R1961

Sub. Code
509101

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2024

First Semester

Zoology

STRUCTURE AND FUNCTIONS OF INVERTEBRATES

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option

1. In title classification of animals a 'family' name is formed by adding (CO1, K2)

   (a) 'idae" as a suffix (b) "inae" as a suffix

   (c) "ceae" as a suffix (d) "oidea" as a suffix

2. Which of the following is a deuterostome phylum? (CO1, K4)

   (a) Echinodermata (b) Annelida

   (c) Mollusca (d) Arthropoda

3. A turbellarian that has no pharynx or digestive cavity is known as (CO2, K4)

   (a) tricladia (b) polycladida

   (c) acoela (d) marcostomida

4. Extracellular digestion is seen in (CO2, K3)

   (a) Earthworms (b) Flat worms

   (c) Ctenophorans (d) Cnidarians

5. _____ organ is used to grind food in earthworms. (CO3, K3)

(a) Pharynx (b) Crop

(c) Gizzard (d) Intestine

6. All are hermaphrodites except (CO3, K3)

(a) *Taenia solium* (b) *Pheretima posthuma*

(c) *Fasciola hepatica* (d) *Ascaris lumbricoides*

7. Which of the following is a living fossil? (CO4, K3)

(a) *Limulus* (b) Ammonites

(c) Unio (d) *Nereis*

8. Which of the following causes Elephantiasis? (CO4, K2)

(a) *Plasmodium vivax*

(b) *Ascaris lumbricoides*

(c) *Wuchereria bancrofti*

(d) *Taenia solium*

9. Earthworm has no skeleton but during burrowing, the anterior end becomes turgid and acts as a hydraulic skeleton. It is due to (CO5, K5)

(a) Setae

(b) Circular muscles

(c) Coelomic fluid

(d) Longitudinal muscles

10. Shedding of old, outgrown cuticle in some invertebrates occurs periodically, known as (CO5, K4)

(a) growing of cells (b) dying of cells

(c) mutation (d) ecdysis

Part B (5 × 5 = 25)

Answer **all** the questions not more than 500 words each

11. (a) What is the difference between a hemocoel and a coelom? (CO1, K4)

Or

(b) What are the derivatives of mesoderm? (CO1, K3)

12. (a) Explain sol-gel theory of amoeboid movement. (CO2, K3)

Or

(b) Describe the mechanism of filter feeding in Echinodermata. (CO2, K2)

13. (a) Write short notes on aerial respiration in arthropods. (CO3, K4)

Or

(b) Explain different types of nephridia in earthworms. (CO3, K4)

14. (a) Write short notes on polymorphism and colony formation. (CO4, K2)

Or

(b) Describe the life cycle of *Ascaris lumbricoides*. (CO4, K3)

15. (a) Describe the integumentary system of Annelida. (CO5, K2)

Or

(b) Describe the exoskeleton of Arthropoda. (CO5, K2)

Part C (5 × 8 = 40)

Answer **all** the questions not more than 1000 words each

16. (a) Write an essay on taxonomic characters and reconstruction of phylogeny. (CO1, K2)

Or

(b) Give an account on division of labour and organization of tissues in invertebrates. (CO1, K3)

17. (a) Give an account on the types of cilia and ciliary movements. (CO2, K3)

Or

(b) Write an essay on physiology of digestion in invertebrates. (CO2, K3)

18. (a) Compare the nervous system of annelida, arthropoda and Mollusca. (CO3, K5)

Or

(b) Write an essay on asexual reproduction, its prevalence and significance in invertebrates. (CO3, K3)

19. (a) Give a detailed account on the affinities of living fossils. (CO4, K4)

Or

(b) Write an essay on the invertebrate model organisms and their importance in research. (CO4, K6)

20. (a) Write an essay on the phylogeny of integumentary system in invertebrates. (CO5, K5)

Or

(b) Compare the integumentary systems of protostomes and deuterostomes. (CO5, K5)

———————

R1962

Sub. Code
509102

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2024

First Semester

Zoology

COMPARATIVE ANATOMY OF VERTEBRATES

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. A recent use of phylogenetic analysis is to analyse ———— in addition to tracing the evolutionary history of specific genes. (CO1, K3)

   (a) physical separation methods

   (b) proteomes

   (c) genomes

   (d) gene families

2. The contrasting characteristics generally in a pair used for identification of animals in Taxonomic Key are referred to as (CO1, K2)

   (a) Doublet (b) Alternate

   (c) Lead (d) Couplet

3. Which among the following is incorrect about Cyclostomata? (CO2, K2)

(a) Their vertebral column is made of cartilage

(b) Lamprey and hagfishes are examples of this class

(c) Their digestive system is complete with stomach, food pipe and intestines

(d) Their circulatory system is closed with a two chambered heart

4. Which of the following is odd? (CO2, K3)

(a) Urochordata

(b) Hemichordata

(c) Cephalochordata

(d) Agnatha

5. Limbless amphibians belong to (CO3, K3)

(a) Anurans (b) Urodeles

(c) Apoda (d) Squamata

6. Mammal-like reptiles are (CO3, K2)

(a) Sauropsidan

(b) Ichthyopsida

(c) Theropsidan

(d) Dinosaurs

7. Peculiar feature of bird is (CO4, K2)

(a) four chambered heart

(b) presence of RBC

(c) lungs

(d) air sacs

8. Echidna belongs to (CO4, K2)

(a) Prototheria

(b) Metatheria

(c) Eutheria

(d) Holotheria

9. The most diverse biological region of earth is (CO5, K4)

(a) Australian region

(b) Ethiopian region

(c) Neotropical region

(d) Palearctic region

10. What distinguishes the digestive system of reptiles from that of birds? (CO5, K4)

(a) Reptiles have a more complex digestive system

(b) Birds have a more complex digestive system

(c) Reptiles have a simple gut while birds have a more advanced gizzard for grinding food

(d) Birds have a simple gut while reptiles have a more advanced gizzard for grinding food

Part B (5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Explain the polyphyletic group by giving an example. (CO1, K4)

Or

(b) What is the difference between a cladogram and phylogenetic tree? (CO1, K3)

12. (a) Lung fishes are connecting link between fishes and amphibians – Justify. (CO2, K5)

Or

(b) Chart out the classes and general characters of Tetrapoda. (CO2, K2)

13. (a) Explain the adaptive features of Apoda giving an example. (CO3, K4)

Or

(b) Discuss the adaptations in amphibians for dual modes of life. (CO3, K4)

14. (a) *Archeopteryx* is a connecting link between reptiles and birds — Justify. (CO4, K2)

Or

(b) Describe the structural peculiarities of Metatheria. (CO4, K3)

15. (a) Compare the integumentary systems of reptiles and mammals. (CO5, K4)

Or

(b) Briefly discuss the three modes of respiration in frogs. (CO5, K5)

Part C ($5 \times 8 = 40$)

Answer **all** questions not more than 1000 words each.

16. (a) Write an essay on the general principles of taxonomic nomenclature. (CO1, K4)

Or

(b) Give a detailed account on new trends in taxonomy. (CO1, K3)

17. (a) Elaborate on the evolutionary status and affinities of Cyclostomes. (CO2, K5)

Or

(b) Compare and contrast the process of osmoregulation in freshwater and marine teleost fishes. (CO2, K5)

18. (a) Compare and contrast the general characters of Anurans and Urodeles. (CO3, K4)

Or

(b) Write an essay on the structural and functional adaptations of reptiles. (CO3, K3)

19. (a) Describe the morphological and anatomical adaptations for flight in birds. (CO4, K5)

Or

(b) Write an essay on the evolution of mammals. (CO4, K4)

20. (a) Compare the anatomy of the digestive systems in vertebrates. (CO5, K5)

Or

(b) Compare the anatomy of the hearts in vertebrates. (CO5, K5)

———————

R1963

Sub. Code
509103

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2024

First Semester

Zoology

BIOCHEMISTRY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. What is the primary storage polysaccharide in animals? (CO1, K1)

   (a) Starch (b) Cellulose

   (c) Glycogen (d) Chitin

2. Which of the following enzymes is responsible for the conversion of fructose-6-phosphate to fructose-1, 6-bisphosphate in glycolysis? (CO1, K1)

   (a) Hexokinase

   (b) Phosphofructokinase-1 (PFK-1)

   (c) Aldolase

   (d) Glucose-6-phosphate dehydrogenase

3. Which of the following best describes the quaternary structure of a protein? (CO2, K2)

(a) The sequence of amino acids in a polypeptide chain

(b) The overall three-dimensional arrangement of a single polypeptide chain

(c) The arrangement of multiple polypeptide chains into a functional protein complex

(d) The specific interactions between amino acid side chains within a single polypeptide chain

4. In a Ramachandran plot, which region represents steric clashes or physically impossible conformations for amino acid residues? (CO2, K2)

(a) Alpha-helical region

(b) Beta-sheet region

(c) Polyproline II region

(d) Disallowed region

5. Which lipid serves as a precursor for the synthesis of steroid hormones such as estrogen and testosterone? (CO3, K1)

(a) Triglyceride (b) Phospholipid

(c) Cholesterol (d) Sphingolipid

6. In fatty acid oxidation, what is the final product before the entry of the acetyl-CoA into the citric acid cycle?

(CO3, K4)

(a) Propionyl-CoA

(b) Acetoacetyl-CoA

(c) β –hydroxybutyrate

(d) Acyl-CoA

7. What is the primary function of messenger RNA (mRNA) in the cell? (CO4, K2)

(a) mRNA serves as the template for protein synthesis during translation

(b) mRNA functions as an adaptor molecule, bringing amino acids to the ribosome

(c) mRNA plays a structural role in the formation of ribosomes

(d) mRNA regulates gene expression by binding to specific DNA sequences

8. During DNA replication, which enzyme is responsible for synthesizing a short RNA primer on the lagging strand to initiate DNA synthesis? (CO4, K1)

(a) DNA polymerase III

(b) DNA polymerase I

(c) DNA ligase

(d) Primase

9. In Michaelis-Menten kinetics, the Michaelis constant (Km) represents: (CO5, K2)

(a) The maximum velocity of the reaction

(b) The substrate concentration at which the reaction rate is half of Vmax

(c) The rate of the reaction when all enzyme active sites are saturated with substrate

(d) The turnover number of the enzyme-substrate complex

10. Which vitamin plays a key role in blood clotting and is synthesized by bacteria in the intestines? (CO5, K1)

(a) Vitamin C (b) Vitamin K

(c) Vitamin D (d) Vitamin E

Part B (5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Discuss the role of carbohydrates in living organisms, focusing on their functions in energy storage and structural support. (CO1, K4)

Or

(b) Discuss the regulation of glycogen metabolism in the liver. Highlight the role of key enzymes and hormonal control. (CO1, K2)

12. (a) Describe the process of protein digestion in the human body. (CO2, K1)

Or

(b) Describe the process of gluconeogenesis and its relationship with protein metabolism. (CO2, K2)

13. (a) Describe the structure and function of cholesterol in the human body. Discuss the implications of abnormal cholesterol levels on health. (CO3, K4)

Or

(b) Discuss the role of lipoproteins in lipid transport and metabolism. (CO3, K4)

14. (a) Describe the structural features and functions of DNA in its various forms. (CO4, K1)

Or

(b) Compare and contrast the catabolic pathways of purines and pyrimidines. (CO4, K4)

15. (a) Define enzyme inhibition and discuss the differences between competitive and non competitive inhibition. (CO5, K4)

Or

(b) Explain the importance of Vitamin D for bone health. How does the body obtain Vitamin D and what are the consequences of its deficiency? (CO5, K2)

Part C ($5 \times 8 = 40$)

Answer **all** questions not more than 1000 words each.

16. (a) Explain the classification of carbohydrates based on their complexity and provide examples for each category. (CO1, K2)

Or

(b) Discuss the metabolic fate of glucose beyond glycolysis. Include details on the citric acid cycle, oxidative phosphorylation and the regulation of these processes. (CO1, K2)

17. (a) Compare and contrast the primary, secondary, tertiary, and quaternary structures of proteins, highlighting their significance in protein function. (CO2, K4)

Or

(b) Describe the process of protein synthesis, including transcription and translation. (CO2, K2)

18. (a) Describe the classification of lipids, providing examples for each class and discussing their biological significance. (CO3, K1)

Or

(b) Explain the process of lipogenesis and its significance in the body. How does lipogenesis contribute to energy storage and metabolic regulation? (CO3, K4)

19. (a) Discuss the various forms of DNA and RNA found in nature. Explain the significance of each form in cellular processes. (CO4, K2)

Or

(b) Describe the biosynthesis pathways of pyrimidines, highlighting the key enzymes and intermediates involved. Discuss any regulatory mechanisms that control these pathways. (CO4, K4)

20. (a) Explain the significance of Michaelis-Menten kinetics in enzyme catalysis. Discuss the derivation of the Michaelis-Menten equation and its assumptions. (CO5, K3)

Or

(b) Describe the factors influencing enzyme activity. Discuss how changes in substrate concentration affect the rate of enzyme-catalyzed reactions, providing a graphical representation. (CO5, K5)

———————

R1964	Sub. Code
	509104

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2024

First Semester

Zoology

CELL AND MOLECULAR BIOLOGY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. Which molecule activates the formation of a transport vesicle? (CO1, K2)
   (a) G - protein (b) Lactose
   (c) DNA helicase (d) Inducer

2. COPII-coated vesicles move the materials from _____to (CO1, K2)
   (a) ERGIC, Golgi complex
   (b) Golgi complex, ERGIC
   (c) ER, Golgi complex
   (d) Golgi complex, ER

3. Which of these is the correct order of events in the cell cycle? (CO2, K2)
   (a) G1 → G2 → S → M
   (b) G1 → G2 → M → S
   (c) G1 → S → G2 → M
   (d) S → M → G1 → G2

4. Embryonic stem cells are derived from the _____ of the blastocyst. (CO2, K2)

(a) Inner cell mass (b) ectoderm

(c) blastocoels (d) mesoderm

5. Replication fork is the junction between the two _____. (CO3, K3)

(a) Replicated DNA

(b) Newly synthesized DNA

(c) Newly separated DNA strands and newly synthesized DNA strands

(d) Newly separated DNA strands and the unreplicated DNA

6. The eukaryotic initiation codon recognizes _____. (CO3, K3)

(a) f-Met-tRNA-f-Met (b) Met-tRNA i-Met

(c) f-Met-tRNA i-Met (d) f-Met-tRNA-Met

7. Endocrine messengers are also called _____. (CO4, K2)

(a) hormones (b) receptors

(c) antibody (d) antigen

8. G-protein coupled receptors contain _____ transmembrane alpha helices. (CO4, K2)

(a) 2 (b) 5

(c) 7 (d) 9

9. Which of the following is not a point mutation? (CO5, K5)

(a) Substitution (b) Transposition

(c) Insertion (d) Transversion

10. The first tumor-suppressor gene to be studied is associated with _____. (CO5, K5)

(a) Myeloma (b) sarcoma

(c) retinoblastoma (d) carcinoma

Part B (5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Write a brief note on nuclear transport. (CO1, K2)

Or

(b) Explain the types of membrane transport. (CO1, K2)

12. (a) What is apoptosis? What is the importance of apoptosis on the basis of life? (CO2, K2)

Or

(b) Explain about cell lineages. (CO2, K2)

13. (a) Write down the role of RNA polymerase during transcriptional process. (CO3, K3)

Or

(b) Describe the process of Co and post translational modification. (CO3, K3)

14. (a) What is signal transduction pathway? (CO4, K2)

Or

(b) Explain the general principles of cell communication. (CO4, K2)

15. (a) Differentiate tumor cell vs normal cell. (CO5, K5)

Or

(b) Write a brief note on Metastasis. (CO5, K5)

Part C (5 × 8 = 40)

Answer **all** the questions not more than 1000 words each.

16. (a) Write down the elaborate note about the transportation across mitochondria and Chloroplast. (CO1, K2)

Or

(b) Explain any five-cell organelle in addition of cytoskeleton with detailed structure and function. (CO1, K2)

17. (a) Define cell cycle and describe the importance of cell cycle with its regulations. (CO2, K2)

Or

(b) Explain the early development of stem cell in embryo and give detailed explanation about its metabolic activation. (CO2, K2)

18. (a) Describe the process of post transcriptional modification and write down the importance of splicing mechanism. (CO3, K3)

Or

(b) Explain the protein translation machinery and explain the process of post translational modification changes of protein. (CO3, K3)

19. (a) Mention how does the signal receptors works through G-protein coupled receptor. (CO4, K2)

Or

(b) Explain the involvement of cellular communication in regulation of atopoiesis. (CO4, K2)

20. (a) Describe an elaborate note on transposable genetic elements in eukaryotes. (CO5, K5)

Or

(b) Explain the structure, function and mechanism of action of tumor suppressor genes. (CO5, K5)

———————

R1965	Sub. Code
	509502

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2024

First Semester

Zoology

Elective – ANIMAL CELL CULTURE TECHNOLOGY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. In animal cell culture, particularly mammalian cell culture, transformation means (CO1, K1)

   (a) Uptake of new genetic material

   (b) Phenotypic modifications of cells in culture

   (c) Both (a) and (b)

   (d) Release of genetic information

2. In the secondary culture, cells are obtained from _____ (CO1, K1)

   (a) Primary culture

   (b) The organism

   (c) Organ culture

   (d) phenotypic culture

3. What is a suitable condition for the storage of prepared cell culture media? (CO2, K2)

(a) Room temperature (25°C)

(b) Refrigeration (4°C)

(c) Freezing (-20°C)

(d) Direct exposure to sunlight

4. Animal Protein-Free media are suitable for: (CO2, K2)

(a) All types of cell culture

(b) Culturing cells that are sensitive to components derived from animals

(c) Cells that require specific growth factors present in animal serum

(d) Long-term storage of cell cultures

5. What is the primary purpose of cell separation techniques? (CO3, K3)

(a) To remove contaminants from cell cultures

(b) To isolate specific cell populations

(c) To induce cellular differentiation

(d) To induce cellular transformation

6. What does cell portrayal include? (CO3, K3)

(a) Deciding the types of the cell

(b) Dissecting the hereditary cosmetics of the cell

(c) Surveying cell morphology and conduct

(d) Estimating the cell's electrical conductivity

7. Neuroectodermal cells primarily originate from which germ layer? (CO4, K4)

(a) Ectoderm

(b) Endoderm

(c) Mesoderm

(d) Blastula

8. Mesenchymal stem cells can differentiate into: (CO4, K4)

(a) Neurons

(b) Red blood cells

(c) Liver cells

(d) Muscle cells

9. Histotypic cultures involve the culture of cells: (CO5, K5)

(a) In suspension

(b) On a flat surface

(c) In three-dimensional scaffolds

(d) In a liquid medium

10. Scale-up in suspension culture involves: (CO5, K5)

(a) Increasing the surface area for cell adhesion

(b) Growing cells in a single layer

(c) Increasing the volume of culture medium

(d) Using specialized growth factors

Part B (5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) What were the key milestones in the development of animal cell culture techniques? (CO1, K1)

Or

(b) What are the main challenges or limitations associated with animal cell culture techniques? (CO1, K1)

12. (a) What role do other supplements play in enhancing cell growth and viability in culture? (CO2, K2)

Or

(b) Identify and briefly explain the different types of serum-free media available. (CO2, K2)

13. (a) How do you determine the appropriate time to subculture cells? (CO3, K3)

Or

(b) What factors should be considered when selecting a cell line for experimentation? (CO3, K3)

14. (a) What are the challenges in accurately assessing genotoxicity in complex biological systems? (CO4, K4)

Or

(b) Explain in detail neral and glial cell cultures methods. (CO4, K4)

15. (a) What are xenografts and how are they used in cancer research? (CO5, K5)

Or

(b) What are some common techniques used to create histotypic cultures? (CO5, K5)

Part C ($5 \times 8 = 40$)

Answer **all** the questions not more than 1000 words each.

16. (a) What are some notable applications of animal cell culture techniques in scientific research and industry? (CO1, K1)

Or

(b) Why are aseptic techniques crucial in animal cell culture, and how are they implemented? (CO1, K1)

17. (a) What are the physiochemical properties of media, and why are they important in cell culture? (CO2, K2)

Or

(b) Discuss the significance of animal protein-free media in cell culture, and how are they beneficial? (CO2, K2)

18. (a) Explain the significance of cloning and selection in cell culture studies. (CO3, K3)

Or

(b) Briefly explains the steps of cell separation, characterization, differentiation, transformation. (CO3, K3)

19. (a) Explain the concept of cell survival in cytotoxicity assays. (CO4, K4)

Or

(b) Describe the culture conditions for hematopoietic stem cells. (CO4, K4)

20. (a) What are the differences in growth patterns and response to treatments among various tumor types? (CO5, K5)

Or

(b) Briefly elaborate on some common techniques used for imaging and analyzing three-dimensional cultures? (CO5, K5)

———————

R1966	Sub. Code 509301

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2024

Third Semester

Zoology

GENETICS

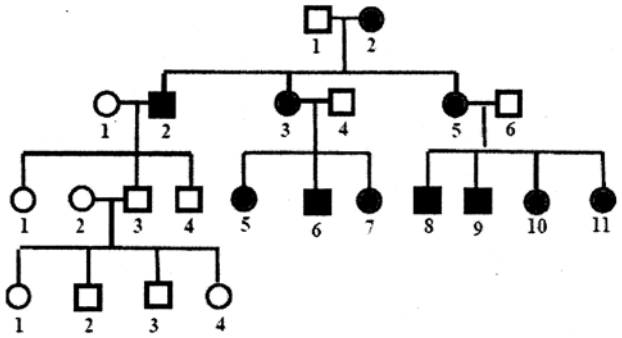
(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option

1. Identify the pattern of inheritance for the pedigree below: (CO1, K5)



(a) Autosomal Dominant

(b) Autosomal Recessive

(c) X-linked Dominant

(d) Maternal Inheritance

2. What is the probability that a male will inherit an X-linked recessive gene from his father? (CO1, K4)

(a) 0 percent (b) 25 percent

(c) 50 percent (d) 75 percent

3. Which of the following is an example of Monosomy? (CO2, K2)

(a) Klinefelter's Syndrome

(b) Turner's Syndrome

(c) Down's Syndrome

(d) Edward's Syndrome

4. How many Barr bodies would be present in the squamous epithelial cell of an individual with 47XXXYY karyotype? (CO2, K4)

(a) 1 (b) 3

(c) 2 (d) 5

5. In a Robertsonian translocation fusion occurs at the (CO3, K3)

(a) Telomeres

(b) Centromeres

(c) Ends of the long arms

(d) Histones

6. A chromosome has the following segments, where ° represents the centromere. A B C D E ° F G. What type of chromosome mutation is required to change this chromosome into the following chromosomes. (a) A B E ° FG (b) A E D C B ° F G (CO3 K5)

(a) deletion and tandem duplication

(b) deletion and displaced duplication

(c) deletion and pericentric inversion

(d) deletion and paracentric inversion

7. Natural selection will not operate if (CO4, K4)

(a) Population is isolated and small

(b) Random mating popuation

(c) Large population

(d) Mutating population

8. Which type of natural selection is observed in moth, *Biston bitularia* during industrial melanism (CO4, K3)

(a) Stabilizing selection

(b) Directional selection

(c) Disruptive selection

(d) Artificial selection

9. According to the Hardy-Weinberg law, the frequencies of alleles in a population would remain constant if_____ is the only process that affects the gene pool. (CO5, K2)

(a) Mutation

(b) Genetic drift

(c) Sexual reproduction

(d) Microevolution

10. The term Quantitative Trait Loci (QTL) was first coined by (CO5, K1)

(a) Gelderman (b) Bateson

(c) Punnet (d) Morgan

Part B ($5 \times 5 = 25$)

Answer **all** questions not more than 500 words each

11. (a) "Coat colours of rabbit exhibit multiple allele series" – Justify. (CO1, K4)

Or

(b) How is gene linkage an exception to the Law of Independent Assortment? (CO1, K5)

12. (a) What causes Down's syndrome during pregnancy? Add a note on atleast four symptoms of Down's syndrome. (CO2, K2)

Or

(b) Species I has 2n=16 chromosomes. How many chromosomes will be found per cell in each of the following mutants in this species? (CO2, K5)

(i) Monosomic

(ii) Double trisonic

(iii) Nullisomic

(iv) Autotetraploid

(v) Tetrasomic

13. (a) What is Deletion and add a note on the causes and effects of Deletion? (CO3, K3)

Or

(b) Describe the different types of mutants. (CO3, K2)

14. (a) What is the modern concept of recapitulation theory? (CO4, K3)

Or

(b) Differentiate Lamarckism and Neo-Lamarckism giving examples. (CO4, K5)

15. (a) What are the five genetic factors that must be occurring for a Hardy Weinberg equilibrium to exist? What can be predicted by using the Hardy Weinberg equation? (CO5, K5)

Or

(b) Giving suitable examples explain gene duplication and divergence. (CO5, K4)

Part C (5 × 8 = 40)

Answer **all** the questions not more than 1000 words each

16. (a) What is criss-cross inheritance? Describe criss-cross type of inheritance in drosophila and humans? (CO1, K3)

Or

(b) Assume that height in people depends on four pairs of alleles. How can two persons of moderate height produce children who are much taller than they are? Assume that the environment is exerting a negligible effect. (CO1, K5)

17. (a) Aneuploidy is typically detrimental, whereas polyploidy is sometimes beneficial, particularly in plants. Discuss why you think this is the case. (CO2, K5)

Or

(b) Explain the causes, symptoms, diagnosis and treatment of Klinefelter's Syndrome? (CO2, K2)

18. (a) Explain the causes and effects of Reciprocal Translocation? Add a note on Myelogenous Leukemia and Burkitt's Lymphoma? (CO3, K4)

Or

(b) Compare the regulation of gene expression in prokaryotes and eukaryotes. (CO3, K2)

19. (a) Describe in detail about the evidences supporting natural selection? (CO4, K4)

Or

(b) Write an essay on the origin and evolution of *Homo sapiens*. (CO4, K2)

20. (a) In a population of 100 individuals (200 alleles), sixteen exhibit a recessive trait. Find the allele frequencies for A and a and also find the genotypic frequencies of AA, Aa, and aa. (CO5, K5)

Or

(b) What is QTL mapping? Describe the principle, procedure and significance of QTL mapping. (CO5, K4)

———————

R1967

Sub. Code
509302

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2024

Third Semester

Zoology

EVOLUTION

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. The synthesis of Mendelian genetics with Darwinian evolution is known as: (CO1, K1)
   (a) Mendelian revolution
   (b) Neo-Darwinism
   (c) Chromosomal theory
   (d) Hardy-Weinberg equilibrium

2. Which of the following scientists proposed a theory on the origin of life suggesting that organic molecules could arise spontaneously from inorganic compounds in Earth's primitive atmosphere? (CO1, K1)
   (a) Louis Pasteur (b) Alexander Oparin
   (c) Charles Darwin (d) Gregor Mendel

3. Which era of geological time is known as the "Age of Dinosaurs"? (CO2, K1)
   (a) Paleogene (b) Mesozoic
   (c) Cenozoic (d) Neogene

4. Which of the following epochs saw the diversification of early hominids and the emergence of bipedalism? (CO2, K1)

(a) Miocene (b) Paleocene

(c) Oligocene (d) Pliocene

5. In neutral evolution, genetic changes are primarily due to: (CO3, K2)

(a) Strong selective pressures

(b) Mutation and genetic drift

(c) Hybridization events

(d) Horizontal gene transfer

6. Which of the following is NOT a factor influencing molecular divergence? (CO3, K2)

(a) Mutation rate (b) Population size

(c) Genetic drift (d) Environmental factors

7. In a population of rabbits, the frequency of the brown fur allele is 0.6. What does this value represent? (CO4, K4)

(a) The proportion of rabbits with brown fur

(b) The probability of a rabbit having brown fur

(c) The percentage of genes responsible for brown fur in the population

(d) The relative abundance of the brown fur allele in the gene pool

8. If in a population of rabbits, the frequency of the recessive phenotype (aa) is 0.25, what is the frequency of the heterozygous genotype (Aa) assuming Hardy-Weinberg equilibrium? (CO4, K3)

(a) 0.50 (b) 0.45

(c) 0.30 (d) 0.75

9. Ultimate causation in biology primarily deals with: (CO5, K2)

(a) Genetic mutations leading to variation

(b) The evolutionary significance or adaptive value of a trait

(c) The specific neural pathways involved in a behavior

(d) Environmental influences on gene expression

10. Which of the following scenarios is most likely an example of kin selection? (CO5, K2)

(a) A bird protecting its nest from predators

(b) A mammal grooming another member of its species

(c) A bee sacrificing itself to protect the hive

(d) A fish competing with other fish for food

Part B ($5 \times 5 = 25$)

Answer **all** questions not more than 500 words each.

11. (a) Compare and contrast Lamarck's theory of evolution with Darwin's theory of natural selection. Highlight their key differences and similarities. (CO1, K4)

Or

(b) Analyze the role of Miller-Urey-type experiments in the study of prebiotic chemistry and early Earth conditions. (CO1, K4)

12. (a) Compare and contrast gradualism and punctuated equilibrium as models of evolutionary change. (CO2, K4)

Or

(b) Explain the concept of mass extinctions in Earth's history. Provide examples of major mass extinction events and discuss their potential causes. (CO2, K2)

13. (a) Describe the concept of the molecular clock hypothesis and its implications in evolutionary studies. (CO3, K2)

Or

(b) Compare and contrast the outcomes of neofunctionalization and subfunctionalization following gene duplication. How do these processes contribute to evolutionary adaptation? (CO3, K5)

14. (a) Describe the role of genetic drift in shaping genetic variation within populations. (CO4, K5)

Or

(b) How does convergent evolution contribute to biodiversity? (CO4, K4)

15. (a) Discuss the evolutionary implications of parental investment on mating systems and sexual selection. Provide examples to support your explanation. (CO5, K4)

Or

(b) Analyze the impact of domestication on the social behavior of animals. Provide evidence to support your analysis. (CO5, K4)

Part C (5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Compare and contrast Mendel's laws of inheritance with the principles proposed by Lamarck. Discuss how each contributes to our understanding of genetic inheritance. (CO1, K4)

Or

(b) Discuss the significance of the Miller-Urey experiment in our understanding of the origin of life. (CO1, K4)

17. (a) Compare and contrast relative dating methods with absolute dating methods in determining the age of fossils and rocks. Discuss their significance in understanding evolutionary time scales. (CO2, K3)

Or

(b) Describe the origin of unicellular organisms and the transition to multicellular organisms. How did this transition contribute to the evolution of complex life forms? (CO2, K2)

18. (a) Compare and contrast the utility of DNA barcoding and molecular phylogenetics in studying evolutionary relationships. Provide examples of situations where each method excels and discuss their limitations. (CO3, K3)

Or

(b) Compare and contrast neutral evolution with natural selection. How do these mechanisms contribute to the diversity of species? (CO3, K5)

19. (a) Explain the Hardy-Weinberg Equilibrium principle. Discuss the factors that can disrupt this equilibrium in a population. (CO4, K2)

Or

(b) Explore the concept of reproductive isolation in the context of speciation. How does reproductive isolation contribute to the formation of new species? Provide examples to support your answer. (CO4, K2)

20. (a) Compare and contrast kin selection with other evolutionary theories of altruism, such as reciprocal altruism. Discuss their respective strengths and weaknesses. (CO5, K4)

Or

(b) Describe the role of social learning in the evolution of complex behaviors in animals. Provide examples from different species to illustrate your points. (CO5, K2)

———————

R1968	Sub. Code
	509303

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2024

Third Semester

Zoology

ECOLOGY AND CONSERVATION BIOLOGY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct option.

1. The first law of thermodynamics states that energy cannot be _____. (CO1, K2)

   (a) Created only (b) Destroyed only

   (c) Converted (d) Created and destroyed

2. Who is the father of environmental science? (CO1, K2)

   (a) Dr.Rex N.Olinares

   (b) Dr.Renold Richards

   (c) Dr.Philip Mark

   (d) Dr.Emerald

3. Plants growing under direct sunlight are known as _____. (CO2, K3)

   (a) Heliophytes (b) Sciophytes

   (c) Psamophytes (d) Dicots

4. Plant species with a wide range of genetic distribution evolve into a local population known as _____. (CO2, K3)

(a) Ecotype (b) Population
(c) Ecosystem (d) Biome

5. The natural place of an organism or community is known as _____. (CO3, K5)

(a) Niche (b) Biome
(c) Habitat (d) Habit

6. Which is not the characteristics of 'r' selected species? (CO3, K5)

(a) Reproduce quickly
(b) Parental care
(c) Low survival rate
(d) Large number of progenies

7. Identify the mismatched pair. (CO4, K4)

(a) Tundra-permafrost
(b) Savanna-Acacia trees
(c) Prairie-Epiphytes
(d) Coniferous-Evergreen trees

8. The major photochemical smog is _____. (CO4, K4)

(a) Hydrogen peroxide
(b) CFC
(c) Peroxy actyl nitrate
(d) All of the above

9. Which of these has the most genetic diversity in India? (CO5, K5)

(a) Teak (b) Tea
(c) Mango (d) Potato

10. _____ is one of the most prevalent hotspots of biodiversity in India. (CO5, K5)

(a) Himalayas (b) Western ghats
(c) Ganges (d) None of the above

Part B (5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) State the law of thermodynamics. (CO1, K2)

Or

(b) Write a note on awareness and ethics about environmental hazards. (CO1, K2)

12. (a) Write a brief note on structure and functions of ecosystem. (CO2, K3)

Or

(b) Define biomes and their classifications. (CO2, K3)

13. (a) Describe a note on community ecology. (CO3, K5)

Or

(b) List out the characteristics of population. (CO3, K5)

14. (a) Explain the impact and their control of noise pollution. (CO4, K4)

Or

(b) Explain the degradation of pesticides/synthetic fertilizers occurs in soil. (CO4, K4)

15. (a) What are the strategies applied for biodiversity conservation? (CO5, K5)

Or

(b) Write about the concept and basis of identification of hotspots in India. (CO5, K5)

Part C (5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Give a detailed account of fundamentals of environmental sciences. (CO1, K2)

Or

(b) Explain about the natural resources and their assessment using remote sensing and GIS.(CO1, K2)

17. (a) What is biogeochemical cycle? and explain any two cycles as detail. (CO2, K3)

Or

(b) Describe the types of ecosystem. (CO2, K3)

18. (a) Write a detailed account on concept of habitat and niche. (CO3, K5)

Or

(b) Explain the concept of 'r' and 'k' species. (CO3, K5)

19. (a) How does the pollution affects the environment and explain how to control it? (CO4, K4)

Or

(b) How the radioactive exposure affects the environment and how to prevent it? (CO4, K4)

20. (a) Define biodiversity. Give a detailed account on their types and importance. (CO5, K5)

Or

(b) Explain the role of biopiracy and bioprospecting. (CO5, K5)

R1969

Sub. Code
509304

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2024

Third Semester

Zoology

FISHERY BIOLOGY AND AQUACULTURE

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct option.

1. During spawning period fishes migrates from marine to freshwater is called as _____. (CO1, K2)

   (a) Anadromous (b) Catadromous

   (c) Both (a) and (b) (d) None of the above

2. Isinglass is employed in (CO1, K2)

   (a) Preparation of wines

   (b) Clearing of wines

   (c) Distillation of wines

   (d) Preservation of wines

3. Smoking is used as a technique of (CO2, K4)

   (a) Fish preservation

   (b) Mushroom cultivation

   (c) Crystallisation of sugar

   (d) Crop harvesting

4. Identify the exotic fish species (CO2, K4)

(a) *Tilapia nilotica* (b) *Catla catla*

(c) *Labeo rohita* (d) *Cyprinus carpio*

5. Clostridium botulinum is an _____ bacterium found in canned sea food. (CO3, K4)

(a) Aerobic (b) Anaerobic

(c) Both (a) and (b) (d) None of the above

6. What is the optimum pH of the water in fish hatcheries? (CO3, K4)

(a) 7.5 to 8.5 (b) 6.5 to 8.0

(c) 6.5 to 7.5 (d) 7.0 to 7.5

7. Water mold disease saprolegniasis caused by _____. (CO4, K2)

(a) virus (b) fungus

(c) bacteria (d) protozoa

8. What is the scientific name of Milkfish? (CO4, K2)

(a) *Chanos chanos*

(b) *Sardinella longiceps*

(c) *Oreochromis niloticus*

(d) *Clarias batrachus*

9. HACCP stands for (CO5, K5)

(a) Hazard Analysis Critical Control Point

(b) Hazard and Critical Control Point

(c) Hazard Analysis Critical Care Process

(d) Hazard Analysis Chemical Control Process

10. Which is the freshwater prawn? (CO5, K5)

(a) *Penaeus indicus*

(b) *Macrobrachium ohione*

(c) *Macrobrachium carcinus*

(d) *Macrobrachium rosenbergii*

Part B (5 × 5 = 25)

Answer **all** the questions not more than 500 words each.

11. (a) Classify any five economically important marine fishes of Indian coasts. (CO1, K2)

Or

(b) Write short note on spawning of fishes. (CO1, K2)

12. (a) Write an account on fish freezing techniques. (CO2, K4)

Or

(b) What is invasive species? Discuss in detail with examples. (CO2, K4)

13. (a) Write an account on pen culture. (CO3, K4)

Or

(b) Explain aquaculture engineering. (CO3, K4)

14. (a) Give an account on life feed production. (CO4, K2)

Or

(b) Write account on induced breeding. (CO4, K2)

15. (a) Give an account on live feed production. (CO5, K5)

Or

(b) Describe in detailed account on water quality management in aquaculture. (CO5, K5)

Part C (5 × 8 = 40)

Answer **all** the questions not more than 1000 words each.

16. (a) Write an essay on fishery by products. (CO1, K2)

Or

(b) Discuss the types of gear and crafts used for fish capture. (CO1, K2)

17. (a) Discuss in detail about *In situ* and *Ex situ* conservation. (CO2, K4)

Or

(b) Write an essay on fish processing and preservation techniques. (CO2, K4)

18. (a) Briefly discuss about the present status of aquaculture in India. (CO3, K4)

Or

(b) Enumerate the structure, construction and management of earthen ponds. (CO3, K4)

19. (a) Write an essay on fish diseases caused by protozoans. (CO4, K2)

Or

(b) What are the biosecurity measures following in aquaculture industries? (CO4, K2)

20. (a) Briefly discuss about finfish culture techniques. (CO5, K5)

Or

(b) Explain the open and closed culture system in aquaculture. (CO5, K5)

———————

R1970

Sub. Code
509507

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2024

Third Semester

Zoology

Elective – Entomology

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following questions by choosing the correct option.

1. The respiratory organs of insects is ———— (CO1, K1)

   (a) Alveoli (b) Tracheae

   (c) Lungs (d) Book lungs

2. Ichneumon wasp is a ———— (CO1, K1)

   (a) Predator (b) Pest

   (c) Parasitoid (d) None of these

3. In Diptera the second pair of wings are modified into (CO2, K2)

   (a) Legs (b) Antennae

   (c) Halteres (d) Uropod

4. The function of corpora alata is (CO2, K2)

   (a) Storage (b) Produce TSH

   (c) Produce JH (d) Produce ecdysone

5. The spermatheca is present in (CO3, K2)

(a) Male (b) Female

(c) Juvenile (d) Larva

6. This is a social insect (CO4, K2)

(a) Mosquito (b) Spider

(c) Bedbug (d) Honey bee

7. The lac insect belongs to the order (CO4, K1)

(a) Orthoptera (b) Diptera

(c) Hemiptera (d) Coleoptera

8. The mulberry silk worm has ———— number of larval stages. (CO4, K2)

(a) Four (b) Five

(c) Six (d) Two

9. *Leptocorisa acuta* is a pest of (CO5, K2)

(a) Coconut (b) Cotton

(c) Paddy (d) Sugar cane

10. The disease spreading insects are called as (CO5, K2)

(a) Parasite (b) Pests

(c) Vectors (d) None of these

Part B ($5 \times 5 = 25$)

Answer **all** questions not more than 500 words each.

11. (a) Write about the general characteristics of insects and their classification up to order level. (CO1, K3)

Or

(b) Briefly discuss about the modern scheme of insect classification. (CO1, K3)

12. (a) Write short note on the nervous system of insects. (CO2, K2)

Or

(b) Briefly mention about the parasitoids which are helpful for the biological control of insects. (CO2, K4)

13. (a) Write short note on pest of stored products and their control. (CO3, K3)

Or

(b) Give a short account on the different types of insect pests attacking paddy. (CO3, K3)

14. (a) Differentiate IPM and biological control of insect pests. (CO4, K4)

Or

(b) What are the disadvantages of using chemical pesticides? (CO4, K2)

15. (a) Illustrate the life cycle of house fly. (CO5, K3)

Or

(b) Discuss about the beneficial role of honey bees. (CO5, K4)

Part C $(5 \times 8 = 40)$

Answer **all** the questions not more than 1000 words each.

16. (a) Give an elaborate account on the collection and preservation of insects and its uses. (CO1, K3)

Or

(b) Compare the old and recent classification of insects and write the characters and each representative insect species for the Insect orders. (CO1, K5)

17. (a) Give a detail account of endocrine system in insects and the hormones secreted by each gland and their functions. (CO2, K4)

Or

(b) Discuss about the male and female reproductive organ of insects. (CO2, K3)

18. (a) Discuss about the life cycle and control measures of any two agricultural insect pests. (CO3, K3)

Or

(b) Discuss about the pros and cons of Integrated farming management. (CO3, K4)

19. (a) Write about different types of silkworms and their culture methods. (CO4, K3)

Or

(b) Give a detail account of Apiculture and its use as cottage industry in India. (CO5, K4)

20. (a) Discuss about the biology and control measures of mosquitoes and house flies. (CO5, K3)

Or

(b) Explain about the biological control of agricultural pests and the predators and parasites used for the biological control. (CO3, K4)

———————