Department of Botany

Scheme of Examination and Syllabus for Pool courses of Post Graduate Program of M.Sc. (UTD) offered for other Departments for 1st & 2nd Years

Under Multiple Entry and Exit, Internship and CBCS-LOCF as per NEP-2020
w.e.f. session 2025-2026

Subject: Botany

Department of Botany
Guru Jambheshwar University of Science and Technology
Hisar-125001, Haryana
(A^+ GRADE NAAC Re-Accredited)

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Hisar-125001, Haryana
('A+' Grade NAAC Re-Accredited State Govt. University)

Scheme of Examination and Syllabus for Pool courses of Post Graduate Program of M.Sc. (UTD) offered for other Departments for 1st & 2nd Years (1st to 4th Semesters) w.e.f. session 2025-2026 according to NEP-2020

Subject: Botany

The Department of Botany, Guru Jambheshwar University of Science & Technology, Hisar, Haryana will offer the following three courses, namely, VAC, OEC and SEC (2 Credits each) for students of other Departments as given below in respective 1st, 3rd and 4th semesters. Likewise, the students of MSc Botany will take three courses, namely, VAC, OEC and SEC (2 Credits each) in respective 1st, 3rd and 4th semesters offered by other Departments of the University.

SEMESTER-I

Type of Course	Course Code	Nomenclature of Paper/Course	Credits	Contact Hours	Internal Marks	External Marks	Total Marks	Duration of Exam (Hours)
VAC	U25VAC105T	Role of Plants in Human Welfare	2	2	15	35	50	2
Total			2	2			50	

SEMESTER-III

Type of Course	Course Code	Nomenclature of Paper/Course	Credits	Contact Hours	Internal Marks	External Marks	Total Marks	Duration of Exam (Hours)
Open Elective Course	U25OEC305T	Open Elective Basics of Ethnobotany	2	2	15	35	50	2
Total			2	2			50	

SEMESTER-IV

Type of Course	Course Code	Nomenclature of Paper/Course	Credits	Contact Hours	Internal Marks	External Marks	Total Marks	Duration of Exam (Hours)
SEC/EEC/VAC	U25SEC405T	Plant Tissue Culture	2	2	15	35	50	2
Total			2	2			50	

Semester-I

Value Added Course (VAC)

Role of Plants in Human Welfare

Paper code: U25VAC105T
Credits: 2
Exam. Time: 2 Hrs

External Marks: 35
Internal Marks: 15
Total Marks: 50

Course Objectives: The aim of this course is to give the students essential knowledge and to create awareness about the essential role of plants in maintaining human health and well-being. It will also explore the ecological, medicinal, nutritional, economic, and cultural significance of plants. It will also promote awareness about the sustainable use of plant resources for future generations. It will encourage conservation of plant biodiversity for global and local welfare.

Course outcomes (CO): On successful completion of this course:	
CO1	Students will be able to **understand** the role of medicinal and aromatic plants in traditional healing systems (Ayurveda, Siddha, Unani) and modern applications, including their use in immunity boosting, mental health, and disease prevention.
CO2	Students will be able to **apply** knowledge of plant-based active principles and herbal nutraceuticals to recognize their relevance in modern medicine, health supplements, and aromatherapy.
CO3	Students will be able to **analyze** the ecological and environmental services provided by plants, such as phytoremediation, air and water purification, climate regulation, and urban greenery.
CO4	Students will be able to **evaluate** the socio-cultural, economic, and psychological importance of plants in religion, folklore, literature, rituals, and daily life, including their utility as timber, oils, fibers, dyes, and resins.

Note: The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 3 marks each. In addition to this, four more questions (each question may be of 2 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt three questions in all by selecting one question from each of the two units of 10 marks each in addition to the compulsory Question No.1.

UNIT-I

Medicinal Plants and Traditional Healing Systems: (Ayurveda, Siddha, Unani), Role of plants in modern medicine (active principles and their sources), Herbal nutraceuticals and dietary supplements, Plants in mental health and aromatherapy, Role of plants in immunity boosting and disease prevention. Case studies: Neem, Tulsi, Aloe vera, Giloy, Ashwagandha, etc.

UNIT-II

Role of Plants in Climate Regulation and Ecosystem Services:, Phytoremediation and air/water purification, Sacred groves and religious importance of plants, Plants in art, literature. rituals, and folklore. Economic value: Timber, fibers, resins, oils, and dyes, Urban greenery and its psychological & environmental benefits.

Suggested Readings:

1. Kochhar, S.L. (2012). *Economic Botany in the Tropics*. MacMillan India Ltd.. New Delhi.
2. Jain, S.K. (2005). *Manual of Ethnobotany*. Scientific Publishers.
3. Upadhyay, R. (2023). *Botany for B.Sc. Students – Economic Botany and Ethnomedicine*. S. Chand Publishing.
4. Wickens, G.E. (2001). *Economic Botany: Principles & Practices*. Kluwer Academic Publishers.
5. Pandey, B.P. (2018). *Economic Botany*. S. Chand Publishing.

Mapping of COs with POs:

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	S	M	S	M	S	S
CO2	S	S	M	S	S	M	S
CO3	M	S	S	M	S	S	S
CO4	S	M	S	S	M	M	S

S = Strong, M = Medium, W = Weak

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Semester-III

Open Elective Course

Basics of Ethnobotany

Paper code: U25OEC305T
Credits: 2
Exam. Time: 2 Hrs

External Marks: 35
Internal Marks: 15
Total Marks: 50

Course Objective: The aim of this course is to give the students essential knowledge and to create awareness and interest amongst the students about medicinal plants. I also aim to increase public awareness about the efficacies of herbal drugs; identify Medicinal plant and Herbal drugs. It will develop awareness for utilization of herbal medicines for home remedies and for creating employment opportunities.

Course outcomes (CO): On successful completion of this course,:	
CO1	Students will be able to **understand** the importance, classification, and cultivation practices of medicinal plants, including their role in traditional medicine systems such as Ayurveda, Siddha, Unani, Chinese, and Tribal medicine.
CO2	Students will be able to **apply** the knowledge of nursery techniques, plantation methods, and sustainable practices for the cultivation and conservation of medicinal plants.
CO3	Students will be able to **analyze** the morphology, chemical constituents, and medicinal significance of various important spices and herbal plants used in drug formulations and health care.
CO4	Students will be able to **evaluate** the therapeutic and economic relevance of selected medicinal plants in the context of modern pharmacology, traditional practices, and their potential in future drug development.

Note: The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 3 marks each. In addition to this, four more questions (each question may be of 2 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt three questions in all by selecting one question from each of the two units of 10 marks each in addition to the compulsory Question No.1.

UNIT-I

Introduction to Medicinal Plants - Definition, Importance, Present and Future needs of Medicinal plants.

Brief account of Traditional Medicinal Systems - Ayurveda, Siddha, Unani, Chinese, and Tribal

Cultivation, Raising of Nursery and Plantation of Medicinal Plants. Importance of medicinal plants in drug formulations and development. Conservation status and need for sustainable use.

UNIT-II

Morphology, Chemical Constitution and Medicinal Importance of some selective spices: Turmeric, Ginger, Clove, Elaichi.

Morphology, Chemical Constitution and Medicinal Importance of some selective species: Tulsi, Aloe, Giloy, Ashwagandha, Cinchona, Opium.

Morphology, Chemical Constitution and Medicinal Importance of some selective species: Amla, Neem, Mulhethi, Swanjana, and Morianga.

Suggested Readings:

1. Chaturvedi A. 2008. Ethnobotany and Taxonomy of Angiosperms. Rashtrasant Tukadoji Maharaj Nagpur University Press.1-295.
2. Pandey B.P.1978.Economic Botany. S. Chand and Company LTD. Ram Nagar, New Delhi.1-534.
3. Panda H., Handbook of Ayurvedic Medicines, National Institute of Industrial Research, Delhi 7.
4. CSIR – Cultivation and Utilization of Medicinal Plants.
5. Brahmvarchas, Ayurved ka Pran: Vanoshadhi vigyan, Vedmata Gayatri Trust, Shaktikunj Haridwar 2004.
6. Chaudhry R. D., Herbal Drug Industry, Eastern Publication
7. Atal C. K. and Kapoor B.M., Cultivation and Utilization of Medicinal Plants, RRL Jammu Tawi.1982.
8. Raphael Ikan, Natural Products: A Lab Guide, Academic Press, 1991.
9. Dutt Ashwin, An Introduction to Medicinal Plants, Adhyayan Publishers and distributers, 2009.

Mapping of COs with POs:

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	S	S	S	S	M	S
CO2	S	S	S	S	S	S	S
CO3	S	S	M	S	S	S	S
CO4	M	M	S	S	S	M	S

S=Strong, M=Medium, W=Weak

Semester-IV

Skill Enhancement Course (SEC)

Plant Tissue Culture

Paper Code: U25SEC405T
Credits: 2
Exam. Time: 2 Hrs

External Marks: 35
Internal Marks: 15
Total Marks: 50

Course Objectives: The aim of this course is to give the students essential knowledge and to create awareness and interest about the history and scope of Plant Tissue Culture. It will impart knowledge about Laboratory requirements and management of Plant Tissue Culture. It will also help to know about different plant tissue culture techniques and also about Micropropagation and its applications.

Course outcomes (CO): On successful completion of this course:	
CO1	Students will be able to **understand** the historical development, scope, and fundamental laboratory setup requirements for plant tissue culture.
CO2	Students will be able to **apply** general techniques of tissue culture, including nutrient media composition, use of growth regulators, and aseptic handling procedures.
CO3	Students will be able to **analyze** core biological processes such as cellular totipotency, organogenesis, and callus formation in the context of in vitro culture.
CO4	Students will be able to **evaluate** the practical applications and implications of micropropagation, somatic embryogenesis, and somaclonal variation in plant biotechnology and crop improvement.

Note: The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 3 marks each. In addition to this, four more questions (each question may be of 2 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt three questions in all by selecting one question from each of the two units of 10 marks each in addition to the compulsory Question No.1.

UNIT-I

History of Plant Tissue Culture; Scope and Advantages of plant tissue culture; Laboratory Requirements (Washing and Storage Facilities; Media Preparation area; Inoculation area; Incubation area)
General Techniques: Composition of nutrient media, role of growth additives, Media Preparation

UNIT-II

Cellular Totipotency; Organogenesis; Callus Culture; Somaclonal variation
Micropropagation and its applications; Somatic embryogenesis and its applications

Suggested Reading:

1. Bhojwani, S.S. and Razdan, M.K. (1996), Plant Tissue Culture; Theroy and Practice. Elsevier Science Amsterdam. The Netherlands.
2. D.A. Evans, W.R. Sharp, P.V. Ammirato, and Y. Yamada. 1983. Handbook of plant cell culture. Coolier MacMillan, London.
3. Stewart, C.N. Jr. (2008). Plant Biotechnology and Genetics: Principles, Techniques and Applications. John Wiley & Sons Inc. U.S.A.
4. Smith, R.H. Plant Tissue Culture, Techniques and Experiments 2nd Ed. Academic Press, New York. 231pp. 2000.

Mapping of COs with POs:

Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	S	S	S	S	M	S
CO2	S	S	S	S	S	S	S
CO3	S	S	M	S	S	S	S
CO4	M	M	S	S	S	M	S

S=Strong, M=Medium, W=Weak