

Scheme of B.Sc. Botany

Year	Course Code	Subject Name	Theory/ Practical	Total Credit	Total Marks	
					Max	Min
First year	BOT-1T	Microbial Diversity and Plant Pathology	Theory	4	50	17
	BOT--2T	Archegoniateae and Plant Architecture	Theory	4	50	17
	BOT--1P	LAB 1 : Microbial Techniques and Archegoniate identification	Practical	2	50	17
Second year	BOT--3T	Plant Systematics, Economic Botany and Ethnobotany	Theory	4	50	17
	BOT--4T	Plant Anatomy, Embryology and Plant Breeding	Theory	4	50	17
	BOT--2P	LAB 2 : Plant Identification and Embryology	Practical	2	50	17
Third year	BOT -5T	Plant Physiology and Ecology	Theory	4	50	17
	BOT -6T	Cytogenetics, plant tissue culture and biometry	Theory	4	50	17
	BOT -3P	LAB 3 : Experiments in Physiology, Biochemistry & Molecular biology	Practical	2	50	17

Note: There shall be four extra credits in each year for internship/apprenticeship. The certificate of extra credits for this would be provided by the concern university and it is not mandatory.

Part A: Introduction			
Program: Diploma in Plant Identification and plant preservation		Class: B. Sc. II Year	Year: 2023 Session: 2023-2024
1.	Course Code	BOT-3T	
2.	Course Title	Plant Systematics, Economic Botany and Ethnobotany	
3.	Course Type	Theory	
4.	Pre-requisite (if any)	NO	
5.	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to <ul style="list-style-type: none"> • Understand the Plant Taxonomy • Learn the characteristics of families included • Learn economic importance of different plants of the concerned families • Understand the traditional knowledge about the plants and possible application of this knowledge 	
6.	Credit Value	Theory: 4	
7.	Total Marks	Max. Marks: 50	Min Passing Marks: 17

Part B: Content of the Course		
Total Periods: 60		
Unit	Topics	No. of Period
I	Taxonomic Resources & Nomenclature: Components of taxonomy (identification, nomenclature, classification); Taxonomic resources: Herbarium- functions & important herbaria, Botanical gardens, Flora, Keys- single access and multi-access. Principles and rules of Botanical Nomenclature according to ICBN	12
II	Types of classification & Evidences: Artificial, natural and phylogenetic. Bentham and Hooker (upto series), Engler and Prantl (upto series) and Hutchinson classification. Introduction to taxonomic evidences from palynology, cytology and phytochemistry	12
III	Families: A study of the following families (Following Bentham & Hooker's system) with economic importance: Ranunculaceae, Brassicaceae, Malvaceae, Rutaceae, Fabaceae, Myrtaceae, Cucurbitaceae, Rubiaceae, Asteraceae, Apocynaceae, Acanthaceae, Asclepiadaceae, Solanaceae, Amaranthaceae, Euphorbiaceae, Papaveraceae, Apiaceae, Lamiaceae, Orchidaceae, Liliaceae, Musaceae and Poaceae.	12
IV	Economically valuable plants: Centre of origin and domestication of crop plants; Botanical name, family, part used and uses of oil yielding plants, fibre yielding plants, Rubber, Dyes, Timber, Sugar and beverages	12
V	Ethnobotany: Concept of Ethnobotany, Documentation, Conservation and application of Traditional Knowledge, Sacred grooves, Role of AYUSH, CIMAP and NMPB Role of important medicinal plants in Traditional therapeutic practices: <i>Aegle marmelos</i> , <i>Asparagus racemosus</i> , <i>Andrographis paniculata</i> , <i>Ocimum sanctum</i> , <i>Aloe vera</i> , <i>Nyctanthes arbor-tristis</i> etc. Conservation of medicinal plants and ethnomedicinal knowledge. Plants in primary healthcare: <i>Tinospora cordifolia</i> , <i>Ocimum sanctum</i> , <i>Aloe vera</i> , <i>Azadirachta indica</i> etc.	12

for records
13.6.22

Keywords: Taxonomy, classification, Families ,ethnobotany

Part C -Learning Resources

Suggested Readings:

1. Plant Systematics. Arun K. Pandey & Shruti Kansana. 2020. Jaya Publishing House.
2. Bole, P. V. and Vaghani, Y. (1986) Field guide to the common trees of India. Oxford University Press; Bombay.
3. Brandis, D. (1906) Indian Trees (London, 5th edition. 1971). International Book Distributors; Dehra Dun.
4. Dallwitz, M. J., Paine, T. A. and Zurcher, E. J. (2003). Principles of interactive keys. <http://delta-intkey.com>
5. <https://www.naace.co.uk/school-improvement/ict-mark/>
6. Pandey, B.P. 2007. Botany for Degree Students: Diversity of Seed Plants and their Systematics, Structure, Development and Reproduction in Flowering Plants. S. Chand & Company Ltd, New Delhi.
7. Singh, G. 1999. Plant Systematics: Theory and Practice. Oxford and IBH, New Delhi.
8. Dutta A.C. 2016. Botany for Degree Students. Oxford University Press.
9. Randhawa, G.S. and Mukhopadhyay, A. 1986. Floriculture in India. Allied Publishers
10. Kochhar, S.L. (2011). Economic Botany in the Tropics, MacMillan Publishers India Ltd., New Delhi. 4th edition.
11. Sambamurthy, AVSS & Subrahmanyam, NS (2000). Economic Botany of Crop Plants. Asiatech Publishers. New Delhi.
12. Singh, D.K and K.V. Peter. 2014. Protected cultivation of horticultural crops. New India Publishing Agency, India.
13. Reddy P. Parvatha. 2016. Sustainable crop protection under protected cultivation. Springer, Singapore.
14. Amit Deogirikar. 2019. A Text Book on Protected Cultivation and Secondary Agriculture. Rajlaxmi Prakashan, Aurangabad, India.
15. Singh, B., B. Singh, N. Sabir and M Hasan. 2014. Advances in protected cultivation. New India Publishing Agency, India.
16. Sharma, OP. 1996. Hill's Economic Botany (Late Dr. AF Hill, adopted by OP Sharma). Tata McGraw Hill Co. Ltd., New Delhi.

Suggested equivalent online courses:

1. <https://www.easybiologyclass.com/topic-botany/>
2. <http://egyankosh.ac.in/handle/123456789/53530>
3. <https://www.delta-intkey.com/www/desc.htm>
4. <https://milneorchid.weebly.com/plant-id-for-beginners.html>
5. <https://plants.usda.gov/classification.html>
6. https://www.senecaohs.org/pages/uploaded_files/Plant%20Classification.pdf
7. https://www.ladykeanecollege.edu.in/files/userfiles/file/Dr_%20S_%20Nongbri%20III%20Sem%20ppt.pdf
8. https://www.brainkart.com/article/Bentham-and-Hooker-s-classification-of-plants---Dicotyledonae,-Gymnospermae-and-Monocotyledonae_1000/
9. <https://libguides.rutgers.edu/c.php?g=336690&p=2267037>
<https://www.delta-intkey.com/>

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50






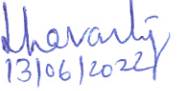

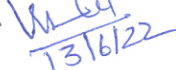

Continuous Comprehensive Evaluation (CCE): As per rule


University Exam(UE): 50Marks

For
13.6.22

Declaration

This is to certify that the syllabus is framed by the Central Board of Studies (Botany) as per the guidelines (TOR) of the Department of Higher Education, Raipur Chhattisgarh.

- | | | | |
|--|---|----------|---|
| 1. Shri Prabhat Pandey
Asst. Prof.
Gramya Bharti Vidyapith, Hardibazar | - | Chairman |  |
| 2. Dr. A.N. Bahadur
Professor
Govt. E.R.R. P.G. Science College, Bilaspur | - | Member |  |
| 3. Dr. Prashant Kumar Singh
Asst. Prof.
Govt. V.B. Singh Dev Girls College, Jashpur | - | Member |  |
| 4. Dr. Awadhesh Kumar Shrivastava
Asst. Prof.
Govt. D.T. P.G. College, Utai, Durg | - | Member |  |
| 5. Dr. Ashok Kumar Bharti
Asst. Prof.
Kirodimal Govt. Arts & Science College, Raigarh | - | Member |  |
| 6. Dr. Smriti Chakravarty
Professor
Govt. J.Y. Chhattisgarh College, Raipur | - | Member | 
13/06/2022 |
| 7. Dr. Rupinder Diwan
Professor
Govt. Nagarjun P.G. College of Science, Raipur | - | Member | 
13/6/22 |
| 8. Dr. Usha Chandel
Asst. Prof.
Govt. Dr. W.W. Patankar Girls P.G. College, Durg | - | Member | 
13/6/22 |
| 9. Mr. Kaushal Kishor
Asst. Prof.
Govt. Pt. Shyamacharan Shukla College, Dharsiwa,
Raipur | - | Member |  |
| 10. Manisha Gupta | - | Member | |

for 
13.6.22

Part A: Introduction			
Program: Diploma in Plant Identification and plant preservation		Class: B.Sc. II Year	Year: 2023 Session: 2023-2024
1.	Course Code	BOT-4 T	
2.	Course Title	Plant Anatomy, Embryology and Plant Breeding	
3.	Course Type	Theory	
4.	Pre-requisite (if any)	NO	
5.	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to <ol style="list-style-type: none"> 1. Understand the internal structure of root, stem and leaves 2. learn about the anomalous secondary growth of some plants 3. understand the life cycle of angiospermic plants with details of microsporogenesis, megasporogenesis, fertilization and other developmental details up to embryogenesis 4. understand concept of plant breeding and its application 	
6.	Credit Value	Theory: 4	
7.	Total Marks	Max. Marks: 50	Min Passing Marks: 17

Part B: Content of the Course		
Total Period: 60		
Unit	Topics	No. of Period
I	Meristems and related theories: Meristematic and permanent tissues, Root meristem, Stem meristem and Leaf meristem. Theories of apical organization: Apical Cell Theory, Histogen Theory and Tunica Carpus Theory	12
II	Anatomy and Secondary growth: Anatomy of Root, Stem and Leaves of both Dicots and Monocots. Secondary growth in Dicots, Anomalous secondary growth in <i>Bignonia</i> , <i>Boerhaavia</i> , <i>Dracaena</i> and <i>Nyctanthus</i>	12
III	Plant Embryology: Flower: Structure and types (Complete, Incomplete, Perfect and Imperfect flower), Microsporangium and Microsporogenesis, Ovule: Structure and types, Megasporogenesis, Development of female gametophyte (Embryo sac), Types of Embryo sac, Pollination, Pollen-pistil interaction, Fertilization, Double fertilization, Endosperm and its types, Embryogenesis, Apomixis and Polyembryony	12
IV	Plant Breeding: Plant Introduction, Agencies of plant introduction in India, Procedure of introduction- Acclimatization- Achievements, Selection- mass selection, pure line selection and clonal selection. Genetic basis of selection methods	12
V	Hybridization: Procedure of hybridization, inter-generic, inter-specific and inter-varietal hybridization. Composite and synthetic varieties, Heterosis, Mutation and Molecular breeding (use of DNA markers in plant breeding). Role of hybridization in agriculture, horticulture and forestry	12
Keywords: Meristems, Anomalous secondary growth. Pure line selection. Hybridization.		

For Review
13.6.22

Part C -Learning Resources

Text Books, Reference Books, Other Resources

1. M K Raxdan An Introduction to Plant Tissue Culture –; Oxfrd& IBH Publishing Co.Pvt. Ltd.,New Delhi
2. Allard RW (1960) Principles of Plant Breeding. John Willey and Sons. Inc. New York
3. BD Singh (2003) Plant Breeding. Kalyani Publishers
4. Sharma JR (1994) Principles and Practices of Plant Breeding. Tata McGraw-Hill Pub. Co. New Delhi
5. Pandey BP (2010) College Botany Vol II, S. Chand and Company, New Delhi.
6. Maheshwari P (1971). An Introduction to Embryology of Angiosperms, McGraw Hill Book Co., London
7. Bhojwani SS and Bhatnagar SP (2000). The Embryology of Angiosperms (4th Ed.), Vikas Publishing House
8. Evert RF (2006). Esau's Plant Anatomy: Meristems, Cells and Tissues of the Plant body: Their Structure, Function and Development, John Willey and Sons, Inc
9. Pandey BP .Plant Anatomy, S. Chand Publishers, New Delhi
10. Srivastava HN (2006). Plant Anatomy, Pradeep Publications, Jalandhar

Suggested equivalent online resources:

1. https://www.pnas.org/content/104/suppl_1/8641
2. <https://www.journals.uchicago.edu/doi/pdfplus/10.1086/659998>
3. <https://bsi.gov.in/page/en/ethnobotany>
4. <http://www.legalserviceindia.com/article/I98-Intellectual-Property-and-Traditional-knowledge.html>
5. https://www.brainkart.com/article/Economic-importance-Plants---Food,-Rice,-Oil,-Fibre,-Timber-yielding-plant_1095/
6. <https://www.loc.gov/rr/scitech/tracer-bullets/economic-botanytb.html>
7. <http://nsdl.niscair.res.in/bitstream/123456789/127/1/Fibre%20crops%2C%20bamboo%2C%20timber%20-%20Final.pdf>
8. <https://www2.palomar.edu/users/warmstrong/econpls.htm>
9. <https://www.longdom.org/proceedings/phytochemistry-and-phytoconstituents-of-herbal-drugs-and-formulations-1668.html>

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50







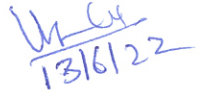


Continuous Comprehensive Evaluation (CCE):As per rule

University Exam(UE): 50Marks

Ag
13.6.22

Declaration

This is to certify that the syllabus is framed by the Central Board of Studies (Botany) as per the guidelines (TOR) of the Department of Higher Education, Raipur Chhattisgarh.

- | | | | |
|--|---|----------|---|
| 1. Shri Prabhat Pandey
Asst. Prof.
Gramya Bharti Vidyapith, Hardibazar | - | Chairman |  |
| 2. Dr. A.N. Bahadur
Professor
Govt. E.R.R. P.G. Science College, Bilaspur | - | Member |  |
| 3. Dr. Prashant Kumar Singh
Asst. Prof.
Govt. V.B. Singh Dev Girls College, Jashpur | - | Member |  |
| 4. Dr. Awadhesh Kumar Shrivastava
Asst. Prof.
Govt. D.T. P.G. College, Utai, Durg | - | Member |  |
| 5. Dr. Ashok Kumar Bharti
Asst. Prof.
Kirodimal Govt. Arts & Science College, Raigarh | - | Member |  |
| 6. Dr. Smriti Chakravarty
Professor
Govt. J.Y. Chhattisgarh College, Raipur | - | Member |  |
| 7. Dr. Rupinder Diwan
Professor
Govt. Nagarjun P.G. College of Science, Raipur | - | Member |  |
| 8. Dr. Usha Chandel
Asst. Prof.
Govt. Dr. W.W. Patankar Girls P.G. College, Durg | - | Member |  |
| 9. Mr. Kaushal Kishor
Asst. Prof.
Govt. Pt. Shyamacharan Shukla College, Dharsiwa,
Raipur | - | Member |  |
| 10. Manisha Gupta | - | Member | |

for 
13.6.22

Part A : Introduction

Programme: Certificate		Class B.Sc.-II	Year: 2022	Session: 2022-23
1.	Course Code	BOT-2P		
2.	Course Title	Plant Identification and Embryology		
3.	Course Type	Practical		
4.	Pre-requisite (if any)	No		
5.	Course outcomes:	Course outcomes: After the completion of the course the students will be able: <ul style="list-style-type: none"> • To learn how plant specimens are collected, documented, and curated for a permanent record. • To observe, record, and employ plant morphological variation and the accompanying descriptive terminology. • To gain experience with the various tools and means available to identify plants. • To develop observational skills and field experience. • To identify a taxonomically diverse array of native plants. • To recognize common and major plant families. • Comprehend the concepts of plant taxonomy and classification of Angiosperms. 		
6.	Credit Value	2		
7.	Total Marks	Max. Marks: 50	Min. Passing Marks:17	

Part B : Content of the Course

Total No. of Periods - 30

Tentative Practical List	Topic*
	*(Topic * (Minimum Any three from each unit depending on facilities and syllabus. 20% for spotting, 10% each for viva and sessional and rest 60 % marks equally in each unit.)
	Herbarium: Plant collection, Preservation and Documentation: Stepwise Practicing Herbarium techniques: 1. FIELD EQUIPMENTS, Collection of any wild 25 plant specimens 2. Learn to handle Herbarium making tools 3. Pressing and Drying of collected plant specimens 4. Special treatments for all varied groups of plants 5. Mount on standard herbarium sheets 6. Label them using Standard methods Arrange the prepared herbarium according to Bentham and Hookers system of classification- 1. herb, shrub and trees 2. annual, biannual and perennial 3. cereals, pulses, vegetables and medicinal 4. ethnobotanical importance

For Records
13.6.22

	<p>Taxonomic Identification of angiospermic plants: Description of plants belonging to following families in semitechnical language and identification up to family level: Brassicaceae, Malvaceae, Fabaceae, Cucurbitaceae, Asteraceae, Apocyanaceae, Asclepiadaceae, Solanaceae, Euphorbiaceae, Papaveraceae, Apiaceae Acanthaceae, Labiatae (Lamiaceae), Rubiaceae. Liliaceae, Musaceae, Poaceae.</p> <p>Identification during field visits: Field identification of common wild plants from families included in the theory syllabus.</p>
	<p>a) Documentation of Ethnobotanical wisdom of area b) Study of economically valuable plants: Medicinal plants, oil yielding plants, cereals, sugarcane, beverages etc.</p>
	<p>1. Anatomy of: Dicot root, stem and leaf 2. Monocot root, stem and leaf 3. Plants showing primary anomaly and anomalous secondary growth a) Study of an angiospermic flower b) Dissection of Ladys finger /Tridax/citrus seeds for study of embryo</p>

Part C - Learning Resource	
Text Books, Reference Books, Other Resources	
	<p>Suggested Readings:</p> <ol style="list-style-type: none"> 1. Bole, P. V. and Vaghani, Y. (1986) Field guide to the common trees of India. Oxford University Press; Bombay. 2. Womersley, J. S. 1981. Plant collecting and herbarium development: A manual.S.K. Pandey (2012). Quick Concept of Botany. Publisher LAP LAMBERT Academic Publishing GmbH & Co. KG, Germany (ISBN: 978-3-8484-3104-5). 3. Pandey S.K. (2012). Quick Concept of Botany. Publisher LAP LAMBERT Academic Publishing GmbH & Co. KG, Germany (ISBN: 978-3-8484-3104-5). 4. Manilal, K. S. and M. S. Muktesh Kumar (ed.) (1998) A Hand book of Taxonomy Training, DST,N. Delhi 5. Dhopte, A.M. (2003) Principles and Techniques for Plant Scientists. - Agrobios,Jodhpur, India. 6. Jain, S.K. & R.R. Rao. 1977. A handbook of field and herbarium methods. Today & Tomorrow's Printers and Publishers, New Delhi. <p>E-learning Resources:</p> <ol style="list-style-type: none"> 1. http://egyankosh.ac.in/bitstream/123456789/13096/1/Unit-5.pdf 2. https://www.for.gov.bc.ca/hfd/pubs/docs/wp/wp18.pdf 3. https://www.researchgate.net/publication/267510854_The_Flowering_Plants_Handbook

for *Alvinda*
13.6.22

Part D – Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50

Continuous Comprehensive Evaluation (CCE): Not Applicable

University Exam(UE): 50 Marks

Internal Assessment:

Continuous Comprehensive
Evaluation (CCE)










Class Test/Assignment/Presentation

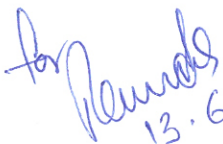
Not Applicable

*for records
13.6.22*

Declaration

This is to certify that the syllabus is framed by the Central Board of Studies (Botany) as per the guidelines (TOR) of the Department of Higher Education, Raipur Chhattisgarh.

- | | | | |
|---|---|----------|---|
| 1. Shri Prabhat Pandey | - | Chairman | |
| Asst. Prof. | - | Member |  |
| Gramya Bharti Vidyapith, Hardibazar | | | |
| 2. Dr. A.N. Bahadur | - | Member |  |
| Professor | | | |
| Govt. E.R.R. P.G. Science College, Bilaspur | | | |
| 3. Dr. Prashant Kumar Singh | - | Member |  |
| Asst. Prof. | | | |
| Govt. V.B. Singh Dev Girls College, Jashpur | | | |
| 4. Dr. Awadhesh Kumar Shrivastava | - | Member |  |
| Asst. Prof. | | | |
| Govt. D.T. P.G. College, Utai, Durg | | | |
| 5. Dr. Ashok Kumar Bharti | - | Member |  |
| Asst. Prof. | | | |
| Kirodimal Govt. Arts & Science College, Raigarh | | | |
| 6. Dr. Smriti Chakravarty | - | Member |  |
| Professor | | | |
| Govt. J.Y. Chhattisgarh College, Raipur | | | |
| 7. Dr. Rupinder Diwan | - | Member |  |
| Professor | | | |
| Govt. Nagarjun P.G. College of Science, Raipur | | | |
| 8. Dr. Usha Chandel | - | Member |  |
| Asst. Prof. | | | |
| Govt. Dr. W.W. Patankar Girls P.G. College, Durg | | | |
| 9. Mr. Kaushal Kishor | - | Member |  |
| Asst. Prof. | | | |
| Govt. Pt. Shyamacharan Shukla College, Dharsiwa, Raipur | | | |
| 10. Manisha Gupta | - | Member | |


13.6.22