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॥ अंतरी पेटवू ज्ञानज्योत ॥ 03

North Maharashtra University, Jalgaon

Syllabus for S.Y.B.Sc.

BOTANY

W.E.From June, 2003

॥ अंतरी पेटवू ज्ञानज्योत ॥

NORTH MAHARASHTRA UNIVERSITY, JALGAON
Syllabus For S.Y.B.Sc.

BOTANY

(W.E.F.June, 2003)

BOT. 2.1

PAPER – I : ANGIOSPERM TAXONOMY, GYMNOSPERMS AND PALEOBOTANY

FIRST TERM : UNIT – I : ANGIOSPERM TAXONOMY

SECOND TERM : UNIT – II : GYMNOSPERMS AND PALEOBOTANY

BOT. 2.2

PAPER – II : PLANT PHYSIOLOGY AND APPLIED BOTANY

FIRST TERM : UNIT-I : PLANT PHYSIOLOGY

SECOND TERM : UNIT-II : APPLIED BOTANY

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॥ अंतरी पेटवू ज्ञानज्योत ॥

North Maharashtra University, Jalgaon
Syllabus For S.Y.B.Sc.
BOTANY
(W.E.F.June, 2003)

THEORY PAPERS TO BE STUDIED FOR S.Y.B.Sc. BOTANY

BOT. 2.1 : PAPER-I

ANGIOSPERM TAXONOMY, GYMNOSPERMS AND PALEOBOTANY

Term I : Unit I : Angiosperm Taxonomy (Total Periods 52)

CHAPTER-I : INTRODUCTION — **(3 Periods)** (3 Marks)

1.1 : Distinguishing features of the group
1.2 : Alternation of generations
1.3 : Phenomenal Success of Angiosperms.

CHAPTER-II : TAXONOMY — **(3 Periods)** (3 Marks)

2.1 : Taxonomy and Systematics – Synonyms
2.2 : Functions of Taxonomy :
(i) Identification
(ii) Nomenclature
(iii) Classification
2.3 : Aims of Taxonomy

CHAPTER-III: CLASSIFICATION OF ANGIOSPERMS — **(5 Periods)** (5 Marks)

3.1 : Ranks of Classification
3.2 : Binomial Nomenclature
3.3 : Types of Systems of Classification :
(i) Artificial
(ii) Natural
(iii) Phylogenetic
3.4 : Bentham & Hooker's System of Classification upto series
(i) History,
(ii) Outline upto series giving reasons
(iii) Merits
(iv) Demerits

CHAPTER-IV: STUDY OF FAMILIES OF ANGIOSPERMS — **(35 Periods)** (33 Marks)

(w.r.t. Systematic Position, General Morphological Characters, Salient features, Economic importance)

(i)	Annonaceae	ii)	Malvaceae	iii)	Rutaceae
iv)	Meliaceae	v)	Mimosaceae	vi)	Caesalpiniaceae
vii)	Papilionaceae	viii)	Myrtaceae	ix)	Rubiaceae
x)	Sapotaceae	xi)	Apocynaceae	xii)	Solanaceae
xiii)	Acanthaceae	xiv)	Labiatae	xv)	Nyctaginaceae
xvi)	Euphorbiaceae	xvii)	Liliaceae	xviii)	Commelinaceae

CHAPTER-V: HERBARIUM — **(6 Periods)** (6 Marks)

5.1 : Definition
5.2 : Functions
5.3 : Techniques :

(i)	Collection	ii)	Drying	iii)	Poisoning
iv)	Mounting	v)	Sticking	vi)	Labeling
vii)	Deposition				

REFERENCE BOOKS :

1. Jain, S.K. and R.R.Rao (1977). A Handbook of Field and Herbarium Methods. Today and Tomorrow Publishers, New Delhi, India.
2. Lawrence, G.H.M. (1951). Taxonomy of Vascular Plants. Macmillan, New York, U.S.A.
3. Naik, V.N. (1984) Taxonomy of Angiospersms. Tata McGraw-Hill Publ. Co.Ltd., New Delhi, India.
4. Sharma, O.P. (1993). Plant Taxonomy. Tata McGraw-Hill Publ. Co. Ltd. New Delhi, India.
5. Singh, V. and D.K.Jain (1992). Taxonomy of Angiosperms. Rastogi Publications, Meerut, India.
6. Singh, M.P., Nayar M.P. and R.P.Roy (1994). Text Book of Forest Taxonomy. Anmol Publications, P.(Ltd.), New Delhi, India.
7. Sivarajan, V.V. (1984). Introduction To Principles of Plant Taxonomy. Oxford & IBH Publishing Co., New Delhi, India.
8. Subrahmanyam, N.S. (1997). Modern Plant Taxonomy. Vikas Publishing House, New Delhi, India.

Term II : Unit II : Gymnosperms and Paleobotany (Total Periods 52)

GYMNOSPERMS (30 periods)

CHAPTER-VI : INTRODUCTION **(4 Periods)**

(4 Marks)

6.1 : Distinguishing features of the group

6.2 : Comparison of Gymnospermic features with Angiosperms

6.3 : Economic importance of Gymnosperms

CHAPGER-VII: CLASSIFICATION OF GYMNOSPERMS BY K.R. SPORNE UPTO ORDERS GIVING REASONS. **(2 Periods)**

(2 Marks)

CHAPTER-VIII: STUDY OF LIFE HISTORY OF PINUS **(12 Periods)**

(11 Marks)

(w.r.t. the following)

8.1 : Systematic Position

8.2 : Distribution in India

8.3 : External Morphology

8.4 : Internal Morphology

(a) Primary structure . stem, root, needle b) Secondary structure : stem

8.5 : Reproductive structures :

(a) Male cone, (b) Female cone, (c) Structure of male Gametophyte,

(d) Structure of female Gametophyte

8.6 : Pollination

8.7 : Fertilization

8.8 : Structure of embryo and polyembryony

8.9 : Seed : Structure and germination

8.10 : Alternation of Generations

(Development of Male and Female gametophytes not expected)

CHAPTER-IX: STUDY OF LIFE HISTORY OF GNETUM **(12 Periods)**

(w.r.t. the following) (11 Marks)

9.1 : Systematic Position

9.2 : Distribution in India

9.3 : External Morphology

9.4 : Internal Morphology

Primary structure :

(a) Stem, (b) Leaf, (c) Root,

(d) Anamolous secondary growth in *Gnetum ula*

9.5 : Reproductive structures :

(a) Male cone, (b) Female cone,

(c) Structure of male gametophyte,

(d) Structure of female gametophyte

9.6 : Pollination

9.7 : Fertilization

9.8 : Seed : Structure and germination

9.9 : Embryo : Structure and polyembryony

9.10 : Alternation of Generations

9.11 : Resemblances with Angiosperms.

(Development of Male and Female gametophytes not expected)

PALEOBOTANY (22 Periods)

CHAPTER-X: INTRODUCTION **(2 Periods)**

10.1 : Scope and objectives (2 Marks)

10.2 : Application of Paleobotany in oil and coal explorations

CHAPTER-XI: FOSSILS **(3 Periods)**

11.1 : Definition (3 Marks)

11.2 : Conditions favourable for fossil formation

11.3 : Different types of fossil formation : Impression, Compression, Petrification, Coal balls, Amber, Pseudofossil

CHAPTER-XII: CONCEPT OF FORM GENERA AND NOMENCLATURE (1 Period)

(1 Mark)

CHAPTER-XIII: GEOLOGICAL TIME SCALE **(2 Periods)**

13.1 : Eras, Periods, Epochs, Major plant groups (2 Marks)

CHAPTER-XIV: STUDY OF THE FOLLOWING FOSSIL GROUPS

(w.r.t. morphology and structure) **(14 Periods)**

14.1 : Psilopsida : Rhynia (14 Marks)

14.2 : Lycopsida :

(i) Lepidodendron, (ii) Lepidostrobus

14.3 : Sphaenopsida

(i) Calamites (ii)Annularia

14.4 : Pteridosperms

(i) Lyginopteris oldhamia (Stem)

14.5 : Bennettitales :

(i) Cycadeoidea (Flower)

14.6 : Angiosperms

(i) Sahanipushpam

REFERENCE BOOKS :

1 Chopra, G.L. (1962). Gymnosperms. S.Nagina & Co. Jallandar, India.

2. Datta, S.C. (1966).Introduction to Gymnosperms. Asia Publishing House, New Delhi, India.

3 Datta, S.C (1998). Systematic Botany (4th Ed.).New Age International (P.) Ltd., New Delhi, India.

4. Gangulee, H.C. and A.K.Kar (1998). College Botany Vol.II. New Central Book Agency (P.) Ltd., Calcutta, India.

5. Singh, V., Pande, P.C. and D.K. Jain (1998). A Text Book of Botany, Rastogi Publications, Meerut, India.

6. Maheshwari, P. and R.N.Konar (1971). Pinus, CSIR, New Delhi, India.

7. Maheshwari, P. and Vimla Vasil (1974). Gnetum, Botanical Monograph No.I, CSIR, New Delhi, India.

8. Pandey, B.P (1982). College Botany Vol II. S.Chand & Co.Ltd., New Delhi, India.

9. Pande, B.P. (1994). Gymnosperms. S.Chand & Co., New Delhi, India.

10. Sporne, K.R. (1967). Morphology of Gymnosperms. Hutchinson University Library, London, U.K.

11. Vasishta, P.C. (1983). Botany for Degree Students : Gymnosperms, Vol. V. S.Chand & Co., New Delhi, India.

BOT. 2.2 : PAPER-II
PLANT PHYSIOLOGY AND APPLIED BOTANY

Term I : Unit I : Plant Physiology (Total Periods 52)

CHAPTER-I : PLANT PHYSIOLOGY — **(1 Period)**

1.1 : Introduction, Definition & Scope in brief. (1 Mark)

CHAPTER-II : DIFFUSION — **(2 Periods)**

2.1 Introduction

2.2 : Definition (2 Marks)

2.3 Laws of Diffusion

2.4. : Mechanism

CHAPTER-III : IMBIBITION **(2 Periods)** (2 Marks)

3.1 : Introduction
3.2 : Definition
3.3 : Phenomenon

CHAPTER-IV: OSMOSIS **(9 Periods)** (9 Marks)

4.1 : Introduction
4.2 : Definition
4.3 : Concentration gradients
4.4 : Osmotic pressure (O.P.), Turgor pressure (T.P.), Wall pressure (W.P.) and DPD
4.5 : Mechanism
4.6 : Equilibrium
4.7 : Plasmolysis
4.8 : Osmosis in living system (Cells)

CHAPTER-V: WATER ABSORPTION **(4 Periods)** (4 Marks)

5.1 : Introduction
5.2 : Importance of Water
5.3 : Active and Passive Absorption of Water
5.4 : Discussion of the following theories :
(a) Osmotic theory (b) Non-osmatic theory
5.5 : Factors affecting water absorption.

CHAPTER-VI: SALT ABSORPTION **(4 Periods)** (4 Marks)

6.1 : Introduction, Importance of Salts/nutrients
6.2 : Discussion of the following theories
(a) Ion exchange theory (b) Contact exchange theory
(c) Carbonic acid exchange theory
6.3 : Factors affecting salt absorption

CHAPTER-VIII : TRANSPIRATION **(10 Periods)** (9 Marks)

7.1 : Introduction
7.2 : Definition
7.3 : Types :
(a) Lenticular, (b) Cuticular (c) Stomatal
7.4 : Mechanism–(Structure of stomata), Opening and Closing of stomata
7.5 : Theories :
(a) Stewards theory (b) K-pump theory
7.6 : Factors affecting the process
7.7 : Significance of the process

CHAPTER-IX: PHOTOSYNTHESIS **(10 Periods)** (9 Marks)

9.1 : Introduction

9.2 : Definition

9.3 : Photosynthetic pigments and their role

9.4 : Mechanism :

(a) Light reaction

(i) Cyclic photophosphorylation

(ii) Non-cyclic photophosphorylation

(b) Dark reaction

(i) Calvin cycle

9.5 : Factors affecting the process

CHAPTER-X: RESPIRATION **(10 Periods)** (10 Marks)

10.1 : Introduction

10.2 : Definition

10.3 : Types :

(a) Aerobic (b) Anaerobic

10.4 : Mechanism :

(a) Glycolysis (b) Kreb's cycle (c) Basic knowledge of ETC

10.5 : Alcoholic fermentation (Ethyl Alcohol)

10.6 : Factors affecting the process

REFERENCE BOOKS :

1 Amar Singh (1977). Practical Plant Physiology. Kalyani Publishers New Delhi. India.

2. Datta S.C. (1998). Plant Pathology, New Age International (P.) Ltd. Publishers.

3 Jain V.K. (1997). Fundamentals of Plant Physiology. S.Chand & Company Ltd. New Delhi, India.

4. P.L. Kochhar (1962). A Text Book of Plant Physiology. Atmaram & Sons New Delhi, India.

4. Kumar A. & S.S.Purohit (1998). Plant Physiology, Fundamentals and Applications. Agro Botanical Bikaner.

5. Meyer B.S. & D.B.Anderson (1952). Plant Physiology Afiliated East-West Press. Pvt. Ltd., New Delhi, India.

6. Mukharji S. & A.K.Ghose (1996). Plant Physiology. Tata McGraw Hill. Publishing Company Ltd., New Delhi, India.

7. Pandey & Sinha (1999). Plant Physiology. Vikas Publishing House Pvt. Ltd., New Delhi, India.

8. Sane.H.D. (1979). A Text Book of Botanyl. Narendra Prakashan, Pune.

9 B.P.Sarabhai (1995). Elements of Plant Physiology. Anmol Publications Pvt. Ltd., New Delhi, India.

10. Sundara Rajan S. (2000). College Botany (Plant Physiology & Molecular Biology) Vol. IV. Himalaya Publishing House, New Delhi, India.

11. Srivastava H.S. (1994). Plant Physiology. Rastogy & Company, Meerut, India.

12. Verma S.K. (1995). A Text book of Plant Physiology and Biochemistry. S.Chand & Company, New Delhi. India.

13. Verma V. (1984). Introduction to Plant Physiology. Emkay Publications. New Delhi, India.

Term II : Unit II : Applied Botany (Total Periods 52)

CHAPTER-I : APPLIED BOTANY **(1 Period)**

1.1 : Introduction, Scope and Importance (1 Mark)

CHAPTER-II: BIOFERTILIZERS **(6 Periods)**

(6 Marks)

2.1 : Definition and Types (Azatobacter, Nitrosomonas, Rhizobium, B.G.Algae)

2.2 : (a) Methods of Culturing *Rhizobium*

(b) Mass culture of Blue-green Algae

2.3 : Utilization of biofertilizers in Agriculture

CHAPTER-III: FERMENTATION INDUSTRY **(10 Periods)**

(10 Marks)

3.1 : Introduction, Definition, Microbes involved in fermentation

3.2 : General process of fermentation :

(a) Pure Culture (b) Substrate (c) Sterilization

(d) Fermentation (e) Recovery of end product

3.3 : Production of (1) Ethyl alcohol, (2) Antibiotic-Penicillin

CHAPTER-IV: MUSHROOM CULTIVATION **(10 Periods)**

(9 Marks)

4.1 : Introduction

(a) Edible and non-edible mushrooms

(b) Nutritional value of mushrooms

4.2 : Important edible species used for cultivation

4.3 : Methods of cultivation of :

(a) Agaricus, (b) Pleurotus/Volvariella

CHAPTER-V: MEDICINAL AND AROMATIC PLANTS **(10 Periods)**

(9 Marks)

5.1 : Taxonomic position , distribution, morphology, part used, active principle and uses of the following :

(a) Hirda (b) Behada (c) Amla

(d) Vasaka (e) Turmeric

(f) Rosha Grass (*Cymbopogon martini*) (g) Vetiveria (Khus)

CHAPTER-VI: ADULTERATION OF PLANT PRODUCTS **(8 Periods)**

(8 Marks)

6.1 : Introduction

6.2 : Detection of probable adulterations in the following :

(a) Oil : Groundnut (b) Spices:Blackpepper

Cinnamomum, chilly powder (c) Cereals : Bajara

(d) Pulses : Gram dal flour (e) Beverages : Tea and Coffee

(f) Food products : Mango pulp

CHAPTER-VII: WASTELAND DEVELOPMENT **(7 Periods)**

(7 Marks)

7.1 : Introduction

7.2 : Causes of wasteland

7.3 : Types of Wasteland

7.4 : Methods of improvement

7.5 : Plant species used in the reclamation of

(a) Saline soils (b) Acidic soils

REFERENCE BOOKS

1. Atkins, F.C. (1972). Mushroom Growing Today. Faber And Faber Ltd., London, U.K.
2. Bhatacharjee, S.K. (1888). Handbook of medicinal plants. Pointer Publishers, Jaipur, India.
3. Bhattacharjee, S.K. (2000). Handbook of Aromatic Plants Pointer Publishers, Jaipur, India.
4. Casida, L.E. (Jr.) (1966). Industrial Microbiology (Repr.1991). Wiley, Eastern Ltd., New Delhi, India.
5. Dubey, R.C. (1995). A Text Book of Biotechnology. S.Chand & Company Ltd., New Delhi, India.
6. Frazier, W.C. (1971). Food Microbiology. Tata McGraw Hill. Publ. Co. Ltd., New Delhi, India.
7. Gokhale, S.B. (1979). Text Book of Pharmacognosy. Jai Publishing House, Jalgaon, India.
8. Grewal, R.C. (2000). Medicinal plants. Capus Books International, New Delhi, India.
9. Jacob Thankamma (1975). Foods, Drugs and Cosmetics : A Consumer Guide. The Macmillan Company of India Ltd., Delhi, Bombay, India.
10. Kurian, J.C. (1995). Plants That Heal. Oriental Watchman Publishing House, Pune, India.
11. Nair, M.C. and S. Balakrishnan (Ed.) (1986). Beneficial Fungi And Their Utilization, Scientific Publisher, Jodhpur, India.
12. Pathak, Y.G. (1998). Mushroom Production and Processing Technology. Agibios, Jodhpur, India.
13. Purkayastha and Chanda (1976). Indian Edible Mushroom. Firma Klam Pvt. Ltd., Calcutta, India.
14. Smith, J.E. and D.R. Berry (1975). Filamentous Fungi. Vol.I, II and III, John Wiley, New York, U.S.A.
15. Somani, L.L., Bhandari, S.C, Saxena, S.N. and K.K. Vyas (Eds.) Biogertilizers, Scientific Publishers, Jodhpur, India.

BOT 2.3 : PRACTICAL BASED ON THEORY PAPERS BOT 2.1 & BOT 2.2

(Total Practicals 24)

1 to 5 : Study of ANY TEN families as per theory syllabus with respect to morphological characters, floral formula, floral diagram and systematic position (Sensu Bentham and Hooker) giving reasons. (Selecting at least TWO families from *Polypetalae, Gamopetalae, Apetalae* and *Monocotyledons*)

6 : Identification of plant species collected by students during botanical excursions.

7, 8,9 : Study of *Pinus* with the help of permanent slides and plant materials as the following :

i) External morphology
ii) T.S. of stem (Temporary double stained preparation)
iii) T.S. of needle -- Temporary double stained preparation.
iv) Morphology of male Cone – T.S. and L.S. (Permanent Slides)
v) Morphology of female cone – T.S. and L.S. (Permanent Slides)
vi) Mounting of Pollen grains
vii) V.S. of mature ovule (Permanent Slide)

10, 11 : Study of *Gnetum* with the help of permanent slides and plant material as the following :

i) External Morphology
ii) T.S. of stem (*G.ula*) (Permanent slide)
iii) T.S. of Leaf (*G.ula*) (Permanent slide)
iv) Secondary growth in stem of *G.ula* (Permanent slide)
v) Morphology of male cone–T.S. & L.S. (Permanent slide)
vi) Morphology of female cone–T.S. & L.S. (Permanent slide)
vii) V.S. of mature ovule (Permanent Slide)

12, 13 : Paleobotany.

(a) Study of different types of fossils. (Any three)

(b) Study of the following with the help of slides and/or specimens :

i.	Rhynia	ii.	Lepidodendron
iii.	Lepidostrobus	iv.	Calamites
v.	Annularia	vi.	Lyginopteris
vii.	Cycadeoidea	viii.	Sahanipushpam

14 : Culture of Rhizobium (Demonstration)

15 : Culture of Blue-green algae (BGA) (Demonstration)

16 : Cultivation of Agaricus/Pleurotus/Volvoriella (Any one)

17 : Observations and description of the following medicinal and aromatic plants:

i)	Hirda	ii)	Behada	iii)	Amla
iv)	Vasaka (Adulsa)	v)	Turmeric	vi)	Rosha Grass
vii)	Khus				

18 Detection of adulteration in the following plant products :

(a) Turmeric with metallic yellow

(b) Besan flour with lead chromate yellow

(c) Bajara with ergot

(d) Castor oil and Groundnut oil

19 : Study of molar concentration of isotonic solution at which incipient *Plasmolysis* takes place.

20 Determine the rate of transpiration by varying :

(a) Intensity of light

(b) Wind velocity

21 : Determine the rate of photosynthesis in aquatic plants (Hydrilla) by varying :

(a) Light intensity

(b) Light quality

22 : Effect of temperature on the activity of *Enzyme amylase*.

23 : Demonstration

(a) Imbibition pressure

(b) Osmosis-Thistle funnel

(c) Osmosis–Curling experiment

(d) Ringing experiment

24. Demonstration

(a) Relative transpiration

(b) Ganong's potometer

(c) Kuhne's tube

(d) CO_2 necessary for photosynthesis

Note :

i) Botanical excursion is compulsory.

ii) Submission of ten duly identified herbarium sheets along with the report of botanical excursion at the time of examination is compulsory.

iii) Duly certified journal is compulsory at the time of examination.

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