DATTAJIRAO KADAM ARTS,SCIENCE AND COMMEREC COLLEGE, ICHALKARANJI

DEPARTMENT OF ZOOLOGY

Details of Cross Details of Cross Cutting Issues relevant with Gender Awareness, Environmental Awareness, Professional Ethics and Human Values

Sr. No.	Name of the Course	Title of Paper	Sem.	Name of the Unit	Details of Cross Cutting Issues relevant with			
					Gender Awareness	Environmental Awareness	Professional Ethics	Human Values
1	**B.Sc.-I (2018-19)**	Animal Diversity - I	I	**Animal Diversity – I** Kingdom Protista,Phylum Porifera,Phylum Cnidaria,Phylum Platyhelminthes, Phylum nemathelminthes,Phylum Annelida,Phylum Arthropoda, Phylum Mollusca, Phylum Echinodermata	Equity in coservation , Sexual dimorphism, Same sex behaviour in animals	Ecosystem Health, Coservation efforts, Impact of human activity on animal population	Animal Walfare, Integrity in research, Ethics of species extinction	Respect for nature, Interconnectedness, Cultural significance of animals in human societies
		Animal Physiology		**Animal Physiology** Nerve and muscle, Digestion, Respiration,Excretion, Cardiovascular system	Sex difference in physiology, Gender specific physiological adaptations, Impact of sex hormones on physiological processes	Effects of climate change on animal physiology, Physilogical responses to pollution and toxins	Human treatment and handling of animals in research and teaching, Ethical consideration in animal experimentation and dissection	Respect for Interconnectedness of human and animal health, Empathy for animal welfare and suffering
		Cell biology and Evolutionary Biology	**II**	**Cell biology** Cellstructure ,Structure of nucleus,Structure of Chromosome, Ultra structure and functions of the following Plasma membrane (Fluid MosaicModel)MitochondriaEndoplasmic reticulumGolgi complexLysosome	Sex chromosomes and their role in cell biology, Gender differences in gene expression	Cellular responses to environmental stressors, Impact of climate change on cellular function.	Responsible use of cell lines and cultures in research, Ethical consideration in stem cell research.	Empathy for individuals affected by cellular diseases or disorders.

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				Evolutionary Biology History of Life, Introduction to Evolutionary Theories,Direct Evidences of Evolution,Extinction	Evolution of sex and gender differences . Biological basis of gender roles and diversity	Impact of evolution on species and ecosystems. Importance of conserving biodiversity.	Humane treatment of research subjects. Integrity and respect in scientific practice.	Evolution of traits like cooperation and altruism. Biological foundations of ethical behavior.
		Genetics		**Genetics** Introduction to Genetics, Mendelian and post Mendelian Genetics, Linkage and Crossing Over, Mutations , SexDetermination	Sex Chromosomes: XX and XY determine biological sex. Genetic Influence: Impact of genetics on gender identity and diversity.	Using genetic tools for protecting endangered species.	Crucial for genetic testing and research, Protecting genetic information and ensuring confidentiality.	Genetic Counseling: Supports informed choices about genetic conditions. Ethical Issues: Considerations in genetic engineering and modification.
	B.Sc.-I (2022-23)	Animal Diversity - I	I	**Animal Diversity - I** Kingdom Protista,Phylum Porifera,Phylum Cnidaria,Phylum Platyhelminthes,Phylum Nemathelminthes,Phylum Annelida,Phylum Arthropoda, Phylum Mollusca, Phylum Echinodermata	Equity in coservation , Sexual dimorphism, Same sex behaviour in animals	Ecosystem Health, Coservation efforts, Impact of human activity on animal population	Animal Walfare, Integrity in research, Ethics of species extinction	Respect for nature, Interconnectedness, Cultural significance of animals in human societies
		Cell biology and Evolutio nary Biology		**Cell biology** Cellstructure ,Structure of nucleus,Structure of Chromosome, Ultra structure and functions of the following Plasma membrane (Fluid Mosaic Model)MitochondriaEndoplasmic reticulumGolgi complexLysosome	Sex chromosomes and their role in cell biology, Gender differences in gene expression	Cellular responses to environmental stressors, Impact of climate change on cellular function.	Responsible use of cell lines and cultures in research, Ethical consideration in stem cell research.	Empathy for individuals affected by cellular diseases or disorders.

				Evolutionary Biology History of Life, Introduction to Evolutionary Theories,Direct Evidences of Evolution,Extinction	Evolution of sex and gender differences . Biological basis of gender roles and diversity	Impact of evolution on species and ecosystems. Importance of conserving biodiversity.	Humane treatment of research subjects. Integrity and respect in scientific practice.	Evolution of traits like cooperation and altruism. Biological foundations of ethical behavior.
		Animal Diversity and Insect Vectors	II	**Type Study: Rat** Systematic position, Habit andHabitat MorphologicalCharacters DigestiveSystem Respiratory System Circulatory System (Composition of Blood and Heart) Excretory System ReproductiveSystem Brain forRat	Ensure balanced representation in research and consider any potential gender biases in studies.	Understand the impact of rat species on their environment and any conservation needs.	Adhere to ethical standards for humane treatment and handling of animals.	Respect animal welfare and consider the implications of research on rat populations and ecosystems
				Insect Vectors Mosquito as an insect vector , Housefly as an important mechanical vector, Flea as an insect vector	Ensure research includes diverse perspectives and does not unintentionally exclude or bias any gender.	Assess the ecological consequences of vector control strategies and strive for sustainable solutions that minimize harm to non-target species	Follow ethical guidelines for handling and studying insects, and ensure responsible use of data.	Consider the impact of vector control measures on human communities and respect the balance of ecosystems.
		Genetics		**Genetics** Introduction to Genetics, Mendelian and post Mendelian Genetics, Linkage and Crossing Over, Mutations , SexDetermination	Sex Chromosomes: XX and XY determine biological sex.Genetic Influence: Impact of genetics on gender identity and diversity.	Using genetic tools for protecting endangered species.	Crucial for genetic testing and research,Protecting genetic information and ensuring confidentiality.	Genetic Counseling: Supports informed choices about genetic conditions.Ethical Issues: Considerations in genetic engineering and m[illegible]ation.

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	B.Sc.-II (2018-19)	Animal Diversity - III	III	**Study of Nonchordates** UNIT I A. Salient features and Classification up to classes B. Amazing invertebrates. UNIT I : Study of phylum Arthropoda- Crab, Cockroach, UNIT III : Study of phylum Mollusca,Pila UNIT IV : Study of following general topics in Nonchordates A. Mouthparts in insects . B. Foot in Mollusca C. Pedicellariae in Echinodermata D. Affinities in Hemichordata	Encourage gender diversity for varied insights Address potential gender biases in research.	Understand nonchordates' roles in ecosystems. Awareness of natural resources and environment	Animal Walfare, Integrity in research, Ethics of species extinction	Biodiversity Respect: Value all life forms to guide ethical research.
		Genetics and Biological Chemistry		**Genetics** UNIT I : Genetics Part I A. Linkage and Crossing over B. Sex determination. C. Gynandromorphs. UNIT II : Genetics Part II A. Interaction of genes. B. Lethal Genes. C.Twins in human	Sex Chromosomes: XX and XY determine biological sex. Genetic Influence: Impact of genetics on gender identity and diversity.	Using genetic tools for protecting endangered species.	Crucial for genetic testing and research, Protecting genetic information and ensuring confidentiality.	Genetic Counseling: Supports informed choices about genetic conditions. Ethical Issues: Considerations in genetic engineering and modification.
				Biological Chemistry UNIT III : Biological Chemistry Part I A. pH and Buffers. B. Classification and Biological Significance of i. Carbohydratesii. Proteinsiii. Lipids. UNIT IV : Biological Chemistry Part II A. Nucleic Acids. B. Enzymes C. Significance of metal ions with reference to human body	Promote gender diversity in research teams and address gender biases in methodologies and interpretations.	Implement sustainable practices in chemical research and assess the ecological impact of chemical processes.	Ensure ethical conduct in handling chemicals and maintain accuracy and transparency in research.	Prioritize health and safety in research applications and promote public understanding of biological chemistry's societal impact.

		Animal Diversity - IV	IV	**Study of chordates** A. Salient features and classification of Reptiles, Birds and Mammals up to orders with suitable examples. B. Poisonous and non-poisonous snakes. B. UNIT II : Study of Rat UNIT IV : Study of the following general topics: ii. Aerial adaptations in birds. iii. Dentition in mammals. iv. Salient features and affinities of monotremes and marsupials.	Equity in coservation , Sexual dimorphism, Same sex behaviour in animals	Ecosystem Impact: Study how chordates influence and are affected by their ecosystems. Impact of environmental changes on chordate species and habitats.	Animal Walfare, Integrity in research, Ethics of species extinction	Respect for nature, Interconnectedness, Cultural significance of animals in human societies
		Histology and Physiology		Histology UNIT I : Histology of mammalian organs Part I UNIT II : Histology of mammalian organs Part II UNIT III : Physiology Part I UNIT IV : Physiology Part II	Gender-specific histological features in reproductive systems. Impact of hormones on tissue morphology	Effects of environmental toxins on tissue structure and function. Histological changes in response to pollution and climate change	Responsible handling and disposal of biological tissues. Ethical considerations in human tissue sampling and research	Respect for the dignity of individuals and their tissues. Empathy for individuals affected by tissue-related disorders or diseases
				Physiology B. Invitro fertilization C. Body defence	Sex differences in physiology,Gender-specific considerations in medical research and treatment	Role of physiology in conservation and wildlife preservation.Impact of environmental toxins on physiological systems	Respect for persons and dignity in physiological research.Responsible use of physiological data and results	Respect for human life and dignity in physiological research.Promoting health and well-being through physiological knowledge.
	B.Sc.-II (2019-20)	Animal Diversity - II	III	Animal Diversity - II	Equity in coservation , Sexual dimorphism, Same sex behaviour in animals	Ecosystem Health, Coservation efforts, Impact of human activity on animal population	Animal Walfare, Integrity in research, Ethics of species extinction	Respect for nature, Interconnectedness, Cultural significance of animals in human societies

		Biochemistry		Nucleic acids: DNA and RNA	Addresses gender-based health disparities	Environmental factors can impact DNA mutations and epigenetic changes	Nucleic acid-based technologies raise ethical concerns	Understanding nucleic acids can promote appreciation for human diversity and individuality
				Carbohydrate, Lipid,Protein metabolism	Gender-specific nutritional needs and recommendations	Dietary choices impact environmental sustainability	Research and clinical practice addresses health inequities and cultural sensitivities	Empathy and compassion in healthcare and nutrition counseling
				Enzymes	Hormonal fluctuations affect enzyme function	Industrial enzyme and their impact on ecosystems	Respect for intellectual property and patents in enzyme research and application	Empathy for individuals with metabolic disorders or deficiencies
		Reproductive Biology	IV	Reproductive Biology	Enhances understanding of gender-specific reproductive health issues	Encourages the development of eco-friendly reproductive technologies and the assessment of their environmental impacts.	Ensures that research and practices respect consent, confidentiality, and humane treatment in reproductive studies.	Fosters appreciation for the diversity of reproductive processes and supports informed public education on reproductive health and rights.
		Applied Zoology		Applied Zoology	Gender-specific differences in animal models can improve human health research Understanding animal behavior and physiology can inform gender studies and social sciences	Animal welfare and environmental sustainability are interconnected Zoological research can address climate change impacts on animal populations and ecosystem	Responsible use of zoological knowledge for human benefit and animal well-being. Transparency and accountability in zoological research and applications	Understanding animal behavior and social structures can inform human social values Appreciation for animal diversity and complexity promotes empathy and compassion

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					Gender Awareness	**Environmental Awareness**	**Professional Ethics**	**Human Values**
1	B.Sc.-III (2018-19)	PAPER - IX FUNCTIONAL ANATOMY OF NON-CHORDATES.	V	Unit :I Animal Diversity	Equity in coservation , Sexual dimorphism, Same sex behaviour in animals	Highlight the importance of biodiversity and the need for conservation of animal species, particularly in the face of habitat destruction and climate change.	Animal Walfare, Integrity in research, Ethics of species extinction	Respect for nature, Interconnectedness, Cultural significance of animals in human societies
				Unit :II Animal Diversity Type study Leech	Gender awareness in the context of animal diversity involves recognizing how gender dynamics affect both scientific research and conservation efforts	When discussing topics like animal diversity and the study of specific organisms like leeches, it's important to acknowledge and promote the contributions of scientists from diverse gender backgrounds. Historically, women and non-binary individuals have been underrepresented in biological sciences, and recognizing their work can help inspire future generations.	Scientific Integrity: Accurate and unbiased reporting of research findings is essential. Any conflict of interest or ethical concerns must be addressed transparently.	Ensure humane treatment and minimal distress when handling leeches for research. Proper guidelines should be followed to avoid unnecessary harm.
1		PAPER - X BIOSTATISTICS, BIOINFORMATICS AND MEDICAL ZOOLOGY..	V	Unit – I Biostatistics	Statistical analysis should account for gender differences when interpreting results. For example, clinical trials should consider varying responses to treatment across genders. Gender-aware biostatistics ensures that data analysis methods do not perpetuate biases that could lead to unequal health outcomes.	Biostatistics is also key in analyzing large datasets related to environmental changes, like temperature shifts, deforestation rates, or pollution levels. Environmental awareness in biostatistics ensures that such studies are carried out with a focus on long-term sustainability and ecological health.	Biostatisticians often handle sensitive information, especially in medical research. Adherence to ethical standards like ensuring data confidentiality, obtaining informed consent, and respecting privacy rights is crucial.	Biostatistics can be used to address health disparities by identifying and analyzing data on vulnerable or underserved populations. This promotes equity in healthcare and ensures that resources and interventions are distributed fairly.
				Unit – II. Biostatistics ,Bioinformatics	In bioinformatics research, algorithms and datasets may be unintentionally biased. For example, genetic studies have historically been male-focused, leading to gaps in understanding female-specific traits or diseases. Gender-aware approaches in bioinformatics emphasize inclusivity in study design, ensuring datasets and algorithms are representative of all genders.	Conservation and Sustainability: Bioinformatics is essential in conservation biology. Analyzing genomic data helps in understanding biodiversity, monitoring endangered species, and managing conservation strategies. Environmental awareness in bioinformatics encourages sustainable practices, such as reducing the environmental footprint of large-scale data centers used for genomic data processing.	Handling large-scale genomic data raises ethical concerns regarding data privacy, especially when dealing with sensitive information like human genomes: Ethical guidelines in bioinformatics emphasize the protection of individual privacy, secure data storage, and responsible data sharing practices.	Bioinformatics should be used in ways that respect and promote human dignity. This includes making bioinformatics tools and knowledge accessible to all, regardless of socioeconomic status, and using the technology to address global health disparities.

				Unit – III Medical Zoology:	In medical zoology, understanding how diseases affect different genders is crucial.Gender awareness is important in disease surveillance and data collection, ensuring that research includes diverse gender identities.In many societies, traditional gender roles can influence exposure to disease vectors.	nvironmental factors such as deforestation, climate change, and pollution can affect the distribution of disease vectors like mosquitoes, ticks, and rodents. Medical zoology integrates environmental awareness to predict how changing ecosystems may influence the spread of zoonotic diseases and develop appropriate preventive measures.	Medical zoologists often work at the intersection of research and public health. Ethical considerations must guide decisions about disease control measures, ensuring that interventions are fair, culturally sensitive, and do not disproportionately affect vulnerable populations.	Public Awareness and Education: Human values emphasize the importance of education and awareness in preventing and managing diseases. Medical zoologists have a responsibility to communicate their findings clearly and to promote understanding among the public, helping communities make informed decisions about their health.
1		PAPER – XI PHYSIOLOGY		Unit – I I. Nutrition -	Gender-Specific Nutritional Needs and Metabolism: Men and women have different nutritional and metabolic requirements due to variations in body composition, hormones, and life stages (e.g., pregnancy, menopause). Gender-sensitive research and dietary recommendations consider these differences to ensure balanced nutrition for all genders.	Impact of Environmental Factors on Nutrition and Health: Environmental factors like pollution, climate change, and food security affect nutrition and metabolism. Contaminated water, soil, and air can lead to deficiencies in vitamins and minerals, impacting overall health.	Ethical Considerations in Research and Clinical Practice: Researchers and healthcare professionals must prioritize ethical standards when conducting studies or providing treatments. This includes ensuring the accuracy of data, avoiding conflicts of interest (especially in nutrition and supplement industries), and maintaining transparency in research	Equity in Access to Nutrition and Healthcare: Ensuring equitable access to nutritious food, vitamins, and medical care is a fundamental human value. This includes addressing disparities in healthcare access and working toward solutions that benefit underserved populations.
				Metabolism,Vitamins ,	Impact of Gender on Vitamin Absorption and Deficiency: Gender plays a role in vitamin absorption, metabolism, and deficiency risks. For example, women may have higher needs for iron and calcium due to menstruation and bone health concerns. Gender-specific interventions help address these differences effectively.	Sustainability in Nutrition and Healthcare: Promoting sustainable dietary practices, such as plant-based diets or reducing food waste, contributes to environmental health. Additionally, the environmental footprint of medical treatments should be considered when prescribing medications or supplements.	Patient-Centered Care and Ethical Decision-Making: Professional ethics emphasize the importance of respecting patient autonomy, providing informed consent, and delivering unbiased care tailored to individual needs; regardless of gender, socioeconomic status, or cultural background.	Respect for Cultural and Individual Preferences: Human values emphasize respecting diverse dietary practices, cultural beliefs, and lifestyle choices while promoting evidence-based health practices. Culturally sensitive care is crucial in addressing nutrition, metabolic health, and disease prevention.
				Respiration ,Circulation ,	Respiratory and Circulatory Differences: Physiological responses in respiration and circulation can differ by gender. For example, women may have smaller airways and different cardiovascular responses, affecting how they experience respiratory diseases or respond to exercise.	Respiratory Health and Air Pollution: Air pollution is a significant environmental concern that directly impacts respiratory health, leading to conditions like asthma and chronic obstructive pulmonary disease (COPD). Research and public health strategies must consider these environmental influences.	Ethics in Supplement and Nutrition Industry: The nutrition and supplement industry must adhere to ethical practices, avoiding false claims and ensuring that products are safe, effective, and accessible. Transparency in labeling and marketing is essential for consumer trust and safety.	Holistic Approach to Health and Well-Being: Integrating human values into healthcare involves considering the physical, emotional, social, and spiritual aspects of well-being. This approach leads to more compassionate care and supports the dignity and humanity of all individuals.

				Excretion ,Muscle , Nervous system	Gender Differences in Muscle and Nervous Function: Muscle mass, strength, and nervous system function can vary based on gender. These differences influence responses to training, injury recovery, and neurological conditions. Understanding these variations ensures gender-sensitive treatment and rehabilitation strategies.	Eco-Friendly Practices in Healthcare and Research: In laboratories and healthcare settings, promoting environmentally sustainable practices—such as reducing waste and energy consumption—helps minimize the ecological impact of medical research and treatment.		Community Health and Social Responsibility: Public health initiatives related to nutrition, vitamins, and metabolic health should prioritize the collective well-being of communities, promoting education, prevention, and interventions that align with the needs and values of the people they serve.
1		PAPER – XII ENDOCRINOLOGY, ENVIRONMENTAL BIOLOGY AND TOXICOLOGY	V	Unit – I I. Endocrinology:-	Gender-Specific Hormonal Differences: Hormonal regulation and endocrine disorders can differ significantly between genders. For example, testosterone and estrogen influence different physiological processes in males and females, and their imbalances can lead to gender-specific conditions such as polycystic ovary syndrome (PCOS) in women and androgen deficiency in men.	Climate change can influence endocrine health by altering exposure to endocrine-disrupting chemicals and affecting the distribution of vectors for endocrine-related diseases. Research and public health policies should consider these environmental impacts.	Ethical considerations involve providing equitable access to endocrine treatments and interventions, regardless of socioeconomic status, gender, or geographic location. Ensuring that all patients receive appropriate care is a fundamental ethical responsibility.	Human values call for promoting education and awareness about endocrine health, including preventive measures and early detection of disorders. Public health initiatives should aim to empower individuals with knowledge to manage their endocrine health effectively.
				II.Biodiversity ,National parks andWild life Sanctuaries of India.	In many communities surrounding national parks and wildlife sanctuaries, traditional gender roles can influence conservation efforts. Women often play a critical role in natural resource management and conservation activities. Recognizing and supporting their contributions can enhance conservation strategies and promote gender equity in these efforts.	National parks and wildlife sanctuaries play a role in climate change adaptation by serving as refuges for species affected by climate shifts. Understanding and mitigating the effects of climate change on these areas is critical for maintaining biodiversity and ecosystem resilience.	Professional ethics in the management of national parks and wildlife sanctuaries include humane treatment of wildlife, ethical research practices, and ensuring that management actions do not harm the animals or their habitats. Ethical considerations also involve balancing conservation goals with local community needs.	Respect for Nature and Cultural Heritage: Human values emphasize the importance of respecting both natural and cultural heritage. National parks and wildlife sanctuaries often encompass areas of cultural significance to local communities. Ensuring that conservation efforts respect and integrate these cultural values promotes more inclusive and respectful management.
				III.Toxicology :	Gender Differences in Toxic Responses: Men and women can exhibit different responses to toxic substances due to biological differences such as hormone levels, body composition; and metabolism.	Environmental toxicology focuses on how pollutants, such as pesticides, heavy metals, and industrial chemicals, affect ecosystems and human health. Environmental awareness involves studying and addressing the sources, pathways, and impacts of these contaminants on air, water, and soil quality.	Toxicologists must adhere to ethical standards in their research, including obtaining informed consent, ensuring the humane treatment of research subjects (including animals), and maintaining transparency in data reporting. Ethical research practices are crucial for generating reliable and actionable results.	Human values emphasize the importance of protecting individuals and communities from the harmful effects of toxins. Toxicology research and policy should prioritize safeguarding health, particularly for vulnerable populations such as children, the elderly, and those with pre-existing health conditions.

I		SEMESTER:VI PAPER- XIII COMPARATIVE ANATOMY OF CHORDATES	VI	Unit – I I. Integument and its derivatives. II. Endoskeleton	Research on integumentary structures sometimes overlooks differences between sexes in anatomical studies. Understanding these differences is crucial for accurate biological research and medical applications. Differences in skeletal structure between sexes, such as pelvis shape, can influence research outcomes and applications. Gender-aware studies ensure comprehensive understanding and application.	The integumentary adaptations of animals often reflect environmental pressures . Skeletal adaptations often reflect environmental challenges, such as aquatic versus terrestrial life. Understanding these adaptations can help in assessing species' responses to environmental changes. Skeletal adaptations often reflect environmental challenges, such as aquatic versus terrestrial life. Understanding these adaptations can help in assessing species' responses to environmental changes.	Ethical considerations include ensuring humane treatment of animals used in research on integumentary structures and avoiding unnecessary harm.Professional Ethics: Ethical concerns involve the responsible use of animal specimens in research and ensuring that skeletal studies do not cause unnecessary harm.	The study of integumentary structures enhances our appreciation of biodiversity and the evolutionary adaptations of various species, fostering respect for different life forms. Studying the endoskeleton helps us understand the complexity of vertebrate evolution and fosters appreciation for the diversity of structural adaptations in nature.
				Unit-II III. Digestive system IV. Respiratory system V. Circulatory system	Differences in digestive physiology and disease prevalence between genders can impact research and clinical practices. Gender-sensitive research helps tailor dietary recommendations and treatments.Respiratory adaptations and efficiency can vary by gender, influencing research outcomes and health recommendations.Gender differences in circulatory system structure and function may impact research and medical treatments. Gender-aware studies ensure comprehensive health care and research outcomes.	Environmental factors such as diet availability and pollution can affect digestive health. Studying these effects informs public health strategies and environmental policies. Respiratory adaptations are often responses to environmental conditions. Understanding these adaptations helps in assessing species' resilience to environmental changes and pollution. The integumentary adaptations of animals often reflect environmental pressures (e.g., camouflage, temperature regulation). Studying these adaptations can inform conservation strategies and our understanding of environmental impacts on species. Environmental factors can influence circulatory system adaptations, such as variations in heart size or blood flow patterns in different habitats	Ensuring ethical treatment of animals used in digestive system research and adhering to guidelines for humane handling are critical.Research on respiratory systems must adhere to ethical standards, ensuring minimal distress to research subjects.Ethical considerations include the humane treatment of animals in research and ensuring that studies contribute meaningfully to scientific knowledge without causing undue harm.	Understanding digestive systems across species highlights the complexity of nutrient processing and contributes to better nutritional practices and health care.
				Unit-III VI. Excretory system VII. Nervous system -	Differences in excretory system function and disease prevalence between genders should be considered in research and clinical practice.Differences in nervous system function and neurological diseases between genders should be acknowledged in research to ensure accurate findings and effective treatments.	Adaptations in the excretory system often reflect environmental conditions, such as the need for water conservation in arid environments.Environmental factors can impact nervous system function and health. Studying these interactions helps in understanding the effects of environmental stressors on neurological health.	Ethical considerations include the humane treatment of animals used in neurological research and ensuring responsible use of data.Ethical treatment of research animals and responsible use of excretory system studies are crucial.	Studying excretory systems enhances our understanding of physiological processes and supports the development of treatments for kidney-related diseases. Understanding the complexity of the nervous system fosters appreciation of [illegible] and supports advances in treating neurological disorders.

		SEMESTER:VI PAPER- XIV DEVELOPMENTAL BIOLOGY	VI	Unit – I I. Gametogenesis. II. Process of fertilization. III. Types of eggs and cleavages. IV. Ascidian tadpole and retrogressive metamorphosis. V. Development of frog up to three germinal layers and metamorphosis	Understanding differences in male and female gametogenesis to address reproductive health issues.Considering male and female factors affecting fertilization success.Identifying differences in reproductive strategies and developmental disorders.Considering any gender-specific aspects in developmental processes.Addressing any gender-specific developmental issues.	Studying environmental impacts on gamete quality and fertility.Assessing how environmental factors impact fertilization.Evaluating how environmental conditions affect egg development.Studying how environmental factors influence metamorphosis.Understanding how environmental changes impact frog development.	Ensuring humane treatment in reproductive research and obtaining informed consent.Maintaining privacy and informed consent in reproductive studies,ethical treatment of animals in research,humane treatment of research animals,ethical treatment of frogs in research.	Advancing fertility treatments and reproductive health.Improving assisted reproductive technologies and fertility treatments.Enhancing understanding of developmental biology.Gaining insights into developmental plasticity and evolutionary biology.Supporting advances in developmental biology and conservation efforts.
				Unit – II VI. Development of chick upto 72 hours.	Focus on eventual sex-related growth differences in broader research.	Impact of temperature, humidity, and oxygen levels on chick development; relevance to climate change studies.	Humane treatment of embryos; adhering to ethical research practices.	Respect for life, supporting advances in developmental biology and medicine for societal benefits.
				Unit – III VII. Organizer - Concept and process of induction. VIII. Study of foetal membrance IX. Placenta- types and significance. X. Cloning - techniques, significance and ethical issues.	Understanding potential gender-specific influences on induction and developmental processes.Investigating differences in fetal membrane development and pregnancy outcomes between sexes.Research on placental function and its variations between male and female offspring.	Environmental factors can affect cellular signaling during induction.Environmental conditions impacting fetal membrane integrity and function.Potential environmental impacts of cloning practices, including biodiversity concerns.	Ethical considerations in manipulating induction pathways in research.Ethical handling of embryonic tissues in research.Ethical issues related to studying placental tissues and maternal health.Major ethical debates around cloning, such as identity, consent, and human rights.	Enhances understanding of developmental biology and regenerative medicine.Understanding fetal development for improving prenatal care and health.Raises questions on the moral and societal implications of cloning in humans and animals.
		PAPER –XV MOLECULAR BIOLOGY, BIOTECHNOLOGYAND BIOTECHNIQUES	VI	Unit – I I. Molecular Biology : 1. Replication of DNA 2. DNA damage and repair mechanism 3. Regulation of gene expression – Operon concept. 4. Genetic code (3) i) Properties of genetic code. ii) Codon assignments 5. Protein synthesis a) Transcription - i) Process of transcription in prokaryotes and eukaryotes. ii) RNA polymerase. b) Translation i) Initiation ii) Elongation iii) Termination.	Differences in DNA replication rates and fidelity between genders in certain conditions.Studying how repair mechanisms may differ across sexes, influencing disease susceptibility.Considering sex-specific differences in gene expression regulation.Insights into how genetic variations influence traits and health differently in genders.Differences in gene expression and protein synthesis between sexes in health and disease.	Effects of environmental factors like radiation and toxins on DNA replication fidelity.Understanding environmental factors (e.g., UV light, chemicals) that cause DNA damage. How environmental signals influence gene regulation in organisms.Studying mutations caused by environmental factors that alter the genetic code.Environmental influences on the efficiency of transcription and translation.	Responsible handling of genetic data and avoiding manipulation in genetic research.Ensuring ethical use of gene-editing tools like CRISPR in repairing DNA damage.Ethical implications of manipulating gene expression for research or therapeutic purposes.Ensuring accurate interpretation of the genetic code in genetic testing and counseling.Ethical considerations in synthetic biology and manipulating gene expression.	Ensures the integrity of research that impacts genetic testing and hereditary disease treatment.Supports treatments for genetic disorders, promoting better healthcare outcomes.Enhances understanding of gene regulation, leading to better-targeted therapies.Protects against misuse of genetic information and supports equitable healthcare.Advances in protein synthesis research contribute to better drug development and therapeutic interventions.

				Unit – II II. Biotechnology:	Potential gender-specific applications in gene therapy and personalized medicine.Recognizing differences in immune responses between genders, which influence vaccine and treatment development.	Ethical considerations of releasing genetically modified organisms (GMOs) and their impact on biodiversity.Using immunological tools for monitoring environmental health, like detecting pollutants through biosensors.	Ensuring responsible use of gene editing technologies, avoiding misuse in human enhancement or discrimination.Ethical issues in producing monoclonal antibodies, ensuring no harm to animals or humans in research.	Balancing innovation with moral concerns, particularly in areas like cloning and gene therapy.Promoting health equity by ensuring immunological advances benefit all populations and are not limited by socioeconomic factors.
2	B.Sc.-III (2019-20)							
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	B.Sc.-III (20120-21)	Zoology Paper-IX DSE-E29 (COMPARATIVE ANATOMY OF VERTEBRATES)	V	Unit 1: Integumentary System 1. Generalized structure of integument 2. Functions of Integument 3. Soft and Hard epidermal derivatives 4.Hard epidermal derivatives	Research on integumentary structures sometimes overlooks differences between sexes in anatomical studies. Understanding these differences is crucial for accurate biological research and medical applications. Differences in skeletal structure between sexes, such as pelvis shape, can influence research outcomes and applications. Gender-aware studies ensure comprehensive understanding and application.	The integumentary adaptations of animals often reflect environmental pressures . Skeletal adaptations often reflect environmental challenges, such as aquatic versus terrestrial life. Understanding these adaptations can help in assessing species' responses to environmental changes. Skeletal adaptations often reflect environmental challenges, such as aquatic versus terrestrial life. Understanding these adaptations can help in assessing species' responses to environmental changes.	Ethical considerations include ensuring humane treatment of animals used in research on integumentary structures and avoiding unnecessary harm.Professional Ethics: Ethical concerns involve the responsible use of animal specimens in research and ensuring that skeletal studies do not cause unnecessary harm.	The study of integumentary structures enhances our appreciation of biodiversity and the evolutionary adaptations of various species, fostering respect for different life forms. Studying the endoskeleton helps us understand the complexity of vertebrate evolution and fosters appreciation for the diversity of structural adaptations in nature.
				Unit 2: Skeletal System 1. Vertebral column 2. Appendicular skeleton	Differences in digestive physiology and disease prevalence between genders can impact research and clinical practices. Gender-sensitive research helps tailor dietary recommendations and treatments.Respiratory adaptations and efficiency can vary by gender, influencing research outcomes and health recommendations.Gender differences in circulatory system structure and function may impact research and medical treatments. Gender-aware studies ensure comprehensive health care and research outcomes.	Environmental factors such as diet availability and pollution can affect digestive health. Studying these effects informs public health strategies and environmental policies. Respiratory adaptations are often responses to environmental conditions. Understanding these adaptations helps in assessing species' resilience to environmental changes and pollution. The integumentary adaptations of animals often reflect environmental pressures (e.g., camouflage, temperature regulation). Studying these adaptations can inform conservation strategies and our understanding of environmental impacts on species. Environmental factors can influence circulatory system adaptations, such as variations in heart size or blood flow patterns in different habitats	Ensuring ethical treatment of animals used in digestive system research and adhering to guidelines for humane handling are critical.Research on respiratory systems must adhere to ethical standards, ensuring minimal distress to research subjects.Ethical considerations include the humane treatment of animals in research and ensuring that studies contribute meaningfully to scientific knowledge without causing undue harm.	Understanding digestive systems across species highlights the complexity of nutrient processing and contributes to better nutritional practices and health care.

				Unit3: Digestive System Brief account of alimentary canal and digestive glands Unit 4: Respiratory System Brief account of Gills, lungs, air sacs Unit 5: Circulatory System Evolution of heart and aortic arches Unit 6: Evolution of Kidney Succession of kidney Unit 7: Nervous System Comparative account of brain Unit 8: Sense Organs Comparative account of ear and eye of vertebrates	Differences in excretory system function and disease prevalence between genders should be considered in research and clinical practice.Differences in nervous system function and neurological diseases between genders should be acknowledged in research to ensure accurate findings and effective treatments.	Adaptations in the excretory system often reflect environmental conditions, such as the need for water conservation in arid environments.Environmental factors can impact nervous system function and health. Studying these interactions helps in understanding the effects of environmental stressors on neurological health.	Ethical considerations include the humane treatment of animals used in neurological research and ensuring responsible use of data.Ethical treatment of research animals and responsible use of excretory system studies are crucial.	Studying excretory systems enhances our understanding of physiological processes and supports the development of treatments for kidney-related diseases. Understanding the complexity of the nervous system fosters appreciation of neurological health and supports advances in treating neurological disorders.
		Zoology Paper-X DSE-F29 (Molecular Cell Biology and Animal Biotechnology)	V	Unit – I I. Molecular Biology : 1. Replication of DNA 2. DNA damage and repair mechanism 3. Regulation of gene expression – Operon concept. 4. Genetic code i) Properties of genetic code. ii) Codon assignments 5.Unit II Protein synthesis a) Transcription - i) Process of transcription in prokaryotes and eukaryotes. ii) RNA polymerase. b) Translation i) Initiation ii) Elongation iii) Termination.	Differences in DNA replication rates and fidelity between genders in certain conditions.Studying how repair mechanisms may differ across sexes, influencing disease susceptibility.Considering sex-specific differences in gene expression regulation.Insights into how genetic variations influence traits and health differently in genders.Differences in gene expression and protein synthesis between sexes in health and disease.	Effects of environmental factors like radiation and toxins on DNA replication fidelity.Understanding environmental factors (e.g., UV light, chemicals) that cause DNA damage. How environmental signals influence gene regulation in organisms.Studying mutations caused by environmental factors that alter the genetic code.Environmental influences on the efficiency of transcription and translation.	Responsible handling of genetic data and avoiding manipulation in genetic research.Ensuring ethical use of gene-editing tools like CRISPR in repairing DNA damage.Ethical implications of manipulating gene expression for research or therapeutic purposes.Ensuring accurate interpretation of the genetic code in genetic testing and counseling.Ethical considerations in synthetic biology and manipulating gene expression.	Ensures the integrity of research that impacts genetic testing and hereditary disease treatment.Supports treatments for genetic disorders, promoting better healthcare outcomes.Enhances understanding of gene regulation, leading to better-targeted therapies.Protects against misuse of genetic information and supports equitable healthcare.Advances in protein synthesis research contribute to better drug development and therapeutic interventions.
				Unit – III Molecular Techniques in Gene manipulation 1	Potential gender-specific applications in gene therapy and personalized medicine.Recognizing differences in immune responses between genders, which influence vaccine and treatment development.	Ethical considerations of releasing genetically modified organisms (GMOs) and their impact on biodiversity.Using immunological tools for monitoring environmental health, like detecting pollutants through biosensors.	Ensuring responsible use of gene editing technologies, avoiding misuse in human enhancement or discrimination.Ethical issues in producing monoclonal antibodies, ensuring no harm to animals or humans in research.	Balancing innovation with moral concerns, particularly in areas like cloning and gene therapy.Promoting health equity, ensuring [illegible] benefit all populations and are not limited by socioeconomic factors.

		Zoology Paper-XI DSE-F30 (Biotechniques and Biostatistics)	V	Unit I: Genetically Modified Organisms 9 1. Production of cloned and transgenic animals: a. Nuclear Transplantation b. Retroviral Method c. DNA microinjection 2. Applications of transgenic animals: a. Productions of pharmaceuticals b. Production of donor organs 3. Knockout mice.	Scientific Research: Gender differences in biological responses must be considered in GMO research to ensure that findings are applicable to all genders. Animal Welfare: Ensure both male and female animals are studied to avoid gender bias in research outcomes and to understand gender-specific effects.	Ecological Impact: Assess potential risks of GMOs on ecosystems, including the escape of GMOs into the wild and their interaction with native species. Sustainability: Consider the long-term environmental impact of GMO production, including waste management and resource use.	Animal Welfare: Adhere to ethical standards for the care and use of animals in GMO research, minimizing suffering and ensuring humane treatment. Justification of Research: Ensure that the scientific and practical benefits of GMO research justify the use of animals and other resources.	Ethical Implications: Address moral concerns about manipulating genetic material and the broader impact on animal rights and welfare. Public Perception: Consider societal values and the potential impact of GMO technology on human health, the environment, and ethical standards.
				Unit II: Culture Techniques and Applications 6 a. Animal cell culture: Introduction, principle and applications b. Stem Cells: Introduction to stem cells i) Potency of stem cells: Totipotency, Pleurepotency, Multipotency, Unipotency ii) Sources of stem cells-Embryo, Fetal, Adult, Bone marrow	Research Inclusivity: Ensure that research and applications involving cell and tissue cultures consider both male and female cells or tissues, as biological responses can differ by gender. Workplace Equality: Promote gender equality in research settings, ensuring that opportunities and recognition are distributed fairly among all genders.	Resource Management: Optimize the use of resources such as energy, water, and raw materials in culture techniques to minimize environmental impact. Waste Disposal: Implement effective waste management strategies to handle biological and chemical waste generated from culture techniques, reducing potential environmental contamination.	Human and Animal Welfare: Adhere to ethical standards in handling human and animal cells, ensuring humane practices and respecting consent when applicable. Transparency: Maintain transparency in research methodologies and findings, ensuring that results are reported honestly and responsibly.	Ethical Use of Technology: Address moral considerations surrounding the use of culture techniques in research and industry, including the implications for human health and safety. Public Engagement: Engage with the public to inform and educate about the applications and potential impacts of culture techniques, fostering informed decision-making and societal acceptance.
				Unit III: Biostatistics a. Classification of Biological data b. Frequency distribution c. Tabulation d. Graphical representation of data e. Measures of central tendency (Mean, Median, Mode) f. Dispersion – Mean, deviation & standard deviation g. Correlation – Scattered diagram, Karl Pearson's correlation coefficient and Spearman's rank correlation coefficient.	Data Representation: Ensure that biological research datasets are inclusive of all genders to avoid bias and ensure that findings are applicable to everyone. Analytical Sensitivity: Recognize and adjust for potential gender-specific variations in biological data to produce accurate and equitable conclusions.	Impact Assessment: Incorporate environmental variables into statistical models to accurately assess their impact on biological phenomena. Sustainable Practices: Adopt environmentally friendly practices in data collection and management to minimize the ecological footprint of research activities.	Data Integrity: Adhere to ethical standards by ensuring accuracy and honesty in data collection, analysis, and reporting. Confidentiality: Maintain the confidentiality and privacy of sensitive biological data, especially when dealing with personal health information or endangered species data.	Equity and Access: Ensure that biostatistical research contributes to equitable outcomes in healthcare and biology. Address disparities and ensure that research benefits are accessible to all communities. Transparency and Communication: Report statistical findings transparently and clearly to the public and stakeholders. Ensure that research results are communicated in a way that is understandable and useful for informed decision-making

				Unit 1: Aquatic Biomes a. Freshwater ecosystem (lakes, wetlands, streams and rivers), b. Estuaries c. Intertidal zones d. Oceanic pelagic zone e. Marine benthic zone f. Coral reefs	Promote gender equity within research teams studying aquatic biomes, ensuring diverse perspectives and reducing biases in research design and outcomes. nsure that research on aquatic biomes includes consideration of gender differences in species' behavior, physiology, and reproductive strategies.	Monitor and mitigate the impacts of human activities on aquatic biomes, including pollution, climate change, and habitat destruction. Prioritize research and conservation efforts that support ecosystem resilience and health. Implement sustainable research and management practices to minimize ecological footprints. This includes responsible sampling techniques and minimizing disturbances to aquatic habitats.	Research Integrity: Uphold ethical standards in conducting and reporting research on aquatic biomes. This involves accurate data reporting, avoiding manipulation, and ensuring that research does not harm the ecosystems being studied. Conservation Ethics: Follow ethical guidelines for the protection of aquatic biomes, ensuring that research contributes positively to conservation efforts and does not exploit or damage the environment.	Conservation and Sustainability: Align research with values that prioritize the long-term health of aquatic biomes and the communities that rely on them. Address issues such as biodiversity loss and the impact of human activities on aquatic environments. Public Awareness and Education: Engage with the public to raise awareness about the importance of aquatic biomes and the need for their protection. Foster community involvement in conservation efforts and promote informed decision-making regarding aquatic resource management.
		Zoology Paper-XII DSE-F31 (AQUATIC BIOLOGY)	V	Unit 2: Freshwater Biology 1. Lakes a. Lake as an Ecosystem b. Lake Morphometry c. Physico-chemical characteristics i. Light ii. Temperature iii. Thermal Stratification iv. Dissolved solids v. Carbonates vi. Bicarbonates vii. Phosphates and Nitrates viii. Turbidity ix. Dissolved gases (Oxygen Carbon dioxide) x. Nutrient Cycle – (Nitrogen, Sulphur and Phosphorus)	Species Research: Consider gender differences in freshwater species, as males and females may exhibit different behaviors, physiological responses, or ecological roles. This helps in obtaining comprehensive and accurate scientific data. Research Diversity: Promote gender equity within research teams to ensure diverse perspectives and reduce potential biases in research design and interpretation.	Ecosystem Health: Address the impacts of human activities such as pollution, water extraction, and habitat destruction on freshwater ecosystems. Prioritize research and practices that support the health and sustainability of these environments. Sustainable Management: Implement sustainable practices in research and resource management to minimize negative impacts on freshwater habitats. This includes careful management of water resources and protection of wetlands and river systems.	Animal Welfare: Adhere to ethical standards in the handling and study of freshwater organisms, ensuring that research practices minimize harm and stress to the animals. Data Integrity: Maintain high standards of honesty and accuracy in data collection and reporting. Avoid data manipulation and ensure that research outcomes are presented transparently.	Conservation and Access: Align research with values that promote the conservation of freshwater resources and equitable access to clean water. Address issues such as water scarcity, pollution, and the impact of development on local communities. Public Engagement: Engage with local communities and stakeholders to raise awareness about the importance of freshwater ecosystems and involve them in conservation efforts. Ensure that research benefits are shared fairly and contribute to community well-being.

				Unit 3: Endocrinology a. Study of endocrine glands – Anatomy and histology b. Hormones- Nature, role, regulation and disorders with reference to the following thyroid gland, parathyroid gland, adrenal gland and islets of Langerhans	Hormonal Differences: Recognize and account for gender-specific differences in hormone levels, endocrine disorders, and responses to treatments. This ensures research and clinical practices are relevant and effective for all genders. Inclusive Research: Ensure that clinical and laboratory studies include diverse gender groups to avoid bias and to capture gender-related variations in endocrine function and disease.	Environmental Impact: Investigate and address how environmental factors, such as endocrine-disrupting chemicals (EDCs), affect hormonal systems and contribute to disorders. Consider the broader implications of environmental pollution on endocrine health. Sustainable Practices: Implement environmentally sustainable practices in research and clinical settings, including reducing the use of harmful chemicals and managing waste responsibly.	Patient Consent: Obtain informed consent from patients for endocrine-related research and treatments, ensuring they are fully aware of potential risks and benefits. Data Integrity: Maintain high standards of accuracy and honesty in research and clinical data, avoiding manipulation or misrepresentation of results. Ensure that findings are used ethically to improve patient outcomes.	Equitable Healthcare: Address disparities in access to endocrine healthcare and treatments, ensuring that all individuals, regardless of socio-economic status or background, receive appropriate care. Public Education: Engage in public education to raise awareness about endocrine health issues, including the impact of lifestyle and environmental factors. Ensure that information is accessible and promotes informed decision-making.
		Zoology Paper-XIII DSE-E30 (DEVELOPMENTAL BIOLOGY OF VERTEBRATES)	VI	Gametogenesis 1. Types of Eggs 2. Fertilization – Types and Process of Fertilization 3. Types of Cleavages	Research Inclusivity: Recognize that gender differences can affect gametogenesis, such as variations in sperm and egg development, quality, and fertility issues. Clinical Implications: Consider gender-specific reproductive health issues when studying gametogenesis. Tailor treatments and interventions to address gender differences in fertility and reproductive health.	Impact of Pollution: Study how environmental pollutants, such as endocrine disruptors and toxins, affect gametogenesis and reproductive health. Understand the potential long-term consequences on fertility and development. Sustainable Practices: Implement environmentally friendly practices in laboratory and clinical settings to reduce waste and minimize ecological impact	Consent and Confidentiality: Obtain informed consent from individuals participating in gametogenesis research or treatments. Humane Treatment: Adhere to ethical standards in the handling of gametes and embryos, ensuring humane and respectful treatment. Follow guidelines for responsible research practices and animal welfare if applicable.	Access and Equity: Ensure that advancements in gametogenesis research and treatments are accessible to all individuals, regardless of socio-economic status. Promote equitable access to reproductive health services. Public Awareness: Engage with the public to educate them about gametogenesis and its implications for health and reproduction. .
				Early Development of Frog 1. Structure of mature egg and its membranes 2. Cleavage 3. Blastula and its fate map 4. Process of gastrulation 5. Types of Morphogenic Movements 6. Fate of three germinal layers 7. Neurulation 8. Metamorphosis in frog and its hormonal regulation	Biological Differences: While frog embryos and early development stages are not gender-specific, understanding differences in developmental outcomes or rates between sexes can be important for comprehensive research.	Support conservation of natural habitats to preserve frog populations and ensure healthy environments for their development. Addressing issues like habitat destruction and climate change is crucial for maintaining biodiversity.	Adhere to ethical standards in the use of frogs for research, ensuring that animals are treated humanely and with respect. This includes minimizing harm and stress during the collection and handling of embryos and larvae.	Educational Value: Recognize the importance of using frog development research to educate the public about developmental biology, conservation, and the impacts of environmental changes on wildlife.

				Chick Embryology 1. Structure of sperm 2. Structure of egg and vitellogenesis 3. Fertilization and cleavage 4. Blastula and its fate map 5. Process of gastrulation 6. Organogenesis a. Development of neural tube and brain up to 72 hours of incubation	Sex-Specific Development: While chick embryology research may not always focus on gender differences, understanding how embryonic development might differ between sexes can be important for comprehensive studies, particularly in terms of growth and organ development.	Impact of Conditions: Monitor how environmental factors such as temperature, humidity, and the quality of incubation conditions affect chick embryonic development. Environmental stressors can significantly impact development and overall health.	Animal Welfare: Follow ethical guidelines for the care and use of chick embryos in research. Ensure humane treatment, minimize suffering, and adhere to guidelines for handling and experimentation.	Utilize research in chick embryology to advance understanding of developmental biology and to educate the public about embryonic development and related biological processes.
		Zoology Paper-XIV DSE-E32 (IMMUNOLOGY)		Overview of the Immune System 1. Introduction to basic concept in immunology 2. Principles of innate and adaptive immune system Unit 2: Cells and Organs of the immune system Humoral and cell mediated Unit 3 : Antigens	Biological Differences: Recognize and account for gender differences in immune system responses, as males and females may exhibit different immune responses to infections, vaccines, and autoimmune conditions. This ensures research and treatments are tailored to both genders.	Impact of Environmental Factors: Study how environmental factors, such as pollution, climate change, and exposure to toxins, affect immune system function and health. Environmental stressors can impact immune responses and contribute to disease prevalence. Sustainable Practices: Implement eco-friendly practices in research and laboratory settings to minimize environmental impact. Properly manage waste and use resources efficiently to reduce the ecological footprint of immunological research.	Obtain informed consent from individuals participating in immunological research or receiving treatments.	Equitable Healthcare: Ensure that advancements in immunology, such as vaccines and treatments, are accessible to all populations, including underserved or marginalized communities. Address disparities in healthcare access and outcomes.
		Zoology Paper-XV DSE-E31 (Applied Zoology - II)		Apiculture 1. Types and casts of honey bee 2. Honey Comb 3. Bee Keeping a. Artificial models of bee hive – Newton and Langstroth models b. Bee keeping Equipments c. Extraction of Honey 4. Medicinal Value of Honey	Promote gender inclusivity in beekeeping practices and research. Encourage and support the participation of women and other underrepresented groups in apiculture, from beekeeping to research and management roles.	Pollinator Health: Recognize the critical role of bees in pollination and ecosystem health. Address environmental issues such as pesticide use, habitat loss, and climate change that impact bee populations and their productivity.	Ensure humane treatment of bees in beekeeping operations. Follow ethical guidelines for handling, managing, and harvesting honey to avoid unnecessary harm and stress to the bees.	Community Engagement: Engage with local communities to promote the benefits of beekeeping for agriculture, food security, and local economies. Educate the public about the importance of bees and beekeeping practices.
				Animal Husbandary 1. Indigenous and exotic breeds of cattle 2. Preservation and artificial insemination in cattle 3. Induction of early puberty 4. Synchronization of estrus in cattle 5. Commercial importance of dairy farming	Inclusion and Equity: Promote gender equity in animal husbandry practices and management roles. Support the participation of women and other underrepresented groups in various aspects of animal care, breeding, and farm management.	Sustainable Practices: Implement sustainable animal husbandry practices to minimize environmental impact. This includes managing waste, reducing greenhouse gas emissions, conserving water, and promoting sustainable feed practices.	Animal Welfare: Adhere to high ethical standards in the care and management of animals. Ensure humane treatment, proper housing, adequate nutrition, and veterinary care to promote the well-being of animals.	Ethical Consumption: Promote awareness about the ethical aspects of animal husbandry, including the treatment of animals and the environmental impact of meat and dairy production. Encourage practices and policies that support ethical and sustainable consumption.

				Pearl culture 1. Species of oyster 2. Process of Pearl formation: natural and artificial 3. Maintenance of oysters 4. Harvesting 5. Importance of Pearl	Role Inclusion: Encourage and support the participation of women and other underrepresented groups in pearl farming and related activities. Recognize the contributions of all genders in various roles, from farming to marketing and management.	Ecosystem Impact: Monitor and mitigate the environmental impact of pearl farming on marine ecosystems. This includes managing waste, preventing overharvesting, and protecting coral reefs and other habitats.	Animal Welfare: Adhere to ethical standards in the care and handling of oysters and other mollusks used in pearl cultivation. Ensure humane treatment and avoid practices that could cause unnecessary harm or stress to the animals.	Community Engagement: Engage with local communities to support and benefit from pearl farming activities. Promote local economic development, fair trade, and community involvement in the pearl industry.
				Freshwater prawn culture 1. Species of Prawn 2. Site selection 3. Farm Construction 4. Production system: fertilization, Larval Development, Food and feeding 5. Harvesting	encouraging and supporting the involvement of women and other underrepresented groups in all aspects of prawn culture, including farming, management, and research.	Ecosystem Impact: Assess and mitigate the environmental impact of freshwater prawn farming on aquatic ecosystems. This includes managing water quality, preventing overexploitation, and avoiding negative effects on local biodiversity.	Animal Welfare: Adhere to ethical standards in the care and handling of prawns. Ensure humane treatment, proper housing, and adequate nutrition, and minimize stress and harm to the prawns during farming operations.	Community Development: Support local communities by promoting economic development through prawn farming. Engage with communities to provide education, training, and opportunities related to prawn culture.
				Fish Technology Genetic improvements in aquaculture industry: 1. Induced breeding 2. Transportation of fish seed 3. Feeding and development 4. Harvesting and Marketing	Recognize and address how gender-specific roles and perspectives can influence fish technology practices and outcomes, including varying impacts on communities and technological adoption.	responsible management of fish stocks, reduction of bycatch, and minimizing habitat disruption in aquaculture and fisheries.	Ensure humane treatment in both aquaculture and research settings, and avoid practices that cause unnecessary harm or stress to fish.	Community Engagement: Engage with local communities to ensure that fish technology practices support economic development and food security. Provide education and training to enhance local capacities and ensure that technology benefits are shared equitably.
				Goat Farming- 1. Breeds 2. Feeding 3. Housing 4. Economic Importance	Address any gender-specific needs or challenges in goat farming, such as differences in roles or responsibilities between men and women, and ensure that all perspectives are considered in farm management practices.	Soil and Water Conservation: Manage grazing practices to prevent overgrazing and soil degradation. Implement strategies to protect water sources and promote soil health to maintain the ecological balance.	Adhere to ethical standards in the care and treatment of goats. Provide humane housing, adequate nutrition, and veterinary care to ensure the health and well-being of the animals.	Community Impact: Support local communities by promoting economic development through goat farming. Engage with communities to provide education, training, and opportunities related to goat farming and its benefits.
		Zoology Paper-XVI DSE-F32 (Insect Vectors and Histology)		Unit I: Dipteran as Disease Vectors	Recognize and address how insect-borne diseases may affect different genders differently. research on insect vectors and vector-borne diseases includes diverse gender perspectives to understand variations in susceptibility, disease outcomes, and responses to interventions.	Ecosystem Impact: Assess and manage the environmental impact of insect vector control measures, such as the use of pesticides. Ensure that control strategies do not negatively affect non-target species or disrupt ecosystems.	Minimize harm and stress to the insects, and follow humane practices in their management and use.	Promote understanding and encourage community participation in vector management efforts.
				Histology of mammalian organs Tooth, tongue, Salivary glands, Stomach, Duodenum, Ileum, Liver, Pancreas, Kidney	Biological Differences: Recognize that there may be gender-specific variations in histological features and organ function	Study how environmental factors such as diet, toxins, and pollutants influence the histology of mammalian organs. For instance, exposure to environmental toxins can alter liver histology or impact kidney function	Adhere to ethical guidelines for the humane treatment of animals used in histological research. Ensure proper care and minimize suffering during specimen collection and handling.	Utilize histological findings to advance knowledge of human health and disease. Educate the public and students about the significance of histology in diagnosing and treating diseases.

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