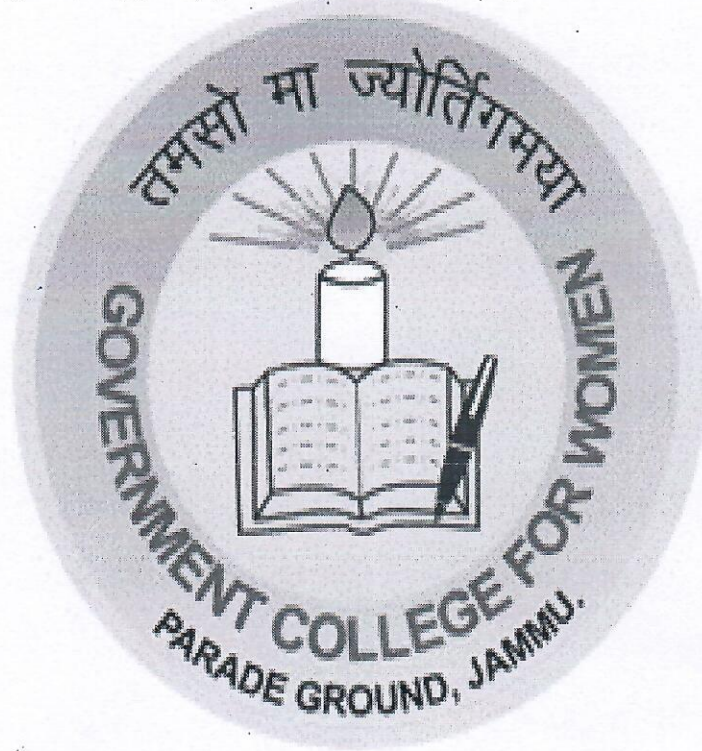


**Govt. College for Women,
Parade Ground, Jammu
Autonomous College under University of Jammu**



Learning outcome based curriculum

B. Sc. Programme (CBCS)

With Botany as a subject

(Session 2021-22, 2022-23 and 2023-24)

Preamble

The objective of any university/college programme is to prepare their students for the society at large. Need of hour is to develop students by inculcating in them creative and reasoning abilities so that they will give their positive contribution for the development of the society in particular and country as a whole. In this direction, the college offers an learning outcome-based curriculum framework (LOCF) for its entire undergraduate programme. The LOCF approach is envisioned to provide a focused, outcome-based syllabus at the undergraduate level with an agenda to structure the teaching-learning experiences in a more student-centric manner. The LOCF approach has been adopted to strengthen students' experiences as they engage themselves in the programme of their choice. The Under-Graduate Programmes will prepare the students for both, academia and employability. Each programme vividly elaborates its nature and promises the outcomes that are to be accomplished by studying the courses. The programmes also state the attributes that it offers to inculcate at the graduation level. The graduate attributes encompass values related to well-being, emotional stability, critical thinking, social justice and also skills for employability. In short, each programme prepares students for sustainability and life-long learning. The new curriculum of B.Sc. Botany offer essential knowledge and technical skills to study plants in a holistic manner. Students would be trained in all areas of plant biology using a unique combination of core and elective papers with significant inter-disciplinary components. Students would be exposed to cutting-edge technologies that are currently used in the study of plant life forms, their evolution and interactions with other organisms within the ecosystem. Students would also become aware of the social and environmental significance of plants and their relevance to the national economy. Each programme vividly elaborates its nature and promises the outcomes that are to be accomplished by studying the courses. Each programme fully prepares students for sustainability and lifelong learning. These programmes will enhance student's intellectual competences, skills and readiness to face the world to make them socially aware and responsible citizens. The new curriculum of B.Sc. Semester III&IV with Botany as a subject has the aim to enable students not only to seek but also to create scientific skill among them. The LOCF curriculum takes into consideration the requirements of the present as well as the future time. It offers training that is comparable to that of an undergraduate student at the national level. College hopes that the LOCF approach of the programme will be of great help to the students in deciding their goal and field of further education.

BOTANY (Semester III)**(For examination to be held in 2021, 2022, 2023)****Title: Plant anatomy, embryology and ecology****Objectives/ Learning outcomes**

The composition of the course has been designed with the focus on the following objectives/ student specific learning outcome.

1. Understand the basic architecture of the plants and thereby appreciate that, the complexity of plant structure has its genesis in the simplistic units.
2. Understand the structural details of each part of the plant with the focus on the specific function being carried out by them.
3. Understand that the structural complexities have evolved in the plant parts in line with designated functions.
4. Understand that there is a complete synergy with regard to the structural nuances and the functional aspects for the overall well being of the plant and completion of its life cycle.
5. Understanding the structural complexities of plants shall have direct bearing in broadening the general outlook of the students and facilitate them to comprehend the structural nuances of more complex organisms like humans.
6. This course shall develop an understanding in the students about the division of functions in a plant and the associated specific structural accessories evolved to facilitate that.

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BOTANY (Semester III)
(For examination to be held in 2021, 2022, 2023)

Title: Plant anatomy, embryology and ecology (Theory)

Course code:-UBOTC-301

Duration of Exam: 3 hrs.

Maximum marks: 100

Credit: 04

External examination marks:-80.

Internal Assessment marks:-20

Unit I Basic body plan, structure, and organization of plants

1.1 Concept of plant metamers. Simple tissues:- parenchyma, collenchyma, and sclerenchyma- structure, function, and distribution in plant parts. Meristems:- structure, classification and organization of RAM and SAM.

1.2 Anatomy of primary root and stem (monocots and dicots), origin of lateral roots.

1.3 Concept of vascularisation in root and stem (monocots and dicot). Structure of leaf traces and leaf gaps, branch traces and branch gaps.

1.4 Epidermal modifications in monocots and dicots;- structural organization and systematic significance of trichomes and stomata.

Unit II Primary structures and secondary growth.

2.1 Vascular cambium:- structure, types, activities, and factors influencing the activity. Cork cambium:- structure and development of periderm, concept of commercial cork, wound cork and polyderm.

2.2 Structure of secondary xylem and phloem. Structure and importance of wood-a general account.

2.3 Concept, structure and significance of tyloses, heartwood, sapwood, growth rings and dendrochronology, Properties and microscopic structures of wood.

2.4 Leaf:- Origin, development, and vascularisation. Internal structure of leaf (monocot and dicot), Concepts of senescence and abscission

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Unit III Embryology

3.1 Structure and functions of Anther and Ovule:- Anther wall: Structure and functions, microsporogenesis, pollen wall structure. Ovule Structure and Types, Female gametophyte:- megasporogenesis monosporic, bisporic and tetrasporic.

3.2 Self-incompatibility:- concept and types interspecific, intraspecific, homomorphic, heteromorphic, Sporophytic self-incompatibility (SSI), Gametophytic self-incompatibility (GSI). Methods to overcome self- incompatibility: mixed pollination, bud pollination, stub pollination.

3.3 Embryo and endosperm development: types, general pattern of development of dicot and monocot embryo; Suspensor: structure and functions. Functions of endosperm.

3.4 Seed formation and seed dispersal strategies of plants.

Unit IV Plants and Environment

4.1 Atmosphere: Stratification and gaseous composition. Details of carbon cycle, hydrological cycle and their significances. Greenhouse gases and climate change.

4.2 Soil: structure, development including the factors affecting profile, and soil types in India.

4.3 Ecology: concept, details of ecosystem, food chain, food web, ecological pyramids, and energy flow.

4.4 Population ecology: characteristics, growth curves, ecotypes and ecads.

Unit V Community and vegetation dynamics

5.1 Ecological succession: concept, process, different types (Lithosere and Hydrosere) and concept of climax community.

5.2 Community characteristics: frequency, density, cover, life forms, biological spectrum

5.3 Ecological niche, ecotone and edge effect-concept and types.

5.4 Phytogeographical regions of India, patterns of geographical distribution, endemism, discontinuous distribution of vegetation.

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Note for paper setters.**External End Semester Examination****(Total marks: 80)****Time duration: 3 hours**

The question paper shall have 3 sections. Section I: Five (5) short answers questions representing all units i e, one from each unit (70-80 words) of 3 marks each =15 marks (all compulsory). Section II: Five (5) medium answer questions (250-300 words) of 7 mark each =35 marks (all compulsory). Section III: Five (5) long answer questions (500 – 600 words) covering all the units. The candidate will be required to answer only two questions of 15 marks each =30 marks. .

Internal Assessment (Total Marks: 20)**Time duration: 1hr.****SUGGESTED READING**

1. Dickison, W.C. (2000). Integrative Plant Anatomy. Harcourt Academic Press, USA
2. Cutter, E.G. 1969. Plant Anatomy: Experiment and Interpretation. Part- I: Cells and Tissues. Edward Arnold, London
3. Cutter, E.G. 1970. Plant Anatomy: Experiment and Interpretation. Part-II: Organs. Edward Arnold London.
4. Esau, K. 1977. Anatomy of Seed Plants. 2nd Edn. John Wiley and Sons, New York.
5. Bhojwani, S.S. and Bhatnagar, S.P. (2011). The Embryology of Angiosperms, Vikas Publishing House. Delhi. 5th edition.
6. Shivanna, K.R. (2003). Pollen Biology and Biotechnology. Oxford and IBH Publishing Co. Pvt. Ltd. Delhi.
7. Raghavan, V. (2000). Developmental Biology of Flowering plants, Springer, Netherlands.
8. Chapman, J.L. and Reiss, M.J. 2000. Ecology principles and Applications. 2nd Edn. Cambridge University Press, U.K.
9. Kehs, C.J. 1989. Ecological Methodology Harper and Row, New York, USA.
10. Kormondy, F. J. 1996. Concepts of Ecology. Prentice- Hall of India Pvt. Ltd. New Delhi.

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11. Odum, K. P. 1983. Basic Ecology. Saunders, Philadelphia.
12. Sharma, P.D. 2010. Ecology and Environment. 10th Edn. Rastogi Publications, Meerut. India 13.
13. Townsend, C.R., Begon, M. and Harper, J.L. 2008. Essentials of Ecology. 3rd Edn. Blackwell publishing. U.K.
14. Underwood, A.J. 1977. Experiments in Ecology: their logical design and interpretation using analysis of variance. Cambridge University Press.
15. APHA-Standard methods for the examination of water and waste water, American Public Health Association, Washington.
16. Fahh, A. 1974. Plant Anatomy. 2nd Edn. Pergamon Press.
17. Mauseth, J.D. 1988. Plant Anatomy. The Benjamin Cummings Publishing Company, Menlo Park, California, USA.
18. Thomas, P. 2000. Trees: Their Natural History. Cambridge University Press, Cambridge.

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BOTANY (Semester III)**(For examination to be held in 2021, 2022, 2023)****Title: Plant anatomy, embryology and ecology (Practical)****Course code UBOTP 302****Duration of Exam: 3 hrs.****Internal assessment 25****Credits: 02****Maximum Marks: 50****External assessment 25**

1. To study shoot and root tip with emphasis on cyto-histological zonation.
2. Anatomy of the root; primary and secondary structure.
3. Anatomy of primary and secondary growth in monocots and dicots using hand sections and prepared slides. Structure of secondary phloem and xylem. Growth rings in wood, microscopic study of wood in T.S., T.L.S. and R. L. S.
4. Study of diversity in leaf shape, size, thickness, surface properties; internal structure structure of leaf , structure and type of stomata and trichomes (using epidermal peels of leaf).
5. Examination of wide range of flower available in the locality and methods of their pollination.
6. Structure of anther, microsporogenesis (using slides) and pollen grains (using whole mounts).
7. Pollen viability using inv itro pollen germination.
8. Structure and types of ovule.
9. Endosperm and embryo development in monocots and dicots (using slides and dissections).
10. To determine the minimum requisite size of the quadrat for phytosociological studies.
11. To determine the frequency, density, abundance, basal area and importance value index of area of study
12. To determine the different life forms of the plant species of study area and prepare a biological spectrum by comparing with Raunkiaer's normal spectrum
13. To study the various soil horizons for drawing the soil profile diagram.
14. To determine the bulk density, water holding capacity and porosity of soil of forest and grassland ecosystem.
15. To measure pH and dissolved oxygen contents in different water ecosystem

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Note for the distribution of 50 marks in practical Examination:**Internal Assessment 25 marks**

Day to Day performance in the laboratory: 12 marks.

Test: 8 marks

Regularity of Attendance: 5 marks

External Examination: 25 marks~~10~~10
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BOTANY (Semester III)
(For examination to be held in 2021, 2022, 2023)

Skill enhancement course

Title: Mushroom cultivation technology (theory)

Objectives/ Learning outcomes

Aimed at instilling technical skills, this course will make the students self reliant, identify several kinds of mushrooms and understand theoretical as well as practical knowledge on mushroom cultivation. This course will also acquaint students with methods of processing mushrooms as a means of self employment and income generation and develop a sustainable business.

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BOTANY (Semester III)
(For examination to be held in 2021, 2022, 2023)
Skill enhancement course
Title: Mushroom cultivation technology (theory)

Course code UBOTS-301

Credits:- 2

Total marks 50 (external =40 Internal =10)

Unit-1. Substrate and cultivation

- 1.1 Introduction to mushrooms, characteristics, nutritional and pharmaceutical importance of commercially important edible mushrooms. Poisonous mushrooms- distinguishing characteristics
- 1.2 Substrate preparation: Basic requirements, General nutritional enrichments required for growth of mushrooms, composting technique and types.
- 1.3 Spawn production technology
- 1.4 Cultivation of *Agraricus bisporus*, *Volvariella volvacea*, *Pleurotus citrinopileatus*

Unit-2. Storage, diseases, research and future prospects

- 2.1 Shelf life of mushrooms, methods for short- and long-term storage of mushrooms.
- 2.2 Diseases, infections, and pests of mushrooms (Pre and Post harvest)
- 2.3 Prospects for mushroom cultivation in Jammu and Kashmir
- 2.4 Mushroom Research centres: National, regional and local levels.

Suggested books

1. Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991) Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
2. Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.
3. Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.
4. Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I & Vol. II.
5. I. Suman, B. C., & Sharma, V. P. (2007). Mushroom cultivation in India. Daya Books.
6. Diamantopoulou, P., & Philippoussis, A. (2015). Cultivated mushrooms: preservation and processing. Handbook of vegetable preservation and processing, 495-525.
7. Ravinder Singh R. & Salathia, I. (2020).Mushroom Cultivation and its Diseases. Sankalp Publication
8. Kumaresan, V. (2018). Mushroom Cultivation. Saras Publication.
9. Gogoi, R. ,Rathaiah, Y., Borah, T.R. (2006). Mushroom Cultivation Technology. Scientific Publishers Journals Dept.

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BOTANY (Semester III)
(For examination to be held in 2021, 2022, 2023)
(Skill Enhancement Course)
Mushroom cultivation technology (Practicals)

UBOTS:-302

Credits: 02

External Examination: 25 marks

Internal Examination: 25 Marks

Duration of Exam: 3hrs

Maximum marks: 50

1. To study the morphology of different types of edible mushrooms from museum specimens. (*Volvariella volvoceo*, *Pleurotus citrinopileatus*, *Calocybe indica*, *Agaricusbisporus*, and *Morchella*).
2. To study the different types of poisonous mushrooms from the museum specimens (preferably local).
3. To acquaint the students about the equipment and instruments (Polythene bags, Vessels, Inoculation hook, Inoculation loop, stove, sieves, culture racks, water sprayers, trays and autoclave) required in the process of cultivation of mushrooms.
4. To demonstrate the method for preparing compost for the cultivation of button mushroom.
5. To inoculate the compost with spores of *Agaricus* sp. for its cultivation.
6. To demonstrate the method of preparation of substrate (Wheat/ Paddy) for *Pleurotus* cultivation.
7. To familiarise the students about some insect pests, nematodes and animal pests of Mushrooms from figures or preserved specimens.
8. To understand the principles of gradation of mushrooms on the basis of quality.
9. To learn the technique of packaging of mushrooms on the basis of quality.
10. To familiarise the students with the optimum conditions of temperature, humidity, light etc for cultivation of mushrooms.
11. Field trip to commercial mushroom farms and research centers.

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Note for the distribution of 50 marks in practical Examination:**Internal Assessment= 25 marks**

Day to Day performance in the laboratory: 12 marks.

Test: 8 marks

Regularity of Attendance: 5 marks

External Examination: 25 marks

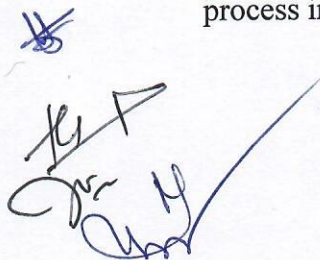
BOTANY (Semester IV)
(For examination to be held in 2021, 2022, 2023)

Title: Plant physiology and metabolism

Objectives/ Learning outcomes

The composition of the course has been designed with the focus on the following objectives/ student specific learning outcomes

1. The students get a thorough understanding of the life processes at work in the plants, and thereby understand the significance of synergy amongst these processes for the overall growth of the plants.
2. Understand the role of the biological phenomena (operational in plants) for sustenance of life in the biosphere and restoring the balance of the components of the environment for posterity.
3. Understand the relevance of plant physiology as a science and area of research for the sustainability of the life in future.
4. To equip the students with the information about the various plant processes and thereby create a subtle consciousness in them about the requirements of the plants.
5. Create a desire in the students to work on the better understanding of the plant life process in their future pursuits.



BOTANY (Semester IV)**(For examination to be held in 2021, 2022, 2023)****Title: Plant physiology and metabolism (Theory)****Course code:-UBOTC-401****Duration of Exam: 3 hrs.****Maximum marks: 100****Credit: 04****External examination marks:-80.****Internal Assessment marks:-20****Unit 1. Enzymes and plant water relations**

- 1.1. Enzyme:- Discovery, nomenclature, properties and structural characteristics of enzymes. Concept of holoenzyme, apoenzyme and co-enzyme.
- 1.2. Mechanism of enzyme action:- lock and key, and induced fit concepts. Concept of activation energy and factors influencing it. Significance of active and allosteric site: Regulation and competitive inhibition of enzyme action.
- 1.3. Water:- Physical properties (cohesion, adhesion and tensile strength). Water Transport:- Diffusion, Bulk flow and imbibitions. Osmosis:- Concept of osmosis, Water potential:- concept, components of cell water potential, and its significance.
- 1.4. Soil-Plant-Atmosphere continuum:- Process of absorption of water by roots, path of movement of water through root tissues (apoplastic, symplastic, transmembrane movement), mechanism of transport of water through xylem and loss into the atmosphere; root pressure and cohesion-tension theory of Ascent of sap. Types of transpiration and their significance, and mechanism of opening and closing of stomata.

Unit 2. Mineral nutrition and phloem transport

- 2.1 Essential nutrients of plants:- Criteria of essentiality, concept of micro-and macro nutrients their general significance. Importance and deficiency symptoms of N, P, K and Mg.
- 2.2 Uptake of mineral ions by plants:- Storage and availability of mineral ions in the soil. Transport of mineral ions across membranes: active, passive, protein mediated and carrier channel operated.
- 2.3 Transport in phloem:- Concept, composition of phloem sap (Aphid test), girdling experiment. Phloem transport. Experimental evidence in support of phloem as the site of sugar translocation.
- 2.4 Mechanism of phloem transport:- Phloem loading and unloading, and Munch's pressure flow model.

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Unit-3. Photosynthesis and respiration

- 3.1 General account of photosynthetic pigments, photosynthetically active radiations, Concept of red drop, Emerson enhancement effect, Quantum requirement of photosynthesis, Concept of photosystem I and II- Organization, location and role, Cyclic and non cyclic photosynthetic electron transport, and photophosphorylation.
- 3.2 Carbon fixation:- Calvin cycle, Photorespiration, Mechanism of enhancing carbon dioxide concentration in the leaf tissue - C₄ cycle, Crassulacean acid metabolism.
- 3.3 Respiration:- Glycolytic pathway, anaerobic respiration, Krebs cycle, Pentose phosphate pathway.
- 3.4 Oxidative electron transport:- Redox potential, electron carriers, Mechanism of oxidative electron transport and Oxidative phosphorylation. Mechanism of synthesis of ATP (Chemi-osmotic theory).

Unit-4. Nitrogen fixation, secondary metabolism and abiotic stress.

- 4.1 Biological nitrogen fixation:- Concept, free-living and symbiotic nitrogen fixer prokaryotes. *Rhizobium* - legume association:- Stages of nodule development, mechanism of nitrogen fixation, assimilation of nitrate and ammonium ions.
- 4.2 General account of lipids, significance and mechanism of β -oxidation,
- 4.3 Secondary metabolites - nature, types and role, Shikimic acid pathway. Plant-plant communications through volatile organic compounds.
- 4.4 Plant and stress:-Concept of oxidative stress- ROS, role of scavenging system and physiological responses of plants (enzymatic and non-enzymatic, anti-oxidants, ascorbic acid, glutathione, SOD, Catalase.)

Unit-5. Physiology of growth and flowering

- 5.1 Plant growth and development -- phases and kinetics of growth, hormonal concept of growth and differentiation..
- 5.2 Physiology of flowering - florigen concept, photoperiodism, vernalization
- 5.3 Phytochromes- discovery, chemical nature, role of phytochrome in photomorphogenesis,.
General concept of Cryptochromes
- 5.4 Plant hormones- auxins, gibberellins, cytokinins, abscissic acid and ethylene, their role and mode of action. Introduction to jasmonic acid, salicylic acid , Brassinosteroids and strigolactones.



Note for paper setters.**External End Semester Examination****(Total marks: 80)****Time duration: 3 hours**

The question paper shall have 3 sections. Section I: Five (5) short answers questions representing all units i e, one from each unit (70-80 words) of 3 marks each =15 marks (all compulsory). Section II: Five (5) medium answer questions (250-300 words) of 7 mark each =35 marks (all compulsory). Section III: Five (5) long answer questions (500 – 600 words) covering all the units. The candidate will be required to answer only two questions of 15 marks each =30 marks. .

Internal Assessment (Total Marks: 20)**Time duration: 1hr.****Suggested reading**

1. Buchanan, B.B., Gruissen, W. and James, R.L. 2000. Biochemistry and Molecular Biology of Plants. I.K. International Pvt Ltd. New Delhi.
2. Galston, A.W. 1989. Life Process in Plants. Scientific American Library, Springer-Verlag, New York, USA.
3. Hopkins, W.G. 2008. Introduction to Plant Physiology. John Wiley and Sons, Inc New York USA.
4. Taiz, L., Zeiger, E., Moller, I.M. and Murphy, A., 2015. Plant Physiology and Development. 33 Sinauer Associates Inc. USA. 6th edition
5. Lalit M. Srivastava. 2002. Plant Growth and Development: Hormones and Environment. Academic Press; 1st edition
6. Jiayang Li, Chuanyou Li, and Steven M. Smith, 2017: Plant Hormones: Biosynthesis and Mechanisms of Action, Academic Press.
7. Plant sensing and communication; Richard Karban
8. Inside the Secret world of plant communications/ modern Farmer; modernfarmer.com
9. Plant physiology in Agriculture and Biotechnology; www.researchgate.net
10. Pandey S.N. Plant Physiology 4/Ed. Vikas Publishing House Pvt
11. B.V. Pandey and Poonam Verma. Plant Physiology and Biochemistry. Ram Prasad publication.
12. S. Mukherjee and A. K. Ghosh. Plant Physiology New Central Book Age

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Botany (Semester IV)
(For examinations to be held in the years May 2021, 2022, 2023)

Title: Plant physiology and metabolism (Practicals)

Course code UBOT 402

Duration of Exam: 3 hrs

Internal assessment 25

credit 02

Maximum Marks: 50

External assessment 25

1. Estimation of inorganic phosphate in plant tissue.
2. To study the permeability of plasma membrane using different concentrations of organic solvents.
3. To study the effect of temperature on permeability of plasma membrane.
4. To prepare the standard curve of protein and determine the protein content in unknown samples by Lowry's and methods.
5. To study the enzyme activity of catalase and peroxidase as influenced by pH and temperature.
6. Comparison of the rate of respiration in germinating seeds.
7. Separation of chloroplast pigments by solvent partitioning/paper chromatography/TLC methods.
8. Determining the osmotic potential of vacuolar sap by plasmolytic method.
9. Determining the water potential of potato tubers.
10. Separation of amino acids in a mixture by paper chromatography and their identification by comparison with standards.
11. Demonstration of rate of transpiration by cobalt chloride method.
12. Demonstration of stomatal movements.
13. Demonstration of osmosis by using potato tuber.
14. Demonstration of plasmolysis and deplasmolysis.

Note for the distribution of 50 marks in practical Examination:

Internal Assessment 25 marks

Day to Day performance in the laboratory: 12 marks.

Test: 8 marks

Regularity of Attendance: 5 marks

External Examination: 25 marks

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BOTANY (Semester-IV)
(For examination to be held in 2021, 2022, 2023)

Skill enhancement course

Title: Nursery, gardening and floriculture (Theory)

Course outcomes: Upon completing this course, students should know the basic steps in setting up a nursery, garden, or a floriculture setup. The course aims to teach students how to choose the right propagation method and how to handle seeds, bulbs, cut flowers, nursery plants, and potted plants properly. Their skills should include recognizing commercial flowers and their packaging. Also, they should know how to diagnose diseases and pest along with their management. In addition, this course aims to equip students with the skills needed to operate a wholesale nursery as well as an understanding of nursery business management .

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BOTANY (Semester-IV)
(For examination to be held in 2021, 2022, 2023)

Skill enhancement course

Title: Nursery, gardening and floriculture (Theory)

Course code:-UBOTS:-401

Credits :- 2

Total marks 50 (external =40 Internal =10)

UNIT-1. Introduction to nursery and gardening

- 1.1. Nursery: Definition and types of nurseries, resources for nurseries, and important nursery operations
- 1.2. Definition and components of gardens, types of gardening (landscape and home gardening) and gardening operations (soil laying, manuring and watering).
- 1.3. Plant propagation methods: sexual methods (through seed germination), and asexual methods (vegetative propagation)
- 1.4. Essential nutrient management for nursery and gardening, pest and disease management and water management systems.

UNIT- 2. Floriculture

- 2.1. Concept and scope of floriculture, factors affecting flower production, packaging of cut flowers; methods to prolong vase life of flowers
- 2.2. Names and methods of locally grown ornamental flowers
- 2.3. Concept of potting, repotting, depotting and mulching
- 2.4. Packing, transport, and marketing of nursery plants

Suggested reading

1. Floriculture in India by G. S. Randhawa, Amitabha Mukhopadhyay. Allied Publishers Pvt Ltd (1986)
2. Plant propagation: Principles and Practices by Hartman H.T. Prentice Hall International: London, 1959.
3. Encyclopedia of Gardening by Christopher Brukell. Dorling Kindersley, Ltd, 2007.
4. Propagation Hand Book; Basic Techniques for Gardners by Geoff Bryant. Mechanicsburg, PA, US; Stackpole Books, 1995.
5. Horticulture, Principles and Practices by George Acquaah. 4th edition, Pearson Publishers, Prentice Hall, 2009.
6. Gardening in India by Bose, T. K and Mukerjee, D. New Delhi Oxford & IBH Pub. Co. Pvt. Ltd, 1977.
7. Textbook of Horticulture by Mani Bhushan Rao. Macmillan India Ltd. 2005 (2nd edition).

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8. Introduction to Horticulture by Kumar, N. 7th edition, Oxford & IBH Publishing Company Pvt. Ltd. 2010.
9. Introduction to Ornamental Horticulture by J. S. Arora, 1999. Kalyani Publishers, Ludhiana, India.
10. Plant Propagation by Sandhu M. K. New Age International Publishers Ltd. 1989.
11. Ornamental Plants and Garden Design in Tropics and Subtropics (Vol 1 & 2) by T. K. Bose, L. J. Singh, M. K. Sandhu and T. K. Maity. Publisher: Daya Publishing House; A division of Astral International Pvt. Ltd. 2015.

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BOTANY (semester IV)
(For examination to be held in 2021, 2022, 2023)
(Skill Enhancement Course)

Nursery, gardening, and floriculture (Practicals)

UBOTS:-402

Credits: 02

External Examination: 25 marks

Internal Examination: 25 Marks

Duration of Exam: 3hrs

Maximun marks: 50

1. To study seed structure, viability test, and treatments to overcome seed dormancy.
2. To learn different asexual plan propagation methods (propagation by bulbs, tubers, corms).
3. To study the basic components of a greenhouse.
4. To learn the different methods of pruning.
5. To learn the methods to prepare a lawn bed using local grasses.
6. To study the steps to prepare seeding beds for nursery production.
7. To identify the ornamental plants for lawns, gardens, houses (indoors, outdoors).
8. Identify the locally grown flowering crops and the methods used to cultivate them.
9. To prepare different types of manures.
10. Visit to some commercially and aesthetically important gardens of Jammu and Kashmir.

Note for the distribution of 50 marks in practical Examination:

Internal Assessment 25 marks

Day to Day performance in the laboratory: 12 marks.

Test: 8 marks

Regularity of Attendance: 5 marks

External Examination: 25 marks

