

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1596

G

Unique Paper Code : 2232011102

Name of the Paper : DSC-2 Biology of Cell :  
Structure and function

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

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. Answer **FOUR** questions in all.
3. Question No. 1 is compulsory.

1. (a) Define :

(1×3)

(i) Osmosis

(ii) Aquaporins

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(iii) Glycocalyx

(b) Write exact location and function of the following  
(Any three): (1×3)

(i) Lamins

(ii) Cadherins

(iii) Flippase

(iv) Signal Peptide

(c) State the contributions of (any three): (1×3)

(i) Gorter and Grendel

(ii) Benda

(iii) Peter Mitchell

(iv) Tim Hunt, Paul Nurse, L H Hartwell

(d) Fill in the blanks: (1×4)

(i) \_\_\_\_\_ organelle is also referred to as suicidal bag.

(ii) A structure found within the nucleus contains much RNA, this structure is called \_\_\_\_\_

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(iii) \_\_\_\_\_ is an intracellular protein that release calcium from within the lumen of Endoplasmic reticulum.

(iv) The effector protein in GPCR that releases cAMP is \_\_\_\_\_.

(e) Expand the following: (1×2)

(i) MTOC

(ii) NPC

2. (a) Write an account on the structure and function of mitochondrial respiratory chain. (6)

(b) Why is Golgi apparatus termed as the "Post Office of the Cell"? Discuss with suitable diagram. (6)

(c) Distinguish between co-translational and post-translational transport of proteins. (3)

3. (a) Explain with diagram the events that regulate the cell cycle. (9)

(b) Distinguish between microfilaments and intermediate filaments. (3)

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- (c) Explain the Endosymbiotic theory. (3)
4. (a) Explain GPCR pathway with any one secondary messenger. (7)
- (b) Discuss role of protein glycosylation within ER. (5)
- (c) Distinguish between Passive and Facilitated diffusion. (3)
5. (a) Explain the assembly of microtubules and its role in cellular mobility. (8)
- (b) What are the polymorphic forms of Lysosomes? (4)
- (c) Enumerate with diagram the organization within nucleolus. (3)
6. (a) What are the major cell-to-cell interactions? (6)
- (b) Comment with diagram upon the transport across nucleus. (6)
- (c) What is euchromatin and how it is different from heterochromatin? (3)

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Your Roll No.....

Sr. No. of Question Paper : 1634 **G**

Unique Paper Code : 2232011103

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

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

Semester : 1 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.

1. (a) Define the following : (3)

- (i) Autecology
- (ii) Modular population
- (iii) Detritus food chain

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- (b) Distinguish between the following : (6)
- (i) Pioneer and climax community
  - (ii) Mutualism and Amensalism
  - (iii) Physiological and realized mortality
- (c) Illustrate the following with the help of diagrams (no description required) : (4)
- (i) Types of survivorship curves
  - (ii) Patterns of dispersion
- (d) Name the scientists associated with the following terms : (2)
- (i) Exponential population growth
  - (ii) Ecosystem
  - (iii) Law of tolerance
  - (iv) Food chain
2. (a) Explain with suitable diagrams and equations the exponential and logistic growth forms of population. (8)

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- (b) Describe various density dependent factors that regulate the population size near carrying capacity level. (7)
3. (a) What are the main causes of wildlife depletion in India? What are the different strategies for wildlife conservation? (9)
- (b) What is environmental impact assessment? Add a note on its significance. (6)
4. (a) What is competitive exclusion principle? Briefly describe the experiments conducted by Gause to explain this principle in the laboratory. (9)
- (b) Differentiate between numerical and functional response of the predator. (6)
5. (a) Explain the Universal and Y-shaped energy flow model with the help of suitable diagrams. (9)
- (b) Discuss the various types of ecological pyramids. (6)

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

- (a) Nitrogen cycle
- (b) Raunkiaer's life forms
- (c) Ecological efficiency
- (d) Protected areas
- (e) Temperature as a limiting factor
- (f) Theories of climax in succession

(500)

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Your Roll No.....

Sr. No. of Question Paper : 1775 **G**

Unique Paper Code : 2232521101

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

Name of the Course : B.Sc. (P) Life Science  
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 is compulsory.
4. Illustrate your answers with diagram wherever necessary.

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1. (a) Define the following : (1×6=6)

- (i) Enterocoelom
- (ii) Mantle
- (iii) Lobopodia
- (iv) Madreporite
- (v) Gnathostomata
- (vi) Keel

(b) Give the scientific name of the following : (2)

- (i) Glass rope sponge
- (ii) Sea Star
- (iii) Slipper animalcule
- (iv) Flying lizard

(c) Differentiate between :

- (i) Amniotes and Anamniotes
- (ii) Endothermy and Ectothermy

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(iii) Ocellus and Ommatidium

(iv) Scolex and Acetabulum

- 2. (a) Give an account of types of metamorphosis and its hormonal control in Insects. (9)
- (b) How does pearl formation occur in molluscs? (6)
- 3. (a) Discuss the parasitic adaptations in Helminthes. (9)
- (b) Discuss the process of Torsion in Gastropods. (6)
- 4. (a) Explain retrogressive metamorphosis in Urochordates. (7)
- (b) Discuss the types of migration in birds with examples. (8)
- 5. (a) Discuss the parental care in fishes with examples. (5)
- (b) Write a detailed account of flight adaptations in birds. (10)

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

- (i) Taxonomic hierarchy and binomial nomenclature
- (ii) Life cycle of *Ascaris*
- (iii) Biting mechanism in snakes
- (iv) Locomotion in Protozoa

(500)

Dec-2023

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Your Roll No.....

Sr. No. of Question Paper : 1558

G

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) Osculum

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(b) Bilateral Symmetry

(c) Plasmotomy

(d) Ootype

(e) Kinety

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

(a) Schizogony and Sporogony

(b) Monogenea and Digenea

(c) Nematocyst 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)

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(a) Pyrenoids

(b) Acetabulum

(c) Colloblast cells

(d) Pneumatophore

2. (a) Why man acts as primary host of *Plasmodium*? Give the illustrated account of life history of malarial parasite in man.

(b) Describe the process of conjugation in *Paramecium* and discuss its significance. (9+6)

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

(b) Give an account of different types of canal systems in Porifera and give its significance. (5+10)

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

(b) Give an outline classification of phylum Cnidaria with characters and examples of each class. (9+6)

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5. (a) Give a detailed account of parasitic adaptations in Helminthes.
- (b) Give graphic life cycle of *Taenia solium*. (10+5)
6. Write short notes on **any three** of the following : (15)
- (a) Course of migration of *Ascaris* larva within its host body.
- (b) Coral reefs.
- (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 : 1770**

**G**

**Unique Paper Code : 223252230**

**Name of the Paper : Biochemistry: Basic concepts  
of Metabolism**

**Name of the Course : B.Sc. (Prog.) Life Science,  
Zoology Examination**

**Semester : III (ZOO-LS-DSC-09)**

**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. Draw neat, well labeled diagrams, wherever required.
3. Attempt **Four** questions in all.
4. Question No. 1 is compulsory.

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

(a) Glycogenin

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- (b) Amphibolic Pathway
  - (c) Zwitterion
  - (d) Carnitine
  - (e) Isozyme
- (ii) Differentiate between (any three): (6)
- (a) Hexokinase and Glucokinase
  - (b) Ketogenic and glucogenic amino acids
  - (c) Synthase and Synthetase
  - (d) Saturated Fatty acid and Unsaturated Fatty acid
  - (e) Ureotelic and uricotelic organisms
- (iii) Give the structure of the following: (5)
- (a) Palmitic acid
  - (b) Phenylalanine
  - (c) Galactose
  - (d) Uridine diphosphate glucose
  - (e) Glyceraldehyde 3 phosphate

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2. (a) Describe Urea Cycle with the help of chemical structures and diagrams. (10)
- (b) Add a note on classification of enzymes. (5)
3. (a) Give a detailed account of P-oxidation of Palmitic acid. (8)
- (b) Briefly describe oxidative phase of pentose phosphate pathway. (7)
4. (a) Describe the various components of mitochondrial respiratory chain and the basics of Chemiosmotic theory for ATP synthesis. (10)
- (b) Discuss briefly the significance of storage and structural lipids. (5)
5. (a) Elaborate the citric acid cycle and its regulation. (12)
- (b) Describe the induced fit model of enzyme action. (3)

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

(5×3=15)

- (a) Polysaccharides
- (b) Transamination
- (c) Glycogenolysis
- (d) Glucose-Alanine cycle

(700)





- (c) Ketogenesis  
 (d) Substrate level phosphorylation  
 (e) Catabolism  
 (f) Uridine Diphosphate Glucose (UDPG)
- (ii) Differentiate between (Any two): (2×2=4)
- (a) Phosphofructokinase I and Phosphofructokinase II  
 (b) Glycogen phosphorylase and Glycogen synthase  
 (c) Acyl CoA and Acetyl CoA  
 (d) SGOT and SGPT  
 (e) Phosphoenolpyruvate carboxykinase and Pyruvate kinase
- (iii) Write the steps to bring about the following conversions with Structural formula (Any two): (2×2=4)
- (a) Pyruvate to Acetyl CoA  
 (b) Succinyl CoA to Succinate  
 (c) Fatty acid to Fatty acyl CoA  
 (d) Aspartate to Glutamate

- (iv) Give reasons for the following (Any Three): (1×3=3)
- (a) Elevated level of glucose and acetone in untreated diabetes mellitus.  
 (b) Strenuous exercise leads to an increase in formation of lactate.  
 (c) Upon entering a cell glucose is phosphorylated. Give two reasons why this reaction is required.  
 (d) Role of biotin in Fatty acid oxidation
2. (i) Trace the path of electrons starting from Complex-I to Molecular Oxygen. Also discuss oxidative phosphorylation in its reference. (12)  
 (ii) Give any three reactions catalyzed by dehydrogenases in Kreb's Cycle. (3)
3. (i) Elucidate the metabolic pathway for the biosynthesis of palmitic acid. Give the Structure of fatty Acid Synthase Complex. (9)  
 (ii) Enumerate the steps of glycolysis with chemical structures. (6)

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4. (i) Explain the hexose Monophosphate shunt with structural formula and its physiological importance. (10)
- (ii) Explain the role of transamination in the catabolism of amino acids. Support your answer with suitable examples. (5)
5. (i) Describe ornithine-citrulline cycle, represent chemical reaction with structures and enzymes only. (10)
- (ii) What is gluconeogenesis? Gluconeogenesis is energetically expensive but essential. Explain. (5)
6. Write short notes (Any three): (3×5=15)
- (i) Fate of C-skeleton of amino acids
  - (ii) Omega Oxidation of Fatty acid
  - (iii) Glycogen Metabolism
  - (iv) Shuttle system
  - (v) Cascade of metabolic events in fasting and starvation

(700)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4355 **G**

Unique Paper Code : 32231301

Name of the Paper : Diversity of Chordates

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

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

1. (a) Define :

(i) Neoteny

(ii) Realm

P.T.O.

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(iii) Pterylosis

(iv) Amniotes (4×1=4)

(b) Differentiate between the following :

(i) Prototheria and Eutheria

(ii) Placoid and Ctenoid scales

(iii) Altricial and Precocial development

(iv) Anura and Urodela (4×2=8)

(c) Give the scientific name and classify the following upto order :

(i) Flying lizard

(ii) Mud puppy

(iii) Mongoose

(iv) Rat fish (4×11/2=6)

(d) Mark the following statement as TRUE or FALSE :

(i) Terrestrial ectotherms have evolved from the Crossopterygian fishes.

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(ii) Tail feathers of birds are called as remiges.

(iii) Amphibians possess a dicondylic skull.

(iv) R.B.Cs. of birds are enucleated.

(v) Stomach of ruminants is three chambered.

(vi) Quadrate is immovable in snakes. (6×1/2=3)

(e) Give the location and function of the following :

(i) Jacobson's organ

(ii) Chloride cells

(iii) Endostyle

(iv) Pecten (4×11/2=6)

2. Describe the various morphological, anatomical and physiological features of birds for a successful aerial life. (12)

3. (a) Explain the different types of migratory movements of fishes. (6)

(b) Describe the poison apparatus and biting mechanism of venomous snake. (6)

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4. (a) Define adaptive radiation and explain the structural modifications in locomotory appendages of mammals in relation to their habitats. (8)
- (b) Explain the retrogressive metamorphic changes during the development of Urochordates. (4)
5. Describe the parental care and its significance in Amphibians with suitable examples. (12)
6. (a) How is the internal balance of salt and water maintained in freshwater fishes? (4)
- (b) Describe the salient features and fauna of Australian and Ethiopian regions. (8)
7. Write short notes on **ANY THREE** of the following :
- (a) *Archaeopteryx*
- (b) Plate tectonic theory
- (c) *Sphenodon*
- (d) Dipleurula concept of origin of chordates (3×4=12)

(1000)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1539

**G**

Unique Paper Code : 2232012301

Name of the Paper : Diversity of Chordates

Name of the Course : B.Sc. (H) Zoology - 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 any **FOUR** questions in all.
3. Question No. 1 is compulsory.
4. Draw well-labelled diagrams wherever necessary.

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

(a) Notochord

P.T.O.

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- (b) Preen Gland
- (c) Amniote
- (d) Proteroglyphous
- (e) Paedogenesis
- (f) Rete mirabile

(ii) Differentiate between the following (**any three**): (6)

- (a) Cephalochordate and Hemichordate
- (b) Prototheria and Metatheria
- (c) Anura and Apoda
- (d) Artiodactyla and Perissodactyla

(iii) Give Genus name of the following and classify upto order (**any four**): (4)

- (a) Flying fish
- (b) Squirrel
- (c) Midwife toad
- (d) Lamprey
- (e) Krait

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2. (a) Discuss various larval forms of protochordates and their significance.

(b) Give the general characteristics of Agnatha. (9+6)

3. (a) Describe the osmoregulation in marine fishes.

(b) Write a note on fauna of oriental region. (9+6)

4. (a) Give a stepwise account of biting mechanism of snake.

(b) Justify the statement 'Sphenodon is a living fossil'. (9+6)

5. (a) Describe the various adaptations of the Aves that make them the master of the air.

(b) How do birds find their way during migration? (9+6)

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

(a) Origin of Tetrapods

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- (b) Swim Bladder
- (c) Parental Care in Amphibia
- (d) Continental Drift Theory

(1000)



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Your Roll No.....

Sr. No. of Question Paper : 4809 **G**

Unique Paper Code : 42234301

Name of the Paper : Physiology and Biochemistry

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

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. Draw neat, well labeled diagrams, wherever required.
3. Attempt **Five** questions in all.
4. Question No. 1 is compulsory.

1. (a) Define (**any four**) : (4)

(i) Sinoatrial node

(ii) Amphibolic pathway

P.T.O.

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- (iii) Prosthetic group
- (iv) Glial cells
- (v) Emulsification

(b) Differentiate between the following (any five): (5)

- (i) Endopeptidase and exopeptidases
- (ii) Epimerase and Isomerase
- (iii) Tidal volume & Residual volume
- (iv) Osteoclasts and osteoblasts
- (v) Glucogenic and Ketogenic amino acids
- (vi) Multipolar and Bipolar neurons

(c) Draw the structures of the following (any four): (8)

- (i) Citrulline
- (ii) Fructose 1,6 Bisphosphate
- (iii) HMG-CoA
- (iv) Myelinated nerve fiber
- (v) Micelles

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(d) Write the importance of the following (any five): (5)

- (i) Carnitine
- (ii) Renin-Angiotensin-Aldosterone pathway
- (iii) Acyl carrier protein
- (iv) NADH
- (v) Resting membrane potential
- (vi) Spermatogenesis

(e) Expand the following (any five): (5)

- (i) DHAP
- (ii) ADH
- (iii) ATP
- (iv) IGFs
- (v) GBHP
- (vi) PDH

2. (a) What is the sliding filament mechanism?

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Describe the role of calcium and regulator proteins in the sliding of filaments.

(b) Glomerular filtration rate is directly related to the pressure that determines net filtration pressure. Explain it. (8+4)

3. Describe the menstrual cycle in human females and add a note on its hormonal control? (12)

4. Give a detailed account of activation of fatty acid and beta-oxidation of Palmitic acid. (12)

5. Describe the various components of mitochondrial respiratory chain and the basics of Chemiosmotic theory for ATP synthesis. (8+4)

6. Short Notes (Any three): (4+4+4)

(i) Glycogenolysis

(ii) Oxidative Phase of pentose phosphate pathway

(iii) Induced Fit Theory

(iv) Transport of carbon-dioxide in blood

(1000)

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Your Roll No.....

Sr. No. of Question Paper : 1714

G

Unique Paper Code : 2233012004

Name of the Paper : Wildlife Conservation and Management (DSE-4)

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

Semester : III

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 including question No.1, which is compulsory.

1. (a) Define the following : (1×5=5)

- (i) Dew claw
- (ii) Preservation
- (iii) Zoonosis
- (iv) Patch-bum grazing
- (v) Biotic potential

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

- (i) National Park and Wildlife Sanctuary

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- (ii) Custodial and Manipulative wildlife management
  - (iii) Primary and Secondary sex ratio
  - (iv) Endangered and Vulnerable species
  - (v) Direct and indirect count
- (c) Expand the following : (1×5=5)
- (i) UNEP      (ii) CITES
  - (iii) GIS      (iv) WHI
  - (v) CBD
- (d) Give reasons of the following statements : (2×2.5=5)
- (i) For trans-boundary movement of wildlife across different countries, pre-shipment and post-shipment quarantine is must.
  - (ii) Wildlife photography is banned in some protected areas during a particular time of the year.
- (e) Fill in the blanks : (1×5=5)
- (i) \_\_\_\_\_ is the national bird of India.
  - (ii) Non-native organisms that have been introduced to a new ecosystem and often outcompete native species for resources are called \_\_\_\_\_.
  - (iii) Logo of WWF is \_\_\_\_\_.

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- (iv) \_\_\_\_\_ is one of the Biodiversity zones of India.
  - (v) Reintroduction of \_\_\_\_\_ in Kuno National Park is an example of a conservation effort.
2. (a) How are GPS, GIS, and remote sensing technologies utilized in wildlife evaluation and management? (8)
- (b) Provide an account of **any one** wildlife disease, focusing on its causative agent, mode of transmission, symptoms, and methods for prevention and management. (7)
3. (a) Discuss the significance, evolution, and key conservation outcomes of Project Tiger in India. What are the techniques used in the estimation of tiger population. Support your answer with relevant examples. (10)
- (b) Describe the various challenges faced during management of protected areas. (5)
4. (a) Explain the *In situ* and *Ex situ* approaches to wildlife conservation by giving specific examples. (8)
- (b) Explain the importance of evaluating and managing wildlife populations, considering both physical and biological parameters. Provide specific examples. (7)
- P.T.O.

5. What are the ecological strategies and techniques used to set back ecological succession in wildlife habitats, and how do these practices impact biodiversity and ecosystem dynamics? Add a note on significance of ungulates in grassland ecosystems. (15)
6. (a) Discuss the role, challenges, and benefits of India's Protected Areas in biodiversity conservation. Provide examples of different types of Protected Areas and their significance in safeguarding the country's natural heritage. (10)
- (b) Describe various ethical perspectives for wildlife management and conservation. (5)
7. (a) Discuss in detail the human wildlife conflict and its impact on wildlife. (7)
- (b) What are the advantages of studying fecal samples in wildlife management? State the differences between the fecal sample of a herbivore and a carnivore. (8)
8. Write short notes on any **three** of the following : (5×3=15)
- (i) Eco-tourism
  - (ii) Positive and negative values of wildlife
  - (iii) Census methods
  - (iv) Care of injured and diseased animal
  - (v) Hair identification

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4495

G

Unique Paper Code : 32237901

Name of the Paper : DSE - Animal Behaviour and Chronobiology

Name of the Course : B.Sc. (H) Zoology (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. (a) Define the following :

(i) Sign stimulus

(ii) Polymorphism

(iii) Siblicide

(iv) Actograms

(v) Zeitgeber

(2×5=10)

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(b) Differentiate between the following :

- (i) Intersexual and Intrasexual selection
- (ii) Master clock and Slave clock
- (iii) Daily rhythms and Free-running rhythms
- (iv) Focal sampling and scan sampling  
(2×4=8)

(c) Match the following :

- (i) R. A. Fisher            Imprinting
- (ii) Oscar Heinroth       Sexual selection
- (iii) E. L. Thorndike       Reciprocal altruism
- (iv) Robert Trivers       Circadian rhythm
- (v) Franz Halberg        Operant conditioning

(1×5=5)

(d) Fill in the blanks/ True-False :        (1×4=4)

- (i) Infanticide is caused by Intra-sexual selection.

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(ii) Species exhibiting altruism are relatively more likely to discriminate against outsiders (non relatives).

(iii) Melatonin secretion is often used as a marker of the body clock.

(iv) In Orthokinesis, relationship exists between the rate of change of direction (turning) and intensity of stimulus.

(v) King Solomon's Ring (book) was written by Konrad Lorenz.

2. (a) Describe foraging in honey bee and comment upon the advantages of waggle dance.        (6)

(b) Discuss various methods of studying and recording animal behaviour.        (6)

3. (a) What is associative learning? Explain Pavlov's classical experiments with dogs involving conditioned reflex.        (6)

(b) Explain the correlation between sign stimulus, innate releasing mechanism and fixed action pattern.        (6)

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4. (a) Classify and explain various form of orientation with suitable example. (6)
- (b) What is filial imprinting? Discuss the role of imprinting in social development of mammals. (6)
5. (a) Give a detailed account of photoperiodic regulation of seasonal reproduction in vertebrates. (6)
- (b) With the help of suitable diagram, discuss the various components of biological oscillators. (6)
6. (a) Explain the adaptive significance of biological clock. (6)
- (b) What are the basic characteristics of biological rhythm? Also state the various types of biological rhythms with suitable examples. (6)
7. Write short notes on any **three** of the following :
- (a) Chronotherapy
  - (b) Male-male rivalry
  - (c) Fisher's runaway theory
  - (d) Supernormal stimuli

(4×3=12)

(1000)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4859

G

Unique Paper Code : 42237903

Name of the Paper : DSE: Animal Biotechnology

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

Semester : V

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.
3. Substantiate your answer with diagrams wherever necessary.

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

(i) CRISPR-CAS 9

(ii) Phasmid

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(iii) Probe

(iv) Recombinant DNA

(v) Transformation

(b) Expand the following terms : (5×1=5)

(i) PCR

(ii) BAC

(iii) NGS

(iv) Taq

(v) VNTR

(c) Differentiate between the following : (6×2=12)

(i) Restriction Endonuclease and Exonuclease

(ii) Cosmid and Plasmid

(iii) Western and Southern blotting

(iv) Isoschizomers and Neo-schizomers

(v) Blunt ends and Sticky ends

(vi) Genomic and cDNA library

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(d) Explain the contribution of following scientists in the field of Biotechnology : (5×1=5)

(i) E.M. Southern

(ii) Frederick Sanger

(iii) Sir Alec Jefferey

(iv) Kary Mullis

(v) Hamilton Smith, D. Nathans & Arber

2. (a) Explain the retroviral method of producing transgenic animals. (8)
- (b) Describe any one application of transgenic animals in detail. (4)
3. (a) What is polymerase chain reaction? Describe the process with suitable diagram. Explain its significance. (8)
- (b) How was "golden rice" created and why? (4)
4. (a) What are DNA modification enzymes? How do they help in genetic manipulation? Explain any three types of DNA modification enzymes in detail. (8)

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- (b) Add a note on metagenomics. (4)
5. Describe in detail Southern Blot Hybridization with appropriate diagrams. How does it differ from Northern blotting. (8+4=12)
6. Explain the process of molecular diagnosis of Cystic Fibrosis in detail. (12)
7. Write short note on the following (Any three): (4×3=12)
- (i) Recombinant Growth Hormone
  - (ii) Real Time PCR
  - (iii) DNA Microarray
  - (iv) *Agrobacterium tumefaciens* mediated transgenesis
  - (v) Screening of genomic DNA library

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4503 **G**

Unique Paper Code : 32237909

Name of the Paper : Immunology

Name of the Course : B.Sc. (H) 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. Attempt **Five** questions in all. Question No. **1** is compulsory.
3. Attempt all the parts of a question together.

1. (a) Define :

- (i) Avidity
- (ii) Extravasation
- (iii) Atopy
- (iv) Cross reactivity

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(v) Opsonization (1×5)

(b) Write the contribution/s of the following scientists :

(i) Karl Landsteiner

(ii) Rosalyn R. Yalow

(iii) G.M. Edelman and Rodney Porter

(iv) Edward Jenner (1/2×4)

(c) Differentiate between the following :

(i) Apoptosis and Necrosis

(ii) T helper ( $T_H$ ) and T cytotoxic ( $T_C$ ) cells

(iii) Antigen and Immunogen

(iv) Polyclonal and Monoclonal sera

(v) Sabin and Salk vaccine (2×5)

(d) Expand the following :

(i) CD

(ii) TAP

(iii) MALT

(iv) HLA

(v) SCID

(vi) TLR (1/2×6)

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(e) Write the immunological significance of the following :

(i) Nude (Athymic) Mice

(ii) Immune privileged organs

(iii) Lymph nodes

(iv) Mononuclear phagocytes (1×4)

(f) Justify the following statements :

(i) IgM is the first immunoglobulin class produced in a primary response to an antigen

(ii) Passive immunization is transient

(iii) Dendritic cells are called versatile (1×3)

2. (a) Differentiate between primary and secondary lymphoid organs. Write a note on structure and function of spleen.

(b) Discuss the properties of T cell epitopes. (8,4)

3. (a) Describe how monoclonal antibodies are produced with the help of hybridoma technology. Write down the applications of monoclonal antibodies.

(b) Discuss the basic attributes of adaptive immunity. (8,4)

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4. (a) Illustrate the basic structure of an antibody with the help of suitable diagram(s). Explain how was the structure of antibody deduced with the help of chemical and enzymatic methods?
- (b) Differentiate between the primary and secondary immune response to an antigen. (8,4)
5. (a) Give a detailed account of Gell and Coomb's classification of hypersensitivity with suitable examples.
- (b) Write a note on cytokines. (8,4)
6. (a) Illustrate and discuss the exogenous pathway of antigen processing.
- (b) Give a detailed account of Recombinant Vector vaccines. (6,6)
7. Write short notes : (Any Three)
- (i) Hematopoiesis
  - (ii) ELISA
  - (iii) AIDS
  - (iv) Clonal selection theory (4×3)

(1000)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4620

**G**

Unique Paper Code : 32237909

Name of the Paper : DSE-2: 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 (**Any Five**) : (5)

- (i) Abzymes
- (ii) Agretope
- (iii) Variolation

P.T.O.



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- (iv) Antigenicity
  - (v) Superantigens
  - (vi) Transcytosis
- (b) Distinguish between (Any Five) : (5×2=10)
- (i) Neoantigenic and conformational epitopes
  - (ii) Autologous and allogenic antigens
  - (iii) Calnexin and calreticulin
  - (iv) Subunit and recombinant vaccines
  - (v) Plasma and memory cells
  - (vi) Type II and Type IV Hypersensitivity
- (c) Expand the following : (5)
- (i) PRR
  - (ii) CLIP
  - (iii) HSP
  - (iv) GPCR
  - (v) ISCOM
- (d) Write the contribution(s) of : (3)
- (i) S.A. Berson and R. Yalow

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- (ii) Wu and Kabat
  - (iii) Loius Pasteur
- (e) Give the immunological significance : (2)
- (i) Bence Jones proteins
  - (ii) C3b
- (f) Give reasons : (2)
- (i) Multivalent vaccines are better than monovalent vaccines.
  - (ii) Polymers of D-amino acids are poor immunogens.
2. (a) Describe the initiation and activation of the alternate complement pathway. (6)
- (b) Define Immunogenicity. Discuss the factors influencing immunogenicity. (6)
3. (a) Explain in detail the structure and functions of IgA and IgD. (6)
- (b) Illustrate and discuss the production and selection of monoclonal antibody by hybridoma technology. (6)

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4. (a) Explain the processing and presentation of endogenous antigens in a cytosolic pathway. (6)
- (b) Describe the various actions, properties and functions of cytokines. (6)
5. (a) Differentiate between class I and class II MHC molecules. Give detailed functions and applications. (6)
- (b) Describe the role of various barriers involved in innate immune responses. (6)
6. (a) What are the effector cells of anaphylaxis and their biological responses in immediate and delayed type hypersensitivity. (6)
- (b) Describe the structure and function of primary lymphoid organs. (6)
7. Write short notes on any **THREE** : (3×4=12)
- (i) Clonal selection theory
  - (ii) Cardinal signs of Inflammation
  - (iii) Properties of antigen
  - (iv) Elucidate the structure of antibody

(700)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4337 **G**

Unique Paper Code : 32231501

Name of the Paper : Molecular Biology

Name of the Course : **B.Sc. (Hons) 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 : (1×5=5)

- (i) Tautomerism
- (ii) snRNPs
- (iii) Polysome
- (iv) Polymerase switching
- (v) Replicator

P.T.O.

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4337 **G**

Unique Paper Code : 32231501

Name of the Paper : Molecular Biology

Name of the Course : **B.Sc. (Hons) 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 : (1×5=5)

- (i) Tautomerism
- (ii) snRNPs
- (iii) Polysome
- (iv) Polymerase switching
- (v) Replicator

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- (d) Explain the mechanism which ensures that eukaryotic chromosomes are replicated only once per cell cycle (with illustration). (4)
5. (a) Illustrate the steps involved in spliceosome mediated RNA splicing. (6)
- (b) Explain the regulation of gene expression by attenuation in tryptophan operon. (6)
6. (a) What will be the sequence of RNA transcribed from the following DNA template (2)
- 5' ATGTC TGGAGGCTAG 3'
- (b) Draw the chemical structure of two modified bases found in tRNA. (3)
- (c) Illustrate the process of mismatch repair of DNA in Prokaryotes. (3)
- (d) Explain the steps involved in processing of pri-miRNA into miRNA. (4)
7. Write short notes on **any three** of the following :
- (a) Pyrimidine dimerization
- (b) Alternative Splicing
- (c) Rho independent termination
- (d) Lac Operon

(3×4=12)

(1000)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4391

**G**

Unique Paper Code : 32231502

Name of the Paper : Principles of Genetics – LOCF

Name of the Course : **B.Sc. (Honours) 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. Attempt five questions in all, including question No. 1 which is compulsory.

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

(a) Point mutation

(b) Hemizygous

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- (c) Reciprocal Cross
  - (d) Allele
  - (e) Episome
  - (f) Maternal effect
- (ii) Differentiate between the following (**any four**) : (8)
- (a) Test cross and Back cross
  - (b) Pericentric and Paracentric inversion
  - (c) Sex influenced traits and Sex-limited traits
  - (d) Incomplete dominance and Codominance
  - (e) Multiple alleles and Multiple genes
- (iii) Justify the following statements : (4)
- (a) Only specified genes can be transduced by bacteriophage in specialized transduction.
  - (b) The *Drosophila* with chromosome combination as XXY is female.
  - (c) Dominant lethal genes are rare in the population.

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- (d) Ds sequences can only move in presence of Ac elements in the maize genome.
- (iv) What are the contributions of the following scientists : (4)
- (a) A. Sturtevant
  - (b) Joshua Lederberg
  - (c) Calvin Bridges
  - (d) Sutton and Boveri
- (v) Give one example each for syndromes associated with the following conditions in humans : (4)
- (a) Monosomy
  - (b) Trisomy
  - (c) Chromosomal Deletion
  - (d) Chromosomal translocation
- (vi) Write true or false : (2)
- (a) Mutations are always harmful.
  - (b) In humans Sry is the master gene in sex determination.

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- (c) An X-linked trait will be passed on from the father to all his children.
- (d) LINEs are examples of retrotransposons.
2. (a) The data obtained from a three-factor test-cross is as follows: (2+5+2=9)

Genotype	Number of progenies
ABc/abc	367
abC/abc	348
ABC/abc	77
abc/abc	68
aBC/abc	58
Abc/abc	64
aBc/abc	10
AbC/abc	8

- (i) Based on the given data, determine the order of the genes.
- (ii) Draw a linkage map and calculate the map distance between the genes.

- (iii) Calculate the coefficient of coincidence and interference.

(b) A panel of cell lines was created from human-mouse somatic cell fusions. Each line was examined for the presence of human chromosomes and for the production of a human protein thymine kinase. The following results were obtained:

Cell Line	thymine kinase	Human Chromosomes						
		1	5	11	13	17	18	21
K	+	-	+	+	+	+	-	-
L	+	+	+	-	+	+	+	+
M	-	+	+	+	+	-	+	-
N	-	+	-	-	+	-	-	-

Which of the human chromosome carries the gene for the thymine kinase? Explain. (3)

3. (a) Describe the characteristics of maternal inheritance. (4)
- (b) Explain the molecular basis of mutations caused by base analogues, nitrous acid, and acridines. (8)



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4. (a) Predict the genotypes of the offspring in a trihybrid cross between  $AaBbCC \times AABbCc$ . (Draw Punnet square or Forked line diagram). What proportion of progeny would be homozygous for all three genes. (5)
- (b) How do gene interactions modify the Mendelian dihybrid ratio? Explain with three suitable examples. (7)
5. (a) What are transposable elements? Describe any three types of transposable elements found in the bacteria. (7)
- (b) Briefly explain the basis of sex determination in humans. (5)
6. (a) In complementation studies of rII locus of phage  $T_2$ , the following pairs of different mutations were tested. From the given data, determine which mutations are in the same cistron assuming mutation 1 is in A cistron and mutation 2 in B cistron. (+) indicates complementation, (-) indicates failure of complementation. (3)

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Test Pair	Results
1,2	+
1,3	-
1,4	-
1,5	+
2,3	+
2,4	+
2,5	-

- (b) Explain the process of transformation with suitable diagrams. How does this process help in the recombination of genes in bacteria? (4)
- (c) Discuss how interrupted mating experiments help in gene mapping in bacteria. (5)
7. Write short notes on the following (any three): (3×4=12)
- Polygenic inheritance.
  - Extra chromosome inheritance in Paramecium.

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(5)

(iii) Environmental sex determination

(iv) F factor

(v) Lethal alleles

(1000)