

B.Sc. BOTANY

**I YEAR – I SEMESTER
COURSE CODE: 7BBOA1**

**ALLIED COURSE - I – PLANT DIVERSITY, PLANT PATHOLOGY AND ANATOMY
THALLOPHYTA**

Unit I

Algae

General Characters, structure and life history of Cyanophyceae (*Oscillatoria*) and Rhodophyceae (*Polysiphonia*).

Fungi

General Characters, Structure and Life history of Basidiomycetes (*Puccinia*). General Features, Structure and Life history of Lichens (*Usnea*).

Unit II

Bryophyta

General Characters, structure and life history of Moss(*Polytrichum*)- Development of Gametophyte, Sporophyte and sex organs need not be discussed.

Plant Pathology

Study of the Following Plant Diseases with reference to causes, symptoms, dissemination, Control and preventive measures.

1. Virus Diseases – Bunchy top of Banana.
2. Bacterial Disease – Citrus Canker.

Unit III

Pteriophyta

General Characters, structure and Life history of *Selaginella* (Development of gametophyte, sporophyte and sex organs need not be discussed).

Unit IV

Gymnosperms

General Characters , structure and Life history of *Pinus* (Development of *Pinus* need not be discussed)

Unit V

Anatomy

1. Tissues – Simple and permanent tissues.
2. Normal secondary thickening in dicot and monocot stem.

Text books:

1. Pandey B.P.– College Botany, Vol.I & II S.Chand & Co., P.Ltd., Ram Nagar, New Delhi.
2. Pandey, B.P. (1978) Plant Anatomy, S.Chand & Co., Calcutta

Books for Reference:

Algae

1. Vashista B.R – Algae, S.Chand & Co.Ltd., New Delhi.
2. Bhatia, K.M. – A Treatise of Algae R.Chand & Co., New Delhi.
3. Chopra G.D.A. Text Book of Algae – S.Nagin & New Delhi.
4. Gupta G.S. – Text Book of Algae-Oxford & IBH Publishing C., New Delhi.

Fungi

1. Chopra G.L. – A text Book of Fungi – S.Nagin & Co., New Delhi.
2. Munkur B.B. – Fungi & Plant diseases.

Bryophyta

1. Watson E.V. – The structure and Life of Bryophyta – Hutchinson, University Library, London.
2. Parithar N.S. An Introduction to Bryophyta Vol. I Central Book Depot, Allahabad.

Pathology

1. Rengaswami G – Diseases of crop plant in India.

Pteridophytes

1. Pandey B.P. – A text book of Botany (Bryophyta, Pteridophyta & Gymnosperms) – S.Chand & Co., New Delhi.
2. Parihar N.A. An Introduction of Pteridophyta Vol.II Central Book depot of Allahabad.

Gymnosperms

1. Gupta M.N. – The Gymnosperms- Shivalal Agarwala & Co., Agra.
2. Vashista P.C. – Botany for Degree Students – Gymnosperms–S.Chand & Co. New Delhi.

Internal Morphology (Anatomy)

1. Vashista, P.C. (1968) A Text Book of Plant Anatomy, S.Negin & Co.



**I YEAR – I/II SEMESTER
COURSE CODE: 7BBOAP1**

ALLIED PRACTICAL – I – PLANT DIVERSITY, PLANT PATHOLOGY, INTERNAL MORPHOLOGY, TAXONOMY OF ANGIOSPERMS, ECONOMIC BOTANY AND EMBRYOLOGY OF ANGIOSPERMS

(Covering the Allied Courses, I & II)

1. Micro – Preparations and Identification of the Thallophyta prescribed in the Syllabus(*Algae-Oscillatoria, Polysiphonia*; Fungi-*Puccinia*; Lichens-*Usnea*).
2. Cutting and Mounting of T.S. of Vegetative parts of *Polytrichum, Selaginella* and *Pinus*.
3. Identification of Micropreparations of cones of *Selaginella, Pinus* and capsule of *Polytrichum*.
4. To observe and identify spot at sight and make detailed study of the types of disease studied.
5. Cutting, Mounting and identifications of T.S. of dicot and monocot stem.
6. Identification of Micropreparations of Dicot and monocot stem.
7. To assign the given plant specimens to the respective families giving reasons.
8. To describe the given plant in technical terms
9. To identify the economic products specified in the syllabus pointing out the Botanical Names and their uses.
10. Identification of Micro preparations of Anther(*Datura*) ,Dicot Embryo(*Tridax*), different ovules

Submission of certified and bonafide record note book is mandatory for External Practical.



COURSE CODE: 7BBOAP1

ALLIED PRACTICAL - I – PLANT DIVERSITY, PLANT PATHOLOGY, INTERNAL MORPHOLOGY, TAXONOMY OF ANGIOSPERMS, ECONOMIC BOTANY AND EMBRYOLOGY OF ANGIOSPERMS.

EXTERNAL QUESTION

Time: 3 hours

Max. Marks- 30

1. Work out the specimen A and identify its family through elimination process
(Identification-1, Elimination process -2, Reason -2) 5 marks
2. Make suitable micropreparation of “B” and “C” mount in Glycerin.
Draw labeled sketches and identify giving reason. Submit the slide for valuation 2x4= 8 marks
3. Comments on the etiology of “D” 2 marks
4. Identify draw sketches and write notes on
(‘E’, ‘F’, ‘G’, ‘H’ and ‘I’) 5x2= 10 marks
5. Submission of Record note book 5 marks

Total = 30 marks

**EXTERNAL
KEY AND SCHEME OF VALUATION**

1. A – Angiosperm specimen selected from families in the syllabus 5 marks
(Identification at family level -1, Elimination process -2, Reason -2)
2. B and C (Dicot and monocot stem from anatomy)
(Slide -1, Identification-1, sketch-1, Reason-1) (2x4=8marks)
3. D – Etiology specimen prescribed in the syllabus
(Identification-1, sketch-1/2, Reason-1/2) 2 marks
4. Algae/ Fungi/ Bryophytes/ lichen/ anther/dicot embryo) (any 5 slides)
(‘E’, ‘F’, ‘G’, ‘H’ and ‘I’) (Identification-1, sketch-1/2, Reason-1/2) 10 marks
5. Submission of Record note book 5 marks

Total = 30 marks



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ALLIED PRACTICAL - I – PLANT DIVERSITY, PLANT PATHOLOGY, INTERNAL MORPHOLOGY, TAXONOMY OF ANGIOSPERMS, ECONOMIC BOTANY AND EMBRYOLOGY OF ANGIOSPERMS.

INTERNAL QUESTION

Time: 3 hours

Max-marks- 20

1. Work out the specimen A and identify its family through elimination process (Identification-1, Elimination process -2, Reason -2) 5 marks
2. Make suitable micropreparation of “B” and “C” mount in Glycerin. Draw labeled sketches and identify giving reason. Submit the slide for valuation 2x3= 6 marks
3. Comments on the etiology of “D” 1 marks
4. Identify draw sketches and write notes on E-Algae, F- Fungi, 5x1= 5 marks
5. G- Bryophytes H-Lichen, I - anther/dicot embryo.
6. Continuous Assessment 3 marks

Total =20 marks

INTERNAL KEY AND SCHEME OF VALUATION

1. A – Angiosperm specimen selected from families in the syllabus (Identification at family level -1, Elimination process -2, Reason -2) 5 marks
2. B and C (Dicot and monocot stem from anatomy) (Slide -1, Identification-1, Reason-1) (2x3=6marks)
3. D – Etiology specimen prescribed in the syllabus (Identification- 1/2, Reason-1/2) 1 marks
4. E-Algae, F- Fungi, G- Bryophytes H-Lichen, I - anther/dicot embryo. (Identification-1/2, Reason-1/2) 5 marks
5. Continuous assessment based on the performance in the practical, attendance, record submission etc 3 marks

Total=20 marks



**I YEAR – II SEMESTER
COURSE CODE: 7BBOA2**

**ALLIED COURSE - II – TAXONOMY OF ANGIOSPERMS, ECONOMIC BOTANY
AND EMBRYOLOGY OF ANGIOSPERMS**

Unit I Taxonomy of Angiosperms

1. Aim and significance of Taxonomy
2. Herbarium techniques
3. Outline of Bentham and Hooker of classification.

Unit II Families

- a. Annonaceae
- b. Rutaceae
- c. Asclepiadaceae
- d. Euphorbiaceae
- e. Poaceae

Unit III Economic Botany

Cereals	–	Paddy & Ragi
Pulses	–	Green Gram & Soyabean
Fruits	–	Pomegranate & Mango
Beverages	–	Coffee & Cocoa
Fibres	–	Jute & Cotton
Essential Oils	–	Sandal oil & Olive Oil

Unit IV Embryology of Angiosperms

Structure of anther and male gametophyte, Different types of Ovules, Structure and development of embryo sac (*Polygonum* type)

Unit V

1. Fertilization – double fertilization, syngamy-significance
2. Different types of endosperm (Nuclear, cellular, helobial)
3. Structure and development of dicot (*Capsella*) and monocot embryo (*Lazula*).

Text books:

1. Vasishta P.C. – Taxonomy of Angiosperms' R.Chand and Co., New Delhi.
2. Kochar, S.L.–Economic Botany – TATA Mc Graw Hill Publishing Co., Ltd., New Delhi.
3. Bhojwani, S.S. and Bhatnagar S.P. – The embryology of Angiosperms' Vikas Publishing House P.Ltd., New Delhi.

Books for Reference:

Taxonomy of Angiosperms

1. George H.M.Lawrence – Taxonomy of vascular plants. Oxford and IBH publishing Co., New Delhi.
2. Singh V. and D.K.Jain – Taxonomy of Angiosperms. Rastogi Publications.
3. Verma, V.A – Text Book of Botany.

Economic Botany

1. Sharma, B.K. and Awasthi, P.B. – Economic Botany – Praksh Book Depot, Boreilley.
2. Hill, A.W, 1951 – Economic Botany – Mc Graw Hill Publishing House.
3. Pandey B.I.1980 – Economic Botany – S.Chand & Ltd.

Embryology of Angiosperms

1. Maheswari, P – Introduction to Embryology of Angiosperms – Tata McGraw Hill publishing Ltd., New Delhi.



**II YEAR – III SEMESTER
COURSE CODE: 7BBOA3**

ALLIED COURSE - III – CELL BIOLOGY AND PLANT TISSUE CULTURE

Cell Biology

Unit I

Ultra structure and functions of Plant cell and Ergastic substances

Unit II

Cell organelles – Nucleus, Mitochondria, Chloroplast, Endoplasmic reticulum, Golgi complex

Unit III

Cell division, Mitosis, Meiosis and their significance

Plant Tissue Culture

Unit IV

Definition – History and Scope, Tissue culture techniques, Application of culture techniques in Crop improvement

Unit V

Cell culture- Meristem culture – Callus induction- Protoplast- culture, Isolation, Purification and culture-Anther Culture

Text books:

1. Verma, P.S. and V.K.Agarwal – Cytology – S.Chand & Co. New Delhi
2. Reinert, J. Plant cell tissue and organs culture, Sathish Book Centre Press, Agra

Books for Reference:

Cell Biology

1. De Robertis E.D.P. Wilkter, W.Nowinkshi & Francis Co.A.Sal 2 Cell biology, W.Sawnders Co. London
2. Wilson, G.P & John H.Harrison – Cytology – East West Press Ltd., New Delhi
3. Carl P.Swanson & Peter L.Webster – The Cell – Prentice Hall of India P. Ltd., New Delhi
4. Burke, J.D. – Cell Biology, Scientific Book Agency, Calcutta

Plant Tissue Culture

1. Dodas, J.H. and Roberts, L.W. – Experiments in Plant tissue culture – Cambridge University Press
2. Johri, B.M. 1982 – Experimental Embryology of Vascular plants – Narosa Publishing House, New Delhi



**II YEAR – III/IV SEMESTER
COURSE CODE: 7BBOAP2**

**ALLIED PRACTICAL – II – CELL BIOLOGY, PLANT TISSUE CULTURE, PLANT
PHYSIOLOGY AND ENVIRONMENTAL BIOLOGY**

(Covering the Allied Courses III & IV)

1. Identifications from Photographs/ models/ micro preparation of cell organelles(chloroplast, Mitochondria, ER, Golgi Complex, Ribosome, Nucleus).
2. Plant tissue culture techniques, Preparation of culture medium
3. To identify and write critical notes on Callus culture, anther culture
4. Ganong's Potometer, Potato osmoscope, Ganong's respire scope, Light screen experiment, Evolution of O₂ during Photosynthesis
5. Ecological study method – Temporary Quadrat
6. To identify and write critical notes on **Spotters at sight**-Tissue culture item-autoclave, inoculation loop, Auxin, Cytokinin, Action spectrum, absorption spectrum, red drop.

Submission of certified and bonafide record note book is mandatory for External Practical.



COURSE CODE: 7BBOAP2

**ALLIED PRACTICAL - II – CELL BIOLOGY, TISSUE CULTURE, PLANT
PHYSIOLOGY AND ENVIRONMENTAL BIOLOGY**

EXTERNAL QUESTION

Time: 3 hours

Max. Marks- 30

1. Taking a lot from the set of the physiology experiments, write the procedure, 8 marks
Complete the experiment, tabulate the data and interpret the result
(Requirement -2, Procedure- 3, Result and data/tabulation-2, interpretation-1)
2. Identify and write a protocol and critical notes on A 3 marks
(Identification-1, Protocol-1, Critical notes-1)
3. Identify draw sketches and write notes on B, C and D 3x3=9 marks
(Identification-1, Sketch -1, Critical notes-1)
4. E Write a Procedure, tabulate the observation and give critical notes on 5 marks
the vegetation setup (Procedure, 2, Tabulation-1, Graph -1, Critical notes-1)
5. Submission of Record note book 5 marks

Total = 30 marks

**EXTERNAL
KEY AND SCHEME FOR VALUATION**

Time: 3 hours

Max. Marks- 30

1. Taking a lot from the set of the physiology experiments, write the procedure, 8 marks
Complete the experiment, tabulate the data and interpret the result
(Requirement -2, Procedure- 3, Result and data/tabulation-2, interpretation-1)
2. Identify and write a protocol and critical notes on A (from Tissue Culture) 3 marks
(Identification-1, Protocol-1, Critical notes-1)
3. Identify draw sketches and write notes on B, C and D 3x3=9 marks
(Photographs/models/micro preparation from cytology
and tissue culture)(Identification-1, Sketch-1, Critical notes-1)
4. E Write a Procedure, tabulate the observation and give critical notes on 5 marks
the vegetation setup (Procedure, 2, Tabulation-1, Graph -1, Critical notes-1)
5. Submission of Record note book 5 marks

Total = 30 marks



COURSE CODE: 7BBOAP2

**ALLIED PRACTICAL II – CELL BIOLOGY, TISSUE CULTURE, PLANT
PHYSIOLOGY AND ENVIRONMENTAL BIOLOGY**

INTERNAL QUESTION

Time: 3 hours

Max. Marks- 20

1. Taking a lot from the set of the physiology experiments, write the procedure, Complete the experiment, tabulate the data and interpret the result (Requirement -1, Procedure- 2, Tabulation and Result -2) 5 marks
2. Identify and write a protocol and critical notes on **A** (Identification-1, Protocol-1, Critical notes-1) 3 marks
3. Identify draw sketches and write notes on **B, C and D** (Identification-1, Critical notes-1) 3x2=6 marks
4. **E** Write a Procedure, tabulate the observation and give critical notes on the vegetation setup (Procedure-1, Graph -1, Critical notes-1) 3 marks
5. Continuous assessment 3 marks

Total = 20 marks

INTERNAL KEY AND SCHEME FOR VALUATION

Time: 3 hours

Max. Marks- 20

1. Taking a lot from the set of the physiology experiments, write the procedure, Complete the experiment, tabulate the data and interpret the result (Requirement -1, Procedure- 2, Tabulation and Result -2) 5 marks
2. Identify and write a protocol and critical notes on **A** (from Tissue Culture) (Identification-1, Protocol-1, Critical notes-1) 3 marks
3. Identify draw sketches and write notes on **B, C and D** (Photographs/models/micro preparation from cytology and tissue culture)(Identification-1, Critical notes-1) 3x2=6 marks
4. **E** Write a Procedure, tabulate the observation and give critical notes on the vegetation setup (Procedure, 1, Graph -1, Critical notes-1) 3 marks
5. Continuous assessment based on the performance in the practical class, attendance, record submission etc 3 marks

Total = 20 marks



**II YEAR – IV SEMESTER
COURSE CODE: 7BBOA4**

ALLIED COURSE - IV – PLANT PHYSIOLOGY AND ENVIRONMENTAL BIOLOGY

Plant Physiology

Unit I

Absorption of water – Transpiration and Ascent of sap

Unit II

Photosynthesis – Mechanism of Light Reaction – Dark Reaction Photosynthesis in C4 Plant

Unit III

Respiration – Mechanism of Aerobic respiration, Fermentation and its significance
Photorespiration – Photoperiodism and Vernalisation

Environmental Biology

Unit IV

Concept of ecosystem. Food chain, Food web, Energy flow and Ecological Pyramids – Pollution – kinds – Cause – Harmful effects including Green House effect and acid rain & control measures

Unit V

Deforestation Land Misuse (Indiscriminate tree felling and raising of Plantations) Effects of Deforestation – Conservation and Management of Forests, Social Forestry, Ecological Studies in the Field Conditions – Quadrat Method – Transect Method

Text books

1. Jain V.K.Fundamentals of Physiology S.Chand & Co, New Delhi.
2. Sharma P.D. – Elements of Ecology – Rastogi Publishing, Meerut

Books for Reference:

Plant Physiology

1. Ray Noggle, G and George J.Frits – Introduction to Plant Physiology. Prentice Hall of India P.Ltd., New Delhi.
2. Robert M.Devlinn – Plant Physiology. Affiliated East West Press P.Ltd., New Delhi.

Environmental Biology

1. Odum E.P. – Fundamentals of Ecology – W.B.Saunders Co, London
2. Kumar, H.D. – Modern Concepts of Ecology – Vikas Publishing House, New Delhi
3. Sukla R.S. and P.S.Chandel–Plant Ecology and Soil Science S.Chand and Co. Ltd. New Delhi
4. Singh, P. – Environmental pollution and Management, Bishen Singh, Mahendra Palsingh Publishing Co. Dehradun. ♣♣♣♣♣♣♣♣♣