

Total No. of Questions : 7]

SEAT No. :

PD-3263

[Total No. of Pages : 2

[6479]-11

M.Sc. - I

ZOOLOGY

ZOUT-111: Biochemistry and Biochemical Techniques

(Rev.2019) (Semester - I) (4 Credits)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.No. 1 is compulsory.*
- 2) *Solve any five questions from Q. 2 to Q. 7.*
- 3) *Questions Q. 2 to Q. 7 carry equal marks.*

Q1) Solve any five of the following :

[10]

- a) Define essential amino acids.
- b) Name any two sources of fat soluble vitamins.
- c) Define covalent bond.
- d) What is a GM counter?
- e) Define respiratory quotient.
- f) What is isoelectric focusing?

Q2) a) Define enzyme. Describe the classification of enzymes with examples.

[7]

b) Write a note on adsorption chromatography technique.

[5]

P.T.O.

- Q3)** a) Describe the types of secondary structures in proteins. [7]
b) Explain the properties of radioisotopes. [5]
- Q4)** a) What is enzyme inhibition? Describe the types of enzyme inhibition. [7]
b) Describe the principle of centrifugation technique. [5]
- Q5)** a) Define polysaccharides. What are mucopolysaccharides? Add a note on their biological functions. [7]
b) Write a note on different support media used for electrophoresis. [5]
- Q6)** a) Write the principle and applications of Affinity chromatography. [7]
b) Write a note on structure and functions of waxes. [5]
- Q7)** Write a short notes on any two of the following: [12]
a) Chain termination DNA sequencing method
b) Principle of Atomic Absorption spectrometry
c) Structure and properties of water molecule



Total No. of Questions : 7]

SEAT No. :

PD-3264

[Total No. of Pages : 2

[6479]-12

M.Sc. (Part - I)

ZOOLOGY

ZOUT - 112 : Cell Biology and Developmental Biology

(Rev.2019 Pattern) (Semester -I) (4-Credits)

Time : 3 Hours]

[Max. Marks : 70

Instruction to the candidates :

- 1) *Q.No. 1 is compulsory.*
- 2) *Solve any five questions from Q.No. 2 to Q.No.7.*
- 3) *Question No.2 to 7 carry equal marks.*

Q1) Solve any five of the following.

[10]

- a) What is morphallaxis regeneration?
- b) Explain cell signalling.
- c) Explain cell communication.
- d) Define protein import.
- e) Describe centrolecithal egg.
- f) What is nuclear lamina?

Q2) a) Explain the regulation of sperm motility. Comment on role of pH and Calcium ions. **[7]**

b) Explain importance of Carbon in biological molecules. **[5]**

Q3) a) Describe the development of vertebrate eye. **[7]**

b) Explain importance of membrane fluidity. **[5]**

Q4) a) Enumerate the functions of endoplasmic reticulum. **[7]**

b) Explain importance of Chick as a model organism. **[5]**

P.T.O.

- Q5)** a) Explain the structure and genetic system of mitochondria. [7]
b) Discuss the concept of Apoptosis with example. [5]
- Q6)** a) Enumerate the functions of organiser and explain molecular mechanism of Amphibian axis formation. [7]
b) Discuss the characteristics of Cancer cell. [5]
- Q7)** Write short notes on any two of the following: [12]
a) Nucleolus.
b) Microtubules and microfilaments.
c) Acrosome reaction.



Total No. of Questions : 7]

SEAT No. :

PD-3265

[Total No. of Pages : 2

[6479]-13

M.Sc. - I

ZOOLOGY

ZOUT-113 : Genetics and English in Scientific Communication

(Rev. 2019) (Semester - I) (4 Credits)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.No. 1 is compulsory.*
- 2) *Solve any five questions from Q.2 to Q.7.*
- 3) *Q.2 to 7 carry equal marks.*

Q1) Solve any Five questions of the following :

[10]

- a) Give the importance of Abstract.
- b) Give the names of any two funding agencies.
- c) Synonyms.
- d) Linkage group.
- e) Epistasis.
- f) Qualitative traits.

Q2) a) Describe the importance of tables, graphs, photographs legends and captions in scientific communication. **[7]**

b) Write a note on Hybridoma technique. **[5]**

Q3) a) Explain the types of gene intractions. Add a note on recessive epistasis. **[7]**

b) Write the difference between research paper and research project. **[5]**

Q4) a) Discuss the importance of result and discussion section of research paper. **[7]**

b) In a population 1920. Students following blood groups were obtained.**[5]**

A = 600

B = 340

AB = 60

O = 920

Calculate the frequency of allele I^A , I^B , I^O in the population.

P.T.O.

Q5) a) The three point test cross in *Drosophila* showed following phenotypes. [7]

Phenotype	Number
+ e + –	420
Cu + s + –	460
+ + s + –	180
Cu e + –	179
+ e s + –	88
Cu + + –	98
+ + + –	30
Cu e s + –	10

Determine the gene distance and sequence of genes chromosome. Draw the genetic map based on above information.

b) Write a note on plagiarism in research. [5]

Q6) a) Write a note on types of tenses. [7]

b) Discuss mitochondrial inheritance with example. [5]

Q7) Solve any two of the following : [12]

- a) Dominant disorders in human
- b) Crossing over
- c) Importance of proof reading and editing.



Total No. of Questions : 5]

SEAT No. :

PD-3266

[Total No. of Pages : 4

[6479]-14

M.Sc.

ZOOLOGY

ZODT - 114 : Biostatistics

(2019 Pattern) (Semester -I) (2-Credits)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) Q.N. 1 is compulsory.
- 2) Solve any 3 questions from Q.No. 2 to Q.No.5.
- 3) Figures to the right indicate full marks.
- 4) Use of calculator and statistical table is allowed.

Q1) Solve any five of the following.

[5]

- a) Define : Population and sample.
- b) Define : Class-frequency and class-limits.
- c) Define : Classical definition of probability.
- d) State absolute and relative measures of dispersion.
- e) If a discrete random variable (r.v.) X takes values -1, 0 and 1 with respective probabilities 0.3, 0.4 and 0.3, then obtain E(X).
- f) A discrete r.v. X has following probability mass function (p.m.f.)

$$P(X = x) = Kx^2; x = 1, 2, 3, 4.$$

$$= 0 \quad ; \quad \text{otherwise}$$

then obtain the value of constant K.

- g) If $X \rightarrow B(n, p)$ with $E(X) = 10$ and $\text{Var}(X) = 6$ then find the values of n and p .

P.T.O.

- Q2) a)** The following is the distribution of number of nurses working in different clinics of a city.

Class interval of nurses	20-22	22-24	24-26	26-28	28-30
No. of clinics	5	12	18	25	10

Draw histogram for the above data and hence obtain mode graphically.

[6]

- b) State probability density function (p.d.f) of a normal distribution. State its any three properties. [4]

- Q3) a)** The following data is of the age (x) in yrs and blood pressure (y) in mmHg of 11 persons:

$$n = 10, \Sigma x = 635, \Sigma y = 933, \Sigma x^2 = 37823, \Sigma y^2 = 79969, \Sigma xy = 54581.$$

obtain the equation of least square regression line of y on x and hence estimate blood pressure of person with age 72 years. [6]

- b) Explain : Type - I error and

Type - II error, with an illustration.

[4]

- Q4) a)** The following are the number of infected patients after operation in different hospitals in a year :

Hospitals	1	2	3	4	5	6
No. of infected patients	45	52	48	55	63	37

Test whether the no.of infected patients are uniformly distributed over the different hospitals in a city. Use 5% level of significance. [6]

- b) Define scatter diagram and explain how it is used to show different types of correlation. [4]

- Q5)** Write short notes on any two of the following:

[2×5=10]

- Chi-square test of goodness of fit.
- Large sample test for equality of two population means.
- F-test for equality of two population variances.



Total No. of Questions : 5]

PD-3266

[6479]-14

M.Sc.

ZOOLOGY

ZODT - 114 : Fresh Water Zoology

(2019 Pattern) (Semester -I) (2-Credits)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) *Q.No. 1 is compulsory.*
- 2) *Solve any 3 questions from Q.No. 2 to Q.No.5.*
- 3) *Q.2 to Q.5 carry equal marks.*

Q1) Solve any 5 of the following. [5]

- a) Ephimeral water bodies.
- b) Ecological significance of tadpole.
- c) Protective adaptations in Rotifers.
- d) Oligotrophic lake
- e) Protective adaptations in crustacean.
- f) Features of tadpole shrimps.

Q2) a) Discuss importance of temperature in fresh water. [6]

b) Bio-chemical changes in rivers due to sewage pollution Insects. [4]

Q3) a) Describe respiratory adaptations aquatic insects. [6]

b) Give importance of dissolved oxygen in aquatic life. [4]

Q4) a) Explain Tadpole as important herbivore of fresh water habitat. [6]

b) Describe importance of temperature in fresh water. [4]

Q5) Write short note on any two of the following: [10]

a) Give protective adaptations of Rotifers.

b) Give importance of dissolved O_2 and CO_2 in aquatic life.

c) Describe locomotory adaptations in fresh water insects.



Total No. of Questions : 7]

SEAT No. :

PD-3267

[Total No. of Pages : 2

[6479]-21
M.Sc.
ZOOLOGY
ZOUT-121: Molecular Biology & Bioinformatics
(Rev. 2019) (Semester - II)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidate:

- 1) *Q. 1 is compulsory.*
- 2) *Solve any five questions from Q. 2 to Q. 7.*
- 3) *Questions Q. 2 to Q. 7 carry equal marks.*

Q1) Solve any five of the following :

[10]

- a) What is central dogma of molecular biology.
- b) Define linking number
- c) Define T_m .
- d) Give any two types of DNA damage.
- e) What is transcriptional unit.
- f) Give the structure of nucleotide.

Q2) a) Explain the initiation process of replication in prokaryotes and eukaryotes.

[7]

b) Describe the structure of nucleosome and give its significance.

[5]

Q3) a) Explain the working of FASTA based on sequence alignment.

[7]

b) Explain the mechanism of photoreactivation

[5]

P.T.O.

- Q4)** a) Describe the structure and function of tRNA. [7]
b) Explain the mismatch repair mechanism. [5]
- Q5)** a) Give application of bioinformatics [7]
b) Explain the role of eIF₂ in regulation of protein synthesis. [5]
- Q6)** a) Explain pharmacogenomics [7]
b) Explain the structure and function of ribosome [5]
- Q7)** Write a short notes on any two of the following: [12]
a) Explain the mechanism of elongation process of protein synthesis
b) Explain the structure and function of DNA polymerase in prokaryotes.
c) Explain watson and crick model of DNA.



Total No. of Questions : 7]

SEAT No. :

PD-3268

[Total No. of Pages : 2

[6479]-22

M.Sc. (Part - I)

ZOOLOGY

ZOUT-122 : Endocrinology and Parasitology

(Rev. 2019) (Semester - II) (4 Credits)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Q.1 is compulsory.
- 2) Solve any five questions from Q.2 to Q.7.
- 3) Q.2 to Q.7 carry equal marks.

Q1) Solve any Five of the following :

[10]

- a) What are biological clocks?
- b) Functions of pancreatic hormones.
- c) What is PRL?
- d) Define Altruism.
- e) What is prophylaxis?
- f) Define parasitoidal.

Q2) a) Describe classification and morphology of Trypanosoma.

[7]

b) Explain mechanism of hormone action in peptide hormones.

[5]

Q3) a) Explain hormone receptors in cytoplasm.

[7]

b) Describe myiasis.

[5]

Q4) a) Discuss molecular characteristics of surface coat of Trypanosoma.

[7]

b) Describe the role of hormones in phosphate metabolism.

[5]

P.T.O.

- Q5)** a) Describe hypothalamo hypophysiotropins. [7]
b) Write a note on pathogenicity, Treatment and prophylaxis of Echinococcus. [5]
- Q6)** a) Describe preparation and demonstration of specific antigen of Leishmania. [7]
b) Explain hormonal regulation of carbohydrate metabolism. [5]
- Q7)** Write short notes on any two of the following: [12]
a) Ultradian rhythm
b) Haemagglutination test
c) Osmoregulatory hormones.



Total No. of Questions : 7]

SEAT No. :

PD-3269

[Total No. of Pages : 2

[6479]-23
M.Sc. (Part - I)
ZOOLOGY
ZOUT 123 : Comparative Animal Physiology and
Environmental Biology
(Rev. 2019) (Semester - II) (4 Credits)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Q. No. 1 is compulsory.
- 2) Solve any five questions from Q.2 to Q.7.
- 3) Questions No. 2 to 7 carry equal marks.

Q1) Solve any Five from the following :

[10]

- a) Hyper and hypo - osmotic regulators.
- b) Define pulmonary respiration.
- c) Summarize the importance of calcium in muscle contraction.
- d) Define Autecology.
- e) Define Natural ecosystems with its examples.
- f) What is human - wildlife conflict?

Q2) a) Discuss the movement of food starting from mouth & the changes it undergoes. **[7]**

b) Describe about the Abiotic & Biotic components in the ecosystem. **[5]**

Q3) a) Write the types of sensory receptors based on the types of stimuli they detect. **[7]**

b) Describe the population characteristics in detail. **[5]**

Q4) a) What is methanephric kidney? Add a note on structure of single nephron. **[7]**

b) Describe mechanism of thermoregulation in homeotherms. **[5]**

P.T.O.

Q5) a) Enlist the causes of wildlife depletion. [7]

b) Describe biomes & give its importance. [5]

Q6) a) Explain the structure of striated muscles in vertebrates. [7]

b) Describe the importance of Red Data book in conservation of species.[5]

Q7) Write short note on any Two of the following : [12]

a) Describe the mechanism of the temperature regulation in poikilotherms.

b) Describe the structure of vertebrates eye.

c) Describe the important projects for the conservation of wildlife in India.



Total No. of Questions : 5]

SEAT No. :

PD-3270

[Total No. of Pages : 4

[6479]-24

M.Sc. (Part - I)

ZOOLOGY

ZODT 124 : Ichthyology

(2019 Pattern) (Semester-II) (2 Credits)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Q.No 1 is compulsory.
- 2) Solve any three questions from Q.No 2 to Q.No. 5.
- 3) Q.No. 2 to Q.No. 5 carry equal marks.

Q1) Solve any Five of the following :

[5]

- a) Name any two types of scales in fishes
- b) Air bladder
- c) Define Aquarium
- d) Name any two bacterial diseases in fishes
- e) Two types of nitrogenous waste products in fishes
- f) Define osmoregulation

Q2) a) Discuss organization of central and peripheral nervous system.

[6]

b) Define TAMO and urea as a nitrogen excretory products.

[4]

Q3) a) Discuss about packing and transport+mechanism in fishes.

[6]

b) Write a note on lateral line system.

[4]

P.T.O.

Q4) a) Give an account on pitutary gland. **[6]**

b) Fish skin and scales. **[4]**

Q5) Solve any Two of the following : **[10]**

a) Photo receptors

b) Spawning

c) Worm and crustacean diseases.



Total No. of Questions : 5]

PD-3270

[6479]-24

M.Sc. (Part - I)

ZOOLOGY

ZODT 124 : Metabolic Pathways

(2019 Pattern) (Semester-II) (2 Credits)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Q.No 1 is compulsory.*
- 2) *Solve any three questions from Q.No 2 to Q.No. 5.*
- 3) *Q.No. 2 to Q.No. 5 carry equal marks.*

Q1) Solve any Five of the following : **[5]**

- a) Define second law of thermodynamics
- b) Define Internal Energy
- c) Define entropy
- d) Define Metabolism
- e) Define Free Energy
- f) What is inborn Errors of Metabolism?

Q2) a) Explain the role of branching enzyme and debranching enzyme in glycogen metabolism. **[6]**

b) Explain different ways by which metabolic pathways are regulated. **[4]**

Q3) a) Explain the reactions in which glucose is formed of non-carbohydrate source. **[6]**

b) Write a note on ketogenesis. **[4]**

- Q4)** a) Explain the oxidation of even chain fatty acids with suitable examples. [6]
b) Describe complex III & complex IV of ETC. [4]

Q5) Solve any Two of the following : [10]

- a) What is oxidative deamination? Explain with suitable example.
b) Explain the de-hovo pathway of purine synthesis.
c) Explain the conversion of citrate to isocitrate to α -ketoglutarate.



Total No. of Questions : 7]

SEAT No. :

PD-3271

[Total No. of Pages : 6

[6479]-31
M.Sc. (Part - II)
ZOOLOGY
ZOUT - 231 : Animal Physiology - I (Special)
(Rev. 2019) (4 Credits) (Semester - III)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Q. No. 1 is compulsory.
- 2) Solve any Five questions from Q.2 to Q.7.
- 3) Q. No. 2 to 7 carry equal marks.

Q1) Solve any five of the following :

[10]

- a) What is swim bladder?
- b) Define-Homeostasis
- c) Define: Nutrition
- d) What is internal respiration?
- e) Define: Action Potential.
- f) What is photoperiodism?

Q2) a) What is Bioluminescence? Explain biochemical and molecular mechanism of bioluminescence. [7]

b) Explain structure and function of voltage gated Na⁺ and K⁺ channels. [5]

Q3) a) What is external environment? Explain aquatic and terrestrial environment. [7]

b) Explain the relation between the muscle length & tension [5]

P.T.O.

- Q4)** a) Define respiration. Discuss the role of central and peripheral receptors in respiration. [7]
b) Explain sliding filament theory of muscle contraction. [5]
- Q5)** a) Explain Nernst Potential. Add a note on Goldman – Hodgkin Katz potential. [7]
b) Explain the role of gas floats in buoyancy. [5]
- Q6)** a) Define digestion. Explain the components of digestive system. [7]
b) Describe abnormalities in the blood gas content. [5]
- Q7) Write short notes on any two of the following :** [12]
a) Explain the process of gas exchange across pulmonary and systemic capillaries.
b) What is animal electricity? Explain the structure of electric organ.
c) Explain structure and function of plasma membrane Add a note on facilitated diffusion.



Total No. of Questions : 7]

PD-3271

[6479]-31
M.Sc. (Part - II)
ZOOLOGY
ZOUT - 231 : Entomology - I (Special)
(Rev. 2019) (4 Credits) (Semester - III)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) *Q. No. 1 is compulsory.*
- 2) *Solve any Five questions from Q.2 to Q.7.*
- 3) *Q. No. 2 to 7 carry equal marks.*

Q1) Solve any five of the following :

[10]

- a) Define endopterygota.
- b) Write the structure and example of setaceous antenna.
- c) Explain elytra
- d) Explain raptorial leg
- e) Explain luciferin
- f) Explain bipolar neuron

Q2) a) Explain structure and function of tentorium in insects.

[7]

b) Explain the characters of Isoptera with two examples.

[5]

Q3) a) Explain in brief different theories regarding origin of insects.

[7]

b) Explain in brief structure and functions of integument in insects.

[5]

P.T.O.

- Q4)** a) Explain respiratory system in insects. [7]
b) Explain the characters of phasmida with two examples. [5]
- Q5)** a) Give the distinguishing characters of order Diptera with two examples. [7]
b) Explain filter chamber in insects. [5]
- Q6)** a) Mention the distinguishing characters of Lepidoptera with two examples. [7]
b) Explain male reproductive system of generalized insect. [5]
- Q7)** Write short notes on any two of the following : [12]
a) Chewing and lapping type of mouthparts
b) Exocrine glands in insect
c) Compound eye of insect.



Total No. of Questions : 7]

PD-3271

[6479]-31
M.Sc. (Part - II)
ZOOLOGY
ZOUT - 231 : Genetics - I (Special)
(Rev. 2019) (4 Credits) (Semester - III)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) *Q. No. 1 is compulsory.*
- 2) *Solve any Five questions from Q.2 to Q.7.*
- 3) *Questions 2 to 7 carry equal marks.*

Q1) Solve any five of the following :

[10]

- a) Write short notes on: Paralogous gene and Inbreeding.
- b) Define the term: Fluorescent in situ Hybridization (FisH) and Polymerase Chain Reaction (PCR)
- c) What is gene therapy? What is the current status of gene therapy research in India?
- d) Explain disruptive selection with suitable example.
- e) Enlist the applications of reverse genetics and quantitative genetics.
- f) What is the evolutionary significance of neutral mutations?

Q2) a) The frequency of Phenylketonuria (PKU caused by an autosomal allele) is 0.00004 at birth. Assuming Hardy - Weinberg, what is the frequency of PKU allele? What is the expected Hardy - Weinberg frequency of the PKU carriers? **[7]**

b) Explain heritability. How is heritability estimated? **[5]**

P.T.O.

- Q3)** a) Explain the strategies adopted to complete human genome project. [7]
 b) Describe the functions of lin -12, ced-3, ced-4 genes in caenorhabditis elegans. [5]
- Q4)** a) Describe both classical and modern concepts of speciation. [7]
 b) What are the distinctive features found in caenorhabditis elegans by virtue of which it is considered as one of the best model organism in developmental Genetics research. [5]
- Q5)** a) If there are 7 alleles for a gene, then what would be the total number of genotypes? Justify your answer. [7]
 b) Define the terms with suitable examples: [5]
 i) hemizyosity ii) Phenocopy
- Q6)** a) Explain using suitable examples from human as well as non-human biota that quantitative genetics focusses on inheritance of complex characteristics whose phenotypes often vary continuously and are also called multifactorial polygenic inheritance. [7]
 b) The frequency of newborn infants, homozygous for a recessive lethal allele is about 1 in 25,000. What is the expected frequency of the carriers of this allele in the population? (Assume random mating). [5]
- Q7)** Write short notes on any two of the following : [12]
 a) Frameshift mutation
 b) VNT Rs
 c) Directional selection



Total No. of Questions : 7]

SEAT No. :

PD-3272

[Total No. of Pages : 2

[6479]-32
M.Sc. (Part-II)
ZOOLOGY
ZOUT-232: Fundamentals of Systematics and Economic Zoology
(Rev. 2019) (Semester - III) (4 Credits)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q. 1 is compulsory.*
- 2) *Solve any five questions from Q. 2 to Q. 7.*
- 3) *Questions Q. 2 to Q. 7 carry equal marks.*

Q1) Solve any five from the following :

[10]

- a) Taxonomy
- b) Species
- c) Phylogeography
- d) Vermiculture
- e) Stored grain pest
- f) Animal husbandry

Q2) a) What is systematics? Add a note on numerical taxonomy and chemotaxonomy. [7]

b) Describe the types of poultry birds and their economic importance. [5]

P.T.O.

- Q3)** a) Write a note on sericulture industry in India. [7]
b) Write a note on taxonomic procedures. [5]
- Q4)** a) Discuss the concept of Zoological nomenclature. Add a note on the operative principles of ICZN. [7]
b) Write a note on economic importance of parasitic protozoa. [5]
- Q5)** a) Discuss the economic importance of insects. [7]
b) Write a note on morphology based taxonomy. [5]
- Q6)** a) Discuss the key characters of major animal phyla with one example. [7]
b) Discuss the economic importance of helminth worms. [5]
- Q7)** Write a short note on any two of the following: [12]
a) Cytotaxonomy
b) Piggary
c) Economic importance of amphibians and birds



Total No. of Questions : 7]

SEAT No. :

PD-3273

[Total No. of Pages : 2

[6479]-33
M.Sc. Part-II
ZOOLOGY
ZOUT-233: Research Methodology and Insect Physiology
and Biochemistry
(2019 Pattern) (Semester - III) (4 Credits)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Q. 1 is compulsory.
- 2) Solve any five questions from Q. 2 to Q. 7.
- 3) Questions Q. 2 to Q. 7 carry equal marks.

Q1) Solve any five of the following :

[10]

- a) What is Sclerotization?
- b) Define Moulting.
- c) State the applications of protein microarray
- d) Define Database.
- e) Name any two types of haemocytes
- f) Name any two endocrine hormones of insects.

Q2) a) What is digestion? Describe physiology of digestion and absorption of carbohydrates. **[7]**

b) Define documentation and state its importance in scientific research. **[5]**

P.T.O.

- Q3)** a) Define Biostatistics. Explain the quantitative methods of biostatistics used for analysis of biology biological data. [7]
- b) Explain the physiology of flight muscle. [5]
- Q4)** a) Describe functions of microsomal and extra microsomal enzymes in detoxification. [7]
- b) Explain structure and functions of fat body. [5]
- Q5)** a) Explain the chromatography techniques used for purification and characterization of biomolecules. [7]
- b) Write about the new generation DNA sequencing. [5]
- Q6)** a) Discuss the mechanism of ventilation in insect and give its control during ventilation. [7]
- b) Explain the role and applications of protein microarray. [5]
- Q7)** Write a short notes on any two of the following: [12]
- a) Explain the role of hormones in insect moulting.
- b) Describe the outline of a scientific paper.
- c) Describe physico-chemical characteristics of insect plasma.



Total No. of Questions : 6]

SEAT No. :

PD-3274

[Total No. of Pages : 4

[6479]-34
M.Sc. (Part - I)
ZOOLOGY
ZYODT 234 : Genetics Toxicology
(2019 Pattern) (Semester - III) (2 Credits)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Q.No. 1 is compulsory.
- 2) Solve any three questions from Q.No. 2 to Q.No. 5.
- 3) Q.No. 2 to Q.No. 5 carry equal marks.

Q1) Solve any Five of the following : **[5]**

- a) Define Genetic Toxicology
- b) Define mutagen
- c) What is paracentric inversion?
- d) Write genotype of *Salmonella typhimurium* TA 98 genotype used in Ames test.
- e) What are benign tumours?
- f) Define silent mutation.

Q2) a) Describe Sex Linked Recessive Lethal Test in Drosophila used in genotoxic screening. **[6]**

b) Write a note on mutagenic agents in human environment. **[4]**

Q3) a) Write a note on role of genetic toxicology in studies of congenital malformation. **[6]**

b) Describe scope and significance of genetic toxicology. **[4]**

- Q4)** a) Explain how tautomeric shift in DNA bases during replication leads to mutations. [6]
b) Describe plant test system. [4]

Q5) Attempt any Two of the following : [10]

- a) Describe various molecular methods used in mutation detection.
b) What are chromosomal aberrations? Explain the various aberrations with suitable examples.
c) Describe in detail ANY TWO Mammalian cytogenetic Tests.



Total No. of Questions : 5]

PD-3274

[6479]-34

M.Sc. - II

ZOOLOGY

ZODT 234 : Immunology

(2019 Pattern) (Semester - III) (2 Credits)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Question 2 to 5 carry equal marks.*

Q1) Solve any Five of the following : [5]

- a) Give two examples of primary Lymphoid Organs.
- b) Define Monoclonal Antibody.
- c) What do you mean by 'Hypersensitivity'?
- d) What is Autoimmunity? Give one example of Autoimmune disease.
- e) What is ELISA? State any one of its applications.
- f) Enlist any two macromolecules involved in Humoral Immunity.

Q2) a) Elaborate on the Principle and Applications of Immuno-electrophoresis. [6]

b) Write a short note on Immunogenetics. [4]

Q3) a) Give an account of molecular basis of "Antibody-class-switching". [6]

b) What is the concept of MHC? Add a note on different classes of MHC (Major Histocompatibility Complex). [4]

Q4) a) Write an essay on : Active and Passive Immunization. **[6]**

b) Explain Antibody structure with suitable diagram. **[4]**

Q5) Write short notes on any Two of the following : **[10]**

a) Immunological Tolerance and its importance

b) Types of Vaccines.

c) Complement Fixation Test.



Total No. of Questions : 7]

SEAT No. :

PD-3275

[Total No. of Pages : 6

[6479]-41

M.Sc (Part - II)

ZOOLOGY

ZOUT 241 : Animal Physiology - II

(Revised 2019 Pattern) (Semester - IV) (4 Credit)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Q.1 is compulsory.
- 2) Solve any five questions from Q.2 to Q.7.
- 3) Q.2 to Q.7 carry equal marks.

Q1) Solve any five of the following :

[10]

- a) Define BMR.
- b) What is saltatory conduction.
- c) Give two examples of Neurotransmitters.
- d) Define synapse.
- e) Explain Taste bud.
- f) What is erythropoiesis?

Q2) a) Define Blood. Explain the composition and functions of the blood. **[7]**

b) "Ammonia formed in body is toxic" Explain. **[5]**

Q3) a) Define acclimation. Discuss the problems of deep sea diving. **[7]**

b) Explain the role of rhodopsin in sense of vision. **[5]**

Q4) a) Define cardiac cycle. Explain the events of cardiac cycle. **[7]**

b) What is Blood pressure? Explain different types of Blood pressure. **[5]**

P.T.O.

- Q5)** a) Describe structure of Ear. Add a note on physiology of hearing. [7]
b) Explain role of fats and glycogen as energy storage. [5]
- Q6)** a) What is excretion? Explain Osmoregulation in fresh water fishes. [7]
b) Discuss various physiological strategies used to cope up with effect of high altitude. [5]
- Q7)** Write short note (Any two) [12]
a) Osmoregulation in Marine water fishes.
b) Physiology of vision.
c) Role of Malphigion tubule in invertebrates.



Total No. of Questions : 7]

PD-3275

[6479]-41

M.Sc (Part - II)

ZOOLOGY

ZOUT 241 : Entomology - II

(Revised 2019 Pattern) (Semester - IV) (4 Credit) (Special)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Solve any five questions from Q.2 to Q.7.*
- 3) *Q.2 to Q.7 carry equal marks.*

Q1) Solve any five of the following : [10]

- a) Define Vitellogenesis.
- b) Define energids.
- c) Explain anatrepsis.
- d) Explain the role of juvenile hormone.
- e) Explain Oviparity.
- f) Define ageing.

Q2) a) Describe the process of fertilization in insects. [7]

b) Sketch and label telotrophic ovariole. [5]

Q3) a) Describe cleavage and blastoderm formation in insect. Add a note on its control. [7]

b) What is gastrulation? Explain variation in the process of gastrulation.[5]

Q4) a) Describe embryonic development of alimentary canal in insects. [7]

b) Describe the formation of dorsal closure and dorsal organ in insects.[5]

- Q5)** a) What is metamorphosis? Explain gradual metamorphosis in insects. [7]
b) Explain eclosion from the egg in insects. [5]
- Q6)** a) Describe apodous larva with suitable examples. [7]
b) Describe exarate pupa with suitable examples. [5]
- Q7)** Write short note on any two of the following: [12]
a) Hemimetabolous development.
b) Coarctate pupa with suitable examples.
c) Occurrence and initiation of diapause.



Total No. of Questions : 7]

PD-3275

[6479]-41

M.Sc (Part - II)

ZOOLOGY

ZOUT 241 : Genetics - II

(Revised 2019 Pattern) (Semester - IV) (4 Credit)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Q.1 is compulsory.***
- 2) Solve any 5 questions from Q.2 to Q.7.***
- 3) Question 2 to 7 carry equal marks.***

Q1) Solve any five of the following : [10]

- a) Define Mosaicism
- b) OMIM
- c) Virulent phage
- d) SNP
- e) Syngenic mice
- f) Quantitative trait loci

Q2) a) Explain genetic basis of antibody diversity. [7]

b) Write a note on proto-oncogenes. [5]

Q3) a) Describe the structure of normal hemoglobin. Add a note on Thalassemia major. [7]

b) Write a short note on RNA phages. [5]

Q4) a) Explain genetics of Schizophrenia disease. [7]

b) Discuss nature of nurture. [5]

- Q5)** a) What are HOX genes in Drosophila? Add a note on its regulation. [7]
b) Explain in detail radiation hybrid mapping. [5]
- Q6)** a) Discuss learning and memory mutants in Drosophila. [7]
b) Describe lysogenic cycle of bacteriophage lambda. [5]
- Q7)** Solve any two of the following. [12]
a) Discuss any one lysosomal storage disorder in detail.
b) Write a note on LOD score analysis.
c) Describe X-inactivation in humans



Total No. of Questions : 7]

SEAT No. :

PD-3276

[Total No. of Pages : 2

[6479]-42

M.Sc.

ZOOLOGY

**ZOUT - 242 : Mammalian Reproductive Physiology & Aquaculture
(2019 Pattern) (Semester - IV) (4 Credit)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Q. No. 1 is compulsory.
- 2) Solve any five questions from Q.2 to Q.7.
- 3) Q. No. 2 to 7 carry equal marks.

Q1) Solve any Five of the following :

[10]

- a) Define spermatogenesis.
- b) What is menarch?
- c) Enlist methods of fish preservation.
- d) What is meant by Induced breeding?
- e) Enlist names of major bacterial diseases in fishes.
- f) Give composition of pearl.

Q2) a) Give causes of infertility in male and female.

[7]

b) Describe steps in the culture of fresh water prawn.

[5]

Q3) a) Describe induced breeding techniques using pituitary extract.

[7]

b) Describe anatomical structure of mammary gland.

[5]

Q4) a) Explain hormonal regulation in pregnancy.

[7]

b) Differentiate between monoculture and composite culture.

[5]

P.T.O.

- Q5)** a) Describe the successive stages of oestrous cycle. [7]
b) Explain role of pH impact on water quality and fish culture. [5]
- Q6)** a) Discuss Integrated fish farming and write its applications. [7]
b) Describe role of prostaglandins in reproduction. [5]
- Q7) Write short note (Any two) :** [12]
a) Fish products and by-products.
b) Delayed implantation.
c) Functions of sertoli cells.



Total No. of Questions : 5]

SEAT No. :

PD-3277

[Total No. of Pages : 4

[6479]-43

M.Sc. (Part - II)

ZOOLOGY

**ZODT - 243 : Histology and Histochemistry
(2019 Pattern) (Semester - IV) (2 Credits)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) *Question 1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Question 2 to 5 carry equal marks.*

Q1) Solve any five of the following :

[5]

- a) Define Muscular tissue.
- b) What is Block making?
- c) Write the fus. of cryostat.
- d) What is automated microtome?
- e) Define dehydration.
- f) Define nucleic acid.

Q2) Answer the following questions :

- a) Describe the principle design and functioning of cryostat. **[6]**
- b) Explain the different applications of histochemical methods for detection of various types of immuno fluorescent techniques. **[4]**

Q3) Answer the following questions :

- a) Write about the general principle for preparation of tissues for histology. **[6]**
- b) Describe the histochemical localization of RNA. **[4]**

P.T.O.

Q4) Answer the following questions :

- a) Explain the principle and mechanism for identification of glycoproteins.[6]
- b) Write about the histochemical localization of mucopolysaccharides by PAS method. [4]

Q5) Write short notes on any two of the following : [10]

- a) Principle for demonstration of lipids in various animal tissues by Sudan black B method.
- b) Methods of temporary and permanent preparations.
- c) Principle and method for identification of proteins by Congo red method.



Total No. of Questions : 5]

PD-3277

[6479]-43
M.Sc. (Part - II)
ZOOLOGY
ZODT - 243 : Pest Control
(2019 Pattern) (Semester - IV) (2 Credits)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) *Question 1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Question No. 2 to 5 carry equal marks.*

Q1) Solve any five of the following : **[5]**

- a) Insecticide
- b) Non residual pesticide
- c) Repellants
- d) Bait
- e) Residual toxicity
- f) Antidote

Q2) a) Describe mechanical method of pest control. **[6]**

b) Explain control measures for stored grain pests. **[4]**

Q3) a) Describe advantages and disadvantages of biological control. **[6]**

b) Explain non insect pests and their control. **[4]**

P.T.O.

- Q4)** a) Describe the role of chemosterilants and radiations for sterilization of pest. [6]
- b) Explain the role of biological agents in biological control of pests. [4]

Q5) Solve any two of the following : [10]

- a) IPM
- b) Hazards of pesticides
- c) Types of pests



Total No. of Questions : 5]

SEAT No. :

PD-3278

[Total No. of Pages : 2

[6479]-44
M.Sc. (Part - II)
ZOOLOGY
ZODT -244 : Pollution Biology
(2019 Pattern) (Semester - IV) (2 Credits)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any three questions from Q.No. 2 to Q. No.5*
- 3) *Question No 2 to 5 carry equal marks.*

Q1) Solve any five of the following. **[5]**

- a) Hydrosphere
- b) Pollution
- c) Bio accumulation
- d) Effects of DDT
- e) LDSO
- f) Ionizing radiations

Q2) a) What are pesticides? Add a note on kinds and sources of pesticides. **[6]**

b) What is bioassay? Add a note on purpose of bioassay. **[4]**

Q3) a) What is pollution monitoring? Explain the strategies for monitoring of noise pollution. **[6]**

b) Explain the sources and effects of radioactive pollution. **[4]**

Q4) a) What is biomedical waste? Add a note on its handling and management. **[6]**

b) Explain Environmental Protection Act of 1986. **[4]**

Q5) Solve any two of the following. **[10]**

- a) Bio magnification of pollutants.
- b) Different types of pollution.
- c) Bio concentration and bio accumulation.



P.T.O.

Total No. of Questions : 5]

PD-3278

[6479]-44
M.Sc. (Part - II)
ZOOLOGY
ZODT -244 : Apiculture
(2019 Pattern) (Semester - IV) (2 Credit)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any 3 questions from Q.No2 to Q.No.5*
- 3) *Question No. 2 to 5 carry equal marks.*

Q1) Solve any five of the following : **[5]**

- a) Royal Jelly
- b) Nuptial Flight
- c) Langstroth Bee Box
- d) Rock Bee
- e) Bee Venom
- f) Smoker

Q2) a) Describe different honey bee pests with examples and their preventive measures. **[6]**

b) Bee pollination. **[4]**

Q3) a) Explain colony organization and division of labour in honey bees. **[6]**

b) Waggle Dance **[4]**

Q4) a) Describe life cycle of Honey bee. **[6]**

b) History of Beekeeping. **[4]**

Q5) Solve any two of the following. **[10]**

- a) Entrepreneurship in Apiculture.
- b) Give medical importance of Bee Venom
- c) Propolis

