(b) Discuss the role of secondary messengers in cell signaling. (5)

5. (a) What is Signal Hypothesis? How does vesicular transport take place from ER to Golgi apparatus? (5+5=10)

(b) Which organelle in the cell is also called the "Suicidal Bag". Enumerate its functions. (5)

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

(a) Receptor-mediated endocytosis

(b) Endosymbiotic Hypothesis

(c) Cell Cycle checkpoints

(d) Protein modifications in ER

(e) Nuclear Pore Complex

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1387 **I**

Unique Paper Code : 2232011102

Name of the Paper : Biology of Cell : Structure & Function

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

Semester : I (NEP-UGCF-2022)

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.

1. (a) Give the function of the following : (1×5=5)

(i) Plasmodesmata

(ii) Flippase

(iii) Lamins

(iv) Liposomes

(v) Aquaporins

(b) Give the contribution of **ANY FIVE** of the following scientists : (1×5=5)

(i) Benda

(ii) Peter Mitchell

(iii) Blobel & Sabatini

(iv) Christian de duve

(v) Tim Hunt, Paul Nurse, Lee Hartwell

(vi) Lynn Margulis

(c) Expand **ANY FIVE** of the following : (1×5=5)

(i) GPCR

(ii) MTOC

(iii) GERL

(iv) CFTR

(v) cAMP

(vi) ATP

2. Distinguish between **ANY FIVE** of the following :

(a) Microfilaments and Microtubules

(b) Mitosis and Meiosis

(c) Integral and Peripheral Proteins

(d) Euchromatin and Heterochromatin

(e) Tight junctions and Gap junctions

(f) Dyneins and Kinesins (1×5=5)

3. With appropriate examples and well-labelled diagrams elaborate the ways in which molecules are passively and actively transported across the plasma membrane. (15)

OR

What is oxidative phosphorylation? Describe how the Electron Transport Chain and ATP Synthase in the mitochondria help generate ATP-the energy currency of the cell. (15)

4. (a) Illustrate the process of microtubule assembly with the help of suitable diagram. Add a note on their role in cellular mobility. (7+3=10)

(b) Explain Nitrogen cycle with the help of diagram. Explain the role of microorganisms in Nitrogen cycle. (9)

(c) Explain ecotone and edge effect. Why is ecotone considered as zone of stress? (5)

5. (a) Explain different energy flow models in an ecosystem. (8)

(b) Define ecological succession. Explain the various theories of climax in succession. (5)

(c) Differentiate between pioneer and climax community. (2)

6. Write short notes on any **three** of the following :

(a) Protected areas

(b) Gause's principle

(c) Light as a limiting factor

(d) Ecological efficiencies

(e) Resource partitioning (3×5)

[This question paper contains-4-printed-pages.]

Your Roll No.....

Sr. No. of Question Paper : 1406 **I**

Unique Paper Code : 2232011103

Name of the Paper : DSC-3, Concepts of Ecology

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

Semester : I, NEP-UGCF 2022

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.
3. Question No. **1** which is compulsory.
4. Draw well-labeled diagrams wherever necessary.

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

(i) Migration

(ii) Natality

(iii) Fecundity

(iv) Sere

(b) Distinguish between the following : (6)

(i) Autecology and Synecology

(ii) Unitary and Modular population

(iii) Fundamental and Realized niche

(c) Name the scientists associated with the following terms : (3)

(i) Ecology

(ii) Hypervolume niche

(iii) Ecosystem

(d) State whether the following statements are True or False : (2)

(i) Maximum theoretical production of new individuals under ideal conditions is known as exponential growth.

(ii) Human population shows concave type of survivorship curve.

(iii) Complete competitors can coexist.

(iv) Commensalism describes a relationship between organisms where one benefits and the other is harmed.

2. (a) Describe various density-dependent factors that regulate the population size near carrying capacity level. (9)

(b) What are life tables? Add a note on their significance. (3)

(c) Illustrate the sigmoid growth curve with the help of well-labeled diagram. (3)

3. (a) Describe Lotka-Volterra model for predator and prey interaction with the help of diagrams and equations. (8)

(b) Explain Shelford's law of tolerance. (3)

(c) Describe various types of ecological pyramids. (4)

4. (a) Define biogeochemical cycles. (1)

4. (a) Explain the process of osmoregulation in fishes detailing the mechanisms used by freshwater and marine species to maintain water and salt balance. (10)

   (b) Describe the biting mechanism in snakes highlighting the structure and function involved. (5)

5. (a) Discuss the adaptations for flight in birds explaining the structural and physiological modifications that enhance flight efficiency. (9)

   (b) Describe parental care in amphibians its various forms with examples. (6)

6. Write short notes on Any **Three** of the following topics : (3×5=15)

   (i) Metamerism in Annelida

   (ii) Retrogressive metamorphosis in Protochordates

   (iii) Locomotion in Amoeboids

   (iv) Origin of Mammals

   (v) Metamorphosis in Insects

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1568 **I**

Unique Paper Code : 2232521101

Name of the Paper : Diversity of Animals (DSC-3)

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

Semester : I

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.
3. Question No. **1** which is compulsory.
4. Illustrate your answers with diagram wherever necessary.

P.T.O.

1. (a) Define the following terms (**Any Five**) : (5)

   (i) Cephalization

   (ii) Endothermy

   (iii) Catadromous migration

   (iv) Strobilation

   (v) Binomial nomenclature

   (vi) Stone canal

   (b) Give the scientific name of the following terms (**Any Four**) : (2)

   (i) Acorn worm

   (ii) Saw fish

   (iii) Portuguese man-of-war

   (iv) Feather star

   (v) Tree frog

   (c) Distinguish between the following terms (**Any Four**) : (2×4=8)

   (i) Protostomes and deuterostomes

   (ii) Pseudocoelomate and coelomate animals

   (iii) Apposition and superposition vision

   (iv) Torsion and detorsion

   (v) Flagella and cilia

2. (a) Outline the life cycle of *Ascaris lumbricoides* and include a brief note on its adaptations for parasitism. (6+3=9)

   (b) Describe the phenomenon of polymorphism in Hydrozoa highlighting its types and functions within the colony. (6)

3. (a) Explain the types of canal systems found in Porifera describing their structure and functions. (8)

   (b) Describe the process of pearl formation in molluscs. (7)

(b) Explain human-wild life conflict with suitable example. (6)

4. (a) Mention the importance of protected are aconcept in wild life conservation in India. (6)

(b) Describe the objectives of biosphere reserves. Add a note on the different zones in a biosphere reserve. (6)

5. Write a short note on ANY YHREE of the following: (3×4=12)

(a) Projecttiger

(b) Conservationreserve

(c) Pugmark Census

(d) Wildlife management

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 3577 **I**

Unique Paper Code : 2234001002

Name of the Paper : GE : Natureand Wild Life

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

Semester : I (UGCF 2022)

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** questionsin all.
3. Question No. **1** is compulsory.

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

   (i) Zoonotic Disease

   (ii) Captive Breeding

   (iii) Direct Count

   (iv) Cryopreservation

   (v) Ecotourism

   (vi) Community Reserve

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

   (i) National Park and Zoological Park

   (ii) Endangered species and Threatened species

   (iii) Emigration and Immigration in wild life

   (iv) Competition and Protoco operation

   (v) Reintroduction and Translocation

   (c) Expand the following : (5×1=5)

   (i) IUCN

   (ii) WWF

   (iii) BNHS

   (iv) CITES

   (v) WCU

   (d) Give the causative agent of the following : (4×1=4)

   (i) Bubonic Plague

   (ii) Rabies

   (iii) Bumble foot

   (iv) Monkeypox

2. (a) What is wildlife ? Explain the positive and negative value of wildlife. (6)

   (b) Explain the various factors responsible for the depletion of wild life in India ? (6)

3. (a) Briefly explain captive breeding programme for the conservation of wildlife. Add a note on its advantages and challenges. (6)

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

(a) Course of migration of *Ascaris* larva within its host body.

(b) Metagenesis.

(c) Asexual reproduction in protozoa.

(d) Compare and contrast flatworms with roundworms.

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1368 **I**

Unique Paper Code : 2232011101

Name of the Paper : Non Chordata-Protista to Pseudocoelomates (DSC-1)

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

Semester : I

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

(a) Mehlis gland

(b) Bilateral Symmetry

(c) Plasmotomy

(d) Ootype

(e) Kinety

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

(a) Schizogony and Sporogony

(b) Primary host and Secondary host

(c) Cnidoblast and Trichocyst

(iii) Match the Columns: (4)

(a) Pinacocytes	1) *Hydra*
(b) Amphids	2) *Ctenoplana*
(c) Comb Plates	3) Sponges
(d) Gastrovascular cavity	4) Nematoda

(iv) Give the exact location and one function of each of the following (**any three**) : (3)

(a) Pyrenoids

(b) Acetabulum

(c) Colloblast cells

(d) Pneumatophore

2. (a) Give the illustrated account of life history of malarial parasite in man. (9)

(b) Describe the process of conjugation in *Paramecium* and discuss its significance. (6)

3. (a) Give the general characteristics of Phylum Porifera. (5)

(b) Give an account of different types of canal systems in Porifera and give its significance. (10)

4. (a) Describe Polymorphism in Cnidaria. Comment upon its significance. (9)

(b) Give an outline classification of phylum Cnidaria with characters and examples of each class. (6)

5. (a) Give a detailed account of parasitic adaptations in Helminthes. (10)

(b) Give graphic life cycle of *Taenia solium.* (5)

3. (a) Describe various larval forms in protochordates. Add a short note on retrogressive metamorphosis. (9)

   (b) Briefly discuss the structure of weberian ossicles. (3)

4. Define migration? Discuss the phenomenon of migration in birds. How do birds find their way during migration. (12)

5. (a) Explain the structure and function of various types of swim bladder. (6)

   (b) State the advanced features of vertebrates over protochordates. (6)

6. (a) Write a detailed note on the affinities of *Sphenodon*. (6)

   (b) Explain the structure of poison apparatus in snake with the help of well labelled diagrams. (6)

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

   (i) Osmoregulation in fish

   (ii) Continental drift theory

   (iii) Affinities of prototheria

   (iv) General characteristics of Cephalochordata

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5855 **I**

Unique Paper Code : 32231301

Name of the Paper : Diversity of Chordata (OC) (LOCF)

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

Semester : III

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. **All** parts of a question should he answered together.
4. Draw labelled diagrams wherever necessary.

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

   (i) Pneumatic bone

(ii) Brood parasitism

(iii) Zoogeography

(iv) Adaptive radiation

(v) Paedogenesis

(b) Give the scientific name and classify upto order : (5)

(i) Sea Horse

(ii) Lance let

(iii) Parrot

(iv) Bat

(v) Cobra

(c) Differentiate between the following **(any four)** : (8)

(i) Catadromous and Anadromous migration

(ii) Eutheria and Metatheria

(iii) Ratitae and Carinatae

(iv) Tornaria larva and Tadpole larva

(v) Wallace's line and weber's line

(d) Give one function of each of the following **(any five)** : (5)

(i) Ampullae of Lorenzini

(ii) Patagium

(iii) Endostyle

(iv) Uropygial gland

(v) Gas gland

(vi) Proventriculus

(e) State whether the following statements are true or false : (5)

(i) Snakes and turtles are without sternum.

(ii) Gills are covered by an operculum in Chondrichthyes.

(iii) Weberian ossicles are modified vertebrae.

(iv) All chordates have a renal portal system.

(v) Salmon fish is the example of catadromous migration.

2. (a) Give a brief account on origin of tetrapoda. (5)

(b) Discuss retrogressive metamorphosis in Urochordates. (7)

(b) Explain plate tectonic theory and comment on the fauna of Australian realm. (6)

5. (a) Write a detailed note on origin of Tetrapods. (7)

(b) Briefly explain the poison apparatus and biting mechanism in snakes. (8)

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

(i) Wallace and Weber line

(ii) Origin of chordates

(iii) Retrogressive metamorphosis

(iv) *Sphenodon*

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1088 **I**

Unique Paper Code : 2232012301

Name of the Paper : Diversity of Chordates

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

Semester : III

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 **four** questions in all.
3. Question No. **1** is compulsory.
4. Draw well labelled diagram wherever needed.

1. (a) Define the following terms (**any three**) : (3)

(i) Operculum

(ii) Preen gland

(iii) Diastema

(iv) Stomochord

(v) Opisthoglyphous fangs

(b) Differentiate between the following terms **(any two)** : (4)

(i) Physostomous and Physoclistous swim bladder.

(ii) Tornaria and Tadpole larvae.

(iii) Altricious and precocious birds.

(c) Give the function of the following **(any four)** :(4)

(i) Nuptial pads

(ii) Buccal funnel

(iii) Jacobson organ

(iv) Keel

(v) Crop

(vi) Weberian ossicle

(d) Give the scientific names and classify upto order **(any two)** : (4)

(i) Australian Lung fish

(ii) Hagfish

(iii) Duck billed platypus

(iv) Flying lizard

2. (a) Compare and discuss the characteristics of modern-day living agnathans. (8)

(b) Describe osmoregulation by teleost fishes in sea and freshwater? How does shark maintain their osmoregulation? (7)

3. (a) Explain various characteristic features which help bird to adapt to aerial mode of life. (8)

(b) A classic example of adaptive radiations can be seen in mammalian locomotory appendages. Explain with examples. (7)

4. (a) Give an elaborative account of parental care in amphibians. (9)

P.T.O.

(b) Draw die detailed structure of haemoglobin and describe the different types of haemoglobin. (6)

5. (a) Give a detailed account of phases of digestion. (9)

(b) Briefly explain absorption of fats in small intestine. (6)

6. (a) Explain the pressure and volume changes that occur during the cardiac cycle. (9)

(b) Describe the hormonal regulation of gastric secretion. (6)

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

(a) Regulation of respiration

(b) Renal blood supply

(c) Coronary circulation

(d) Formation of Platelet plug

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1165 **I**

Unique Paper Code : 2232012303

Name of the Paper : Human Physiology: Life Sustaining Systems: DSC-9

Name of the Course : **B.Sc. (H) Zoology, Theory Examination Nov-Dec, 2024**

Semester : III, 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 **FOUR** questions in all.
3. Question No. **1** is compulsory.
4. Draw diagrams where ever required.

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

   (i) Plasminolysis

   (ii) Portal Triad

   (iii) Haustral Churning

   (iv) Lung compliance

   (v) Herring Breuer Reflex

   (b) Give the location and function of the following : (4)

   (i) Bundle of His

   (ii) Chief cells

   (iii) Surfactant

   (iv) Macula densa

   (c) Differentiate between the following (Any **two**) : (4)

   (i) Afferent arteriole and Efferent arteriole

   (ii) External and Internal respiration

   (iii) Bicuspid and Tricuspid valves

   (d) Expand the following : (1)

   (i) CCK

   (ii) GFR

   (e) Give reason for the following :

   (i) Oxygen is more available to tissue cells when you have a fever.

   (ii) Clot retraction requires an adequate number of platelets. (2)

2. (a) Elaborate the mechanism of oxygen transport in blood. (9)

   (b) Describe the components of the Cardiac Conduction System. (6)

3. (a) Discuss the hormonal regulation of tubular reabsorption and secretion. (9)

   (b) Draw the histological structure of detailed structure of renal corpuscle. (6)

4. (a) Describe the extrinsic and intrinsic pathway of blood clotting. (9)

4. (a) Write an account on the Protected Areas Network in India. (8)

   (b) What are the major challenges in Tiger Reserves in the present Indian geographical scenario? (7)

5. (a) Write a brief account of the ethics in wildlife conservation. (8)

   (b) What is conservation? Write the importance of Biodiversity conservation. (7)

6. (a) Discuss in detail the benefits of studying fecal samples and pug marks in population estimation of wildlife. (10)

   (b) Write a brief account on Ecotourism. (5)

7. Write short notes on **any three** of the following : (5,5,5)

   (a) Effect of invasive plants on wild animals

   (b) Red data book

   (c) Quarantine

   (d) Ecological perturbation

   (e) Causes of wildlife depletion

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1348 **I**

Unique Paper Code : 2233012004

Name of the Paper : Wildlife Conservation & Management

Name of the Course : **B.Sc. (Hons.) Zoology Theory - 2024**

Semester : (DSE)- IIIrd, NEP, UGCF-2022

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.
3. Question No. **1** is compulsory.

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

   (i) Population density

   (ii) Patch burn grazing

(iii) Biotelemetry

(iv) Zoonotic diseases

(v) Genetic diversity

(b) Distinguish between the following : (10)

(i) Point Count and Line Transect

(ii) Natality and Mortality

(iii) Wildlife Sanctuary and National Park

(iv) Pug mark of dog and cat family members

(v) Endangered Species and Vulnerable Species

(c) Expand the following : (5)

(i) WCS

(ii) WII

(iii) IUCN

(iv) ZST

(v) WWF

(d) Illustrate the following with the help of diagrams (no description required) : (4)

(i) Structure of a hair

(ii) Zones in a Biosphere reserve

(e) Explain the following : (6)

(i) Role of wildlife in maintaining balance in ecosystem.

(ii) Educational institutions can contribute significantly in wildlife conservation.

(iii) Planting a variety of native species is the preferred approach for cover construction.

2. (a) Discuss any one disease of wildlife in detail with emphasis on its causative agent, reservoir, symptoms and control measures. (7)

(b) Explain the positive and negative values of wildlife. (8)

3. (a) Discuss in detail the application of GIS and remote sensing in wildlife management. (8)

(b) Describe the various methods of preserving genetic diversity in forests. (7)

P.T.O.

5. (i) Give an account of different kinds of vaccines. (8)

(ii) Describe the structure and function of Class I and Class II MHC. (7)

6. Write short notes (Any three): (3x5=15)

(i) Clonal Selection Theory

(ii) Properties of Cytokines

(iii) B cell and T Cell Epitopes

(iv) Autoimmunity

(v) Monoclonal Antibodies and their applications

2

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1069 **I**

Unique Paper Code : 2232013501

Name of the Paper : Principles of Immunology

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

Semester : V

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 including Question No. 1 which is compulsory.
3. Draw well-labelled diagrams wherever necessary.

1. (i) Define the following terms (Any four): (1×4=4)

(a) Extravasation

(b) Paratope

(c) Avidity

(d) Opsonization

(e) Anaphylatoxin

(ii) Differentiate between the following: (Any three): (2×3=6)

(a) Primary and Secondary Immune Response

(b) Innate and Adaptive Immunity

(c) Exogenous and Endogenous Antigens

(d) Salk and Sabin Vaccine

(iii) Expand the following: (Any six): (0.5x6=3)

(a) PAMPs

(b) MASP

(c) MAC

(d) CLIP

(e) DTH

(f) ADCC

(g) ISCOM

(iv) Write the contribution of the following: (1x2=2)

(a) Elie Metchnikoff

(b) Jules Bordet

2. (i) Draw the basic structure of Immunoglobulin. Compare the structure and functions of IgA and IgM. (8)

(ii) Explain the experiments on the basis of which Immunoglobulin structure was deduced. (7)

3. (i) Explain the cytosolic pathway for processing of endogenous antigens. (8)

(ii) What is complement system. Explain Classical pathway of complement activation. (7)

4. (i) Describe Gell and Coomb's classification of hypersensitivity. (8)

(ii) What are the cardinal features of adaptive immunity. (7)

P.T.O.

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

(a) Adaptive radiation

(b) Host-parasite interactions

(c) Escape and radiate coevolution

(d) Post-mating Isolating mechanisms

(e) Survivorship curves

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1469 **I**

Unique Paper Code : 2232523501

Name of the Paper : DSC, Evolutionary Ecology

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

Semester : V, 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 **four** questions in all. Question no. **1** is compulsory.

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

(i) Allelopathy

(ii) Pangenesis

(iii) Species richness

(iv) Sewall Wright Effect

(b) Distinguish between the following : (8)

(i) Microecology and Macroecology

(ii) Allopatric speciation and sympatric speciation

(iii) Exponential and Logistic Growth

(iv) Alpha and Gamma diversity

(c) Fill in the blanks : (3)

(i) Darwin's finches are a group of species found primarily on the _____ Islands.

(ii) Well defined groups interrelated in the way they exploit the environment are known as _____.

(iii) A species having a disproportionate impact on the community relative to its abundance is referred to as a _____.

2. (a) Describe the regulation of a population by density dependent factors. (8)

(b) Give an account of dispersion patterns in populations. (4)

(c) What is a fecundity table? Explain with the help of an example. (3)

3. (a) Describe the different types of natural selection with suitable examples. (9)

(b) What type of adaptation allows desert animals to survive in extremely hot climates? (6)

4. (a) Discuss the different modes of speciation with suitable examples. (9)

(b) Differentiate between r-selected and k-selected species. (6)

5. (a) Explain the concept of allometric scaling. How can allometric scaling be used to predict the metabolic rate of an organism based on its body size. (8)

(b) How does climate change affect macroecological patterns? (7)

P.T.O.

i. Recombinant DNA technology

ii. Calcium chloride method of transformation

iii. Somatic Cell Nuclear transfer

iv. Recombinant vaccines

[This question paper contains 4 printed pages.]

Your Roll No.....

आपका अनुक्रमांक.....

Sr. No. of Question Paper : 3410 **I**

Unique Paper Code : 2234000007

Name of the Paper : GE 11: Animal Cell Biotechnology

Name of the Course : **B.Sc./BCom. /B.A.**

Semester : V, (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 Four 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:

i. Transformation

ii. Transgene

iii. Plasmid

iv. Frequent cutters

v. Primers

(b) Differentiate between **any three** of the following: (2X3)

i. Continuous and Fed batch Fermentation

ii. Cosmid and Phagemid

iii. Dolly and Polly

iv. Cloning Vector and Expression vector

(c) Expand the following: (4)

i. CFU

ii. YAC

iii. MCS

iv. IPTG

2 (a) What is transgenesis? Discuss two methods for producing Transgenic mice? (8)

(b) Make a map of pBR322. Discuss the selection of transformants using this plasmid. (7)

3. (a) Describe the strategy used to produce recombinant human insulin. (8)

(b) Describe the process of Ion Exchange chromatography. (7)

4 (a) What are restriction enzymes? Elaborate on the different types of restriction enzymes. (8)

(b) Write a short note on Gene therapy and its types. (7)

5 (a) Describe the procedure for creating and screening Genomic DNA Library. Add a note on cDNA libraries. (7,3)

(b) Write a short note on Adsorption Chromatography. (5)

6. Write short notes on **Any Three** of the following: (5,5,5)

P.T.O.

4. (a) Justify ribosomes as ribozymes. (4)

   (b) Discuss briefly the post transcriptional modification of mRNA in eukaryotes. (8)

5. (a) Explain the functioning of *lac* operon. Supplement your answer with diagrammatic illustrations. (6)

   (b) Initiation of translation in eukaryotes. (6)

6. (a) Explain the classic experiment performed by Matthew Meselson and Franklin Stahl to prove that DNA Replication is semi-conservative. (6)

   (b) Explain the experiment conducted by Nirenberg and Khorana to decipher the Genetic Code. (6)

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

   (i) Role of enzymes in transcription

   (ii) Trombone model

   (iii) Mis-match repair mechanism

   (iv) DNA polymerase I

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[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5837 **I**

Unique Paper Code : 32231501

Name of the Paper : Molecular Biology

Name of the Course : **B.Sc. (Honours) Zoology, CBCS-LOCF**

Semester : V

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.

1. **All** parts of this question are compulsory :

   (i) Define : (5)

   (a) Replication fork

(b) Repressor

(c) Consensus sequence

(d) Polymerase switching

(e) Nonsense codon

(ii) Differentiate between the following : (8)

(a) Group I and Group II introns

(b) Cistron and operon

(c) DNA pol alpha and DNA pol epsilon

(d) Shine- Dalgarno and Kozak sequences

(iii) Expand the following : (5)

(a) MCM

(b) RISC

(c) DNA

(d) PCNA

(e) CTD

(iv) What is the contribution of the following scientists : (5)

(a) Rosalind Franklin

(b) Andrew Fire

(c) Marshal Nirenberg

(d) Arthur Kornberg

(e) Yonath & Ramakrishnan

(v) Draw the structure of (2×2)

(a) C-G Base pair

(b) 5' – 7 Methylguanosine Cap

2. Explain with suitable diagrams the mechanism of RNAi. (12)

3. (a) Explain the salient features of Watson Crick model of DNA double helix with suitable diagram. (8)

(b) In Eukaryotes (except cells displaying polyteny), Replication occurs only once during a cell Cycle. Justify the statement. (4)

4. Explain the construction of genomic libraries. Describe any two methods of screening the libraries. (12)

5. (a) Explain with the help of diagram the technique of PCR. (6)

   (b) What are restriction enzymes? Explain Type II restriction endonuclease. (6)

6. (a) What is Cystic fibrosis? Explain the molecular diagnostic methods of this genetic disease. (6)

   (b) Explain briefly Dideoxy method of DNA sequencing. (6)

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

   (a) Dolly the Sheep

   (b) Edible Vaccine

   (c) CRISPR Cas-9

   (d) Metagenomics

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[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 6341 **I**

Unique Paper Code : 42237903

Name of the Paper : DSE-Animal Biotechnology

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

Semester : V, Theory Exam-Nov/Dec, 2024

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No., Name of the paper, Course, Semester, and Date of examination on the first page of answer sheet.
2. Attempt **ANY FIVE** questions. Question number **1** is compulsory. Substantiate your answer with diagrams wherever necessary.

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

   (i) STR

   (ii) Ligase

   (iii) Shuttle Vectors

(iv) Transformation

(v) Genomics

(b) Differentiate between : (2×5=10)

(i) Lysogenic and Lytic cycle

(ii) Cosmid and Phagemid

(iii) Staggered and Blunt cuts

(iv) Northern and Western blotting

(v) Electroporation and Calcium chloride method of transformation

(c) Write true and false for the following : (4)

(i) Blue and white screening is used to differentiate between recombinants and non-recombinants.

(ii) Cyanogen bromide is used to make the bacterial cells competent for transformation.

(iii) EDTA is used as blocking agent in blotting technique.

(iv) Modified binary shuttle Ti Plasmid can propagate in two different hosts.

(d) Expand the following : (4)

(i) pBR322

(ii) PAGE

(iii) SCID

(iv) SDS

(e) Write the contribution the scientist : (4)

(i) Boliver & Rodriguez

(ii) Ian Wilmut

(iii) E. M. Southern

(iv) Kary Mulis

2. (a) Describe in detail the process of production of recombinant insulin hormone. (6)

(b) What is transformation? Explain the process of transformation by electroporation. (6)

3. (a) What is gene therapy? Explain the various types of gene therapies. (6)

(b) Explain the method of production of insect resistant transgenic plants with the help of suitable diagrams. (6)

P.T.O.

(b) What is end replication problem? Discuss the role of telomerase in replication of 5' end of linear chromosome. (5)

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

(a) Alternative splicing

(b) Lac Operon

(c) Synthesis of rRNA

(d) RNA editing

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[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1107 **I**

Unique Paper Code : 32232013502

Name of the Paper : Cell and Molecular Biology

Name of the Course : **B. Sc. (Hons) Zoology (NEP-UGCF 2022)**

Semester : V

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, including Question No. **1** which is compulsory.
3. Draw neat labelled diagrams wherever necessary.

1. (a) Define the following **(Any Four)** : (4×1=4)

(i) Yamanaka factors

(ii) Ribozyme

(iii) Silencer elements

(iv) Central Dogma

(v) Split genes

(b) Differentiate between **(Any Three)** : (3×2=6)

(i) Euchromatin and Heterochromatin

(ii) Apoptosis and Necrosis

(iii) Activators and Repressors

(iv) Totipotent and Pluripotent Stem cells

(c) Expand the following : (0.5×6=3)

(i) CPSF

(ii) CREB

(iii) NELF

(iv) RNP

(v) ORF

(vi) CAP- cAMP

(d) State the reasons : (2×1=2)

(i) Why transcription occurs in 5' to 3' direction only?

(ii) Why primase is required for DNA replication but not for transcription?

2. (a) Discuss the mechanism of DNA replication in a bacterial cell. (10)

(b) Discuss the salient features of Genetic code. (5)

3. (a) Define Apoptosis and write down its hallmark features. Explain the intrinsic pathway in regulation of apoptosis with the help of suitable examples. (10)

(b) Design an experiment to prove that DNA replication is semi-conservative. (5)

4. (a) With the help of suitable diagram describe the process of transcription in Eukaryotes. (10)

(b) Write down the main differences between eukaryotic and prokaryotic translation. (5)

5. (a) What is cell signalling and importance of second messengers? Write the major differences of hormone signalling mechanism of nuclear receptor pathway and cell surface receptor pathway? (10)

P.T.O.

4. (a) Discuss various complement pathways that lead to the formation of a membrane attack complex (MAC). (9)

(b) Differentiate between innate and adaptive immune responses. (3)

5. (a) Describe the structure and functions of class I and class II MHC molecules. (6)

(b) Define autoimmunity. Explain various immunodeficiencies with examples. (6)

6. (a) Elucidate the detailed process of production of monoclonal antibodies. Mention their applications. (18)

(b) What is the principle of the technique ELISA ? Explain various types of it with suitable diagrams. (4)

7. Write short notes on any **THREE** : (3×4=12)

(i) Adjuvants, their types and functions

(ii) Rheumatoid arthritis

(iii) Factors determining antigenicity

(iv) Type I hypersensitive reactions

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 6120 **I**

Unique Paper Code : 32237909

Name of the Paper : DSE : IMMUNOLOGY

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

Semester : V

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. Question No. 1 is compulsory.
3. Attempt **five** questions in all.
4. Draw neat labelled diagrams wherever necessary.

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

(i) Avidity

(ii) Diapedesis

(iii) Antigenicity

(iv) Cross presentation

(v) Memory cells

(b) *Distinguish* between the following : (10)

(i) Conformational and neoantigenic determinants

(ii) Allotype and idiotype

(iii) Cathepsins and proteasome

(iv) Variolation and vaccination

(v) Active vs passive immune responses

(c) *Expand* the following : (3)

(i) PAMP

(ii) MLR

(iii) TAP

(iv) TLR

(v) SMAC

(vi) GALT

(d) Write the *contribution*(s) of the following scientists : (2)

(i) George Snell and Jean Daussat

(ii) Edward Jenner

(e) Immunological significance : (4)

(i) Acute-phase proteins

(ii) ICAMs

(iii) Adjuvants

(iv) J-chain

(f) Give reasons : (3)

(i) Cells of the myeloid lineage are the first responders to infection.

(ii) Fever is good for health.

(iii) Secondary immune responses are always fast and furious

2. (a) Compare and contrast the pathways of antigen processing and presentation to T cells. (8)

(b) Discuss various theories of lymphocyte development and maturation. (4)

3. (a) What is the immunological significance of vaccines ? Discuss various types thereof. (8)

(b) Classify the cytokines based on their structure and function. (4)

(iv) Calculate the coefficient of coincidence and interference. (2+2+3+2=9)

(b) Explain the cytological basis of crossing over with the help of an experiment. (6)

4. (a) Discuss the molecular basis of spontaneous and induced mutations. Differentiate between aneuploidy and polyploidy with suitable examples. (5+4=9)

(b) Describe the Ac-Ds elements in maize. Comment on the significance of P elements. (4+2=6)

5. (a) Compare the mechanisms of dosage compensation in humans and *Drosophila*. How many Barbodies will be observed in the individuals with Klinefelter syndrome and with Patau syndrome? (7+2=9)

(b) Compare the phenomena of nuclear and extranuclear inheritance. Explain the inheritance of pigmentation in *Ephestia*. (3+3=6)

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

(a) ClB method of detection of mutations

(b) Retrotransposons

(c) Infective heredity in *Paramecium*

(d) Penetrance and Expressivity

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This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1126 **I**

Unique Paper Code : 2232013503

Name of the Paper : Fundamentals of Genetics

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

Semester : V

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.

1. (a) Distinguish between the following **(Any three)** (2×3=6)

(i) Co-dominance and Incomplete dominance

(ii) Coupling and Repulsion

(iii) Sex-influenced and sex-limited inheritance

(iv) Conservative and replicative transposons

(b) Define the following **(Any three)** (1×3=3)

(i) Multiple alleles

(ii) Episome

(iii) Heterosis

(iv) Pleiotropy

(c) Give the significant contribution of the following scientists **(Any three)** (1×3=3)

(i) Alfred Sturtevant

(ii) William Bateson

(iii) C B Bridges

(iv) Barbara McClintock

(d) Give reasons for the following **(Any two)** (1.5×2=3)

(i) Some XX humans were found to be males and XY humans were found to be females.

(ii) A cross between pure line sinistrally-coiled shell female *Limnaea* and dextrally coiled shell male *Limnaea* yielded all sinistrally-coiled shell progeny.

(iii) For a paracentric inversion, with rare exceptions, recombinant chromosomes are not stable and will not lead to viable offspring.

2. (a) What do you understand by gene interactions? Discuss any two types of gene interactions (with suitable examples) that cause deviation from the Mendel's dihybrid ratio. (10)

(b) Explain the sex-linked inheritance with any one example. (5)

3. (a) A female *Drosophila* heterozygous at three loci- cu/cu^+ (curved vs. straight wings), e/e^+ (ebony vs. gray bodies), st/st^+ (scarlet vs. red eyes) was test crossed with completely homozygous recessive males. The following progeny were observed.

cu	e	st^+	=	366
cu^+	e^+	st	=	380
cu	e	st	=	24
cu^+	e^+	st^+	=	30
cu^+	e	st	=	89
cu	e^+	st^+	=	105
cu	e^+	st	=	2
cu^+	e	st^+	=	4

(i) Are the three genes linked? Give reason for your answer.

(ii) What is the order of genes?

(iii) Determine the map distance and construct a linkage map.

P.T.O.

4. (a) Explain the structure and function of insect stomodeum, mesenteron and proctodeum with suitable diagram. (8)

   (b) Define different types of antennae found in the insects with a labeled diagram. (7)

5. (a) What is tracheal respiration? Explain the respiratory system of insects with a diagram. (8)

   (b) Explain the structure of and function of different types of heads in insects. (7)

6. (a) Describe the different types of legs and their functions in the insect. (8)

   (b) Write a brief account on the structure of insect wings and its modifications. (7)

7. (a) Explain the physiology of excretion in insects in detail with suitable diagram. (8)

   (b) Write a brief account on the circulatory system of the insects. (7)

8. Write short notes on **any three** of the following: (15)
   (a) Insect-plant interactions
   (b) Mouth parts of cockroach
   (c) Cash crops and stored grains
   (d) Nervous system of insect

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1264 **I**

Unique Paper Code : 2233010012

Name of the Paper : DSE-BIOLOGY OF INSECTA

Name of the Course : **B.Sc. (HONS) ZOOLOGY**

Semester : V

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.
3. Question no. **1** is compulsory
4. Draw well labelled diagram wherever possible.

1. (a) Define the following : (5)
   (i) Trochanter
   (ii) Chitin
   (iii) Nymph
   (iv) Ecdysis
   (v) Raptorial leg

(b) Give the location and functions of the following : (5)

(i) Malpighian tubules

(ii) Labrum

(iii) Spiracle

(iv) Corpora cardiac

(v) Alary muscle

(c) Differentiate between the following pairs **(any four)** (8)

(i) Fossorial leg and Saltatorial leg

(ii) Apterygota and Pterygota

(iii) Geniculate antenna and Serrate antenna

(iv) Chitinous wing and membranous wing

(v) Corpora cardiac and Corpora allata

(d) Give the scientific name of the following Pest (3)

(i) Rice weevil

(ii) Mulberry silkworm

(iii) Pulse beetle

(e) Match the following : (5)

(i) Tibia	(a) Central Nervous System
(ii) Siphoning mouthparts	(b) Sclerites
(iii) Mesonotum	(c) Hormone
(iv) Subesophageal ganglion	(d) Butterflies
(v) Juvenile	(e) Leg

(f) Classify the following upto the order (4)

(i) Termite

(ii) Grasshopper

(iii) Pulse beetle

(iv) Honey bee

2. (a) Give a detailed account on the life stages of pulse beetle with diagram. (8)

(b) Write a brief note on insect diversity with examples. (7)

3. (a) What is Metamorphosis? Define different types of metamorphosis with examples. (8)

(b) Explain the structure of compound eyes and the image formation in insects. (7)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5891 **I**

Unique Paper Code : 32231502

Name of the Paper : DSC – Principles of Genetics

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

Semester : V

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 including Question no. **1** which is compulsory.

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

   (i) Transposon

   (ii) Synteny

   (iii) Phenocopy

P.T.O.

(iv) Heteroplasmy

(v) Euploidy

(vi) Map distance

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

(i) Polygenic inheritance and pleiotropy

(ii) Sex-influenced and sex-limited traits

(iii) Auxotrophs and prototrophs

(iv) Intergenic and intragenic suppressor mutation

(v) First division and second division segregates

(c) Write the contribution of the following geneticists **(any five)** (1×5=5)

(i) William Bateson

(ii) Walter Stanborough Sutton

(iii) Barbara McClintock

(iv) Thomas Hunt Morgan

(v) Y.M. Bhende

(vi) Carl Erich Correns

(d) Give reason for the following **(any two)** (2×2=4)

(i) After the cross between Hfr and F- bacterial cell, recipient cell remains F-.

(ii) Father has blood group A and mother has blood group AB, however, daughter has blood group O.

(iii) For a paracentric inversion, with rare exceptions, recombinant chromosomes are not stable and will not lead to viable offspring.

(e) Expand the following abbreviations **(Any three)** (1×3=3)

(i) ClB

(ii) HGPRT

(iii) ORF

(iv) PAR

(f) Predict the sex of the following individuals with given chromosome compositions (A= haploid set of autosomes) (1×2=2)

(i) 2X, 3A (*Drosophila*)

(ii) XXXY (Human)

2. (a) How do epistatic interactions modify Mendelian dihybrid ratios? Explain with suitable examples. (7)

(b) What is Robertsonian translocation? With the help of a suitable example, explain its consequences in humans. (5)

3. (a) Discuss an experiment that provided evidence for cytological basis of crossing over. (4)

(b) In *Drosophila melanogaster,* kidney shaped eye (k), cardinal eye (cd), and ebony body (e) are recessive traits. If the homozygous kidney, cardinal females are crossed with homozygous ebony males, the F1 offsprings are all wild type. If heterozygous FI females are mated with homozygous recessive males, following F2 progenies are obtained : (2+3+3)

Phenotypes	**Number**
Kidney, cardinal	880
Ebony	887
Kidney, ebony	64
Cardinal	67
Kidney	49
Ebony, cardinal	46
Kidney, ebony, cardinal	3
Wild	4

(i) Are the three genes linked? Explain your answer.

(ii) Determine the order of genes and construct the genetic map.

(iii) Calculate the coefficient of coincidence and interference. Comment on the significance of interference.

4. (a) What is interrupted mating technique? How is interrupted mating technique used in bacterial chromosomal mapping? (7)

(b) With the help of a suitable example, explain the concept of penetrance and expressivity. (5)

5. (a) What is spontaneous mutation? Discuss molecular basis of spontaneous mutations. (7)

(b) Three different Hff strains of *E. coli* transfer their genes in the order and with entry times as given below. Using these results, construct a genetic map of the donor cell. Show the distances between the adjacent marker pairs. (5)

Hfr strain A markers	Pro	Met	Xyl	Mal	Str
Entry time (in mins)	7	19	24	41	52
Hfr strain B markers	Ade	His	Gal	Pro	Met
Entry time (in mins)	9	23	48	56	68
Hfr strain C markers	Mal	Str	Ser	Ade	His
Entry time (in mins)	3	14	21	44	58

6. (a) Explain extranuclear inheritance of killer trait in *Paramoecium*. (5)

(b) Compare the mechanisms of dosage compensation in humans and *Drosophila*. How many Barr bodies will be observed in the individuals,

(i) with Klinefelter syndrome

(ii) with Patau syndrome? (6+1)

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

(a) Chemical mutagens

(b) Ty elements in yeast

P.T.O.

(c) Antibiotic resistance in *Chlamydomonas*

(d) Generalized and specialized transduction

(e) Gene mapping by somatic cell hybridization