Department of Zoology
B.Sc. Honours
Semester-I

CC1-ZOOLOGY
(Non-Chordates I)

1. **Answer the following questions (1 mark each):**
   (a) What is elephantiasis?
   (b) Differentiate between homonymy and synonymy.
   (c) What is apical complex?
   (d) Name the primary and secondary host of *Taenia*.
   (e) Name an organism having pseudocoelom.
   (f) Define intermediate host.
   (g) What do you mean by beta taxonomy?
   (h) Write the function of collar cells? Where do you find such cells?
   (i) What do you mean by apolysis?
   (j) What is signet ring stage?

2. **Answer the following questions (5 marks each):**
   (a) Briefly describe locomotion in *Amoeba*.
   (b) Write a short note on the balancing organ of Ctenophora.
   (c) What is meant by type in Taxonomy? Briefly explain the different taxonomic types. (1+4)
   (d) Briefly describe the different cell types found in the pinacoderm and choanoderm layer of Poriferans. Add a note on their functions.
   (e) Draw and describe the structure of a cnidoblast cell.
   (f) Write a short note on (i) miracidium larva (ii) microfilaria larva (2½+2½)

3. **Answer the following questions (10 marks each):**
   (a) Write down the characteristics of Phylum Sarcomastigophora with examples. Describe in brief, the conjugation process in *Paramoecium*. (3+7)
   (b) Write the life cycle of *Taenia solium* along with suitable diagrams. Add a note on the scolex of *T. solium*. (7+3)
   (c) Define polymorphism. Describe the different types of polyps found in phylum Cnidaria. Add a note on the significance of polymorphism. (1+7+2)
   (d) Briefly describe the life cycle of *Ascaris*. Write a note on the parasitic adapatations in helminthes. (7+3)
   (e) Compare and contrast the different types of canal system in Porifera.

CC2-ZOOLOGY
(Ecology)

1. **Answer the following questions (1 mark each):**
   (a) Define carrying capacity.
   (b) What do you mean by niche?
   (c) Define pioneer species in ecological succession.
   (d) What is climax community?
   (e) Define amensalism.
   (f) What is species richness?
   (g) Define species abundance.
   (h) Give the definition of biosphere.
   (i) What is autecology?
   (j) Define population.

2. **Answer the following questions (5 marks each):**
   (a) Differentiate r and k selected species.
   (b) Write a note on Wildlife Protection Act 1972.
   (c) Comment on Human modified ecosystem.
   (d) Explain Gause's Principle with an experiment.
   (e) Elaborate Nitrogen cycle with a diagram.
   (f) What is food chain? Explain food web with a diagram. (2+3)

3. **Answer the following questions (10 marks each):**
   (a) Elaborate Lotka-Voltera equation for competition.
   (b) Explain Y-shaped energy flow model with diagram.
   (c) Write a note on management strategies for tiger conservation.
   (d) What do you understand by ecological succession? Write a note on Hydrosere. What is climax community? (2+6+2)
   (e) What is a life table? How can you construct a survivorship curve? Explain different types of survivorship curves. (2+2+6)

Department of Zoology
B.Sc. Honours
Semester-II

CC3-ZOOLOGY
(Non-Chordates II)

1. **Answer the following questions (1 mark each):**
   (a) Define Metamere.
   (b) What is coelom?
   (c) What is Stomochord?
   (d) What is Clitellum?
   (e) What is stone canal?
   (f) Name a larval stage of Mollusca.
   (g) Define rhabdom.
   (h) Write the function of madreporite.
   (i) Name a connecting link between annelida and arthropoda.
   (j) Give the scientific name of Sea lemon.

2. **Answer the following questions (5 marks each):**
   (a) Write a note on respiration of *Pila* sp. with diagram.
   (b) What is torsion? Describe the mechanism of torsion. (1+4)
   (c) Briefly describe the mechanism of respiration of prawn.
   (d) Elaborate trochophore theory- the importance of trochophore larva.
   (e) Write a note on larval stages of Echinodermata.
   (f) Briefly elaborate the affinities of echinoderms with chordates.

3. **Answer the following questions (10 marks each):**
   (a) Write the characteristics of phylum annelida. Classify phylum annelida up to classes with characters and example. (3+7)
   (b) Describe water vascular system in star fish with diagram. Mention the mechanism of locomotion by tube feet. (7+3)
   (c) Briefly elaborate the affinities of onychophora with other phyla.
   (d) What is metamorphosis? Write a note on metamorphosis of butterflies mentioning the importance of insect hormone. (2+8)
   (e) Give the general characteristics of hemichordata. Elaborate its relationship with non-chordates and chordates. (3+7)

CC4-ZOOLOGY
(Cell Biology)

1. **Answer the following questions (1 mark each):**
   (a) What is active transport?
   (b) What is passive transport?
   (c) Name two membrane phospholipids.
   (d) Give an example of facilitated transport?
   (e) What is cis Golgi network?
   (f) What is trans Golgi network?
   (g) Expand GERL
   (h) Expand SRP
   (i) What is primary lysosome?
   (j) Name the enzyme complexes of electron transport chain.
   (k) Name two electron carrier.
   (l) Name one enzyme of TCA cycle that is not present in the mitochondrial matrix.
   (m) What is axoneme?
   (n) Name two motor proteins of microtubule.
   (o) Name the motor protein of actin filament.
   (p) What is 10 nm fibre?
   (q) What do you mean by nucleosome.
   (r) Name the phases of cell cycle.
   (s) What is cyclin?
   (t) What is second messenger?

2. **Answer the following questions (5 marks each):**
   (a) Write about the fluid mosaic model of plasma membrane.
   (b) Write the basic structure of a prokaryotic cell
   (c) How secretory proteins are transported into the endoplasmic reticulum?
   (d) Describe the modifications of the polypeptide chain within the endoplasmic reticulum.
   (e) How proteins are transported through the Golgi cisternae?
   (f) Write note on endosymbiotic hypothesis.
   (g) Write note on chemiosmotic hypothesis.
   (h) Describe the ultrastructure of centrosome.
   (i) Write the functions of peroxisome.
   (j) Describe the organization of the microtubule.
   (k) Describe the dynamic stability of microfilament.
   (l) Write note on nuclear pore complex.
   (m) Write the characteristics of different phases of mitosis.
   (n) Write the characteristics of different phases of first meiotic prophase.
   (o) Write about the role of cAMP in cell signallingWrite about the role of calcium in cell signalling

3. **Answer the following questions (10 marks each):**
   (a) Describe the sodium potassium pump along with the mechanism of the transport
   (b) How proteins are sorted and transported via vesicular transport?
   (c) Describe the formation of primary lysosome. How lysosomal proteins are targeted to the developing lysosome? 5+5

(d) Describe the electron transport system. Write short note on ATP synthase. 6+4
(e) Describe the packaging of chromatin fibre into metaphase chromosome.
(f) Describe the G-protein mediated cell signalling.

Department of Zoology
B.Sc. Honours
Semester-III

CC5-ZOOLOGY
(Chordates)

1. **Answer the following questions (1 mark each):**
   (a) What is catadromous migration?
   (b) What is foam nest?
   (c) What is venom?
   (d) What do you mean by double respiration in birds?
   (e) Write the difference between horn and antlers.
   (f) What do you mean by continental drift?
   (g) What is dynamic soaring?
   (h) Define protochordata.
   (i) What do you mean by accessory respiratory organ in fish.
   (j) What is neoteny?

2. **Answer the following questions (5 marks each):**
   (a) Write a short note on exoskeletal derivatives of mammals.
   (b) Write a short note on echolocation on mammals.
   (c) Write the fundamental characters of phylum Chordates.
   (d) Write a short note on zoological significance of ammocoete larva.
   (e) Write a short note on retrogressive metamorphosis of *Ascidia* sp
   (f) Write a short note on swim bladder of fish.

3. **Answer the following questions (10 marks each):**
   (a) Define migration. Explain different types migration in fish. (2+8)
   (b) Define parental care. Describe different modes of parental care in amphibia. (2+8)
   (c) Write the general characters of amphibian. Classify class amphibia up to living orders. (3+7)
   (d) What do you mean by poison apparatus? Describe the biting mechanism of a poisonous snake. (3+7)
   (e) What do you mean by zoogeographical realm? Explain the distribution of birds and mammals of Oriental realm with example. (2+8)

CC6-ZOOLOGY
(Animal Physiology: Controlling and Co-ordinating System)

1. **Answer the following questions (1 mark each):**
   (a) What are contractile and regulatory proteins?
   (b) What do you understand by muscle twitch?
   (c) What causes Tetanus?
   (d) Collagen is neither excitable nor contractile. (Write true or false.)
   (e) What is understood by the all-or-none law?
   (f) What is meant by saltatory conduction of nerve impulse?
   (g) What is the function of the neuralemma?
   (h) Simple epithelium consists of a _____layer of epithelial cells resting on a _____ membrane. (Fill in the blank).
   (i) Insulin is secreted by the
   (i) Alpha cells (ii) Acinar cells (iii) Beta cells (iv) Delta cells (Choose the correct answer)
   (j) Goblet cells are found in the _____. (Fill in the blank).
   (k) Calcitonin is secreted by
   (i) Islets of Langherhans (ii) Acinar cells (iii) Para-follicular cells (iv) Adrenal medulla (Choose the correct answer).
   (l) Haversian canals of bone are interconnected by _____. (Fill in the blank).
   (m) Matured sperms are stored in the _____. (Fill in the blank).
   (n) What is pheochromocytoma?
   (o) What causes Conn's syndrome?
   (p) Differentiate between adrenal virilism and adrenal feminization.

2. **Answer the following questions (5 marks each):**
   (a) What are connective tissues? Differentiate between edomysium, perimysium and endomysium.
   (b) Describe the ultra-structure of the basement membrane.
   (c) Describe the ultra-structure of skeletal muscles giving suitable diagrams.
   (d) Compare and contrast the skeletal, smooth and cardiac muscles.
   (e) Differentiate between action potential and resting potential.
   (f) Classify the different types of neurons giving appropriate diagrams.
   (g) Write a note on the types of reflex action.
   (h) Describe the microscopic structure of the exocrine pancreas.
   (i) Write about the synthesis of thyroglobulin and its iodination.
   (j) Where are the Sertoli cells found? Describe its structure and functions.
   (k) Write a note on corpus luteum.
   (l) Differentiate between elastin and collagen.
   (m) Explain how hormones act through intracellular receptors giving relevant schematic diagrams.
   (n) Write about the disorders of the adrenal cortical hormone.
   (o) Discuss the histological structure and function of the vas deferens.
   (p) Write a short note on tetanus.

3. **Answer the following questions (10 marks each):**
   (a) What is meant by the term 'epithelium"? Differentiate between mesothelium, endothelium and mesenchymal epithelium. Classify epithelial tissues on the

basis of cell shape and layers giving their major functions and distribution. (1+1+5+3)

(b) Write down the characteristics of a muscle fibre. Summarize the sequence of events in the contraction-relaxation cycle of skeletal muscle fibres. (4+6)

(c) Define the term 'synapse'. Describe the structure of a typical chemical synapse. Write down the summary of the events that occur during synaptic transmission. (1+4+5)

(d) Differentiate between medullated and non-medullated nerve fibre.Describe the propagation of nerve impulse in medullated nerve fibre. (3+7)

(e) Write down the location and origin of the thyroid gland. Give a detailed account of the histological structure of the thyroid gland seen under light/optical and electron microscopes. (2+5+4)

(f) Where is the pituitary gland located? Describe the histological structure of the anterior pituitary gland. Add a note on the functions of the hormones secreted by it. (1+5+4)

(g) Classify hormones on the basis of their chemical nature giving suitable examples.

(h) Why pancreas is called a mixed gland? Write about the functions of the three hormones secreted by the pancreas. (1+4+3+2)

(i) What is the function of chromaffin cells? Describe the histological structure of a section of mammalian adrenal gland giving suitable diagrams. Name the catecholamines released from this gland. (2+6+2)

(j) What is meant by cell signaling? Discuss the events of cell signal transduction giving relative schematic diagrams. Write down the properties of hormone receptors. (2+6+2)

(k) Classify receptors on the basis of their occurrence in the target cells. Write about the control of spermatogenesis by feedback mechanism. (6+4)

(l) Why is placenta considered to be a whole endocrine system? Discuss the role of steroidal and protein hormones produced by the placenta. (1+5+4)

(m) Define secondary messenger giving examples. Discuss in brief about signal transduction mechanism of steroid action. Add a note on adaptor protein. (2+1+5+2)

(n) Describe the histoarchitecture of a graafian follicle. Name the hormones secreted from the ovary and state their functions. (5+5)

(o) Discuss the ovarian and uterine changes that occur during menstrual cycle. State the hormonal regulation of spermatogenesis in humans. (7+3)

(p) Name the three zones of adrenal gland and the hormones secreted by them. Briefly describe the process of biosynthesis of T_3 and T_4 hormones. (4+6)

CC7-ZOOLOGY
(Genetics)

1. **Answer the following questions (1 mark each):**
   (a) Define pleiotrophy.
   (b) State the function of Sox-9 gene.
   (c) What is Barr body?
   (d) Define lysogeny.
   (e) What do you mean silent mutation?
   (f) Expand Hfr. Why is it so called?
   (g) What do you mean by lethal allele?
   (h) Name two chemical mutagens.
   (i) Differentiate between generalized and specialized transduction.
   (j) Name an organism where Kappa particles are found? State their function.

2. **Answer the following questions (5 marks each):**
   (a) Briefly describe the Holliday model of crossing over.
   (b) Write a short note on dosage compensation.
   (c) Write a short note on shell spiralling in snail.
   (d) Define non-disjunction. Explain the mechanism by which non-disjunction occurs during meiosis. (1+4)
   (e) Draw and describe the lytic cycle in bacteria
   (f) Differentiate between incomplete dominance and co-dominance using suitable example.

3. **Answer the following questions (10 marks each):**
   (a) What is inversion? Differentiate between paracentric and pericentric inversion. What is Robertsonian translocation? Name two deletion related disorders in human. (2+4+2+2)
   (b) Define conjugation. Describe the process of conjugation between F+ and F- strain of bacteria with suitable diagrams. State the properties of F factor. (2+6+2)
   (c) Write down the principles of inheritance. Differentiate between sex linked, sex influences and sex-limited inheritance using appropriate examples. Define epistasis. (3+6+1)
   (d) Describe in brief the sex determination in *Drosophila*. Elucidate the role of Y chromosome in the sex determination of man. (5+5)
   (e) Define test cross. Differentiate between test cross and back cross. If the progeny of the cross aaBBxAAbb is testcrossed and the following genotypes are observed among the progeny of the test cross, what is the frequency of recombination between these loci?
   AaBb – 135
   Aabb – 430
   aaBb – 390
   aabb – 120 (2+3+5)

SEC1-ZOOLOGY
(Apiculture)

1. **Answer the following questions (1 mark each):**
   (a) What is Royal jelly?
   (b) What is propolis?
   (c) What do you mean nuptial flight?
   (d) What do you mean bee wax?
   (e) Define Apiary.
   (f) What do you mean by Swarming?
   (g) What is the function of pollen basket?
   (h) What do you mean by queen substance?
   (i) Define bee bread.
   (j) What do you mean by waggle dance?

2. **Answer the following questions (5 marks each):**
   (a) Write a short note on use of honey.
   (b) Write a short note on Bee Pasturage.
   (c) Write the differences between indigenous and modern method of extraction of honey.
   (d) Briefly describe the social organization of honey bee.
   (e) Write a short note on selection procedure of bee species for apiculture.
   (f) Write a short note on Bee enemies.

3. **Answer the following questions (10 marks each):**
   (a) Describe in details the name and use of products of apiculture.
   (b) Describe the prospects and problems of apiculture industries in India.
   (c) Describe the life cycle of honey bee with a suitable diagram.
   (d) Write the name of causative agent, symptoms, transmission and preventive measures of fungal, bacterial and protozoan diseases of bee brood.
   (e) Describe different accessory equipments used for modern scientific method of apiculture
   (f) Describe Langstroth and Newton method of Bee rearing in India.

Department of Zoology
B.Sc. Honours
Semester-IV

CC8-ZOOLOGY
(Comparative Anatomy of Vertebrates)

1. **Answer the following questions (1 mark each):**
   (a) What is ductus botalli?
   (b) What is Foramen Monro?
   (c) What do you mean by axial skeleton?
   (d) What do you mean by bunodont teeth?
   (e) Define holonephric kidney
   (f) What do you mean by occipital condyle?
   (g) What is the function of mitral vulve?
   (h) What is effector?
   (i) Define ophisthonephros kidney.
   (j) What is hyoid apparatus?

2. **Answer the following questions (5 marks each):**
   (a) Write a short note on Ruminant stomach
   (b) Write a short note on Dental formula
   (c) Write a short note on jaw suspension
   (d) Briefly describe visceral arch in vertebrates
   (e) Describe different modifications of mammalian integumentary glands
   (f) Describe the structure of a typical flight feather of a bird

3. **Answer the following questions (10 marks each):**
   (a) Describe different components of axial skeleton of vertebrates with their functions.
   (b) Describe the comparative anatomy of respiratory organs in fish and birds.
   (c) Describe the comparative anatomy of brain in vertebrates.
   (d) Describe dentition in mammals with neat diagram.
   (e) Describe the comparative anatomy of aortic arches in vertebrates.

CC9-ZOOLOGY
(Animal Physiology: Life Sustaining Systems)

1. **Answer the following questions (1 mark each):**
   (a) Expand JGA.
   (b) Define tidal volume.
   (c) Name two compounds secreted into urine by tubular secretion.
   (d) Differentiate between ectothermy and endothermy.
   (e) Expand TMAO
   (f) What is the role of gastric lipase in digestion?
   (g) What are podocytes?
   (h) What is H antigen?
   (i) What is the function of SA node?
   (j) Differentiate between osmoconformers and osmoregulators.

2. **Answer the following questions (5 marks each):**
   (a) Write the process of origin and propagation of cardiac impulses.
   (b) Briefly explain the process of non-shivering thermiogenesis.
   (c) Define plasma. Write a short note on the plasma component of blood.
   (d) Write a short note on the digestion of food in the oral cavity.
   (e) Comment on the factors that control glomerular filtration.
   (f) Write a short note on salt glands of birds.

3. **Answer the following questions (10 marks each):**
   (a) Briefly describe cardiac cycle with the help of diagrams. What do you mean by cardiac output? (8+2)
   (b) Briefly describe oxygen hemoglobin dissociation curve. What are the factors that control it? Write a short note on chloride shift. (4+2+4)
   (c) What is urine? Name its constituents. Describe in brief the mechanism of urine concentration by mammalian kidneys. (1+1+8)
   (d) Describe the mechanism and chemical digestion of carbohydrates. Add a short note on the glands associated with the GI tract. (6+4)
   (e) Describe in brief the process of osmoregulation in fresh and salt water fishes. What do you mean by thermiogenesis. (7+3)

CC10-ZOOLOGY
(Fundamentals of Biochemistry)

1. **Answer the following questions (1 mark each):**
   (a) Name one monosaccharide having no asymmetric carbon.
   (b) Name two reducing disaccharides.
   (c) Name two non-reducing disaccharide.
   (d) What is homopolysaccharide? Give example.
   (e) What is heteropolysaccharide? Give example.
   (f) What is glycosidic bond?
   (g) How many ATP are produced in glycolytic pathway in aerobic condition?
   (h) Name two essential fatty acids.
   (i) What is unsaturated fatty acid? Give example.
   (j) What is omega oxidation?
   (k) What is glycolipid?
   (l) Name two sulphur containing amino acids.
   (m) Name two aromatic amino acids.
   (n) What is peptide bond
   (o) What is transamination?
   (p) What is deamination?
   (q) What is nucleoside?
   (r) What is nucleotide?
   (s) What is isoenzyme?
   (t) Name two inhibitors of electron transport chain

2. **Answer the following questions (5 marks each):**
   (a) WDifferentiate between starch and glycogen
   (b) Differentiate between starch and cellulose
   (c) Write note on reducing sugar.
   (d) Write note on mutarotation.
   (e) Why fat is solid and oil is liquid at room temperature?
   (f) Write short note on phospholipid.
   (g) Write short note on alpha helix
   (h) Write note on beta pleated sheet
   (i) Write note on Ramachandran plot.
   (j) Write note on urea cycle
   (k) Differentiate A, B and Z DNA
   (l) Classify enzymes
   (m) Write note on ATP synthase
   (n) Write the dehydrogenation steps of Krebs cycle.
   (o) Mention the steps by which hexose phosphate is converted into pentosephospahate.
   (p) Write glycolysis in flow chart.

3. **Answer the following questions (10 marks each):**
   (a) Classify standard protein amino acids based on R groups.
   (b) Describe different levels of organization of protein.

(c) Describe the neoglucogenesis process.
(d) Describe the beta oxidation of saturated even carbon containing fatty acid.
(e) Derive Michaelis-Menten equation. What is Lineweaver-Burk plot? 7+3
(f) Describe the electron transport. How ATP are synthesized by ATP synthase? 4+6

SEC2-ZOOLOGY
(Sericulture)

1. **Answer the following questions (1 mark each):**
   (a) What do you mean by chandraki?
   (b) What is spun silk?
   (c) What do you mean by cocoon?
   (d) What do you mean by spinning of silk?
   (e) What is the major chemical composition of silk?
   (f) What do you mean by latkoa?
   (g) How Uzi fly create problem in sericulture industry?
   (h) What do you mean non-mulberry silk?
   (i) Write the name of one sericulture research station of West Bengal.
   (j) Write the name of host plants of Tasar silk.

2. **Answer the following questions (5 marks each):**
   (a) Write a short note on use of silk.
   (b) Write a short note on reeling of silk.
   (c) Write a short note on Silk Gland.
   (d) Briefly describe about different types of disinfectants used in sericulture.
   (e) Write a short note on different types of endogenous and exotic races of silk moth.
   (f) Write a short note different types of silk moth used in India.

3. **Answer the following questions (10 marks each):**
   (a) Describe the life cycle of Silk moth with suitable diagram.
   (b) Describe the protozoan, bacterial and fungal diseases of honey bee along with the name of causative agent, symptoms and preventive measures.
   (c) What do you mean by Mountage? Write different types of mountages used in India. (2+8)
   (d) Describe the steps and process of Mulberry plantation.
   (e) Describe different prospects and problems of sericulture in India.
   (f) Describe a model of rearing house. Add a note on different rearing appliances used in sericulture technique. (6+4)

Department of Zoology
B.Sc. Honours
Semester-V

CC11-ZOOLOGY
(Molecular Biology)

1. **Answer the following questions (1 mark each):**
   (a) Name two unusual bases of tRNA
   (b) Name two enzymes which polymerase DNA.
   (c) Name the enzyme which is responsible for removing primer.
   (d) What is semiconservative replication?
   (e) What is promoter?
   (f) What is Pribnow box?
   (g) Name the start codon.
   (h) Write any two stop codons.
   (i) Name two inhibitors of replication
   (j) Name two inhibitors of transcription.
   (k) Name two inhibitors of translation.
   (l) What is operon.
   (m) What is operator?
   (n) What is the inducer in lac operon?
   (o) What is attenuation?
   (p) Expand PCR
   (q) What is SOS repair?
   (r) Name the polymerase used in PCR.
   (s) Name the initiator and terminator protein in transcription.
   (t) Mention two salient feature of genetic code.

2. **Answer the following questions (5 marks each):**
   (a) Differentiate DNA and RNA
   (b) Write the features of Watson Crick model of DNA
   (c) Describe the proof reading of DNA
   (d) Describe the role of sigma factor in transcription
   (e) Describe the role of rho factor in transcription
   (f) Mention the role of initiation factors in translation
   (g) Describe the charging of tRNA
   (h) Describe the prokaryotic promoter region.
   (i) Write note on Wobble hypothesis.
   (j) Write note on genetic code.
   (k) Describe the nucleotide excision DNA repair
   (l) Describe the base excision DNA repair
   (m) Write note on Western blotting
   (n) Write note on northern blotting
   (o) Write note on Southern blotting.
   (p) Describe the sequencing of DNA by Sanger method.

3. **Answer the following questions (10 marks each):**
   (a) Describe the clover leaf model of tRNA. Write note on the tertiary structure of tRNA.
   (b) Describe the replication process in prokaryotes.
   (c) Describe the transcription process in prokaryotes.
   (d) Describe the translation process in prokaryotes.
   (e) Describe the lac operon
   (f) Describe the trp operon.
   (g) Write the basic principle and application of PCR.

CC12-ZOOLOGY
(Immunology)

1. **Answer the following questions (1 mark each):**
   (a) What do you mean by hapten?
   (b) Which cells are responsible for cell mediated and antibody mediated immunity.
   (c) What is an epitope?
   (d) Define antigen and antigenicity.
   (e) Name two non-professional antigen presenting cells.
   (f) Expand CDR.What is its function?
   (g) Name two secondary lymphoid organs.
   (h) What is meant by ITAM?
   (i) Which immunoglobulin is produced in Type 1 hypersensitivity?
   (j) What is a toxoid?

2. **Answer the following questions (5 marks each):**
   (a) What are haematopoietic stem cells? Differentiate between B and T lymphocytes.
   (b) Describe the structure of TCR complex.
   (c) Briefly describe the process of antigen presentation by the intrinsic pathway.
   (d) Write down the classification of hypersensitivity proposed by Gell and Coombs, giving brief explanation of each.
   (e) Write a note on DNA vaccine.
   (f) Why is there low host immune response to malarial parasites?

3. **Answer the following questions (10 marks each):**
   (a) Distinguish between antigenicity and immunogenicity. Write down the properties of an immunogen. What is meant by epitope, hapten and adjuvant? (1½+4+4½)
   (b) Describe the structure of IgG. Explain the hybridoma technology for the production of monoclonal antibodies. (4+6)
   (c) Explain in brief the classical pathway of complement system. How does it differ from alternative pathway? (8+2)
   (d) Compare the structures of MHC class I and II molecules. Write a short note on the functions of Natural Killer (NK) cells. (6+4)
   (e) Differentiate between passive and active immunization. Describe in brief the various types of vaccines with the help of diagrams and flowcharts. 2+(5+3)

DSE1-ZOOLOGY
(Endocrinology)

1. **Answer the following questions (1 mark each):**
   (a) Name the protein hormone secreted from ovary.
   (b) What is the full form of GnRH? Mention its function.
   (c) Mention the source and function of ABP.
   (d) State two important functions of thyroid gland.
   (e) Give the full form of SON and PVN.
   (f) Mention the location and function of Zona pellucida?
   (g) State two characteristic features of oestrous stage.
   (h) Differentiate between hormone and enzyme.
   (i) State the differences between menstrual and oestrous cycle.
   (j) Distinguish between autocrine and paracrine signalling.

2. **Answer the following questions (5 marks each):**
   (a) What is feedback system of hormone action? Discuss about the negative feedback system of hormone action with example. (1+4)
   (b) Discuss in brief about the role of melatonin in circadian rhythm.
   (c) Why posterior pituitary is known as neurohaemal organ? Describe role of hypothalamo-hypophysial portal system in hormone transport. (1+4)
   (d) Classify the hormone depending on their chemical nature. Differentiate between neurohumor and neurohormone. (4+1)
   (e) State the full form of RIA. Discuss the procedure of RIA. Mention the demerits. (1+3+1)
   (f) Name the hormone secreted from the parathyroid gland. State the role of the hormones involved in calcium metabolism.(1+4)

3. **Answer the following questions (10 marks each):**
   (a) Describe the ovarian & uterine changes take place during different phases of menstrual cycle. (5+5)
   (b) Describe the histological architecture of adrenal medulla with a suitable diagram. Name the hormones secreted from adrenal gland. Add a note on Addison's disease. (6+2+2)
   (c) What is meant by second messenger? Describe the mechanism of hormone action through G-protein coupled receptor. (1+9)
   (d) Give the full form of ELISA. Discuss in brief about different types of ELISA. Add a note on the advantages and disadvantages of this method. (1+7+2)
   (e) Name the cells of islets of Langerhans. Mention the hormones secreted from them and discuss their role in blood glucose metabolism. (1+1+8)

DSE2-ZOOLOGY
(Animal Behaviour and Chronobiology)

1. **Answer the following questions (1 mark each):**
   (a) What is pheromone?
   (b) What is tidal rhythm?
   (c) Expand FAP.
   (d) Define zeitgebers.
   (e) Who gave the idea of Classical conditioning?
   (f) Write a function of suprachiasmatic nucleus.
   (g) What is internal clock?
   (h) Give the definition of society.
   (i) What is sexual dimorphism?
   (j) Define altruism

2. **Answer the following questions (5 marks each):**
   (a) Elaborate reciprocal altruism with example.
   (b) Describe operant conditioning with an experiment.
   (c) What is learning? Differentiate associative and non- associative learning. (2+3)
   (d) Define imprinting. Mention different types of imprinting with example. (1+4)
   (e) Write a note on male rivalry with example.
   (f) What is kinesis? Differentiate orthokinesis and klinokinesis. Give examples of these two types of kineses (1+2+2)

3. **Answer the following questions (10 marks each):**
   (a) What do you understand by asymmetry of sex? What is female choice? Write a note on sexual conflict in parental care. (2+2+6)
   (b) Elaborate the mechanism of communication among honey bees regarding the foraging activity. Give the list of information they do share among themselves during foraging. (8+2)
   (c) Mention different types of chemical communication in insects. Differentiate Kairomones and allomones. (8+2)
   (d) What is eusociality? Describe Hamilton's rule in relation to honey bee's colony. Describe haplodiploidy with example. (2+6+2)
   (e) What is instinct behaviour? Explain proximate and ultimate cause of behaviour with example. Write a note on kin selection. (2+5+3)

Department of Zoology
B.Sc. Honours
Semester-V

CC13-ZOOLOGY
(Developmental Biology)

1. **Answer the following questions (1 mark each):**
   (a) Mention two properties of a stem cell
   (b) Define teratogen. Give example.
   (c) What is acrosome reaction?
   (d) What is zona pellucida?
   (e) State the function of cornea.
   (f) What is cephalic flexure?
   (g) Distinguish between determinate and indeterminate cleavage.
   (h) Define capacitation.
   (i) What is polyspermy?
   (j) State the full form of ICSI?

2. **Answer the following questions (5 marks each):**
   (a) What is fate map? Describe the process of construction of fate map. Comment on its significance. (1+3+1)
   (b) Write a note of different types of cleavage based on the amount of yolk present. Add a note on the role yolk in cleavage. (3+2)
   (c) Discuss reciprocal induction with suitable example.
   (d) What is foetal alcohol syndrome? Comment on the role of alcohol as teratogen.(1+4)
   (e) Write a note on amniocentesis.
   (f) Describe spermatogenesis with a suitable diagram. Add a note on the hormonal control of spermatogenesis. (3+2)

3. **Answer the following questions (10 marks each):**
   (a) Describe the developmental process of eye / brain in Chick with suitable diagrams.
   (b) Define placenta. Classify placenta depending on the histological architecture with examples. Mention the functions of placenta. (1+7+2)
   (c) Explain the term ‘organizer’. Who first coined the term? Give experimental proof in favour of Chordamesoderm as neural inductor. (1+1+8)
   (d) Give an illustrated account of gastrulation in chick. State the significance of primitive streak formation. (8+2)
   (e) What are the foetal membranes in chick? Describe the process of formation of extra-embryonic membranes in chick. State their functions. (2+6+2)

CC14-ZOOLOGY
(Evolutionary Biology and Statistics)

1. **Answer the following questions (1 mark each):**
   (a) Distinguish between convergent and divergent adaptation
   (b) Define sibling species.
   (c) What is coacervate?
   (d) Define allometry with example.
   (e) Differentiate between background extinction and mass extinction.
   (f) What is frame shift mutation?
   (g) Define mean and standard deviation.
   (h) What is known as Lamarckian doctrine?
   (i) Define founder's effect.
   (j) What is hybrid breakdown?

2. **Answer the following questions (5 marks each):**
   (a) Mention different factors responsible for the extinction of species. Discuss about K-T extinction. (2+3)
   (b) What are the different types of variations found in population? Discuss the role of variations in evolution. (3+2)
   (c) Write a short note on neutral theory of evolution. Comment of Molecular Clock. (3+2)
   (d) Discuss the Darwinian concept of evolution.
   (e) Define species in the light of biological species concept. Add a note on the merits and demerits of the concept. (3+2)
   (f) Discuss the Lamarckian theory of evolution.

3. **Answer the following questions (10 marks each):**
   (a) Discuss the evolution of modern horse from *Eiohippus* with special emphasis on the changes in teeth and limb.
   (b) Discuss the biochemical origin of life on Earth.
   (c) Discuss about different types of post zygotic isolating mechanisms. Distinguish between sympatric and allopatric speciation. (6+2+2)
   (d) Define adaptive radiation. Discuss the process of adaptive radiation with special reference to Galapagos finches. (2+8)
   (e) What is Hardy-Weinberg Law? Derive the equation and state the application of the law in biallelic population. What are the forces that can disrupt the Hardy-Weinberg Equilibrium? (2+5+3)

DSE3-ZOOLOGY
(Parasitology)

1. **Answer the following questions (1 mark each):**
   (a) What is a parasitoid?
   (b) Differentiate between vector and carrier giving examples.
   (c) What is a parasitophorous vacuole?
   (d) What is a hexacanth embryo?
   (e) Why is 'elephantiasis' a misnomer?
   (f) What is meant by trichinosis?
   (g) Differentiate between male and female *Ancylostoma.*
   (h) What is pediculosis?
   (i) Name the causative agent of scabies.
   (j) Why is the name cookiecutter shark given?

2. **Answer the following questions (5 marks each):**
   (a) Describe the morphology of *Giardia intestinalis* and its control.
   (b) Discuss about visceral leishmaniasis.
   (c) Write on the pathogenicity of *Ancylostoma duodenale*.
   (d) Discuss the pathogenicity, prophylaxis and treatment of Ascariasis.
   (e) Write a note on *Xenopsylla*.
   (f) Write about the medical importance of *Pediculus.*

3. **Answer the following questions (10 marks each):**
   (a) Differentiate between the structures of amastigote and promastigote forms of *Leishmania donovani.* Describe the life cycle of *Leishmania donovani* giving relevant diagrams/flow charts. (4+4+2)
   (b) Name the vector which transmits *Trypanosoma gambiense*. Describe the life cycle of *Trypanosoma gambiense* giving suitable diagrams/flowchart. What is VSG (1+4+3+2)
   (c) Describe the morphology of adult male and female *Schistosoma haematobium* giving suitable diagrams. Highlight the pathogenic effect caused in humans by infection by *Schistosoma* haematobium. (4+6)
   (d) Write about the symptoms and clinical manifestations shown by the human body when infected with *Trichinella spiralis*. Discuss its treatment and control. (3+4+3)
   (e) Describe the typical characteristics of ticks. Name the families to which hard ticks and soft ticks belong. Write down the medical importance of ticks. (3+2+5)

DSE4-ZOOLOGY
(Biology of Insects)

1. **Answer the following questions (1 mark each):**
   (a) What is trophallaxis?
   (b) Define co-evolution.
   (c) Give scientific name of a major insect pest of paddy.
   (d) What is Elytron?
   (e) Expand PTTH.
   (f) What is haltere?
   (g) Name an insect living fossil.
   (h) What is ommatidium?
   (i) Caddisflies belong to which order of Insecta?
   (j) Write the function of ecdysone.

2. **Answer the following questions (5 marks each):**
   (a) Write a note on caste system in termite colony.
   (b) Write the characteristics of order Hemiptera. Give example. All weevils are beetles- justify (2+1+2)
   (c) Differentiate endopterygote and exopterygote. Write the difference between holometabolous and hemimetabolous insects. (2½×2)
   (d) Why insects are considered as one of the most successful group of organisms on earth?
   (e) Mention different types of antennae found among insects with example.
   (f) Write the characters of mayflies. Differentiate naiads and nymphs (3+2)

3. **Answer the following questions (10 marks each):**
   (a) Describe different types of mouthparts with respect to feeding habits of insects with diagram.
   (b) Comment on Diptera as an important vector of human society.
   (c) Briefly elaborate the mechanism of metamorphosis of Lepidoptera. Mention the functions of the hormones responsible for metamorphosis. (7+3)
   (d) Write a note on wing articulation in insects. Give a generalised view of insect thorax. (6+4)
   (e) Write a note on different types of legs present in insects with examples and diagram. Comment on order- Coleoptera. (7+3)