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**M.Sc. (Semester - I) (New) (NEP CBCS) Examination: Oct/Nov-2023
ZOOLOGY**

Biosystematic (2309101)

Day & Date: Friday, 05-01-2024
Time: 03:00 PM To 05:30 PM

Max. Marks: 60

Instructions: 1) All questions are compulsory.
2) Figure to right indicate full marks.

Q.1 A) Choose the correct alternatives from the given options. 08

- 1) _____ is the term given to a duplicate specimen of original type.
 - a) Isotype
 - b) Lectotype
 - c) Holotype
 - d) Neotype
- 2) Name the organization which provides rules for naming animals _____.
 - a) IBM
 - b) ICBN
 - c) ICN
 - d) ICZN
- 3) Checklist, monograph are the terms related with taxonomic _____.
 - a) Publication
 - b) Classification
 - c) Identification
 - d) Nomenclature
- 4) _____ involves the designation of a nomenclature type for a name.
 - a) Purification
 - b) Classification
 - c) Typification
 - d) Centrifugation
- 5) Speciation is also called _____.
 - a) Cladogenesis
 - b) Phylogenesis
 - c) Gametogenesis
 - d) Cytogenesis
- 6) Parsimony and likelihood are methods of estimating the _____.
 - a) Progeny
 - b) Phylogeny
 - c) Population
 - d) Genes
- 7) In panmictic species offspring develop from _____.
 - a) Fertilized egg
 - b) Unfertilized egg
 - c) Cloning
 - d) Both a and b
- 8) The first step in taxonomy is _____.
 - a) Classification
 - b) Identification
 - c) Collection
 - d) Publication

B) Fill in the blanks OR write true/false. 04

- 1) The system of providing organisms with appropriate and distinct names is called _____.
- 2) The taxonomic keys are used in the identification of _____.
- 3) _____ type is used to describe particular species.
- 4) _____ is sometimes used in an effort to identify unknown species or parts of an organism.

- Q.2 Answer the following. (Any Six) 12**
- a) Define biosystematics and taxonomy.
 - b) Define cytotaxonomy and chemotaxonomy.
 - c) ICZN.
 - d) Which are the two methods of phylogenetic tree construction.
 - e) Difference between panmictic and apomictic species.
 - f) Significance of taxonomic characters.
 - g) Holotype and syntype.
 - h) Curation.
- Q.3 Answer the following. (Any Three) 12**
- a) Give an account of biosystematics in biology.
 - b) Explain historical resume of systematics.
 - c) Preservation and curating.
 - d) Neotype.
- Q.4 Answer the following. (Any Two) 12**
- a) Give an account on theories of biological classification.
 - b) Describe recent trends in taxonomy.
 - c) Explain systematic publication.
- Q.5 Answer the following. (Any Two) 12**
- a) Explain difference between panmictic and apomictic speciation.
 - b) Describe procedure and key in taxonomy.
 - c) Explain process of typification.

- Q.2 Answer the following (Any Six) 12**
- a) State the functions of cell membrane.
 - b) Draw neat labelled diagram of mitochondria.
 - c) Discuss the properties of cancer cell.
 - d) What is the active transportation?
 - e) Draw neat labelled diagram of microtubule.
 - f) What is gap junction?
 - g) Discus the desmosomes.
 - h) State the functions of mitochondria.
- Q.3 Answer the following (Any Three) 12**
- a) Describe the structure and function of Golgi bodies.
 - b) Write a note on morphology of cancer cell
 - c) Discuss the different treatment of cancer.
 - d) Write a short note on cell cycle.
- Q.4 Answer the following (Any Two) 12**
- a) Give an account of transportation across the cell membrane.
 - b) Describe the different causes of cancer.
 - c) Write a note on biogenesis of mictochondria.
- Q.5 Answer the following. (Any Two) 12**
- a) Explain in detail post transcriptional modification in protein synthesis.
 - b) Describe the structure of Nucleus with neat labelled diagram.
 - c) Give an account on biological component of plasma membrane.

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M.Sc. (Semester - I) (New) (NEP CBCS) Examination: Oct/Nov-2023
ZOOLOGY
Techniques in Biology (2309107)

Day & Date: Tuesday, 09-01-2024
 Time: 03:00 PM To 05:30 PM

Max. Marks: 60

Instructions: 1) All questions are compulsory.
 2) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. (MCQ)**08**

- 1) Technique used to separate biomolecules based on their size and electrical charge is called as _____.
 a) Electrophoresis b) Chromatography
 c) PCR d) Centrifugation
- 2) Number of times that the culture has been recultured is known as _____.
 a) Avogadro Number b) Passage Number
 c) Generation Number d) Poisson Number
- 3) Maxam and Gilbert method of DNA sequence is known as _____.
 a) Cryopreservation b) Fermentation
 c) Chilling d) Chemical Degradation
- 4) In cryopreservation storage is done in _____.
 a) Paraffin b) Nitrogen gas
 c) Liquid nitrogen d) Liquid hydrogen
- 5) In _____ microscopy electron beam passes through sample.
 a) Light b) TEM
 c) SEM d) Compound
- 6) In the secondary culture, cells are obtained from _____.
 a) Primary culture b) Organism
 c) Organ culture d) Phenotypic culture
- 7) HPLC stands for _____.
 a) High Pressure Liquid Chromatography
 b) High Performance Liquid Chromatography
 c) Highly Placed Liquid Chromatography
 d) Highly Positive Liquid Chromatography
- 8) Single layer of cells growing on surface is called _____.
 a) Bilayer b) Trilayer
 c) Monolayer d) Qudralayer

Seat No.	
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M.Sc. (Semester - I) (New) (NEP CBCS) Examination: Oct/Nov-2023
ZOOLOGY
Economic Entomology (2309108)

Day & Date: Tuesday, 09-01-2024
 Time: 03:00 PM To 05:30 PM

Max. Marks: 60

Instructions: 1) All Questions are compulsory.
 2) Figure to right indicate full marks.

Q.1 A) Choose correct alternative.

08

- 1) _____ is known as Father of Apiculture.

a) Thomas Adison	b) Johann Dzierzon
c) Mendel	d) Lweis
- 2) Honey bees shows _____ type of mouth parts.

a) Chewing and biting	b) Chewing only
c) Chewing and lapping	d) Grinding
- 3) _____ is the end product of the reeling in sericulture.

a) Pupa	b) cocoon
c) larvae	d) Silk
- 4) Lac insect shows _____ types of mouth parts.

a) sap sucking	b) cutting
c) grinding	d) biting
- 5) Integrated pest management includes _____.

a) chemical	b) pheromones
c) biological	d) all the a, b, c
- 6) Lac is secreted by _____.

a) salivary gland	b) vaginal gland
c) dermal gland	d) anal gland
- 7) Honey is prepared by _____ cast.

a) worker	b) queen
c) drone	d) larvae
- 8) In Autocidal control involves _____ insects.

a) only males	b) only females
c) both male and females	d) pupae

B) Write True / False.

04

- 1) In artificial inoculation, lac bearing sticks are called brood lac.
- 2) Migration of honey bees is known as swarming.
- 3) Royal jelly is the food of drones.
- 4) In biological control all pollutions are avoided.

- Q.2 Answer the following. (Any Six) 12**
- a) Importance of lac insect
 - b) Species of silkworms
 - c) Autocidal control
 - d) Propolis of bees
 - e) Caste of honey bees
 - f) Define IPM in pest control.
 - g) Role of the feromones
 - h) Functions of worker bees
- Q.3 Answer the following. (Any Three) 12**
- a) Describe economic importance of lac.
 - b) Describe diseases of honey bees.
 - c) Describe importance of silk.
 - d) Hand prickling method in pest control.
- Q.4 Answer the following. (Any Two) 12**
- a) Describe life cycle of silkworm *bombaxmorii*.
 - b) Describe structure of artificial bee hive.
 - c) Explain process of lac culture.
- Q.5 Answer the following. (Any Two) 12**
- a) Describe in detail IPM in pest management.
 - b) Explain process of silk formation from cocoon.
 - c) How pure lac is obtained raw lac.

Seat No.	
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**M.Sc. (Semester - I) (New) (NEP CBCS) Examination: Oct/Nov-2023
ZOOLOGY**

Research Methodology (2309103)

Day & Date: Thursday, 11-01-2024

Max. Marks: 60

Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.8

Q.1 A) Choose correct alternative.

08

- 1) _____ is a bivariate test is used for determining the association between categorical variables.
 - a) Mean
 - b) Mode
 - c) Median
 - d) Chi-square Test
- 2) A _____ is a coherent explanation or interpretation of one or more phenomena.
 - a) Sample
 - b) Fact
 - c) Sub-set
 - d) Theory
- 3) In _____ chart, the circle is divided into a series of segments to show & organize data as percentage of whole.
 - a) Histogram
 - b) Pie-Chart
 - c) Line chart
 - d) Bar Diagram
- 4) _____ variable is also called as response variable and is often the focus of the research.
 - a) Independent variable
 - b) Dependent variable
 - c) Autonomous variable
 - d) Non-autonomous variable
- 5) _____ is called as subset of the population.
 - a) Sample
 - b) Population
 - c) Individuals
 - d) Trial
- 6) The condition of not being influenced by personal experiences, value judgments, or preconceived notions is called as _____.
 - a) Replicability
 - b) Validity
 - c) Objectivity
 - d) Generability
- 7) In research _____ is a complete set of elements with a standard parameter?
 - a) Population
 - b) Sample
 - c) Sampling frame
 - d) Quadrat

- 8) _____ is a reference management tool.
- a) NCBI
 - b) BLAST
 - c) Zotero
 - d) GenBank

B) Fill in the blanks or write true or false **04**

- 1) Generability is the extension of research findings and conclusions from a study conducted on a sample population to the population at large.
- 2) Google Scholar is a plagiarism detection tool.
- 3) Random errors are the result of unpredictable changes.
- 4) Dependent variable are variables which are manipulated or controlled or changed.

Q.2 Answer the following. (Any Six) **12**

- a) Null hypothesis
- b) Impact Factor (IF)
- c) Frequency table
- d) Sample size
- e) Qualitative variable
- f) Dependent variable
- g) Generalization
- h) Sampling Error

Q.3 Answer the following. (Any Three) **12**

- a) Discuss the characteristic of good sample.
- b) Write on the qualitative and quantitative research.
- c) Elaborate on deductive and inductive theory.
- d) Discuss univariate and bivariate analysis.

Q.4 Answer the following. (Any Two) **12**

- a) Discuss the reference management software like Zotero and Mendeley.
- b) Give a detailed account on the research process.
- c) Give an account on the concept of theory and add a note on its benefits with suitable example.

Q.5 Answer the following. (Any Two) **12**

- a) Write an account on layout of research paper.
- b) Explain types of sampling methods-Random, stratified & systematic sampling.
- c) Give a detailed account on levels of measurement such as nominal, ordinal, interval & ratio.

Seat No.	
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M.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY

Tools and Techniques in Biology (MSC31102)

Day & Date: Sunday, 07-01-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) Q. Nos.1 and 2 are compulsory.
2) Attempt any Three questions from Q.No.3 to Q.No.7.
3) Figures to the right indicate full marks.

Q.1 A) Choose correct alternatives.

10

- 1) The study of molecular structure, conformational changes and certain types of kinetic investigation is the main use of _____ in the biological field.
 - a) PCR
 - b) FTIR
 - c) NMR
 - d) None of the above
- 2) Shadow casting is used in microscopy _____.
 - a) TEM
 - b) SEM
 - c) Phase contrast
 - d) Fluorescence
- 3) In animal cell culture transformation means _____.
 - a) Phenotypic modification
 - b) Release of genetic information
 - c) Uptake of new genetic material
 - d) Both a and b
- 4) _____ is used as cryoprotective agent added to the cells prior to freezing to lower the freezing point and prevent formation of ice crystals.
 - a) Dimethyl sulfoxide (DMSO)
 - b) Sulphuric acid (H₂SO₄)
 - c) Sodium chloride (NaCl)
 - d) Ethyl alcohol (C₂H₅OH)
- 5) How is the wavelength controlled in an FTIR spectrometer?
 - a) By a Michelson Interferometer
 - b) By a computer
 - c) By a laser
 - d) By calibration with a standard sample
- 6) A key technique for separating and analyzing the various elements of a cellular homogenate is known as _____.
 - a) centrifugation
 - b) hybridization
 - c) chromatography
 - d) electrophoresis
- 7) In final cryopreservation procedure the frozen vials are transferred into a _____ storage container where cells can be stored and frozen until required for use.
 - a) ammonia
 - b) liquid oxygen
 - c) alcohol
 - d) liquid nitrogen
- 8) In spectrophotometer the light source mostly used for visible range is _____.
 - a) Deuterium
 - b) Hydrogen
 - c) Both a and b
 - d) Tungsten

- 9) In flow cytometer most commonly, the measurement is based on ____.
- a) Transmission
 - b) Fluorescence
 - c) Radioactivity
 - d) Absorbance
- 10) In hybridoma technique _____ chemical is used as fusing agent.
- a) Poly lactic-glycolic acid
 - b) Poly glycolic acid
 - c) Poly lactic acid
 - d) Polyethylene glycol

B) Fill in the blanks OR write true/false.**06**

- 1) Trypan blue dye exclusion is most common, easy and rapid method to interpret viability of cells in culture system. (True/ False)
- 2) ELISA is used for Identify specific proteins. (True/ False)
- 3) Due to the short wavelength of electrons, the resolving power of the electron microscope is very high. (True/ False)
- 4) The cell lines with limited culture life spans are referred to as infinite cell line. (True/ False)
- 5) Ribonuclease is a proteolytic enzyme and is used for dissociating the tissue into single cells during the primary culture. (True/ False)
- 6) The term chromatography describes the migration of a charged particle under the influence of an electric field. (True/ False)

Q.2 Answer the following.**16**

- a) Types of culture and its uses.
- b) Cell characterization.
- c) Hybridoma
- d) X Ray in biology

Q.3 Answer the following.**16**

- a) Electron microscope- TEM
- b) Proteomics

Q.4 Answer the following.**16**

- a) Cell viability testing
- b) Cell transformation

Q.5 Answer the following.**16**

- a) Cell hybrids and its applications.
- b) Fusions in different cell cycle phases and its applications.

Q.6 Answer the following.**16**

- a) Cryotomy.
- b) Cryopreservation of organs and organisms.

Q.7 Answer the following.**16**

- a) Define centrifuge and add a note on different type of centrifuge.
- b) Electrophoresis and its types.

Seat No.	
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**M.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY**

Cell and Molecular Biology (MSC31103)

Day & Date: Tuesday, 09-01-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) Q. No. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose the most correct alternative for given multiple choice question. 10

- 1) In simple diffusion, molecules cross the plasma membrane _____.
 - a) against the concentration gradient
 - b) along the concentration gradient
 - c) do not depend on concentration
 - d) with the help of energy
- 2) _____ forms the cytoplasmic connections between plant cells.
 - a) Gap junction
 - b) Tight junction
 - c) Desmosomes
 - d) Plasmodesma
- 3) Lysosomes are present in all cell, except _____.
 - a) muscle cells
 - b) acinal cells
 - c) erythrocytes
 - d) hepatocytes
- 4) Cisternae are present in _____.
 - a) Cytoplasm
 - b) Golgi bodies
 - c) Lysosome
 - d) Nucleus
- 5) The kinesin is the motor molecules that are related to the _____.
 - a) Actin
 - b) Intermediate filaments
 - c) Microtubules
 - d) Desmin
- 6) _____ acts as inhibitor of microfilament.
 - a) Aspirin
 - b) Cinchonine
 - c) Colchicine
 - d) Cytochalasin-B
- 7) _____ vesicle transport the secretory products from the *trans* Golgi network to late endosome.
 - a) Clathrin coated
 - b) COP II
 - c) Primary
 - d) COP I
- 8) Proteins that are synthesized by free polysomes are transported to _____.
 - a) lysosomes
 - b) outside cell
 - c) nucleus
 - d) ER membrane
- 9) Angiogenesis contributes to cancer development by _____.
 - a) Providing nutrient and oxygen to tumor and by facilitating metastasis
 - b) Initiating a mutation in a gene that causes uncontrolled cell growth
 - c) Inhibiting apoptosis (PCD)
 - d) Preventing the normal inhibition of growth that occurs between cells upon contact

Seat No.	
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**M.Sc. (Semester-I) (Old) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY**

Population Genetics and Evolution (MSC31108)

Day & Date: Thursday, 11-01-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) Question no. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Figure to right indicate full marks.

Q.1 A) Choose the correct alternatives. (MCQ) 10

- 1) Which of the following is not explained by the theory of natural _____ selection?
 - a) The ability of survive and reproduce
 - b) Prodigality of production
 - c) Competition
 - d) Physical Strength
- 2) The theory of use and disuse was given by _____.
 - a) Lamark
 - b) Mendal
 - c) Darwin
 - d) Motokimura
- 3) What is the ultimater source of genetic variability?
 - a) Selection
 - b) Migration
 - c) Genetic drift
 - d) Mutation
- 4) Two animals considered of different species if they _____.
 - a) An geographically isolated
 - b) Look different
 - c) Live in different
 - d) Cannot interbreed
- 5) The life originated about 3.6 billion years ago in the _____ era.
 - a) Preacambrian
 - b) Silurian
 - c) Cambrian
 - d) Mesozoic
- 6) The percentage of garnets in a gene pool for a pair of alleles depend upon _____.
 - a) Mutation
 - b) Recessive allele
 - c) Genotypic frequencies of parental generation
 - d) Dominant allele
- 7) Sympatric speciation is _____.
 - a) The appearance of new species in the same area as the parental population
 - b) Initiated by the appearance of geographical barrier
 - c) The emergence of many species from a single ancestor
 - d) All the above
- 8) Industrial melanic peppered moth is called _____.
 - a) Carbonaria
 - b) Glossina
 - c) Lepsima
 - d) Coptotermis

- 9) Founder principle was proposed by _____
a) Charls Darwin b) Lamark
c) Mayer and Shepperd d) Hugo deveris
- 10) Directional selection produces a shift of the population in one direction due to a _____ in the environment in a particular direction.
a) Change b) Unchanged
c) Constant d) Equilibrium

B) Fill in the blanks or write true or false.**06**

- 1) _____ is the ultimate source of genetic variability.
2) Two animals considered of different species if they _____.
3) The altered codon leads to insertion of an incorrect amino acid into protein molecule during translation this is called _____.
4) Geographical isolation is the first step in _____ speciation.
5) The effect of _____ may be countered by genetic drift.
6) _____ principle was proposed by Mayer and Shepperd.

Q.2 Answer the following**16**

- a) Natural selection
b) Allopatric speciation
c) Darwin concept
d) Mendelism

Q.3 Answer the following.

a) Role of mutation in evolution.

08

b) Describe phylogenetic and biological concept of speciation.

08**Q.4 Answer the following.**

a) Explain Hady-Weinberg law of genetic equilibrium and deduce the equation.

08

b) Describe the patterns and mechanism of reproductive isolation.

08**Q.5 Answer the following.**

a) Discuss eukaryotic evolution based on different gene families

08

b) Give an account on Patterns of change in nucleotide and amino acid sequences.

08**Q.6 Answer the following.**

a) Give an account on natural selection and describe its types.

08

b) Give an account on emergence of Neo-darwinism-Neutral hypothesis.

08**Q.7 Answer the following.**

a) Give detailed account of destabilizing forces.

10

b) Explain the principle of Lamarkism.

06

Seat No.	
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**M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY**

Developmental Biology (MSC31201)

Day & Date: Monday, 18-12-2023
Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- Instructions:** 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. 10

- 1) In reptiles, birds, and mammals, mesoderm is formed by invagination and involution into the _____.
 - a) archenteron
 - b) primitive streak
 - c) gastrocoel
 - d) amnion
- 2) The gut or digestive tract of a vertebrate arises from the _____.
 - a) vegetal pole
 - b) primitive streak
 - c) archenteron
 - d) somites
- 3) The allantois _____.
 - a) occurs in birds but not in mammals
 - b) is an outgrowth of the amnion in all animals producing it
 - c) contributes blood vessels to the umbilical cord in mammals
 - d) None of these
- 4) In chick heart formation takes place during _____ hrs of incubation.
 - a) 18
 - b) 24
 - c) 33
 - d) 48
- 5) Development of egg starts from _____.
 - a) Fragmentation
 - b) Cleavage
 - c) Regeneration
 - d) None of these
- 6) Programmed cell death is called as _____.
 - a) Mitosis
 - b) Meiosis
 - c) Lipolysis
 - d) Apoptosis
- 7) Fertilisation takes place in _____.
 - a) ovary
 - b) Fallopian Tube
 - c) uterus
 - d) vagina
- 8) _____ is a Foetal membrane.
 - a) Blastodisc
 - b) Amnion
 - c) Chalaza
 - d) Zonapellucida
- 9) In meroblastic cleavage, cleavage occurs only in the _____.
 - a) Placodes
 - b) Blastodisc
 - c) Trophoblast
 - d) Yolk
- 10) Fertilizin is a chemical substance produced from _____.
 - a) mature eggs
 - b) acrosome
 - c) polar bodies
 - d) middle piece of sperm

- B) Fill in the blanks.** **06**
- 1) The vertebrate nervous system is derived from _____.
 - 2) Microlecithal eggs are the characteristics of Amphioxus _____.
 - 3) The segmented blocks of tissue that develop on each side of the notochord are called the _____.
 - 4) A fertilized egg is called a _____.
 - 5) The Central fluid filled cavity of the blastula is known as _____.
 - 6) Anterior end of neural groove forms future _____.
- Q.2 Answer the following.** **16**
- a) Write a note on three germ layer formation in Amphioxus.
 - b) Describe the process of binary fission in paramecium.
 - c) Give an account on different types of eggs on the basis of amount of yolk with example.
- Q.3 Answer the following.**
- a) Regulation of limb development in chordates. **08**
 - b) Describe process of organogenesis. **08**
- Q.4 Answer the following.**
- a) Write a note on capacitation of sperm. **08**
 - b) Write in detail the process of Apoptosis. **08**
- Q.5 Answer the following.**
- a) Describe process of fertilisation in mammals. **08**
 - b) Describe the development of anteriority to posteriority in Drosophila. **08**
- Q.6 Answer the following.**
- a) Give an account of neural tube formation in chick. **08**
 - b) Describe process of cleavage in frog. **08**
- Q.7 Answer the following.**
- a) Give an account on evolution of sexual reproduction in vertebrates. **08**
 - b) Describe Regulation of development in Drosophila. **08**

Seat No.	
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**M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY**

General and Comparative Endocrinology (MSC31202)

Day & Date: Tuesday, 19-12-2023

Max. Marks: 80

Time: 11:00 AM To 02:00 PM

- Instructions:** 1) Question 1 and 2 are compulsory.
2) Attempt any Three from Q.3 to Q.7.
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. (MCQ)

10

- 1) _____ is known as father of Endocrinology.
 - a) Kelvin
 - b) Edward
 - c) Candolle
 - d) Addison
- 2) _____ hormone is not secreted by hypothalamus.
 - a) PRH
 - b) FSH
 - c) CRH
 - d) TRH
- 3) _____ is not an endocrine gland.
 - a) Adrenal
 - b) Pituitary
 - c) Lacrimal
 - d) Thyroid
- 4) Thyroid hormone belong to _____ class of hormone.
 - a) Steroid
 - b) Protein
 - c) Amino acid
 - d) Peptide
- 5) _____ is gland located superior to kidney.
 - a) Adrenal
 - b) Pancreas
 - c) Ovaries
 - d) Pituitary
- 6) In the pancreas _____ cells secrete insulin.
 - a) alpha
 - b) delta
 - c) gamma
 - d) beta
- 7) _____ endocrine gland responsible for body's circadian rhythm.
 - a) Thymus
 - b) Pineal
 - c) Parathyroid
 - d) Pituitary
- 8) _____ hormone responsible flight-fight response.
 - a) Epinephrine and norepinephrine
 - b) Insulin and Glucagon
 - c) Estrogen and Progesterone
 - d) Thyroxin and melatonin
- 9) Cell surface receptors also known as _____.
 - a) Intracellular receptors
 - b) Nuclear receptors
 - c) Nucleus receptors
 - d) Plasma membrane receptors
- 10) _____ is not a second messenger in hormonal action.
 - a) cGMP
 - b) Sodium
 - c) Calcium
 - d) cAMP

Seat No.	
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**M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY**

Environmental Physiology (MSC31206)

Day & Date: Wednesday, 20-12-2023
Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- Instructions:** 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Draw neat labelled diagrams wherever necessary.
4) Figure to right indicate full marks.

Q.1 A) Multiple Choice Questions.

10

- 1) People living at high altitudes have _____.
 - a) more better digestive system processes
 - b) have better phagocytosis
 - c) have increased immunity
 - d) have decreased oxygen for exchange
- 2) In Space, what sickness do astronauts frequently experience?
 - a) Motion sickness
 - b) Food poisoning
 - c) Migraines
 - d) Body pain
- 3) When danger or stress is perceived/experienced, this response occurs in the body _____.
 - a) Exhaustion
 - b) Adaption
 - c) Fight-or-flight
 - d) Resistance
- 4) Which one of the following organization dedicated to protecting human health from environmental harms?
 - a) Environment and Human Health
 - b) Environmental and Scientific Science
 - c) Ecological Protection Organization
 - d) Ecological Science and Solutions
- 5) A real or perceived challenge or threat which causes the body to produce a response is a _____.
 - a) injury
 - b) phobia
 - c) stressor
 - d) frustration
- 6) Who was the first to describe the "fight or flight response" _____.
 - a) Walter B. Cannon
 - b) Sigmund Freud
 - c) Atkinson Potter
 - d) Mrunal Sengupt
- 7) Which of these is known as the pacemaker of the heart?
 - a) Purkinje fibers
 - b) AVN
 - c) Sino Auricular Node
 - d) Bundle of His
- 8) _____ organ is important in regulating the body temperature.
 - a) Skin
 - b) Kidney
 - c) Appendix
 - d) Bladder
- 9) The astronauts inside spaceship feel _____ weight.
 - a) more
 - b) less
 - c) zero
 - d) depends on g force

- 10) Check list for Job Safety Analysis (JSA) consists of _____.
 a) Work area, material, machine, tools
 b) Men, machine, material, tools
 c) Men, machine, work area, tools
 d) Men, work area, Material, tools

B) One sentence answer. 06

- 1) Define acclimatization.
 2) Define homeostasis.
 3) Define stress.
 4) Define Fatigue.

Q.2 Answer the following. 16

- a) What are biological health hazards.
 b) What is black lung disease.
 c) Explain the structure of heart of fishes.
 d) Explain stressor.

Q.3 Answer the following.

- a) Define cardiac output and describe cardiac cycle. 08
 b) Explain the nervous and chemical regulation of heart beat. 08

Q.4 Answer the following.

- a) Explain the importance of Yoga in stress management. 08
 b) What is the vestibular system, and explain the effect of microgravity on vestibular system. 08

Q.5 Answer the following

- a) Describe in detail the process of haemopoiesis. 08
 b) Explain environmental health hazards? 08

Q.6 Answer the following.

- a) What is blood pressure? Describe high and low pressure and their effects on the body. 08
 b) What is motion sickness and why it is caused. 08

Q.7 Answer the following.

- a) Describe physiological responses of body in Space. 08
 b) Describe the process of acclimatization with suitable example. 08

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**M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY**

Molecular cytogenetics (MSC31301)

Day & Date: Friday, 05-01-2024
Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- Instructions:** 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose the correct alternative (MCQ) 10

- 1) DNA sequencing method using the chemical is generally called as _____ method
 - a) Sanger-Coulson
 - b) Maxam-Gilbert
 - c) Enzymatic
 - d) Dideoxy
- 2) cDNA can be formed from RNA by enzyme _____
 - a) Transcriptase
 - b) Reverse transcriptase
 - c) Ligase
 - d) DNAase
- 3) Genetically active areas of chromosomes are called _____
 - a) Euchromatin
 - b) Heterochromatin
 - c) allochromosome
 - d) Telomere
- 4) The intervening non coding nucleotide sequences in DNA are called ____
 - a) exons
 - b) codons
 - c) histones
 - d) introns
- 5) In Prokaryotes Chromatin is formed of _____
 - a) nucleic acid and proteins
 - b) nucleic acids and carbohydrates
 - c) nucleic acids and lipids
 - d) only nucleic acids
- 6) DNA Polymerase I has _____
 - a) Ligases
 - b) Ribozymes
 - c) Exonucleases
 - d) Endonucleases
- 7) The phage DNA when it is incorporated in host chromosome DNA is called as _____
 - a) Temperate DNA
 - b) Prophage DNA
 - c) Muton
 - d) Pseudogene
- 8) Restriction endonuclease enzymes are also called as _____
 - a) Transporter
 - b) isomerase
 - c) permease
 - d) molecular scissor
- 9) The viruses which attack on bacteria are specifically called as _____
 - a) Animal virus
 - b) Bacterial virus
 - c) Bacteriophage
 - d) Plant virus
- 10) Eukaryotic chromosome for most of the part remain in the uncoiled condensed region called _____
 - a) Euchromatin
 - b) allochromatin
 - c) Centromere
 - d) heterochromatin

- B) Fill in the blanks.** **06**
- 1) The DNA finger prints are _____
 - 2) In human the chromosome that determines the sex is _____
 - 3) _____ consists of a very large arrays of tandemly repeated non coding sequences at telomere
 - 4) Genes for _____ coded on the Y chromosome:
 - 5) A mutation caused by substitution of purine by purine is _____
 - 6) Tip of the chromosomes are called _____

Q.2 Answer the following **16**

- a) Write a note on Euchromatin.
- b) Explain the principle and applications of FISH.
- c) Discuss causes and symptoms of PKU.
- d) Write a note on Morphology of Bacteriophage.

Q.3 Answer the following **16**

- a) Give an account on bacterial genome.
- b) Discuss sex determination in human.

Q.4 Answer the following **16**

- a) Give an account on chromosomal structural aberrations.
- b) Discuss salient features human genome based on the findings of Human Genome Project

Q.5 Answer the following **16**

- a) Explain the principle, procedure and applications of Northern blotting technique.
- b) Give an account on human karyotype and basis for nomenclature of chromosomes.

Q.6 Answer the following **16**

- a) Give a brief account on proteomics with significance.
- b) Explain the cytogenetic effects of ionizing and non-ionizing radiations.

Q.7 Answer the following **16**

- a) Give an account on the chloroplast genome.
- b) Define and discuss transposable genetic elements in bacteria.

- B) Fill in the blanks.** **06**
- 1) The enzyme increases the rate of reaction by lowering the _____ energy of reaction.
 - 2) _____ acts as connecting bridge between glycolysis and TCA cycle.
 - 3) First law of thermodynamics states that total energy of universe remains ____.
 - 4) _____ is referred as 'animal starch' as it is storage polysaccharide in animals.
 - 5) _____ enzyme helps in hydrolysis of triacylglycerol.
 - 6) _____ is most common coenzyme used in amino acid metabolism.

- Q.2 Answer the following.** **16**
- a) Write a note on Salvage pathway for nucleotide biosynthesis.
 - b) Draw the structure of cAMP. Give its any two functions.
 - c) What is hydrogen bonding? Explain two different types of hydrogen bonds present in biomolecules.
 - d) State the Michaelis-Menten equation. Add a note on significance of K_m and V_{max} .

- Q.3 Answer the following.**
- a) Explain different methods of site directed mutagenesis. Give its applications. **10**
 - b) Discuss in detail biosynthesis pathway for cholesterol. **06**

- Q.4 Answer the following.**
- a) Describe in detail general reactions of amino acid metabolism. **08**
 - b) Explain in detail electron transport chain of oxidative phosphorylation. **08**

- Q.5 Answer the following.**
- a) Explain the structure, properties and function of sucrose, lactose and starch. **10**
 - b) Write a note on concept of free energy. Add a note on coupled reactions. **06**

- Q.6 Answer the following.**
- a) Explain in detail the reactions of pentose phosphate pathway. Give its significance. **10**
 - b) Describe in detail biosynthesis of triacylglycerol. Add a note of breakdown of triacylglycerol. **06**

- Q.7 Answer the following.**
- a) Discuss in detail the various methods of regulation of enzyme activities. **10**
 - b) Write a note on mRNA, tRNA and rRNA. **06**

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**M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY**

Comparative Animal Physiology (MSC31306)

Day & Date: Tuesday, 09-01-2024
Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- Instructions:** 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. (MCQ) 10

- 1) The circadian rhythm is controlled by a group of cell in the _____.
a) Central nervous system b) brain stem
c) Pituitary gland d) Hypothalamus
- 2) The enzymes present in pancreatic juice are _____.
a) Amylase, Trypsinogen, Peptidase, Rennin
b) Trypsinogen, Lipase, Amylase, Procarboxypeptidase
c) Peptidase, Pepsin, Amylase, Rennin
d) Maltase, Amylase, Trypsinogen, Pepsin
- 3) The blood pigment present in Molluscs is _____.
a) Haemoglobin b) Haemocyanin
c) Chlorocurin d) Haemerythrin
- 4) Night blindness is caused by: _____.
a) Hypermetropia b) Myopia
c) Defective cornea d) Deficiency of rhodopsin
- 5) _____ is the largest endocrine gland.
a) Thyroid b) Pancreas
c) Parathyroid d) adrenal
- 6) Which of the following controls involuntary action _____.
a) circulatory system b) autonomic nervous system
c) respiratory system d) excretory system
- 7) What is myosin?
a) Muscle fibres b) myofibrils
c) myocardium d) myofilament
- 8) Hibernation in Frog takes place during _____.
a) winter b) spring
c) summer d) autumn
- 9) Amonotelism type of excretion is found in _____.
a) Birds b) Fishes
c) Mammals d) Reptile
- 10) Light band have _____ of filament protein.
a) Myosin b) actin
c) myosin and actin d) lysine

- B) Fill in the blanks OR Write true/false. 06**
- 1) Pushing forward the food that has been chewed is the function of the _____.
 - 2) _____ stimulates the production of gastric juice in the stomach.
 - 3) Muscle fatigue is due to the accumulation of _____.
 - 4) In the human eye, the photosensitive compound is composed of _____.
 - 5) Multiple forms of the same enzyme is referred to as _____.
 - 6) A set of three tiny _____ in the middle part of ear passes on sound vibrations from the eardrum to the liquid in the cochlea.

- Q.2 Answer the following. 16**
- a) Feeding mechanism and its regulation in paramoecium.
 - b) Respiratory pigments.
 - c) Define thermoregulation with suitable examples.
 - d) Acoustic organ.

- Q.3 Answer the following.**
- a) Sketch and label hemoglobin molecule. **08**
 - b) Describe molecular mechanism of muscle contraction. **08**

- Q.4 Answer the following.**
- a) Describe Physiology of light reception. **08**
 - b) Describe physiology of Bioluminescence explain with examples. **08**

- Q.5 Answer the following.**
- a) Describe in brief Circadian rhythm. **08**
 - b) Describe Physiology of hearing. Discuss on hearing aids. **08**

- Q.6 Answer the following.**
- a) Describe reproductive cycle in mammals. Discuss role of hormones in mammals. **08**
 - b) Describe osmoregulation in freshwater and marine fishes. **08**

- Q.7 Answer the following.**
- a) Describe role of isoenzymes in cardiac physiology. **08**
 - b) Describe physiology of excretion. **08**

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M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY
Animal Biotechnology (MSC31401)

Day & Date: Monday, 18-12-2023
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) Q. Nos. 1 and. 2 are compulsory.
 2) Attempt any three questions from Q. No. 3 to Q. No. 7
 3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. 10

- 1) _____ is a technique widely used in molecular biology research to detect RNA in tissue sample.
 - a) Northern blotting
 - b) Southern blotting
 - c) Western blotting
 - d) All the above
- 2) DNA sequencing method using the chain termination is generally called as _____ method.
 - a) Sanger
 - b) Maxam-Gilbert
 - c) Enzymatic
 - d) Dideoxy
- 3) In eukaryotes, transcription is initiated by _____.
 - a) RNA polymerase I
 - b) RNA polymerase II
 - c) RNA polymerase III
 - d) RNA polymerase IV
- 4) The lac operon concept in E.coli was proposed in 1961 by _____.
 - a) H.G. Khorana
 - b) Watson and Crick
 - c) Jacob and Monad
 - d) Meselson and Stahl
- 5) Bacterial RNA polymerase has _____ sub-units.
 - a) three
 - b) four
 - c) five
 - d) six
- 6) DNA only transposons possess genes which encodes _____.
 - a) Transposease
 - b) Reverse transcriptase
 - c) Transcriptase
 - d) Polymerase
- 7) _____ contamination in cell culture is difficult to control.
 - a) Fungal
 - b) Bacterial
 - c) Mycoplasmal
 - d) All of the above
- 8) Platelets are the cell fragments, lacking a nucleus, that breaks off from a _____.
 - a) macrophage
 - b) megakaryocyte
 - c) erythrocytes
 - d) monocyte
- 9) _____ is the rapid method of DNA cloning without host cell.
 - a) PCR
 - b) FISH
 - c) GISH
 - d) Blotting
- 10) What are the basic units from which human cells can be repaired:
 - a) Kidney cells
 - b) Heart cells
 - c) Stem cells
 - d) Nerve cells

- B) Fill in the blanks.** **06**
- 1) Protein sequencing was discovered by _____.
 - 2) Genetically active areas of chromosomes are called _____.
 - 3) _____ is the process of DNA synthesis from DNA.
 - 4) The coding nucleotide sequences in DNA are called _____.
 - 5) AUG is initiation codon codes for _____ amino acid.
 - 6) _____ is the rapid method of DNA cloning without host cell.
- Q.2 Answer the following.** **16**
- a) Write a note of cell clones.
 - b) Give a note on RNA processing.
 - c) Discuss in brief haploidy.
 - d) Explain the types of somatic embryogenesis.
- Q.3 Answer the following.**
- a) Write an essay on transgenic animals and their application. **10**
 - b) Describe the stemcell disorder with a note on stem cell therapy. **06**
- Q.4 Answer the following.**
- a) Discuss in detail the regulation of gene expression. **10**
 - b) Give a brief explanation on ethical issues in human cloning. **06**
- Q.5 Answer the following.**
- a) Write an account on micropropagation of plants. **08**
 - b) Describe green house management. **08**
- Q.6 Answer the following.**
- a) Explain the diversification in early embryo. Add a note on haematopoitic stem cells. **08**
 - b) Differentiate mechanism of transcription of prokaryotic and eukaryotic cells. **08**
- Q.7 Answer the following.**
- a) Give an account on post translational modification of proteins. **10**
 - b) Write a note on mechanisms of gene transfer. **06**

- 10) Nematodes (roundworms), cestodes (tapeworms), and trematodes (flatworms) are among the most common parasites belongs to _____.
- a) Protozoans
 - b) Arthropods
 - c) Helminthes
 - d) Virus

B) Write True or False**06**

- 1) Two methods of cryopreservation for oocytes and embryos are available: slow freezing and vitrification.
- 2) Innate immunity, also known as genetic or natural immunity.
- 3) Immunoglobulins (Ig) or antibodies are glycoproteins produced by bonemarrow.
- 4) Hematological tests can help diagnose anemia, infection, hemophilia, blood- clotting disorders, and leukemia.
- 5) Vermicomposting is a natural process whereby Tape worms convert waste material with rigid structures into compost.
- 6) Eartworms are rich source of protein.

Q.2 Answer the following.**16**

- a) Amniocentensis
- b) IVF sterility and its treatment
- c) Scope of Immunology
- d) Importance of Vermiculture

Q.3 Answer the following.

- a) Describe collection and cryopreservation of gametes.
- b) Give an account on surrogate pregnancy and gestational carrier

08**08****Q.4 Answer the following.**

- a) Describe common methods of biological warfare.
- b) Give an account on veterinary parasites

10**06****Q.5 Answer the following.**

- a) Describe HLA system in human.
- b) Define vaccine? Explain DNA vaccine.

08**08****Q.6 Answer the following.**

- a) Give an account on blood bank protocols.
- b) Give an account on vermitechology.

08**08****Q.7 Answer the following.**

- a) Describe cell mediated immunity
- b) Give an account on Blood cell Routine tests of blood for hepatitis and ELISA

08**08**

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**M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY**

Environmental Biology and Toxicology (MSC31403)

Day & Date: Wednesday, 20-12-2023
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) Question no. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. 10

- 1) Which of the following is the main reason for producing the atmospheric greenhouse effect?
 - a) Absorption and re-emission of ultraviolet radiations by the atmosphere
 - b) Absorption and re-emission of infrared radiations by the atmosphere
 - c) Absorption and re-emission of visible light by the atmosphere
 - d) None of the above
- 2) Escherichia coli is used as an indicator organism to determine pollution of water with:

a) Heavy Metals	b) Industrial Effluents
c) Fecal matters	d) Pollen of aquatic plants
- 3) Which of the following is an example of a natural pesticide?

a) DDT	b) Heptachlor
c) Chlordane	d) Rotenone
- 4) Gross primary productivity is highest in which type of ecosystem?

a) Temperate grasslands	b) Agro ecosystems
c) Tropical rain forests	d) Wet deciduous forests
- 5) The Bhopal Gas tragedy of 1984 was due to the leakage of which of the following gases?

a) MIC	b) DDT
c) SO ₂	d) Dioxins
- 6) Photosynthesis and respiration are central to which cycle?

a) Nitrogen cycle	b) Carbon cycle
c) Phosphorus cycle	d) Sulfur cycle
- 7) Where do we find reservoir for sedimentary type nutrient cycling?

a) Land	b) Sea
c) Earth's crust	d) Atmosphere
- 8) The word "Limne" mean?

a) Stream	b) Lake
c) Pond	d) All of above
- 9) The three mile island is famous as _____.
 - a) it hosted the Kyoto protocol
 - b) it was the site of a large oil spil
 - c) it was a site of nuclear accident
 - d) it hosted the earth summit

- B) Fill in the blanks OR write true/false.** **06**
- 1) Which two animals are threaten by poachers and traders?
 - a) Elephant's ivory
 - b) Rhino horns and Elephant Ivory
 - c) Ibex Horns
 - d) Crocodile and Cheetah Skin
 - 2) Mammalians and birds are _____.
 - a) carnivores
 - b) cold-blooded
 - c) warm-blooded
 - d) herbivores
 - 3) _____ National Park was the first national park of India.
 - a) Jim Corbett
 - b) Nanda Devi
 - c) Kaziranga
 - d) Jaldapara
 - 4) A natural area designated to protect the ecological integrity of one or more ecosystems for present and future generations is known as _____.
 - a) Wildlife Sanctuaries
 - b) Bioreserves
 - c) Botanical Gardens
 - d) National Parks
 - 5) Which is a deadly disease affecting birds causing a mass extinction?
 - a) Bird Flu or Avian Influenza
 - b) Cold infection
 - c) Scaly Leg disease
 - d) Mycoplasma
 - 6) Common pests of a zoo birds are _____.
 - a) Avian flea
 - b) Head louse
 - c) Mosquito
 - d) Wasp
- Q.2 Answer the following.** **16**
- a) Behavior of Land birds
 - b) Ethical issues of Zoo
 - c) Avian Diseases
 - d) Public awareness programs in a zoo
- Q.3 Answer the following.**
- a) Explain Housing and feeding behavior in crocodiles. **08**
 - b) How to management of Rodents in the zoo. **08**
- Q.4 Answer the following.**
- a) Give an account on Management of Elephant. **08**
 - b) Give an account ex-situ Conservation. **08**
- Q.5 Answer the following.**
- a) Describe Management of grain eater birds. **08**
 - b) Give an Account on Veterinary services for crocodiles in zoo. **08**
- Q.6 Answer the following.**
- a) Give an account on first aid to the zoo animals and visitors. **08**
 - b) What is taxidermy? Give its importance. How taxidermist prepares head, skin, and fish mounts? **08**
- Q.7 Answer the following.**
- a) Identification of Snakes. **08**
 - b) Give an account on Management of aquatic birds. **08**

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M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY
Fishery Science (MSC31407)

Day & Date: Thursday, 21-12-2023
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) Q. Nos. 1 and. 2 are compulsory.
 2) Attempt any three questions from Q. No. 3 to Q. No. 7
 3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative.

10

- 1) Bombay duck is _____ fish.
 - a) Marine
 - b) Freshwater
 - c) Estuarian
 - d) Brackish
- 2) In super class pieces, first three classes are completely extinct and are collectively called _____.
 - a) Holocephali
 - b) Dipnoi
 - c) Placoderms
 - d) Elasmobranchi
- 3) Dipnoi are _____ fishes.
 - a) Lung
 - b) Gill
 - c) Extinct
 - d) Warm blooded
- 4) Juvenile fish is a _____ stage in fish.
 - a) Adult
 - b) Egg
 - c) Larvae
 - d) Sterile
- 5) A fry which losses larval characters is like a miniature adult and is called _____.
 - a) Egg
 - b) Toad
 - c) Caterpillar
 - d) Fingerlings
- 6) Fishes in which migration from freshwater to sea or vice versa is called _____.
 - a) Catadromous
 - b) Anadromous
 - c) Amphidromous
 - d) Potadromous
- 7) _____ by products is prepared from skin, fins and bones of fishes.
 - a) Fish blue
 - b) Fish oil
 - c) Liver oil
 - d) Istin glass
- 8) Photophores are _____ producing organs in fishes.
 - a) Sound
 - b) Light
 - c) Electric
 - d) Egg
- 9) Catla, rohu, mrigal are collectively called as _____.
 - a) Indian minor carp
 - b) Indian major carp
 - c) Exotic carps
 - d) Chinese carp
- 10) Torpedo fish have _____ organs.
 - a) Light
 - b) Sound
 - c) Flying
 - d) Coloration

