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 the right indicate full marks.
4) Draw neat labeled diagrams wherever necessary

Q1) a) Classify lipids in brief. [4]
b) Give the biological significance of monosaccharides. [4]
c) What is Rickets? [2]

Q2) a) Explain the structure of water molecule. Add a note on properties of water. [5]
b) Explain source and functions of vitamin E. [3]
c) What is holoenzyme? [2]

Q3) a) Define pH? Explain the role of buffers in biological system with an example. [3]
b) Give M-M equation and derive Lineweaver-Burk equation. [3]
c) What are structural polysaccharides? Explain their structure and function with examples. [4]

Q4) a) Explain competitive and Non Competitive enzyme inhibition. [4]
b) Explain coenzymes with suitable examples. [4]
c) Write Henderson-Hesselbalch equation and give its importance. [2]

P.T.O.
Q5) a) What are isozymes? Explain them with suitable example.  
   [5]
   b) Classify enzymes with suitable examples.  
   [5]

Q6) Write short note on (Any two):  
   [8]
   a) Draw the structure of following polypeptide.
     Ser-Ala-Lys
   b) Effect of temperature on enzyme activity.
   c) Allosteric enzyme.
   d) Biological significance of Lipids.
P2835

[5029]-102
M.Sc-I
ZOLOGY
ZY 102(T): Cell Biology
(2013 Pattern)(Semester-I)(3 Credits)

Time : 2½ Hours

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) Describe functions of Rough Endoplasmic reticulum. [4]
    b) Lysosomes are suicide bags in cell. Explain [4]
    c) Explain glycocalyx [2]

Q2) a) Describe fluid mosaic model of plasma membrane [5]
    b) Explain cell adhesion molecules with their significance [3]
    c) What are plasmo desmata. [2]

Q3) a) Explain the mechanism of synaptic tranomission. [4]
    b) Give the organic compounds of cytoplasmic matrix [3]
    c) Describe β oxidation of fatty acids. [3]

Q4) a) Explain the different phases of cell cycle. [5]
    b) Explain Nucleo-cyto plasmic interactions. [5]

Q5) a) Explain glyoxylate cycle & give its significance. [5]
    b) Describe composition & functions of microtubules [5]

P.T.O.
Q6) Write short note on (Any two):

a) Intermediate filaments.

b) Sketch & label ultrastructure of nucleus

c) Protein import in mitochondria.

d) Genetic system of chloroplast.
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) Define Epistasis. Explain Epistatic gene interaction with reference to Duplicate gene epistasis.

b) Explain- Structural organization of Lac operon

c) Define:

   i) Linkage group
   ii) cistron

Q2) a) Write the characteristic features of autosomal recessive inheritance

b) “Quantitative traits are influenced by both, genes and environmental factors”-Explain.

c) Explain-classical concept of a gene.

Q3) a) Describe the technique of somatic cell hybridization. State its applications.

b) The PTC tasting ability was checked in a population of 1000 individuals. 600 individuals were tasters and remaining were non-tasters. Calculate the percentage of heterozygous tasters

c) State the assumptions and results of Hardy-Weinberg’s law.

P.T.O.
Q4) A corn plant known to be heterozygous at three loci is test crossed. The progeny phenotypes and numbers are as follows:

<p>| | | | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>a</td>
<td>b</td>
<td>c</td>
<td>570</td>
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<tr>
<td>+</td>
<td>+</td>
<td>+</td>
<td>575</td>
</tr>
<tr>
<td>+</td>
<td>b</td>
<td>c</td>
<td>355</td>
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<tr>
<td>a</td>
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<td>a</td>
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<td>+</td>
<td>37</td>
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<tr>
<td>+</td>
<td>+</td>
<td>c</td>
<td>37</td>
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<td>+</td>
<td>b</td>
<td>+</td>
<td>33</td>
</tr>
<tr>
<td>a</td>
<td>+</td>
<td>c</td>
<td>33</td>
</tr>
</tbody>
</table>

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

OR

Among 600 students of a college, the following ABO blood types were obtained:

A: 280, B: 19, AB: 13 and O: 288. Calculate the gene frequencies of genes \( I^A, I^B, \) and \( i \)
P2837

[5029]-104
M.Sc.
ZOOLOGY
ZY-104 (T): Biostatistics
(2013 Pattern) (Semester - I)

Time : 1½ Hours

[Max. Marks :25]

Instructions to the candidates:

1) Attempt any two questions from Q 1, Q 2, and Q 3.
2) Questions 4 is compulsory.
3) Figures to the right indicate full marks.
4) Use of calculator and statistical tables is allowed.

Q1) a) Define the terms: Population, frequency, cumulative frequency, mode.[4]

b) Describe in brief the method of drawing pie diagram. [3]

c) Define the term bivariate data. Give one suitable example. [3]

Q2) a) The table below gives frequency distribution. Compute 17th Percentile.[4]

<table>
<thead>
<tr>
<th>Class</th>
<th>Frequency</th>
</tr>
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<tbody>
<tr>
<td>00-20</td>
<td>12</td>
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<tr>
<td>20-40</td>
<td>19</td>
</tr>
<tr>
<td>40-60</td>
<td>26</td>
</tr>
<tr>
<td>60-80</td>
<td>32</td>
</tr>
<tr>
<td>80-100</td>
<td>17</td>
</tr>
<tr>
<td>100-120</td>
<td>11</td>
</tr>
</tbody>
</table>

b) State the formula for quartile deviation, variance and coefficient of variation. [3]

c) Explain the concept of regression. State the equations of two regression lines. [3]

P.T.O.
**Q3** a) What are different types of events? Give one example of each. [4]

b) State the probability distribution of Poison distribution. Also state its properties. [3]

c) Define: Hypothesis, P-value, Type II error. [3]

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

a) F-test for equality of two population variance.

b) Mathematical and Classical definition of Probability.

EEE
ZY-105: Skills in Scientific Communication and Writing
(2013 Pattern - Credit System) (Semester - I)

Instructions to the candidates:
1) Attempt any two questions from Q 1, 2, and Q 3.
2) Question no 4 is compulsory.

Q1) a) Mention the common errors that occurs in written communication. [4]
   b) Explain tautology, double negative and double positive. [4]
   c) Importance of key words. [2]

Q2) a) What are the objectives of a project work. [4]
   b) Write a note on power point slides. [3]
   c) Mention any three synonyms. [3]

Q3) a) Write a letter to editor for publishing a research paper. [4]
   b) What is IMRAD format. [3]
   c) Mention any two acronyms. [3]

Q4) Explain how to write ‘Introduction’.

OR

Write a note on different types of citations.
Instructions to the candidates:

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

Q1) a) Describe protective adaptations in rotifers. [4]

b) Give diagnostic features of fairy shrimps. [3]

c) Give adaptations of crocodiles. [3]

Q2) a) Describe adaptations for respiration in freshwater insects. [5]

b) Describe importance of pH in aquatic life. [3]

c) Describe oligotrophic lake. [2]

Q3) a) Explain lotic Habitat. [4]

b) Describe biological changes in river due to sewage pollution. [3]

c) Give importance of tadpole in life cycle of frog. [3]

Q4) Write short notes on (any one): [5]

a) Thermal stratification.

b) protective adaptations in freshwater protozoa.
P2840

[5029]-201
M.Sc. -I
ZOOLOGY
ZY-201 T: Biochemistry - II (3C)
(2013 Pattern) (Semester - II)

Time : 2½ Hours] [Max. Marks : 38

Instructions to the candidates:

1) Attempt any three questions from Q.No.1, to Q.No. 5.
2) Questions No.6 is compulsory.
3) Figures to the right indicate full marks.
4) Draw neat labeled diagrams wherever necessary.

Q1) a) Explain in brief role of enzyme in the regulation of metabolic pathways. [5]

b) Write note on entropy. [3]

c) Define catabolism and anabolism. [2]

Q2) a) Draw the gluconeogenic pathway of glucose synthesis. [4]

b) Explain the role of glycogen phosphorylase in glycogen breakdown. [4]

c) Give the significance of glycolysis. [2]

Q3) a) Explain the formation of isocitrate from citrate. [3]

b) What is oxidative phosphorylation. [3]

c) Write a note on ATP Synthase. [4]

Q4) a) Explain in detail Complex IV (cytochrome oxidase) of the mitochondrial electron transfer chain. [4]

b) Explain the conversion of glutamate in to carbamoyl phosphate. [3]

c) What is deamination? [3]

P.T.O.
Q5) a) Explain the role of cAMP in metabolic pathway. [5]  
b) Explain ketogenesis in brief. [5]

Q6) Attempt any two of the following:

a) Explain the conversion of nucleoside monophosphate to nucleoside triphosphate. [4]  
b) Explain the oxidation of odd chain fatty acids. [4]  
c) How is uric acid formed from GMP. [4]
Instructions to the candidates:

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

Q1) a) Write a note on Watson and Crick model of DNA. [5]
    b) Explain the nucleotide excision repair. [3]
    c) What is Satellite DNA? [2]

Q2) a) What are the nucleosomes? Explain their role in chromatin organization. [4]
    b) What is Genetic code? Explain the phenomenon of degeneracy of genetic code. [4]
    c) What is central dogma of molecular biology? [2]

Q3) a) What are non-replicative transposons? [3]
    b) Explain the structure of nucleotide. [3]
    c) Write a note on activation of amino acids during translation. [4]

Q4) a) Explain the termination of transcription in bacteria. [4]
    b) Explain any two types of DNA Damage. [4]
    c) Define linkage number. [2]
Q5) a) Write a note on processing of mRNA at 3’ end. [5]
   b) Explain the promoters of eukaryotic polymerase. [5]

Q6) Write notes on any two of the following:
   a) Elongation process of translation. [4]
   b) Temperature melting. [4]
   c) Termination of transcription in bacteria. [4]
   d) Photoreactivation. [4]
P2842  

M.Sc.  

ZOOLGY  

ZY-203 T: Developmental Biology  
(2013 Pattern) (Credit System) (Semester - II)  

Time : 1½ Hours  

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 side indicate full marks.  

Q1) a) Explain molecular signaling during neural induction.  
   b) Explain cell ageing with example.  
   c) Give importance of maternal macromolecules and organelles during early development.  

Q2) a) Explain acrosome reaction of sperm.  
   b) Explain radial cleavage with example.  
   c) Give the significance of oogenesis.  

Q3) a) Explain importance of chick as model organism.  
   b) Enumerate role of Lampbrush chromosome.  
   c) Explain cortical granule reaction to avoid polyspermy.  

Q4) Attempt any one of the following:  
   a) Comment on role of Torso morphogen gradient in pattern formation of Drosophila.  
   b) Explain role of Hensen’s node as a organizer in birds.
Instructions to the candidates:

1) Attempt any two questions from question 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 hormonal regulation of insect metamorphosis. [5]
     b) Explain the role of pituitary in regulating control of chromatophores. [3]
     c) Enlist hormones involved in calcium and phosphate metabolism. [2]

Q2) a) What are hormone receptors? Explain plasma membrane receptors. [4]
     b) Write a note on gastrointestinal hormones. [3]
     c) Explain vitellogenesis in amphibians. [3]

Q3) a) Explain hormonal regulation of carbohydrate metabolism. [4]
     b) Write a note on role of PRL and STH. [3]
     c) Explain chemical messengers. [3]

Q4) Write short notes on any one of the following: [5]
     a) Role of JG complex in osmoregulation.
     b) Role of X & Y organs in moulting and colour change in crustaceans.
Instructions to the candidates:

1) Attempt any two questions from question 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 the process of digestion. [4]
    b) Explain the ultrastructure of motor end plate. [4]
    c) Define: osmotic regulators. [2]

Q2) a) Explain the mechanism of thermoregulation in homeotherms. [4]
    c) Enlist the essential amino acids. [2]

Q3) a) Write a note on physiological and ecological significance of O₂ dissociation curve. [3]
    b) Explain the principles of neural integration. [3]
    c) Describe the role of calcium in muscle contraction. [4]

Q4) a) Discuss the role of haemoglobin in gas transport. Add a note on its chemistry. [5]

OR

b) Write a comparative account on the distribution and specificity of digestive enzymes in animals. [5]
Total No. of Questions :4

P2845

[5029]-206
M.Sc. -I
ZOVOLOGY
ZY-206 (T): Biochemical Techniques
(2013 Pattern) (2 Credits) (Semester - II)

Time : 1½ Hours

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) What is HPLC? Explain its principle and application. [4]
   
   b) Explain Edman’s degradation reaction and give its application. [3]
   
   c) Explain the principle of atomic absorption spectrometry. [3]

Q2) a) Explain native PAGE. [5]
   
   b) Explain the principle of Warburg’s apparatus. [3]
   
   c) Define isoelectric point. [2]

Q3) a) Explain the application of UV-Spectrophotometry. [4]
   
   b) Explain the application of centrifugation. [3]
   
   c) Give the application of gel filtration chromatography. [3]

Q4) Attempt any one:

   a) Explain the radiation hazards. [5]
   
   b) Explain any one method of DNA sequencing.

EEE

P.T.O.
Instructions to the candidates:
1) Attempt any two questions from Q. No.1, to 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 any one order from class osteichthyes with two examples. [4]
    b) Explain role of swim bladder in fishes. [3]
    c) Describe anadromous migration. [3]

Q2) a) Give an account of osmoregulation in fishes. [5]
    b) Explain in brief seasonal changes in male gonads in fishes. [3]
    c) Define chromatophores. [2]

Q3) a) Describe food & feeding habits of fishes. [4]
    b) Discuss functions of pituitary gland in fishes. [3]
    c) Differentiate the orders petromyzontia & myxinoidea. [3]

Q4) Write short notes on (any one): [5]
    a) Lateral line system.
    b) Thyroid gland.

EEE
P2846

[5029]-301
M.Sc. -II
ZOOLOGY
ZY-301 (T): Animal Physiology - I
(2013 Pattern) (Special Paper - 4 Credits) (Semester - III)

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 labeled diagrams wherever necessary.

Q1) a) Explain the mechanism of water & electrolyte balance in marine air breathing vertebrates. [4]

b) Describe in detail the role of malphigian tubules in insects. [4]

c) Define: Buoyancy. [2]

Q2) a) Describe various strategies employed for reduction in density so as to achieve neutral buoyancy. [5]

b) Explain the structure and composition of plasma membrane. Add a note on facilitated diffusion. [5]

Q3) a) What is bioluminescence? Add a note on phyletic distribution of bioluminescence. [4]

b) Explain various regulatory mechanisms to achieve homeostasis. [4]

c) Enlist any two miscellaneous and products of nitrogen metabolism. [2]

Q4) a) Discuss the problems of deep sea diving. [5]


P.T.O.
Q5) a) What is animal electricity? Explain the structure of electric organ.  [4]

b) What is action potential? Add a note on role of various ion channels in generation of action potential.  [4]

c) Define: Acclimatisation.  [2]

Q6) a) What is an aerobic metabolism? Add a note on significance of lactic acid synthesis.  [4]

b) Define internal environment. Add a note on extracellular and intracellular environment.  [4]

c) Define: Conductance.  [2]

Q7) a) Explain organs used by various organisms for excretion. Add a note on mechanism of urine formation by vertebrate kidney.  [5]

b) Explain the energy cost of running and swimming.  [5]

Q8) a) Write a note on acclimation to low O₂ level.  [4]

b) Explain the atmosphere and aquatic environment with reference to their physiological implications.  [4]

c) Define: Euryhaline.  [2]

EEE
Total No. of Questions :8]

P2846

[5029]-301
M.Sc.-II
ZOOLOGY
ZY-301 (T): Entomology - I
(2013 Pattern) (4 Credits) (Semester - III)

Time : 3 Hours]

Instructions to the candidates:

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

Q1) a) Discuss inter-relationship of insects with other arthropods. [5]

b) Write the structure and example of ganiculate antenna. [3]

c) Explain abdomen of wasp. [2]

Q2) a) Give the distinguishing characters of order dipleura with two examples.[4]

b) Explain the characters of Hemisptera with two examples. [3]

c) Give functions of regenerative cells. [3]

Q3) a) Mention the distinguishing characters of Hymenoptera with two examples. [4]

b) Explain important calicular derivatives in insects. [4]

c) Give the meaning of oligopneustictrachead system. [2]

Q4) a) Explain modifications of head capsule in insects. [4]

b) Explain tegmina. [3]

c) Explain ostia in insects. [3]
Q5) a) Describe exocrine glands in insects. [5]
   b) Sketch and label fossorial leg. [3]
   c) Define endopterygota. [2]
Q6) a) Explain piercing and sucking type of mouth parts. [4]
   b) Explain course of blood circulation in insects. [4]
   c) Give the functions of cryptonephridium. [2]
Q7) a) Explain male reproductive system in insects. [5]
   b) Explain panoistic ovariole. [5]
Q8) a) Explain light producing organs in insects. [5]
   b) What is excretion? Explain structure and functions of malpighian tubules. [5]
P2846

M.Sc.-II

ZOOOLOGY

ZY-301 (T): Genetics - I

(2013 Pattern) (Semester - III)

Time : 3 Hours]

Instructions to the candidates: [Max. Marks :50

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 by migration.[5]

b) Explain the terms: [3

i) Pseudogenes,

ii) Cladogenesis

iii) Synonymous substitution.

c) Explain the advantages of Heterozygote superiority over the homozygotes with a suitable example. [2]

Q2) a) How do ‘r’ strategies differ from ‘k’ strategies. [4]

b) The narrow sense heritability of wool length in a breed of sheep is 0.92, and the narrow sense heritability of body size is 0.87. The genetic correlation between wool length and body size is - 0.84. If a breeder selects for sheep with longer wool, what will be the most likely effects on wool length and body size? [4]

c) Inbreeding leads to homozygosity- Explain. [2]

Q3) a) Describe In vivo gene therapy with suitable example. [4]

b) Write a note on flow cytometry. [3]

c) The narrow sense heritability for abdominal bristle number is 12. A male with 10 bristles is mated to a female with 20 bristle number. What is the expected number of the bristles among these progeny? [3]
Q4) a) Explain directional and stabilizing selection modes and their effects with suitable example. [4]

b) The mean value of a trait is 100 units and the narrow sense heritability is 0.4. A male and a female measuring 124 and 126 units, respectively, mate and produce a large number of offspring, which are reared in an average environment. What is the expected value of the trait among these offspring? [4]

c) Enlist any four fluorescent dyes along with their excitation range used in genetic analysis. [2]

Q5) a) Why might Mitochondrial DNA sequences accumulate substitutions at a faster rate than nuclear gene in the same organism? [4]

b) Calculate the effective population size \( N_e \) for a breeding population of 02 adult males and 98 adult females. [2]

c) What is speciation? How do sympatric speciation differ from allopatric mode of speciation. [4]

Q6) a) Explain in brief: Molecular Markers. [5]

b) Explain how a phylogenetic relationship can be determined using nucleic acid sequencing. [5]

Q7) a) What are model organisms? Explain the life cycle of *E.coli*. State various reasons why it is used as a model organism in genetics studies. [5]


Q8) a) Explain the role of Mu temperate bacteriophage in genetics studies. [5]

b) ‘Genetic polymorphism allows many populations to confront new environmental challenges’ - Justify. [5]

EEE
P2847

[5029] - 302
M.Sc. (Part-II)
ZOLOGY

ZY - 302(T) : Immunology
(2013 Pattern) (Semester - III)

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) Enlist primary and secondary lymphoid organs of human. [2]
    b) Write a short note on immunological tolerance. [3]
    c) Explain the principle and application of hybridoma technique. [5]

Q2) a) Explain the principle and procedure of immuno-diffusion and give its applications. [4]
    b) Explain the clonal selection theory. [4]
    c) What are the different applications of immuno-fluorescence. [2]

Q3) a) Explain in short the alternative cascade of complement fixation. [3]
    b) Write a short note on inflammation. [3]
    c) Explain the structure-function relationship of immunoglobulin. [4]


OR

Explain the cellular basis of immunity. Add a note on different cells of the human immune system. [5]

✓ ✓ ✓
P2847  
[5029] - 302  
M.Sc.- II  
ZOOLOGY  
ZY-302T: Environmental Biology  
(2013 Pattern- 2Credits) (Semester - III)

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) Describe Impact of climate on Biodiversity. [5]
    b) What are endemic species? [3]
    c) Define edge effect. [2]

Q2) a) Describe importance of wild life conservation. [4]
    b) Describe the role of microbes in environmental science. [3]
    c) Discuss vital role of local communities in wild life management. [3]

Q3) a) Describe interrelationship between microbes and human. [4]
    b) Comment upon India’s Biogeographical history. [4]
    c) Describe goals of wild life management. [2]

Q4) Write an essay on faunal biodiversity. [5]
    OR
    Explain the energy flow in ecosystem. [5]
Time : 1½ Hours

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) What is Toxicology? Explain the significance of genetic toxicology. [4]
    b) Explain the biological significance of mutagens. [3]
    c) Explain the process of inversion in chromosome. [3]

Q2) a) Explain the Ames test and give its significance in genetic toxicology. [5]
    b) Why is *Drosophila* used in mutation studies [3]
    c) What is congenital malformation [2]

Q3) a) Explain in brief the numerical changes in chromosome [3]
    b) Write a note on micronucleus test. [3]
    c) What are base analogs? Explain the mechanism by which they cause mutation. [4]

Q4) Write note on any one of the following
    a) Molecular methodologies used to detect mutation [5]
    b) Carcinogenicity [5]

✓ ✓ ✓
Total No. of Questions : 4]

P2848 [5029] - 303
M.Sc.-II
ZOOLOGY
ZY-303(T) : Aquaculture
(2013 Pattern) (2 Credits) (Semester - III)

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) Write a note on cary fish culture [4]
   b) Describe fish culture in paddy fields [4]
   c) What are Nursery Ponds? [2]

Q2) a) Describe briefly the methods of preservation and processing of fishes. [5]
   b) Give the methods of packaging and transportation of fishes [3]
   c) Name the non parasitic diseases found in fishes. [2]

Q3) a) What are the requirements for breeding fresh water prawns? [4]
   b) Write a note on pearl formation [3]
   c) Explain the use of Information Communication technology in fisheries.[3]

Q4) Describe the techniques used in mixed fish farming in India. [5]

OR

Explain the role of hard water in culture of Macrobrachium species [5] 

✓ ✓ ✓
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 histological structure of insect integument. [5]
b) Describe structure and physiology of flight muscles. [3]
c) What is ventilation? [2]

Q2) a) Describe structure and functions of fat bodies. [4]
b) Describe types of haemocytes. [3]
c) How insecticide degradation takes place in insects. [3]

Q3) a) What is hormone? Describe chemistry and physiology of juvenile hormone. [4]
b) Describe structure of malpighian tubule. [3]
c) Describe process of protein digestion and absorption. [3]

Q4) Attempt any One of the following [5]
   a) Describe the physiology of digestion and absorption of carbohydrates and lipids in insects.
   b) What is haemolymph? Describe physico-chemical characteristics of plasma.

✔✔✔
Time: 1½ Hours

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) Mention the points of differences between qualitative and quantitative research. [4]
b) Define Biostatistics and explain the importance of students ‘t’ test [3]
c) Give the importance of literature survey in research [3]

Q2) a) Explain the importance of Histochemistry in research. [5]
b) List out the points for the preparation of the manuscript. [3]
c) Write the applications of different databases in Bioinformatics. [2]

Q3) a) Give an account of protein microarray in research. [4]
b) Write short notes on chromatography [3]
c) What is real time PCR? [3]

Q4) a) Explain the role of Biostatistics in research with the help of examples [5]

OR

b) Discuss in detail the different types of microscopic techniques applied in research. [5]

✓ ✓ ✓
Instructions to the candidates:

1) Attempt any two questions from Q.No.1 to 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 morphology and mode of transmission of *Schistosoma* sps. [5]
    b) Explain how parasitic effects benefits the host. [3]
    c) What do you mean by conspecific transmission? [2]

Q2) a) Describe molecular characteristics of VSG of *Trypanosoma*. [4]
    b) Describe chromatin diminution in *Ascaris*. [3]
    c) What is ELISA. [3]

Q3) a) Describe heterospecific transmission of parasites. [4]
    b) Describe parthenogenesis and polyspermy in Platyhelminthes. [3]
    c) Explain surface antigen diversity of *Plasmodium*. [3]

Q4) Attempt any One of the following: [5]
    a) Describe morphology and life cycle of *Leishmania* sps.
    b) Describe various serological methods so as to demonstrate specific antigens of *Entamoeba* and *Leishmania*.

✔  ✔  ✔
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 labelled diagrams wherever necessary.

Q1) a) Give major differences between Chordates and nonchordates. [4]
b) What are dichotomous keys? Explain with examples [3]
c) How are various molecular markers helpful in detecting genetic polymorphism? [3]

Q2) a) Describe the five kingdom classification? [5]
b) Explain in detail phylogeography. [3]
c) Explain the term Cyto-taxonomy. [2]

Q3) a) What is hierarchical classification? Give its advantages [3]
b) Define
   i) Species [3]
   ii) Biological species concept
   iii) Subspecies

c) Describe RAPD and RFLP and their role in systematics [4]

Q4) Write note on any one of the following.
a) Preservation and care of insect specimens [5]
b) Give the operative principles in International code for Zoological nomenclature [5]
P2853

[5029] - 308
M.Sc. II
ZOOLOGY
ZY - 308 T: Insect Ecology
(2013 Pattern) (Semester - III) (2Credits)

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) Describe how climatic factors regulate insect population. [5]
b) Discuss plant defence mechanism. [3]
c) What is niche? [2]

Q2) a) Describe how natural enemies affects on insect population. [4]
b) Discuss insect importance in cycling of nutrients. [3]
c) Discuss insect conservation measures. [3]

Q3) a) Discuss how insects compete with each others. [4]
b) ‘Insects are beneficial to human being’. Justify the sentence. [3]
c) Describe insect defoliators. [3]

Q4) Write short note on any One of the following: [5]
a) Insect-human relationship.
b) Structure of plant community.
P2854

ZOOLOGY
ZY - 309 : Toxicology-I (2-Credits)
(2013 Pattern) (Semester - III)

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

Q1) a) Explain the mode of action of any one toxicant. [5]
    b) What is difference between toxin & poison. [3]
    c) Define xenobiotics. [2]

Q2) a) What are insecticides, describe any one insecticide and its mode of toxicity. [4]
    b) Illustrate the mechanism of action of teratogens. [4]
    c) Define heavy metals. [2]

Q3) a) Define receptors, give their chemical nature and its role in toxicity. [4]
    b) Write a note on cytochrome P-450 species. [4]
    c) Define bioactivation. [2]

Q4) Define biotransformation and describe its mechanism. [5]

OR

What is toxicity? Explain the acute and chronic toxicity.

✓ ✓ ✓
Time: 3 Hours

Instructions to the candidates:

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

Q1) a) Describe cardiovascular response of exercise [5]
b) Explain the transport of CO₂ [3]
c) Define-saltatory conduction. [2]

Q2) a) Explain lung volume and capacities. [4]
b) Explain the structure and function of organ of corti. [4]
c) What is partial pressure. [2]

Q3) a) Describe the extrinsic mechanism of blood clotting. [4]
b) Explain receptor adaptation. [4]
c) Define BMR [2]

Q4) a) Explain the general mechanism of digestion [5]
b) Explain electrocardiography. [5]

Q5) a) Explain the molecular mechanism of muscle contraction [5]
b) Explain the effect of drugs on synaptic transmission. [3]
c) Define-heart sounds [2]
Q6) a) Explain small molecule, rapid acting and large molecule, slow acting neurotransmitters. [5]

b) Explain the excitation-contraction coupling mechanism of muscle contraction. [5]

Q7) a) Explain the structure and function of eye. [3]

b) Explain the various factors involved in hypo. & hypertension [3]

c) Explain the role of intrinsic and extrinsic nerve plexus in regulating digestion. [4]

Q8) a) Describe neuronal control of respiration [5]

b) Describe the role of arteriole in distribution in cardiac output and maintenance of arterial blood pressure. [5]
Total No. of Questions :8

P2855

[5029] - 401

M.Sc.-II

ZOVOLOGY

ZY-401T : Entomology-II (Special)

(2013 Pattern) (Semester - IV)(4Credits)

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 vitellogenesis in insects. [5]
    b) Explain oviposition habits in phytophagous insects. [3]
    c) Explain seminal transfer in insects. [2]

Q2) a) Describe oligopod larva with suitable examples. [4]
    b) Sketch and label panoistic ovariole. [4]
    c) Explain role of juvenile hormone. [2]

Q3) a) Describe any two theories of gastrulation [4]
    b) Describe holometabolous development [3]
    c) Explain naid. [3]

Q4) a) Describe development of alimentary canal in insects. [5]
    b) Explain protopod phase of insect embryo [3]
    c) Explain anatrepsis. [2]

Q5) a) Describe the process of spermatogenesis in insects. [4]
    b) Explain regeneration in insects. [4]
    c) What is metamorphosis? [2]

3
Q6) a) Describe cleavage and blastoderm formation in insects.  
b) Describe obect pupa with examples.  
c) Explain amnion in insects.

Q7) a) Describe segmentation and appendages formation in insects.  
b) Describe development of reproductive system in insects.

Q8) a) What is diapause? Describe its occurrence and initiation.  
b) Explain Hadron’s experiments with imaginal discs.

✓ ✓ ✓
Instructions to the candidates:

1) Attempt any five questions.
2) Marks are shown on right hand margin.
3) Draw neat diagrams wherever necessary.

Q1) a) Explain different types of mutations in LDL receptor gene that lead to familial hypercholesterolemia. [4]
b) Explain the following terms. [4]
   i) Genome imprinting
   ii) Uniparental Disomy
c) Define “Induced mutation”. [2]

Q2) a) What are disorders of carbohydrate metabolism? Explain with one suitable example. [4]
b) Explain briefly physical mapping [3]
c) Explain Regeneration of TCR diversity. [3]

Q3) a) Explain briefly about invasive and non-invasive method of prenatal diagnosis. [4]
b) Differentiate between oncogenes and tumour suppressor genes. [4]
c) Define sex limited traits and sex linked inheritance [2]

Q4) a) Explain how dosage compensation occurs in humans. [5]
b) Write a note on DNA sequence mapping. [3]
c) Define cell hybrids [2]
Q5) a) Explain briefly how genetics and environment influences learning and memory formation. [5]
b) Explain following briefly [3]
   i) chimerism
   ii) Spontaneous mutations
c) Explain any one genetic experiment for investigating animal behavior. [2]

Q6) a) Write a note on twin and adoption studies [5]
b) Explain regulation of gap genes and pair rule genes. [5]

Q7) a) Explain the genetics of human behavioural defect in schizophrenia [5]
b) Explain the following [5]
   i) Tay-Sachs syndrome
   ii) Fragile X syndrome

Q8) a) Describe the characteristics of autosomal recessive inheritance. [5]
b) Explain molecular basis of Sickle cell anemia [5]

✓ ✓ ✓
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.

    b) Write short notes on Reptiles and give their uses in industry. [4]
    c) Name any four model animals used in Pharmaceutical industry. [2]

Q2) a) Explain in brief the Sponge Culture. [4]
    b) Comment on Dairy Industry giving examples. [4]
    c) Enlist any two birds and give their economic importance. [2]

Q3) a) What are Helminths? Describe the role of any two Helminths as human parasites. [4]
    b) Write a note on insects of commercial value. [3]
    c) Give a brief account of Wool industry. [3]

Q4) Attempt any one of the following: [5]
    a) Describe in detail the household insects.
    b) What are nematodes? Explain the role of any two parasitic animal nematodes.

✓ ✓ ✓

P.T.O
Total No. of Questions : 4

P2856

[5029] - 402
M.Sc. - II
ZOOLOGY
ZY- 402T : Bacteria and Phage Genetics
(2013 Pattern) (Semester - IV) (2Credits)

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

Q1) a) Write a note on nucleic acid structure of T2 and T4 Phage. [4]
     b) Explain bacterial chromosome. [4]
     c) Define conditional suppressors. [2]

Q2) a) Describe morphology and nucleic acid structure of Bacteriophage T7. [4]
     b) Describe interrupted mating experiment. [4]
     c) Define Cistron. [2]

Q3) a) Write a note on Bacteriophage Mu. [4]
     b) Describe retrovirus and reverse transcriptase. [4]
     c) Define Auxotrophs. [2]

Q4) Explain IS elements and mechanism of transposition. [5]

OR

Write the distinguishing features of T even and odd phages w.r.t. morphology, life cycle and nucleic acid structure. [5]

✓    ✓    ✓
ZY - 403 (T) : Mammalian Reproductive Physiology
(2013 Pattern) (Semester - IV) (2 Credits)

Time : 1½ Hours

Instructions to the candidates:
1) Attempt any two questions from Q1 to Q3.
2) Question No.4 is compulsory.
3) Draw neat and labelled diagrams wherever necessary.
4) Figures to the right indicate full marks.

Q1) a) Explain the methods of embryo transfer. [5]
    b) Explain the follicular phase and cycling of non-pregnant uterus. [3]
    c) What is puerperium. [2]

Q2) a) Explain the environmental factors affecting reproductive patterns in seasonal breeders. [4]
    b) Explain surgical methods of contraception in female. [3]
    c) Explain the role of ovarian hormones. [3]

Q3) a) Explain the process of parturition and its neuroendocrine control. [4]
    b) Explain the hormonal aspect of artificial control of reproduction. [4]
    c) What is suckling reflex. [2]


OR

Explain the types and functions of placenta. [5]

P.T.O.
Total No. of Questions : 4

P2857

[5029]-403
M.Sc. - II
ZOOLOGY
ZY - 403 (T) : Biodiversity Assessment
(2013 Pattern) (Semester - IV) (2 Credits)

Time : 1½ Hours] [Max. Marks : 25

Instructions to the candidates:
1) Attempt any two questions from Q1, Q2 to Q3.
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 characteristics features of phylum mollusca and Echinodermata, with suitable examples. [4]
   b) Write a note on Biosphere reserve and wildlife sanctuaries with suitable examples. [3]
   c) Discuss - Biodiversity as a natural and biological capital of Earth. [3]

Q2) a) Write a short note on wildlife values related to human culture. [4]
   b) Define mass extinction. What are the factors for mass extinction. [3]
   c) Explain three major threats to biodiversity. [3]

Q3) a) Explain the concept of ecodevelopment for biodiversity conservation. [4]
   b) Write a note on project Rhino. [3]
   c) Define threatened species, endangered species and Rare species with suitable examples. [3]

Q4) Describe India as a megadiversity Nation. [5]

OR

Describe various causes of depletion of biodiversity. Explain any two conservation methods. [5]
P2858

ZY - 404 (T) : Histology and Histochemistry
(2013 Pattern) (Semester - IV) (2 Credits)

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 labelled diagrams wherever necessary.

Q1) a) Explain the structure and function of any two types of connective tissue. [5]
b) What is bipolar neuron? Give its structure. [3]
c) What are the constituent’s of Bouin’s fluid? [2]

Q2) a) Explain the problems encountered while sectioning using a microtome.[4]
b) Why is tissue fixation important in histology? [4]
c) What is glandular epithelium? [2]

Q3) a) Write a note on immunohistochemical staining. [3]
b) Why and when is xylene used in histological preparations. [3]
c) Explain the procedure of block making. [4]

Q4) Explain the principle and procedure of histochemical detection of basic protein. [5]

OR

How will you process tissues for histochemical detection of enzymes. [5]
P2859

[5029]-405
M.Sc. - II
ZOLOGY
ZY - 405 (T) : Pollution Biology
(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) Define Pesticide Pollution. Give the possible sources of Pesticide pollution. [4]
    b) Comment on the sources and effects of Agricultural pollution. [4]
    c) Describe the sources of Radioactive pollution. [2]

Q2) a) Describe the methods for Water pollution monitoring. [4]
    b) Give the causes and consequences of Bioaccumulation. [3]
    c) Describe the effects of Noise pollution. [3]

    b) Write a note on Atmosphere. [3]
    c) Explain the effects of Air Pollution on animals and humans. [3]

Q4) a) Give any two Biological methods for assessment of Environmental quality. [5]

    OR

    b) What is hazardous waste? Explain handling and management of hazardous waste. [5]
P2860

M.Sc. - II
ZOOLEGY
ZY - 406 (T) : Apiculture
(2013 Pattern) (Semester - IV) (2 Credits)

Time : 1½ Hours

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 honey bee morphology.
    [5]
    b) Discuss advantages of beekeeping.
    [3]
    c) What is bee veil?
    [2]

Q2) a) Describe seasonal management in apiary.
    [5]
    b) Discuss the types of honey bee species practiced in apiculture.
    [3]
    c) Sketch and label bee box.
    [2]

Q3) a) Discuss bee keeping as an occupation.
    [4]
    b) Describe protozoan diseases of honey bees.
    [4]
    c) What is foraging?
    [2]

Q4) Write short notes on any one of the following:
    a) Bee enemies.
    [5]
    b) National Bee Board.
    [5]
Instructions to the candidates:

1) Attempt any two questions from question No. one to three.
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 measures for rats and bandicoots. [3]
c) What are aerosols? [2]

Q2) a) Describe various cultural control measures employed in pest control. [4]
b) Explain use of pheromones in pest control. [4]
c) Define veterinary entomology. [2]

Q3) a) Describe structure and working mechanism of shoulder type rotary duster. [4]
b) Describe dry insecticide formulations. [3]
c) Discuss insects of medical importance. [3]

Q4) Write short notes on any one of the following:
   a) Stored grain pests. [5]
b) Integrated pest Management. [5]
P2862

[5029]-408
M.Sc. - II
ZOOLOGY
ZY - 408 (T) : Toxicology - II
(2013 Pattern) (Semester - IV) (2 Credits)

Time : 1½ Hours] [Max. Marks : 25

Instructions to the candidates:
1) Attempt any two questions from question No. one to three.
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 the various methods of excretion of toxic agents. [5]
    b) Explain the term metabolomics. [3]
    c) Define toxicology. [2]

Q2) a) Describe the metabolism of xenobiotics. [4]
    b) Write a note on GI absorption of toxic compounds. [3]
    c) What is IAEC? Give its objectives. [3]

Q3) a) Mention the role of regulatory agencies in toxicity testing. [4]
    b) What are the alternatives for animal models in toxicology. [4]
    c) What is GLP? [2]

Q4) Explain in brief detoxification mechanism of any one toxicant. [5]

OR

“Biomedical waste management is the utmost important aspect of toxicology”. Justify. [5]