"**Education for Knowledge, Science and Culture.”**

– Shikshanmaharshi Dr. Bapuji Salunkhe

VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR.

B.Sc. Part II CBCS syllabus with effect from June 2019

Semester : III Botany- Paper III

BOTANY- DSC 7 C

“ Taxonomy, Embryology and Plant Physiology”

Theory: 60 Hours(75 Lectures)Credits : 4

Section –I

“Taxonomy and Embryology”

Unit : I. Organization of flower : 05 hrs

1a: Concept of flower as a modified shoot, structure of typical flower.

1b. Structure of typical stamen, microsporogensis, pollen germination and development of male gametophyte.

1c. Structure of typical gynoecium, structure of a typical ovule, types of ovules.

1d. Megasporogenesis, structure of embryo sac: Monosporic (*Polygonum*) ,Bisporic (*Allium*) and Tetrasporic (*Pepromia*) development of female gametophyte.

Unit: II. Pollination and Fertilization : 12 hrs

2a.Definition, Types and mechanism in Anemophily (*Zea mays*), Entomophily (*Calotropis*) and Hydrophily (*Vallisneria*), Mimicry (*Orchid*).

2b. Fertilization: Entry of pollen tube,double fertilization and triple fusion.Significance of double fertilization.

2c: Structure and development of embryo in Monocotyledons.

2d: Structure and development of embryo in Dicotyledons.

2e: Development of endosperm, Types of endosperm- Nuclear, Helobial and Cellular.

2f: Apomixes

Unit: III. Taxonomic Literature 05 hrs

3a. Introduction of Flora, Monograph, Revisions, Mannunals, Journals, Periodicals, Reference Books , research papers and Websites.

Unit: IV. Plant Families 08 hrs

4a. Morphological, floral, distinguishing character and economic importance of following families.

i.Annonaceae ii. Meliaceae iii. Apocynaceae iv. Lamiaceae v. Amaranthaceae vi. Orchidaceae

Section –II

" Plant Physiology"

Unit : I. Plant water relationship 08 hrs

1a. Introduction, Physiological importance of water.

1b. Water transport process: Mechanism of water absorption: Active (Osmotic and Non osmotic) and passive (Transpiration pull) absorption theories, water transport through xylem and tracheids.

1c. Transpiration: Definition, Types of transpiration, Mechanism of stomatal movement, Starch-sugar hypothesis, Factors affecting transpiration, Significance of transpiration.

Unit : II. Mineral Nutrition 07 hrs

2a. Introduction, Criteria of essentiality

2b. Macro and Micronutrients

2c. Mineral nutrient uptake- Passive uptake (Diffusion), Active uptake (Carrier Concept - Protein Lecithian Theory).

2d. Role and Deficiency Disorders of Macronutrients (P, K, Ca, Mg) and Micronutrients

(Fe, Mn, Zn, Br) in plants and its recovery.

Unit : III. Photosynthesis 08 hrs

3a. Introduction : Ultrastructure of Photosynthetic apparatus.

3b. Photosynthetic pigments-(Chlorophylls, Carotenoids and Phycobilins)

3c. Mechanism of Photosynthesis:

a) Light reaction- Photolysis of water, Photosystem I and Photosystem II, Electron transport and Photophosphorylation- Cyclic and Non-cyclic.

b) Dark reaction: Calvin cycle C_3

c) Adaptive Pathway of Photosynthesis- Hatch- Slack Pathway- (C_4) and CAM pathway

3d. Significance of photosynthesis

Unit : IV. Respiration 07 hrs

4a. Introduction

4b.Types of respiration

4c.Glycolysis

4d. Formation of Acetyl Co A

4e. TCA cycle

4f. ETS in mitochondria

4g. Significance of Respiration

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B.Sc. Part II CBCS syllabus with effect from June 2019

Semester : IV Botany- Paper IV

BOTANY- DSC 7 D

“ Plant Aantomy and Plant Metabolism ”

Theory: 60 Hours(75 Lectures)Credits : 4

Section –I

“Plant Anatomy”

Unit : I. Organization of higher plant body 03 hrs

1a. Plant organs (Introductory)

1b. Development of plant body (Seedling development)

1c. Internal organization

Unit : II. Tissue and Tissue System 12 hrs

2a. Meristem: a) Introduction, Characteristics and Classification of meristems based on position

b) Theories of structural development- i) Apical cell theory ii) Histogen theory iii) Tunica Corpus theory.

2b. Permanent tissue: i) Simple tissue- Parenchyma, Collenchyma and Sclerenchyma

ii) Complex tissue: Xylem and Phloem

2c. Epidermal tissue system

2d. Secretary tissue system

2e. Mechanical tissue system

2f. Types of Vascular bundles

Unit : III. Primary and secondary structure of plant body 08 hrs

3a. Primary structure of Monocotyledon and Dicotyledon root, stem and leaf.

3b. Normal secondary growth in Dicotyledon root and stem.

3c. Anomalous secondary growth in *Bignonia* (Dicot.) and *Dracaena* (Monocot.) stem.

3d. Periderm and Lenticel

Unit : IV. Plant Adaptations 07 hrs

4a. Mangrove Biology

4b. Xeric adaptations

4c. Carnivorous Plant

4d. Epiphytic and Parasitic Plant

Section –II

" Plant Metabolism "

Unit : I. Enzymes 08 hrs

1a.Introduction

1b. Chemical nature and properties of enzymes

1c. Classification and Nomenclature of enzyme

1d.Mechanism of enzyme action- Lock and Key hypothesis and Induced fit hypothesis.

1e. Factors affecting enzyme activity- temperature and pH.

1f. Allosteric modification and Feedback inhibition.

Unit : II. Nitrogen Metabolism 07 hrs

2a. Introduction – Role of N_2

2b. Biological Nitrogen Fixation- Asymbiotic and Symbiotic

2c. General structure and role of Nitrogenase

2d. Mechanism of Reduction of Nitrate into Ammonia

2e. Mechanism of Ammonia assimilation in plants

2f. nif genes

Unit : III. Growth and Development 08 hrs

3a. Definition and Phases of growth

3b. Plant growth regulators: Discovery, site of synthesis, Physiological (Practical applications) roles of growth regulators – Auxins, Cytokinin, Gibberellins and Abscisic acid.

3c. Photoperiodism and Floreign Concept, Photoperiodic classification of plants- LDP, SDP, DNP.

3d. Vernalization: Concept, site of vernalization and its significance.

Unit : IV. Seed Dormancy and Germination 06 hrs

4a. Concept of dormancy, Causes of Seed dormancy.

4b. Methods of breaking of seed dormancy.

4c. Seed germination- Introduction and types (Epigeal, Hypogeal and Viviparous).

4d. Factors affecting on seed germination

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B.Sc. Part II CBCS syllabus with effect from June 2019

Botany

“ Taxonomy, Embryology and Plant Physiology”

PRACTICAL – I

1) Study structure of stomata and determination of stomatal density.
2) Study stomatal and cuticular transpiration by cobalt chloride paper method.
3) Study of role and deficiency symptoms of P, K, Ca, Mg.
4) Separation of photosynthetic pigments by ascending paper chromatography.
5) Study of Kranz leaf anatomy in C_4 plants.
6) Estimation of TAN value in CAM plants.
7) Analysis of vegetative growth (any suitable method).
8) Effect of different concentrations of Auxins (IAA) on seed germination (any suitable dicot seeds).
9) Effect of different concentrations of Gibberlic acid (GA) on seed germination (any suitable monocot seeds).
10) Effect of Cytokinin on Leaf Senescence.
11) Study of effect of light intensity on photosynthesis.
12) Detection of Calcium, Phosphate, Potassium and Iron in the plant tissue by biochemical tests.
13) Demonstration of Endo-osmosis and Exo-osmosis.
14) Study of permeability of plasma membrane by using different concentrations of organic solvent.
15) Study of typical flower and its parts (floral whorls with their functions).
16) Study of young / mature anther by permanent slide.
17) Study of germination of pollen grains.
18) Detection of pollen fertility by staining technique.

19) Study of types of ovules (by permanent slide or photograph).

20) Study of dicotyledon and monocotyledon embryo (by permanent slide or photograph).

21) Preparation of e – herbarium/ weed herbarium.

22-25) Study angiospermic families as per syllabus.

Distribution of Marks	
PRACTICAL – I	**Marks**
1) Taxonomy	11
2) Embryology	10
3) Plant Physiology	19
4) Weed Submission	05
5) Journal	05
Total	**50**

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B.Sc. Part II CBCS syllabus with effect from June 2019

Botany

“ Plant Aantomy and Plant Metabolism ”

Practical- II

1) Study of shoot and root apex by permanent slides.
2) Study of simple tissues.
3) Study of complex tissues.
4) Study of primary structure of dicot and monocot root
5) Study of primary structure of dicot and monocot stem
6) Study of normal secondary growth in dicot stem (Annona / Moringa / Sunflower) by temporary double stained techniques.
7) Double stained permanent micro preparation of any suitable material.
8) Study of anomalous/abnormal secondary growth in *Bignonia* (Dicot stem).
9) Study of anomalous/abnormal secondary growth in *Dracaena* (Monocot stem)**.**
10) Study of periderm and lenticels (by permanent slides)
11) Study of anatomy of porous (ring porous & diffused porous) and non porous wood.
12) Study of Epidermal tissue system (Sunken stomata, multiple epidermis, stellate hairs).
13) Study of Mechanical tissue system (I-girdles).
14) Study of Secretary tissue system (glandular hairs).
15) Study of excretory products viz., Cystolith, sphaeraphides, raphides in plants.
16) Determination of rate of respiration during seed germination by Ganong’s respirometer.
17) Breaking of seed dormancy by mechanical and chemical scarification.
18) Study of effect of pH on enzyme activity of Catalase.
19) Study of effect of temperature on enzyme activity of Malate dehydrogenase.
20) Demonstration of fermentation by Yeast.
21) Morphological and Anatomical adaptations in Mangroves.

22) Study of Digestive glands.
23) Study of Mimicry in *Orchid* flowers.

Distribution of Marks	
PRACTICAL – I	**Marks**
1) Plant Anatomy	23
2) Plant Metabolism	17
3) Tour report	05
4) Journal	05
Total	**50**

PRACTICALS IN BOTANY
B.Sc. Part – II
(To be implemented from June 2019)

Botanical excursions –

One teacher along with a batch not more than sixteen students is taken for Botanical excursions to places of botanical interest, one in each term. If there are female students in a batch of sixteen, one additional lady teacher is permissible for excursion. Each excursion will not be more than 3 days during college working days. T.A. and D.A. for teachers and non teaching staff participating in the excursions should be paid as per the rules. The tour report duly certified by the concerned teacher and the head of the department should be submitted at the time of practical examination.

Practical – I and II are to be covered in 25 practicals each. These practicals are to be performed by the students. Each practical is to be supplemented by permanent slides, preserved / fresh specimens / materials, charts, herbarium sheets, wherever necessary.

Every candidate must produce a certificate from Head of the Department in his / her college stating that he / she has completed practical course in a satisfactory manner as per the lines laid down by academic council on the recommendations of Board of Studies in Botany. The student should record his / her observations and report of each experiment should be written in the Journal.

The Journal is to be signed periodically by teacher in charge and certified by Head of the Department at the end of the year. Candidates have to produce their certified journal and tour reports at the time of practical examination. A candidate will not be allowed to appear for the practical examination without a certified journal, otherwise a candidate must produce a separate certificate of his / her regular attendance for practical course and completion of the same signed by the concerned teacher and Head of the Department.

Total Marks for practical 100 Marks

a) Practical – I - 50 Marks

b) Practical – II - 50 Marks

The practical course is to be covered in 50 practicals .The practical course should be divided into practical no. I which will comprise 25 practicals based on Paper No. V & Paper No.VI where as the practical No. II will comprise 25 practicals based on Paper No.VII & VIII. The practical No I will carry 50 marks & practical II will also carry 50 marks. The practical examination will be conducted at the end of semester IV on two successive days.

Each practical examination (Practical I and II) should be of maximum 5 hours duration and shall test a candidate in respect of following –

i. Identification and preparation of temporary and permanent slides.
ii. Practical study of external and internal structures of different plants as per the syllabus.
iii. Understanding of principles of the experiments.
iv. Identification and setting of ecological experiments.
v. Identification and setting of Physiological experiments.
vi. Recording of observations and conclusions.
vii. Identification and understanding of the practicals conducted with respect to development of plants.
viii. Spotting of the specimens as per the syllabus.
ix. Submission of the tour report.

"Taxonomy, Embryology and Plant Physiology"

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Botany

EXAMINATION MARCH / APRIL - 2019

PRACTICAL - I

Time : 5 Hours 11.00 am onwards **Marks :** 50

N. B.: Draw neat labeled sketches wherever necessary.
Record your observation carefully and neatly wherever asked.

Que. 1) Set up physiological experiment assign to you and show it to the examiner 'A'. (09)

Que. 2) Arrange physiological experiment assign to you and show it to the examiner 'B'. (04)

Que. 3) Assign the specimen 'C' to its respective family on the basis of characters observed by you. Give floral formula and floral diagram. (09)

Que. 4) Flower study / Embryo mounting of specimen 'D'. (04)

Que. 5) **Identification** (14)

i) Identify and comment - E
ii) Identify and describe – F
iii) Identify and comment – G
iv) Identify and comment – H
v) Identify and comment – I
vi) Identify and comment – J
vii) Identify and comment - K

Que. 6) Weed Submision (05)

Journal (05)

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Botany

EXAMINATION MARCH / APRIL - 2019

PRACTICAL - II

Time : 5 Hours 11.00 am onwards **Marks :** 50

N. B.: Draw neat labeled sketches wherever necessary.
Record your observation carefully and neatly wherever asked.

Que. 1) Set up biochemical experiment assign to you and show it to the examiner 'A'. (09)

Que. 2) Arrange physiological experiment assign to you and show it to the examiner 'B'. (04)

Que. 3) Make a double stained permanent micropreparation of specimen 'C' and show it to the examiner. (06)

Que. 4) Make a temporary anomalous preparations of specimen 'D' and show it to the examiner. (04)

Que. 5) **Identification :** (14)

i) Identify and describe – E
ii) Identify and describe – F
iii) Identify and describe – G
iv) Identify and describe – H
v) Identify and describe – I

Que. 6) Tour report (05)

Journal (05)