Scheme of B.Sc./ B.Sc. (Hons.) Biotechnology

Year	Course Code	Subject Name	Theory/ Practical	Total Credit	Total Marks	
					Max	Min
First year	BIOT -1T	Biochemistry, Biostatics and Computers	Theory	4	50	17
	BIOT -2T	Cell Biology, Genetics and Microbiology	Theory	4	50	17
	BIOT -1P	LAB 1: Microbiology and Biochemical Techniques	Practical	2	50	17
Second year	BIOT -3T	Molecular Biology and Biophysics	Theory	4	50	17
	BIOT -4T	Recombinant DNA Technology and Genomics	Theory	4	50	17
	BIOT -2P	LAB 2: Molecular Biology, Bioinstrumentation, and Genomics	Practical	2	50	17
Third year	BIOT -5T	Plant, Environmental and Industrial Biotechnology	Theory	4	50	17
	BIOT -6T	Immunology, Animal and Medical Biotechnology	Theory	4	50	17
	BIOT -3P	LAB 3: Applied Biotechnology	Practical	2	50	17
			Total (I+II+III years)	**30**	**450**	--

Note: There shall be four extra credits in each year for internship/apprenticeship. The certificate of extra credits for this would be provided by the university concern.

Part A: Introduction				
Program: **B.Sc Course**		Class: **B.Sc. III Year**	Year: **2024**	Session: **2024-2025**
1	Course Code	**BIOT-3P**		
2	Course Title	**LAB 3: Applied Biotechnology**		
3	Course Type	**Practical**		
4	Pre-requisite (if any)	As per Govt. norms		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • learn to prepare Plant Tissue Culture (PTC) media • learn to perform PTC • learn to determine the quality of water • learn to perform the diagnostic test of microbial disease		
6	**Credit Value**	**Practical: 2**		
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks : 17**	

Part B: Content of the Course	
Total No. of Teaching Hours – 20 / 30 Periods	
Tentative Practical List	**Note:** This is tentative list; the teachers concern can add more practical's as per requirement. 1. Preparation of Tissue culture media (ATC/PTC). 2. Sterilization of plant material (Explants). 3. Seed Germination, Root, Shoot and Callus Culture. 4. Determination of total dissolved solids of water. 5. Determination of DO, BOD, COD of water. 6. Determination of Coliform by MPN Test. 7. Production of Enzymes/Antibiotics/Acids. 8. Effect of Biopesticides on microorganism. 9. Antigen Antibody interaction- Determination of Blood Group and Rh factor. 10. Widal Test 11. VDRL Test. 12. ELISA Test. 13. Perform of Immuno-diffusion test

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

1. Molecular Biotechnology: Principles and Applications of Recombinant DNA (2010) 4th ed., Glick B.R., Pasternak, J.J. and Patten, C.L., ASM Press (Washington DC), ISBN: 978-1-55581-498-4 (HC).
2. Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H. Freeman and Company (New York), ISBN:13; 978-1-4641-0962-1 / ISBN:10-14641- 0962-1.
3. Textbook of Biochemistry with Clinical Correlations (2011) Devlin, T.M. John Wiley & Sons, Inc. (New York), ISBN: 978-0-4710-28173-4.
4. Molecular Biochemistry (2018) DSVGK Kaladhar, RBSA Publishers ISBN 9788176117708.
5. . Introduction to Human Physiology (2013) 8th edition; Lauralee Sherwood. Brooks/Cole, Cengage Learning.

E-learning Resources:

https://britannica.com
https://en.wikibooks.org/wiki/Biochemistry
https://nptel.ac.in
https://freebookcentre.net/biology-books-download/Introduction-to-Biotechnology-Laboratory-Manual.html
http://site.iugaza.edu.ps/mwhindi/files/Laboratory_Manual_And_Workbook_In_Microbiology.pdf
https://www.vnmkv.ac.in/student-academic/Study_Material_Practical_Manual_Fundamental_of_Plant_Biochemistry_Biotechnology.pdf

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 50
Continuous Comprehensive Evaluation (CCE): Not Applicable
University Exam(UE): 50 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable
External assessment University Exam (UE)	As per Govt. norms	

Declaration

Syllabus is framed as per the ToR

Name	Signature
Dr DSVGK Kaladhar, Prof & Chairperson CBoS Biotechnology, UTD ABVV	
Dr Pramod Kumar Mahish, Asst. Professor Govt. Digvijay College Rajnandgaon	
Dr Saumya Khare, Asst Prof, Kalyan PG. College Bhilai	
Dr Shubha Thakur, Asst Prof, St. Thomas College Bhilai	
Dr Akanksha Jain, Asst Prof. Shri Shankaracharya Mahavidyalaya, Bhilai	
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Dr Tarun Kumar Patel, Asst Professor, Sant Guru Ghasidas PG. College Kurud	
Dr Neha Behar, Asst Prof. DLS PG. College Bilaspur	
Dr Sanjana Bhagat, Asst Prof. Govt Ngarjuna PG. Science College, Raipur	
Dr Kamlesh Shukla, PRSU, Raipur	
Dr Ashish Kumar, Sant Gahira Guru Vishwavidyalay Sarguja	

Part A: Introduction				
Program: **B.Sc. Course**		Class: **B.Sc. III Year**	Year: **2024**	Session:**2024-2025**
1	Course Code	BIOT-5T		
2	Course Title	**Plant, Environmental and Industrial Biotechnology**		
3	Course Type	Theory		
4	Pre-requisite (if any)	As per Govt. norms		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • learn the basics of plant tissue culture • learn the application of GMO plants • learn about basics of Environmental Biotechnology and its management • learn the basics of Biological degradation of pollutant • learn the basics of Bioreactor		
6	Credit Value	Theory: 4		
7	Total Marks	**Max. Marks:** 50	**Min Passing Marks:** 17	

Part B: Content of the Course		
Total No. of Teaching – Periods- 60 / Hours – 40		
Unit	**Topics**	No. of Period / Hour
1	1.Introduction to Plant cell and tissue culture: History Scope and Applications; Tissue culture media 2. Micropropagation, Somatic embryogenesis, Organogenesis, Somaclonal variations 3. Protoplast isolation and fusion, Anther and Ovule culture, Triploid production	12 Periods / 08 Hours
2	1.Agrobacterium mediated Transformation, Ti & Ri Plasmid 2. Bt gene and its applications, Edible vaccine; Genetically modified plants: Herbicide resistant Plant and drought resistant plants 3. Germplasm storage and cryopreservation	12 Periods / 08 Hours
3	1. Environmental Biotechnology: Introduction and scope 2. Environmental pollution and its types, Global environmental problems (Acid rain, Ozone depletion, Global warming) 3. Solid Waste management: Principle of management, Concept of composting and Vermicomposting 4. Wastewater Treatment: Primary, Secondary and Tertiary treatment	12 Periods / 08 Hours
4	1.Biofertilizer and Biopesticides: types and applications 2. Bioremediation and Biodegradation of Xenobiotics: Phytoremediation, Bioleaching 3. Biological indicators of pollution, Biotechnological method of pollution management	12 Periods / 08 Hours
5	1. Types of Bioreactor: Design of Stirred tank, Fluidized bed 2. Fermentation: Lactic acid & Alcohol 3. Industrially important microoganisms: Isolation, Preservation (Slant, Mineral Oil and Lyophilize) and its application) 4. Food Technology: Production of fermented foods (Chees, Butter milk & Yoghourt), Food spoilage, Canning, Packing and Food Preservation	12 Periods / 08 Hours
Keywords: Plant cell and Tissue culture, Agrobacterium, Waste water treatment, Bioremediation, Bioreactor,		

Part C - Learning Resource		
Text Books, Reference Books, Other Resources		
Suggested Readings: 1. A text Book of Biotechnology: Indu Shekher Thakur, 2nd edition. I.K. International Pvt. Ltd. New Delhi. 2. Biotechnology (Fundamentals and Applications): S.S. Purohit - Agrobios (India), Jodhpur. 3. Fundamentals of Microbiology and Immunology: Ajit Kr. Banerjee, Nirmalya Banerjee – New Central Book Agency (NCBA); 1st edition (2017) 4. Plant Biotechnology: H.S. Chawla Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi. 5. Plant Biotechnology: B.D. Singh - Kalyani Publication, New Delhi. 6. Biotechnology: Fundamental & Application (2005) S.S. Purohit 7. Immunology: J. Kubey et al. 7th edition. 8. Immunology: Roitt et al. 9. Fundamental of Immunology: W. Paul. 10. Plant Tissue culture: K. K. De. 11. Plant Tissue Culture (Practical): H.S. Chawla. 12. Biochemistry & Molecular Biology of Plant: Buchanan, Gruissemen& Jones 2nd edition. 13. Tools and Techniques in Biotechnology (2011) M. Debnath **E-learning Resources** https://swayam.gov.in/ https://lecturenotes.in/subject/652/environmental-biotechnology-eb https://britannica.com https://en.wikibooks.org/wiki/Biochemistry https://nptel.ac.in https://onlinecourses.nptel.ac.in/noc21_bt41/preview		
Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 50 Continuous Comprehensive Evaluation (CCE): Not Applicable University Exam(UE): 50 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable
External assessment University Exam (UE) Time 3Hours		As per Govt. norms
Any remarks/ Suggestions: -		

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Dr Kamlesh Shukla, PRSU, Raipur	
Dr Ashish Kumar, Sant Gahira Guru Vishwavidyalay Sarguja	

Part A: Introduction				
Program: B.Sc **Course**		Class: **B.Sc. III Year**	Year: **2024**	Session:**2024-2025**
1	Course Code	BIOT-6T		
2	Course Title	**Immunology, Animal and Medical Biotechnology**		
3	Course Type	Theory		
4	Pre-requisite (if any)	As per Govt. norms		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • learn the basics of immune system • learn about the DNA diagnostic methods • learn the types of Ag-Ab interaction • learn the basics of Animal tissue culture		
6	Credit Value	Theory: 4		
7	Total Marks	**Max. Marks:** 50	**Min Passing Marks:** 17	

Part B: Content of the Course		
Total No. of Teaching – Periods- 60 / Hours – 40		
Unit	**Topics**	**No. of Period / Hour**
1	1. Concept of Immunity: Innate and Acquired, Humoral and Cell mediated Response. 2. Cells and Organs involved in Immune system-Structure and Function. 3. Antigen, Antibody: Types, Structure and Functions.	12 Periods / 08 Hours
2	1. Cytokines 2. Autoimmune diseases- Hemolytic Anemia, Rheumatoid arthritis, Insulin dependent diabetes. 3. Immuno deficiencies. Diseases-SCID, AIDS.	12 Periods / 08 Hours
3	1. Antigen-Antibody Interaction: Agglutination, Precipitation, RIA, ELISA. Immuno Electrophoresis and Immunofluorescence. 2. Immunity of Infectious Diseases: Protozoa (Malaria, Kalaazar), Bacteria (T.B., Typhoid) and Virus (Influenza, Pox). 3. Fundamental of Diseases: Swine flu, Dengue and Covid-19.	12 Periods / 08 Hours
4	1. Animal Cell Culture and Growth Media. 2. Primary, Secondary culture and Established Cell line Culture. 3. Tissue engineering: Basic Concept, Transgenic animal: Mice and Sheep.	12 Periods / 08 Hours
5	1. Hypersensitivity, Interferon and Monoclonal antibody. 2. Organ Transplantation, Biology of Cancer. 3. *In vitro* fertilization and Embryo Transfer. 4. Vaccine vectors and Nucleic acid vaccines 5. DNA in disease diagnosis (Tuberculosis and AIDS)	12 Periods / 08 Hours
Keywords: Immunity, Cytokines, Ag-Ab Interaction, Animal Cell Culture, Hypersensivity, DNA in Disease Diagnosis.		

Part C - Learning Resource		
Text Books, Reference Books, Other Resources		
Suggested Readings: 1. Fundamentals of Microbiology and Immunology: Ajit Kr. Banerjee, Nirmalya Banerjee –New Central Book Agency (P) Ltd., Kolkata. 2. Plant Biotechnology: H.S. Chawla Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi. 3. Plant Biotechnology: B.D. Singh - Kalyani Publication, New Delhi. 4. Biotechnology: Fundamental & Application (2005) S.S. Purohit 5. Immunology: J. Kubey et al. 7th edition. 6. Immunology: Roitt et al. 7. Fundamental of Immunology: W. Paul. 8. Biotechnology : Books and Allied Ltd : U Satyanarayana 9. Immunology : Saras Publication : Dulsy Fatima, N Arumugam **E-learning Resources** https://britannica.com https://en.wikibooks.org/wiki/Biochemistry https://nptel.ac.in https://www.vedantu.com/biology/immunology https://www.clearitmedical.com/2019/06/biology-notes-biotechnology-principles-and-processes.html https://www.edx.org/learn/immunology		
Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 50 Continuous Comprehensive Evaluation (CCE): Not Applicable University Exam(UE): 50 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable
External assessment University Exam (UE) Time 3Hours		As per Govt. norms
Any remarks/ Suggestions: -		

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