

PRACTICAL MANUAL

(As per Recommendations of V Deans' Committee, ICAR, New Delhi)
For all SAUs of Maharashtra

Name of University:

Course Title : **Agri. Informatics**
Credits : **2 (1+1)**
Course No. : **COMP - 231**
Degree : **B.Sc. (Hons.) Agriculture**
Programme
Semester : **III Semester (New)**

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Semester : III (New)

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Name of University:

College of Agriculture,

CERTIFICATE

This is to certify that Shri / Miss
Reg.No..... a student of **III (New) Semester,**
B.Sc. (Hons.) Agriculture has completed all the exercises successfully
for the Course : **Agri. Informatics** Course No. : **COMP - 231 (New**
Course), during Academic Year 201 - 201 .

Place :

Date :

COURSE TEACHER

Remarks :

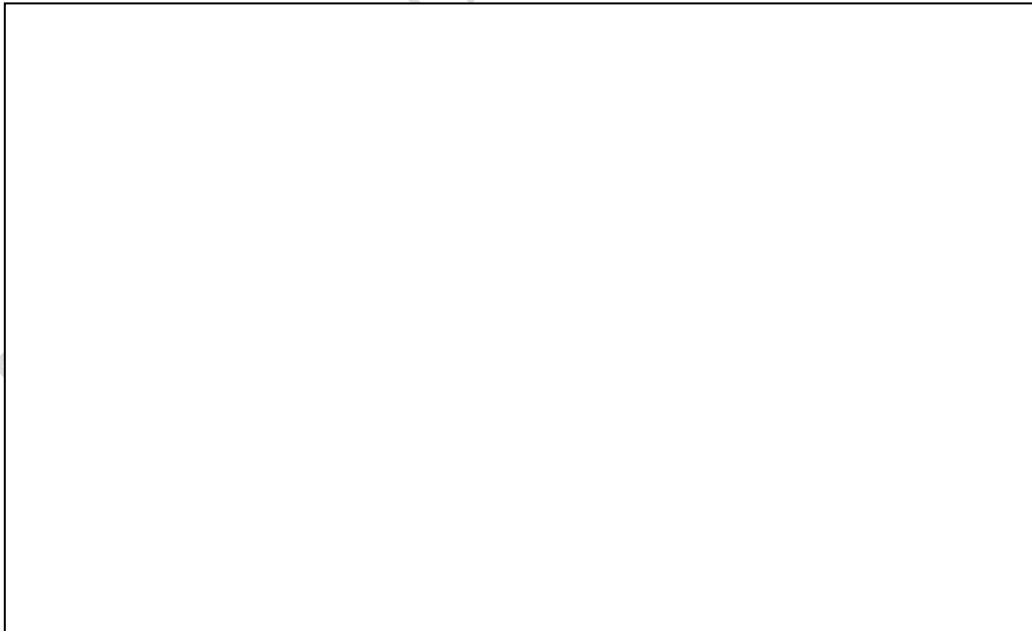
Practical 1 : Study of Computer Components and Accessories

1. Define Computer :

2. Explain following 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

Draw a Block Diagram of a Computer



Write Functions of units and some example devices of each :

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

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 semi conductor 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.

Fill the capacity column in the following table:

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

INPUT DEVICES:

Some commonly used input devices are listed below:

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

OUTPUT DEVICES: Some commonly used output devices are listed below:

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

Type	Characteristics
Dot matrix printer	9 pin/ 24 pin with speed of 300 cps.
	24 pin DMP with color facility
Line printers	speed of 600 LPM
Desk jet printers	100 LPM (Approx.)
Laser jet printers	12 PPM (Approx.)

Exercise :- Fill type of device and description column in the following table:

Sr. No	Device	Type of device	Description (function)
1	RAM		
2	Hard Disk		
3	Floppy Disk		
4	Mouse		
5	Compact Disk		
6	Key Board		
7	Visual Display Unit		
8	Printer		
9	Plotter		
10	Scanner		

Exercise: Write configuration of Computers / Terminals available in the laboratory:

Practical 2 : Practice for important DOS Commands

SOFTWARE:

A set of Instructions is called a PROGRAM. Software refers to a group of such programs related to a particular task. It causes the hardware to function in the desired way. A system without software is of no use. Software can be categorized as:

1. System Software (BIOS, Operating System, Device Drivers).
2. Application and Utility programs
3. General purpose packages.

OPERATING SYSTEM:

An operating System is the program that manages two interfaces; the interface between the user and the application and the interface between the applications and the computer devices and files. Operating system like DOS provides text base interface for user. Whereas a operating system like Microsoft windows provides graphical user interface (GUI) for user.

Write names of some of the OS mostly in use

1. _____
2. _____
3. _____

BOOTING YOUR COMPUTER:

1: DOS

As soon as the Computer is put 'ON', it performs its initial work Power On Self Test (POST) by executing the programs in ROM BIOS, executes instructions from the file AUTOEXEC.BAT and stops with one of the following prompts:

A:> (If the Computer is booted from Floppy Disk)

C:> (If the Computer is booted from Hard Disk)

Where A or C indicate the logged drive.
Various DOS Commands can then be used for booting the computer depending on work to be carried out.

The DOS Commands are categorized as Internal and External Commands. Internal commands are those which are loaded into the computers memory when you start your computer. In contrast the external commands are loaded only when they are called.

In following table commands for **DOS** and **Linux** operating system are given

- What operating system you are working with? -----
- Execute the command in corresponding column shown below.
- Understand meaning of each command given below.

DOS Commands	Linux Commands
- dir/p	- ls more
- mkdir mydir	- mkdir mydir
- cd mydir	- cd mydir
- copy con demo.txt	- cat > demo.txt
- dir demo.txt	- ls -l demo.txt
- copy demo.txt demo1.txt	- cp demo.txt demo1.txt
- dir	- ls
- type demo.txt	- cat demo.txt
type demo1.txt	cat demo1.txt
- mkdir mydir1	- mkdir mydir1
- cd..	- cd..
- dir c:\mydir	- ls mydir
- copy mydir\demo.txt mydir\mydir1	- cp mydir/demo.txt mydir/mydir1

External commands -- CHKDSK, FORMAT, MEM, MORE, TREE, DELTREE, SYS, VOL, LABEL
--

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

Practice Resizing window, File and Folder operations using following Procedure to study Graphical User Interface (GUI) of Operating System (OS)

Resize window

Open Window that you want to resize (Ex. My Computer window)

Click on Restore Button

Place Mouse pointer on either of the border of window

Press & Hold left mouse button, Move mouse

Change Properties

Click the Restore button



Place the mouse pointer in blank area



Click the right button



Click on properties



Select any option from given



Change them



Click on 'OK'

Create Folder

Double click on my Computer



Select D:\ and double click



Right click in blank area



Select new



Select folder



Type folder Name

Rename Folder operation

Right click
↓
Select rename option
↓
Rename the folder (Type new name)

Delete Operation

Select the folder
↓
Right click the mouse
↓
Select delete option

Cut Paste Operation

Right click on the folder
↓
Select cut option
↓
Now select the folder in which we have to copy the folder
↓
Right click in blank area
↓
Select paste option

Copy paste Operation

Right click on the folder
↓
Select Copy option
↓
Now select the folder in which we have to copy the folder
↓
Right click in blank area
↓

Select paste option

NOTE : Remember the difference between cut paste and copy paste. For all the above operations you can use different methods. For example for cut / copy / paste operation you can use cut / copy / paste buttons on standard toolbar.

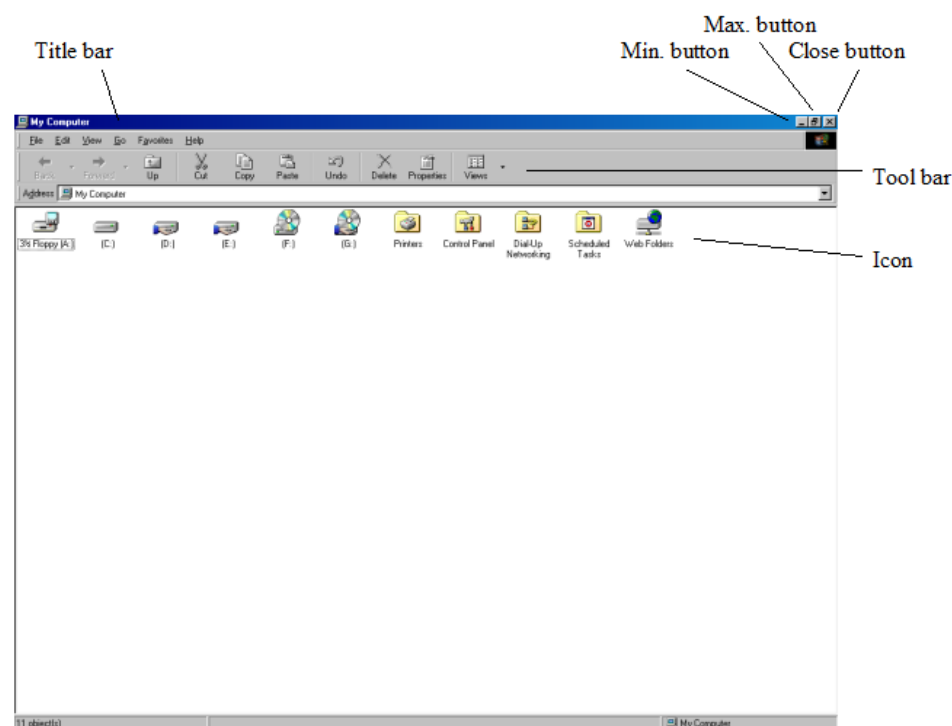


Diagram of My Computer Window

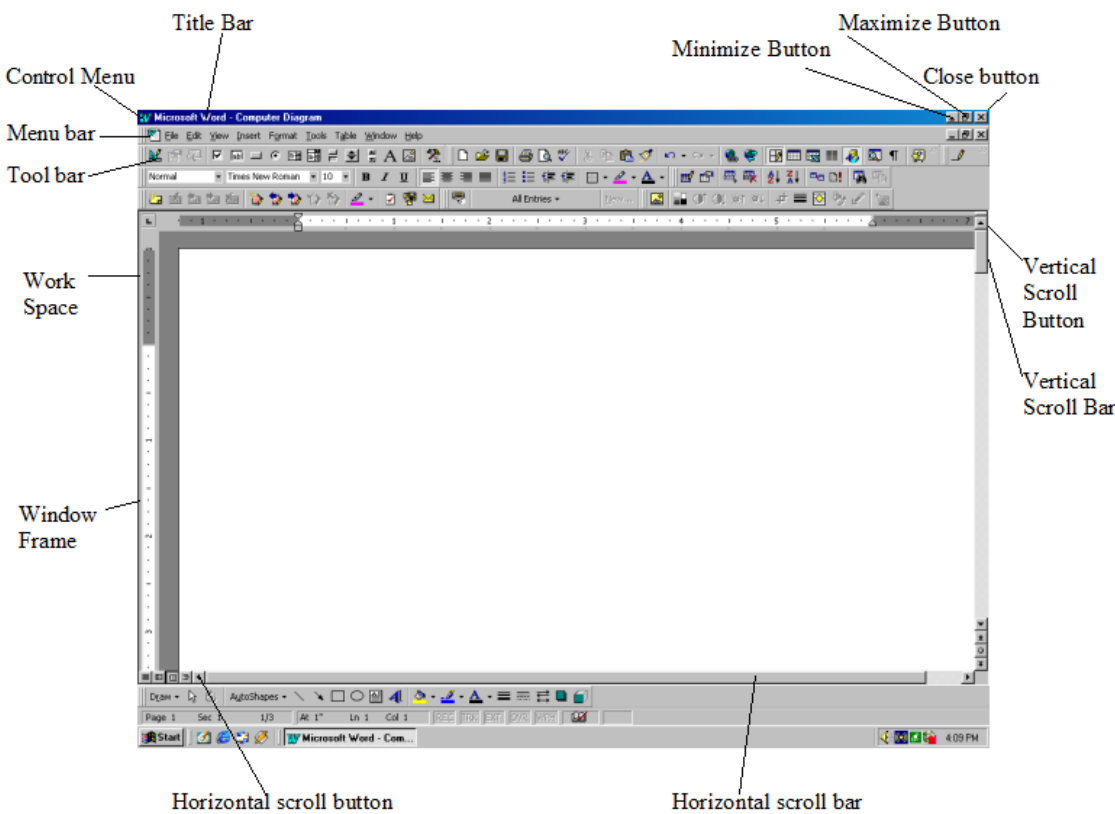


Diagram of Typical Window

Practical 4 : Word Processing – 1

1. **Word Processing – Using word-processing software provided to you and practice following activities. Write procedure and purpose of activities in your words on back page (If required attach additional sheet).**

- (a) Page set up
- (b) Opening Document / Non Document file
- (c) Paragraph/Line/Word - Formatting
- (d) Block marking
- (e) Operations on block
 - 1. Cut–Paste
 - 2. Copy – Paste
 - 3. Clip Board
 - 4. Writing block to disk
 - 5. Special Pest
- (f) File Operations
 - (i) Save
 - (ii) Save As
 - (iii) Export
 - (iv) Insert
- (g) Print
 - (i) Landscape, Portrait, Paper size
- (h) Tools
 - (i) Spell check & Grammar check

Q. No. 1 What do you understand by word processing? Name at least two popular word processor?

Q. No. 2 Differentiate between a document and a plain text file. How to convert a document in text file?

Q. No. 3 What is a special paste? What is a clipboard?

Practical : 5 Word Processing 2

Practice use of Tables using word processing software

Q1. Write the options in table Menu.

Q2. Write the Steps followed for table creation.

Q3. Create a following table.

Treatment	Plant height (cm)	Branches per plant	Functional leaves per plant	Mean leaf area per plant
1	2	3	4	5
Varieties				
V ₁ :HPR-35	29.05	4.40	0.51	2.13
V ₂ :PDR-14	33.54	6.63	3.36	3.05
V ₃ :HUR-15	30.52	5.17	0.70	2.41
V ₄ :VL-63	31.20	5.30	1.20	2.61
SE ₊	0.24	0.14	0.28	0.14
CD at 5%	0.75	0.43	0.83	0.42
Plant density				
S ₁ :3.33 lakh plants/ha (30 x 10cm)	32.24	4.77	1.19	2.02
S ₂ :2.22 lakh plants/ha (45 x 10 cm)	30.64	5.65	1.52	2.61
S ₃ :1.48 lakh plants/ha (45 x 15 cm)	30.36	5.71	1.62	3.04
SE ₊	0.23	0.10	0.15	0.06
CD at 5%	0.70		NS	0.19

Practice the following

Copy the table and perform

1. Cut Row no 3 and past after row no. 5
2. Copy Column no.2 and past after Column no. 4
3. Delete row no. 7
4. Add a single row after row no. 3
5. Add a column after 3
6. Delete column no. 4

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1. Using provided presentation software; prepare a slide show for results of Practical 4, 5, 11 and 13.

1. Using provided presentation software; prepare a slide show for results of Practical 4, 5, 11 and 13.

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. A faint, diagonal watermark is visible across the center of the page, reading "CG. VMKV, PARBHANI".

- DEPT. of AGRIC.

3. Write the procedure for import / export and inserting an object.

[illegible]

Practical 7 : Spread Sheet 1

Using spreadsheet software provided to you create a new spread sheet and store following data into it. Save it.

Humidity outside	Humidity Inside the green house
45	48
65	70
52	45
70	78
72	80
68	72
56	64
45	55
60	65
65	70
62	72
36	75
37	65
38	66

	Write Answers to following questions
1	How do you refer the range of cells containing Humidity inside the Green House?

2	How do you refer the range of cells containing Humidity outside the Green House?
3	How do you type a formula into a cell?
4	What is the difference between Absolute cell and Relative cell Referencing?

Practical 8 : Spread Sheet 2

	By Using Spread Sheet created in practical 7		
1	Work out the sum, average of columns and rows, Write down the formula used and results here		
	Activity	Formula	Result
	Sum Column A		
	Sum Column B		
	Average Column A		
	Average Column B		
	Sum Row 1		
	Average Row 1		
	Copy formula used for row1 to remaining rows		
2	Use and write purpose of Log10, LN and Log functions		

3	Use and write purpose of Sqrt , Median, Mode, Correlation, Regression, t-test arcsin functions.
---	---

Take help of electronic documentation of spread sheet software to understand use, example and syntax of function.

Practical 9 : Spread Sheet 3

Using the spread sheet find range, standard deviation, mean deviation, standard error, coefficient of variation and variance. .

Find the measures of dispersion using the values of grain yield per plot given below:

(yield in kg).

09.9	10.0	10.2
10.4	10.2	10.1
10.1	09.8	09.9
10.2	10.1	10.0
09.9	10.0	10.2
10.4	10.2	10.1
10.1	09.8	09.9
10.2	10.1	10.4

Formulae for understanding:

- 1) Range is the difference between largest and smallest of observations,
i.e. $\text{Range} = x_{\max} - x_{\min}$

- 2) Mean deviation of $x_1, x_2, x_3, x_4, \dots, x_n$ about an arbitrary origin A is given by

$$\text{Mean deviation about } A = (\Sigma |x_i - A|) / n$$

Where, A = mean

x_i = data

n = total number of entries

3) Variance : (sample) is given by

$$\frac{\sum (x_i - \text{mean})^2}{n - 1}$$

4) Standard deviation = (variance)^{0.5}

5) Standard error = $\frac{\text{Standard deviation}}{n^{0.5}}$

6) Coefficient of variation = CV = $\frac{\text{S.D.}}{\text{mean}} \times 100$

1. Prepare a line graph using following data

X	Y = 2x
2	4
4	8
8	16
5	10
20	40
80	160

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2. Prepare a pie graph using Male, Female, and Child population data of city.
Assume suitable data.
Save Graph.

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3. Retrieve above generated graph. Add legends and titles. Take a print out and attach it.

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4. Prepare a bar graph indicating crop yield per year and quantity exported
X axis - Year, Y axis - Yield, quantity exported

Year	Yield (tons)	Exported (tons)
1989	40	20
1990	75	50
1991	65	40
1992	100	20
1993	25	20
1995	125	100

Practical 10 : DBMS / RDBMS Creating, Updating database

Design and create a database to store district level Sorghum Production Information for Maharashtra state using RDBMS Software.

(For Preparation of this practical, course notes of training program "Web based Education and Training" conducted by NAARM, Hyderabad are used. Authors acknowledge NAARM for the same.)

Given:

- (i) List of districts
- (ii) Data sheet of sorghum production during 2014-2018
- (iii) Data sheet of sorghum area during 2014-2018

Step 1: Conceptual design of database structure (Identification of tables, keys, relationships)

(a) Following is the list all the fields (Columns) in table and their data types

- (i) DISTID (identification number of district – integer)
- (ii) DISTNAME (name of district – character)
- (iii) YEAR (integer)
- (iv) SORGHUMKA (area under sorghum in kharif season – number)
- (v) SORGHUMRA (area under sorghum in rabi season – number)
- (vi) SORGHUMKP (production of sorghum in kharif season-number)
- (vii) SORGHUMRP (production of sorghum in rabi season – number)

(b) Group data fields into tables by theme

Two tables will be required to store the data –

Table 1 will be the districts table and will contain the fields DISTID and DISTNAME.

Table 2 will be the area and production of sorghum table and contain the fields DISTID, YEAR, SORGHUMKA, SORGHUMRA, SORGHUMKP and SORGHUMRP.

DISTID will be the common field between the two tables

(c) Identify primary and related tables: Since the area and production of sorghum data is about districts, the primary table will be Table-1. Table 2 will be the related table containing information about area and production of sorghum in districts in different years.

(d) Identify the keys in each table and the relationships: In table 1, since DISTID takes unique values and identifies each row uniquely it is the primary key in table 1. In Table 2, none of the listed fields will take on unique values and can not therefore be used as a primary key. With the existing set of fields it will not be possible to uniquely identify a record. So, a new field (serial Number, NO) is introduced to be the primary key.

DISTID which is the common field between Table 1 and Table 2 can be used to connect or relate the records in the two tables. The relationship between the two tables can be established by connecting DISTED in Table 1 with DISTID in Table 2. When this is done DISTID becomes the foreign key in Table 2.

Why two tables are created? write answer in your words below

Step 2: Create the database file using provided RDBMS software and write procedure (Steps)

Step 3. Create tables

(a) Table 1: Design and create table with DISTID and DISTNAME: as two fields. The data type of DISTID is number (integer) and of DISTNAME is text. Make DISTID the primary key field.

Write Procedure used for creating table.

What are the different data types which can be assigned to a field?

Procedure for data entry –

Select DISTRICTS and select view in the Top bar and select Datasheet View. The table is displayed with a blank row. Alternately double clicking on DISTRICTS in database window also opens the table with the blank row. Data can be typed into each column of this row (or previously existing data can be edited).

Records can be sorted in ascending or descending order for each column after they are entered. Specific records can be selected from the record toolbar that is displayed at the bottom of the Table. Columns can be moved or resized by selecting the fields and dragging them to be desired location. Columns can also be hidden if required. Practice how to do these activity.

Open the Table and enter the data directly on screen for DISTID and DISTNAME.

(b) Table 2: Design the second table for data of annual area and production in *kharif* and *rabi* seasons by following the same procedure as for Table 1. The table will have the following fields.

NO, DISTID, YEAR, SORGHUMKA, SORGHUMKP, SORGHUMRA, and SORGHUMRP

NO field will be the primary key field. Choose the data type of this as Auto number.

Choose data type of all other fields is number.

Save this Table with the name SORGHUM

Creating relationships between the two tables –

DISTRICTS and SORGHUM in the database, using RELATIONSHIP option from the TOOLS menu. Use distid as common field for relationship. Write the procedure used.

DATA SHEET

Sample data sheet for Sorghum Production in Maharashtra from 2014 to 2018

No.	District	2014		2015		2016	
		<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>
1							
2							

Practical : 11 Querying / Retrieving Data , Relation

(For Preparation of this practical, course notes of training program "Web based Education and Training" conducted by NAARM, Hyderabad are used. Authors acknowledge NAARM for the same.)

Create a query to obtain sorghum yields and sort by district

Let sorghum yield in kharif season be represented by SORGHUMKY and in rabi season by SORGHUMRY.

(Queries are also Tables, with the difference that they are in response to questions asked on the data in the Tables. But unlike in Tables, the tables that are seen on the screen are not stored. What is stored is the question or the query. Each time the query is invoked, it is run and the output is seen as a table on the screen.)

1. Select QUERY tab on the database window, and select NEW for a new query.
The new query dialogue box appears.
2. Select Simple Query Wizard.
3. Select Tables and fields options (DISTID and DISTNAME from DISTRITS table and YEAR, SORGHUMKA, SORGHUMKP, SORGHUMRA and SORGHUMRP from SORGHUM table.
4. Assign the query a name (sorghum yield query).
5. In the database window, open the query. A table with data in selected fields appears.
6. Select design view in the query window, for setting criteria, sorting records and inserting new fields (sorghum yields SORGHUMKY and SORGHUMRY) that are derived from the selected fields by calculations.
7. Create new fields SORGHUMKY (for sorghum yield in kharif) and SORGHUMRY (sorghum yield in rabi) in the Fields row of the query design view as:
8. SORGHUMKY; (SORGHUMKP) / (SORGHUMKA)
9. SORGHUMRY; (SORGHUMRP) / (SORGHUMRA)
10. Create a parametric query to display information by district name. To do this, in the query design view, in the criteria row and field DISTNAME type:
11. (ENTER DISTNAME)

Save and open query to display result. The query will prompt the user for the name of the district.

Practical 12 : Introduction to World Wide Web (WWW) . Demonstration of Agri-information system.

Visit following URL (Web Site)

- <https://farmer.gov.in/>
- agims.wto.org
- [http:// icar.gov.in/](http://icar.gov.in/)
- <http://iasri.icar.gov.in/>

1. What information is available on above sites.
2. Are the contents static or dynamic in nature.
3. What are the components of Agriculture Information System.
4. List the Web sites which are beneficial for farming community.

Internet Browsing:

Use the Search engines, online reference services for collecting information

Enlist the search engines

- 1.
- 2.
- 3.
- 4.

Enlist the URL's (Uniform Resource Locator) of online resources

To complete this practical student need to do following paper work.

1. Decide a topic you would like to find more information about.

2. Compile a list of terms and phrases that you want in the search results as well as things you do not want:

List words and phrases to look for:	Words or phrases to leave out:

3. Compile search criteria that use Boolean logic to define the scope of your search:

4. Try your search criteria in several different sites listed above

Practical 13 : 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

Visit the sites :

- <https://dssat.net/about>
- <https://cropinfo.in/agriinfo/crop-information/>
- <https://en.wikipedia.org/wiki/CropSyst>
- http://modeling.bsyse.wsu.edu/CS_Suite/cropsyst/index.html
- <https://www.wur.nl/en/Research-Results/Research-Institutes/Environmental-Research/Facilities-Products/Software-and-models/WOFOST.htm>
- or any other related to crop simulation models.

What is DSSAT?

What Information about crops is available on crop-info website.

Computation of water and nutrient requirements of crop using CSM and IT tools

Practical 14 : Introduction to Geospatial Technology for generating valuable information for Agriculture

1) Define word Geospatial

2) With the help of Practical 12 search Literature / Research Papers / Lecture Notes Geospatial Technology.

3) With reference extracted from step 2 explain importance of GIS for agriculture field (attach separate blank sheet if needed)

Practical 15 : Hands on Decision Support System

Study the literature available at

<http://www.crida.in:8080/naip/home.jsp>

- 1) With the help of Practical 12 search Literature / Research Papers / Lecture Notes

To know what is DSS and how it works

- 2) With reference extracted from step 2 explain importance and working of DSS for agriculture field (attach separate blank sheet if needed)

**Practical 16 : Introduction of programming languages.
Preparation of contingent crop plan.**

What Is Programming Language ? Enlist Names and use of Some programming languages.

Write difference between MLL , HLL, and LLL.

How to write Algorithm and Flowchart. Explain with the help of example.

Preparation of contingent crop plan:

Visit following URL's to know more about

1. https://en.wikipedia.org/wiki/Contingency_plan
2. <http://www.crida.in/cp-2012/index.html>
3. <http://www.crida.in:82/contingencyplanning/>

Define contingency plan

Write in short about what inputs are needed for preparation of contingency plan for agriculture
