

Multidisciplinary Courses Biotechnology

Examination Scheme for EoSE for Semester III

CA – Continuous Assessment

EoSE – End of Semester Examination

Regular Students –

Type of Examination	Course Code and Nomenclature	Duration of Examination		Maximum Marks		Minimum Marks	
		CA	01 Hr	CA	10 Marks	CA	04 Marks
Theory	Introduction of Biotechnology	EoSE	02 Hrs	EoSE	40 Marks	EoSE	16 Marks
		CA	1 Hr	CA	10 Marks	CA	04 Marks
Practical	Introduction of Biotechnology – Practical	EoSE	04 Hrs	EoSE	40 Marks	EoSE	16 Marks
		CA	1 Hr	CA	10 Marks	CA	04 Marks

The theory question paper will have two parts A and B.

Part-A: will have 12 short answer/objective-type questions of one mark each.

Part-B: Part B of the question paper will be divided into four units including question number 2-5. From each unit there will be a question with internal choice. Each question will be of 7 marks.


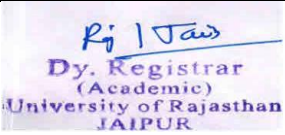
Non-Collegiate Students –

Type	Course Code and Nomenclature	Duration of Examination	Maximum Marks (EoSE)	Minimum Marks (EoSE)
Theory	Introduction of Biotechnology	02 Hrs	50 Marks	20 Marks
Practical	Introduction of Biotechnology - Practical	04 Hrs	50 Marks	20 Marks

The theoretical question paper will have two parts A and B.

Part-A: will have 14 objective-type questions of one mark each.

Part-B: Part B of the question paper will be divided into four units including question number 2-5. From each unit there will be a question with internal choice. Each question will be of 9 marks.

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Syllabus

Multidisciplinary Courses - Biotechnology Introduction of Biotechnology

Semester	Code of the Course	Title of the Course/Paper			NHEQF Level	Credits
III		Introduction of Biotechnology			6	4
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method
		Theory	Practical	Total		
Introductory	MDM	2	2	4	Yes	30 lectures with diagrammatic and informative assessments during lecture hours
List of Programme Codes in which Offered as Minor Discipline						
Prerequisites		Senior Secondary level				
Objectives of the Course:		<ul style="list-style-type: none"> ➤ To understand the basics of biotechnology. ➤ To learn about cell structure and molecular biology. ➤ To acquire skills in laboratory techniques and genetic engineering. ➤ To explore biotechnology applications in daily life. ➤ To discuss ethical and social issues in biotechnology. ➤ To appreciate biotechnology's role in healthcare, sustainable development. 				

Course Outcomes-

1. To familiarize students with the fundamental principles and scope of biotechnology.
2. To enable students to understand cell structure, molecular biology, and laboratory techniques.
3. To equip students with practical skills in genetic engineering and biotechnology applications.
4. To highlight the role of biotechnology in daily life, including its environmental and healthcare impacts.
5. To raise awareness about ethical, legal, and social issues in biotechnology and its contribution to sustainable development.

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Introduction to Biotechnology Detailed Syllabus

Unit-I

Fundamentals of Biotechnology: Introduction to Biotechnology: Definition, scope, and applications; Overview of cell structure and function; Basic concepts of DNA, RNA, and proteins; Introduction to enzymes and their role in biological processes. **8 lectures**

Unit-II

Tools and Techniques in Biotechnology: Basic laboratory techniques: Microscopy, centrifugation, chromatography; Introduction to molecular biology tools: DNA extraction, Polymerase Chain Reaction (PCR), gel electrophoresis; Basics of genetic engineering: restriction enzymes, plasmids, and gene cloning **7lectures**

Unit-III

Biotechnology in Daily Life: Applications of Biotechnology in everyday life: GM foods, biofuels, and biodegradable plastics; biofertilizers, biopesticides; Plant tissue culture techniques; Bioremediation, waste management, and water treatment; **8 lectures**

Unit-IV



Biotechnology and Society: Impact of Biotechnology on healthcare: Vaccines, antibiotics, and diagnostics; Ethical, legal, and social issues in biotechnology: GMOs, cloning, and gene editing; Role of biotechnology in sustainable development: Agriculture, industry, and medicine. **7lectures**

Books Recommended

1. NCERT class 11 and 12, Biology
2. NCERT class 11 and 12, Biotechnology
3. Molecular biology and Biotechnology, P. K. Gupta, Rastogi Publication

Introduction of Biotechnology Practical Syllabus

1. Study of cell structures.
2. Demonstration of Lab equipment and techniques.
3. Exercise based on Restriction enzymes based maps.
4. Study of GM products.

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5. Visit to waste/water treatment plant.
6. Any other exercise based on theory syllabus.

Scheme of Practical Examination and Distribution of marks

MDM
Max. Marks: 10*+40



Duration- 4 hrs
Min. Marks: 4*+16

S.No.	Exercise	Regular	Ex./N.C. Students
1.	Major Exercise-	10	15
2.	Minor Exercise-1	5	8
3.	Minor Exercise-2	5	7
4.	Spotting (1-5)	10	15
5.	Viva	5	5
6.	Record	5	-
*Internal marks for regular students only			
Regular Candidates must keep a record of all work done in the practical classes and submit the same for inspection at the time of practical examination.			

Course learning outcomes:

By the end of this course, the student will be able to:

- Understand the fundamental principles and scope of biotechnology.
- Describe the structure and function of cells, DNA, RNA, and proteins.
- Demonstrate practical skills in laboratory techniques and genetic engineering.
- Identify applications of biotechnology in daily life, including GM foods, biofuels, and biodegradable plastics.
- Recognize the role of biotechnology in environmental protection, such as bioremediation and waste management.
- Discuss the impact of biotechnology on healthcare and sustainable development.
- Address ethical, legal, and social issues related to biotechnology..

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Examination Scheme for EoSE for Semester IV

CA – Continuous Assessment

EoSE – End of Semester Examination

Regular Students –

Type of Examination	Course Code and Nomenclature	Duration of Examination		Maximum Marks		Minimum Marks	
		Theory	Plants and Human Health	CA	01 Hr	CA	10 Marks
EoSE	02 Hrs			EoSE	40 Marks	EoSE	16 Marks
Practical	Plants and Human Health - Practical	CA	1 Hr	CA	10 Marks	CA	04 Marks
		EoSE	04 Hrs	EoSE	40 Marks	EoSE	16 Marks

The theory question paper will have two parts A and B.

Part-A: will have 12 objective-type questions of one mark each.

Part-B: Part B of the question paper will be divided into four units including question number 2-5. From each unit there will be a question with internal choice. Each question will be of 7 marks.



Non-Collegiate Students –

Type	Course Code and Nomenclature	Duration of Examination	Maximum Marks(EoSE)	Minimum Marks(EoSE)
Theory	Plants and Human Health	02 Hrs	50 Marks	20 Marks
Practical	Plants and Human Health - Practical	04 Hrs	50 Marks	20 Marks

The theoretical question paper will have two parts A and B.

Part-A: will have 14 objective-type questions of one mark each.



Part-B: Part B of the question paper will be divided into four units including question number 2-5. From each unit there will be a question with internal choice. Each question will be of 9 marks.

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Syllabus

Multidisciplinary Courses - Biotechnology Plants and Human Health

Semester	Code of the Course	Title of the Course/Paper			NHEQF Level	Credits
IV		Plants and Human Health			6	4
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method
		Theory	Practical	Total		
Introductory	MDM	2	2	4	Yes	30 lectures with diagrammatic and informative assessments during lecture hours
List of Programme Codes in which Offered as Minor Discipline						
Prerequisites		Senior Secondary level				
Objectives of the Course:		<ul style="list-style-type: none"> ➤ To understand the medical uses of plants. ➤ To differentiate use of plants in different natural medical systems. ➤ To gain understanding of importance of plants for human welfare. ➤ To be able to active ingredients of medicinal plants. 				

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Plants and Human Health

Detailed Syllabus

Unit I

History, Scope and Importance of Medicinal Plants: Indigenous Medicinal Sciences; Definition and Scope-Ayurveda: plants used in ayurvedic treatments, medicinal plants used in Siddha, plants used in Unani. **8 Lectures**

Unit II

Herbal medicines: history and scope - definition of medical terms, cultivation - harvesting - processing - storage - marketing and utilization of medicinal plants, polyherbal formulations **7 Lectures**

Unit III

Pharmacognosy – Active compounds and medicinal uses of the following herbs in curing various ailments- Tulsi, Ginger, Fenugreek, Indian Goose berry, Ashoka, Neem, Babool, Karanj, Ashwagandha, Sarpagandha, Isabgol, Senna, Guggal. **8 Lectures**

Unit IV

Ethnic communities of Rajasthan, Application of natural products to certain diseases- Jaundice, Pain, Fever, infertility, diabetics, Blood pressure and skin diseases. Brief overview of plants can be used as nutritional supplements- Millets, Bajra, Ragi, Rajgiri, Jawar. **7 Lectures**



Suggested Readings:

1. Chaudhry, B. (2019). A Handbook of Common Medicinal Plants Used in Ayurveda. New Delhi, Delhi: Kojo Press.
2. Purohit and Vyas (2008). Medicinal Plant Cultivation: A Scientific Approach, 2nd edition. Jodhpur, Rajasthan: Agrobios.
3. Shrivastava, R, Singh, S, Barwant, MM, Singh, B. 2023. Handbook of Medicinal Plants in Health and Diseases, Bluerose Publishers Pvt. Ltd.

Plants and Human Health

Practical Syllabus

1. Examples of herbal medicine.
2. Preparation of basic herbal formulation used in Ayurveda.
3. Preparation of decoction of Tulsi, Ginger, Neem, Babool, Karanj etc.
4. Part used and release of active ingredients of medicinal herbs.

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5. List of natural products used for certain diseases.
6. Any other exercise based on theory syllabus.

Scheme of Practical Examination and Distribution of marks

MDM
Max. Marks: 10*+40



Duration- 4 hrs
Min. Marks: 4*+16

S.No.	Exercise	Regular	Ex./N.C. Students
1.	Major Exercise-	10	15
2.	Minor Exercise-1	5	8
3.	Minor Exercise-2	5	7
4.	Spotting (1-5)	10	15
5.	Viva	5	5
6.	Record	5	-
*Internal marks for regular students only			
Regular Candidates must keep a record of all work done in the practical classes and submit the same for inspection at the time of practical examination.			

Course learning outcomes:

By the end of this course, the student will be able to:

1. Describe how plants are used to improve human health and nutrition.
2. An appreciation of the contribution of medicinal plants to traditional and modern medicine and the importance of holistic mode of treatment.
3. understanding of the constraints in promotion and marketing of medicinal plants.
4. Developing entrepreneurship skills to establish value addition products, botanical extracts and isolation of bioactive compounds.

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Examination Scheme for EoSE for Semester V

CA – Continuous Assessment

EoSE – End of Semester Examination

Regular Students –

Type of Examination	Course Code and Nomenclature	Duration of Examination		Maximum Marks		Minimum Marks	
		Theory	Biodiversity Conservation and Ecotourism	CA	01 Hr	CA	10 Marks
EoSE	02 Hrs			EoSE	40 Marks	EoSE	16 Marks
Practical	Biodiversity Conservation and Ecotourism - Practical	CA	1 Hr	CA	10 Marks	CA	04 Marks
		EoSE	04 Hrs	EoSE	40 Marks	EoSE	16 Marks

The theory question paper will have two parts A and B.

Part-A: will have 12 objective-type questions of one mark each.

Part-B: Part B of the question paper will be divided into four units including question number 2-5. From each unit there will be a question with internal choice. Each question will be of 7 marks.



Non-Collegiate Students –

Type	Course Code and Nomenclature	Duration of Examination	Maximum Marks(EoSE)	Minimum Marks(EoSE)
Theory	Biodiversity Conservation and Ecotourism	02 Hrs	50 Marks	20 Marks
Practical	Biodiversity Conservation and Ecotourism - Practical	04 Hrs	50 Marks	20 Marks

The theoretical question paper will have two parts A and B.

Part-A: will have 14 objective-type questions of one mark each.

Part-B: Part B of the question paper will be divided into four units including question number 2-5. From each unit there will be a question with internal choice. Each question will be of 9 marks.

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Syllabus

Multidisciplinary Courses - Biotechnology Biodiversity Conservation and Ecotourism

Semester	Code of the Course	Title of the Course/Paper			NHEQF Level	Credits
V		Biodiversity Conservation and Ecotourism			7	4
Level of Course	Type of the Course	Credit Distribution			Offered to NC Student	Course Delivery Method
		Theory	Practical	Total		
Introductory	MDM	2	2	4	Yes	30 lectures with diagrammatic and informative assessments during lecture hours
List of Programme Codes in which Offered as Minor Discipline						
Prerequisites		Senior Secondary level				
Objectives of the Course:		<ul style="list-style-type: none"> ➤ Concept of biodiversity ➤ Factors affecting biodiversity ➤ Understanding the major conservation policies ➤ Getting knowledge on ecotourism with home-stay tourism approach 				

Course Outcomes-

1. Understanding the fundamental concepts in biodiversity and environmental science.
2. Concept development in conservation, global ecological crisis, Sustainable development and pros and cons of human intervention.
3. Enable the student to appreciate bio diversity and the importance of various conservation strategies, laws and regulatory authorities and global issues related to climate change and sustainable development.

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Biodiversity Conservation and Ecotourism

Detailed Syllabus

Unit I

Biodiversity and its distribution: Definition & Concept of biodiversity, levels and types of biodiversity; Biodiversity in India and the world; Endemism, Biodiversity hotspots and importance of its conservation.

8 Lectures

Unit II

Threats to biodiversity: Types and causes of biodiversity loss - Land use and Land cover changes, commercial exploitation of species, invasive species, fire, disaster and climate change.

7 Lectures

Unit III

Conservation policies: Importance and major policies – *in situ* and *ex situ* conservation; Major protected areas; National and International institutions for biodiversity conservation; Role of traditional knowledge for conservation; Community-based conservation, concept of Zoo management.

8 Lectures

Unit IV

Eco-Tourism: Types of Tourism; Ecotourism – Concept, Growth and Developments; Impacts and management of ecotourism. Main tourist places of Rajasthan and ecological significance.

7 Lectures



Suggested Readings:

1. Mitra, A.P., Sharma, S., Bhattacharya, S., Garg, A., Devotta, S. & Sen, K. 2004. Climate Change and India. Universities Press, India. Philander, S.G. 2012.
2. Saha T.K. 2010. Ecology and Environmental Biology, Books and Allied (P) Ltd. Kolkata.
3. Sharma, P. D. 2012. Ecology and Environment, Rastogi Publication

Biodiversity Conservation and Ecotourism

Practical Syllabus

1. Prepare a list of conventions held on biodiversity conservation.
2. Prepare list of SDG goals by UN.
3. Case study of model Eco-tourism areas.

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4. Map of biodiversity hot spots in India.
5. Visit to any nearby protected area.
6. Any other exercise based on theory syllabus.

Scheme of Practical Examination and Distribution of marks

MDM
Max. Marks: 10*+40

Duration- 4 hrs
Min. Marks: 4*+16

S.No.	Exercise	Regular	Ex./N.C. Students
1.	Major Exercise-	10	15
2.	Minor Exercise-1	5	8
3.	Minor Exercise-2	5	7
4.	Spotting (1-5)	10	15
5.	Viva	5	5
6.	Record	5	-
*Internal marks for regular students only			
Regular Candidates must keep a record of all work done in the practical classes and submit the same for inspection at the time of practical examination.			

Course learning outcomes:

By the end of this course, the student will be able to:

1. Understand the concepts of biodiversity and conservation
2. Understand the factors impacting biodiversity loss in India and the World
3. Major conservation strategies taken in India
4. Ideas on ecotourism with special emphasis on Rajasthan.

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