6. Short note any three of the following : (5,5,5)

(a) Fate map

(b) Egg membranes

(c) Extra-embryonic membrane

(d) Von Baer Laws

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4028 **H**

Unique Paper Code : 2232521201

Name of the Paper : Cell and Developmental Biology of Animals

Name of the Course : **B.Sc. (P) Life Sciences, 2023**

Semester : II

Duration : 2 Hours Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **FOUR** questions in all including question no. **1** which is compulsory.
3. Draw well labelled diagrams wherever required.
4. **All** parts of a question to be attempted together.

1. (a) Define the following (any **five**) : (5)

(i) Vitellogenesis

(ii) Polyspermy

(iii) Neurulation

(iv) Amphimixis

(v) Morphogenesis

(vi) Grey Crescent

(b) Differentiate between the following (any **four**) : (2×4=8)

(i) Penetration and copulation path

(ii) Epiboly and Emboly

(iii) Epigenesis and Preformation

(iv) Tight junctions and gap junctions

(v) Karyokinesis and Cytokinesis

(c) Name the germ layers from which the following are derived : (½×4=2)

(i) Liver

(ii) Brain

(iii) Ovary

(iv) Lung

2. (a) Describe the development of frog from fertilized egg to gastrula formation. (8,7)

(b) Describe various planes and patterns of cleavage in different animals.

3. (a) Describe the process of oogensis in mammals. (8,7)

(b) Give an account on stem cells.

4. (a) Describe the process of meiosis and its significance. (8,7)

(b) Compare and contrast the prophase of mitosis and meosis.

5. (a) Describe the cortical reaction. Discuss its role to block polyspermy. (8,7)

(b) Discuss the role of various hormones that control Metamorphosis in frog.

P.T.O.

6. Write short notes on **any three** : (5×3)

(a) Cot curves and their significance

(b) Allosteric regulation

(c) Membrane lipids

(d) Ramachandran plot

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4126 **H**

Unique Paper Code : 2232011202

Name of the Paper : Fundamentals of Biomolecules

Name of the Course : **B.Sc. (Hons) Zoology (DSC)**

Semester : II

Duration : 2 Hours Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **four** question including. Question No. **1** which is compulsory.
3. Draw well-labelled diagrams wherever necessary.

1. (a) Define the following (**Any five**) : (1×5)

(i) Isozymes

(ii) Trans fats

(iii) RNA world hypothesis

(iv) C-value paradox

(v) Hyperchromic shift

(vi) Cofactor

(b) Expand the following (**Any five**) : (1×5)

(i) PUFA

(ii) GAG

(iii) siRNA

(iv) ADH

(v) LPS

(vi) IUBMB

(c) Differentiate between (**Any five**) : (1×5)

(i) Homotropic and heterotropic enzymes

(ii) Hydrolase and lyase

(iii) Configuration and conformation

(iv) Saturated and unsaturated fatty acids

(v) Glycoproteins and proteoglycans

(vi) Anomers and Epimers

2. Describe the salient structural features of B-DNA. Explain how reducing the water content around this molecule to about 75% would change its structure. Compare the two structures. (15)

3. Describe how Michaelis-Menten model can be modified in presence of different types of reversible inhibitors. Illustrate with suitable graphs. (15)

4. (a) Explain the various levels of structural organization of proteins with suitable illustrations. (10)

   (b) Explain the physiological significance of derived lipids. (5)

5. (a) Discuss isomerism in carbohydrates with suitable examples. (12)

   (b) Add a note on physiological importance of essential and non-essential amino acids. (3)

5. (a) Discuss the role of ATP and calcium ions in the excitation-contraction coupling in a skeletal muscle fibre with help of diagrams. (10)

   (b) Give a brief account of the physiological effect of the hormones secreted by the thyroid gland. (5)

6. Write short notes on any **three** of the following : (3×5=15)

   (a) Oogenesis

   (b) Sliding Filament mechanism

   (c) Hypothalamo-hypophyseal portal system

   (d) Implantation

   (e) Neuromuscular junction

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4164 **H**

Unique Paper Code : 2232011203

Name of the Paper : Human Physiology: Control and Coordination Systems/ Discipline Specific Core- 6

Name of the Course : **B.Sc (Hons) Zoology Exam-2023**

Semester : II – (NEP-UGCF)

Duration : 2 Hours Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **FOUR** QUESTIONS in all and Question No. **1** is COMPULSORY.

1. (a) Define the following terms **(Any four)** : (4)

   (i) Sertoli cells

   (ii) Hyperpolarization

(iii) Sarcomere

(iv) Trigger zone

(v) Perimysium

(b) Differentiate between the following : (4)

(i) Myelinated vs Unmyelinated nerve fibre

(ii) Follicular phase vs Luteal phase

(c) Give the location and function of the following : (3)

(i) Islet of Langerhans

(ii) Sarcoplasmic reticulum

(iii) Nissl granules

(d) Expand the following : (2)

(i) PNS

(ii) FSH

(iii) EPSP

(iv) Ach

(e) Fill in the blanks : (2)

(i) _____ cells form the myelin sheath around the neurons of the PNS.

(ii) The mature and dominant follicle in the ovary is known as _____.

2. (a) What is action potential? Explain the generation of action potential in a neuron. (10)

(b) Explain the all or none principle of action potential. (5)

3. (a) What is Spermatogenesis? Explain the process of spermatogenesis. (10)

(b) Draw a well-labelled diagram of the mature mammalian sperm. (5)

4. (a) How does pancreas regulate the normal level of glucose in the blood? (10)

(b) Describe the negative feedback regulation of secretion of a hormone. (5)

P.T.O.

6. (a) Explain the water vascular system of Starfishes with well labelled diagram. (7)

(b) Describe the different types of metamorphosis in insects. (5)

7. Write short notes on any **three** of the following : (4×3)

(a) Respiration in insects

(b) Reproduction in Earthworm

(c) Metamerism

(d) Evolutionary significance of *Peripatus*

D 12 MAY-2024

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 2920 **H**

Unique Paper Code : 32231201

Name of the Paper : Non-Chordata II : Coelomates

Name of the Course : **B.Sc. (H) Zoology**

Semester : II (LOCF)

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. This paper contains seven questions. Question No. **1** is compulsory.
3. Answer **five** questions in all.
4. **All** parts of a question should be answered together.

1. (a) Define the following terms : (1×4)

(i) Epitoky

(ii) Cephalization

(iii) Evisceration

(iv) Autotomy

P.T.O.

(b) Differentiate between the following : (2×4)

(i) Holothuroidea and Echinoidea

(ii) Worker bee and drone bee

(iii) Taenidia and Ctenidia

(iv) Schizocoelous and enterocoelous mode of coelom formation

(c) Give the name of the animal having the following structure and mention its function. (1×4)

(i) Parapodia

(ii) Osphradium

(iii) Pedicellariae

(iv) Malpighian tubules

(d) Give generic name of the following and classify upto class : (1.5×4)

(i) Brittle star

(ii) Pearl oyster

(iii) King crab

(iv) Paddle worm

(e) Match the following : (1×5)

(i) Oligochaeta	(a) Halteres
(ii) Echinoidea	(b) Chelicerae
(iii) Scaphopoda	(c) Clitellum
(iv) Diptera	(d) Tusk shell
(v) Arachnida	(e) Aristotle's lantern

2. (a) Give an account of social organisation in Termites. (7)

(b) Describe the pearl formation in bivalves. (5)

3. Describe the structure of compound eye of Arthropods and explain the image formation in dim and bright light intensities with suitable diagrams. (12)

4. Describe the general characteristics of Phylum Mollusca in brief. Explain the mechanism of torsion and detorsion in gastropods. (12)

5. Give a detailed account of structure and functioning of excretory organs of Annelids. (12)

5. (a) Describe the Torsion and detorsion in gastropods.

(b) Comment upon affinities of Phylum Onychophora with Annelida and Arthropoda. (9+6)

6. Write the short notes on the following : (15)

(a) Types of metamerism

(b) Respiration in insects

(c) General characteristics of Echinodermata

25

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4088 **H**

Unique Paper Code : 2232011201

Name of the Paper : Non-Chordata : Coelomates

Name of the Course : **B.Sc. (H) Zoology - UGCF**

Semester : II

Duration : 2 Hours Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Answer any **FOUR** questions in all.
3. Question No. **1** is compulsory.
4. Draw well-labelled diagrams wherever necessary.

1. (i) Define the following (any **four**) : (4)

(a) Cephalization

(b) Omatidium

(iv) Give generic of the following and classify upto classes (any **three**) : (3)

(a) Sea mouse

(b) Star fish

(c) Pearl oyster

(d) King crab

2. (a) Give an account on the social life of Termite and add note on their economic importance.

(b) Describe the evolution of Coelom. (9+6)

3. (a) Give the structure of Compound eyes and explain its functioning with diagram.

(b) Write an account on metamorphosis in insects and discuss its hormonal control. (9+6)

4. (a) Discuss the locomotion of Asteroidea.

(b) Describe the pearl formation in Mollusca. (9+6)

P.T.O.

(c) Taenidia

(d) Osphradium

(e) Madriporite

(ii) Differentiate between the following (**any two**) : (4)

(a) Enteronephric and Exonephric

(b) Holothuroidea and Echinoidea

(c) Setae and Chaetae

(iii) Give the location and function of the following (any **four**) : (4)

(a) Parapodia

(b) Coxal gland

(c) Polian vesicle

(d) Pedicellariae

(e) Radula

4. Write short notes on any three of the following: (4×3=12)

(a) Swim bladder

(b) Dentition in mammals

(c) Functions of integument

(d) Evolution of heart in mammals

SECTION B

5. (a) Discuss the pattern of cleavage in different vertebrate organisms. (6)

(b) Explain the process of cloning with the help of suitable example. (6)

6. Describe the formation and functions of different types of placentae in mammals. (12)

7. Write short notes on any three of the following: (4×3=12)

(a) Spermiogenesis

(b) Fate of germ layers

(c) Metamorphosis in frog

(d) Embryonic induction

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 3369 **H**

Unique Paper Code : 42231202

Name of the Paper : Comparative Anatomy and Developmental Biology of Vertebrates

Name of the Course : **B.Sc. (P) Life Science**

Semester : II-LOCF

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **Five** questions in all including **Question No. 1** which is compulsory.
3. All the parts of a question must be attempted together.
4. Draw well labelled diagrams wherever required.

1. (a) Define the following: (5)

(i) Sebaceous gland

(ii) Holobranch

(iii) Carnassial teeth

(iv) Zona pellucida

(v) Preformation

(b) Differentiate between the following: (12)

(i) Euryhaline and Stenohaline organism

(ii) Horns and Antlers

(iii) Larynx and Syrinx

(iv) Pseudobranch and Holobranch

(v) Epiboly and Emboly

(vi) Monospermy and Polyspermy

(c) Give location and function of the following: (3)

(i) Ceruminous gland

(ii) Iter

(iii) Macula lutea

(d) Write the contribution of the following: (3)

(i) Hans Spemann

(ii) J. F. Gudernastch

(iii) W. Vogt

(e) State whether the following statements are true or false: (4)

(i) Glenoid cavity of pectoral girdle articulates with the humerus.

(ii) The mesonephric duct persists in males forming the vas deferens.

(iii) Metamorphosis occurs in frog under the influence of growth hormone.

(iv) Malleus is the modification of quadrate bone.

SECTION-A

2. (a) Explain the structure of avian lung with help of suitable diagrams. Give the mechanism of respiration in birds. (8)

(b) Write a short note on the fate of first two visceral arches. (4)

3. Describe the succession of kidney in vertebrates with suitable diagrams. (12)

6. Write short notes on any **three** of the following : (3×5=15)

(a) Parental care

(b) Imprinting

(c) FAP

(d) Courtship behaviour in 3-spine stickleback

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4145 **H**

Unique Paper Code : 2232012403

Name of the Paper : Animal Behaviour – DSC

Name of the Course : **B.Sc. (H) Zoology (NEP-UGCF)**

Semester : IV

Duration : 2 Hours Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **four** questions in all including Question No. **1** which is compulsory.
3. **All** questions carry equal marks. **All** parts of a question should be answered together.

1. (a) Define the following : (1x5=5)

(i) Inclusive fitness

(ii) Stimulus filtering

(iii) Code breakers

(iv) Infanticide

(v) Sexual Dimorphism

(b) Differentiate between the following : (2x3=6)

(i) Orthokinesis and Klinokinesis

(ii) Habituation and Sensitization

(iii) Klinotaxis and Tropotaxis

(c) Give the important contributions made by the following scientists : (1x4=4)

(i) E.O. Wilson

(ii) Ivan Pavlov

(iii) Robert drivers

(iv) R. A. Fisher

2. (a) What are the characteristics of eusocial organisms? Describe Social organization in honey bees. (10)

(b) Add a note on honeybee communication methods and the related experimental studies conducted to prove communication pattern in honey bees. (5)

3. (a) Describe the principles of classical and operant conditioning in associative learning, providing examples for each, and discuss how these processes contribute to behavior modification and learning in animals? (8)

(b) Describe courtship behaviour in animals and its significance. Discuss in detail the courtship behaviour of any bird/insect with help of well-labelled diagram. (7)

4. (a) Explain the different modes of communication used by animals by giving suitable examples. Analyze the advantages and drawbacks of each mode in terms of their functional relevance. (10)

(b) Explain the importance of Tinbergen's four questions in modern study of animal behaviour by giving suitable examples. (5)

5. (a) What mechanisms drive sexual selection in the animal kingdom, and how do they influence the evolution of traits related to mating success? Explain with suitable examples. (10)

(b) Explain altruism? With suitable example describe how Hamilton's rule provides the evolutionary significance of altruism. (5)

P.T.O.

5. (a) Define cardiac output. Describe the various factors that affect the regulation of cardiac output.

   (b) Draw a neat labelled diagram of cardiac cycle showing all the events associated with one heartbeat. (6,6)

6. (a) Describe the three phases of digestion.

   (b) Explain the factors involved in regulation of blood pressure. (6,6)

7. Write short notes on **Any Three** of the following : (3×4=12)

   (a) Pulmonary volume and capacities

   (b) Glomerular filtration

   (c) ECG

   (d) Carbon monoxide poisoning

   (e) Formed elements of blood

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 3010 **H**

Unique Paper Code : 32231402

Name of the Paper : Animal Physiology : Life Sustaining Systems

Name of the Course : **B.Sc. (Hons.) Zoology**

Semester : IV, LOCF

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **FIVE** QUESTIONS in all.
3. Question no. **1** is COMPULSORY.
4. Draw diagrams wherever necessary.

1. (a) Define the following terms : (5)

   (i) Hematocrit

   (ii) Respiratory acidosis

   (iii) Haustral churning

   (iv) Renal threshold

   (v) Ectopic focus

(b) Distinguish between the following : (10)

(i) Bohr and Haldane effect

(ii) PCT and DCT

(iii) Pulmonary ventilation and pulmonary respiration

(iv) Hemopoiesis and hemostasis

(v) Peristalsis and segmentation

(c) Expand the following abbreviations : (2)

(i) PCV

(ii) EDV

(iii) SARS

(iv) CCK

(d) Fill in the blanks : (4)

(i) Kupffer cells are found in _____ and play a role in _____.

(ii) The renal corpuscle consists of the _____ and _____.

(e) State the *location* and *function* of the following **(Any FOUR)** : (4)

(i) Brunner's glands

(ii) Septal cells

(iii) Apneustic area

(iv) JGA

(v) Crypts of Lieberkühn

(f) Give reason/s : (2)

(i) Tetany does not occur in the cardiac cells.

(ii) Digested lipids are mainly absorbed in the lacteals.

2. (a) Discuss the counter current mechanism and its role in producing concentrated urine.

(b) Explain the mechanism of GFR regulation in nephrons. (6,6)

3. (a) Discuss the basic characteristics of alveoli for gas exchange: Explain the role of various muscles involved in pulmonary ventilation.

(b) Briefly explain the factors affecting Oxygen-hemoglobin dissociation curve. (6,6)

4. (a) Draw and explain portal triad. Briefly discuss the functions of liver.

(b) How is HCI formed in the stomach? (8,4)

6. (a) What is significance of pentose phosphate pathway? (6)

   (b) Describe the process through which glucose is stored in the body. (6)

7. Write short notes on **any three** :– (4×3)

   (i) Malate aspartate shuttle

   (ii) Oxidative phosphorylation

   (iii) Intermediary metabolism

   (iv) ETC

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 3121 **H**

Unique Paper Code : 32231403

Name of the Paper : Biochemistry of Metabolic Processes

Name of the Course : **B.Sc. (H) Zoology, LOCF**

Semester : IV

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **FIVE** QUESTIONS in all, question no. 1 is COMPULSORY.

1. Define the following : (5)

   (i) Cori cycle

   (ii) Fermentation

   (iii) Glycogenolysis

   (iv) Oxidative phosphorylation

   (v) Acidosis

(b) Differentiate between the following : (2×5=10)

(i) Catabolism and anabolism

(ii) Inhibitors and uncouplers

(iii) Transamination and deamination

(iv) Hexokinase and glucokinase

(v) Glucogenic and ketogenic amino acids

(c) Give the function(s) of the following enzymes : (1×4=4)

(i) Transaldolase

(ii) Succinate dehydrogenase

(iii) Methyl malonyl CoA mutase

(iv) Phosphoenolpyruvate carboxykinase

(d) Expand the following : (1×5=5)

(i) UDP Glucose

(ii) PFK

(iii) NADPH

(iv) DHAP

(v) GTP

(e) Draw the structures of the following : (3)

(i) α-Ketoglutarate

(ii) Glutamate

(iii) HMG CoA

2. (a) With the help of structural formulae, describe the fate of glucose under aerobic condition. (8)

(b) Add a note on ketone bodies. (4)

3. (a) "Gluconeogenesis is not the reversal of glycolysis", justify the statement. (6)

(b) Explain the chemiosmotic hypothesis. (6)

4. (a) Give a detailed account of urea cycle. Add a note on its link to TCA cycle. (8)

(b) Enlist the cascade of metabolic events occur during starving condition. (4)

5. Describe the β-oxidation of palmitic acid. Discuss about fates of the end products produced in this process. (12)

P.T.O.

3. Describe the life cycle of the malaria parasite with a schematic diagram and add a note on the control strategies of the vector to prevent the disease. (15)

4. Describe the morphology, life cycle, laboratory diagnosis and treatment of *Ascaris lumbricoides.* (15)

5. What is African sleeping sickness? How is it transmitted? Describe its pathogenesis, diagnosis and treatment. Give some important control measures to prevent the disease. (15)

6. (a) Discuss in detail the life cycle, medical importance and control measures of *Schistosoma haematobium.* (9)

   (b) Write the epidemiology of *Ancyclostoma duodenale.* (6)

7. Write short notes on **any three** of the following: (3×5=15)

   (a) Pathogenecity of *Wuchereria bancrofti*

   (b) Amoebiasis

   (c) Parasite as evolutionary response

   (d) Cookicutter shark

   (e) Biology of *Xenopsylla cheopis*

(1000)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4261 **H**

Unique Paper Code : 2233012008

Name of the Paper : DSE-8, Parasitology

Name of the Course : **B. Sc. (H) Zoology, (NEP)**

Semester : IV, (DSE-8)

Duration : 3 Hours Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.

2. Attempt **any five** questions in all including **question No.1**, which is compulsory.

1. (i) Define any five of the following: (5)

   (a) Definitive Host

   (b) Reservoir Host

   (c) Chromatid bars

   (d) Ectoparasite

P.T.O.

(e) Cysticercosis

(f) Mechanical vector

(g) Parasitism

(ii) Differentiate between the following: (10)

(a) Infection and infestation

(b) Epidemic and Endemic disease

(c) Anthroponosis and Zoonosis

(d) Trophozoite and Cyst

(e) Facultative and obligatory parasite

(iii) Fill up the following blanks: (5)

(a) Smallest tape worm infecting the human is _____

(b) The cercaria larva of _____ has bifid tail for penetration.

(c) Presence of _____ in liver cells cause relapse in Malaria.

(d) _____ is the infective stage of *Entamoeba histolytica.*

(e) Egg stage of *Pediculus humanus is known as* _____

(iv) Draw well labelled diagrams of the following: (5)

(a) Polymormorphic forms of Trypanasoma gambiense.

(b) Internal anatomy of Fascioplisis buski

(v) Match the following: (5)

A	B
(a) Entamoeba histolytica.	(i) ventral sucker
(b) *Plasmodium vivax*	(ii) copulatory spicules
(c) *Trichinella spiralis*	(iii) chromatoid bodies
(d) *Schistosoma haematobium*	(iv) signet ring stage
(e) Ascaris lumbricoides	(v) claspers

2. (a) Describe the life cycle and medical importance of *Pediculus humanus.* (7)

(b) Explain the parasitic adaptation, diagnosis and cure of disease caused by *Taenia solium.* (8)

P.T.O.

5. (a) Describe the process of DNA sequencing using Sangers method. (8)

   (b) What are recombinant vaccines and how are they made? (4)

6. Make a map of pUC18. Discuss the strategy of selection of transformants using this plasmid. (4,8)

7. Write short notes on **Any Three** of the following :

   (i) Industrial Fermentation

   (ii) DNA microarrays

   (iii) Western Blotting

   (iv) PCR (4,4,4)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1185 **H**

Unique Paper Code : 32235901

Name of the Paper : GE: Animal Cell Biotechnology

Name of the Course : **B.Sc. / B.Com. / B.A. Theory Examination May/June 2023**

Semester : IV, LOCF (GE)

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **Five** questions in all, including Question No. **1** is which is compulsory.
3. Illustrate your answers with appropriate diagrams whenever necessary.

1. (a) Define the following : (5)

   (i) Competent cells

   (ii) Transgenesis

   (iii) Plasmid

(iv) Primers

(v) Isocaudomers

(b) Differentiate between the following : (2×5)

(i) Cloned Animal and Transgenic animal

(ii) Stringent and Relaxed Plasmid

(iii) Ex-vivo and In-vivo Gene therapy

(iv) Submerged and solid state fermentation

(v) Cloning Vector and Expression vector

(c) Expand the following : (4)

(i) YAC

(ii) MCS

(iii) X Gal

(iv) CFU

(d) State the contribution of the following scientists : (4)

(i) Kary Mullis

(ii) Stanley Cohen

(iii) F. Bolivar

(iv) Edwin Southern

(e) Write the importance of the following in Biotechnology : (4)

(i) T_4 DNA Ligase

(ii) ddNTP

(iii) Polynucleotide Kinase

(iv) Agar

2. (a) Describe the strategy of Somatic Cell Nuclear Transfer. (6)

(b) Diagrammatically explain the process of Southern Blotting. (6)

3. (a) Describe the strategy used to produce recombinant Human Growth Hormone. (8)

(b) What are high capacity vectors and what are their use? (4)

4. (a) What is Transformation? Compare the different transformation techniques. (8)

(b) Differentiate between Agarose Gel Electrophoresis and Polyacrylamide Gel Electrophoresis. (4)

P.T.O.

(b) Briefly discuss the accessory respiratory organs in fishes. (4)

6. Give a comparative account of brain in vertebrates with labelled diagrams. (12)

7. Write short notes on *any* **three** of the following. (12)

(i) Jaw suspensorium in vertebrates

(ii) Dentition in mammals

(iii) Types of feathers

(iv) Autonomic nervous system

(v) Scales in fishes

30

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 2956 **H**

Unique Paper Code : 32231401

Name of the Paper : Comparative Anatomy of Vertebrates

Name of the Course : **B.Sc. Hons. Zoology**

Semester : IV - LOCF

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Answer any **five** questions in all, including question 1 which is compulsory.
3. Draw well-labelled diagrams wherever necessary.

1. (a) Define the following terms : (5)

(i) Iter

(ii) Opisthonephros

(iii) Plastron

(iv) Synsacrum

(v) Holobranch

(b) Differentiate between the following terms : (10)

(i) Monocondylic anddicondylic skull

(ii) External and internal glomeruli

(iii) Spinal and cranial nerves

(iv) Nail and claw

(v) Parotid and paratoid gland

(c) State whether the following statement is true or false. (4)

(i) Syrinx is the voice box of mammals.

(ii) The neurocrania of chondrichthyans are well ossified.

(iii) Cycloid scales are epidermal derivatives.

(iv) In adult birds only the right aortic arch is functional.

(d) Give the exact location and function of the following. (8)

(i) Meibomian gland

(ii) Fovea centralis

(iii) Foramen Panizza

(iv) Foramen magnum

2. With the help of labelled diagrams, illustrate the evolution of aortic arches in vertebrates. (12)

3. (a) Describe the evolution of male urinogenital ducts in vertebrates. (6)

(b) Comment upon the ruminant stomach. (6)

4. (a) Classify and give functions of various types of receptors found in vertebrates. (7)

(b) Describe the types of centrum in vertebrates. (5)

5. (a) Explain the structure and functioning of the gills in cartilaginous and bony fishes. (8)

(f) Microevolution

(ii) Distinguish between **(any three)** : (3×2)

(a) Natural selection and Artificial selection

(b) Trace fossil and Index fossil

(c) Anagenesis and Cladogenesis

(d) Homologous organs and Analogous organs

(iii) State the contribution of the following scientists **(any two)** : (2)

(a) Birbal Sahani

(b) Theodosius Dobzhansky

(c) August Weismann

2. What is speciation? Discuss the various mechanisms of speciation. (12)

3. State Hardy-Weinberg law. Explain the various factors causing the deviation of population from Hardy-Weinberg equilibrium. (12)

4. Write short notes on following **(any three)** : (3×4)

(a) Pre-mating isolating mechanisms

(b) Macroevolution

(c) K-T extinction

(d) Organic variation

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 3491 **H**

Unique Paper Code : 42234406

Name of the Paper : Genetics and Evolutionary Biology

Name of the Course : **B.Sc. (P) Life Sciences**

Semester : IV

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **Section A & B** on separate answer sheets.
3. Question No. **1** of each section is compulsory.

SECTION A – GENETICS

Attempt **three** questions in all, including Question No. **1** which is compulsory.

1. (i) Define the following terms **(any five)** : (5)

(a) Lethal allele

(b) Base analog

(c) Intersex

(d) Holandric trait

(e) Recombination frequency

(f) Pericentric inversion

(ii) State an important contribution of the following scientists **(any three)** : (3)

(a) H. J. Muller

(b) C. B. Bridges

(c) G. Barski

(d) A. Sturtevant

(iii) Differentiate between the following **(any two)** : (2×2)

(a) Pleiotropy and Multiple alleles

(b) Transition and Transversion

(c) Cis-coupling and Trans-coupling phase

(iv) How many different types of gametes will be formed by a parent having following genotypes : (2)

(a) AaBbCcDdEe

(b) AaBBCcDDEe

2. (a) Describe Mendelian traits with the help of suitable examples. How do they differ from polygenic traits. (7)

(b) Illustrate the use of 'Three-Factor Crosses" in chromosome mapping. (5)

3. (a) What is the difference between aneuploidy and polyploidy? Discuss different types of polyploidy and their significance. (8)

(b) Explain the mechanism of dosage compensation in mammals? (4)

4. Write short notes on following **(any three)** :

(a) Genic balance theory

(b) Spontaneous mutations

(c) Somatic cell genetics

(d) Epistasis (3×4)

SECTION B – EVOLUTIONARY BIOLOGY

Attempt **three** questions in all, including.

Question No. **1** which is compulsory.

1. (i) Define the following terms **(any five)** : (5)

(a) Gene pool

(b) Connecting link

(c) Carbon dating

(d) Mutation

(e) Hybrid sterility

6. Write a short note on any **three** of the following : (5×3=15)

(a) Excitation-Contraction coupling

(b) Chloride shift

(c) Counter-current Mechanism

(d) Transport of Carbon dioxide

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4023 **H**

Unique Paper Code : 2232522401

Name of the Paper : Fundamentals of Human Physiology

Name of the Course : **B.Sc. (Prog) Life Sciences**

Semester : IV (DSC)

Duration : 2 Hours Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **FOUR QUESTIONS** in all and **QUESTION NO. 1** is COMPULSORY.
3. Draw Well labelled diagram wherever necessary.

1. (a) Define following (**Any three**) : (3)

(i) Chyme

(ii) Sinoatrial (SA) node

(iii) Glomerular filtration rate (GFR)

(iv) Lung compliance

(b) Differentiate between the following. (6)

(i) Primary active transport and secondary active transport.

(ii) Action potential and Graded potential.

(iii) Spermiogenesis and spermatogenesis.

(c) Give the location and function of the following : (3)

(i) Papillary muscles

(ii) Chief cells

(iii) Gonadotrophs

(d) State whether the statement is true or false. (3)

(i) The oxytocin and antidiuretic hormone (ADH) are synthesized by posterior pituitary.

(ii) Pepsinogen is converted to pepsin by the action of HCI secreted from parietal cells.

(iii) A rightward shift in the O_2-Hb saturation curve indicates decreased affinity of hemoglobin for oxygen, making it easier for oxygen to dissociate from hemoglobin.

2. (a) Explain chemical digestion and absorption of proteins with detailed account of enzymes involved. (8)

(b) Draw ultrastructure of a sarcomere and briefly discuss three classes of proteins of a sarcomere. (7)

3. (a) Explain the O_2-Hb dissociation curve? Describe various factors affecting this curve. (8)

(b) Describe origin and conduction of action potential in myelinated and non-myelinated nerve fiber. Which of the conduction is more efficient and why? (7)

4. (a) Give a detailed account of the events occurring during menstrual cycle along with hormonal control. (10)

(b) Describes events of a cardiac cycle in detail. (5)

5. (a) Explain the process of origin and conduction of cardiac impulse. (6)

(b) Give a detailed account of the factors responsible in regulating of glomerular filtration rate (GFR). (9)

P.T.O.

(b) Define fate map. Explain different methods of preparing a fate map. Draw well labelled diagrams of fate map of frog and chick blastula. (6)

5. (a) Describe the mechanism of fertilization in detail. Add a note on the difference between external and internal fertilization with examples. (9)

(b) What is aging? Enumerate various causes/theories of aging. (6)

6. Write short notes on any three of the following: (3×5=15)

(a) Embryonic induction

(b) Hormonal control of metamorphosis in Amphibians

(c) Embryonic stem cell and therapeutic cloning

(d) Types of eggs based on distribution and amount of yolk

8 (3)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4107 **H**

Unique Paper Code : 2232012402

Name of the Paper : DSC-Developmental Biology

Name of the Course : **B.Sc. (H) Zoology-UGCF**

Semester : IV - NEP

Duration : 2 Hours Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **any four** questions including **Question No. 1** which is compulsory.
3. Draw well-labelled diagrams wherever necessary.

1. (a) Define the following: (4)

(i) Gray crescent

(ii) Compensatory regeneration

(iii) Epiboly

(iv) Capacitation

(b) Distinguish between the following (any two): (2×2=4)

(i) Amnion and mosaic development

(ii) Involution and invagination

(iii) Totipotency and pluripotency

(c) Match the following: (2)

(i) Louis Brown	(a) Aristotle
(ii) Teratogen	(b) Fate maps
(iii) Walter Vogt	(c) IVF
(iv) Epigenesis	(d) Rachel Carson

(d) Expand the following abbreviations: (3)

(i) FAS

(ii) ICSI

(iii) NIMZ

(e) Name the germ layer from which each of the following is derived: (2)

(i) Epidermis

(ii) Thyroid

(iii) Vertebrae

(iv) Pancreas

2. (a) What are three different types of regeneration and explain epimorphic regeneration in detail with the appropriate diagram. (9)

(b) Explain the effect of various chemicals and drugs on embryonic development (6)

3. (a) What is placenta and its role in embryonic development? Describe different types of placenta based on the villi distribution and histology with suitable examples and diagram. (9)

(b) Discuss the process of IVF and amniocentesis and add a note on its merits and demerits (6)

4. (a) Enumerate different morphogenetic movements involved in gastrulation. Explain the process of gastrulation in frog. (9)

P.T.O.

(c) Multi drug resistant bacteria

(d) Role of prebiotics in human health

(e) Innate immunity

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5915 **H**

Unique Paper Code : 2234002005

Name of the Paper : GE: Microbiota: Importance in Health & Disease

Name of the Course : **B.Sc. (H) Zoology (NEP)**

Semester : IV

Duration : 2 Hours Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **any FOUR** questions in all.
3. **Question No. 1** is compulsory

1. (a) Define the following terms (1×6=6)

(i) Adaptive immunity

(ii) Gut-Microbiota

(iii) Periplasmic space

(iv) Bioterrorism

(v) Virulence

(vi) Granuloma

(b) Distinguish between the following (1.5×4=6)

(i) Resident flora and Transient flora

(ii) Probiotics and Prebiotics

(iii) Humoral immunity and Cell mediated immunity

(iv) Chicken pox and Shingles

(c) Fill in the blanks (0.5×6=3)

(i) The fungi _____ is used for the production of first commercial antibiotic _____.

(ii) Methanogens are _____ .

(iii) T_H and T_c cells are related to _____ immunity.

(iv) After encounter with antigen, B cell becomes _____ and _____ plasma cell.

2. (a) Give a detailed account of the various bacterial diseases of the skin. (12)

(b) Write a short note on trichiasis (3)

3. (a) Diagrammatically explain the cell mediated response against bacteria. (8)

(b) Explain the bacterial endotoxins and exotoxins (7)

4. Give a brief description of the microbe that causes Tuberculosis. Give a detailed account of the symptoms, test, diagnosis, vaccine and preventive measures for the disease. (15)

5. Give an account of the following diseases and their causative agents. (7.5×2=15)

(a) Syphilis

(b) Tetanus

6. Write short note on any three (5x3=15)

(a) Factors affecting the children's gut microbiota

(b) Role of gut microbiome in GI cancer

(b) Explain calcium chloride method of transformation. (5)

6. (a) Explain how recombinant Insulin is produced using recombinant DNA technology. (7)

(b) Describe the use of TALENS as a tool in gene editing. (5)

7. Write short notes on any **three** of the following : (4×3=12)

(a) Molecular diagnosis of Sickle Cell Anaemia

(b) Production of pharmaceuticals in transgenic animals

(c) Microarray

(d) Bacteriophage lambda

(e) Scope of Biotechnology

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 3095 **H**

Unique Paper Code : 32237903

Name of the Paper : Animal Biotechnology

Name of the Course : **B.Sc. (H) Zoology**

Semester : VI (DSE)

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Answer **five** questions in all.
3. Q. No. **1** is compulsory.

1. (a) Define the following : (5)

(i) Genetically modified organism

(ii) Humulin

(iii) DNA Polymerase

(iv) Gene Therapy

(v) Gene Knockout

(b) Differentiate between any **four** of the following : (8)

(i) Adaptors and Linkers

(ii) YAC and MAC

(iii) Plasmid and M13

(iv) Southern and Northern Blotting

(v) Transformation and Transfection

(c) Expand the following : (5)

(i) BAC

(ii) NGS

(iii) SCID

(iv) SCNT

(v) RFLP

(d) Write the contributions of the following scientists. (5)

(i) Ian Wilmut and Keith Campbell

(ii) Alec Jeffreys

(iii) Smith, Nathan and Arber

(iv) Mario Capecchi & Oliver Smithies

(v) Boliver and Rodriquez

(e) Explain any **two** of the following : (2+2)

(i) Taq polymerase

(ii) Transformation efficiency

(iii) Plaque hybridization

2. (a) Describe type II restriction endonucleases and explain their mode of action. (7)

(b) Describe colony hybridization technique for the screening of genomic library. (5)

3. (a) Describe Western Blotting technique in detail with the help of appropriate diagrams. (7)

(b) Define cloning vectors. Describe the essential features of a cloning vector with suitable examples. (5)

4. (a) Explain the method of producing insect resistant transgenic plants by recombinant DNA technology. (7)

(b) How was 'Dolly the sheep' created? Explain. (5)

5. (a) What is ex-vivo gene therapy? Describe in detail. (7)

4. (a) Explain the implantation of embryo in human. (6)

(b) Define teratogenesis, Discuss pharmaceutical drugs and alcohol as teratogens. (6)

5. (a) What are the different extra embryonic membranes in birds. Add a note on their evolutionary significance. (4)

(b) Describe various morphogenetic movements with reference to gastrulation in chick. (8)

6. (a) Explain the process of neural tube formation with suitable diagrams. Name a neural tube defect which occur due to improper closing of anterior neuropore. (6)

(b) 'The amount and deposition of yolk affects the cleavage pattern' Justify the statement. (6)

7. Write short notes on any **three** of the following : (3×4=12)

(a) Amniocentesis

(b) Types of placenta on the basis of histology

(c) Techniques to study fate maps

(d) Cortical Reaction

(e) Embryonic stem cell

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 2938 **H**

Unique Paper Code : 32231601

Name of the Paper : Developmental Biology

Name of the Course : **B.Sc. (H) Zoology**

Semester : VI (LOCF)

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **Five** questions in all. Question No. **1** is compulsory.
3. Attempt **all** the parts of question together.

1. (a) Define the following **(any five)** : (5)

(i) Invagination

(ii) Amphimixis

(iii) Archenteron

(iv) Morphogen

(v) Window of implantation

(b) Distinguish between any **four** of the following : (2×4=8)

(i) Splanchnopleure and Somatopleure

(ii) Coeloblastula and Steroblastula

(iii) Progressive and Retrogressive metamorphosis

(iv) Area Opaca and Area Pellucida

(v) Epimorphosis and Morphailaxis

(c) Match the following : (3)

(i) E. Allen	a. Phocomelia
(ii) Thalidomide	b. DDT as teratogen
(iii) A. Trembley	c. Senescence
(iv) Rachel Carson	d. Superovulation
(v) Clomiphene	e. Amphibian metamorphosis
(vi) Genetic instability	f. Hydra Regeneration

(d) Expand the following abbreviations : (3)

(i) IVF

(ii) GGF

(iii) DLHP

(e) Fill in the blanks : (4)

(i) Second meiotic arrest in human oocyte takes place at _____ stage.

(ii) Absence of _____ makes the sperm immotile.

(iii) Chemoattractants identified in the egg jelly of sea urchin are _____ and _____.

(f) Name the germ layer from which each of the following is derived : (4)

(i) Trachea

(ii) Ovary

(iii) Bone

(iv) Adenohypophysis

2. (a) Differentiate between Holometabolous and Hemimetabolous development. Discuss the role of hormones in insect metamorphosis. (6)

(b) What are the various causes of ageing, describe any two in detail. (6)

3. (a) Discuss the process by which the spermatid transforms into spermatozoa. (6)

(b) What do you understand by embryonic induction. Write the experimental proof of the regional specificity of induction. (6)

(b) Which observations led to the conceptualization of neutral theory of molecular evolution? Discuss the salient features of the proposed theory. (6)

5. (a) Describe and exemplify the types of speciation initiated by extrinsic and intrinsic isolation. (8)

(b) Discuss briefly the type of mass extinction resulting from asteroid impact. (4)

6. (a) Enumerate the trends in the evolutionary progression of horse phylogeny with reference to important fossil records. (8)

(b) How do you infer phylogenetic tree topology? (4)

7. Write short notes on **any three** of the following : (12)

(a) Darwin's theory and its demerits

(b) RNA world

(c) Adaptive radiation

(d) Types of Natural Selection

(e) Unique hominin characteristics

13

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 2992 **H**

Unique Paper Code : 32231602

Name of the Paper : Evolutionary Biology

Name of the Course : **B.Sc. (Hons.) Zoology (LOCF)**

Semester : VI

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Draw well-labeled diagrams wherever necessary.
3. Attempt **five** questions in all. Question No. **1** is compulsory.

1. (a) Define the following : (5)

(i) Gene pool

(ii) Genetic load

(iii) Deme

(iv) Orthologous genes

(v) Haldane's rule

(b) Differentiate between the following : (10)

(i) Cladogram and Phylogram

(ii) Anagenesis and Cladogenesis

(iii) Species and Subspecies

(iv) Bottle neck effect and Founder effect

(v) Homologous and Analogous organs

(c) Give the major contribution of the following in the field of Evolutionary biology : (5)

(i) Georges Cuvier

(ii) Gould and Eldredge

(iii) Lynn Margulis

(iv) HBD Kettlewell

(v) Donald Johanson

(d) Match the following : (3)

Column A	Column B
(i) Stromatolites	A. Migration
(ii) Circle of races	B. Land tetrapods
(iii) Trace fossils	C. Inclusive fitness
(iv) Devonian period	D. Filamentous Cyanobacteria
(v) Gene flow	E. Coprolites
(vi) Kin selection	F. Ressenkries

(e) Justify the following statements : (4)

(i) Fragmentation of habitats result in speciation on one hand and extinction on the other.

(ii) Both Lamarck's and Darwin's theory can be explained by the example of giraffe's neck.

2. (a) What are the assumptions of Hardy Weinberg equilibrium? Add a note on the implications and significance of the principle as applied to natural populations. (6)

(b) Describe the various pre-zygotic isolating mechanism with suitable examples. (6)

3. (a) How do fossils provide direct evidence for evolution? Briefly describe the various dating methods for fossils. (6)

(b) Organic variations provide raw material for evolution. Support the statement with the help of examples. (6)

4. (a) Explain how simple chemical compounds in the early environment gave rise to basic bio molecules. (6)

(b) Describe the technique used for the production of monoclonal antibodies. (8)

4. (a) Describe the initiation and activation of the classical pathway of complement system. (7)

(b) What is Immunogenicity? Discuss the factors which influence immunogenicity. (5)

5. (a) Describe the immune mediator, immune mechanism and typical manifestation of delayed type hypersensitivity. (7)

(b) Describe the various properties and functions of cytokines. (5)

6. (a) Describe the pathway for processing and presentation of endogenous antigen. (6)

(b) Describe the structure of antibody molecule. What are different types of antigenic determinants present on immunoglobulins? (6)

7. Write short note on *any three* of the following: (3x4=12)

(a) Hematopoiesis

(b) DNA vaccine

(c) Sandwich ELISA

(d) AIDS

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 3211 **H**

Unique Paper Code : 42237904

Name of the Paper : Immunology (DSE)

Name of the Course : **B.Sc. (P) Life Sciences (LOCF)**

Semester : VI

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **five** questions in all, including **Question No. 1** which is compulsory
3. Draw well labelled diagram wherever necessary

1. (a) Define the following: (6)

(i) Antigenicity

(ii) Clonal selection theory

(iii) Phagocytosis

(iv) Cross reactivity

(v) Autoimmunity

(vi) Avidity

(b) Differentiate between the following: (10)

(i) Primary Immunodeficiency and Secondary Immunodeficiency

(ii) Humoral Immunity and Cell mediated Immunity

(iii) Immediate hypersensitivity and delayed type hypersensitivity

(iv) Primary lymphoid organs and Secondary lymphoid organs

(v) Polyclonal antibodies and Monoclonal antibodies

(c) Mention the contribution of the following scientists: (4)

(i) Louis Pasteur

(ii) Jules Bordet

(iii) Edward Jenner

(iv) Rolf Zinkernagel and Peter Doherty

(d) Explain the function of the following: (4)

(i) Antigen presenting cells

(ii) Immunoproteasome

(iii) CLIP

(iv) Bence Jones proteins

(e) Expand the following: (3)

(i) TAP

(ii) PAMPs

(iii) ISCOM

(iv) IFN

(v) ADCC

(iv) SCID

2. (a) Describe the various barriers of the innate immune system. (6)

(b) Describe the structure and function of Lymph Node. (6)

3. (a) Describe the structure and function of MHC class II molecule. (4)

(b) Discuss the human- wildlife conflict, its reasons and solution. (6,6)

5. (a) Discuss zoonosis in wildlife. Explain with two suitable examples.

(b) Describe different components of Global Positioning Tracking in wildlife. Enlist their merits and demerits. (6,6)

6. (a) What is a habitat? Describe the various biological parameters of a habitat that need to be modified for wildlife management.

(b) What are the causes for the depletion of wildlife? Discuss with relevant examples from Indian context. (6,6)

7. Write a short note on the following, **(any three)** :

(a) Birth rate

(b) Biotelemetry

(c) Climax community

(d) Quarantine (4,4,4)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 3213 **H**

Unique Paper Code : 32237911/42237911

Name of the Paper : Wildlife Conservation and Management

Name of the Course : **B.Sc. (Hon)/Prog.**

Semester : VI

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **five** questions in all. Question **1** is compulsory.

1. (a) Define the following : (5)

(i) Endangered species

(ii) Natality

(iii) Bioreserve

(iv) Ecological succession

(v) Census

(b) Distinguish between the following : (8)

(i) National Park and Sanctuary

(ii) Male and female tiger pugmark

(iii) Exotic and Endemic species

(iv) Horns and Antlers

(v) Primary and secondary sex ratio

(c) Expand the following : (4)

(i) WPSI

(ii) WWF

(iii) IUCN

(iv) MAB

(d) Illustrate following with the help of diagrams (no description required) : (3)

(i) Difference between front and hind pug marks in carnivores.

(ii) Structure of a hair.

(e) Fill in the blanks :

(i) _____ Act was enacted on 7th September 1972.

(ii) Excess night lighting around urban areas which can impact life cycles of organisms is called _____ Pollution.

(iii) Variations in the genetic make-up among individuals within a single species are called _____ diversity. (3)

(f) Give reasons : (4)

(i) Today, wildlife Conservation is more important.

(ii) Wildlife Ecology is the science behind the practice of wildlife management.

2. (a) Discuss the different *in-situ* conservation strategies for wildlife. Elaborate its advantages over ex-situ conservation.

(b) Define carrying capacity. How would you estimate the carrying capacity of any wildlife population? (6,6)

3. (a) Describe the methods of preserving genetic diversity in forests.

(b) Explain different mechanical approaches for setting back succession, and importance of setting back succession. (6,6)

4. (a) Discuss various indirect evidences used for census of a wildlife population.