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M.Sc. (Semester - I) (New) (CBCS) Examination March/April-2023
ZOOLOGY
Biosystematics (MSC31101)

Day & Date: Wednesday, 19-07-2023
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- 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 the correct alternatives from the given options. 10

- 1) The chief merit of Bentham & Hookers classification is that _____.
 a) it is a natural system of classification of all group of plants
 b) a system based on evolutionary concept
 c) it also considered the phylogenetic aspect
 d) the description of taxa are based on actual examination of the specimens
- 2) A classifical taxonomy is also termed as _____.
 a) beta taxonomy b) systematics
 c) descriptive taxonomy d) experimental taxonomy
- 3) _____ is not covered under Taxonomy.
 a) alpha taxonomy b) beta taxonomy
 c) delta taxonomy d) gamma taxonomy
- 4) _____ organization which provides rules for naming animals and plants.
 a) ICZN b) ICN
 c) ICBN d) IBM
- 5) A Chemotaxonomy is connected _____.
 a) classification of chemicals found in plants
 b) use of biochemical data in systematic in animals
 c) application of chemicals on herbarium sheets
 d) use of statistical methods in chemical yielding plants
- 6) _____ is the term given to a duplicate specimen of original type?
 a) Lectotype b) Holotype
 c) Isotype d) Neotype
- 7) _____ is the key to speciation of populations.
 a) reproductive health b) reproductive isolation
 c) population growth d) extinction
- 8) In _____ speciation, evolution can be expected to be faster whilst the speciation between the speciating events.
 a) peripheral speciation b) hybridization
 c) sympatric speciation d) both (b) and (c)
- 9) The reproductive isolating factor occurring when a sperm and an egg are incompatible is called _____.
 a) temporal isolation b) ecological isolation
 c) gametic isolation d) behavioural isolation

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M.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2023
ZOOLOGY

Tools and Techniques in Biology (MSC31102)

Day & Date: Thursday, 20-07-2023

Max. Marks: 80

Time: 03:00 PM To 06:00 PM

- 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 the correct alternatives from the options.

10

- 1) X-ray crystallography is used to elucidate the following _____.
 - a) X-ray treatment of plants
 - b) Graphical presentation of X-rays
 - c) X-ray photography
 - d) Crystal structure
- 2) Which of the following is a technique for the determination of the three-dimensional structure of a protein?
 - a) Gas chromatography
 - b) Mass spectroscopy
 - c) Radiotherapy
 - d) NMR spectroscopy
- 3) The acquisition of an infinite life span by the cell is referred as _____.
 - a) Immortalization
 - b) Abnormal
 - c) Both a and b
 - d) Growth
- 4) 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
- 5) The ultimate aim of _____ is to catalogue the identity and amount of every protein in a cell, and determine the function of each protein.
 - a) Chromatography
 - b) PCR
 - c) Proteomics
 - d) Spectroscopy
- 6) The best technique to separate isoenzymes is _____.
 - a) Paper chromatography
 - b) Microscopy
 - c) Electrophoresis
 - d) Thin layer chromatography
- 7) In cell culture for quantification of cells the most common method involves the use of _____.
 - a) Calorimeter
 - b) Haemocytometer
 - c) Thermometer
 - d) All of the above
- 8) In thin layer chromatography, the stationary phase is made of _____ and the mobile phase is made of _____.
 - a) Solid, gas
 - b) Liquid, liquid
 - c) Solid, liquid
 - d) Liquid, gas

- 9) If a radiolabel is used to tag a DNA molecule, the technique used to localize would be _____.
a) X-ray crystallography b) Autoradiography
c) Fluorescence microscopy d) Electron microscopy
- 10) Hybridomas are produced by fusion of _____.
a) Selected lymphocytes b) Tumour cells & Hela cells
c) lymphocytes & tumour cell d) Hela cells & plants cells

B) State true/false: 06

- 1) The best technique to separate isoenzymes is paper chromatography.
- 2) The chemical nature of agarose used in electrophoresis is glycoprotein.
- 3) In cell culture for quantification of cells the most common method involves the use of haemocytometer.
- 4) Mikhail Tswet is credited for development of chromatography and referred as father of chromatography.
- 5) The most commonly used gel for cell immobilization is Alginate.
- 6) Immunoblotting is introduced in Northern blotting technique.

Q.2 Answer the following. 16

- a) Importance of tissue culture
- b) Cryotomy
- c) NMR
- d) DNA Sequencing

Q.3 Answer the following. 08

- a) Electron Microscope - SEM 08
- b) Lasers in Biology 08

Q.4 Answer the following. 08

- a) Types of Culture 08
- b) Design and functioning of tissue culture laboratory 08

Q.5 Answer the following. 08

- a) Fusion of different cell cycle phases 08
- b) Cell hybrids and its application 08

Q.6 Answer the following. 08

- a) Freeze drying and freeze fracturing techniques 08
- b) Cryopreservation of cells and tissue 08

Q.7 Answer the following. 08

- a) Define Chromatography and add a note on TLC 08
- b) Radiolabel techniques in biology 08

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**M.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2023
ZOOLOGY**

Cell and Molecular Biology (MSC31103)

Day & Date: Friday, 21-07-2023
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 the most correct alternative for given multiple choice question. 10

- 1) The region of the cell within the plasma membrane, but outside of organelles is the _____.
 - a) Cytosol
 - b) Matrix
 - c) Vacuole
 - d) Nucleoplasm
- 2) The uptake of glucose along with sodium ion inside cell is _____.
 - a) Uniport
 - b) Symport
 - c) Antiport
 - d) passive transport
- 3) In 1873, Camillo Golgi discovered Golgi apparatus by using _____ to visualize Golgi apparatus.
 - a) Silver stain
 - b) Jannus green B
 - c) Haematoxylin
 - d) Orange G
- 4) In the nucleus, the nucleolus is _____.
 - a) dispersed throughout the
 - b) concentrated at nucleolar organizer
 - c) located in nuclear membrane
 - d) attached to centromere of all chromosomes
- 5) Actin filament is not present in _____.
 - a) flagella of bacteria
 - b) sarcomere of skeletal muscle
 - c) microvilli of intestinal brush border
 - d) below plasma membrane during cytokinesis
- 6) The kinesin are the motor molecules that are related to the _____.
 - a) intermediate filaments
 - b) Microfilaments
 - c) Microtubules
 - d) myosin filaments
- 7) A signal sequence for protein translocation in Endoplasmic reticulum is located at the _____.
 - a) 3' end of m-RNA
 - b) C-terminus of protein
 - c) Cytosolic face of ER
 - d) N-terminus of protein
- 8) The carrier of oligosaccharide for protein glycosylation, which is present in ER membrane is _____.
 - a) Phospholipid
 - b) Anchor proteins
 - c) Carnitine
 - d) Dolichol

- 9) Directional selection produce a shift of a population in one direction due to a _____ in the environment in a particular direction
- a) Change
 - b) Unchanged
 - c) Equilibrium
 - d) Constant
- 10) The main feature of biological species concept its emphasis on the _____.
- a) Large morphological difference between different species
 - b) Genetic variation within populations
 - c) Role of sexual reproduction in maintain diversity within species
 - d) Absence of gene flow between different species

B) Write true or false**06**

- 1) Lamarkism is conveniently known as germplasm theory
- 2) The present day epoch is Coenozoic
- 3) $p+q=1$ is the equation of Hardy Weinberg equilibrium
- 4) industrial melanic peppered moth is called Glossina
- 5) Sewall Wright effect is also known as natural selection
- 6) When the population is in the genetic equilibrium the rate of evolution is decreases

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

- a) Meiotic drive
- b) Allopatric speciation
- c) Ecological significance of molecular variations
- d) Migration

Q.3 Answer the following.

- a) Describe in detail Models of speciation
- b) Describe the Darwins theory of evolution

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

- a) Discuss eukaryotic evolution based on different gene families
- b) Give account on phylogenetic and biological species concept of speciation.

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

- a) Give detailed account of destabilizing forces
- b) What is speciation? Describe models of speciation

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

- a) Give an account on concept of evolution and theories of organic evolution
- b) Explain Hardy Weinberg law of genetic equilibrium and describe the equation

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

- a) Describe Patterns and mechanism of reproductive isolation
- b) Explain the principle of Lamarkism

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M.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2023
ZOOLOGY

Developmental Biology (MSC31201)

Day & Date: Wednesday, 19-07-2023
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) Fill in the blanks by choosing correct alternatives given below. 10

- 1) The number of somites present in 24 hrs chick embryo is _____.
a) 4 b) 13
c) 18 d) 7

- 2) Gut is derived from _____.
a) Mesoderm b) ectoderm
c) Endoderm d) Germ cell

- 3) Fertilizin is a chemical substance produced from _____.
a) mature eggs b) acrosome
c) polar bodies d) middle piece of sperm

- 4) Which type of eggs contain enormous amount of yolk _____.
a) Telolecithal b) Mesolecithal
c) Megalecithal d) Oligolecithal

- 5) Chalaza functions for _____.
a) keeping the blastodisc in position
b) nutrition
c) respiration
d) excretion

- 6) The Amhioxus egg is _____ type
a) Telolecithal b) Microlecithal
c) Centrolecithal d) Alecithal

- 7) Acrosome is present on the _____ region of sperm
a) Middle piece b) Tail region
c) Head d) Posterior region

- 8) The first number of cells formed just after first cleavage is _____.
a) 3 b) 2
c) 4 d) 6

- 9) The outer membrane of shell is made of _____.
a) Nitrogen b) Calcium
c) potassium d) phosphorous

- 10) The Central fluid filled cavity of the blastula is known as _____.
a) archenteron b) blastocoel
c) blastocyst d) morula

B) Fill in the blanks**06**

- 1) Dermatome develops into _____
- 2) Centrolecithal eggs are the characteristics of _____
- 3) The segmented blocks of tissue that develop on each side of the notochord are called the _____
- 4) Anterior end of neural groove forms future _____.
- 5) The vertebrate nervous system is derived from _____.
- 6) Reproductive cells are also called _____ cell.

Q.2 Answer the following**16**

- a) Write a note on blastula of frog
- b) Describe the process of conjugation in paramecium
- c) Write a note on centrolecithal egg

Q.3 Answer the following**a) Describe structure of hen's egg.****08****b) Describe 33 hrs development of chick embryo.****08****Q.4 Answer the following****a) Write a note on capacitation of sperm.****08****b) Describe development of limbs in fishes.****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) Write in detail the process of Apoptosis.****08****b) Give an account of neural tube formation in chick.****08****Q.7 Answer the following****a) Give an account on evolution of sexual reproduction in vertebrates****08****b) Describe process of gastrulation in frog****08**

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**M.Sc. (Semester - II) (New) (CBCS) Examination March/April-2023
ZOOLOGY**

General and Comparative Endocrinology (MSC31202)

Day & Date: Sunday, 23-07-2023
Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- 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 the correct alternatives from the given options. 10

- 1) Uterine and ovarian cycles are controlled by _____ hormone.
 - a) GnRh
 - b) ACTH
 - c) Catacholamin
 - d) MSH
- 2) _____ hormone helps in relaxation of endometrium, pubic bone.
 - a) lh
 - b) pth
 - c) relaxin
 - d) mlatonin
- 3) _____ hormone from placenta increases secretion for lung formation in fetus.
 - a) Pth
 - b) CRH
 - c) GnRh
 - d) Lh
- 4) Hormone _____ regulates calcium level in blood.
 - a) Gh
 - b) lh
 - c) pitocin
 - d) Pth
- 5) Pineal gland is also known as _____ which also plays imp role in sexual and reproductive activities.
 - a) mammary
 - b) epiphysis
 - c) testis
 - d) ovary
- 6) Mineralocortecoids are secreted by _____ endocrine gland.
 - a) ovary
 - b) testis
 - c) pancreas
 - d) supra renal
- 7) The Pars intermedia is the source of _____ Hormone.
 - a) Melanocyte Stimulating
 - b) LH Stimulating
 - c) Oestrogen Stimulating
 - d) Androgen Testies
- 8) Corpus allatum Secretes _____ hormone.
 - a) Juvenile
 - b) Ecdysone
 - c) Parathormone
 - d) Insulin
- 9) Secretin is one of many peptide hormone are secreted by _____.
 - a) Stomach
 - b) Small intestine
 - c) Kidney
 - d) Liver
- 10) _____ hormone stimulates parental behavior.
 - a) TH
 - b) Lactogenic
 - c) PTH
 - d) FSH

- B) Fill in the blanks or write true/ false.** **06**
- 1) _____ is the father of Endocrinology.
 - 2) _____ used first the term hormones to the chemical messengers.
 - 3) _____ is the father of biological taxonomy.
 - 4) In 1898 international congress of zoology organized an international commission for zoological nomenclature.
 - 5) Biological species are reproductively isolated from other such groups.
 - 6) In taxonomy a word contains 20 words.
- Q.2 Answer the following.** **16**
- a) Give structure and function of sertoli cell of testis.
 - b) Note on discovery of hormones.
 - c) Give the functions of ACTH hormone.
 - d) Role of hormones in metamorphosis in invertebrates.
- Q.3 Answer the following.** **16**
- a) Describe functions of hormones of posterior lobe of pituitary gland.
 - b) Explain the role of hormones in gastro intestinal tract.
- Q.4 Answer the following.** **16**
- a) Describe various hormones involved in homeostasis.
 - b) Explain structure and functions of steroid hormones.
- Q.5 Answer the following.** **16**
- a) What is role of hormones in migration in chordates.
 - b) Explain functions of insulin in diabetes.
- Q.6 Answer the following.** **16**
- a) What are the causes of infertility and give treatment on it.
 - b) Explain mechanism of parturition and hormonal role.
- Q.7 Answer the following.** **16**
- a) Explain mechanism of sex differentiation and hormonal role in it.
 - b) Explain hormonal role indifferent behaviours in animals.

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**M.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2023
ZOOLOGY**

Environmental Physiology (MSC31206)

Day & Date: Tuesday, 25-07-2023
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) Multiple Choice Questions.

10

- 1) People living at high altitudes have _____.
 - a) More better digestive system
 - b) have better phagocytosis processes
 - 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) Which of the following pair has double circulation pathway?
 - a) Amphibian and Mammal
 - b) Bird and mammal
 - c) Reptile and Mammal
 - d) Fish and Bird
- 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) Which of the following statements is true?
 - a) Moodiness is a cognitive symptom of stress
 - b) Moodiness is an emotional symptom of stress
 - c) Poor judgement is an emotional symptom of stress
 - d) Agitation is cognitive symptom of stress
- 6) Who was the first to describe the "fight or flight response"?
 - a) Walter B. Cannon
 - b) Cannon
 - c) Atkinson Potter
 - d) Mrunal Sengupt
- 7) Which of these is known as the pacemaker of the heart?
 - a) Purkinje fibers
 - b) AVN
 - c) SAN
 - 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 cardiac output
3) Define stress
4) Define Fatigue

Q.2 Answer the following. 16

- a) What is Homeostasis AND explain its mechanism.
b) Define and explain ECG of humans.
c) Explain why the body temperature needs to be maintained?
d) Explain Cardiac cycle.

Q.3 Answer the following.

- a) What is vasoconstriction? Give its significance in thermoregulation. 08
b) What are biological health hazards. 08

Q.4 Answer the following

- a) Explain the importance of Yoga in stress management. 08
b) Describe the comparative anatomy of heart of vertebrate. 08

Q.5 Answer the following

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

Q.6 Answer the following.

- a) What is the effect of microgravity environment in space? Add a note on low gravity on cardiovascular system and muscular system. 08
b) What is blood pressure? Describe high and low pressure and their effects on the body. 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: March/April-2023
ZOOLOGY

Molecular cytogenetics (MSC31301)

Day & Date: Monday, 10-07-2023
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) Fill in the blanks by choosing correct alternatives given below. 10

- 1) The linker DNA is associated with _____ histone.
 - a) H2A
 - b) H2B
 - c) H3
 - d) H1
- 2) Identify mendelian disorder from the following.
 - a) Turner syndrome
 - b) Klinefelter syndrome
 - c) Edwards syndrome
 - d) PKU
- 3) Buckle out or compensation loop in normal homologous chromosome is formed during _____.
 - a) Duplication
 - b) Deletion
 - c) Translocation
 - d) Inversion
- 4) The transfer of naked DNA froth one cell to another is referred to as _____.
 - a) Transduction
 - b) Lysogeny
 - c) Transformation
 - d) Conjugation
- 5) The sex ratio of a normal female in *Drosophila* is _____.
 - a) 0.5
 - b) 1.0
 - c) 1.5
 - d) 0.2
- 6) Trisomic condition is represented by _____.
 - a) $2n+1$
 - b) $2n-1$
 - c) $2n-2$
 - d) $2n+2$
- 7) The coding sequences in DNA are called _____.
 - a) exons
 - b) recons
 - c) histones
 - d) introns
- 8) Example of point mutation.
 - a) sickle cell anemia
 - b) Thalassemia
 - c) Syndrome
 - d) PKU
- 9) In sickle cell anemia hemoglobin valine is substituted by _____.
 - a) arginine
 - b) glutamic acid
 - c) cytosine
 - d) glycine
- 10) Human genome contains _____ nucleotides.
 - a) 3.2 billion
 - b) 3.3 billion
 - c) 3.2 million
 - d) 4.2 billion

- B) Fill in the blanks.** **06**
- 1) Allosomes determine _____ characters of the individuals.
 - 2) The 'barrbody X' chromosome have large amount of _____.
 - 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 chromosomal numerical aberrations.
- b) Discuss salient features of Human Genome Project.

Q.4 Answer the following **16**

- a) Give an account on the Yeast genome.
- b) Define and discuss sex determination with reference to Drosophila.

Q.5 Answer the following **16**

- a) Explain the principle, procedure and applications of western 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 geneomics 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 maize.

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M.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2023
ZOOLOGY
Biochemistry (MSC31302)

Day & Date: Tuesday, 11-07-2023
 Time: 11:00 AM To 02:00 PM

Max. Marks: 80

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

Q.1 A) Choose the correct alternatives from the given options. 10

- 1) _____ is a type of lipid and acts as precursor of Vitamin D and Bile salt.

a) Cholesterol	b) Chloroform
c) Collagen	d) Sphingolipid
- 2) The number of base pair present in Z-form of DNA per turn is _____.

a) 11	b) 10
c) 10.5	d) 12
- 3) From stoichiometry of oxidative phosphorylation, one FADH₂ yields _____ ATPs.

a) 1.5	b) 2.0
c) 2.5	d) 3.0
- 4) The reaction is said to be at equilibrium if the value of ΔG^0 is _____.

a) positive	b) Negative
c) more than zero	d) Zero
- 5) _____ acts as connecting bridge between glycolysis and TCA cycle.

a) Propionyl CoA	b) Acetyl CoA
c) Succinyl CoA	d) HMG CoA
- 6) The two nitrogen atoms in urea are contributed by _____.

a) Ammonia and glutamate	b) Ammonia and aspartate
c) Glutamine and glutamate	d) Ammonia and alanine
- 7) _____ is carrier of fatty acid to mitochondrial matrix.

a) Cysteine	b) Glutathione
c) Carnitine	d) Acyl carrier protein
- 8) The enzymes of β -oxidation are found in _____.

a) mitochondrial matrix	b) nucleus
c) cytoplasm	d) Golgi apparatus
- 9) The enzymes with different structure, different properties but with same function are called as _____.

a) allosteric enzymes	b) ribozymes
c) abenzymes	d) isoenzymes
- 10) _____ method of immobilization is only physical bonding of enzyme to carrier surface.

a) Adsorption	b) Cross-linking
c) Encapsulation	d) Covalent bonding

- B) Fill in the blanks.** **06**
- 1) The catalytic RNA are called as _____.
 - 2) _____ is key regulatory enzyme of cholesterol biosynthesis.
 - 3) As per nutritional requirements the amino acid which are not synthesized in human body are called _____.
 - 4) The second law of thermodynamics states that, entropy of universe goes on _____.
 - 5) _____ is longest but most unstable form of RNA.
 - 6) The two stands of double helical structure of DNA stands are held together by _____ bond.

Q.2 Answer the following.

- a) Explain the structure and function of phospholipids. **04**
- b) What is energy rich bond? Discuss the types of energy rich bonds. **04**
- c) Write a note on significance of pentose phosphate pathway. **04**
- d) Discuss in detail ketone bodies synthesis. **04**

Q.3 Answer the following.

- a) Explain various factors affecting enzyme activities. **08**
- b) Illustrate the reactions of breakdown of triacylglycerol and β -oxidation of fatty acids. **08**

Q.4 Answer the following.

- a) Describe in detail reactions of urea cycle. Add a note on deamination reaction of amino acids. **10**
- b) Draw the structure of ATP synthase complex and explain the mechanism of it. **06**

Q.5 Answer the following.

- a) With neat labelled diagram explain the structure of B-form DNA. Add a note A-form and Z-form DNA. **08**
- b) Explain the IUB system of classification and nomenclature of enzymes with one example from each class. **08**

Q.6 Answer the following.

- a) Discuss in detail reactions, energetics and regulation of TCA cycle. **10**
- b) Give the outline for the de novo synthesis of uridylate and cytidylate. **06**

Q.7 Answer the following.

- a) Discuss in detail primary, secondary, tertiary and quaternary structural level of proteins. **10**
- b) Explain the concept of metabolism. Add a note on metabolic regulation during hypoxia. **06**

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

Comparative Animal Physiology (MSC31306)

Day & Date: Wednesday, 12-07-2023
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. (MCQ) 10

- 1) The image formed by retina in human _____.
a) visual and erect b) real and inverted
c) visual and inverted d) Real erect
- 2) The following is the ammoniotelic animal _____.
a) Whale b) Seal
c) Lizard d) Salamander
- 3) Muscle get fatigue due to accumulation of _____.
a) lactic acid b) ATP
c) phosphate molecule d) Carbon dioxide
- 4) Oxygen carrying blood pigment in certain Molluscan is _____.
a) hemoglobin b) Hemocyanin
c) Chlorocruorin d) Haemoerythrin
- 5) What is the covering of an individual muscle fiber _____.
a) Sarcoplasm b) Perimycin
c) Endomycin d) Sarcolemma
- 6) During night low intensity of light is detected by _____.
a) Cones b) Rods
c) optic nerves d) Lens
- 7) HCL secretions in stomach are stimulated by:
a) Gastrin b) Acetylcholine
c) Somatostatin d) Epinephrin
- 8) Cardiac muscles are mainly _____.
a) Striated muscles b) non striated muscles
c) striated and voluntary d) striated and involuntary
- 9) Amototelism type of excretion is found in _____.
a) Birds b) Fishes
c) Mammals d) Reptile
- 10) Which of the following is largest endocrine gland?
a) Thyroid b) Parathyroid
c) Pancreas d) adrenal gland

B) Fill in the blanks OR Write true/false.

06

- 1) Nitrogenous wastes are in the form of _____.
- 2) cones are responsible for _____.

- 3) Muscles of the heart are _____.
- 4) Pushing forward the food that has been chewed is the function of the _____.
- 5) Eyelids have _____ muscles.
- 6) Multiple forms of the same enzyme is referred to as _____.

- Q.2 Answer the following.** **16**
- a) Hearing aids.
 - b) Hibernation of frog.
 - c) Describe surrogacy.
 - d) Rhodopsin cycle or visual cycle.
- Q.3 Answer the following.**
- a) Describe physiology of nutrition among invertebrates. **08**
 - b) Describe, Sketch and label structure of hemoglobin molecule. **08**
- Q.4 Answer the following.**
- a) Describe desert adaptation of osmoregulation. **08**
 - b) Sliding filament theory of muscle contraction. **08**
- Q.5 Answer the following.**
- a) Describe physiology of contractile element **08**
 - b) Describe the process of IVF. **08**
- Q.6 Answer the following.**
- a) Give comparative account of stomach in vertebrates **08**
 - b) Write a note on acidosis and alkalosis. **08**
- Q.7 Answer the following.**
- a) Describe osmoregulation in fresh water and Marine water fish. **08**
 - b) Describe statoacoustic organ in chordates. **08**

Set
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M.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2023
ZOOLOGY

Economic Entomology (MSC31307)

Day & Date: Wednesday, 12-07-2023
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. (MCQ) 10

- 1) Following _____ species produces silk of the superior quality.
 - a) *Attacus atlas*
 - b) *Bombyx mori*
 - c) *Attacus ricini*
 - d) *Antheraea assamensis*
- 2) Insects not found in wild state is _____.
 - a) Cochineal insect
 - b) Lac insect
 - c) Silk moth
 - d) Honey bee
- 3) Honey, silk and lac are _____.
 - a) Artificial elements
 - b) Secretory substance of plants
 - c) Secretory substance of insects
 - d) Cosmetic material
- 4) Sericulture is native of _____.
 - a) China
 - b) India
 - c) Japan
 - d) Bhutan
- 5) Pebrine is the _____ disease of *B. mori*.
 - a) Viral
 - b) Bacterial
 - c) Fungal
 - d) Protozoan
- 6) In the word univoltine, voltine stands for _____.
 - a) Brood frequency
 - b) Cocoon frequency
 - c) Worm frequency
 - d) Silk frequency
- 7) Pink ball worm is common pest on _____.
 - a) Maize
 - b) Wheat
 - c) Nut
 - d) Cotton
- 8) *Pyrilla* is the pest of _____.
 - a) Sugarcane
 - b) Cotton
 - c) Pomegranate
 - d) Rice
- 9) Sleeping sickness is also called _____.
 - a) HAT
 - b) CAT
 - c) MAT
 - d) BAT
- 10) Humans are secondary host of _____.
 - a) *Plasmodium vivax*
 - b) *Ascaris lumbricoides*
 - c) *Wuchereria bancrofti*
 - d) *Enterobius vermicularis*

B) Write true/false.

- 1) Muga silk is generated by the silkworm *Antheraea mylitta*.
- 2) *Apis dorsata* is used to refer to Rock bee.
- 3) United states banned the use of Malathion in 1972.
- 4) In parasites Suckers, Hooks and Claws are the organs of attachment.
- 5) Predation is a one sided relationship where one partner is benefited at the expense of the other.
- 6) Male anopheles mosquitoes spread dengue to people through bites.

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

- a) Economic importance of silk.
- b) Life cycle of *Bombyx mori*.
- c) Ticks as a veterinary pest.
- d) Symptoms of Malaria.

Q.3 Answer the following.

- a) Give an account on rearing of silkworm.
- b) Describe life cycle of Honey bee.

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

- a) Describe the house hold pest.
- b) Explain the Integrated pest management.

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

- a) Describe mode of transmission and control of *Filaria*.
- b) Describe mode of transmission and control of Kala azar.

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

- a) Give an account on Lac culture.
- b) Describe mode of transmission of parasites.

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

- a) Describe the cocoon processing for silk fabric.
- b) Define parasite? Give an account on parasitic adaptation.

08**08**

Seat No.	
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M.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2023
ZOOLOGY**Animal Biotechnology (MSC31401)**

Day & Date: Monday, 10-07-2023
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) Fill in the blanks by choosing correct alternatives given below. 10

- 1) Protoplasts from the cells of two species are taken and fused together is called _____.
 - a) Cybrid
 - b) Somatic hybrid
 - c) Haploidy
 - d) Myolema
- 2) During nomenclature, somaclones that are regenerated from tissue culture directly are regarded as _____.
 - a) R
 - b) R₀
 - c) R₁
 - d) either R or R₀
- 3) _____ can be analyzed using a northern blot.
 - a) RNA
 - b) Carbohydrates
 - c) Proteins
 - d) DNA
- 4) DNA methylation requires _____ as a methyl group donor.
 - a) S-Adenosyl methionine
 - b) Formyl-tetrahydrofolate
 - c) Carbon dioxide
 - d) ATP
- 5) The Cot_{1/2} of DNA is defined as _____.
 - a) the time taken to reanneal
 - b) concentration of DNA in cell at any time
 - c) amount of cytosine in single DNA strand
 - d) initial concentration multiplied by time of half DNA to reanneal
- 6) In _____ a regulatory repressor protein is normally bound to the operator, which prevents the transcription of the genes on the operon.
 - a) negative inducible operons
 - b) negative repressible operons
 - c) positive inducible operons
 - d) positive repressible operons
- 7) The process of cutting the pre-mRNA to remove the introns and joining together of the exons is called _____.
 - a) Editing
 - b) Splicing
 - c) Polyadenylation
 - d) Cleavage
- 8) Because most of the amino acids are represented by more than one codons, the genetic code is said to be _____.
 - a) Deaminated
 - b) Comma less
 - c) Degenerate
 - d) Overlapping
- 9) If a gene is inactivated by gene targeting then it is called as _____.
 - a) knock-in gene
 - b) knock-out gene
 - c) gene disruption
 - d) insertional inactivation

- 10) The first clinical gene therapy was done for the treatment of _____.
 a) AIDS
 b) Cancer
 c) Cystic fibrosis
 d) SCID due to deficiency of adenosine deaminase

B) Fill in the blanks.

06

- 1) _____ is a eukaryotic cell line produced by the fusion of a whole cell with a cytoplasm.
- 2) The purine rich ribosome binding site on prokaryotic mRNA upstream to coding sequence is called as _____.
- 3) Flavr Savr' variety of tomato which remains fresh for a longer period than normal tomato variety because it has reduced amount of enzyme _____.
- 4) _____ subunits of RNA polymerase is totally required to initiate transcription.
- 5) Embryonic stem cells are derived from the _____ of the blastocyst.
- 6) In M-phase nuclear envelope dissociated due to phosphorylation of _____ protein of nuclear envelope by MPF.

Q.2 Answer the following

16

- a) What is stem cell therapy? Explain it.
- b) Outline the general method of nucleic acid hybridization.
- c) Explain in short about enhancers and insulators in gene regulation.
- d) Give the applications of genetic engineering in agriculture.

Q.3 Answer the following

a) Write an essay on methods of gene transfer.

10

b) Discuss in detail about the role of Cyclin/Cdc (MPF) in mitosis.

06

Q.4 Answer the following

a) Explain in detail the protein sequencing method.

08

b) Describe in detail the replicative and non-replicative mode of transposition.

08

Q.5 Answer the following

a) Write an essay on environmental regulation of gene expression.

10

b) What is genetic code? Explain its properties.

06

Q.6 Answer the following

a) Discuss in brief the post transcriptional mRNA processing in eukaryotes.

10

b) Explain any three most pressing ethical issues in biotechnology.

06

Q.7 Answer the following

a) Write an essay on gene targeting with special emphasis on its methods and applications.

08

b) What is somaclonal variation? Discuss the reasons and applications of it.

08

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**M.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2023
ZOOLOGY
Applied Zoology (MSC31402)**

Day & Date: Wednesday, 12-07-2023
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. (MCQ) 10

- 1) Vermicompost is biofertilizer which is rich in _____.
 - a) Phosphorus
 - b) Calcium
 - c) Nitrogen
 - d) All of the above
- 2) The cytotoxic T cells recognize antigen in association with _____.
 - a) Class III MHC determinants
 - b) Class II MHC determinants
 - c) Class I MHC determinants
 - d) Both Class I and II MHC determinants
- 3) Malaria fever is caused by _____.
 - a) Foul air
 - b) Plasmodium
 - c) Mosquito
 - d) House fly
- 4) The most physiologically significant blood group for transfusions is _____.
 - a) MNS system
 - b) ABO system
 - c) Kell system
 - d) Kidd system
- 5) Which one of the following species is recommended for vermicomposting?
 - a) *Eudriluseugeniae*
 - b) *A. lumbricoides*
 - c) *Phytonematodes*
 - d) *Meloidogyne*
- 6) An open neural tube defect _____ which can be detected by amniocentesis.
 - a) Down's syndrome
 - b) Spina bifida
 - c) Turner syndrome
 - d) All above
- 7) Which of the following diseases are caused by poxviruses in humans?
 - a) Monkey pox
 - b) Cow Pox
 - c) *Molluscumcontagiosum*
 - d) Anthrax
- 8) Which of the following is correct about Psychological causes of terrorism?
 - a) It relates to terrorists growing up with the right resources (food and water)
 - b) It relates to terrorists having a proper education
 - c) Is the theory that terrorists are born "programmed" to do what they do
 - d) All the above
- 9) The most stable of all vaccine types are _____.
 - a) Attenuated vaccines
 - b) Inactivated vaccines
 - c) DNA vaccines
 - d) Subunit vaccines

- 10) The thymus independent type I antigen are _____.
 a) The polysaccharide of bacterial origin
 b) Viral nucleic acids
 c) Bacterial nucleic acids
 d) Small proteins of bacterial origin

B) Fill in the blanks OR Write true/false.

06

- 1) Most antigenic molecules are _____.
 a) Proteins
 b) Nucleic acids
 c) Carbohydrates
 d) Lipids
- 2) Vermicompost is a/an _____.
 a) toxic material
 b) organic biofertilizer
 c) inorganic fertilizer
 d) synthetic fertilizer
- 3) The amoebic dysentery is caused by _____.
 a) Entamoeba histolytica
 b) Giardia lamblia
 c) T. tropica
 d) T. cruzi
- 4) The protein _____ is primarily responsible for stimulating platelet Clumping.
 a) Fibrinogen
 b) Globulin
 c) Albumin
 d) keratin
- 5) Which of the following cells is involved in cell-mediated immunity?
 a) Leukemia
 b) T cells
 c) Mast cells
 d) Thrombocytes
- 6) Oocytes can be frozen in liquid nitrogen. At which phase of the cell cycle are these cells at the time of freezing?
 a) meiosis, metaphase I
 b) meiosis, metaphase II
 c) mitosis, metaphase
 d) meiosis or mitosis, interphase

Q.2 Answer the following.

16

- a) Give an account on Humoral immunity.
 b) Give an account on Cell mediated immunity.
 c) Note on Immunoglobulins.
 d) Note on Modern Contraception.

Q.3 Answer the following.

- a) Give an account on cryopreservation of gametes.
 b) Describe the cells and tissue immune system.

08

08

Q.4 Answer the following.

- a) Give an account on Biological warfare and its control.
 b) Give an account on vermitechology.

08

08

Q.5 Answer the following.

- a) What is amniocentesis? Add a note on merits and demerits of amniocentesis.
 b) Give an account on separation of blood cells.

08

08

Q.6 Answer the following.

- a) Describe in detail Protozoan diseases of human. **08**
- b) Give an account on Conventional and genetically engineered vaccines. **08**

Q.7 Answer the following.

- a) Describe in detail Resistance mechanism against biological warfare. **08**
- b) Give an account on IVF sterility and its treatment. **08**

Seat
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**M.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2023
ZOOLOGY**

Environmental Biology and Toxicology (MSC31403)

Day & Date: Friday, 14-07-2023

Max. Marks: 80

Time: 03:00 PM To 06:00 PM

- 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) Multiple choice questions.**10**

- 1) The sum of all earth's ecosystem is called the _____.
a) Biosphere b) Atmosphere
c) Hydrosphere d) Lithosphere
- 2) Which one of the following can cause thermal pollution?
a) Residential houses
b) Power plants
c) Death of marine organisms
d) Oil spill
- 3) Which of the following rivers is called the world's most polluted river?
a) Ganga River b) Chenab river
c) Cauvery River d) Yamuna River
- 4) What are the health effects of excess fluoride in drinking water?
a) Fluorosis b) Toothaches
c) Lung disease d) Intestinal infection
- 5) Which of the following salts is the main cause of permanent hardness of water?
a) Magnesium sulphate b) Magnesium bicarbonate
c) Magnesium carbonate d) Magnesium Chloride
- 6) Where was the first minamata disease outbreak reported?
a) Kumamoto b) Alabama
c) Texas d) Carolina
- 7) Brewery and sugar factory waste alter the quality of a water body by increasing.
a) temperature b) turbidity
c) pH d) COD and BOD
- 8) World Environmental Day is celebrated on _____.
a) 5th June b) 15th August
c) 5th January d) 12th August
- 9) The Chipko movement was a movement for _____.
a) Land rights b) Environmental protection
c) Job reservation d) Disarmament
- 10) The quantity of DDT at each trophic level in the food chain.
a) decreases b) remains the same
c) increases d) changes

B) Fill in the blanks. 06

- 1) Natural phenomena that becomes harmful due to pollution is_____.
- 2) The atmosphere has_____ nitrogen.
- 3) Ozone layer in upper atmosphere protects life on earth from harmful radiation from sun is known as_____.
- 4) The general term for particles suspended in air is_____.
- 5) CSF stands for_____.
- 6) Maximum soot is released from_____.

Q.2 Answer the following. 16

- a) Methyl Isocyanates in Bhopal
- b) Productivity
- c) Food Chain
- d) Carbon Cycle

Q.3 Answer the following. 16

- a) Describe classification of toxicants.
- b) Explain solid waste management.

Q.4 Answer the following. (Any one) 16

- a) Describe industrial pollution their control with reference to textile.
- b) Explain water recycling.

Q.5 Answer the following. 16

- a) Describe greenhouse effect.
- b) Give explain of noise pollution.

Q.6 Answer the following. 16

- a) Explain Legislation and Indian Standards of pollution levels.
- b) Explain conservation of natural resources.

Q.7 Answer the following. 16

- a) Describe kinds of aquatic habitats.
- b) Describe classification of toxicants.

Seat No.	
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**M.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2023
Zoology**

Zookeeping and Animal House Management (MSC31406)

Day & Date: Sunday, 16-07-2023
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. (MCQ) 10

- 1) In India crocodile breeding center is located in_____.
a) Kolkata b) Chennai
c) Chilica Lake d) Tiruvananthpuram
- 2) Rabies is a zoonotic_____ disease which infects domestic and wild animals.
a) Viral b) Bacterial
c) Hematic d) Helminth
- 3) The important character of Cobra is.
a) Presence of hood b) Small scales on head
c) Rounded tail d) None of these
- 4) A critically endangered animal is.
a) passenger pigeon b) Dodo
c) great Indian bustard d) Zebu
- 5) What are female elephants called?
a) Mares b) Sows
c) Cows d) Dams
- 6) One-horned rhinoceros is specific to which of the following sanctuaries?
a) Bharatpur b) Vedanthgoi
c) Kaziranga d) Corbett Park
- 7) Conservation in the natural habitat is _____.
a) in situ b) ex situ
c) zoo d) botanical garden
- 8) Sanctuary is a place where _____.
a) Animals are protected
b) Plants are protected
c) Office of forest department
d) None of these
- 9) In a national park, protection is provided to _____.
a) flora and fauna b) entire ecosystem
c) fauna only d) flora only
- 10) The places where animals receive protection is called _____.
a) Zoo b) National parks
c) Rock shelters d) None of these

- B) Fill in the blanks OR Write true/false.** **06**
- 1) It is difficult to keep King Cobra in a Zoo because_____.
 - a) Food of king cobra is snakes only
 - b) King cobra refuses to feed in captivity
 - c) King cobra needs a suitable partner
 - d) With other animals it becomes lethargic
 - 2) Cryopreservation involves storage of gametes in liquid nitrogen at____.
 - a) -296°C
 - b) 159°C
 - c) -196°C
 - d) 100°C
 - 3) _____ National Park was the first national park of India.
 - a) Jim Corbett
 - b) Nanda Devi
 - c) Kaziranga
 - d) Jaldapara
 - 4) It is difficult to keep amphibians in a zoo because_____.
 - a) There is a problem of temperature regulation
 - b) Amphibians cannot be fed
 - c) Amphibians die soon in captivity
 - d) Amphibians escape from zoo
 - 5) Identification of missing zoo tiger in wild can be done with_____.
 - a) Pug marks
 - b) Dentition
 - c) Band pattern and a photograph
 - d) Fingerprints
 - 6) Organization responsible for maintaining Red Data Book is_____.
 - a) IUCN
 - b) WWF
 - c) CITES
 - d) IBWL
- Q.2 Answer the following.** **16**
- a) Snake management.
 - b) Zoo design.
 - c) Public awareness programmes in a zoo.
 - d) Contraception in zoo mammals.
- Q.3 Answer the following.**
- a) What is taxidermy? Give its importance. How taxidermist prepares head, skin, and fish mounts? **08**
 - b) How to management of Rodents in the zoo. **08**
- Q.4 Answer the following.**
- a) Give an account on Management of Vertebrates animals in Zoo. **08**
 - b) Explain Housing and feeding behavior in crocodiles. **08**
- Q.5 Answer the following.**
- a) What are the visitor rules, regulations and surveillance in a zoo? Give an account on first aid to the zoo animals and visitors? **08**
 - b) Give an Account on Animal behavior in captivity. **08**
- Q.6 Answer the following.**
- a) What are Avian Diseases? Add a note on their treatment. **08**
 - b) Give an account on write the names of aquatic birds and their food and feeding habitat. **08**

Q.7 Answer the following.

- a)** Give an Account on Veterinary services in zoo.
- b)** Give an account on Management of Grain eater birds.

08

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Seat No.	
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**M.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2023
(ZOOLOGY)
Fishery Science (MSC31407)**

Day & Date: Sunday, 16-07-2023
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) Fill in the blanks by choosing correct alternatives given below. 10

- 1) Fish that spend some or their entire life in the lakes and rivers are called _____ fish.
 - a) Marine water
 - b) Fresh water
 - c) Brackish water
 - d) Estuarine water
- 2) The photic zone of any aquatic ecosystem is based on _____.
 - a) Waves of water
 - b) Penetration of sunlight
 - c) Type of plankton
 - d) Salt concentration
- 3) The culture of trout, tilapia, catfish, and carps are typical examples of _____.
 - a) Monoculture
 - b) Polyculture
 - c) Aquaculture
 - d) Pearl culture
- 4) Following _____ fish have an electric organ.
 - a) Torpedo
 - b) Saw fish
 - c) Shark
 - d) Scoliodon
- 5) _____ are living organisms that are able to swim and move independently.
 - a) Plankton
 - b) Benthos
 - c) Nekton
 - d) Phytoplankton
- 6) Isinglass is a substance obtained from the dried _____ of fish.
 - a) Fin
 - b) Scales
 - c) Liver
 - d) Swim bladder
- 7) Following _____ is an example of marine fish.
 - a) Bombay duck
 - b) Wallogoattu
 - c) Catlacatla
 - d) Labeorohita
- 8) Induced breeding is a technique where by ripe fish breeders are stimulated by _____ hormones.
 - a) Pituitary
 - b) Thyroid
 - c) Adrenal
 - d) Pineal
- 9) Larval stage of major carp is called _____.
 - a) Tadpole
 - b) Catter pillar
 - c) Maggot
 - d) Juvenile fish

- 10) Chilling, freezing and canning are the methods of _____.
a) Fish preservation b) Fish migration
c) Fish culture techniques d) Fish byproduct

B) Write true/false **06**

- 1) Cartilaginous fishes belong to class Chondrichthyes.
- 2) Fish glue is a good adhesive obtained from trimming, bones and skin of fishes.
- 3) In some fishes luminous organ play role in the production of light.
- 4) Catadromous fishes migrate to fresh water to breed.
- 5) The benthos is comprised of all the organisms that live at the bottom of a body of standing or running water.
- 6) Monosex culture refers to the culture of all male and female populations of fishes.

Q.2 Answer the following **16**

- a) Describe the general characters of fresh water fishes.
- b) Give an account on fish migration.
- c) Describe the techniques of fish preservation.
- d) What is fish culture? Explain the role of plankton in fish culture.

Q.3 Answer the following **16**

- a) Give an account on the identification of plankton and nekton.
- b) Describe the characteristics of fresh water ecosystem.

Q.4 Answer the following **16**

- a) Describe identification keys of larval stages of major carps.
- b) Give an account on the coloration in fishes.

Q.5 Answer the following **16**

- a) Describe the economic importance of fishes.
- b) Give an account on types of hatcheries in fishes.

Q.6 Answer the following **16**

- a) Describe general characters of marine water fishes.
- b) Give an account on fish gears and crafts.

Q.7 Answer the following **16**

- a) Describe the induced breeding in fishes.
- b) Describe the types of fish culture.