

BOTANY III SEMESTER [SEP 2024-25]
Paper III: PTERIDOPHYTES, PALEOBOTANY &
EMBRYOLOGY OF ANGIOSPERMS

Programme	B.Sc (Botany)
Course Title	Paper III: Pteridophytes, Paleobotany & Embryology of Angiosperms (Theory)
Course code	BOTT 301
Total Hours of Teaching	56
Number of Teaching Hours / Week	4 Hours
Number of Credits	4
Formative Assessment	20
Summative Assessment	80
Course Outcome	
1. Pupil will be able to understand the General Characters, Classification and Life cycle 2. Pupil will be able to understand the Geological time scale, formation of fossils and their importance 3. Pupil will be able to understand the Developmental aspects of Flowering plants and role of Palynology in Forensic Science and Allergy	

Units	Content	Teaching Hours / week
1	Pteridophytes: Introduction, General characters, Classification (G.M. Smith). Stellar evolution, Study of distribution, morphology, anatomy and reproduction of the following forms: Psilotum, Selaginella and Osmunda (Developmental stages are not required)	14 Hours
2	Pteridophytes: Marsilea, (Developmental stages are not required) Heterospory and Seed Habit, Economic importance of Pteridophytes. Paleobotany: Geological Time Scale, Types of Fossils (Compression, Impression, Petrification, Cast and Moulds). Study of Rhynia and Lepidodendron. Significance of fossils. Contribution of Birbal Sahani	14 Hours
3	Embryology of Angiosperms: Introduction, Contribution of P. Maheshwari and BGL Swamy. Structure of a typical flower (Tribulus). Microsporangium: Structure and Development of mature anther, Microsporogenesis (Successive & Simultaneous), Types of Pollen tetrads. Tapetum: Types and Role. Development of male gametophyte, Concept of male germ unit, Pollen Embryo Sac (Nemec phenomenon). Palynology: Pollen Morphology - aperture, size, shape & polarity, Pollen wall architecture, NPC system of classification. Significance of palynology.	14 Hours

4	<p>Megasporangium: Types of Ovules, Megasporogenesis: Development of female gametophyte. Types of Embryosac development; Monosporic (Polygonum type), Bisporic (Allium type) and Tetrasporic (Fritillaria type). Structure of mature embryosac. Pollination: Self and cross pollination. Fertilization: Double fertilization and its significance, Post-fertilization changes. Endosperm: Types - Nuclear, Cellular, Helobial and Ruminant. Embryo: Development of Monocot and Dicot embryo</p>	14 Hours
---	--	----------

Pedagogy: Lectures, Demonstrations with live specimens, charts, permanent slides, Assignments, Seminars and field visits.

Methods of Assessment for Theory

Formative Assessment		
Components for IA	Marks Assigned	Total
Assignment – No. 1	5	20
Test – No. 1	5	
Assignment – No. 2	5	
Test – No. 2	5	
Summative Assessment		
Semester End Theory Examination	80	

BOTANY III SEMESTER [SEP 2024-25]
Paper III: PTERIDOPHYTES, PALEOBOTANY &
EMBRYOLOGY OF ANGIOSPERMS

Programme	B.Sc (Botany)
Course Title	Paper III: Pteridophytes, Paleobotany & Embryology of Angiosperms (Practical)
Course code	BOTT 302
Total Hours of Teaching	48
Number of Teaching Hours / Week	4 Hours
Number of Credits	2
Formative Assessment	10
Summative Assessment	40
Practical Syllabus	
Sl No	
1	Study of Psilotum
2	Study of Selaginella
3	Study of Osmunda
4	Study of Marsilea
5	Study of Fossils: Rhynia and Lepidodendron
6	Section of Anther
7	Morphology of Pollen grains(Grass, Hibiscus, Vinca, Acacia & Mimosa), Pollinia of Calotropis
8	Germination of Pollen grain by Hanging drop technique
9	Types of Ovules
10	Mounting of Endosperm (Cucumis)
11	Mounting of Embryo (Tridax / Mustard)

Methods of Assessment for Practical's

Formative Assessment		
Components for IA	Marks Assigned	Total
Practical Test	10	10
Summative Assessment		
Semester End Practical Examination	40	40
Total		50

References

1. The morphology of pteridophytes. The structure of ferns and allied plants. 1966. Sporne, K.R. Hutchinson University Library, London
2. Textbook of Pteridophyta. 1990. Sharma, O.P. McMillan India Ltd.
3. Botany for degree students. 1992. P. C. Vashishta, S. Chand & Company Pvt.Ltd
4. A Text book of Botany: Biodiversity (Microbes, Fungi, Algae & Archegoniate): 2018. Singh, Pandey, Jain. Rastogi Publications, Meerut, India
5. A Text book of Botany: 2013. Singh, Pandey, Jain. Rastogi Publications, Meerut, India
6. Botany: A functional approach (Fourth edition): 1974. Walter H. Muller. Macmillon Publishing Co. New York.
7. The Morphology of pteridophytes. 1977. Parihar, N.S. Central Book Depot, Allahabad
8. Pteridophyta. 2010. Vashishta, B.R., Sinha, A.K. & Kumar, A. S. Chand & Company Pvt. Ltd.
9. An Introduction to Pteridophyta. (2nd edition). 1998. Rashid, A. Vikas Publishing House Pvt. Ltd., New Delhi.
10. Paleobotany: Plants of the past, their evolution, paleoenvironment, and allied plants. 1995. Agashe, S.N. Hutchinson & Co. Ltd.
11. An introduction to fossil plants. 2009. Cleal, C.J. & Thomas, B.A. Cambridge University Press.
12. Paleobotany. Plants of the past, their evaluation, paleoenvironment and application in exploration of fossil fuels. 1995. Agashe, S.N. Oxford & I.B.H. New Delhi
13. Essentials of Paleobotany. 1975. Ashok C Shukla & Shital P Misra. Vikas Publishing House. Delhi
14. Textbook of paleobotany. 1966. Surange, K.R. Popular Book Depot.
15. Recent advances in embryology. 1963. Maheshwari, P. International Society of Plant Morphologists.
16. Embryology of angiosperms. 1984. Johri, B.M. Springer-Verlag
17. The embryology of angiosperms. 1979. Bhojwani, S.S. & Bhatnagar, S.P. Vikas Publishing House. Delhi
18. Systematic embryology of angiosperms. 1966. Davis, G.L. John Wiley & Sons Inc
19. From flower to fruit: Embryology of flowering plants. 1980. Swamy, B.G.L. & Krishnamurthy, K.V. Tata McGraw-Hill

BOTANY - III SEMESTER
Paper III: PTERIDOPHYTES, PALEOBOTANY &
EMBRYOLOGY OF ANGIOSPERMS
Model Question Paper for Theory Examination

Time: 3Hours

Max Marks: 80

Instructions: 1) Answer all parts
2) Draw neat labeled diagrams wherever necessary

Part - A

I. Answer any **TEN** of the following

10x2=20

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.

Part - B

II. Answer any **SIX** of the following

6X5=30

- 12.
- 13.
- 14.
- 15.
- 16.
- 17.
- 18.

Part - C

III. Answer any **THREE** of the following

3X10=30

- 19.
- 20.
- 21.
- 22.

BOTANY III SEMESTER [SEP 2024-25]
Practical Paper III: PTERIDOPHYTES, PALEOBOTANY &
EMBRYOLOGY OF ANGIOSPERMS [BOTP 302]

Model Question Paper for Practical Examination

Time: 3 Hours

Max Marks: 40

SI No	Experiments / Questions	Marks Assigned
1	Identify and classify the specimens A and B with reasons	2 x3 =6
2	Identify the Slides C , D and E with labeled diagrams with reasons	3x4=12
3	Comment on F	3
4	Calculate the percentage of Pollen germination by Hanging drop technique of G	6
5	Mount the Embryo / Endosperm of H	6
6	Class Record and Submission	5 + 2=7

Scheme of Valuation

SI No	Experiments / Questions	To be given	Marks
1	A & B	Pteridophytes	Identification & Classification – 1 Mark, Reasons - 2 Marks
2	C, D & E	Pteridophytes	Identification- 1 Mark, Labeled diagram - 1Mark, Reasons- 2 Mark
3	F	Fossil material (Specimen / Photocopy)	Identification-1Mark, Comment-2 Marks
4	G	Pollen germination	Conducting experiment-3 Marks, Identification- 1 Mark, Comment-1 Mark, Calculation-1
5	H	Tridax, Embryo / Cucumis	Mounting – 3 Marks, Diagram – 1 Mark, Comment – 2 Marks
6	Class Records	--	5Marks
7	Vivo Voce	Submission: 2 Slides	2Marks

BOTANY III SEMESTER [SEP 2024-25]
ELECTIVE-01: MEDICINAL PLANTS AND HERBAL TECHNOLOGY
COURSE CODE: BOTET 01

Programme	B.Sc (Botany)
Course Title	Elective-1: Medicinal Plants And Herbal Technology (Theory)
Course code	BOTET 01
Total Hours of Teaching	36
Number of Teaching Hours / Week	3 Hours
Number of Credits	3
Formative Assessment	20
Summative Assessment	80
Course Outcome	
<p>The students will be able to:</p> <ol style="list-style-type: none"> 1. Recognize the basic medicinal plants 2. Apply techniques of conservation and propagation of medicinal plants. 3. Setup process of harvesting, drying and storage of medicinal herbs 4. Propose new strategies to enhance growth of medicinal herbs considering the practical issues pertinent to India 	

Units	Content	Teaching Hours / week
1	Traditional Systems of Medicine: History, scope and importance of medicinal plants. Traditional systems of medicine - definition and scope. Ayurveda- history, origin, panchamahabhutas, saptadhatu and tridosha concepts. Siddha- origin and basis of siddha system. Conservation of endemic and endangered medicinal plants. In-situ conservation (Biosphere reserves, Sacred groves, National Parks). Ex-situ conservation (Botanic Gardens, Ethno medicinal plant gardens). Propagation of Medicinal Plants - cuttings, layering, grafting and budding. Objectives of the nursery, Use of green house for nursery production.	12
2	Ethno botany and Folk medicines: Definition, Ethno botany in India, Methods to study ethno botany, Applications of Ethno botany, Palaeo-ethno botany. Folk medicines of ethno botany, ethno medicine, Brief description of selected plants (part used and uses and derived drugs) : Rauwolfia, Belladonna, Ocimum (Tulasi), Drumstic (Nugge), Fenugreek (Mentya), Curry leaf (Karibevu), Gooseberry (Nelli), Centella (Ondelaga), Sweet flag (Baje), Gymnema (Madhunashini), Aloe vera (Lolesara), Tinospora (Amrutha balli), Withania (Ashwagandha), Coleus	12

	(Doddapathre), Adathoda (Aadusooge), Turmeric (Harishina), Ginger (Shunti)	
3	Herbal Technology: Definition history and scope. Traditional systems of medicine, and overview of AYUSH (Traditional Indian Systems of Medicine). Cultivation, harvesting, processing and storage of herbs and herbal products. Value added plant products: herbs and herbal products. Major herbs used as cosmetics and biopesticides (botanical names, plant parts used and major chemical constituents). Pharmacognosy: Methods of drug evaluation, Biological testing of herbal drugs: phytochemical screening tests for secondary metabolites (alkaloids, steroids & phenolic compounds). Plant gene banks, Introductory knowledge of Tissue culture and Micro propagation of Neem and Tulsi.	12

Methods of Assessment

Formative Assessment		
Components for IA	Marks Assigned	Total
Practical Test	10	10
Summative Assessment		
Semester End Practical Examination	40	40
Total		50

References:

1. Akerele, O., Heywood, V. and Synge, H. (1991). The Conservation of Medicinal Plants. Cambridge University Press
2. CSIR- Central Institute of Medicinal and Aromatic Plants, Lucknow (2016). *Aush Gyanya: Handbook of Medicinal and Aromatic Plant Cultivation*.
3. Dev, S. (1997). Ethnotherapeutics and modern drug development: The potential of Ayurveda. *Current Science* 73:909–928.
4. Jain, S.K. and Jain, Vartika. (eds.) (2017). Methods and Approaches in Ethnobotany: Concepts, Practices and Prospects. Deep Publications, Delhi
5. Thakur, R. S., H. S. Puri, and Husain, A. (1989). *Major medicinal plants of India*. Central Institute of Medicinal and Aromatic Plants, Lucknow, India
6. Kapoor, L. D. (2001). *Handbook of Ayurvedic medicinal plants*. Boca Raton, FL: CRC Press.

7. Varzakas, T., Zakyntinos, G, and Francis Verpoort, F. (2016). Plant Food Residues as a Source of Nutraceuticals and Functional Foods. *Foods* 5: 88.
8. Aburjai, T. and Natsheh, F.M. (2003). Plants Used in Cosmetics. *Phytotherapy Research* 17:987-1000.
9. AYUSH (www.indianmedicine.nic.in). About the systems—An overview of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy. New Delhi: Department of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy (AYUSH), Ministry and Family Welfare, Government of India
10. Evans, W.C. (2009): Trease and Evans PHARMACOGNOSY. 16th Edition, SAUNDERS / Elsevier.
11. Sivarajan, V.V. and India, B. (1994). Ayurvedic Drugs and Their Plant Sources. *Oxford & IBH Publishing Company*, 1994 - Herbs - 570 pages.

BOTANY III SEMESTER [SEP 2024-25]
ELECTIVE-1: MEDICINAL PLANTS AND HERBAL TECHNOLOGY
COURSE CODE: BOTET 01
Model Question Paper for Theory Examination

Time: 3 Hours

Max Marks: 80

Instructions: 1) Answer all parts
2) Draw neat labeled diagrams wherever necessary

Part - A

I. Answer any **TEN** of the following 10x2=20

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.

Part - B

II. Answer any **SIX** of the following 6X5=30

- 12.
- 13.
- 14.
- 15.
- 16.
- 17.
- 18.

Part - C

III. Answer any **THREE** of the following 3X10=30

- 19.
- 20.
- 21.
- 22.

BOTANY IV SEMESTER
[SEP 2024-25]
Paper IV: GYMNOSPERMS, ECOLOGY AND PHYTOGEOGRAPHY
(THEORY)

Programme	B.Sc (Botany)
Course Title	Paper IV: Gymnosperms, Ecology and Phytogeography (Theory)
Course code	BOTT 401
Total Hours of Teaching	56
Number of Teaching Hours / Week	4 Hours
Number of Credits	4
Formative Assessment	20
Summative Assessment	80
Course Outcome	
<ol style="list-style-type: none"> 1. Pupil will be able to understand the General Characters, Classification and Life cycle of the forms studied 2. Helps to understand the Concepts of Ecology, Environmental Science and Phytogeography 3. Helps to understand the impact of climate change on ecosystem 4. Helps to understand Global environmental crisis, sustainable development and Conservation Biology 	

Units	Content	Teaching Hours / week
1	Gymnosperms: Introduction, General characters, distribution, Classification (K. R. Sporne), Distribution, morphology, anatomy and reproduction of the following forms: Cycas, Pinus and Gnetum (Developmental stages not required). Economic importance of Gymnosperms.	14 Hours
2	Ecology: Introduction, Aim and Scope of Ecology. Climatic factors: Light, Temperature, Precipitation and Humidity. Edaphic factors: Soil and its types, Soil texture, Soil profile. Soil formation, Soil organisms, Soil humus, Soil air, Soil temperature and Soil pH. Soil aeration. Ecological Adaptations: Hydrophytes, Xerophytes, Epiphytes and Halophytes. Soil erosion and conservation.	14 Hours
3	Ecosystem: Concept of Ecosystem, Structure and function of Ecosystem, Energy flow in Ecosystem. Biocoenosis: Types of Ecosystem. Study of Forest and Pond ecosystem. Food chain and Food web. Ecological pyramids – Pyramid of Number, Energy and Biomass. Plant Succession:	14 Hours

	Hydrosere and Xerosere. Biogeochemical cycles: Nitrogen cycle and Phosphorous cycle. Biodiversity and Conservation: Types and Values of Biodiversity, Hotspots of Biodiversity and Methods of Biodiversity Conservation (Insitu and Exsitu).	
4	Environmental Issues: Causes, effects and control measures of Air, Water, Soil and Noise Pollution. Global Environmental Issues: Green house effect, Global warming, Ozone depletion, Acid rain, Nuclear winter, Solid waste management and impact of Bioremediation on Global Environmental issues. Phytogeography: Continental drift, Theory of Land bridge, Phytogeographical regions of India and Vegetational types of Karnataka.	14 Hours

Pedagogy: Lectures, Demonstrations with live specimens, charts, permanent slides, Assignments, Seminars and field visits.

Methods of Assessment for Theory

Formative Assessment		
Components for IA	Marks Assigned	Total
Assignment – No. 1	5	20
Test – No. 1	5	
Assignment – No. 2	5	
Test – No. 2	5	
Summative Assessment		
Semester End Theory Examination		80

BOTANY IV SEMESTER [SEP 2024-25]

Paper IV: GYMNOSPERMS, ECOLOGY AND PHYTOGEOGRAPHY

Programme	B.Sc (Botany)
Course Title	Paper IV: Gymnosperms, Ecology and Phytogeography (Practical)
Course code	BOTP 402
Total Hours of Teaching	48
Number of Teaching Hours / Week	4 Hours
Number of Credits	2
Formative Assessment	10
Summative Assessment	40

Sl. No.	Practical Syllabus
1.	Study of Ecological instruments – Hygrometer, LUX meter, Anemometer, Soil thermometer and Rain gauge.
2.	Study of soil types, soil pH and Water holding capacity of soil.
3.	Morphological adaptations of Hydrophytes – Pistia and Eichhornia. Morphological and anatomical adaptations of Hydrilla.
4.	Morphological adaptations of Xerophytes – Opuntia, Asperagus, Nerium. Morphological and anatomical adaptations of Casuarina
5.	Morphological adaptations of Halophytes – Pnematophores and Vivipary. Morphological and anatomical adaptations of Epiphytes – Vanda
6.	Visit to the aquatic and terrestrial ecosystem and record the biotic and abiotic components of Ecosystem.
7.	Determination of Dissolved Oxygen content of the water sample.
8.	Determination of Chloride content of the water sample.
9.	Determination of Hardness of the water sample.
10.	Field Visit to Water purifying unit / Water testing Laboratory (Report to be submitted)

Methods of Assessment for Practical's

Formative Assessment		
Components for IA	Marks Assigned	Total
Practical Test	10	10
Summative Assessment		
Semester End Practical Examination	40	40
Total		50

References:

1. The Morphology of Gymnosperms.1971. K. R. Sporne. Hutchinson University Library, London
2. Botany: A functional approach (Fourth edition): 1974. Walter H. Muller.Macmillon Publishing Co. New York.
3. A Text book of Botany: 2013. Singh, Pandey, Jain. Rastogi Publications, Meerut, India
4. A Text book of Botany: Biodiversity (Microbes, Fungi, Algae & Archegoniate): 2018. Singh, Pandey, Jain. Rastogi Publications, Meerut, India
5. Fundamentals of Ecology (Third edition):1971. Eugene P. Odum. W. B. Saunders Co. Philadelphia
6. The Ecology of Natural Resources (Third edition): 1981. I. G. Simmons. English language Book Society / Edward Arnold Publishers
7. Environmental and Pollution Science (Second Edition): 2006.Ian L. Pepper, Charles P.Gerba and Mark L. Brusseau. Academic Press. Elsevier.Canada
8. Environmental Biology and Toxicology. 2008. P. D. Sharma. Rastogi Publications, Meerut, India
9. Ecology and Environment (11th revised edition): 2012. P. D. Sharma. Rastogi Publications, Meerut, India
10. Modern concepts of Ecology (7th revised edition):1992. H. D. Kumar. Vikas Publishing House Pvt Ltd. Delhi
11. Bioresources Ecology (2nd edition):1982. T.N. Ananthakrishnan. Oxford & IBH Publishing Co. Ltd. New Delhi.
12. Principles of Environmental Biology. 1990. P. K. G Nair. Himalaya Publishing House, Bombay
13. Plant Ecology (8th Edition) 1973. P. L. Kochhar. Nagin Poblshers
14. College Botany Vol II. 1997. Sundarrajan S. Himalaya Publishing house

BOTANY IV SEMESTER [SEP 2024-25]
Paper IV: GYMNOSPERMS, ECOLOGY AND PHYTOGEOGRAPHY
Model Question Paper for Theory Examination

Time: 3Hours

Max Marks: 80

- Instructions: 1) Answer all parts
2) Draw neat labelled diagrams wherever necessary

Part - A

I. Answer any **TEN** of the following

10x2=20

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.

Part – B

II. Answer any **SIX** of the following

6X5=30

- 12.
- 13.
- 14.
- 15.
- 16.
- 17.
- 18.

Part – C

III. Answer any **THREE** of the following

3X10=30

- 19.
- 20.
- 21.
- 22.

BOTANY IV SEMESTER [SEP 2024-25]
Paper IV: GYMNOSPERMS, ECOLOGY AND PHYTOGEOGRAPHY
Course Code: BOTP 402
Model Question Paper for Practical Examination

Time: 3 Hours

Max Marks: 40

Sl No	Experiments / Questions	Marks Assigned
1	Identify and classify the specimens A , B & C with reasons	3x3 = 9
2	Identify the Slides D , E & F with labeled diagrams with reasons	3x3=9
3	Comment on G	3
4	Estimation of Dissolved Oxygen / Chlorinity of water sample H	6
5	Determine the pH / Water holding capacity of the soil samples I	3
5	Submission of Field visit Report	5
6	Class Record	5

Scheme of Valuation

Sl No	Experiments / Questions	To be given	Marks
1	A, B & C	A and B from Gymnosperms, C from Ecological adaptations	Identification –1 Mark, Diagram – 1 Mark, Reasons –1 Mark
2	D, E & F	D and E from Gymnosperms, F from Ecological adaptations	Identification- 1 Mark, Labelled diagram -1 Mark, Reasons-1 Mark
3	G	Ecological Instrument/ Photocopy	Identification-1Mark, Comment- 2 Marks
4	H	Water sample	Requirement -1Mark, Principle –1Mark, Conduct of Experiment – 3 Marks, Result –1 Mark
5	I	Soil sample	Conduct–2Marks, Result–1 Mark
6	Field visit report	--	5Marks
7	Class Record	--	5 Marks

BOTANY IV SEMESTER [SEP 2024-25]
ELECTIVE-2: GLOBAL CLIMATE CHANGE & ITS IMPLICATIONS
COURSE CODE: BOTET 02

Programme	B.Sc (Botany)
Course Title	Elective-02: GLOBAL CLIMATE CHANGE & ITS IMPLICATIONS (Theory)
Course code	BOTET 02
Total Hours of Teaching	36
Number of Teaching Hours / Week	3 Hours
Number of Credits	3
Formative Assessment	20
Summative Assessment	80
Course Outcome	
<p>After completing this course the learner will be able to;</p> <ol style="list-style-type: none"> 1. Develop understanding on the concept and issues of global environmental change 2. Analyse the causes and effects of depletion of stratospheric ozone layer 3. Examine the climate change and its effect on living beings 4. Understand the physical basis of natural green gashouse effect on man and materials 5. Evaluate human influenced driver of our climate system and its applications 	

Unit	Content	Teaching Hours / week
1	Global Environmental Change Issues and Scenario: Stratospheric ozone layer: Evolution of ozone layer. causes for depletion and consequences. Effects of enhanced UV radiations on plants, microbes, animals, human health and materials. Global efforts for mitigation ozone layer depletion. Montreal Protocol and its amendments, National policies and public awareness. Climate Change: Global warming-causes (manmade and natural), effects and control measures. Greenhouse effect - greenhouse gases and their sources, causes, consequences of green house effect on climate, oceans, agriculture, natural vegetation and humans.	12
2	Global Environmental Changes: Acid rain, deforestation, desertification, costal degradation (causes, consequences and remedial measures). Global issues on climate change: Extreme Weather Events, Sea Level Rise, Biodiversity Loss, Food and Water Insecurity, Human Health Impacts, Economic Disparities, Soil Degradation,	12

	Ecological Collapse, Displacement and Migration. Impact of climate change on ecosystem and human health.	
3	Solid Waste & Climate Change: Solid waste management (urban and industrial wastes) - causes, effects & management methods. Thermal pollution & nuclear hazards. Case studies, Role of individual in prevention of solid waste pollution. Role of information technology in global climate change and sustainable development. International efforts on climate change issues: The Paris Agreement, The United Nations Framework Convention on Climate Change (UNFCCC), Kyoto Protocol, Green Climate Fund (GCF)	12

Methods of Assessment

Formative Assessment		
Components for IA	Marks Assigned	Total
Practical Test	10	10
Summative Assessment		
Semester End Practical Examination	40	40
Total		50

References:

1. Adger, N. Brown, K. and Conway, D. (2012). Global Environmental Change: Understanding the Human Dimensions. The National Academic Press.
2. Turekian. K. K. (1996). Global Environmental Change-Past, Present, and Future. Prentice-Hall.
3. Matthew. R. A. (2009). Jon Barnett, Bryan McDonald. Global Environmental Change and Human Security. MIT Press., USA.
4. Hester, R.E. and Harrison, R.M. (2002). Global Environmental Change. Royal Society of Chemistry.
5. The Ecology of Natural Resources (Third edition): 1981. I. G. Simmons. English language Book Society / Edward Arnold Publishers
6. Environmental and Pollution Science (Second Edition): 2006. Ian L. Pepper, Charles P. Gerba and Mark L. Brusseau. Academic Press. Elsevier. Canada
7. Environmental Biology and Toxicology. 2008. P. D. Sharma. Rastogi Publications, Meerut, India
8. Ecology and Environment (11th revised edition): 2012. P. D. Sharma. Rastogi Publications, Meerut, India
9. Modern concepts of Ecology (7th revised edition): 1992. H. D. Kumar. Vikas Publishing House Pvt Ltd. Delhi

10. Bioresources Ecology (2nd edition):1982. T.N. Ananthakrishnan. Oxford & IBH Publishing Co. Ltd. New Delhi.
11. Principles of Environmental Biology. 1990. P. K. G Nair. Himalaya Publishing House, Bombay
12. Plant Ecology (8th Edition) 1973. P. L. Kochhar. Nagin Poblshers

BOTANY IV SEMESTER [SEP 2024-25]
ELECTIVE-2: GLOBAL CLIMATE CHANGE & ITS IMPLICATIONS
COURSE CODE: BOTET 02
Model Question Paper for Theory Examination

Time: 3 Hours

Max Marks: 80

Instructions: 1) Answer all parts
2) Draw neat labeled diagrams wherever necessary

Part - A

I. Answer any **TEN** of the following 10x2=20

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.

Part - B

II. Answer any **SIX** of the following 6X5=30

- 12.
- 13.
- 14.
- 15.
- 16.
- 17.
- 18.

Part - C

III. Answer any **THREE** of the following 3X10=30

- 19.
- 20.
- 21.
- 22.