B.Sc. BOTANY: Semester - 3

Theory: Discipline Specific Core Course (DSCC) Title of the Course and BOT-A-3.1: PLANT ANATOMY AND DEVELOPMENT BIOLOGY

Course No.	Type of Course	Theory/ Practical	Credits	Instruction: hours/week	Total No. of Lecturers /Hours/ Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
BOT-A-3.1	DSCC	Theory	04	04	56hrs	2hrs	40	60	100

Course Outcomes:

On completion of this course, the students will be able to:

- Observation of variations that exist in internal structure of various parts of a plant and as well as among different plant groups in support for the evolutionary concept.
- Skill development for the proper description of internal structure using botanical terms, their identification and further classification.
- Induction of the enthusiasm on internal structure of locally available plants.
- Understanding various levels of organization in a plant body with an outlook in the relationship between the structure and function through comparative studies.
- Observation and classification of the floral variations from the premises of college and house.
- Understanding the various reproductive methods sub-stages in the life cycle of plants.
- Observation and classification of the embryological variations in angiosperms.
- Enthusiasm to understand evolution based on the variations in reproduction among plants.

Unit-1	
PLANT ANATOMY **ANGIOSPERM ANATOMY, PLANT CELL STRUCTURE AND TISSUES** Introduction, objective and scope of Plant Anatomy, Plant cell structure. ***Tissue systems*** - meristematic tissue, permanent tissue and secretary cells. Classification of meristem: (apical, intercalary and lateral), primary and secondary meristem. ***Apical meristem:*** Theories on organization of meristem (apical cell theory, Tunica-Corpus theory). Evolution and concept of organization of shoot apex (Apical cell theory, Histogen theory, Tunica Corpus theory continuing meristematic residue, cytohistological zonation).	14 hrs
Unit-2	
MORPHOGENESIS AND DIFFERENTIATION Morphogenesis in plants - Differentiation of root, stems and leaf. Types of vascular bundles and Vascular cambium.	14 hrs

Structure of Dicot root: primary and secondary structures (Tridax/Sunflower), Structure of monocot root (Maize). Structure of Dicot stem: Primary and secondary structures (Tridax/Sunflower), Structure of Monocot stem (Maize), Nodal anatomy. Structure of Dicot leaf: primary structure (Tridax/Sunflower), primary structure of Monocot leaf (Maize),, Stomatal types. Anomalous secondary growth: Aristolochia, Boerhaavia (dicot stem) Dracaena (monocot stem) Applications in systematics, forensics and Pharmacognosy.	
Unit-3	
DEVELOPMENT BIOLOGY **MORPHOGENESIS AND DIFFERENTIATION** Differentiation and cell polarity in acellular (*Dictyostelium*), Unicellular (*Acetabularia*) and multicellular system (root hair and stomata formation) Shoot Apical meristem (SAM): Origin, structure and function, Cytohistological zonation and Ultrastructure of meristems. Organogenesis: Differentiation of root, stem, leaf and axillary buds, bud dormancy Mechanism of leaf primordium initiation, development and Phyllotaxis (Diversity in size and shape of leaves) Structure and function of root apical meristem (RAM): Root cap, quiescent centre and origin of lateral roots. Transition from vegetative apex into reproductive apex. Developmental patterns at flowering apex: ABC model specification of floral organs. Modification of gene action by growth hormones and cellular differences between floral organs. Senescence – a general account.	14 hrs
Unit-4	
REPRODUCTIVE BIOLOGY Introduction, scope and contributions of Indian embryologists: P. Maheswari, B G L Swamy, P.Maheshwari, M.S. Swaminathan and K.C. Mehta. **Microsporangium**: Development and structure of mature anther, Anther wall layers, Tapetum - types, structure and functions and sprogenous tissue. **Microsporogenesis** - Microspore mother cells, microspore tetrads, Pollinia. **Microgametogenesis** – Formation of vegetative and generative cells, structure of male gametophyte. Pollen embryosac (Nemec phenomenon). **Megasporangium** – Structure of typical Angiosperm ovule.Types of ovule-Anatropous, Orthotropous, Amphitropous, Circinotropous.**Megagametogenesis** – Types of development of Female gametophyte/embryosac- monosporic-*Polygonum* type, bisporic – *Allium* type, tetrasporic - *Fritillaria* type. Structure of mature embryosac. **Pollination and fertilization:** Structural and functional aspects of pollen, stigma and style. Post pollination events; Current aspects of fertilization and Significance of double fertilization, Post fertilization changes. **Endosperm** – Types and its biological importance. Free nuclear (*Cocos nucifera*) cellular (*Cucumis),* helobial types. Ruminate endosperm. **Embryogenesis** – Structure and composition of zygote ,Dicot (*Capsella bursa-pastoris)*and Monocot (*Najas)* embryo development. A general account of seed development.	14 hrs

Formative Assessment	
Assessment Occasion/ type	Weightage in Marks
I Test	10
II Test	10
Seminar	10
Assignment	05
Attendance	05
Total	40

B.Sc. BOTANY: Semester – 3

Practical: Discipline Specific Core Course (DSCC) Title of the Course and Code:

BOT-A-3.2: PLANT ANATOMY AND DEVELOPMENT BIOLOGY

Course No.	Type of Course	Theory/ Practical	Credits	Instruction: hours/week	Total No. of Lecturers /Hours/ Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
BOT-A-3.1	DSCC	Theory	02	04	52 hrs	2hrs	25	25	50

LIST OF EXPERIMENT TO BE CONDUCTED

Practical No.1 i) Study of meristem (Permanent slides/ Photographs) ii) Study of Simple Tissues (Parenchyma, Collenchyma and Sclerenchyma)and Complex Tissues (xylem and phloem).
Practical No.2 Maceration technique to study elements of xylem and phloem, Study of primary structure of dicot root, stem and leaf (Sunflower) and monocot root, stem and leaf (Maize)
Practical No.3 Study of Normal secondary growth structure in dicot stem and root (Sunflower) and Anomalous secondary growth: *Aristolochia, Boerhaavia* (dicot stem) *Dracaena* (monocot stem)
Practical No. 4 Study of trichomes (any three types) and stomata (any three types) with the help of locally available plant materials
Practical No. 5 Permanent slides of Microsporogenesis and male gametophyte Mounting of Pollen grains of Grass and Hibiscus and Pollinia of Calotropis
Practical No. 6 Pollen germination (hanging drop method) and Effect of Boron and Calcium on pollen germination

Practical No. 7 Permanent slides of types of ovules, Megasporogenesis &embryosac development and types of placentation: Axile, Marginal and Parietal types. Sectioning of ovary, for the studied types of placentation
Practical No. 8 Mounting of embryo: Tridax and Cyamopsis, Mounting of endosperm: Cucumis
Practical No. 09 Histochemical localization of proteins/ carbohydrates
Practical No. 10 and 11 Mini project work in groups of 3-5 students, from the following list • Study of pollen morphology of different flowers with respect to shape, colour, aperture etc. • Pollen germination of different pollen grains and calculates percentage of germination. • Calculating percentage of germination of one particular type of pollen grain collected from different localities/ under different conditions. • Study of placentation of different flowers. • Any other relevant study related to Anatomy / Embryology.

Text Books for Reference:

- Bhatnagar SP, Dantu PK and Bhojwani SS. 2011. Introduction to Embryology of Angiosperms –Oxford & IBH, Delhi
- Bhojwani SS. 2014. Current Trends in the, Embryology of Angiosperms, Woong-Young Soh, Springer Netherlands.
- Coutler EG. 1969. Plant Anatomy – Part I Cells and Tissues – Edward Arnold, London,
- Dickison WC. 2000. Integrative Plant Anatomy, Harcourt Academic Press, USA.
- Eames AJ. 1961. Morphogenesis of angiosperms. McGraw Hill, New York.
- Esau K. 1990. Plant Anatomy, Wiley Eastern Pvt Ltd New Delhi
- Evert RF. 2006. Esau's Plant Anatomy: Meristem, Cells, and Tissues of the Plant Body: Their Structure, Function and Development. John Wiley and Sons, Inc
- Johri BMl. 1984.Embryology of Angiosperms, Springer-Verlag, Netherlands.
- Karp G. 1985. Cell Biology; Mc.Graw Hill Company
- Fahn A. 1992. Plant Anatomy, Pergamon Press, USA.
- Maheshwari P. 1950. An introduction to the embryology of angiosperms. New York. McGraw-Hill
- Nair PKK. 1971. Pollen Morphology of Angiosperms - Scholar Publishing House, Lucknow
- Mauseth JD. 1988. Plant Anatomy, the Benjammin/Cummings Publisher, USA
- Pandey SN. 1997, Plant Anatomy and Embryology .A. Chadha, Vikas Publication. House Pvt Ltd
- Pandey BP. 1997. Plant Anatomy, S.Chand and Co. New Delhi
- Raghavan V. 2000. Developmental Biology of Flowering plants, Springer, Netherlands.
- Saxena MR. 1993. Palynology – A treatise - Oxford & I. B .H., New Delhi.

- Shivanna KR. 2003. Pollen Biology and Biotechnology. Oxford and IBH Publishing Co. Pvt. Ltd. Delhi.
- Vashishta PC. 1984. Plant Anatomy – Pradeep Publications – Jalandhar
- Vashishta PC. 1997. Plant Anatomy, Pradeep Publications,

B.Sc. BOTANY SEMESTER IV

Title of The Course: Ecology and Conservation Biology

Number of Theory Credits	Total Lecture Hours/Semester	Number of Practical Credits	Total Practical hours/Semester
04	56	02	56

Unit-1	
Introduction to Ecology and Conservation Biology Definitions, Principles of Ecology, Brief History, Major Indian Contributions, Scope and importance. Ecological levels of organization. **Ecological factors:** Climatic factors: light, temperature, precipitation and humidity. **Edaphic factors**: Soil and its types, soil texture, soil profile, soil formation; physico- chemical properties of soil - mineral particle, soil pH, soil aeration, organic matter, soil humus and soil microorganisms. Topographic Factors: Altitude **Ecological groups of plants and their adaptations:** Morphological and anatomical adaptations of hydrophytes, xerophytes, epiphytes and halophytes.	15 Hrs
Unit-2	
Ecosystem Ecology: Introduction, types of ecosystems with examples -terrestrial and aquatic, natural and artificial. **Structure of ecosystem**: Biotic and Abiotic components, detailed structure of a pond ecosystem **Ecosystem functions and processes**: Food chain-grazing and detritus; Food web. Ecological pyramids -Pyramids of energy, biomass and number. Principles of Energy flow in ecosystem. **Bio-geo chemical cycles**: Gaseous cycles -carbon and nitrogen, Sedimentary cycle- Phosphorus. **Ecological succession**: Definition, types- primary and secondary. General stages of succession. Hydrosere and xerosere. **Community Ecology:** Community and its characteristics – frequency, density, Abundance, cover and basal area, phenology, stratifications, life-forms. Concept of Ecotone and Ecotypes. Intra-specific and Inter-specific interactions with examples. **Ecological methods and techniques:** Methods of sampling plant communities – transects and quadrates. Remote sensing as a tool for vegetation analysis, land use – land cover mapping. **Population Ecology:** Population and its characteristics – Population density, natality, mortality, age distribution, population growth curves and dispersal.	15 Hrs

Unit-3	
Phytogeography and Environmental issues: Theory of land bridge, theory of continental drift, polar oscillations and glaciations. **Centre of origin of plant** – Vavilov's concept, types. Phytogeographical regions – concept, phytogeographical regions of India. **Vegetation types of Karnataka** – Composition and distribution of evergreen, semi- evergreen, deciduous, scrub, mangroves, shoal forests and grasslands. An account of the vegetation of the Western Ghats. **Pollution**: Water pollution: Causes, effect, types; water quality standards in India, control of water pollution (Waste water treatment). **Water pollution disasters** – National mission on clean Ganga, Minimata, Pacific gyre garbage patch, Exxon valdez oil spill. **Air pollution**: Causes, effect, air quality standards, acid rain, control. **Soil pollution**: Causes, effect, solid waste management, control measures of soil pollution.	11 Hrs
Unit-4	
Biodiversity and its conservation **Biodiversity**: Definition, types of biodiversity - habitat diversity, species diversity and genetic diversity, Global and Indian species diversity. SDG's in biodiversity conservation. **Values of Biodiversity** – Economic and aesthetic value, Medicinal and timber yielding plants. NTFP. Threats to biodiversity. Biodiversity hot spots of India. Concept of endemism and endemic species. ICUN plant categories with special reference to Karnataka/ Western Ghats. **Biodiversity Conservation**- Indian forest conservation act, Biodiversity bill (2002). Conservation methods – *In-situ* and *ex-situ* methods. ***In-situ* methods** –Biosphere reserves, National parks, Sanctuaries, Sacred grooves. ***Ex-situ* methods**-Botanical gardens, Seed bank, Gene banks, Pollen banks, Culture collections, Cryopreservation.	15 Hrs

Formative Assessment	
Assessment Occasion/ type	Weightage in Marks
I Test	10
II Test	10
Seminar	10
Assignment	05
Attendance	05
Total	40

SUGGESTED REFERENCE BOOKS

- Sharma PD. 2018. Fundamentals of Ecology. Rastogi Publications.
- Odum EP. 1975. Ecology By Holt, Rinert& Winston.
- Oosting HG. 1978. Plants and Ecosystem Wadworth Belmont.

- Kochhar PL. 1975. Plant Ecology. (9th Edn.,) New Delhi, Bombay, Calcutta-226pp.
- Kumar HD. 1992. Modern Concepts of Ecology (7th Edn.,) Vikas Publishing Co., New Delhi.
- Kumar HD. 2000. Biodiversity & Sustainable Conservation. Oxford & IBH Publishing Co Ltd. New Delhi.
- Newman EI. 2000. Applied Ecology, Blackwell Scientific Publisher, U.K.
- Chapman JL and Reiss MJ. 1992. Ecology (Principles & Applications). Cambridge University Press, U.K.
- Hunter Jr ML, Gibbs JP, Popescu VD. 2020. Fundamentals of Conservation Biology, 4th Edition. Wiley-Blackwell.
- Saha TK. 2017. Ecology and Environmental Biology. Books and Allied Publishers

List of Practical in Ecology and Conservation Biology

Practical	Experiments
1	Determination of pH of different types of Soils, Estimation of salinity of soil/water samples
2	Hydrophytes: Morphological adaptations in *Pistia, Eichhornia, Hydrilla, Nymphaea.* Anatomical adaptations in *Hydrilla* (stem) and *Nymphaea* (petiole).
3	Xerophytes: Morphological adaptations in *Asparagus, Casuarina, Acacia, Aloe vera, Euphorbiatirucalli.* Anatomical adaptations in phylloclade of *Casuarina.*
4	Epiphytes: Morphological adaptations in *Acampe, Bulbophyllum, Drynaria.* Anatomical adaptations in epiphytic root of *Acampe/ Vanda.*
5	Halophytes: study of Viviparyin mangroves, Morphology and anatomy of Pneumatophores.
6	Study of a pond/forest ecosystem and recording the different biotic and abiotic components.
7	Demonstration of different types of vegetation sampling methods – transects and quadrats. Determination of Density and frequency
8	Application of remote sensing to vegetation analysis using satellite imageries
9	Field visits to study different types of local vegetations/ecosystems and the report to be written in practical record book.
10	Determination of water holding capacity of soil samples.
11	Determination of Biological oxygen demand (BOD)
12	Determination of Chemical oxygen demand (COD)

B.Sc. BOTANY – III Semester

Open Elective Course (OEC - 3)

(OEC for other students)

Paper: Community Forestry

Code: OEC-3.1

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures / Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
OEC-3.1	OEC	Theory	03	03	42 hrs	2 hrs	40	60	100

Learning outcomes:

After completion of the course, the students will be able to;

- Understand community forestry and its conservation
- Examine the use of trees and community forestry
- Interpret the role of indigenous / tribal people in conservation of forest
- Examine the role of various community forestry conservation programs
- Measure the different properties of trees such as wood volume, age, height, volume etc.

Keywords:
Community forestry, Commercial forestry, Conservation Land uses, Timber harvesting

Unit-1	
Defining community forestry and conservation, Indigenous community-based forestry systems and their changes, Case studies of indigenous forest management systems: India., History of commercial forestry in India, Diseases of commercial forestry, maintenance of forests, Protection form fire, illicit felling, Measurement of Trees- Height, girth, wood density, wood quality, clear and selective felling.	14 Hrs
Unit-2	
Role of community forestry in Environmental conservation, Water shed management, soil management and poverty reduction, Trees as a forest management tool managing vegetation to modify climate, soil conditions & ecological processes, Social considerations on land-uses.	14 Hrs
Unit-3	
State-sponsored community forestry and conservation programs, Changing paradigms in forestry and environmental conservation, Community-managed commercial timber harvesting. Community based forestry and collaborative conservation in India, factors contributing to the rise of community forestry, Role of tribes in Forest and management.	14 Hrs

Suggested Reading

1. Agrawal A and Gibson CC. 2001. Introduction: The Role of Community in Natural Resource Conservation. In: Agrawal, A and C. C. Gibson (eds).Communities and the Environment. NJ: Rutgers University Press
2. Mosse D. 2001.'People's knowledge', participation and patronage: operations and representations in rural development. In: Cook, B & Kothari, U (eds), Participation the new tyranny? Zed Press
3. Ong CK and Huxley PK. 1996. Tree Crop Interactions–A Physiological Approach. ICRAF.
4. Robinson D. 2018. The Economic Theory of Community Forestry (Routledge Explorations in Environmental Economics) Routledge.
5. Sagreiya KP. 1979. Forests and Forestry. National Book Trust, India, New Delhi, P1-307

B.Sc. BOTANY – III Semester
Open Elective Course (OEC - 3)
(OEC for other students)
Paper: Algal Cultivation and Applications
Code: OEC-3.2

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures / Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
OEC-3.2	OEC	Theory	03	03	42 hrs	2 hrs	40	60	100

Learning outcomes:

On completion of this course, the students will be able to;

- Understand core concepts and fundamentals of various levels of algal growth
- Translate various algal technologies for benefit of ecosystem
- Demonstrate algal growth in different types of natural water.
- Analyze emerging areas of Algal Biotechnology for identifying commercial potentials of algal products & their uses.

Keywords:
Culture techniques, Algal growth, Algal blooms, Eutrophication, Algal immobilization, Biofertilizers, Pollution indicators.

Unit I	A brief account of culture techniques and media for algal research. Measurement of algal growth: lag phase, log phase, stationary phase and death phase using biomass, chlorophyll content. Limits to algal growth in natural waters. Dynamics and consequences of marine & freshwater algal blooms;	14 L
Unit II	Causative factors for eutrophication and its impact on algal blooms. Algal immobilization: methods and applications, Algal technologies for the restoration/maintenance of soil fertility; reclamation of usar soils. Restoration of degraded aquatic systems through algae; High rate algal ponds for the treatment of wastewaters for the production of useful biomass & fuels.	14 L
Unit III	Emerging areas of Algal Biotechnology: Single cell proteins, bio-fertilizers, Algae as food, medicine, feed, Biofuel, industrial products such as phyco-colloid (Agar-agar, Algin, Carrageenan, Diatomite); A brief account of commercial potentials of algal products & theiruses. Algae as indicators of pollution. Biofouling, Sewage disposal.Waste-land reclamation. Use of Algae in experimental studies. Algae in space. Algal toxins.	14 L

Suggested Readings

- Hoek C and Van D. 2009. Algae: An Introduction to Phycology. Cambridge University Press.
- Bast F. 2014. An Illustrated Reviewon Cultivation and Life History of Agronomically Important Seapl ants. In Seaweed: Mineral Composition, Nutritional and Antioxidant Benefits and Agricultural Uses, Eds. Vitor Hugo Pomin, 39-70. Nova Publishers, New York.
- Kumar HD. 1999. Introductory Phycology. Affiliated East-West Press, Delhi
- Sahoo D. 2000. Farming the ocean: seaweeds cultivation and utilization. Aravali International, New Delhi.
- Bast F. 2014. Seaweeds: Ancestors of land plants with rich diversity. Resonance, 19 (2)1032-1043

B.Sc. BOTANY – III Semester
Open Elective Course (OEC - 3)
(OEC for other students)
Paper: Landscaping and Gardening
Code: OEC-3.3

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures / Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
OEC-3.3	OEC	Theory	03	03	42 hrs	2 hrs	40	60	100

Learning outcomes:

After the completion of this course the learner will be able to:

- Apply the basic principles and components of gardening
- Conceptualize flower arrangement and bio-aesthetic planning
- Design various types of gardens according to the culture and art of bonsai
- Distinguish between formal, informal and free style gardens
- Establish and maintain special types of gardens for outdoor and indoor land scaping

Keywords:
Gardening, Landscaping, Flower arrangement, Vertical gardens, Roof gardens, Computer aided designing.

Unit-1	
Principles of gardening, garden components, adornments, lawn making, methods of designing rockery, water garden, etc. Special types of gardens, their walk-paths, bridges, constructed features. Green house. Special types of gardens, trees, their design, values in land scaping, propagation, planting shrubs and herbaceous perennials. Importance, design values, propagation, plating, climbers and creepers, palms, ferns, grasses and cacti succulents.	14 Hrs
Unit-2	
Flower arrangement: importance, production details and cultural operations, constraints, post-harvest practices. Bio-aesthetic planning, definition, need, round country planning, urban planning and planting avenues, schools, villages, beautifying railway stations, dam sites, hydroelectric stations, colonies, river banks, planting material for play grounds.	14 Hrs

Unit-3	
Vertical gardens, roof gardens. Culture of bonsai, art of making bonsai. Parks and public gardens. Land scape designs, Styles of garden, formal, informal and freestyle gardens, types of gardens, Urban land scaping, Land scaping for specific situations, institutions, industries, residents, hospitals, road sides, traffic islands, dam sites, IT parks, corporate. Establishment and maintenance, special types of gardens, Bio-aesthetic planning, eco-tourism, indoor gardening, therapeutic gardening, non-plant components, water-scaping, xeri-scaping, hardscaping; Computer Aided Designing (CAD) for outdoor and indoor scaping, Exposure to CAD (Computer Aided Designing)	14 Hrs

Suggested Readings

1. Berry F. and Kress J. 1991. Heliconia: An Identification Guide. Smithsonian Books
2. Butts E. and Stensson K. 2012. Sheridan Nurseries: One hundred years of People, Plans, and Plants. Dundurn Group Ltd.
3. Russell T. 2012. Nature Guide: Trees: The world in your hands (Nature Guides).

B.Sc. BOTANY – IV Semester
Open Elective Course (OEC - 4)
(OEC for other students)
Paper: Plant Diversity and Human Welfare
Code: OEC-4.1

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures / Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
OEC-4.1	OEC	Theory	03	03	42 hrs	2 hrs	40	60	100

Learning outcomes:

After the completion of this course, the learner will be able to:

- Develop understanding of the concept and scope of plant biodiversity
- Identify the causes and implications of loss of biodiversity
- Apply skills to manage plant biodiversity
- Utilize various strategies for the conservation of biodiversity
- Concept ualize the role of plants in human welfare with special reference to India

Keywords:
Biodiversity, Biodiversity loss, Hotspots, Biodiversity management, Conservation strategies, Biodiversity awareness programmes.

Unit-1	
Plant Diversity and its Scope Levels of biodiversity: Genetic, Species and Ecosystem; Agro-biodiversity and cultivated plant taxa and related wild taxa. Values and uses of Biodiversity, Methodologies for valuation, Ethical and aesthetic values, Uses of plants; Ecosystem services.	14 Hrs
Unit-2	
Loss of Biodiversity and Management of Plant Biodiversity Loss of biodiversity-causes and implications, Hotspots of biodiversity, extinction of species, projected scenario for biodiversity loss. Organizations associated with biodiversity management, IUCN, UNEP, WWF, UNESCO, NBPGR; Methodology for execution; Biodiversity legislation; Information management and communication.	14 Hrs

Unit-3	
Conservation of Biodiversity, Role of Plants in Relation to Human Welfare Conservation of genetic, species and ecosystem diversity, *In situ* and *ex situ* conservation strategies, India's biodiversity and its conservation Social approaches to conservation, Biodiversity awareness programmes, Sustainable development. Importance of forestry their utilization and commercial aspects; Avenue trees; Ornamental plants of India; Alcoholic beverages; Fruits and nuts; Wood and its uses; their commercial immortal,	14 Hrs

Suggested Readings

1. Krishnamurthy KV. 2004. An Advanced Text Book of Biodiversity-Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi.
2. Singh JS, Singh SP and Gupta S. 2006. Ecology Environment and Resource Conservation. Anamaya Publications, New Delhi, India.
3. Reddy KV and Veeraiah S. 2010. Biodiversity and Plant Resources. Aavishkar publication, New Delhi.
4. Heywood VH and Watson RT. 1995. Global biodiversity and Assessment. Cambridge University Press.

B.Sc. BOTANY – IV Semester

Open Elective Course (OEC - 4)

(OEC for other students)

Paper: Medicinal Plants in Health Care

Code: OEC-4.2

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures / Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
OEC-4.2	OEC	Theory	03	03	42 hrs	2 hrs	40	60	100

Learning outcomes:

On completion of this course, the students will be able to:

- Recognize the basic medicinal plants
- Apply techniques of conservation and propagation of medicinal plants.
- Setup process of harvesting, drying and storage of medicinal herbs
- Propose new strategies to enhance growth of medicinal herbs considering the practical issues pertinent to India

Keywords:
Medicinal plants, Traditional systems, endangered medicinal plants, Ethnobotany, Folk medicines, Ethnic communities.

Unit-1	
History and Traditional System of Medicine History, Scope and Importance of Medicinal Plants; Traditional systems of medicine; Definition and Scope. **Ayurveda:** History, origin, panchamahabhutas, saptadhatu and tridosha concepts, Rasayana, plants used in ayurvedic treatments, **Siddha:** Origin of Siddha medicinal systems, Basis of Siddha system, plants used in Siddha medicine. **Unani:** History, concept: Umoor-e-tabiya, tumors treatments / therapy, polyherbal formulations.	14 Hrs
Unit-2	
Conservation, Augmentation and Ethnobotany and Folk Medicine Conservation of Eendemic and endangered medicinal plants, Red list criteria; ***In situ*** conservation: Biosphere reserves, sacred groves, National Parks; ***Ex situ*** conservation: Botanic Gardens, Ethnomedicinal plant Gardens. ***Propagation of Medicinal Plants:*** Objectives of the nursery, its	14 Hrs

classification, important components of a nursery, sowing, pricking, use of greenhouse for nursery production, propagation through cuttings, layering, grafting and budding. **Ethnobotany and Folk medicines**: Definition; Ethnobotany in India: Methods to study ethnobotany; Applications of Ethnobotany: National interacts, Palaeo-ethno-botany. Folk medicines of ethnobotany, ethnomedicine, ethnoecology, ethnic communities of India.	
Unit-3	
Medicinal Plants Brief description of selected plants and derived drugs, namely Guggul (*Commiphora*) for hypercholesterolemia, *Boswellia* for inflammatory disorders, Arjuna (*Terminalia arjuna*) for cardioprotection, turmeric (*Curcuma longa*)f or wound healing, antioxidant and anticancer properties, Kutaki (*Picrorhiza kurroa*) for hepatoprotection, Opium Poppy for analgesic and antitussive, Salix for analgesic, Cincona and Artemisia for Malaria, Rauwolfia as tranquilizer, Belladona as anticholinergic, Digitalis as cardiotonic, Podophyllum as antitumor.	14 Hrs

Suggested Readings:

- Akerele O, Heywood V and Synge H. 1991. The Conservation of Medicinal Plants. Cambridge University Press.
- AYUSH (www.indianmedicine.nic.in). About the systems—An overview of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy. New Delhi: Department of Ayurveda, Yogaand Naturopathy, Unani, Siddha and Homoeopathy (AYUSH), Ministry and Family Welfare, Government of India.
- CSIR- Central Institute of Medicinal and Aromatic Plants, Lucknow (2016). *Aush Gyanya*: Handbook of Medicinal and Aromatic Plant Cultivation.
- Dev S. 1997. Ethno-therapeutics and modern drug development: The potential of Ayurveda. *Current Science* 73:909–928.
- Evans WC. (2009). Trease and Evans Pharmacognosy, 16thedn. Philadelphia, PA: Elsevier Saunders Ltd.
- Jain SK. and Jain V. (eds.) 2017. Methods and Approaches in Ethnobotany: Concepts, Practices and Prospects. Deep Publications, Delhi
- Kapoor LD. 2001. Handbook of Ayurvedic medicinal plants. Boca Raton, FL: CRC Press.
- Saroya AS. 2017. Ethnobotany. ICAR publication.
- Sharma R. 2003. Medicinal Plants of India-An Encyclopaedia. Delhi: Daya Publishing House.
- Sharma R. 2013. Agro Techniques of Medicinal Plants. Daya Publishing House, Delhi.
- Thakur RS, Puri HS and Husain A. 1989. Major medicinal plants of India. Central Institute of Medicinal and Aromatic Plants, Lucknow, India.

B.Sc. BOTANY – IV Semester
Open Elective Course (OEC - 4)
(OEC for other students)
Paper: Floriculture
Code: OEC-4.3

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures / Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
OEC-4.3	OEC	Theory	03	03	42 hrs	2 hrs	40	60	100

Learning outcomes:

After completing this course the learner will be able to;

- Develop conceptual understanding of gardening from historical perspective
- Analyze various nursery management practices with routine garden operations.
- Distinguish among the various Ornamental Plants and their cultivation
- Evaluate garden designs of different countries
- Appraise the landscaping of public and commercial places for floriculture.
- Diagnoses the various diseases and uses of pests for ornamental plants.

Keywords:
Gardening, Transplanting, Mulching, Plant growth regulators, Ornamental plants, Commercial floriculture.

Unit-1	
Introduction: Importance and scope of floriculture and landscape gardening. Nursery Management and Routine Garden Operations: Sexual and vegetative methods of propagation; Soil sterilization; Seed sowing; Pricking; Planting and transplanting; Shading; Stopping or pinching; Defoliation; Wintering; Mulching; Topiary; Role of plant growth regulators.	14 Hrs
Unit-2	
Ornamental Plants: Flowering annuals; Herbaceous perennials; Divine vines; Shade and ornamental trees; Ornamental bulbous and foliage plants; Cacti and succulents; Palms and Cycads; Ferns and fern allies; Cultivation of plants in pots; Indoor gardening; Bonsai. Principles of Garden Designs:	14 Hrs

English, Italian, French, Persian, Mughal and Japanese gardens; Features of a garden (Garden wall, Fencing, Steps, Hedge, Edging, Lawn, Flowerbeds, Shrubbery, Borders, Water-garden. Some Famous gardens of India. Floriculture and green house technology. Commercial aspects and exporting of flowers and ornamental plants. Quarantine and testing requirements.	
Unit-3	
Landscaping Places of Public Importance: Landscaping highways And Educational institutions. Commercial Floriculture: Factors affecting flower production; Production and packaging of cut flowers; Flower arrangements; Methods to prolong vase life; Cultivation of Important cut flowers (Carnation, Aster, Chrysanthemum, Dahlia, Gerbera, Gladiolus, Marigold, Rose, Lilium, Orchids). Diseases and Pests of Ornamental Plants.	14 Hrs

Suggested Readings

1. Randhawa GS and Mukhopadhyay A. 1986. Floriculture in India. Allied Publishers.
2. Adams C, Early N and Brrok J. 2011. Principles of Horticulture. Routledge, U.K

"Zoology"

DAVANGERE UNIVERSITY
IV Semester B.Sc. Botany Degree Examination- January 2022
(NEP-2020)
Paper- Code: Ecology and Conservation Biology

Time: 2 Hours | Maximum Marks: 60

Note:
i) All Parts are compulsory
ii) Draw labeled diagram whenever necessary

PART-A

I. Write brief note on any **FIVE** of the following 2x 10=10 M

1.
2.
3.
4.
5.
6.
7.
8.

PART-B

II. Write short notes on any **FIVE** of the following 5x4=20 M

9.
10.
11.
13.
14.
15.
16.

PART-C

Answer any **THREE** of the following 3x10=30M

17.
18.
19.
20.
21.