PERIYAR UNIVERSITY
SALEM – 636011

PERIYAR INSTITUTE OF DISTANCE EDUCATION
(PRIDE)

M.Sc., Botany

Regulations and Syllabus

Effective from the academic year
2007 – 2008 and thereafter
PERIYAR UNIVERSITY
SALEM – 11
M.Sc. BOTANY
REGULATION AND SYLLABUS
REGULATIONS

Eligibility

A pass in the B.Sc., Botany with any Ancillary Subject. Preference in admission will be given to teachers in recognised schools and Research Assistants in research institutions and laboratories, besides meritorious candidates.

Examinations

There shall be two examinations, one at the end of the First year (part – I) and another at the end of the Second year (Part – II).

A candidate will be permitted to go to the second year. If he / she has been permitted to sit for the 1 year examination, irrespective of his / her performance in the I year examination.

The examination for the degree shall consist of theory and practicals. Each candidate shall submit his laboratory record note books of all his / her practical work performed during the period of study for the examination. The record should be countersigned by the teachers, as a bonafide record of work performed by the candidates. it shall be submitted on the day of practical examination.
# Scheme of Examinations

## First Year

<table>
<thead>
<tr>
<th>Name of the Papers</th>
<th>Duration Hours</th>
<th>Maximum Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory Paper – I</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>Theory Paper – II</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>Theory Paper – III</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>Theory Paper – IV</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>Practical- I</td>
<td>4</td>
<td>150</td>
</tr>
<tr>
<td>Practical-II</td>
<td>4</td>
<td>150</td>
</tr>
<tr>
<td><strong>Total Marks of Part – I</strong></td>
<td><strong>700</strong></td>
<td></td>
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</tbody>
</table>
Note: Those who fail in the theory / practical examinations, may reappear for such examination alone. The marks once awarded for records, Herbarium and submission will remain the same and will be considered for any reappearance.

Passing Minimum

A candidate must secure 50% of marks for a pass in each theory or / and practical.

Classification of Candidates

I. Candidates who secured 60% and more of marks in the aggregate in the whole examination shall be declared to have passed the examination in First Class.

II. Candidates who obtain 75% and more of marks in the aggregate shall be provided to have passed the examination in First Class with distinction provided they pass all the examinations prescribed for the course in the first appearance.

III. Candidates who pass all the examinations prescribed for the course in the first instance and within a period of two academic years from the year of admission to the course are only eligible for ranking, if he / she stands first in the total marks amongst his / her classmates of that period.

IV. All other successful candidates shall be declared to have passed in Second Class.
PAPER – I

ALGAE, FUNGI, LICHENS, PLANT PATHOLOGY AND BRYOPHYTES

UNIT – I


UNIT – II

Systematic position, distribution, thallus structure, cell structure, pigmentation, method of reproduction and life history of the following genera of algae.

Scytonema, Hydrodictyon, Cladophora, Enteromorpha, Nitella, Cyclotella, Padina, Batrachospernum and Gracilaria.

UNIT – III


Detailed study of the occurrence, structure and reproduction of the following genera of fungi.

Peranospora, Rhizopus, Yeast, Penicillium, Puccinia, Lycoperdon and Fusarium.
A general account of lichens with special reference to their structure, nutrition, reproduction and economic importance.

**UNIT – IV**


Host – pathogen interaction – physiological, chemical and bio – defence mechanism in host.


Study of the following plant disease with reference to causes, symptoms, dissemination, control and preventive measures – Bacterial blight of Rice, wilt of cotton, Bunchy top of banana, Little leaf of Brinjal.

**UNIT – V**


Structure and reproduction of the following genera of Bryophytes – Reboulia, Porella, Anthoceros and Sphagnum.
Reference Books

Algae

5. Fritsch F.E. 1945, 1955 The structure and reproduction of algal vol – I, II

Fungi and Lichens


**Bryophyta**

10.Ram udar., 1976 Bryology in India.
**Plant pathology**

5. Nagarajan., S. 1983 plant diseases Epidemiology oxford IBH.

**Practicals**

Detailed study of the vegetative and reproductive morphology of the genera of Algae, Fungi, Lichens and Bryophytes included in the syllabus. Study of the disease mentioned in the syllabus.
PAPER – I
ALGAE, FUNGI, LICHENS, PLANT PATHOLOGY AND
BRYOPHYTES.

Time : 3 Hours  Maximum : 100 Marks

Draw diagrams wherever necessary
Part – A (5 X 5 = 25 Marks)
Answer All Questions

1. (a) Give a brief account of prokaryotic cell
   Or
   (b) Describe the branching and cell structure of Cladophora.

2. (a) Describe briefly alternation of generation in an algae.
   Or
   (b) Describe briefly the structure and a sexual reproduction in
       Cyclotella.

3. (a) Describe the types of spores produced by Puccinia graminis.
   Or
   (b) Write notes on the economic importance of lichens.

4. (a) Write short note Little leaf of Brinjal
   Or
   (b) Explain the causal organism, symptoms and control measures of
       Blight of Rice.

5. (a) Describe the structure and morphology of Reboulia.
   Or
   (b) Write an account of any four vegetative reproduction in Bryophytes.
Part – B (5 X 15 = 75 marks)

Answer all questions.

6. (a) Trace the lines of evolution in the thalli organisation of chorophyceae.

Or

(b) Explain the unique features of Nitella. How is it more advanced among the Charophyta.

7. (a) Write an essay on organisation of thallus, cell structure asexual and sexual reproduction in Bactrochospermum.

Or

(b) Write an essay on the economic importance of algae

8. (a) Describe the different mechanisms of spore dispersal in fungi

Or

(b) Describe different types of fruit bodies in fungi.

9. (a) Describe the biological method of controlling the disease.

Or

(b) What are the various types of defense mechanisms exhibited by plants and explain any four in detail.

10. (a) Describe the structure and evolution of sporophytes in bryophytes.

Or

(b) Describe the structure and reproduction of Sphagnum.
PAPER – II
PTERIDOPHYTES, GYMNOSPERMS AND PALAEOBOTANY

OBJECTIVE

To understand the general features, Origin, Structure (External and Internal), Reproduction, Evolution and Economic importance of Pteridophytes and Gymnosperms. Also to impart knowledge on Fossilization, Geological time scale, structural details of fossil plants of these groups and techniques of fossil study.

UNIT I


UNIT II

Range in Morphology, Structure, Reproduction, Gametophyte and Embryogeny in Psilotum, Equisetum, Isoetes, Ophioglossum, Angiopteris, Osmunda, Pteris and Salvinia.

UNIT III

General characters, Distribution, Phylogeny, and Economic Importance of Gymnosperms – Classification of Gymnosperms (Sporne 1965) – Evolution of male and female gametophytes in Gymnosperms.
**UNIT IV**


**UNIT V**

Geological Time Scale – Types of Fossils – Methods of Fossilization – A study of the following fossils of Pteridophytes and Gymnosperms.

<table>
<thead>
<tr>
<th>Pteridophytes</th>
<th>Gymnosperms</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Rhynia</td>
<td>A. Lagenostoma</td>
</tr>
<tr>
<td>B. Lepidodendron</td>
<td>B. Cordites</td>
</tr>
<tr>
<td>C. Calamites</td>
<td>C. Pentoxylon</td>
</tr>
</tbody>
</table>

**PRACTICALS**

01. Structural details of the vegetative and reproductive parts of the types included in unit II and unit IV of the theory syllabus.

02. Structural details of the fossils through fossil slides.
REFERENCE BOOKS

PART - A

Answer all the questions (5 x 5 = 25)

1. (a) Give the important features of the gametophytes of pteridophytes.
   Or
   (b) List out the salient features of the morphology of pteridophytes.

2. (a) Write a short note on Psilophytales.
   Or
   (b) What are the important features of Isoetales.

3. (a) Describe the structure of sorus in Angiopteris.
   Or
   (b) Describe the internal structure of Equisetum stem.

4. (a) Explain the anatomy of the Gnetum stem
   Or
   (b) Describe the structure of Cordaites Leaf

5. (a) Write a short note on cycadales.
   Or
   (b) Explain the structure of stem in Cupressus.
PART- B

Answer all the questions (5 x 15 = 75)

6. (a) Give an account on the Reimer’s classification of pteridophytes.

   Or

   (b) Write an essay on the evolution of sporophytes in Pteridophytes.

7. (a) Enumerate the salient features of the Ophioglossales.

   Or

   (b) Give an account on Osmundales.

8. (a) Write an essay on Heterspory and seed habit

   Or

   (b) Explain the different methods of fossilization in Pteridophytes.

9. (a) Explain the evolution of female gametophytes in gymnosperms.

   Or

   (b) Give an account on the economic importance of Gymnosperms

10. (a) Give an account on Pentoxylales.

    Or

    (b) Write an essay on the evolution of Coniferales.
PAPER III
TAXONOMY OF ANGIOSPERMS AND ECONOMIC IMPORTANCE

UNIT – I


UNIT – II

Modern trends in classification Taximetrics, Chemotaxonomy, Botanical Survey of India [BSI]. ICBN, Herbarium technique. Typification, Priority, Publication, Author Citation.

UNIT – III

A detailed account of the following families and their economic importance.

- Ranunculaceae
- Magnoliaceae
- Capparidaceae
- Caryophyllaceae
- Meliaceae
- Sapindaceae

UNIT – IV

- Asteraceae
- Sapotaceae
- Asclepiadaceae
- Solanaceae
- Bignoniaceae
- Verbenaceae

UNIT – V

- Amaranthaceae
- Euphorbiaceae
- Casuarinaceae
- Typhaceae
- Poaceae
- Zingiberaceae
PRACTICALS

Taxonomy

Identification of specimens belonging to the families included in theory syllabus at family, generic and specific levels. Familiarity with the use of floras.

REFERENCE

12. Rendle, A.B. the Classification of flowering plants Vol. I and II.


PAPER - III
TAXONOMY OF ANGIOSPERMS AND ECONOMIC IMPORTANCE

Time : 3hrs  Maximum : 100 Marks

PART – A
Answer all questions (5 X 5 = 25)

1. (a) Explain the natural system of classification
   Or
   (b) Discuss the ancestors of angiosperms

2. (a) Write a short notes on BSI.
   Or
   (b) Comment on Taximetrics

3. (a) Bring out the characteristic features of Magnoliaceae
   Or
   (b) Write notes on the Floral variation in Meliaceae

4. (a) Describe the general features of Sapotaceae
   Or
   (b) Write on the Adnation in Solanaceae

5. (a) Write notes on the Floral variation in Euphorbiaceae
   Or
   (b) Discuss the systematic position of Casuarinaceae
PART – B

Answer all questions (5 × 15 = 75 Marks)

6. (a) Give an account on Engler and Prantl’s classification.
    Or
    (b) Write an essay on the origin and evolution of Angiosperms.

7. (a) Give the organisation, function and Contribution of BSI.
    Or
    (b) Write an essay on chemotaxonamy.

8. (a) Give a comparative account of the families of Capparidaceae and Caryophyllaceae.
    Or
    (b) Bring out the economic value of the following families
        1. Magnoliaceae
        2. Sapindaceae
        3. Meliaceae.

9. (a) Describe the features of Asclepiadceae.
    Or
    (b) Floral variation in Bignoniaceae and Verbenaceae.

10. (a) Describe the features of Amaranthaceae and Polygalaceae.
    Or
    (b) Give a comparative account of Typhaceae and Poaceae.
PAPER - IV
PLANT ANATOMY, EMBRYOLOGY AND MICROTECHNIQUE

UNIT – I


UNIT – II


UNIT – III


UNIT – IV

Structure and development of different types of Endosperms. Embryo development – Dicot (Capsella bursa – pastoris) monocot (Luzula forsteri) polyembryony, apomixes.

UNIT – V

Microtechnique steps – Fixation & fixatives, dehydration clearing, infiltration, embedding & block making, microtome – Rotary, sledge & freezing, Section cutting, staining. Camera lucida – types principle,

PRACTICALS

Study of suitable examples to understand the anatomy of plants based on the theory syllabus.

Suitable examples to illustrate the features in the theory syllabus with the help of embryo mounting, pollen types, and whole mounts.

Knowledge of the function of rotary and sledge microtome. Measure and calculate the macerated elements by micrometry. Submission of 5 double stained permanent hand sections.

REFERENCE BOOKS

Anatomy


Embryology


Microtechnique

1. Patki, Balachandra and Jeevaji, An introduction to Microtechnique

**PAPER - IV**

**PLANT ANATOMY, EMBRYOLOGY AND MICROTECHNIQUE**

**PART – A**

*Answer all questions (5 X 5 = 25)*

1. Write a short notes on periderm
   
   Or
   
   Write notes on plasmodesmata

2. Describe the ontogeny of dorsivental leaf
   
   Or
   
   Explain the different types of sclereids.

3. Explain Hypostase and Epistase
   
   Or
   
   Explain pollen kit and its function.

4. Write a short notes on ruminate endosperm
   
   Or
   
   Write short notes on Apomixis

5. Write a short notes on camera Lucida
   
   Or
   
   Write a short notes on Fixatives.

**PART – B**

*Answer all questions (5 X 15 = 75)*

6. Describe the different theories of shoot apical meristem.
   
   Or
   
   Explain the structure of vascular cambium
7. Describe the structure and function of secondary xylem
   Or
   Describe the anomalous secondary growth in Dicot stem

8. Write an essay about the development of male gemetophyte
   Or
   Write an essay on sexual incompatibility

9. Give an account of polyembryony
   Or
   Write an essay about the embryo development in Dicot (Capsella)

10. Write an essay on parrafin and Freezing microtome
    Or
    Write an essay on Transmission Electron microscope.
UNIT - I

General Organisation of Plant cell. Molecular Organisation of the cell membrane; cell permeability. Types of Plastids. Ultrastructure, function and biogenesis of chloroplast.


UNIT - II


Special types of chromosomes – Polytene chromosome, Lampbrush chromosome, B – chromosome and Isochromosomes. Identification of chromosomes – Banding technique.

UNIT - III

Mendel’s work – Monohybrid cross and law of segregation; Dihybrid cross and law of independent assortment. Interaction of genes – (Incomplete dominance; Co-dominance, Epistasis, Complementary genes, Duplicate genes). Quantitative inheritance, Multiple alleles, with reference to blood group in humans. Linkage and recombination – gene mapping.
UNIT- IV

The genetic control of sex in plants: Sex chromosomes and sex-linked inheritance, extranuclear transmission of traits. Variation in chromosomes number; chromosomal aberrations.

Chemical nature of DNA and RNA. Replication of DNA.

UNIT - V

Gene transcription, genetic code and translation. Genetic regulation in prokaryotes (The Lac operon model). Mutation types – Mutagenic agents; Significance of mutation.

Gene and genotype frequencies; The Hardy – Weinberg Law.

PRACTICALS

1. Study of mitosis and meiosis - squash and smear techniques.
2. Demonstration of salivary gland chromosomes.
3. Examination of electron micrographs of cell organelles.
4. Genetic problems in mendelism, gene interactions and sex linkage.
5. Construction of chromosomes map.
REFERENCE

1. a) Write notes on the DNA of Chloroplast.
   Or
   b) Describe the functions of Dictyosome.

2. a) Comment on the significance of meiosis.
   Or
   b) What are B chromosomes.

3. a) Explain the phenomenon of Epistasis.
   Or
   b) Give an account of gene mapping.

4. a) Describe the replication of DNA.
   Or
   b) Briefly explain the operon concept.

5. a) What are the salient features of genetic code.
   Or
   b) Write notes on mutagenic agents.
PART – B
Answer all the Questions (5 X 15 = 75 Marks).

6. a) Describe the structure and function of plasma membrane.
   Or
   b) Give an account of Microbodies.

7. a) Explain the special types of chromosomes.
   Or
   b) How banding technique is helpful in the identification of chromosomes.

8. a) Using suitable examples explain the process of quantitative inheritance.
   Or
   b) Write an essay on the genetic control of sex.

9. a) Describe the Organisation and function of DNA.
   Or
   b) Give an account of the mechanism of Protein synthesis.

10. a) Write an essay on Mutation.
    Or
    b) Explain the Hardy – Weinberg Law.
PAPER - VI
MICROBIOLOGY AND BIOTECHNOLOGY

MICROBIOLOGY

UNIT – I


UNIT – II


BIOTECHNOLOGY :

UNIT – III

UNIT – IV


UNIT – V


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PRACTICALS

1. Cleaning and sterilization of glasswares.
2. Preparation of culture media – agar slant, Agar plate.
3. Isolation of microbes by soil dilution technique
4. Gram staining of bacteria
5. MBRT of milk (Phosphotase test)
6. Study of biotechnologically important chemicals
7. Isolation of leaf protoplasts (mechanical method)
REFERENCE BOOKS

1. Microbiology – essentials and Applications : Larry MeKane, Judy
   Kandel, McGraw hill Inc.

TEXT BOOKS

1. Microbiology – essential and Application, Mc Kane and Kannel, Mc
   Graw Hill Publishing Co.,
2. General Microbiology, C.B. Powar, H.F. Daginwala, Himalaya
   Publishing House
3. Microbiology, concepts and applications. Ketchum, P.A. Wiley
   Publications, USA
4. Microbiology, Mani – A, et.al. saras publications, Nager koil,
   Kanyakumari District.
5. Industrial Microbiology, Casido,j.r, Willey Eastern Ltd., ISBN.
6. Industrial Microbiology, Read. A. Prescott and Dunns, AOS
**BIOTECHNOLOGY**

**REFERENCE BOOKS**


**TEXT BOOKS**

PART – A

Answer the all questions (5X5 =25 Marks)

1. a) Write about the methods of microbial growth.
   Or
   b) Write about fermentation technology.

2. a) Give an account on microbial insecticides.
   Or
   b) Write about toxins.

3. a) Give an account on the role of nucleases in Recombinant D.N.A. technology.
   Or
   b) Write about amplification of genes.

4. a) Discuss about Micropropagation.
   Or
   b) Describe somatic embryogenesis.

5. a) Write notes on Cybrids.
   Or
   b) Give an account on somatic hybridization.
PART – B

Answer the all questions (5x15 = 75 Marks)

6. a) Describe the various types and preparation of culture media

Or

b) Give a brief account on microbial products

7. a) What are vitamins ? Give a detailed account of vitamin - B\textsubscript{12}

Or

b) List out microorganisms producing enzymes and add note on their production and application.

8. a) Write an essay on different methods used in the production of transgenic plants.

Or

b) Write an essay on the role of vectors in Recombinant D.N.A. technology.

9. a) Write in detail about the isolation, culture and application of cell culture.

Or

b) Write an essay on biotechnological applications of plant cell and tissue culture in Agriculture.

10. a) How will you isolate protoplasts from the plant cells ? Give the application of protoplast culture.

Or

b) Write about protoplast fusion technique and application.
PAPER - VII
PLANT PHYSIOLOGY AND BIOCHEMISTRY

PLANT PHYSIOLOGY

UNIT – I


UNIT – II


UNIT – III


UNIT – IV


UNIT – V: BIOCHEMISTRY

PRACTICLES

1. Measurement of membrane permeability as affected by chemicals
2. Separation of photosynthetic pigments by paper chromatography
3. Estimation of photosynthetic pigments (Arnon’s method)
5. Estimation of total free amino acids (Moore and Stein’s method)
   Or
   Estimation of protein (Lowry’s method)

REFERENCE


PART – A

Answer all questions(5 X 5 = 25 Marks)

Draw diagrams wherever necessary

1. (a) Explain the passive absorption of water.

Or

(b) Describe the ion – channels of solute transport.

2. (a) Give the schematic diagram of photophosphorylation.

Or

(b) Describe the glycolate metabolism during photorespiration.

3. (a) Draw the Kreb’s cycle schematically

Or

(b) Write an account on the symbiotic nitrogen fixing organisms.

4. (a) Write notes on photoperiodism

Or

(b) Give an account on vernalization.

5. (a) How the carbohydrates are classified ?

Or

(b) What are the aliphatic amino acids ?
PART – B
Answer all questions (5 X 15 = 75 Marks)

Draw diagrams wherever necessary

6. (a) Explain the mechanism of stomatal transpiration.  
Or  
(b) Explain the role and deficiency symptoms of micro and macro nutrients.

7. (a) Describe the Calvin cycle.  
Or  
(b) Explain the Hatch and Slack pathway.

8. (a) Describe the glycolysis pathway.  
Or  
(b) Explain the GDH, GS and GOGAT pathway.

9. (a) What are the physiological effects of auxins and gibberellins?  
Or  
(b) Write an essay on dormancy of seeds and seed viability.

10. (a) Describe the secondary and tertiary structure of proteins.  
Or  
(b) Explain the mode of action of enzymes.
PAPER - VIII
PLANT ECOLOGY AND PHYTOGEOGRAPHY

UNIT – I


UNIT – II


UNIT – III

Autecology and Synecology – Population ecology. Quantitative analysis of plant community structure (quadrat, transect and point methods). Habitat ecology (Fresh water, Marine and Estuary).

UNIT – IV

UNIT – V


REFERENCES


PRACTICALS

1. Estimation of Soil moisture
2. Determination of pH of Soil and water samples.
3. Simple quadrat method of studying vegetation
4. Line transect method of studying vegetation
5. Measuring the transparency level of an aquatic system using secchi disc.
6. Spotting of phytogeographical regions of India.
PART – A

Answer the all questions (5 x 5 = 25)

1. a) Write short notes on wind.
   Or
   b) Explain soil erosion.

2. a) Add a note on Decomposers.
   Or
   b) Write short notes on succession.

3. a) Define Autecology and Synecology.
   Or
   b) Write short note on Ecads and Ecotypes.

4. a) Add a note on green house effect.
   Or
   b) Write short notes on Red Data book.

5. a) Define age and area hypothesis.
   Or
   b) Define Endemism with an example.
PART – B
Answer the all questions (5x15 = 75)

6. a) Explain the effect of light on vegetation. Add a note on its significance.

Or

b) Write an essay on soil erosion and its control measures.

7. a) Explain in detail about the energy flow in an ecosystem.

Or

b) What is plant succession? Write an essay about lithosere.

8. a) What are the various methods used to study a plant community.

Or

b) Give an account on autecology studied of a species.

9. a) Write an essay about water pollution and their control measures.

Or

b) Write an essay about conservation of natural resources.

10. a) Give an account on remote sensing and its applications.

Or

b) What are the various phytogeographical regions of India.
**PRACTICAL - I**

**COMPRISING THE THEORY.**

**PAPERS I & II (ALGAE, FUNGI, LICHEN, PATHOLOGY, BRYOPHYLES, PTERIDOPHYTES AND GYMNOSPERMS)**

Time : 4 Hrs

<table>
<thead>
<tr>
<th>Practical</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record (2)</td>
<td>30</td>
</tr>
<tr>
<td>Submission</td>
<td>10</td>
</tr>
<tr>
<td>Viva – voce</td>
<td>10</td>
</tr>
</tbody>
</table>

**Max. Marks : 150**

1. Make suitable micropreparation of A, B and C. Draw labelled sketches Identify giving seasons. Submit the slides for valuation

   \[(3 \times 9 = 27)\]

2. Make suitable micropreparation of D, E and F. Draw labelled sketches identify giving seasons. Submit the slides for valuation

   \[(3 \times 9 = 27)\]

3. Identify any two algae from the given algal mixture G. Draw diagrams only.

4. Name the genus and group of the given specimens. H, I, J and K.

   \[(4 \times 2 = 8)\]

5. Draw diagrams and notes of interest on. L, M, N and O.

   \[(4 \times 5 = 20)\]

6. Name the causal organism, disease symptoms and control measures of pathological specimen P.

   \[(8 \text{ marks})\]

**Key**

1. A, B, C materials each one from Algae, Fungi and Bryphytes.

2. D, E and F. Materials each one from Pteridophates and Gymnosperms. (Vegetative / Reproductive).

3. G. Microscopic algal material
5. L. Fossil Slide. M. N and O – Permanent Slides
6. P = Pathological specimen
PRACTICAL PAPER – II
COMPRISING THE THEORY
PAPERS III & IV (TAXONOMY, ANATOMY, EMBRYOLOGY AND
MICROTECHNIQUE)

Practical : 100
Record (2) : 30
Submission : 10
Viva : 10
Max. Marks : 150

1. Find the binomials of A, B and C  
   3 X 5 = 15

2. Refer specimens D, E and F to their respective families giving reasons at each level of hierarchy  
   3 X 7 = 21

3. Describe the given plant specimen G in botanical terms with diagram  
   1 X 10 = 10

4. Cut transverse section of H and I. Identify with suitable diagram and reasons. Submit the slide for valuation.  
   2 X 10 = 20

5. Dissect and mount any two stages of embryo from the given material J. Submit the slide for valuation.  
   2 X 4 = 8

6. Name the family, genus and species K and L.  
   2 X 3 = 6

7. Name the family, genus, species and economic importance of M, N and O.  
   3 X 4= 12

8. Write a short notes on P and Q.  
   2 X 4 = 8
PRACTICAL PAPER III
COMPRISING THE THEORY.
PAPERS V & VI (CELL BIOLOGY, GENETICS, MICROBIOLOGY & BIOTECHNOLOGY)

Practical : 110
Record (2) : 30
Viva – voce : 10
Max. Marks : 150

1. Make a squash preparation of A. 15
   Display any two stages of cell division.
   Draw diagrams. Submit the slides for valuation.

2. Prepare a smear of B. 15
   Display any two stages of cell division.
   Draw diagrams and submit the slides for valuation.

3. Solve the genetic problems C and D. 20

4. Construct a chromosome map from the given data. 25

5. Determine whether the given sample F is contaminated with bacteria or not. Leave the sample for valuation. 10

6. Isolate the protoplasm of the given material G by mechanical method. 10

7. Write notes of interest on H, I and J. 15

Key

H – Cell Biology
I – Microbiology
J – Biotechnology
PRACTICAL PAPER – IV
COMPRISING THE THEORY
PAPERS VII & VIII (PLANT PHYSIOLOGY, BIOCHEMISTRY, ECOLOGY AND PHYTOGEOGRAPHY)

Practical : 110
Record : 30
Viva – voce : 10
Max. Marks : 150

1. Set up the experiment A assigned to you. Record your observation and interpret the results. Leave the set up for valuation 25
2. Set up the experiment B assigned to you. Record your observation and interpret the results. Leave the set up for valuation 25
3. Construct a meter quadrat C. Analyze the Vegetation. Record your data. Interpret the results. 20
4. Determine the pH of the given soil / water sample D. 10
5. Write critical notes on E, F, G, H, I, J 6 X 5 = 30

Key
A – Plant Physiology
B – Biochemistry
C – Quadrat
D – Soil / Water Sample
E, F – Physiology
G – Biochemistry
H, I – Ecology
J – Phytogeography.