

Class		B.Sc. Zoology	
Year		III Year	
Subject & Subject Code		Zoology - BZOOL20Y301	
Paper	English	Genetics Paper - I	
	हिन्दी	अनुवांशिकी	
Max. Marks		30 (ETE) + 20(IA) = 50	
Credit		Total Credits	
L	T	P	4
3	1	0	
<p>Course Objectives: Students will understand the genetic variation through linkage and crossing over, gene frequency, chromosomal aberrations and sex determination. Students will understand the theories of classical genetics and blood group inheritance in man. Understood themolecular structure of genetic materials and understood the mechanism ofgene expression and regulation character formation.</p>			
<p>Course Outcome: At the end of the course, learners will be able to: 1. Understand the theories of classical genetics and blood group inheritance in man 2. Describe the genetic variation through linkage and crossing over, chromosomal aberrations and sex determination. 3. Understood the genetic defects and inborn errors of metabolism and genetic counseling and role of inbreeding and outbreeding. 4. Understand the molecular structure of genetic materials and understood the mechanism of gene expression and regulation character formation. 5. Illustrate the mechanism of replication, transcription and translation. 6. Understand the post transcriptional and post translational modifications.</p>			
<p>Student Learning Outcomes (SLO): 1. Students will have In-depth understanding on the principles and mechanisms of inheritance. 2. Explain the fine structure and molecular aspects of genetic material. 3. Learn the mechanism of Inheritance in Man. 4. Expose the learners to the emerging field of research and equip them the various research methodologies. 5. Students will understand the concept of mutation. 6. Students will understand DNA structure. 7. Students will Paraphrase the Central dogma of molecular biology.</p>			
Unit	Syllabus		Periods

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UNIT - I	Heredity and Genetic Material 1. Mendel's laws of heredity. 2. Variations-Sources and types. 3. Structure, Molecular organization and function of DNA and RNA and types of RNA 4. DNA replication in Prokaryotes. 5. Nucleosome (solenoid Model).	15
	अनुवांशिकता तथा अनुवांशिक पदार्थ 1. मेडल के अनुवांशिकता के नियम 2. विभिन्नतायें:- स्त्रोत तथा प्रकार 3. डी.एन.ए. एवं आर.एन.ए. की संरचना, आणविक संगठन एवं कार्य तथा आर.एन.ए.के प्रकार 4. प्रोकेरियोट्स में डी.एन.ए. का द्विगुणन 5. न्यूक्लियोसोम (सोलीनाइड मॉडल)	
UNIT - II	Gene Expression 1. Genetic Code 2. Transcription in Prokaryotes. 3. Translation in Prokaryotes. 4. Gene expression: Regulation of protein synthesis and Lac operon model. 5. Split gene ,Overlapping gene,Pseudo gene.	15
	जीन अभिव्यक्ति 1. अनुवांशिक कूट 2. प्रोकेरियोट्स में अनुलेखन 3. प्रोकेरियोट्स में अनुवाद 4. जीन अभिव्यक्ति: प्रोटीन संश्लेषण का नियम तथा ओपेरॉन मॉडल 5. स्प्लिट जीन,ओवरलैपिंग जीन,स्यूडोजीन	
UNIT - III	Linkage and Chromosomal aberration 1. Linkage and Crossing over -Types and Significance. 2. Sex determination-Chromosomal and Genetic balance theory. 3. Sex linked inheritance (Haemophilia, Colour blindness). 4. Structural and numerical changes in chromosomes. 5. Mutation types and Mutagens.	15
	सहलग्नता तथा गुणसूत्रीय विपथन 1.सहलग्नता तथा कांसिंग ओवर:- प्रकार तथा महत्व 2.लिंग निर्धारण- गुणसूत्रीय तथा अनुवांशिक संतुलन सिद्धांत 3.लिंग सहलग्न अनुवांशिकता- हीमोफिलिया,वर्णान्धता 4.गुणसूत्रों में संरचनात्मक तथा संख्यात्मक परिवर्तन 5.उत्परिवर्तन-प्रकार तथा म्यूटाजेन	
	Human Genetics 1. Human karyotype. 2. Human Genome project. 3. Multiple allele and inheritance of blood group. 4. Autosomal and sex Chromosome syndromes in human. 5. Genetic diseases in human -sickle cell anaemia,Albinism and Thalassemia.	

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Class		B.Sc. Zoology
Year		III Year
Subject & Subject Code		Zoology - BZOOL20Y302
Paper	English	Ecology and Applied Zoology Paper - II
	हिन्दी	पारिस्थितिकी एवं व्यवहारिक प्राणीशास्त्र
Max. Marks		30 (ETE) + 20 (IA) = 50
Credit		4
Total Credits		
L	T	
3	1	0

Course Objectives:

Students will understand Process of ornamental fish breeding which is highly professional and attractive avenue for youth. Areas of responses to Laws of limiting factor, Laws of minimum, Laws of Tolerance and Tragedy of commons. Types of ecosystem – freshwater, marine and terrestrial, Population characteristics and dynamics – conceptual approach Growth curves and pyramids; sigmoid curve, J curve and hyperbola; logistic equation and concepts relating to growth.

Course Outcome:

After successfully completing this course, students will be able to:

1. The learners will be able to identify and critically evaluate their own beliefs, values and actions in relation to professional and societal standards of ethics and its impact on ecosystem and biosphere due to the dynamics in population.
2. To understand anticipate, analyse and evaluate natural resource issues and act on a lifestyle that conserves nature.
3. The Learner understands and appreciates the diversity of ecosystems and applies beyond the syllabi to understand the local lifestyle and problems of the community.
4. The learner will be able to link the intricacies of food chains, food webs and link it with human life for its betterment and for non-exploitation of the biotic and abiotic components.
5. The working in nature to save environment will help development of leadership skills to promote betterment of environment.

Student Learning Outcomes (SLO):

Students will

1. Have In-depth understanding on the principles and mechanisms of basic theories and principles of ecology.
2. Learn current environmental issues based on ecological principles.
3. Gain critical understanding on human influence on environment.
4. Expose to the basics and advances in ethology.
5. Generate an interest in Ethology in order to understand the complexities of both animal and human behavior.
6. Have positive attitude towards Biodiversity conservation.

Unit	Syllabus	Periods
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UNIT - I	Concept of Ecology 1. Abiotic and biotic factors, Component of ecosystem. 2. Energy Flow in ecosystem: Food chain, Food web and Pyramids. 3. Biogeochemical cycle: Carbon, Oxygen, Nitrogen, Phosphorus. 4. Population Concept- Characteristics of population. Factors affecting population growth.	15
UNIT - II	Habitat Ecology 1. Fresh water. Marine and terrestrial habitat. 2. Ecological division of India. 3. Biodiversity: Natural resources and their conservation with special reference to forests.	15
UNIT - III	Wild life Environment 1. Wild life Protection Act. National Parks and Sanctuaries of Madhya Pradesh. 2. Endangered Species of India. 3. Types of Pollution: Air, Water, Soil, thermal and noise pollution. 4. Urbanisation and effect of human population on environment.	15
UNIT - IV	Aqua Culture 1. Prawn culture: Culture of Fresh water prawn, Methods of Prawn fishing, preservation and processing of prawns. 2. Pearl Culture and Pearl industry. 3. Frog Culture. 4. Major carp Culture: Management of ponds, Preservation and processing of fishes. 5. Maintenance of Aquarium.	15

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Class		B.Sc. Zoology	
Year		III Year	
Subject & Subject Code		Practical Zoology- BZOOOL20Y303	
Paper		Paper I and Paper II, Practical	
Max. Marks		50= (30+20) (ETE + IA)	
Credit		Total Credits	
L	T	P	2
0	0	2	

PRACTICALS

The practical's work will be as per theory syllabus and the candidates will be required to show the knowledge of the following:-

- 1 Study of fresh water, marine and terrestrial fauna, major carps, Common stored grain pest and vegetable pest.
- 2 Water analysis – Dissolve Oxygen, pH, Hardness, Turbidity.
- 3 Study of Ecosystems and maintenance of Aquarium.
- 4 Study of instrument related to Genetics- Centrifuge , PCR, Gel electrophoresis, DNA finger printing.
- 5 Wild life – Endangered species.
- 6 Life cycle of silkworm, Honey Bee, Lac insect.

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Class				B.Sc. Zoology (Honours)			
Year				III Year			
Subject & Subject Code				Zoology Honours - BZOOL20Y304			
Paper				Animal Biotechnology Paper - III			
Max. Marks				30 (ETE) + 20 (IA) = 50			
Credit			Total Credits				
L	T	P	4				
3	1	0					
<p>Course Objectives: Understanding the principle and application of recombinant DNA in biotechnology. Application of genetic engineering to veterinary and medical sciences for production of high value and industrial products, Biohazard and safety aspects in genetic engineering, Extraction of DNA and RNA.</p>							
<p>Course Outcome: At the end of the course, learners will be able to: 1. To describe meristem culture and clonal propagation of plants on a commercial scale. 2. To get insight in applications or recombinant DNA technology in agriculture, production of therapeutic proteins. 3. To explain commercial production of fuels, microbial enzymes. 4. To explain Transformation techniques. 5. To explain Culture Techniques and Applications.</p>							
<p>Student Learning Outcomes (SLO): Students will .Be able to describe: 1. The structure of animal genes and genomes. 2. How genes are expressed and what regulatory mechanisms contribute to control of gene expression. 3. Basic principles and techniques in genetic manipulation and genetic engineering. 4. Gene transfer technologies for animals and animal cell lines. 5. Applications of transgenic animals. 6. Recombinant insulin and human growth hormone.</p>							
Unit		Syllabus				Periods	
UNIT - I		Introduction Concept and scope of biotechnology.				15	
UNIT - II		Molecular Techniques in Gene manipulation Cloning vectors: Plasmids, Cosmids, Phagemids, Lambda Bacteriophage, M13, BAC, YAC, MAC and Expression vectors (characteristics). Restriction enzymes: Nomenclature, detailed study of Type II.				15	

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Class				B.Sc. Zoology (Honours)			
Year				III Year			
Subject & Subject Code				Practical Zoology Honours- BZOO20Y305			
Paper				Paper III, Practical			
Max. Marks				50= (30+20) (ETE + IA)			
Credit			Total Credits				
L	T	P	1				
0	0	1					

PRACTICALS

- 1 Genomic DNA isolation from E. coli.
- 2 Plasmid DNA isolation (pUC 18/19) from E. coli.
- 3 Restriction digestion of plasmid DNA.
- 4 Construction of circular and linear restriction map from the data provided.
- 5 Calculation of transformation efficiency from the data provided.
- 6 To study following techniques through photographs.
 - a. Southern Blotting.
 - b. Northern Blotting.
 - c. Western Blotting.
 - d. DNA Sequencing (Sanger's Method).
 - e. PCR.
 - f. DNA Fingerprinting.
- 7 Project report on animal cell culture.

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