software
4. Import the raster layer
5. Create a new shapefile layer
6. Choose the type of features (point, line or polygon)
7. Save the file with projection system
8. Select the file in the layer panel
9. Digitize the features using Add feature tool



## Field data collection using GPS device and data import to QGIS

**Objective:** To collect the field data (location) and import data to GIS system

**Instrument:** GPS Garmin e trex 10

### Methodology:

1. Visit to the field. Collect the location (longitude and latitude) data using GPS device.
2. Note the location data. Save the data in a “.csv” (comma separated value) file
3. Import the “.csv” file in the QGIS through: Layer → Add layer → Add delimited text layer
4. Data is imported as point file in the GIS system
5. Export the file as a “.shp” file (vector file)
6. Open the attribute table of the vector file
7. Activate the “toggle editing” and add a new filed in the attribute table.
8. Fill the newly added fields with the information collected during field visit corresponding to a particular location

## Collection of open source satellite data

**Objective:** To know and collect the open source satellite images.

Bhuvan an ambitious project of ISRO(Indian space research organization) to take Indian images and thematic information in multiple spatial resolutions to people with a web portal through easy access to information on basic natural resources in the geospatial domain. Bhuvan showcases Indian images by the superimposition of the IRS satellite imageries on 2D/ 3D virtual globe.

- 1) Go to Google Chrome
- 2) Serach [bhuvan.nrsc.gov.in](https://bhuvan.nrsc.gov.in)
- 3) Welcome to Bhuvan > Open data Archive > Log in > Insert valid entries for your name, email, and location. Profile .Click Submit.
- 4) after registering > go to login option > to start download

### Vegetation indices

**Objective:** commonly used to indicate the amount and health of vegetation in an image, and to differentiate vegetation, soil and water in forest.

**The vegetation index** is an indicator that is calculated as a result of operations with different spectral ranges of remote sensing data and is related to the vegetation parameters in a particular pixel of the image. The effectiveness of vegetation indices is determined by the characteristics of reflection. The calculation of most of the vegetation indices is based on two the most stable sections of the curve spectral reflectance of plants.

- 1) **NDVI** - normalized difference vegetation index. NDVI is an image transformation technique used to monitor the vegetation condition. NDVI is a combination of addition, subtraction and division. The index for NDVI of a **LISS III** image is (band4-band3)/(band4+band3)

$$NDVI = \frac{(NIR - Red)}{(NIR + Red)}$$

Pixel value in the resultant image varies between **-1.0** and **+1.0**. NDVI of an area containing a dense vegetation canopy will tend to positive values (say 0.3 to 0.8) while clouds, water and snow fields will be characterized by negative values of this index. Other targets show values near 0; e.g., soils generally show values between 0.1 and 0.2. Very high positive values (say 0.6 to 0.8) indicate healthy vegetation, while value-range 0.3 to 0.6 may be considered as stressed vegetation. However, this may vary from species to species and season to season.

#### **How to calculate NDVI**

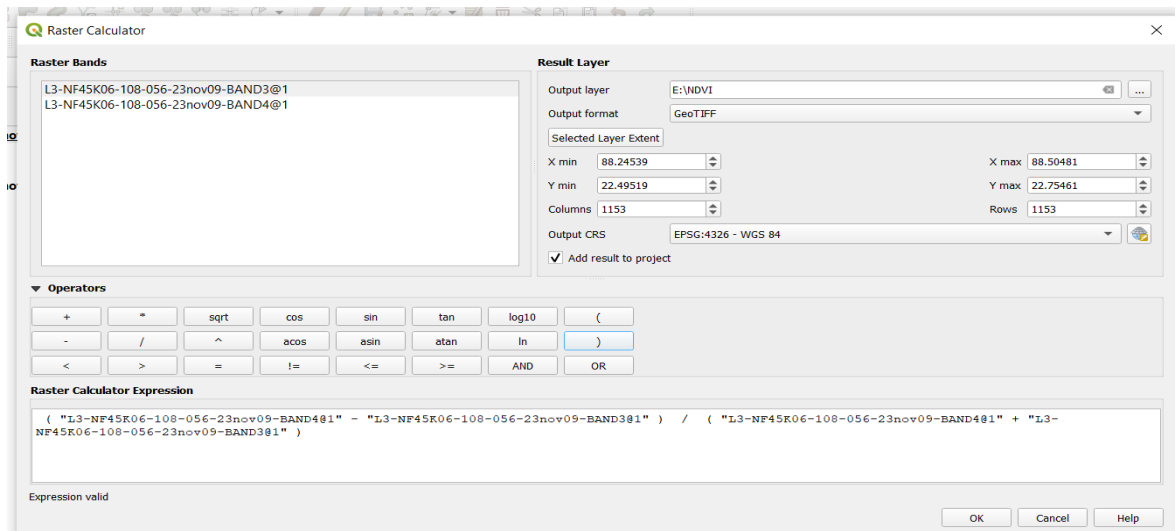
**Objective:** To compute NDVI in QGIS software

**Software:** Quantum GIS 3.6.3

**Data requirement:** NIR BAND, RED BAND

**Workflow:**

- 1) Open Quantum GIS 3.6.3
- 2) Import NIR BAND and RED BAND
- 3) Go to Raster menu > Raster calculator



**Exercise:**

1) Which of the following statement is true?

- A) QGIS is a proprietary software
- B) QGIS is an open source cross platform
- C) QGIS can't be downloaded freely
- D) All the above

2) What does the abbreviation QGIS stands for?

- A) Qualitative Geographic Information System
- B) Quantum Geographic Information System
- C) Quick user Geographic Information System
- D) Quarterly Geographic Information System

3) Three basic symbol types for vector data-

- a) Cells,Dots and Triangles
- b) Points,squares and Plygons
- c) 2D, 3D, and Hybrid
- d) Points,lines and polygons

4) The difference between Raster and Vector is:

- a) Raster is composed by pixels and vector is composed paths
- b) Vector represents images and Raster represents points,lines and polygons
- c) Raster represents data as cell or grid while Vector represents data using sequential points or vertices.

5) Which instrument is used in field data collection?

6) ISRO stands for.....

7) What is the range of NDVI?

8) Which of the band has the highest reflectance for Vegetation?

**Conclusion:**

**Video tutorial link:**

<https://youtu.be/08eufydgV5c>

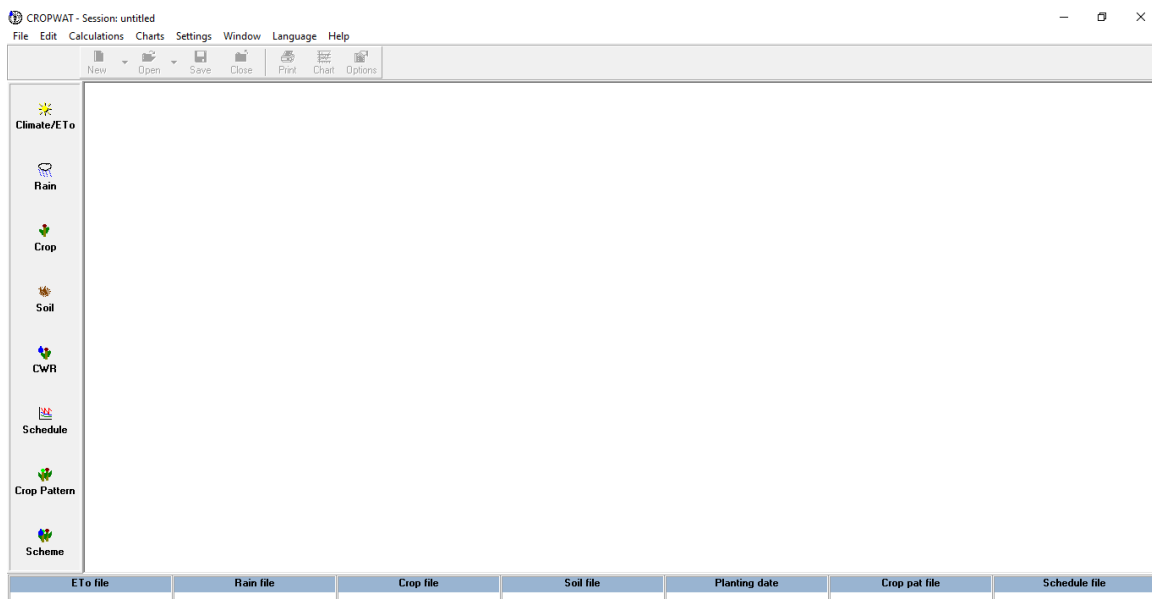
<https://youtu.be/H5DwXK7EMXk>

<https://youtu.be/WIP1genuoVo>

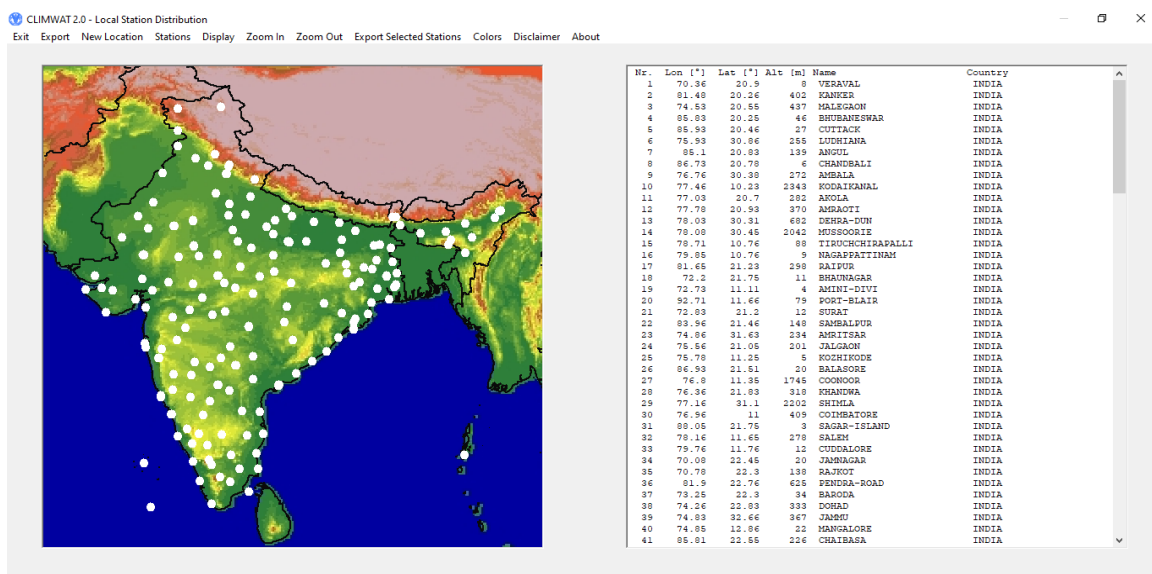


## Practical 13: Computation of water requirement of crop using CROPWAT 8.0 and CLIMWAT 2.0

- **Objective:** To learn about how to estimate crop water requirement using CROPWAT 8.0 and CLIMWAT 2.0.
- **Requirement:** Windows OS.
- **Crop water requirement:** Crop water requirement is the amount of water which is needed by crop or plant in order to replace the water which is lost by evapotranspiration.
- **CROPWAT:** CROPWAT irrigation management model is a decision support tool investigated by food and agricultural organization called FAO.



- **CLIMWAT:** CLIMWAT is a climatic database to be used in combination with the computer program CROPWAT and allows the calculation of crop water requirements.

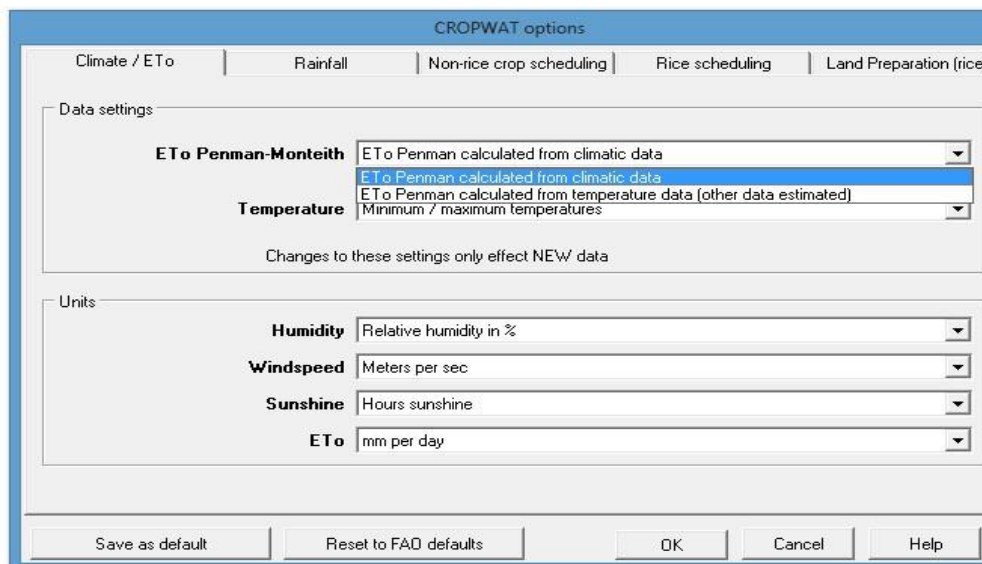




- CROPWAT 8.0 is interactive in nature and can execute the following tasks very quickly:
  - Calculates the potential evapotranspiration (ET<sub>o</sub>) based on monthly climatic data;
  - Calculates the crop water requirements on a decade (10-day) basis based on ET<sub>o</sub> and crop data;
  - Calculates effective rainfall based on dependable rainfall data; and
  - Calculates the irrigation water requirement and irrigation scheduling based on crop data, soil data and the selected irrigation scheduling criteria.
- **Potential evapotranspiration:** The influence of the climate on crop water need is given by the potential evapotranspiration or reference crop evapotranspiration (ET<sub>o</sub>).

The CROPWAT 8 software employs the FAO Penman-Monteith method for determining reference crop evapotranspiration (ET<sub>o</sub>). This method calculates the ET<sub>o</sub> of an area based on the temperature, humidity, wind speed and sunshine data.

- **PROCEDURE:**
  - Start CROPWAT 8 software.
  - Go to “Settings” on the top horizontal menu of the main screen and select “Options”
  - Based on available data select “ET<sub>o</sub> Penman-Monteith method” dropdown menu and press “OK”.
  - Select “Climate/ET<sub>o</sub>” icon from the left vertical menu of the main screen and enter the required location and temperature data.



- Enter Location data
- Save the file in a folder for future use.
- Right click on the small “Monthly ET<sub>o</sub> Penman-Monteith” screen and select “Copy table >> Data and Headers”

Monthly ETo Penman-Monteith - F:\000Tsigea CROPWAT simulation\Tsigea...

Country: Ethiopia Station: Mehoni  
 Altitude: 1960 m. Latitude: 12.50 °N Longitude: 39.60 °E

Month	Min Temp °C	Max Temp °C	Humidity %	Wind m/s	Sun hours	Rad MJ/m <sup>2</sup> /day	ETo mm/day
January	10.1	26.8	68	2.0	10.0	21.3	4.15
February	12.8	28.2	69	2.0	9.6	22.3	4.54
March	13.2	27.6	71	2.0	9.3	23.3	4.75
April	13.5	28.5	70	2.0	9.9	24.8	5.12
May	14.3	28.7	70	2.0	9.9	24.3	5.07
June	14.9	29.8	70	2.0	9.9	24.7	5.24
July	15.7	30.1	70	2.0	9.9	24.5	5.30
August	14.6	26.8	70	2.0	9.9	22.5	4.62
September	14.4	27.5	70	2.0	9.9	22.7	4.66
October	14.6	27.2	70	2.0	9.9	22.7	4.66
November	13.9	26.1	70	2.0	9.9	22.7	4.66
December	13.1	25.8	73	2.0	8.0	18.0	3.61
Average	13.8	27.8	71	2.0	9.2	22.3	4.59

- **Crop water requirement**

Crop water requirement (ET<sub>c</sub> or CWR) is the quantity of water required by a crop in a given period of time for its normal growth under field condition at a specific place.

- **Net irrigation water requirement**

The water demand of crops can be supplied by either rainfall, irrigation or a combination of both. The net irrigation water requirement of a certain crop is the difference between the crop water requirement and part of the rainfall which can be used by the crop (the effective rainfall, P<sub>e</sub>).

**PROCEDURE**

- **Determination of effective rainfall**

- Go to “Settings” on the top horizontal menu of the main screen and select “Options”
- Click the “Rainfall” icon, select the “Dependable rain (FAO/AGLW formula)” option and press “OK”.
- Select the “Rain” icon from the left vertical menu of the main screen and enter the location name and rainfall data
- Save the file in a folder you have created for future use.

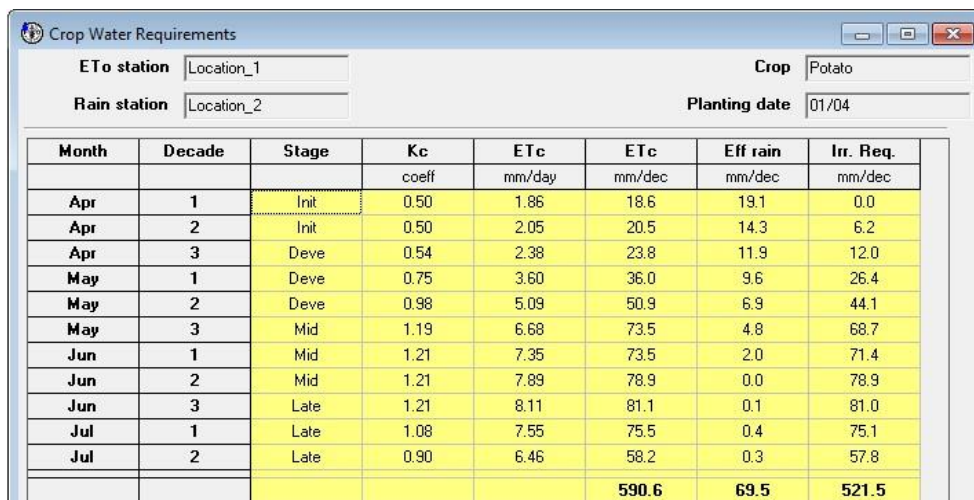
- **Crop type and cropping pattern data:**

- Select the “Crop” icon from the left vertical menu followed by “Open” from the second row of the top horizontal menu from the main screen and the screen given below will appear.
- Click the “FAO” folder and select your crop
- Check the crop data and make corrections if necessary

- Enter the crop planting date
- Save the file in the folder you have created for future use.

**Cropping Pattern:**

- Select the “Crop pattern” icon from the left vertical menu of the main screen
  - Fill in the “Cropping pattern name”
  - Now, place the cursor in the number 1 box under the “Crop file”, click the icon in front of the box and select your crop from the “FAO” folder.
  - Enter the crop planting date and the percentage of total area planted to the crop.
- **Crop water requirement (CWR) and Net irrigation water requirement (NIR):**
    - Now, CWR and NIR is now ready – All you need to do is click the “CWR” icon from the left vertical menu of the main screen.
    - Unlike the others, you don’t need to save this file for future use. It is calculated by the CROPWAT 8 based on the aforementioned climatic and crop data.



Month	Decade	Stage	Kc	ETc	ETc	Eff rain	Irr. Req.
			coeff	mm/day	mm/dec	mm/dec	mm/dec
Apr	1	Init	0.50	1.86	18.6	19.1	0.0
Apr	2	Init	0.50	2.05	20.5	14.3	6.2
Apr	3	Deve	0.54	2.38	23.8	11.9	12.0
May	1	Deve	0.75	3.60	36.0	9.6	26.4
May	2	Deve	0.98	5.09	50.9	6.9	44.1
May	3	Deve	1.19	6.68	73.5	4.8	68.7
Jun	1	Mid	1.21	7.35	73.5	2.0	71.4
Jun	2	Mid	1.21	7.89	78.9	0.0	78.9
Jun	3	Late	1.21	8.11	81.1	0.1	81.0
Jul	1	Late	1.08	7.55	75.5	0.4	75.1
Jul	2	Late	0.90	6.46	58.2	0.3	57.8
					590.6	69.5	521.5

**Exercise:**

1. Calculate ET<sub>0</sub>, Effective Rainfall, CWR and NIR of your nearest place using CROPWAT 8.0 and CLIMWAT 2.0.

**Conclusion:**

**Video Link:** <https://www.youtube.com/watch?v=9mCED2tfqAY>

## **Practical 15: Preparation of contingent crop plan**

- **Objective:** To learn about different contingent crop plan.
- **Contingency plan:** Contingency plan is a plan devised for an outcome other than usual plan.
- **Contingency Crop plan:** Contingency crop plan can be defined as a plan aimed and executed for an outcome other than in the usual and expected plan. In other words, it is frequently used for risk management when an exceptional risk occurs in future.
- **Stepwise preparation of contingent crop plan:**

The types are:

1. Inadequate and Uneven distribution of rainfall.
2. Long gap of rainfall.
3. Early onset of monsoon.
4. Late onset of monsoon.
5. Easy cessation of rains.
6. Prolonged dry spells.

- **Contingent crop plan #1:**

**Inadequate and uneven distribution of rainfall:**

- a) Cultivation of low water required crops
- b) Short duration crops grown
- c) Providing lifesaving irrigation.

- **Contingent crop plan #2:**

Long gap in rainfall

- a) Increase in seed rate to obtain more population
- b) Spraying urea solution
- c) Providing lifesaving irrigation
- d) Weeding and intercultural operations

- **Contingent crop plan #3:**

Early onset of monsoon:

- a) Cultivate Pearl millet, Seasmum

- **Contingent crop plan #4:**

Late onset of monsoon:

- a) Alternate crops and varieties: Castor, green gram, cowpea, sunflower.
- b) Dry sowing/ Kura sowing

- c) Pre-sowing
- d) Seed soaking/ treatments
- e) Transplanting of one month old Bajra seedling
- f) Complete weed control
- g) Grow legumes/ oilseed crops I place of seeds.

- **Contingent cop plan #5**

Early cessation of rains:

- a) Mulching
- b) Lifesaving irrigation
- c) Decrease in plant population.

- **Contingent crop plan #6**

Prolonged dry spells:

- a) If 10 days dry spells in DAS then resowing.
- b) If mild moisture stress at 30-35 DAS, thinning of alternate rows of Sorghum and Pearl millet
- c) If severe moisture stress at 30-35 DAS, cutting of Sorghum and Pearl millet and ratooning.
- d) If moisture stress at blooming stage, cutting of sorghum ad pearl millet.
- e) In-situ water harvesting
- f) Lifesaving irrigation
- g) Wider spacing for moisture conservation
- h) Weed control to save water, nutrients.

- **Online Contingency Crop Planning**

1. Go to the link: <https://agricoop.nic.in/en/agriculture-contingency-plan-listing>
2. Choose any State
3. Choose the districts for which you want contingency crop planning and you will get Agriculture Contingency Plan for District

OR

1. Go to the link: <http://www.nicra-icar.in/nicarevised/index.php/state-wise-plan>
2. Choose any State
3. Choose the districts for which you want contingency crop planning and you will get Agriculture Contingency Plan for District

### Agriculture Contingency Plan

- [» A AND N ISLANDS](#)
- [» LAKSHADWEEP](#)
- [» ANDHRA PRADESH](#)
- [» MADHYA PRADESH](#)
- [» ARUNACHAL PRADESH](#)
- [» MAHARASHTRA](#)
- [» ASSAM](#)
- [» MANIPUR](#)
- [» BIHAR](#)
- [» MEGHALAYA](#)
- [» CHANDIGARH](#)
- [» MIZORAM](#)
- [» CHHATTISGARH](#)
- [» NAGALAND](#)

**Exercise:**

1. State the steps to find contingency crop plan for your home district.

**Conclusion:**

**Video Link:** <https://youtu.be/0RcGJKtHhcU>

**Syllabus (According to ICAR 5<sup>th</sup> Dean Committee report)**

Study of Computer Components, accessories, practice of important DOS Commands. Introduction of different operating systems such as windows, Unix/ Linux, Creating, Files & Folders, File Management. Use of MS-WORD and MS Power-point for creating, editing and presenting a scientific Document. MS-EXCEL - Creating a spreadsheet, use of statistical tools, writing expressions, creating graphs, analysis of scientific data. MS-ACCESS: Creating Database, preparing queries and reports, demonstration of Agri-information system. Introduction to World Wide Web (WWW). Introduction of programming languages. Hands on Crop Simulation Models (CSM) such as DSSAT /Crop-Info/ CropSyst/ Wofost; Computation of water and nutrient requirements of crop using CSM and IT tools. Introduction of Geospatial Technology for generating valuable information for Agriculture. Hands on Decision Support System. Preparation of contingent crop planning. Forecasting and early warning.

**Lesson Plan:**

1	(P) Study of computer components and accessories
2	(P) Practice of important DOS commands
3	(P) Introduction to different operating systems such as MS-Windows, Unix/ Linux, Creating Files and Folders, File Management
4	(P) Use of Microsoft Word
5	(P) MS Excel Mathematical calculations, Preparation of Spread Sheets
6	(P) MS Excel chart –Line, XY, Bar and Pie
7	(P) MS-Access: Creating Database, Preparation of queries, reports and forms
8	(P) Microsoft PowerPoint
9	(P) Basic concept of HTML for creating a Web page
10	(P) Demonstration of Agri-information Systems
11	(P) Introduction to Programing Language : C
12	(P) Hands on Decision Support System and Crop Simulation Model: DSSAT
13	(P) Introduction to Geospatial Technology for generating valuable information for Agriculture
14	(P) Computation of water requirement of crop using CROPWAT 8.0 and CLIMWAT 2.0
15	(P) Preparation of contingent crop plan