

Total No. of Questions : 6]

SEAT No. :

P2259

[Total No. of Pages : 2

[4829]-101

M.Sc. - I (Semester - I)

ZOOLOGY

ZY-101-T : Biochemistry - I

(2013 Pattern)

*Time : 2½ Hours]*

*[Max. Marks :38*

*Instructions to the candidates:*

- 1) *Attempt any three questions from Q.No.1 to Q.No.5.*
- 2) *Question No.6 is Compulsory.*
- 3) *Figures to right indicate full marks.*
- 4) *Draw neat labelled diagrams wherever necessary.*

- Q1)** a) What are polysaccharides? Classify them with examples. [4]  
b) What is buffer? Explain bicarbonate buffer system. [4]  
c) What is Beri-beri? [2]
- Q2)** a) Explain the bonds responsible for stabilization of tertiary structure of proteins. [5]  
b) Explain sources and functions of Vitamin C. [3]  
c) What is prosthetic group. [2]
- Q3)** a) Explain the importance of lipids in biological system. [3]  
b) Explain the properties of water. [3]  
c) Give the outline of aminoacid classification based on polarity of R group. [4]
- Q4)** a) Explain the effect of substrate concentration on enzyme activity. [4]  
b) What are isozymes? Explain with suitable example. [4]  
c) What are essential amino acids? [2]

*P.T.O.*

**Q5) a)** Explain the biological significance of proteins. **[5]**

b) Explain the source and function of Vitamin-D. **[5]**

**Q6) Write short note on (any two) :** **[8]**

a) Draw the structure of following polypeptide.

Lys - Tyr - Gly

b)  $\beta$  - Pleats of proteins.

c) Fatty acids and their significance.

d) Allosteric enzymes.



Total No. of Questions : 6]

SEAT No. :

P2260

[Total No. of Pages : 2

[4829]-102

M.Sc. - I (Semester - I)

ZOOLOGY

ZY-102T : Cell Biology

(2013 Pattern) (3 Credits)

*Time : 2½ Hours]*

*[Max. Marks :38*

*Instructions to the candidates:*

- 1) *Attempt any three questions from Q.No.1 to Q.No.5.*
- 2) *Question No.6 is Compulsory.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

- Q1)** a) Explain ultrastructure of nucleus. [4]  
b) Differentiate mitosis & meiosis. [4]  
c) What is intrinsic proteins. [2]
- Q2)** a) Describe the structure of Golgi complex. [5]  
b) Explain genetic system in mitochondria. [3]  
c) Explain phago cytos. [2]
- Q3)** a) Differentiate between plant cell & animal cell. [4]  
b) Explain glyoxylate cycle & give its significance. [3]  
c) Explain the mechanism of synaptic transmission. [3]
- Q4)** a) Explain the prophase I of meiosis. [5]  
b) Describe peroxisomes. [5]
- Q5)** a) Describe functional role of mitotic apparatus. [5]  
b) Describe functions of smooth endoplasmic reticulum. [5]

*P.T.O.*

**Q6)** Write short notes on (any two) :

**[8]**

- a) Write a note on sodium - potassium pump.
- b) Microtubules & Microfilaments.
- c) Functions of lysosomes.
- d) Prokaryotic cell.



Total No. of Questions : 4]

SEAT No. :

P2261

[Total No. of Pages : 2

[4829]-103

M.Sc. - I (Semester - I)

ZOOLOGY

ZY-103T : Genetics

(2013 Pattern)

*Time : 1½ Hours]*

*[Max. Marks :25*

*Instructions to the candidates:*

- 1) *Attempt any two questions from Q.No.1, 2 & 3.*
- 2) *Question No.4 is Compulsory.*
- 3) *Figures to right indicate full marks.*
- 4) *Draw neat labeled diagrams wherever necessary.*

**Q1) a)** Explain Epistatic gene interaction with reference to Dominant epistasis. **[4]**

b) Explain - structural organization of Lac operon. **[3]**

c) Explain - Modern concept of a gene. **[3]**

**Q2) a)** Write the characteristic features of sex linked recessive inheritance with suitable example. **[5]**

b) "Quantitative traits are influenced by both, genes and environmental factors" - Explain. **[3]**

c) Define : **[2]**

i) Linkage groups.

ii) Multiple allelism.

**Q3) a)** Describe the technique of somatic cell hybridization. State its applications. **[4]**

b) The PTC tasting ability was checked in a population of 2000 individuals. The population shows 100 individuals homozygous for the 't' allele, 800 heterozygous and 1,100 homozygous for the T allele. What is the frequency of the 't' allele and 'T' allele in the population. **[3]**

c) Explain in brief the Forces that change the gene frequencies in a population present in Hardy-Weinberg Equilibrium. **[3]**

**P.T.O.**

**Q4)** In *Drosophila* the genes ct (cut wing margin), y (yellow body) and v (vermillion eye colour) are 'x' linked. Female heterozygous for all three markers were mated with wild type males and the following male progenies were obtained. **[5]**

ct	y	v	4
ct	y	+	93
ct	+	v	54
ct	+	+	349
+	y	v	331
+	y	+	66
+	+	v	97
+	+	+	06

Determine the sequence of genes on the chromosomes and the distance between them. Construct a genetic map for the three loci.

OR

Among 192 students of a college, the following phenotypes were observed.

A:63, B:31, AB : 06 and O:92. Calculate the gene frequencies of Genes  $I^A$ ,  $I^B$  and i. **[5]**



Total No. of Questions : 4]

SEAT No. :

P2262

[Total No. of Pages : 2

**[4829]-104**  
**M.Sc. (Semester - I)**  
**ZOOLOGY**  
**ZY-104 : BIostatISTICS**  
**(2013 Pattern) (Credit System)**

*Time : 1½ Hours]*

*[Max. Marks :25*

*Instructions to the candidates:*

- 1) *Attempt any two questions from Q.No.1, 2 & 3.*
- 2) *Question No.4 is Compulsory.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of calculator and statistical table is allowed.*

**Q1) a)** Define the following terms :

Range, Frequency, Sample, Median. **[4]**

b) A study was conducted to observe the effect of grapefruit juice on cyclosporine and prednisone metabolism in transplant patients. The measurements on creatinine clearance at the beginning of the study on 8 male patients are 38, 66, 74, 99, 80, 64, 80 and 120. Compute mean and median. **[3]**

c) Define the terms : Quartile Deviation and Coefficient of Variation. **[3]**

**Q2) a)** Define the terms with illustration : Response and explanatory variables.**[4]**

b) It is observed that, individuals with a certain gene have 0.70 probability of eventually contracting a certain disease. What is the probability that out of 8 individuals in none or all cases the gene will contract the disease.**[4]**

c) State the probability mass function of Poisson distribution. State further mean and variance. **[2]**

**Q3) a)** State the formulae of third quartile ( $Q_3$ ), seventh decile ( $D_7$ ) and 63<sup>rd</sup> percentile ( $P_{63}$ ). **[3]**

b) The length of human pregnancies are approximately distributed with mean  $\mu = 266$  days and standard deviation  $\sigma = 16$  days. What proportion of pregnancies lasts more than 270 days? **[4]**

**P.T.O.**

- c) Define the terms : Sample space, Conditional Probability, Random variable. [3]

**Q4)** Write short note on any one : [5]

- a) Paired 't' test  
b) Regression.





Total No. of Questions : 4]

SEAT No. :

P2263

[Total No. of Pages : 1

[4829]-105

M.Sc. (Semester - I)

ZOOLOGY

ZY-105 : Skills in Scientific Communication and Writing

(2013 Pattern) (Credit System)

*Time : 1½ Hour]*

*[Max. Marks :25*

*Instructions to the candidates:*

- 1) *Attempt any two questions from Q.No.1, 2 & 3.*
- 2) *Question No.4 is Compulsory.*

- Q1)** a) Genetic code is the simplest language for intracellular & extra cellular communication. Justify the statement. [5]  
b) Give the importance of Syntax. [3]  
c) Write a note on acknowledgement. [2]

- Q2)** a) Give the out line of a research paper. Why it is preferred universally in writing a research article. [4]  
b) How to write legends for illustration. [3]  
c) Give the importance of Jargons. [3]

- Q3)** a) How to prepare an abstract for writing a research paper. [4]  
b) Mention any three synonyms. [3]  
c) Importance of proof reading. [3]

- Q4)** Describe the importance of accuracy and completeness of material & methods. [5]

OR

How to write a discussion in a research paper.



Total No. of Questions : 4]

SEAT No. :

**P2264**

[Total No. of Pages : 1

**[4829]-106**  
**M.Sc. (Semester - I)**  
**ZOOLOGY**  
**ZY-106 : Fresh Water Zoology**  
**(2013 Pattern) (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) Describe adaptations for respiration in insects. [4]  
b) Describe Mastax in Rotifers. [3]  
c) Give importance of light in aquatic life. [3]
- Q2)* a) Give adaptations of aquatic reptiles. [5]  
b) Give an economic importance of Bivalves. [3]  
c) Explain Buoyancy. [2]
- Q3)* a) Give ecological significance of tadpole. [4]  
b) Give protective adaptations in protozoa. [3]  
c) Describe eutrophic lake. [3]
- Q4)* Write short notes on (any one) : [5]  
a) Diagnostic features of Tadpole shrimps.  
b) Biological changes in rivers due to sewage pollution.



Total No. of Questions : 6]

SEAT No. :

P2265

[Total No. of Pages : 2

[4829]-201

M.Sc. - I (Semester - II)

ZOOLOGY

ZY-201T : Biochemistry - II

(2013 Pattern)

*Time : 2½ Hours]*

*[Max. Marks :38*

*Instructions to the candidates:*

- 1) *Attempt any three questions from Q.No.1 to Q.No.5.*
- 2) *Question No.6 is Compulsory.*
- 3) *Figures to right indicate full marks.*
- 4) *Draw neat labeled diagrams wherever necessary.*

- Q1)** a) What is metabolic pathway? Explain principle characteristics of metabolic pathway. [5]  
b) Explain the structure and function of ATP. [3]  
c) State second law of thermodynamics. [2]
- Q2)** a) Draw the glycolytic pathway of glucose breakdown. [4]  
b) Explain the role of glycogen synthase in glycogen synthesis. [4]  
c) Give the significance of gluconeogenesis. [2]
- Q3)** a) How is pyruvate converted in to acetyl-CoA. [3]  
b) Explain the metabolic fate of amino groups. [3]  
c) Explain how citric acid cycle is regulated by PDH complex. [4]
- Q4)** a) Explain in detail complex I (NADH dehydrogenase) of the mitochondrial electron transfer chain. [4]  
b) Explain the transamination reaction of amino acid catabolism. [3]  
c) Give the significance of ketone bodies. [3]

*P.T.O.*

- Q5)** a) Explain the excretion of ammonia in brief. [5]  
b) Explain the carnitine shuttle. [5]

**Q6)** Attempt any two of the following :

- a) Explain the conversion of IMP to AMP and GMP. [4]  
b) Explain the conversion of AMP to uric acid. [4]  
c) Explain the oxidation of odd chain fatty acids. [4]



Total No. of Questions : 6]

SEAT No. :

P2266

[Total No. of Pages : 2

[4829]-202

M.Sc. - I (Semester - II)

ZOOLOGY

ZY-202T : Molecular Biology

(2013 Pattern)

*Time : 2½ Hours]*

*[Max. Marks :38*

*Instructions to the candidates:*

- 1) *Attempt any three questions from Q.No.1 to Q.No.5.*
- 2) *Question No.6 is Compulsory.*
- 3) *Figures to right indicate full marks.*
- 4) *Draw neat labeled diagrams wherever necessary.*

- Q1)** a) Describe the structure and function of tRNA. [5]  
b) Explain the mismatch repair. [3]  
c) What are histones? Give their significance. [2]
- Q2)** a) Explain the mechanism of elongation process of protein synthesis. [4]  
b) Write a note on replicative transposons. [4]  
c) What is Cot½? [2]
- Q3)** a) Explain the temperature melting of DNA. [3]  
b) Explain the role of eIF-2 in regulation of protein synthesis. [3]  
c) Explain in detail the initiation of DNA replication. [4]
- Q4)** a) Explain the structure and function of DNA polymerase in prokaryotes. [4]  
b) Explain the mechanism of photoreactivation. [4]  
c) Define phosphodiester linkage. [2]

*P.T.O.*

- Q5)** a) Explain mechanism of mRNA splicing. [5]  
b) Write a note on glycosylation. [5]

**Q6)** Write notes on **any two** of the following :

- a) Ribonucleoprotein. [4]  
b) Structure and function of ribosome. [4]  
c) Genetic code their characteristics. [4]  
d) LINES and SINES. [4]



Total No. of Questions : 4]

SEAT No. :

P2267

[Total No. of Pages : 1

[4829]-203

M.Sc. (Semester - II)

ZOOLOGY

**ZY-203: Developmental Biology  
(2013 Pattern) (Credit System)**

*Time : 1½ Hour]*

*[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 diagram must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*

- Q1)** a) Explain the role of tail fiber complex and dynein ATPase in regulation of sperm locomotion. [4]  
b) Explain spiral cleavage with example. [3]  
c) Define programmed cell death. [3]
- Q2)** a) How is cell cycle regulated during early development? [5]  
b) Explain concept of growth. [3]  
c) Give the significance of spermatogenesis. [2]
- Q3)** a) Explain importance of frog as a model organism. [4]  
b) Explain fast block to avoid polyspermy. [3]  
c) Give importance of rDNA amplification during oogenesis. [3]
- Q4)** Attempt any one of the following : [5]  
a) Comment on role of hunchback in pattern formation of Drosophila.  
b) Explain role of spemann's organizers in frog.



Total No. of Questions : 4]

SEAT No. :

P2268

[Total No. of Pages : 1

[4829]-204

M.Sc. (Semester - II)

ZOOLOGY

ZY-204: Endocrinology

(2013 Pattern) (Credit System)

*Time : 1½ Hours]*

*[Max. Marks : 25*

*Instructions to the candidates:*

- 1) *Attempt any two questions from Q.No. 1, 2 & 3.*
- 2) *Question No. 4 is compulsory.*
- 3) *Figures to the right indicate full marks.*
- 4) *Draw neat and labeled diagrams wherever necessary.*

- Q1)** a) Explain vitellogenesis in amphibians. [5]  
b) Explain the role of pituitary hormones in regulating control of chromatophores. [3]  
c) Enumerate role of adrenal cortex as endocrine organ. [2]
- Q2)** a) Give the role of osmoregulatory hormones. [4]  
b) How do pancreatic islets regulate metabolism in vertebrates? [3]  
c) How is calcium and phosphate metabolism control achieved? [3]
- Q3)** a) Explain role of X & Y organs in crustacean metabolism and osmoregulation. [4]  
b) Enlist any four hypothalamic hypophysiotropins. [3]  
c) Write a note on insect metamorphosis with respect to hormonal regulation. [3]
- Q4)** Write short notes on any one of the following : [5]  
a) Plasma membrane hormone receptors.  
b) Action of steroid hormones.





Total No. of Questions : 4]

SEAT No. :

P2269

[Total No. of Pages : 1

[4829]-205

M.Sc. - I (Semester - II)

ZOOLOGY

ZY-205: Comparative Animal Physiology

(2013 Pattern)

*Time : 1½ Hours]*

*[Max. Marks : 25*

*Instructions to the candidates:*

- 1) *Attempt any two questions from Q.No. 1, 2 & 3.*
- 2) *Question No. 4 is compulsory.*
- 3) *Figures to the right indicate full marks.*
- 4) *Draw neat labelled diagrams wherever necessary.*

- Q1)** a) Give the significance of gastric digestion. [4]  
b) Explain the various pathway's of ATP formation during muscle contraction. [4]  
c) Define: Resistance. [2]
- Q2)** a) Explain the mechanism of thermoregulation in Poikilotherms. [4]  
b) Explain the basic processes in urine formation with respect to mammalian kidney. [4]  
c) Define: Critical temperature. [2]
- Q3)** a) Write a note on chemistry of vertebrate hormones. [3]  
b) Explain hyper and hypo-osmotic regulators. [3]  
c) Describe proteins of the myofilaments. [4]
- Q4)** a) Explain the respiratory surfaces with respect to gills and lungs. Add a note on blood pigments. [5]  
b) Explain the classification and functions of sense organs. Add a note on photoreception.



Total No. of Questions : 4]

SEAT No. :

P2270

[Total No. of Pages : 2

[4829]-206

M.Sc. (Semester - II)

ZOOLOGY

ZY-206: Biochemical Techniques

(2013 Pattern) (2 Credits)

Time : 1½ Hour]

[Max. Marks : 25

Instructions to the candidates:

- 1) Attempt any two questions from Q.No. 1, 2 & 3.
- 2) Question No. 4 is compulsory.
- 3) Figures to right indicate full marks.
- 4) Draw neat labeled diagrams wherever necessary.

- Q1)** a) Explain separation of molecules by using Ion exchange chromatography. [4]  
b) Define N and C terminals of a polypeptide. Mention the methods to determine them. [3]  
c) What is monochromator? Give its role in spectrophotometer. [3]
- Q2)** a) Explain agarose gel electrophoresis to resolve DNA fragments. [5]  
b) Explain the principle of centrifugation. [3]  
c) Define isotope. [2]
- Q3)** a) Explain the construction and applications of UV-Spectrophotometer. [4]  
b) Explain the construction of Warburg's apparatus. [3]  
c) Why is SDS used to resolve denatured proteins by SDS-PAGE? [3]
- Q4)** Attempt any one : [5]  
a) Explain Sanger's dideoxy reaction for DNA sequencing.  
b) Explain the applications of isotopes in biology.

P.T.O.

Total No. of Questions : 4]

**P2270**

**[4829]-206**

**M.Sc. (Semester - II)**

**ZOOLOGY**

**ZY-206: ICHTHYOLOGY**

**(2013 Pattern) (2 Credits)**

*Time : 1½ Hour]*

*[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) Give distinguishing features of Cyclostomata with examples. [4]  
b) Explain role of air bladder in respiration. [3]  
c) Describe Migration. [3]
- Q2)** a) Write an account of water and salt balance in Euryhaline fishes. [5]  
b) Enlist different endocrine organs in fishes. [3]  
c) What is TMAO. [2]
- Q3)** a) Differentiate chondrichthyes and osteichthyes. [4]  
b) Describe structure of holobranch in fishes. [3]  
c) Describe lateral line organs in fishes. [3]
- Q4)** Write short notes on (any one) : [5]  
a) Scales in fishes.  
b) Pectoral girdle in fishes.



Total No. of Questions : 8]

SEAT No. :

P2271

[Total No. of Pages : 6

[4829]-301

M.Sc. - II (Semester - III)

ZOOLOGY

**ZY-301T: Animal Physiology - I**  
**(2013 Pattern) (Special Paper - 4 Credits)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Attempt any five questions.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat labelled diagrams wherever necessary.*

- Q1)** a) Explain the relation between metabolic rate and body size of birds and mammals. [4]  
b) Explain the regulatory mechanism to achieve homeostasis. [4]  
c) Define : GFR. [2]
- Q2)** a) Explain the role of gas floats in buoyancy. [4]  
b) Draw a neat labeled diagram of plasma membrane. Add a note on dynamics of semipermeable membrane. [4]  
c) Define : Excretion. [2]
- Q3)** a) Discuss various physiological strategies used to cope up with effect of high altitude. [5]  
b) What is resting membrane potential? Add a note on Goldman-Hodgkin-Katz potential. [5]
- Q4)** a) Explain the structure of luminescent organs. [4]  
b) Distinguish between tolerance and resistance. [4]  
c) Define : Metabolic rate. [2]

*P.T.O.*

- Q5)** a) What is the role of animal electricity? Add a note on generation of electric current. [4]  
b) Explain the roles of fats and glycogen as energy storage. [4]  
c) Define : acclimation. [2]
- Q6)** a) Give an account on water and electrolyte balance in moist skinned animals and arthropods. [4]  
b) Write a note on renal regulation and acid-base balance. [4]  
c) Define : Capacitance. [2]
- Q7)** a) Describe in detail the role of various ion channels in action potential. [5]  
b) Discuss the energy cost of running and flying. [5]
- Q8)** a) Describe various strategies used in achieving neutral buoyancy. [4]  
b) What is biological clock? Add a note on lunar rhythm. [4]  
c) Define : Electro-receptors. [2]



Total No. of Questions : 8]

**[4829]-301**  
**M.Sc. - II (Semester - III)**  
**ZOOLOGY**  
**ZY-301T: Entomology - I**  
**(2013 Pattern) (4 Credits)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Attempt any five questions.*
- 2) *Figures to the right indicate full marks.*

- Q1)** a) Explain abdominal appendages in collembola. [5]  
b) Enlist different theories regarding origin of insects. [3]  
c) Write the structure and example of aristate antenna. [2]
- Q2)** a) Give the distinguishing characters of order thysanura with two examples. [4]  
b) Explain the characters of Isoptera with two examples. [3]  
c) Give the functions of goblet cells. [3]
- Q3)** a) Mention the distinguishing characters of Coleoptera with two examples. [4]  
b) Explain in brief the general structure of integument of insect. [4]  
c) Give the meaning of polypneustic tracheal system. [2]
- Q4)** a) Describe the morphology of head of a typical insect. [4]  
b) Explain elytra. [3]  
c) Explain alary muscles in insects. [3]
- Q5)** a) Describe endocrine glands in insects. [5]  
b) Sketch and label raptorial leg. [3]  
c) Define exopterygota. [2]

- Q6)** a) Explain sponging type of mouth parts. [4]  
b) Explain structure and functions of thoracic spiracles of Grasshopper. [4]  
c) Give the functions of nephrocytes. [2]
- Q7)** a) Give an account of alimentary canal of any orthopteroid insect. [5]  
b) Explain polytrophic ovariole. [5]
- Q8)** a) Explain sound producing organs in insects. [5]  
b) Explain different types of haemocytes in insects. [5]



Total No. of Questions : 8]

**[4829]-301**  
**M.Sc. - II (Semester - III)**  
**ZOOLOGY**  
**ZY-301T: Genetics - I**  
**(2013 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 50*

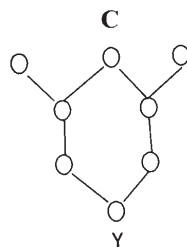
*Instructions to the candidates:*

- 1) *Attempt any five questions.*
- 2) *Figures to right indicate full marks.*
- 3) *Draw neat labeled diagrams wherever necessary.*

- Q1)** a) Derive an equation for change in allelic frequency caused due to mutation. **[4]**
- b) What is Narrow sense heritability? How does it differ from Broad sense heritability? **[3]**
- c) 'It is advantageous to use Nucleic acid information in determining Molecular Phylogeny'. Explain. **[3]**
- Q2)** a) What is genetic drift? Explain founders effect. **[4]**
- b) The narrow sense heritability of egg weight in a particular flock of chickens is 0.60. A farmer selects for increased egg weight in this flock. The difference in the mean egg weight of the unselected chickens and the selected chickens is 10g. How much should egg weight increase in the offspring of the selected chickens. **[4]**
- c) Explain the terms : **[2]**
- i) Clade.
  - ii) Homoplasy.
- Q3)** a) Explain Nucleic acid phylogenies based on Nucleotide sequence Comparisons and Homologies. **[4]**
- b) Write the characteristics of 'r' strategists. **[3]**
- c) Explain whole genome hybridization. **[3]**



- Q4)** a) Explain Ex-vivo gene therapy with suitable example. [4]  
 b) In a population of 4 adult males and 76 adult females, the frequency of allele 'A' is 0.6 and the frequency of allele 'a' is 0.4. Calculate the 95 percent confidence limits of the allelic frequency for 'A'. [4]  
 c) Explain the term : Over dominance. [2]
- Q5)** a) Explain the role of gene conversion in the process of evolution. [4]  
 b) Define Allopatric and sympatric speciations. Explain how these speciations do differ from one another. [4]  
 c) A study of quantitative variation for abdominal bristle number in female *Drosophila* Yielded estimates of  $V_g = 3.17$ ,  $V_p = 6.08$ ,  $V_e = 2.91$ . What is the broad sense heritability for this trait? [2]
- Q6)** a) 'Gene Duplication leads to evolution of multigene families'. Explain the statement considering globin gene family. [5]  
 b) Explain gene localization on chromosome with suitable example. [5]
- Q7)** a) Explain the life cycle of *C.elegans*. How is it useful in genetic studies?[5]  
 b) In the pedigree below, what is the inbreeding coefficient of the common ancestor, C, if the inbreeding coefficient of Y is 1/16? [5]



- Q8)** Explain the partitioning of phenotypic variance into Genetic Variance ( $V_g$ ) and environmental variance ( $V_e$ ). [10]



Total No. of Questions : 4]

SEAT No. :

P2272

[Total No. of Pages : 2

[4829]-302

M.Sc. (Part - II) (Semester - III)

ZOOLOGY

ZY-302T: Immunology

(2013 Pattern)

Time : 1½ Hours]

[Max. Marks : 25

Instructions to the candidates:

- 1) Attempt any two questions from Q.No. 1, 2 & 3.
- 2) Question No. 4 is compulsory.
- 3) Figures to the right indicate full marks.
- 4) Draw neat and labelled diagrams wherever necessary.

- Q1)** a) Explain in short the molecular mechanism of generation of antibody diversity. [3]  
b) Write a short note on lymph node. [2]  
c) Explain the principle and application of ELISA. [5]
- Q2)** a) Explain the mechanism of Antigen presentation by APC. [4]  
b) Explain the different mechanism of Antigen-Antibody reactions. [4]  
c) Enlist the differences between Monoclonal and Polyclonal antibodies. [2]
- Q3)** a) Write a short note on CD<sub>4</sub> and CD<sub>8</sub> receptors. [3]  
b) Explain the alternate pathway of complement fixation pathway. [3]  
c) What is immune deficiency? Add a note on immune deficiency disorders. [4]
- Q4)** Describe the structure and classes of immunoglobulins. Add a note on iso; idio-and allo-types. [5]

OR

What is major Histocompatibility complex? Explain the structure and function of its classes. [5]

P.T.O.

Total No. of Questions : 4]

P2272

[4829]-302

M.Sc. (Semester - III)

ZOOLOGY

ZY-302T: Environmental Biology

(2013 Pattern)

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 and labelled diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.

- Q1)** a) Define ecosystem and describe energy flow in an ecosystem. [5]  
b) Describe extinct species of India. [3]  
c) Define ecological niche. [2]

- Q2)** a) Describe semiarid habitats of India. [4]  
b) Describe the inter relationship between microbes and plants. [3]  
c) Explain nutritional flux. [3]

- Q3)** a) Give various factors influencing wild life management. [4]  
b) Explain the role of Indian forest in biodiversity conservation. [4]  
c) Give the examples of threatened species of Indian animals. [2]

- Q4)** Describe various projects for conservation of Indian wild life. [5]

OR

Give the various IVCN categories and explain with suitable examples. [5]



Total No. of Questions : 4]

SEAT No. :

P2273

[Total No. of Pages : 2

[4829]-303

M.Sc. (Semester - III)

ZOOLOGY

ZY-303: Genetic Toxicology

(2013 Pattern) (2 Credits)

*Time : 1½ Hours]*

*[Max. Marks : 25*

*Instructions to the candidates:*

- 1) *Attempt any two questions from Q.No. 1, 2 & 3.*
- 2) *Question No. 4 is compulsory.*
- 3) *Figures to right indicate full marks.*
- 4) *Draw neat labeled diagrams wherever necessary.*

- Q1)** a) Explain the mechanism of mutation caused due to UV light. [4]  
b) Explain the subdivisions of toxicology. [3]  
c) Explain the process of duplication in chromosome. [3]
- Q2)** a) Explain an assay to test the mutagenic potential of a compound in insects. [5]  
b) Explain in brief carcinogens. [3]  
c) What is yeast? Give its significance in genetic toxicology. [2]
- Q3)** a) Enlist the mutagenic agents in human environment with their impact on human. [3]  
b) Write a note on Ames's test. [3]  
c) What is point mutation? Explain its consequence. [4]
- Q4)** Write note on any one of the following :  
a) Importance of genetic toxicology. [5]  
b) Base analogs. [5]



*P.T.O.*

Total No. of Questions : 4]

**P2273**

**[4829]-303**

**M.Sc. (Semester - III)**

**ZOOLOGY**

**ZY-303: Aquaculture**

**(2013 Pattern) (2 Credits)**

*Time : 1½ Hours]*

*[Max. Marks : 25*

*Instructions to the candidates:*

- 1) *Attempt any two questions from Q.No. 1, 2 & 3.*
- 2) *Question No. 4 is compulsory.*
- 3) *Figures to the right indicate full marks.*
- 4) *Draw neat labelled diagrams wherever necessary.*

- Q1)** a) Describe aquatic insects and their control. [4]  
b) Explain the techniques used in composite culture system. [4]  
c) Define the term Aquaculture. [2]

- Q2)** a) Write the causes of mortality of fish seed and fish brood during transport. [5]  
b) Write on salting and freezing of fish preservation. [3]  
c) What is Juvenile Prawn Migration? [2]

- Q3)** a) What are the parasitic infections found in fishes? [4]  
b) Explain the fish food organisms and their production. [3]  
c) Describe gill net used in Indian fisheries. [3]

- Q4)** Comment on the Fish Pond preparation and management. [5]

OR

- Write a note on GIS technology in fisheries development. [5]

Total No. of Questions : 4]

SEAT No. :

P2274

[Total No. of Pages : 1

[4829]-304

M.Sc. (Semester - III)

ZOOLOGY

ZY-304: Insect Physiology and Biochemistry

(2013 Pattern) (2 Credits)

*Time : 1½ Hour]*

*[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 and labelled diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

- Q1)** a) What is digestion? Describe physiology of digestion and absorption of carbohydrates in insects. [5]  
b) Describe histological structure of fat body. [3]  
c) How proteins are digested by insects? [2]
- Q2)** a) Describe structure and functions of insect integument. [4]  
b) Explain how ventilation is controlled in insects. [3]  
c) Describe moulting hormone. [3]
- Q3)** a) Describe mechanism of water balance and nitrogen excretion in insects. [4]  
b) Describe types of insect haemocytes. [3]  
c) Discuss endocrine glands in insects. [3]
- Q4)** Attempt any one of the following : [5]  
a) Role of microsomal and extra microsomal enzymes in insecticides degradation.  
b) Describe structure and physiology of insects flight muscle.



Total No. of Questions : 4]

SEAT No. :

P2275

[Total No. of Pages : 1

[4829]-305

M.Sc. - II (Semester - III)

ZOOLOGY

ZY-305T: Research Methodology

(2013 Pattern)

*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) *Draw neat labelled diagrams wherever necessary.*
- 4) *Figures to the right indicate full marks.*

- Q1)** a) Explain the role of Immunohistochemistry in Biological Research. [4]  
b) Write the different applications of spectrometry. [3]  
c) List out the points for the preparation of the manuscript. [3]

- Q2)** a) What is data? Discuss in detail the primary and secondary data. [5]  
b) Define Biostatistics and explain the importance of students 't' test. [3]  
c) Write the application of DNA microarray. [2]

- Q3)** a) Explain the different techniques used for the characterization of biomolecules. [4]  
b) Write short notes on Centrifugation. [3]  
c) What is literature review? [3]

- Q4)** What is research problem? How will you frame a research problem in Zoology. [5]

OR

What is Bioinformatics? Discuss in detail the different databases applied in research. [5]



Total No. of Questions : 4]

SEAT No. :

P2276

[Total No. of Pages : 1

**[4829]-306**  
**M.Sc. (Semester - III)**  
**ZOOLOGY**  
**ZY-306: Parasitology**  
**(2013 Pattern) (2 Credits)**

*Time : 1½ Hour]*

*[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 and labelled diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

- Q1)** a) Describe life cycle and mode of transmission of Ancylostoma sps. [5]  
b) Explain transovarian transmission of parasites. [3]  
c) What is altruism? [2]
- Q2)** a) Describe diploid stages and chromosome polymorphism in plasmodium. [4]  
b) Explain parasitic preadaptations to infectiousness. [3]  
c) Describe mode of transmission of schistosoma sps. [3]
- Q3)** a) Describe immunodiagnostic assays. [4]  
b) Explain mechanism of resistance to malarial drug. [3]  
c) Classify myasis according to tissue. [3]
- Q4)** Attempt any one of the following : [5]  
a) Describe morphology and life cycle of Trypanosoma sps.  
b) Describe mechanism of sex determination and sex linked inheritance in schistosoma.





Total No. of Questions : 4]

SEAT No. :

P2277

[Total No. of Pages : 1

[4829]-307

M.Sc. (Semester - III)

ZOOLOGY

**ZY-307: Fundamentals of Systematics  
(2013 Pattern)**

*Time : 1½ Hours]*

*[Max. Marks : 25*

*Instructions to the candidates:*

- 1) *Attempt any two questions from Q.No. 1, 2 & 3.*
- 2) *Question No. 4 is compulsory.*
- 3) *Figures to the right indicate full marks.*
- 4) *Draw neat labeled diagrams wherever necessary.*

- Q1)** a) Give the important characters of vertebrata. [4]  
b) Define systematics and explain its use in biology. [3]  
c) What are the advantages of Molecular tools in systematics. [3]
- Q2)** a) Describe the five kingdom classification? [5]  
b) Explain what is molecular phylogeny. [3]  
c) Explain the term Chemo-taxonomy. [2]
- Q3)** a) What is hierarchical classification? Give its advantages. [3]  
b) Define : [3]  
i) Race.  
ii) Sibling species.  
iii) Phylogeography  
c) What is the different collection techniques used for insect collection?[4]
- Q4)** Write note on any one of the following :  
a) What is the use of taxonomic keys? Give its merits and demerits. [5]  
b) Explain the morphology based taxonomy with examples. [5]



Total No. of Questions : 4]

SEAT No. :

P2278

[Total No. of Pages : 1

[4829]-308

M.Sc. (Semester - III)

ZOOLOGY

ZY-308: Insect Ecology  
(2013 Pattern) (2 Credits)

*Time : 1½ Hour]*

*[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 and labelled diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

- Q1)** a) Describe various ecological associations. [5]  
b) Describe role of moisture in regulating insect population. [3]  
c) What is insect ecology. [2]
- Q2)** a) Discuss the plant defence mechanism. [4]  
b) What is contribution of enemies in regulating insect population dynamics. [3]  
c) How climate change affects on insect life? [3]
- Q3)** a) Describe effect of photoperiod on insect. [4]  
b) Discuss various threats to insect life. [3]  
c) Describe leaf shredding insects. [3]
- Q4)** Write short note on any one of the following : [5]  
a) Role of insects in ecosystem.  
b) Natural enemies of insects.



Total No. of Questions : 4]

SEAT No. :

P2279

[Total No. of Pages : 1

**[4829]-309**  
**M.Sc. (Semester - III)**  
**ZOOLOGY**  
**ZY-309: Toxicology - I**  
**(2013 Pattern)**

*Time : 1½ Hour]*

*[Max. Marks : 25*

*Instructions to the candidates:*

- 1) *Attempt any two questions from Q.No. 1, 2 & 3.*
- 2) *Question No. 4 is compulsory.*
- 3) *Neat diagram must drawn wherever necessary.*
- 4) *Figure to the right indicate full marks.*

- Q1)** a) What is toxicology? Explain its role. [5]  
b) What is biotransformation. [3]  
c) Define biomagnification. [2]
- Q2)** a) Define pesticides, classify them on the basis of mode of action. [4]  
b) Write a note on general handling of animals for toxicological studies.[4]  
c) Define L.D. 50. [2]
- Q3)** a) Describe the toxicology of any one heavy metal that you have studied.[4]  
b) What is bioaccumulation, explain it with a suitable example. [4]  
c) Define clinical toxicology. [2]
- Q4)** Define Xenobiotic, give the mechanism of their translocation. [5]
- OR
- What is nanotoxicology? Explain its significance. [5]



Total No. of Questions : 8]

SEAT No. :

P2280

[Total No. of Pages : 6

[4829]-401

M.Sc. (Semester - IV)

ZOOLOGY

ZY-401T: Entomology - II  
(2013 Pattern) (4 Credits)

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Attempt any five questions.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat labelled diagrams wherever necessary.*

- Q1)** a) Describe the process of spermatogenesis in insects. [5]  
b) Explain telotrophic ovariole. [3]  
c) Define vitellogenesis. [2]
- Q2)** a) Describe mechanism of oviposition in insects. [4]  
b) Sketch and label obtect pupa. [4]  
c) Define Acephalous larva. [2]
- Q3)** a) Explain sex determination in insects. [3]  
b) Describe Apodous larva. [3]  
c) Explain regeneration in insects. [4]
- Q4)** a) Describe the process of formation of Embryonic envelopes in insects. [5]  
b) Explain Exarate pupa. [3]  
c) Define Diapause. [2]
- Q5)** a) Explain Seminal transform in insects. [3]  
b) Explain Vitellogenesis. [3]  
c) Describe Holometabolous pupa. [4]

*P.T.O.*

- Q6)** a) Describe development of alimentary canal in insects. [4]  
b) Explain Dyar's law. [4]  
c) Define Ametabolous development. [2]
- Q7)** a) Describe the different types of gastrulation in insects. [5]  
b) Describe the development of nervous system in insects. [5]
- Q8)** a) Describe the ascending and descending blastokinesis in insects. [5]  
b) What is metamorphosis? Explain different types of metamorphosis. [5]



Total No. of Questions : 8]

P2280

[4829]-401

M.Sc. (Semester - IV)

ZOOLOGY

ZY-401T: Animal Physiology - II  
(2013 Pattern)

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Attempt any five questions.*
- 2) *Figures to right indicate full marks.*
- 3) *Draw neat labelled diagrams wherever necessary.*

- Q1)** a) Describe the events of cardiac cycle. [5]  
b) Explain the process of oxygen transport. [3]  
c) Define action potential. [2]
- Q2)** a) Explain the anatomy of the respiratory system. [4]  
b) Comment on the function of autonomous smooth muscles in digestion. [4]  
c) What is internal respiration? [2]
- Q3)** a) Describe the composition of Blood. [4]  
b) Explain in brief intrinsic blood clotting pathway. [3]  
c) Define Nutrition [3]
- Q4)** a) Explain the role of gastrointestinal hormone in digestion. [5]  
b) Explain the neuronal control of heart. [5]
- Q5)** a) Explain the role of ATP in muscle contraction. [5]  
b) Explain the structure of synapse. [3]  
c) What are Capillaries? Explain their function. [2]

- Q6)** a) Explain the ionic basis of nerve excitation and conduction. [5]  
b) Explain the contractile machinery of smooth muscle. [5]
- Q7)** a) What is receptor? Explain any two types of receptors. [3]  
b) Explain the structure and function of taste bud. [3]  
c) Explain the physiology of vision. [4]
- Q8)** a) Describe the structure of internal ear. [5]  
b) Write a note on venous return. [5]



Total No. of Questions : 8]

**P2280**

**[4829]-401**

**M.Sc. (Semester - IV)**

**ZOOLOGY**

**ZY-401T: Genetics - II**

**(2013 Pattern) (4 Credits)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Attempt any five questions.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat diagrams wherever necessary.*

- Q1)** a) Explain the genetic basis of Alzheimers disease. [4]  
b) Explain the following features of autosomal dominant disorders. [4]  
i) Reduced Penetrance.  
ii) Variable Expressivity.  
c) Define “Quantitative trait loci”. [2]
- Q2)** a) Explain the genetic defects in purine metabolism that leads to Lesh-Nyhan Syndrome. [4]  
b) What is positional cloning? Explain positional cloning using structural abnormalities. [3]  
c) Describe role of RAG 1 and RAG 2 in generation of antibody diversity. [3]
- Q3)** a) Explain any one invasive method of pre-natal diagnosis. [4]  
b) Write a note on “Tumor suppressor genes”. [4]  
c) Define Sex Influenced genes and Sex Limited genes. [2]
- Q4)** a) X-Inactivation leads to dosage compensation in humans. – Justify. [5]  
b) Write a note on the very first Physical Map. [3]  
c) Define Syntenic homology. [2]



- Q5)** a) Write a note on Twin and adoption studies. [5]  
b) What is Mosaicism? How does it differ from Chimerism. [3]  
c) What are Inbred Strains? Explain the same with suitable example. [2]
- Q6)** a) What is genomic imprinting? Give evidences for the same from imprinting syndromes. [5]  
b) Explain regulation of hox gene with reference to Abd-b gene regulation. [5]
- Q7)** a) Explain the role of genetics in learning and memory formation. [5]  
b) Explain the concept of pleiotropy with suitable autosomal syndromes. Marfan syndrome and Digeorge syndrome. [5]
- Q8)** a) Describe the characteristics of sex linked recessive inheritance. [5]  
b) Explain molecular basis of simple  $\beta$ -Thalassemia. [5]



Total No. of Questions : 4]

SEAT No. :

P2281

[Total No. of Pages : 2

[4829]-402

M.Sc. - II (Semester - IV)

ZOOLOGY

ZY-402T: Economic Zoology

(2013 Pattern)

*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) *Figures to right indicate full marks.*
- 4) *Draw neat labeled diagrams wherever necessary.*

- Q1)** a) Define parasite. Explain the economic importance of protozoans. [5]  
b) Write a note on importance of sponge culture in industry. [3]  
c) Name any four stored grain pests. [2]
- Q2)** a) What is trematode? Describe the role of any two trematode in animal life. [4]  
b) Write a note on coral reef. [3]  
c) Write a note on economic importance of birds. [3]
- Q3)** a) What is nematode? Describe the role of any two nematodes in plant health. [4]  
b) Write a note on ethical committee for animal experiment regulation. [4]  
c) Economic importance of prawns. [2]
- Q4)** Attempt any one of the following :
- a) Give a detailed layout of an Apiculture Unit. [5]
  - b) Describe the life cycle of silk worm. [5]



**P.T.O.**

Total No. of Questions : 4]

**P2281**

**[4829]-402**

**M.Sc. (Semester - IV)**

**ZOOLOGY**

**ZY-402T: Bacteria and Phage Genetics**

**(2013 Pattern) (2 Credits)**

*Time : 1½ Hours]*

*[Max. Marks : 25*

*Instructions to the candidates:*

- 1) *Attempt any two questions from Q.No. 1 to 3.*
- 2) *Question No. 4 is compulsory.*
- 3) *Draw neat diagrams wherever necessary.*

- Q1)** a) Describe any one mechanism of DNA repair in Bacteria. [5]  
b) Explain about complementation. [3]  
c) What are base analogues? Give an example. [2]

- Q2)** a) Define lysogeny? Explain about base analogues as mutagens. [4]  
b) Explain the term point mutation. [3]  
c) Give morphology of T2 phage. [3]

- Q3)** a) Give general properties of bacteriophage. [4]  
b) Explain about salient features of lambda phage. [4]  
c) What is chromosomal mapping. [2]

- Q4)** Give an account on 'Transduction'. [5]

OR

Write a note on 'Transformation'.



Total No. of Questions : 4]

SEAT No. :

P2282

[Total No. of Pages : 2

[4829]-403

M.Sc. - II (Semester - IV)

ZOOLOGY

**ZY-403: Mammalian Reproductive Physiology  
(2013 Pattern)**

*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) *Figures to the right indicate full marks.*
- 4) *Draw neat labeled diagrams wherever necessary.*

- Q1)** a) Explain the Oestrous cycle. [5]  
b) What is lactation? Explain the role of hormones in lactation. [3]  
c) What is androgen? [2]
- Q2)** a) Explain in vitro fertilization and give its applications. [4]  
b) Explain the structure and functions of endothelio-chorial placenta. [3]  
c) What are continuous breeders? [3]
- Q3)** a) Explain the causes and treatment of infertility. [4]  
b) Write a note on hormones during gestation period. [4]  
c) What is blastocyst formation? [2]
- Q4)** Attempt any one of the following :
- a) Explain the hypothalamus-pituitary and gonad axis. [5]  
b) Explain the structure and function of female reproductive organ. [5]

*P.T.O.*

Total No. of Questions : 4]

**[4829]-403**  
**M.Sc. - II (Semester - IV)**  
**ZOOLOGY**  
**ZY-403: Biodiversity Assessment**  
**(2013 Pattern)**

*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 diagram must be drawn wherever necessary.*
- 4) *Figure to the right indicate full marks.*

- Q1)** a) Explain the role of Devrai Movement of conservation in India. [5]  
b) What are the hotspots of biodiversity of the world. [3]  
c) Define Rare species. [2]
- Q2)** a) Write a note on tools and techniques used to assess the biodiversity. [4]  
b) What is ex-situ conservation. [3]  
c) Write a note on Blue data book. [3]
- Q3)** a) What is biodiversity? Explain the species biodiversity. [4]  
b) Enlist the factors responsible for mass extinction. [3]  
c) Write the characteristic features of Phylum Annelida. [3]
- Q4)** What are Keystone species? Explain. Why it is necessary to conserve them? [5]

OR

Explain the five kingdom classification proposed by Whittakar. [5]



Total No. of Questions : 4]

SEAT No. :

P2283

[Total No. of Pages : 1

[4829]-404

M.Sc. - II (Semester - IV)

ZOOLOGY

**ZY-404: Histology and Histochemistry  
(2013 Pattern) (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) *Figures to right indicate full marks.*
- 4) *Draw neat labelled diagrams wherever necessary.*

- Q1)** a) What is epithelial tissue? Comment on the location and functions of simple epithelial tissue. [5]  
b) Explain the various parts of a rotary microtome. [3]  
c) Define Mordant. [2]
- Q2)** a) What is tissue fixation? Explain its significance in histological preparations. [4]  
b) Explain the procedure of histochemical detection of alkaline phosphatase. [3]  
c) Explain cytoplasmic stains with suitable examples. [3]
- Q3)** a) Explain the principle and practice of histochemical detection of mucopolysaccharides. [4]  
b) Explain the process of dehydration and give its significance. [4]  
c) What is areolar connective tissue? [2]
- Q4)** Attempt any one of the following :  
a) Explain immunohistochemical staining. [5]  
b) Explain the procedure of preparation of permanent histological slide. [5]



Total No. of Questions : 4]

SEAT No. :

**P2284**

[Total No. of Pages : 1

**[4829]-405**

**M.Sc. (Semester - IV)**

**ZOOLOGY**

**ZY-405T: Pollution Biology**

**(2013 Pattern) (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) What is Biosphere? Describe various layers of atmosphere? [4]  
b) Describe impact of pesticide on living organisms. [3]  
c) Explain the sources of water pollution. [3]

- Q2)** a) Describe strategies for noise pollution monitoring. [4]  
b) Describe causes and consequences of Biomagnifications. [4]  
c) Explain the sources of radioactive pollution. [2]

- Q3)** a) What is bioassay? Explain pollutant bioassay using fish. [4]  
b) Write a note on Biomedical waste. [4]  
c) Define : [2]  
i) Bioconcentration.  
ii) Bioaccumulation.

- Q4)** Attempt any one :  
Describe biological methods for assessment of Environmental quality. [5]

OR

Describe physiological methods to study impact of pollutants on animals.



Total No. of Questions : 4]

SEAT No. :

P2285

[Total No. of Pages : 1

**[4829]-406**  
**M.Sc. (Semester - IV)**  
**ZOOLOGY**  
**ZY-406 T: Apiculture**  
**(2013 Pattern) (2 Credits)**

*Time : 1½ Hours]*

*[Max. Marks : 25*

*Instructions to the candidates:*

- 1) *Attempt any two questions from Q.No. 1 to 3.*
- 2) *Question No. 4 is compulsory.*
- 3) *Draw neat labelled diagrams wherever necessary.*

- Q1)** a) Describe caste system found in Honey bees. [5]  
b) What is honey flow period? [3]  
c) What do you mean by apiary? [2]
- Q2)** a) Describe any four equipments for handling the bees. [4]  
b) What is routine management of a bee colony? [3]  
c) Describe honey as a beehive product. [3]
- Q3)** a) Describe viral diseases of bees. [4]  
b) Explain economics of bee keeping. [4]  
c) What is apitoxin? [2]
- Q4)** Write short notes on the following : [5]  
a) Bee flora.  
b) Honey extractor.





Total No. of Questions : 4]

SEAT No. :

P2286

[Total No. of Pages : 1

[4829]-407

M.Sc. (Semester - IV)

ZOOLOGY

ZY-407T: Pest Control

(2013 Pattern) (2 Credits)

*Time : 1½ Hours]*

*[Max. Marks : 25*

*Instructions to the candidates:*

- 1) *Attempt any two questions from Q.No. 1 to 3.*
- 2) *Question No. 4 is compulsory.*
- 3) *Figures to the right indicate full marks.*

- Q1)** a) Describe different types of insecticides based on mode of action. [5]  
b) Describe control measure for stored grain pests. [3]  
c) What is EC. [2]
- Q2)** a) Describe various physical control methods employed in pest control.[4]  
b) Describe methods of insecticide dilution. [4]  
c) What is Insect Pest Management. [2]
- Q3)** a) Describe advantages and drawbacks of biological control of insects.[4]  
b) How birds and squirrels can be controlled. [3]  
c) Discuss insects of medical importance. [3]
- Q4)** Write short notes on (any one) : [5]  
a) Integrated Pest Management.  
b) Hazards of Pesticides.



Total No. of Questions : 4]

SEAT No. :

P2287

[Total No. of Pages : 1

[4829]-408

M.Sc. - II (Semester - IV)

ZOOLOGY

ZY-408T: Toxicology - II

(2013 Pattern) (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) Describe the detoxification of any one OP compound. [4]

b) Give good laboratory practices on lab safety. [3]

c) Describe the absorption of toxic agents with reference to Gastro-intestinal tract. [3]

**Q2)** a) Explain Bio-medical waste disposal. [4]

b) Give the advantages and limitations of Toxicogenomics. [4]

c) Define the term 'Bioactivation' and 'Detoxification'. [2]

**Q3)** a) Describe the mechanism of Biotransformation giving either phase I or phase II reactions. [5]

b) What is IAEC? Give its role in animal research. [3]

c) Define xenobiotics giving examples. [2]

**Q4)** a) Describe the alternatives for animal models. [5]

OR

b) Explain the transfer of toxic agents across membranes. [5]

