Total No. of Questions : 7]

SEAT No. :

**PA-3248**

[Total No. of Pages : 2

# [5912]-11
# F.Y. M.Sc. (Semester-I)
# ZOOLOGY
## ZOUT-111 : Biochemistry and Biochemical Techniques
## (2019 Pattern) (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) ***Question 2 to 7 carry equal marks.***

***Q1)*** Solve any five of the following. **[10]**

a) What is active site of an enzyme?

b) Define the term of manometry.

c) What is allosteric enzyme?

d) What is agarose? Explain its role.

e) What is centrifugation?

f) Enlist any four fat soluble vitamins.

***Q2)*** a) What is secondary structure of protein? Write a note on Ramachandran plot. **[7]**

b) Explain the principle and working of uv-visible spectrophotometer. **[5]**

***Q3)*** a) Derive Michaelis - Menten equation based on equilibrium assumption. **[7]**

b) Explain in details DNA sequencing methods. **[5]**

***Q4)*** a) Explain the N-Terminal sequencing in protein. **[7]**

b) Define enzyme inhibition. Explain type of enzyme inhibition with suitable example. **[5]**

***P.T.O.***

***Q5)*** a) What are vitamins? Explain the water soluble vitamins with their significance. **[7]**

b) Define the term of chromatography. Write a note on affinity chromatography. **[5]**

***Q6)*** a) What are steroids? Explain their Biological significance. **[7]**

b) Describe in details types of centrifugation and explain its applications. **[5]**

***Q7)*** Write a note on any two of the following. **[12]**

a) Gel chromatography.

b) Types of protein structures.

c) Protein electrophoresis.

Total No. of Questions : 7]

SEAT No. :

**PA-3249**

[Total No. of Pages : 2

# [5912]-12

## M.Sc.

## ZOOLOGY

## ZOUT-112: Cell Biology & Development Biology

## (2019 Pattern) (Semester - I) (4 Credits)

*Time : 3 Hours]* *[Max. Marks : 70*

***Instructions to the candidates :***

1) ***Q.1 is compulsory.***
2) ***Solve any five questions from Q2 to Q7.***
3) ***Q2 to Q7 carry equal marks.***

***Q1)*** Solve any Five of the following : **[10]**

a) Megalecithal egg.

b) Plasmodesmata.

c) Radial holoblastic clevage.

d) Pattern formation.

e) Intrinsic proteins.

f) P 53 protein.

***Q2)*** a) Describe the cell cycle check points? Explain their relationship with cancer. **[7]**

b) Describe molecular events during capacitation of sperm in mammals. **5]**

***Q3)*** a) Explain the importance of chick & frog as best models for embryology.**[7]**

b) Differentiate between Prokaryote & Eukaryote cell. **[5]**

***P.T.O.***

***Q4)*** a) Explain the role of goligi complex in sorting & transport of vehicles to their final destination. **[7]**

b) With the help of development of vertebrate eye, explain the process of induction. **[5]**

***Q5)*** a) Explain the role of bicoid, nanos, caudal & hunchback morphogens in anterior posterior axis formation in Drosophila. **[7]**

b) Co-translational & post-translational transport of proteins. **[5]**

***Q6)*** a) Explain the structure & function of $F_0F_1$ complex in mitochondria. **[7]**

b) Define Regeneration & enlist different types of regenerations with suitable examples. **[5]**

***Q7)*** Attempt any Two of the following :

a) Explain major pattern of clevages in vertebrates. **[6]**

b) Explain the role of smooth endoplasmic reticulum in carbohydrate & lipid metabolism. **[6]**

c) Explain the structure & function of nuclear pore complex. **[6]**

Total No. Of Questions : 5]

SEAT No. :

**PA-3250**

[Total No. Of Pages : 2

# [5912]-13
## M.Sc. I
## ZOOLOGY
## ZOUT-113: Genetics and English For Scientific Communication
## (2019 Pattern) (Semester-I) (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) ***Question 2 to 7 carry equal marks.***

***Q1)*** **Solve <u>any Five</u> from the following** : **[10]**

a) Transduction.

b) Law of dominance.

c) Sex linked inheritance.

d) Synonyms.

e) Super fluous words.

f) Paraphases.

***Q2)*** a) Describe the draft of research project for financial assistance. **[7]**

b) Write a note on multiple alleles. **[5]**

***Q3)*** a) Discuss the pattern of inheritance of any one dominant and recessive human genetic disorder. **[7]**

b) Write a note on tools and techniques of effective oral presentation. **[5]**

***P.T.O.***

***Q4)*** a) In given human population the frequency of ABO alleles are given. Calculate the frequencies of all possible Genotypes.

$I^A = 0.25$ $I^B = 0.50$ $I^O = 0.25$. **[7]**

b) Write a note on editing and correction methods of scientific paper. **[5]**

***Q5)*** a) Discuss the outline of scientific research paper. Add a note on citations. **[7]**

b) In Drosophila the results of Two point test cross are as below. Construct a chromosome map. **[5]**

AB - 42

ab - 44

Ab - 105

aB - 109

***Q6)*** a) Discuss the law of segregation with example. Add a note on testcross. **[7]**

b) Write a note on Plagiarism. **[5]**

***Q7)*** **Write a short note on any two of the following:** **[12]**

a) Polygenic inheritance

b) Precis writing

c) Pragmatic competence of communication.

Total No. of Questions : 5]

SEAT No. :

PA-3251

[Total No. of Pages : 5

# [5912]-14

## M.Sc. Zoology (Part - I)

## ZODT-114 : BIOSTATISTICS

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

*Time : 2 Hours]* *[Max. Marks : 35*

***Instructions to the candidates:***

1) ***Q.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.***
4) ***Figures to the right indicate full marks.***
5) ***Use of statistical table and calculator is allowed.***



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

Choose correct alternative from the following :

a) With the help of ogive curve, one can not determine _____.

A) Median B) Deciles

C) Percentiles D) Mode

b) Mode of the data is _____.

A) Middle most value B) The minimum value

C) The maximum value D) The most frequent value

c) If the smallest value in a set is? and its range is 85, the largest value of the set is _____.

A) 92 B) 78

C) 82 D) 98

d) If Corr(X, Y) = –0.75, then Corr(X, –Y) = _____.

A) –0.75 B) +0.75

C) 0 D) –1

***P.T.O.***

e) If S.D.(X) = $\sigma_x$ = 1, S.D.(Y) = $\sigma_y$ = 2 and Corr (X, Y) = $r_{XY}$ = 0.5 then Cov(X, Y) = _____.

A) 0.25 B) 0.40

C) 1 D) 4

f) The sample space corresponding to the experiment "five seeds are planted and the total number of seeds germinated are recorded after a week" is _____.

A) (1, 2, 3, 4, 5) B) (1, 2, 3, 4, 5, 6, 7)

C) (0, 1, 2, 3, 4, 5) D) (5, 6, 7)

***Q2)*** a) Solve any two of the following : (3 each) **[6]**

i) In a population of size N = 6, the observations were : 3, 4, 7, 9, 11, 14. Draw all possible SRSWOR of size 2.

ii) Explain the terms : class frequency, less than type cumulative frequency, more than type cumulative frequency.

iii) Explain Why standard deviation is the best measure of dispersion.

b) The range, arithmatic mean and standard deviation of 10 observations are 12, 50 and 6 respectively. If each observation is increased by 10, What will be new range, mean and S.D.? **[4]**

***Q3)*** a) Solve any two of the following : (3 each) **[6]**

i) Define Karl - pearson's coefficient of correlation and state its properties.

ii) Distinguish between regression coefficients and correlation coefficient.

iii) Give the classical definition of probability. State its limitations.

b) The probabilities that a man fishing at a particular place will catch 1, 2, 3 and 4 fish are 0.4, 0.3, 0.15 and 0.15 respectively. What is the expected number of fish caught? **[4]**

***Q4)*** a) Solve <u>any two</u> of the following : (3 each) **[6]**

i) Explain the terms : hypothesis, null hypothesis, alternative hypothesis.

ii) Explain the terms : Test, critical region, acceptance region.

iii) Explain the terms :

Type I error

Type II error

b) For $X \rightarrow B(n, P)$ with

i) $n = 25$, $E(x) = 10$, find P and Var(X) **[2]**

ii) Is this true $E(X) = 3$, $Var(X) = 5$? **[2]**

***Q5)*** Solve any four of the following : (2½ each) **[10]**

a) If $X \rightarrow$ Poisson(m) with $P(X = 0) = 0.5$ then find the value of parameter m and its mean and variance.

b) If a r.v.x $\rightarrow N(0, 1)$ then obtain the values of $P(X \leq 0)$, $P(X \geq 0)$, mean, median and mode of r.v.x.

c) Explain the terms : level of significance p-value

d) Explain Chi-square test of goodness of fit.

e) Explain paired t-test.

f) Explain F-test for equality of two population variances.

**Total No. of Questions : 5]**

**PA-3251**

# [5912]-14
## M.Sc. Zoology (Part - I)
## ZODT-114 : FRESHWATER 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 three questions from Q.No. 2 to Q. No. 5.***
3) ***Question No. 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***



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

a) Turbidity

b) Peats and bogs

c) Water current

d) Mining waste

e) Order plecoptera

f) Osmotic adaptations.

***Q2)*** a) What is eutrophication? Explain how it occurs and its impact on freshwater biota. **[6]**

b) Mention thermal adaptations in fresh water fauna. **[4]**

***Q3)*** a) Give taxonomic characters of Ostracoda. **[6]**

b) Mention reproductive adaptations in freshwater fauna. **[4]**

***Q4)*** a) What are the chemical properties of freshwater body? Mention any four of them. **[6]**

b) Write a note on taxonomic characters of copepoda. **[4]**

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

a) Respiratory adaptations in fresh water ephemeroptera.

b) Invasive species and its impact on biota.

c) Write a note on effect of nitrates on freshwater biota.

Total No. of Questions : 7]

SEAT No. :

**PA-3252**

[Total No. of Pages : 2

**[5912]-21**

**M.Sc. - I**

**ZOOLOGY**

**ZOUT-121 : Molecular Biology and Bioinformatics**

**( 2019 Pattern) (Semester-II) (4-Credits)**

*Time : 3 Hours]* *[Max. Marks : 70*

***Instructions to the candidates:***

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

***Q1)*** Solve any five of the following. **[10]**

a) Give structure of ribosome in eukaryotes.

b) Write expansion i) EMBL ii) DDBJ.

c) Explain chromatin remodeling.

d) Explain the telomere.

e) What is OMIM.

f) Define phosphodiester linkage.

***Q2)*** a) Describe activation of amino acids during translation, process. **[7]**

b) Write a note on origin recognition complex in replication of eukaryotes. **[5]**

***Q3)*** a) Explain the post-translational modification of M-RNA. **[7]**

b) Describe SINES and LINES. **[5]**

***Q4)*** a) Explain the working of BLAST based on sequence alignments. **[7]**

b) Explain SOS repair mechanism of DNA. **[5]**

***P.T.O.***

***Q5)*** a) Write a note on DNA damage by UV radiation and alkylating agents. **[7]**

b) Explain the lac operon in prokaryotes. **[5]**

***Q6)*** a) What is secondary database? What are major secondary database. **[7]**

b) Explain C-value parado. **[5]**

***Q7)*** Write short notes on any two of the following. **[12]**

a) Explain the mechanism of okazaki fragments? Give different enzymes involved in replication.

b) Write a note on retrotransposons.

c) Discuss the importance of biological databases in bioinformatics.

**Total No. of Questions : 7]**

**SEAT No. :** ____

**PA-3253**

**[Total No. of Pages : 2**

**[5912]-22**

# M.Sc.-I

# ZOOLOGY

## ZOUT -122 : Endocrinology & Parasitology

## (2019 Pattern) (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) ***Questions from 2 to7 carry equal marks.***



***Q1)*** Solve any 5 of the following: **[10]**

a) Chronobiology.

b) Hypophysiotropins.

c) Peptide hormones.

d) Parasitism

e) Serology.

f) Hyper parasitism.

***Q2)*** a) Describe be morphology and life cycle of Trypanosoma sps. **[7]**

b) Write a note on plasma membrane receptors. **[5]**

***Q3)*** a) Explain gastrointestinal hormones. **[7]**

b) Write a note on myasis. **[5]**

***Q4)*** a) Discuss molecular characteristics of VSG in Trypanosomes. **[7]**

b) Write a note on hormones as chemical messangers. **[5]**

***P.T.O.***

***Q5)*** a) Discuss mechanism of hormone action in steroid hormones. **[7]**

b) Explain pathogenicity, treatment and prophylaxis of Leishmania. **[5]**

***Q6)*** a) Describe biological control of parasites. **[7]**

b) Write a note on hormonal regulation of carbohydrates metabolism. **[5]**

***Q7)*** Write a short note on any two of the following. **[12]**

a) ELISA.

b) Immunodiffusion.

c) Osmoregulatory hormones.

● ● ●

Total No. of Questions : 7]

SEAT No. :

**PA-3254**

[Total No. of Pages : 2

**[5912]-23**

# M.Sc.-I

# ZOOLOGY

## ZOUT-123 : Comparative Animal Physiology and Environmental Biology.

## (2019 Pattern) (Semester-II) (4 Credits)

*Time : 3 Hours]* *[Max. Marks : 70*

***Instructions to the candidates:***

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



***Q1)*** Solve any five from the following: **[10]**

a) What are enzymes.

b) Define neurosecretion.

c) Explain resistance and to lerance.

d) Ecosystem.

e) Wet land.

***Q2)*** a) Describe the major organs and associated glands of the digestive system of animals. **[7]**

b) Discuss the practices & strategies of wild life conservation. **[5]**

***Q3)*** a) Discuss the concept of ecosystem with any one example. **[7]**

b) Describe the basic process of urine formation. **[5]**

***Q4)*** a) What is respiration? describe the role of blood pigment in oxygen transport. **[7]**

b) Write a note on characteristics of population. **[5]**

***Q5)*** a) Discuss the concept of wetland. Add a note on types of wetland. **[7]**

***P.T.O.***

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

***Q6)*** a) Explain the structure of skeletal muscle. Add a note on Muscle contraction and role of $Ca^{+2}$ ions in contraction. **[7]**

b) Write a note on Biodiversity hotspots in India. **[5]**

***Q7)*** Write a short note on any two of the following: **[12]**

a) Discuss the classification of sense organs.

b) Discuss compensatory patterns in poikilotherms.

c) Discuss the role of local communities in wild life conservation.

Total No. of Questions : 5]

SEAT No. :

**PA-3255**

[Total No. of Pages :2

# [5912]-24
# M.Sc. - 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 compuslory.*
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 questions. **[5]**

a) State second law of thermodynamics.

b) Define Deamination

c) What is the role of $\alpha$ - ketoglutarate in amino acid metabolism?

d) Define enthalpy

e) Define catabolism and Anabolism

f) What is Inborn errors of metabolism?

***Q2)*** a) Draw the glycolytic path way of Glucose breakdown. **[6]**

b) Describe the process of Glycogenesis. **[4]**

***Q3)*** a) Describe complex I and complex II of ETC. **[6]**

b) Explain the energetics of Glycolysis to TCA in aerobic condition. **[4]**

***Q4)*** a) Explain $\beta$ - oxidation of Fatty acids. **[6]**

b) Write a note on ketone Bodies. **[4]**

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

a) Explain the De-novo pathway of purine synthesis.

b) Explain structure & function of ATP.

c) Explain the conversion of Fumarate to Malate to oxaloacetate.

***P.T.O.***

**Total No. of Questions : 5]**

**PA-3255**

# [5912]-24
# M.Sc. - I
# ZOOLOGY
# ZODT - 124 : Icthyology
# (2019 Pattern) (Semester - II) (2 Credits)

***Time : 2 Hours]*** ***[Max. Marks : 35***

***Instructions to the candidates:***

1) ***Q. No. 1 is compuslory.***
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) Enlist any two types of scales in Fishes.

b) What is glomerular kidney.

c) Name any two exotic ornamental fish.

d) What is stenohaline fish?

e) What is TMAO?

f) Define spawning.

***Q2)*** a) Give distinguishing features of cyclostamata with examples. **[6]**

b) Explain the role of bladder in respiration. **[4]**

***Q3)*** a) Describe the structure and function of heart in fishes. **[6]**

b) Describe lateral line organs in Fishes. **[4]**

***Q4)*** a) Explain pathological procedure for diagnosis of fish diseases and give its control measures. **[6]**

b) Describe different types of filters used in aquarium. **[4]**

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

a) Explain the central Nervous system in fish.

b) Describe Female reproductive system in fish.

c) Osmoregulation in fresh water fishes.

Total No. of Questions : 7]

SEAT No. :

**PA-3256**

[Total No. of Pages : 6

# [5912]-31

## M.Sc. (Part - II)

## ZOOLOGY

## ZOUT-231: Animal Physiology - I (Special)

## (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 2 to 7 carry equal marks.***

***Q1)*** Solve any Five of the following : **[10]**

a) What is resting membrane potential?

b) Define RQ.

c) Define Resistance.

d) What is homeostasis?

e) Define Photoperiodism.

f) Define BMR.

***Q2)*** a) What is buoyancy? Explain the role of swim bladder with suitable example. **[7]**

b) "Biological membrane is semi-permeable". Explain. **[5]**

***Q3)*** a) What is biological clock? Explain exogenous clock hypothesis. **[7]**

b) What is animal electricity? Give it's significance with suitable example. **[5]**

***P.T.O.***

***Q4)*** a) What is respiration? Explain anatomy of respiratory system. **[7]**

b) What is bioluminescence? Add a note on phyletic distribution of bioluminescence. **[5]**

***Q5)*** a) What is muscle contraction? Explain the role of ATP in muscle contraction. **[7]**

b) Explain gastrointestinal hormones & give it's function. **[5]**

***Q6)*** a) Explain the structure and composition of plasma membrane. Add a note on facilitated diffusion. **[7]**

b) Define internal environment. Add a note on extracellular and intracellular environment. **[5]**

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

a) Define action potential. Explain the role of various ion channels.

b) Explain components of digestive system.

c) Explain the structure of alveolus. Add a note on external respiration.

✷ ✷ ✷

**Total No. of Questions : 7]**

**PA-3256**

# [5912]-31
# M.Sc. (Part - II)
# ZOOLOGY
# ZOUT-231: Entomology - I (Special)
# (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 2 to 7 carry equal marks.***



***Q1)*** Solve any Five of the following : **[10]**

a) Define Pterygota.

b) Write the structure and example of aristate antenna.

c) Explain hemelytra.

d) Explain Fossorial leg.

e) Explain Stridulatory pegs.

f) Explain multipolar neuron.

***Q2)*** a) Explain modifications of head capsule in insects. **[7]**

b) Explain the characters of Hemiptera with two examples. **[5]**

***Q3)*** a) Explain in brief the origin and evolution in insects. **[7]**

b) Describe the structure of cuticle in insects. **[5]**

***Q4)*** a) Explain circulatory system in insects. **[7]**

b) Explain the characters of Orthoptera with two examples. **[5]**

***Q5)*** a) Give the distinguishing characters of order Collembola with two examples. **[7]**

b) Explain structure and functions of thoracic spiracles of grasshopper. **[5]**

***Q6)*** a) Mention the distinguishing characters of Hymenoptera with two examples. **[7]**

b) Explain female reproductive system of generalized insect. **[5]**

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

a) Sponging type of mouth parts.

b) Corpora cardiaca and Corpora allata.

c) Fat bodies in insects.

**Total No. of Questions : 7]**

**PA-3256**

# [5912]-31
# M.Sc. (Part - II)
# ZOOLOGY
# ZOUT-231: Genetics - I (Special)
# (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 2 to 7 carry equal marks.***

***Q1)*** Solve any Five of the following : **[10]**

a) State the conditions of neutral selection where no allele would be lost.

b) Enlist the factors that lead to genetic drift.

c) What is the most important barrier for speciation event in sexually reproducing organism?

d) Write short notes on : RFLP aand VNTRs.

e) Distinguish between missense mutation and non-sense mutation.

f) What are the ethical issues associated with gene therapy research?

***Q2)*** a) What are the distinctive features found in Caenorhabditis elegons by virtue of which it is considered one of the most important and best model organism in developmental genetics research. **[7]**

b) Which type of speciation allows the production of hybrid between two species? Cite an example. **[5]**

***Q3)*** a) In a population 1 in 2500 newborn babies is affected by an autosomal recessive genetic disorder. In this population, what will be the frequency of the dominant allele? **[7]**

b) If total variance of a phenotypic character is split into genetic (VG) and environmental (VE), how will you express the heritability of a phenotypic trait. **[5]**

***Q4)*** a) For a particular quantitative trait, 1024 flower were produced. One was white and one was the darkest red possible. How many genes are involved in flower colour in this case? **[7]**

b) What is gene therapy? What is the current status of gene therapy research in India. **[5]**

***Q5)*** a) Explain Fluorescent in situ hybridization (FISH). How it is different from chromosome painting. **[7]**

b) Define Hardy-Weinberg principle and enlist different assumptions underlying this principle. **[5]**

***Q6)*** a) What is diversifying selection? Define and explain from the context of evolutionary genetics. **[7]**

b) Justify the statement, "Quantitative genetics focusses on inheritance of complex characteristics, whose pherotype vary continuously and are also multifactorial polygenic inheritance". **[5]**

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

a) Drosophila as Model organism.

b) Inbreeding.

c) Chromosomal probes.

Total No. of Questions : 7]

SEAT No. :

**PA-3257**

[Total No. of Pages : 2

# [5912]-32
# M.Sc. (Part-II)
# ZOOLOGY
## ZOUT-232 : Fundamentals of Systematics and Economic Zoology
## (2019 Pattern) (Semester - III) (4 Credits)

*Time : 3 Hours]* *[Max. Marks : 70*

***Instructions to the candidates:***

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

***Q1)*** Solve any five of the following. **[10]**

a) Taxa

b) Allopatric species.

c) Protista.

d) Enlist economically important amphibians.

e) Enlist economically important household insets.

f) Enlist model animals in pharaceutical industry.

***Q2)*** a) Discuss the Dairy industry of India. Add a note on milk products. **[7]**

b) Discuss the method of Zoological nomenclature as per ICZN rules. **[5]**

***Q3)*** a) What are taxonomic keys? Add a note on its merits and demerits. **[7]**

b) Write a note on economic importance of corals. **[5]**

***Q4)*** a) Describe the economic importance of protozoa. Add a note on types of malerial parasite. **[7]**

b) Discuss the characteristics of kingdom animalia. **[5]**

***P.T.O.***

***Q5)*** a) Discuss the concept of systematics? Add a note on cytotaxonomy and chemotaxonomy. **[7]**

b) Write a note on apiculture. **[5]**

***Q6)*** a) Discuss the economic importance of parasitic helminthes. **[7]**

b) Write a note on hierarchies of classification. **[5]**

***Q7)*** Write a note on any two of the following. **[12]**

a) Taxonomy - methods of animal preservation.

b) Numerical taxonomy.

c) Wool Industry.

Total No. of Questions : 7]

SEAT No. :

**PA-3258**

[Total No. of Pages : 2

# [5912]-33

## M.Sc. (Part - II)

## ZOOLOGY

## ZOUT233: 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) ***Q.2 to Q.7 carry equal marks.***

***Q1)*** Solve any Five of the following : **[10]**

a) How proteins are digested by insects?

b) Define moulting harmone.

c) Write the application of DNA Microrray.

d) Define primary data.

e) What is integument?

f) What is research?

***Q2)*** a) Explain the different techniques used for the characterization of biomolecules. **[7]**

b) Describe the types of haemocytes and give composition of haemolymph of insect. **[5]**

***Q3)*** a) What is research problem? How will you frame research problem in zoology? **[7]**

b) Discuss the endocrine glands in insects. **[5]**

***P.T.O.***

***Q4)*** a) Describe the structure and function of insect integument. **[7]**

b) Describe histological structure of fat body. **[5]**

***Q5)*** a) What is data? Discuss in detail the primary and secondary data. **[7]**

b) Write short note on centrifugation. **[5]**

***Q6)*** a) Describe mechanism of water balance and nitrogen excretion in insects. **[7]**

b) Explain the points for the preparation of the manuscript. **[5]**

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

a) Describe structure and physiology of insect flight muscle.

b) Describe fluorescence and confocal microscopy.

c) Explain the structure and function of Malpighian tubules.

Total No. of Questions : 5]

SEAT No. :

PA-3259

[Total No. of Pages : 4

# [5912]-34

## M.Sc.

## ZOOLOGY (Part - II)

## ZODT - 234 : GENETICS TOXICOLOGY

## (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) ***Q.2 to Q.5 carry equal marks.***

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

a) Define anugen.

b) Define teratology.

c) Name the Drosophila mutant used in Sex linked Recessive lethal test.

d) State names of all three non-sense mutaions.

e) Give example of autosomal trisomy?

f) What is metastasis?

***Q2)*** a) Discuss various mechanisms of mutagenesis. **[6]**

b) Describe applications of genetic toxicology to human and environmental monitoring. **[4]**

***Q3)*** a) Describe in detail Ames Test. **[6]**

b) Write a note on hazard assessment of chemicals for genotoxic properties. **[4]**

***Q4)*** a) Explain the yeast test system to assess the genotoxic potential of a test compound. **[6]**

b) What is Genetic toxicology and add a note on its scope and significance. **[4]**

***P.T.O.***

***Q5)*** Attempt ANY Two of the following: **[10]**

a) Describe Micronucleus test in mammalian test system.

b) Write a note on plant test system.

c) Explain how carcinogenesis is a multimutational process with suitable example.

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**Total No. of Questions : 5]**

**PA-3259**

# [5912]-34

## M.Sc.

## ZOOLOGY (Part - II)

## 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) ***Q.No. 2 to Q.No.5 carry equal marks.***

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

a) Define hypersensitivity.

b) Name any two antibody classes.

c) What is primary immunodeficiency.

d) What do you mean by Monoclonal antibody?

e) State names of any two components of humoral immunity.

f) What is HLA?

***Q2)*** a) Give a detailed account of secondary lymphoid organs. **[6]**

b) Explain briefly active and passive Immunization. **[4]**

***Q3)*** a) Discuss in detail the antibody structure. **[6]**

b) Explain the process and importance of antibody class- switching. **[4]**

***Q4)*** a) What is major Histocompatibility complex (MHC)? Add a note on MHC. Class - I, Class - II and Class - III. **[6]**

b) Write a short note on Antigen - Antibody reaction. **[4]**

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

a) Give an account of different types of vaccines.

b) Discuss the principle and applications of ELISA technique.

c) Explain the concepts of Immunological Tolerance and Autoimmunity.

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Total No. of Questions : 7]

SEAT No. :

**PA-3260**

[Total No. of Pages : 6

**[5912]-41**

# M.Sc. - II
# ZOOLOGY
## ZOUT-241 : Animal Physiology - II (Special)
## (2019 Pattern) (Semester - IV) (4 Credits)

*Time : 3 Hours]* *[Max. Marks : 70*

***Instructions to the candidates:***

1) ***Question 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) Enlist any two miscellaeneous end products of metabolism.

b) Explain the role of acetyl choline esterase in synaptic transmission.

c) Define BMR.

d) Explain HPA axis.

e) Chronic stress causes deleterious effects. - Justify.

f) Define - Erythropoiesis.

***Q2)*** a) Define haemostasis. Describe the intrinsic pathway of blood clotting. **[7]**

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

***Q3)*** a) Define cardiac cycle. Explain the events of cardiac cycle. **[7]**

b) 'Glycogen in energy storage molecule'. Explain. **[5]**



***P.T.O.***

***Q4)*** a) What is the effect of high altitude on metabolism? Discuss various physiological strategies used to cope up with effects of high altitude. **[7]**

b) Role of veins as blood reservoir and process of venous return. **[5]**

***Q5)*** a) Define osmoregulation. Explain the structure of vertebrate kidney. Add a note on renal functioning. **[7]**

b) Explain chemotransduction in taste bud. **[5]**

***Q6)*** a) What is synapse? Explain structure of synapse and neuronal integration. **[7]**

b) Discuss the problems of deep sea diving. **[5]**

***Q7)*** Write short notes on any two of the following. **[12]**

a) Types of neurotransmitter.

b) Internal structure of heart.

c) Physiology of hearing.



**Total No. of Questions : 7]**

# PA-3260

**[5912]-41**

## M.Sc. - II

## ZOOLOGY

## ZOUT - 241 : Entomology - II (Special)

## (2019 Pattern) (Semester - IV) (4 Credits)

***Time : 3 Hours]*** ***[Max. Marks : 70***

***Instructions to the candidates:***

1) ***Question 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) Define spermiogenesis.

b) Define germ band.

c) Explain amnion in insects.

d) Explain role of ecdysone hormone.

e) Explain viviparity with example.

f) Explain imaginal discs in insects.

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

b) Sketch and label polytrophic ovariole. **[5]**

***Q3)*** a) Describe cleavage and blastoderm formation in insects. **[7]**

b) What is gastrulation? Explain the general process of gastrulation in insects. **[5]**

***Q4)*** a) Describe embryonic development of heart in insects. **[7]**

b) Describe blastokinesis in insects. **[5]**

***Q5)*** a) What is metamorphosis? Explain incomplete metamorphosis in insect. **[7]**

b) Explain emergence from the pupa and cocoon. **[5]**

***Q6)*** a) Describe oligopod larva with suitable examples . **[7]**

b) Describe object pupa with suitable examples. **[5]**

***Q7)*** Write short notes on any two of the following. **[12]**

a) Holometabolous development

b) Parthenogenesis

c) Initiation and preparation for diapause.



**Total No. of Questions : 7]**

# PA-3260

**[5912]-41**

## M.Sc.-II

## ZOOLOGY

## ZOUT 241 : Genetics - II (Special)

## (2019 Pattern) (Semester - IV) (4 Credits)

***Time : 3 Hours]*** ***[Max. Marks : 70***

***Instructions to the candidates:***

1) ***Questions 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) How epigenetic modifications are accomplished through the occurrence of methylation and acetylation process? Explain.

b) Enlist the inherited disorders associated with tyrosine and phenylalanine metabolism and explain the enzyme deficiency and phenotypic features.

c) Write a note on 'triplet repeat' disease.

d) Outline how are pre-implantation and pre-natal testing are carried out for detecting genetic diseases.

e) Justify the statement. "Cancer often develop through accumulation of somatic mutations in proto-oncogenes and tumour suppressor genes".

f) Compare merits and demerits of aminocentesis and chorionic villi sampling.

***Q2)*** a) Discuss the characteristic of qualitative and quantitative traits. Why it becomes necessary to study genetics of quantitative traits at population level? **[7]**

b) Explain parametric and non – parametric analysis. **[5]**

***Q3)*** a) Explain the genetic basis of "hygenic behaviour" in honeybees. **[5]**

b) In Rothenbuhler's experiment with honey bee species, Apis mellifera, homozygous hygienic queen u/u; r/r was crossed with homozygous drone U/R. Explain the result of the cross and provide explanation of each phenotype classes obtained in the progeny. **[7]**

***Q4)*** a) Justify the statement, "Somatic cell genetics and chromosome mediated gene transfer were important steps in human genome mapping". **[5]**

b) A circular DNA of 10.5 kb was digested with restriction endonuclease Bam HI and Hind-III. The fragments so obtained were 4.6, 2.7, 2.0, 0.7 and 0.5 kbs when the enzymes were used in combination. When these restriction enzymes were used singly 1.3 and 3.2 kb bands were obtained for Bam HI and 5.1, 3.4 and 2.0 kb bands were obtained for Hind-III.Draw the restriction map that fits this data. **[7]**

***Q5)*** a) What are MHC proteins? Explain its role in immune system. **[5]**

b) What do you mean by autoimmunity? Explain one systemic autoimmune disease of your choice. **[7]**

***Q6)*** a) Explain how x-chromosome inactivation takes place in mammals at the chromosomal and molecular level. What genes are involved in inactivating a X-chromosome. **[7]**

b) Why a turner female, who have one X-chromosome phenotypically is not normal, given that males with only one X-chromosome are normal. All females (Mammalian female) otherwise inactivate one of their 2x chromosome (leaving with one x-just like turner female) and are normal. But turner's female are not normal. Why? **[5]**

***Q7)*** Write short notes on any two of the following. **[12]**

a) Explain the genetics of circadian rhythm.

b) What are synteny orthology? How it helps in investigating evolutionary relationship.

c) Write a note on chromosome walking.

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**Total No. of Questions : 7]**

**SEAT No. :** ____

**PA-3261**

**[Total No. of Pages : 2**

**[5912]-42**

# M.Sc.-II

# ZOOLOGY

## ZOUT 242 : Theory-Mammalian Reproductive Physiology and Aquaculture

## (2019 Pattern) (Semester-IV) (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 from 2 to 7 carry equal marks.***

***Q1)*** Solve any 5 of the following: **[10]**

a) What is Ferguson Reflex?

b) Define 'Menarche'

c) What is the role of prolactin hormone?

d) Which are the major nutritional contents in fish.

e) What is the role of anaesthetic drugs in live fish transport?

f) Give the composition of Pearl.

***Q2)*** a) Describe the anatomy of female reproductive system. **[7]**

b) Describe the construction of Pond for fish culture. **[5]**

***Q3)*** a) Discuss the role of various Physico-Chemical parameters of water for fish culture. **[7]**

b) Discuss the role of environmental factors on breeding. **[5]**

***Q4)*** a) Describe the successive stages in Oestrous cycle. **[7]**

b) State the causes of mortality in transport of fish seed and brood fish. **[5]**

***P.T.O.***

***Q5)*** a) Give an account of various diseases of fish encountered during fish culture. **[7]**

b) Discuss the anatomical structure of mammary gland. **[5]**

***Q6)*** a) Give an account of various disorders leading to reproductive dysfunctions. **[7]**

b) Give the application of geographic information system (GIS) in production and marketing in fisheries. **[5]**

***Q7)*** Write short notes on any two of the following. **[12]**

a) Delayed implantation.

b) Artificial feeding in fish culture.

c) Fish products and by-products.

Total No. of Questions : 5]

SEAT No. :

**PA-3262**

[Total No. of Pages : 2

**[5912]-43**

# M.Sc. - II
# ZOOLOGY
## ZODT-243 : Histology and Histochemistry
## (2019 Pattern) (Semester - IV) (2 Credits) (Theory)

*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 No. 2 to question No. 5 carry equal marks.***

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

a) What is full form of PAS method ? What purpose it is used for?

b) Define Histology.

c) What purpose the Sudan Black-B is used for?

d) What is the role of Hydrochloric acid in Feulgen Reaction?

e) State the names of any two histochemical methods used for the detection of carcinoma.

f) What is dehydration of fixed tissue?

***Q2)*** a) Give an account of Congo red method for proteins with respect to reagents, procedure and result. **[6]**

b) Explain the procedure and significance of PAS method for Glycogen. **[4]**

***Q3)*** a) Discuss in brief the dye-binding reactive groups and mordants. **[6]**

b) Explain a suitable histochemical method for tissue. Localization of Alkaline phosphatase enzyme. **[4]**

***Q4)*** a) Explain the principle, aims and objectives of fixatives. **[6]**

b) Discuss the importance of Enzyme Histochemistry. **[4]**

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

a) Describe the principle and functioning of the Ultramicrotome.

b) Discuss the scope and importance of Histology.

c) Describe the pyronine method of Histochemical localization of nucleic acids.

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***P.T.O.***

**Total No. of Questions : 5]**

# PA-3262

**[5912]-43**

## M.Sc. - II

## ZOOLOGY

## ZODT-243 : Pest Control

## (2019 Pattern) (Semester - IV) (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 No. 2 to question No. 5 carry equal marks.***

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

a) Predators.

b) Repellants.

c) Damage caused by bandicoots.

d) What is medical entomology.

e) Polyphagous pests.

f) Define IPM.

***Q2)*** a) Describe medical entomology with reference to important measures to control the vector. **[6]**

b) Write a note on biological control agents. **[4]**

***Q3)*** a) Describe the chemical control measures. Write a note on insecticidal formulations & dilution. **[6]**

b) Write a note on Hazards of pesticides & Antidotes. **[4]**

***Q4)*** a) Describe Advantages & disadvantages or biological control measures. Write a note on Biological control management. **[6]**

b) Write a note on types of insect pests & damages caused by them. **[4]**

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

a) Physical control measures.

b) Autocidal control.

c) Medical entomology & veterinary important insects.

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Total No. of Questions : 5]

SEAT No. :

**PA-3263**

[Total No. of Pages :2

# [5912]-44
# M.Sc. - II
# ZOOLOGY
## ZODT - 244 : Pollution Biology
## (2019 Pattern) (Semester - IV) (2 Credits)

*Time : 2 Hours]* *[Max. Marks : 35*

***Instructions to the candidates:***

1) *Q. No. 1 is compuslory.*
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) Describe Lithosphere.
b) Define Bio concentration.
c) What is Biomedical waste?
d) Define Limnology.
e) Define Biosphere.
f) What is the purpose of Bioassay?

***Q2)*** a) Comment on the sources and effects of Agricultural Pollution. **[6]**

b) What is radioactive pollution? Explain the assessments and control of radioactive pollution. **[4]**

***Q3)*** a) Describe biochemical methods to study impact of pollutants on animals. **[6]**

b) Describe the methods for water pollution monitoring. **[4]**

***Q4)*** a) Define pollution. Describe sources of noise pollution. **[6]**

b) Explain the sources, pathways and impact of pesticide pollution. **[4]**

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

a) Environmental protection Act 1986.
b) Explain Biological methods for assessment of environmental quality.
c) Explain monitoring strategies of soil pollution.

***P.T.O.***

**Total No. of Questions : 5]**

**PA-3263**

# [5912]-44
# M.Sc.
# ZOOLOGY
## ZODT - 244 : Theory - Apiculture
## (2019 Pattern) (Semester - IV) (2 Credits)

***Time : 2 Hours]*** ***[Max. Marks : 35***

***Instructions to the candidates:***

1) ***Q. No. 1 is compuslory.***
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) Italian bee

b) Jeolikote hive

c) Narse bee

d) Naptial filght

e) Bee venom

f) Aplary

***Q2)*** a) What do you understand by the term polymorphism? Explain with example. **[6]**

b) How to manage bee colony? **[4]**

***Q3)*** a) Describe parasites of honeybees with example. **[6]**

b) Write a note on honey extraction. **[4]**

***Q4)*** a) Add a note on entrepreneurship in beekeeping. **[6]**

b) Give medical importance of pollen. **[4]**

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

a) How to extract royal jelly for commercial purpose?

b) Add a note on selection of apiculture/beekeeping site.

c) Maintenance of bee colony in monsoon Season.

**Total No. of Questions : 4]**

**SEAT No. :** ____

**PA-3532**

**[Total No. of Pages : 1**

# [5912]-51

## M.Sc. - II

## ZOOLOGY

## ZY - 302 - T : ENVIRONMENTAL BIOLOGY

## (2013 Pattern) (Semester - III) (2 Credits) (50305)

***Time : 1½ Hours]*** ***[Max. Marks : 25***

***Instructions to the candidates:***

1) ***Attempt any two questions from Q.No. 1 to Q.No. 3.***
2) ***Question No. 4 is compulsory.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

***Q1)*** a) Describe community ecology. **[5]**

b) Discuss floral diversity of India. **[3]**

c) What is biome? **[2]**

***Q2)*** a) Discuss associations of microorganisms with man and animals. **[4]**

b) Describe impact of climate on biodiversity. **[3]**

c) What is edge effect? **[3]**

***Q3)*** a) Describe threatened animal species of India. **[4]**

b) Discuss important projects for conservation of Indian Wildlife. **[4]**

c) What is wetland? **[2]**

***Q4)*** Write short notes on any one of the following **[5]**

a) Ecotone.

b) Energy flow in ecosystem.

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**Total No. of Questions : 4]**

**SEAT No. :** ____

**PA-3533**

**[Total No. of Pages : 1**

# [5912]-52

## M.Sc. (Part - II)

## ZOOLOGY

## ZY - 306T : PARASITOLOGY

## (2013 Pattern) (Semester - III) (2 Credits)

***Time : 1½ Hours]*** ***[Max. Marks : 25***

***Instructions to the candidates:***

1) ***Attempt any two questions from Q.No. 1 to Q.No. 3.***
2) ***Question No. 4 is compulsory.***
3) ***Neat labelled diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

***Q1)*** a) Describe the morphology and lifecycle of Echinococcus sp. **[5]**

b) Explain heterospecific transmission of parasites. **[3]**

c) Define/explain myosis. **[2]**

***Q2)*** a) Describe gene encoding circum sporozoite protein in plasmodium. **[4]**

b) Explain inseminative behaviour in platyhelminths. **[3]**

c) What is immunodiffusion. **[3]**

***Q3)*** a) Describe various immunodiagnostic assays. **[4]**

b) Explain method of haemagglutination test. **[3]**

c) What is genetic prophylaxis and control of parasites. **[3]**

***Q4)*** a) Describe VSG of Trypanosome. **[5]**

OR

b) Describe ELISA. **[5]**

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**Total No. of Questions : 4]**

**SEAT No. :** ____

**PA-3534**

**[Total No. of Pages : 1**

# [5912]-53

## M.Sc. (Part - II)

## ZOOLOGY

## ZY - 308(T : INSECT ECOLOGY

## (2013 Pattern) (Semester - III) (2 Credits) (50312)

***Time : 1½ Hours]*** ***[Max. Marks : 25***

***Instructions to the candidates:***

1) ***Attempt any two questions from Q.No. 1 to Q.No. 3.***
2) ***Question No. 4 is compulsory.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

***Q1)*** a) Describe in detail how physical factors control insects population. **[5]**

b) What are the different threats to insects. **[3]**

c) Describe insect defoliators. **[2]**

***Q2)*** a) Explain impact of natural enemies on insects population. **[4]**

b) Early evolution of insects in aquatic habitat. **[3]**

c) Effect of photoperiod on insects. **[3]**

***Q3)*** a) Discuss the plant defence mechanism. **[4]**

b) Describe leaf shredding insects. **[3]**

c) Explain the feeding mechanism of herbivorous insects. **[3]**

***Q4)*** Write short notes on any one the following **[5]**

a) Niche

b) Harmful insects.

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**Total No. of Questions : 4]**

**SEAT No. :** ____

**PA-3535**

**[Total No. of Pages : 1**

# [5912]-54

## M.Sc. - II

## ZOOLOGY

## ZY - 403T : Biodiversity Assessment

## (2013 Pattern) (Semester - IV) (2 Credits)

***Time : 1½ Hours]*** ***[Max. Marks : 25***

***Instructions to the candidates:***

1) ***Attempt any two questions from Q.No. 1 to Q.No. 3.***
2) ***Question No. 4 is compulsory.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

***Q1)*** a) Explain eco-development for biodiversity conservation. **[5]**

b) Describe in-situ conservation. **[3]**

c) Define vulnerable species. **[2]**

***Q2)*** a) Describe class Mammalia with suitable examples. **[4]**

b) Enlist factors responsible for mass extinction. **[3]**

c) Write a note on Red data book. **[3]**

***Q3)*** a) Write a characteristics features of Mollusca with suitable example. **[5]**

b) What are the objectives of conservation. **[3]**

c) What is species diversity. **[2]**

***Q4)*** a) Write a note on biogeographical classification of India. **[5]**

OR

b) Explain role of NGOs in conservation. **[5]**

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