

**Mahatma Gandhi University
B. Sc Botany Programme**

SEMESTER II

Course 2

BO2B02U

General Informatics and Methodologies in Plant Sciences

A. General Informatics

(Theory 36 hours, Practical 36 hours) (Theory Credit 2, Practical credit 1)

General Informatics (Theory 18 hours, Practical 18 hours)

Module 1.

Overview of the information technology 3 hours

- Features of the modern personal computers and peripherals.
- Internet as a knowledge repository, e-mail, search engines (Google,), study of educational sites related to life sciences (DNAi, Scitable) , academic search techniques,(Science direct and INFLIBNET)
- Introduction to the use of information technology in teaching and learning

Module 2.

Use of computers 15 hours

- DOS – The basic concept of operating systems (Study of commands not required)
- MS-WINDOWS:- logging to windows, organizing files and folders, copying, moving, deleting and saving documents, installing software, installing hardware
- MS-WORD:- word processing using WORD, editing tools (cut , copy, paste,) formatting tools (font, paragraph) use of spell check, inserting tables (draw), inserting graphs and pictures
- MS-EXCEL:- Creating a worksheet, data entry, sorting (ascending and descending), use of statistical tools in EXCEL (SUM, MEAN, MODE, MEDIAN), preparation of graphs (bar diagram, pie chart and line graph)
- MS-POWERPOINT:- Creating a presentation, Inserting tables, charts and pictures into slides, Use of animation tools

Practicals

18 hours

1. Gather information and pictures on a given topic using the internet. Make a list of the sites visited for the purpose
2. Prepare a project report using MS-WORD based on the information and pictures gathered from the internet.
3. Prepare a worksheet using a set of data collected and find out the SUM, MEAN, MEDIAN and MODE using EXCEL
4. Prepare suitable tables/ charts/graphs based on the data using EXCEL
5. Prepare a powerpoint presentation based on the 1& 2 exercises

B. Methodologies of Plant Science (Theory 18 hours, Practical 18 hours)

Module 1.

Microtechnique

6 hours

- Introduction
- Microscopy:- simple, compound, phase contrast, fluorescent, confocal and electron microscopes (working principle and application only)
- Microtome:- rotary, sledge (application only)
- Killing and fixing :- Purpose,
Agents used:-
Killing agents – Formalin, Ethyl alcohol
Fixing agents - Carnoy's fluid, Farmers' fluid, FAA
- Dehydration:- Purpose, Agent used – Ethyl alcohol
- Sectioning:- Hand sections, microtomy
- Staining technique:- Principle of staining
Stains:- Safranin, Hematoxylin, Acetocarmine
Vital stains: Purpose , Examples: Neutral red and Evan's blue
Mordents : Purpose and examples
Single staining and Double staining
- Mounting and Mounting Media, Purpose of mounting media , Glycerin, DPX, Canada balsam
- Use of permanent whole mounts, permanent sections
- Maceration
- Smear and squash preparation

Practicals

2 hours

1. Maceration and identification of tracheary elements

Module 2

Biophysics

3 hours

- Principles and applications of colorimeter, spectrophotometer and centrifuge, Beer-Lambert's Law,
- Separation methods :- chromatography ; thin layer , paper, column (principle and applications only) , electrophoresis ; PAGE, Agarose gel electrophoresis(Principle and applications only)
- pH:- concept of pH, methods to measure pH ; pH paper and pH meter,
- Buffers:- definition, functions of buffers in biological systems, use of buffers in biological research, examples of commonly used buffers

Practicals

6 hours

1. Preparation of 0.1M sodium phosphate buffer (pH 6 and 7)
2. Measurement of pH using pH meter
3. Paper chromatography of plant pigments (demonstration)
4. Electrophoresis of nucleic acids (demonstration)
5. Column chromatography of plant pigments (demonstration)
6. Determination of the concentration of a given solution of CuSO_4 using colorimetry

Module 3

Biostatistics

8 hours

- Introduction, statistical terms and symbols
- Sample:- concept of sample, sampling methods,
- Collection and representation of data, graphic representation of data(Line graph, bar diagram, Pie diagram & Histogram)
- Measures of central tendency:- mean, mode, median
- Measures of dispersion:- standard deviation, standard error
- Distribution patterns:- normal distribution, binomial distribution
- t-test :- introduction, uses, procedure
- chi-square test:- introduction, uses, procedure

Practicals

10 hours

1. Collect numerical data and find out the central tendencies and prepare different types of graph mentioned in the syllabus
2. Familiarize with situations requiring t-test, chi-square test

Module 4

Research Methodology

1 Hour

- Need for research
- Types of research
- Scientific literature, Books, Research Journals, Reputed National and International journals in life sciences, Research paper
- INSDOC services
- Laboratory Etiquette
- Laboratory Hygiene

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