

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1274                      F

Unique Paper Code                      : 2232521201

Name of the Paper                      : Cell and Developmental  
Biology of Animals

Name of the Course                      : B.Sc. Life Sciences

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 whenever necessary.
4. Parts of questions to be attempted together.

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

(i) Metamorphosis

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- (ii) Nebenkern
- (iii) Polar Body
- (iv) Blastopore
- (v) Cell theory
- (vi) Stem cells

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

- (i) Protoplast and protoplasm
- (ii) Gap junction and tight junction
- (iii) Embryogenesis and blastogenesis
- (iv) Parturition and hatching
- (v) Sertoli cell and interstitial cell
- (vi) Telolecithal And Centrolecithal eggs

(c) Give the contribution of the following scientists in the field of cell and developmental biology (any three).  
(3)

- (i) Robert Hook

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- (ii) Purkinje/Huxley
- (iii) Singer and Nicolson
- (iv) Spemann
- (v) August Weisman

2. (a) Define plasma membrane. Describe the various models of plasma membrane.

(b) Explain how "prevention of polyspermy" take place.  
(9, 6)

3. (a) What is a cell cycle. Describe its various phases.

(b) Give an account of somatic cell division along with diagrams.  
(5, 10)

4. (a) Describe various stages and process of spermatogenesis.

(b) Give a brief account of different types of morphogenetic movements occurring during gastrulation.  
(8, 7)

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5. (a) Give an account of the assembly and functions of microtubules.
- (b) Explain the secretory pathway of endomembrane system in cell. (6,9)
6. Write short notes on any three of the following:
- (a) Pattern of cleavage
- (b) Acrosome reaction
- (c) Lysosome
- (d) Active transport
- (e) Nerve cell (5,5,5)

21/7/23  
(mor.)

(1000)

May-June-2023

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5780 E

Unique Paper Code : 42231202

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

Name of the Course : BSc. (P) Life Sciences,  
Theory Exam, May-June  
2023

Semester : II, CBCS, OC

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. There are two sections, **Section A and B**. Attempt two questions from each section. Attempt five questions in all.

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

(i) Monophyodont Dentition

(ii) True stomach

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- (iii) Antlers
- (iv) Fertilization
- (v) Gastrulation
- (vi) Phonoreceptor

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

- (i) Monocondylic and Dicondylicskull
- (ii) External and Internal fertilization
- (iii) Epidermal and Dermal derivatives
- (iv) Blastula and Gastrula
- (v) Bolus and Chyme

(c) Fill in the blanks: (5)

- (i) The tongue of mammals is attached to buccal floor by a ligament called \_\_\_\_\_.
- (ii) Poison glands of snake are modified \_\_\_\_\_.
- (iii) Slow block polyspermy is achieved by \_\_\_\_\_ reaction.
- (iv) The process of differentiation of spermatid into spermatozoa is called \_\_\_\_\_.
- (v) The process of attachment of embryo to the

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inside of uterine wall in humans is known as \_\_\_\_\_.

(d) Match the following (6)

- | A                         | B                           |
|---------------------------|-----------------------------|
| (i) Blastocyst            | (a) Brain                   |
| (ii) Corpora quadrigemina | (b) Extraembryonic membrane |
| (iii) Placenta            | (c) Inner cell mass         |
| (iv) Nephrostome          | (d) Tongue                  |
| (v) Chemoreceptors        | (e) Nutrition               |
| (vi) Amnion               | (f) Kidney                  |

**Section A**

- 2. (a) Trace the evolution of lungs in vertebrates. (8)
- (b) Write a short note on L.S. syrinx in birds. (4)
- 3. Give a detailed account of the evolution of heart in vertebrates, with the help of suitable diagrams. (12)

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

- (a) Specializations of the alimentary canal
- (b) Dentition in mammals
- (c) Accessory respiratory organs in fishes
- (d) Mammalian brain

**Section B**

5. (a) Describe the process of gastrulation in frog. (8)  
(b) Mention briefly the fate of the three germ layers. (4)

6. (a) Discuss in detail the mechanism of Oogenesis in mammals (6)  
(b) Explain various mechanisms involved by oocyte to prevent polyspermy? (6)

7. Write short notes on any three of the following: -  
(a) Implantation of human embryo  
(b) Types of Eggs  
(c) Neurulation  
(d) Embryonic Induction (4, 4, 4)  
(500)



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- (b) Eicosanoids
- (c) Zwitterion
- (d) Nucleotides
- (e) Isozyme
- (ii) Differentiate between (any two) (4)
- (a) B DNA and Z DNA
- (b) Aldose and Ketose
- (c) Reducing and Non—reducing sugar
- (iii) Draw the structure of (3)
- (a) Palmitic acid
- (b) Phenylalanine
- (c) Galactose
- (iv) Explain why (2×2=4)
- (a) Saturated fatty acids have high melting point?
- (b) Absorbance at 260 nm increases when we denature DNA?

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2. (a) Describe the levels of organization in proteins. (10)
- (b) Add a note on general properties of amino acids. (5)
3. (a) Explain the structure of B-form of DNA with suitable diagrams. (8)
- (b) Add a note on Cot curves and their significance. (7)
4. (a) Elucidate the Michaelis-Menten equation for one enzyme one substrate reaction. (12)
- (b) Briefly describe the irreversible enzyme inhibitions. (3)
5. (a) Give detailed account of structure and function of polysaccharides. (8)
- (b) Describe the structure of Phospholipids and Glycolipids with suitable diagrams. (7)
6. Write short notes on (any three) (5×3=15)
- (a) Steroids
- (b) Glycoconjugates

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(c) Lineweaver Burk plot

(d) Types of RNA

(1000)

Zoology 6114

Unique Paper Code : 32235907  
Name of the Paper : GE-7 Human Physiology  
Name of the Course : B.Sc. Theory Examination, May 2023  
Semester : Semester - II, CBCS  
Duration : 3 hours  
Maximum Marks : 75 Marks

**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. Draw diagrams wherever required.

Q1. (a) *Define* the following terms (Any five): 5

1. Tropic hormone
2. Latent period
3. Bohr's effect
4. Glial cells
5. Semilunar valves
6. Deglutition

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

1. Spermatogenesis and spermiogenesis
2. I-band and A-band
3. Tubular reabsorption and tubular secretion
4. Systemic and pulmonary circulation
5. Chief cells and Parietal Cells
6. Neurotransmitter and Hormone

(c) *Expand* the following abbreviations: 4

1. ANP
2. CCK
3. MMC
4. PRL

(d) State the *location* and *function* of the following (Any four): 8

1. Acrosome
2. Tropomyosin
3. Type I Pneumocytes
4. Submucosal plexus
5. Thyrotrophs

Q2 (a) Discuss the various hormones of anterior pituitary and their effect on the target tissue. 8,4

(b) Discuss the role of parathyroid gland in calcium homeostasis.

Q3 (a) Explain the excitation-contraction coupling with the help of suitable diagram. 8,4

(b) What is an action potential.

- Q4. (a) Describe the process of digestion and absorption of carbohydrate in the gastrointestinal tract. 9,3  
(b) Discuss the role of liver in food digestion.
- Q5. (a) Discuss the various mechanisms of oxygen transport in blood. 8,4  
(b) Draw a well labelled diagram of Nephron.
- Q6. (a) Discuss the various phases of cardiac cycle. 8,4  
(b) Explain the hormonal regulation of oogenesis.
- Q7. Write short notes on *Any Three* of the following: 4x3=12  
a) Renin-Angiotensin-Aldosterone system  
b) Sarcomere  
c) Regulation of Glomerular filtration rate  
d) Conduction system of heart

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1247 **F**  
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**.
3. Draw well labelled diagram wherever necessary

1. (a) Define the following (Any Four): (4)  
(i) Saltatory conduction

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(ii) TRIAD

(iii) Permissive effect

(iv) Implantation

(v) Motor Unit

(b) Differentiate between the following: (4)

(i) Absolute vs Relative refractory period

(ii) Granulosa vs Thecal cells

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

(i) Fascia

(ii) Corpus luteum

(iii) Principal cells

(d) Expand the following: (2)

(i) IPSP

(ii) ICSH

(iii) BMR

(iv) PRL

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(e) Match the following: (2)

1. Myosin (a) Axon

2. Nissl granules (b) A band

3. Tropomyosin (c) Calcitonin

4. Parafollicular cells (d) I band

2. (a) How is blood-testes barrier important? Giving the functions of Leydig and Sertoli cells explain the key events in spermatogenesis. (10)

(b) Describe the various types of muscle proteins. (5)

3. (a) Describe the events occurring at the neuromuscular junction (8)

(b) Explain the muscle contraction cycle. (7)

4. (a) Diagrammatically illustrate the different layers of adrenal gland. Enumerate the hormones secreted and describe their functions. (10)

(b) Explain the mode of action of water soluble hormone. (5)

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5. (a) Outline the major events of uterine cycle and correlate them with ovarian events (10)
- (b) Diagrammatically represent folliculogenesis in ovary. (5)
6. Write short notes (any three) (3×5=15)
- (i) Hypothalamo-hypohyseal Portal System
  - (ii) Hormonal control of testicular function
  - (iii) Ultrastructure of a Sarcomere
  - (iv) Generation of action potential in neuron
  - (v) Synthesis and Secretion of thyroid hormones

(1000)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 2048 **F**

Unique Paper Code : 2234001201

Name of the Paper : Lifestyle Disorders -  
Generic Elective (GE)

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

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. First question is compulsory and attempt any three questions from remaining

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

(i) Basal Metabolic Rate

(ii) Hemorrhage

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- (iii) Meditation
  - (iv) Metabolic syndrome
  - (v) Obesity
  - (vi) Thrombolysis
- (b) Distinguish between the following: (5)
- (i) Proto-oncogenes and Tumor suppressor genes
  - (ii) Cardiac arrest and Cardiac failure
  - (iii) Relative and Absolute risk factors
  - (iv) Fasting and Postprandial blood glucose level
  - (v) VLDLs and LDLs
- (c) What do you understand by the following: (4)
- (i) Diuretics
  - (ii) Myocardial Infarction
  - (iii) CPR
  - (iv) Glucose intolerance

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2. (i) How is the Benign tumor different from Malignant tumor? (5)
- (ii) Enlist the lifestyle habits that leads to cancer of mouth. In details describe any two methods to diagnose and treat the Oral cancer. (10)
3. (i) What is Echocardiography? Describe about its principle and various modes. (8)
- (ii) How does erratic sleep patterns, smoking and wrong food-choices increase the risk of lifestyle disorders? (7)
4. (i) Write about symptoms and causes of Type 2 diabetes. Add an account on the associated risk factors and complications. (8)
- (ii) What is CAD? Explain the associated symptoms and causes. (7)
5. (i) Define blood pressure. What are the types and causes of hypertension. Give a detailed account on hypertension management strategies? (7)

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(ii) What are the risk factors associated with hypertension, and how do they contribute to the development of complications in various organs such as the brain, heart, and eyes? (8)

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

(i) Coronary atherosclerosis

(ii) Biopsy

(iii) Fit India Movement

(iv) ECG

(v) Cardiac rehabilitation

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1209 **F**  
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 terms (any four): (4)

(a) Ecdysis

(b) Epitoky

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(c) Pseudo-metamerism

(d) Ocelli

(e) Tagmosis

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

(4)

(a) Schizocoelous and Enterocoelous

(b) Septal and pharyngeal nephridia

(c) Tracheal gills and book gills

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

(4)

(a) Malpighian gland

(b) Radula

(c) Tiedmann's body

(d) Statocyst

(e) Typhlosole

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

(3)

(a) Brittle star

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(b) Water flea

(c) Clamp worm

(d) Tusk shell

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

(b) Describe the evolution of Metamerism.

(9+6)

3. (a) Explain the mechanism of Torsion and detorsion in Gastropoda.

(b) Give the detailed description of excretion in Annelida with diagrams.

(9+6)

4. (a) Discuss the water-vascular system in Asteroidea and write about its significance.

(b) Explain the process of Pearl formation in bivalves.

(9+6)

5. (a) Give the brief account on respiratory organs. in Arthropods and discuss the mechanism of respiration in insects.

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(b) What is Mosaic vision? Describe the functioning of compound eye of Arthropods in different intensities of light. (9+6)

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

(a) Evolutionary significance of Onychophora

(b) Types of metamorphosis

(c) General characteristics of Mollusca

(1000)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4690

**E**

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 : (4)

(i) Stroke Volume

(ii) Plasminolysis

(iii) Ultrafiltration

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(iv) Hering-Breuer reflex

(b) Differentiate between the following : (10)

- (i) Cortical and juxtamedullary nephron
- (ii) Granulocytes and agranulocytes
- (iii) Respiratory acidosis and metabolic acidosis
- (iv) Salivary amylase and pancreatic amylase
- (v) Tricuspid valve and bicuspid valve

(c) Expand the following abbreviations : (2)

- (i) GIP
- (ii) ANP
- (iii) GFR
- (iv) EDV

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

- (i) Podocytes
- (ii) Type II alveolar cells
- (iii) K cells

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(iv) Carotid bodies

(v) Chordae tendineae

(c) Fill in the blanks :- (4)

- (i) Respiratory pigment present in the muscle is known as \_\_\_\_\_
- (ii) Facultative reabsorption of water occurs only in the \_\_\_\_\_ of kidney.
- (iii) Gastrin stimulates the secretion of \_\_\_\_\_
- (iv) The chamber of the heart with thickest myocardium is \_\_\_\_\_

(f) Draw a detailed structure of nephron. (3)

2. (a) Discuss in details the mechanism of oxygen transport in blood.

(b) Comment on Oxygen-hemoglobin dissociation curve. (8,4)

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

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- (b) Explain the pathway of renal blood supply. (8,4)
4. (a) Describe the extrinsic and intrinsic pathway of blood clotting.
- (b) What is cardiac output? Explain the factors that regulate stroke volume. (8,4)
5. (a) Give a detailed account of mechanical and chemical digestion in the stomach.
- (b) Write a note on the portal triad. (9,3)
6. (a) Describe the events of the cardiac cycle, along with the diagrams.
- (b) Explain the components of a normal ECG. (9,3)
7. Write short notes on Any **THREE** of the following:  
(3×4=12)
- (a) Structure and functions of haemoglobin
- (b) Juxtaglomerular apparatus
- (c) Coronary circulation
- (d) Chloride shift
- (e) Absorption of carbohydrates in small intestine.

(1000)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4535 E  
Unique Paper Code : 32231401  
Name of the Paper : Comparative Anatomy of Vertebrates  
Name of the Course : B.Sc (H) Zoology  
Semester/Annual : 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. Answer five questions in all.
3. Question no. 1 is compulsory.

1. (a) Define any five of the following terms; (1×5=5)

(i) Dermatocranium

(ii) Neuromast Organs

(iii) Procoelous

(iv) Archinephros

(v) Venous heart

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(vi) Holocrine

(b) Distinguish between any Five of the following\*

(2×5=10)

(i) Larynx and Syrinx

(ii) True horns and Antlers

(iii) Contour and Down feathers

(iv) Rod and Cone cells

(v) Single circulation and double circulation

(vi) Spinal and cranial nerves

(c) State exact location and function of the following:

(2×4=8)

(i) Preen gland

(ii) Jacobson's organ

(iii) Carnassial tooth

(iv) Meibomian gland

(d) State whether following statements are true or false:

(1×4=4)

(i) Sebaceous glands of mammals are apocrine

(ii) Placoid scales are epidermal derivatives.

(iii) Craniostylic jaw suspension is found in fishes.

(iv) Gizzard is the part of bird stomach.

2. Explain the anatomical details of heart in different vertebrates and draw suitable diagrams. (12)
3. (a) Discuss the succession of kidney among vertebrates with suitable diagrams. (6)
- (b) Describe various types of uteri found in mammals with suitable diagrams. (6)
4. Describe the various parts of brain. Compare the brain anatomy of reptiles and mammals. (12)
5. (a) Compare the anatomy of digestive tract among amniotes. Draw required diagrams also. (6)
- (b) Classify and give functions of various types of receptors found in vertebrates. (6)
6. (a) Explain the anatomy of avian lung with the help of diagrams and give the mechanism of respiration in birds. (6)
- (b) Describe the structure of integument in vertebrates. Draw appropriate diagrams also. (6)

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

(3×4=12)

(a) Internal ear

(b) Accessory Respiratory organs

(c) Visceral arches

(d) Scales in fishes

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Your Roll No.....

Sr. No. of Question Paper : 6230

E

Unique Paper Code : 32235901

Name of the Paper : GE: Animal Cell Biotechnology

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

Semester : (GE), 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 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) Plasmid

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(ii) Transgene

(iii) VNTR

(iv) Probes

(v) Primary Culture

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

(i) Continuous and Fed batch Fermentation

(ii) Natural and Synthetic media

(iii) Cosmid and Phagemid

(iv) Finite Cell Lines and continuous cell lines

(v) Dolly and Polly

(c) Expand the following : (4)

(i) RFLP

(ii) BAC

(iii) dNTP

(iv) IPTG

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

(i) Ian Wilmut

(ii) Sir Alec Jeffreys

(iii) Herbert Boyer

(iv) Werner Arber

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

(i) Alkaline Phosphatase

(ii) Taq DNA Polymerase

(iii) Frequent cutters

(iv) Reverse Transcriptase

2. (a) Discuss two methods for producing Transgenic mice? (6)

(b) Diagrammatically explain the process of DNA Fingerprinting. (6)

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

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- (b) Describe the process of Ion Exchange chromatography. (4)
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. (4)
5. Describe the procedure for creating and screening Genomic DNA Library. Add a note on cDNA libraries. (9,3)
6. Make a map of pBR322. Discuss the selection of transformants using this plasmid. (4,8)
7. Write short notes on Any **Three** of the following :
- (i) Recombinant DNA technology
  - (ii) Animal Cell Culture
  - (iii) Southern Blotting
  - (iv) SDS PAGE (4,4,4)

1/6/23  
E

(500)

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Your Roll No.....

Sr. No. of Question Paper : 5716

E

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.

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

- (a) Linkage
- (b) Barr body
- (c) Position effect
- (d) Chiasmata
- (e) Nonsense mutation
- (f) Haploinsufficiency

(ii) Differentiate between the following (any two): (2×2)

- (a) Heterogametic and homogametic
- (b) Back mutation and suppressor mutation
- (c) Incomplete dominance and co-dominance

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(iii) Justify the following statements: (2)

- (a) Recombination frequency never exceeds 50%.
- (b) The reciprocal crosses between white-eyed and red-eyed *Drosophila* flies do not yield identical results.
- (iv) One form of color blindness (c) in humans is caused by an X-linked recessive mutant gene. A woman with the normal vision ( $c^+$ ) whose father was color blind marries a man with normal vision whose father was also color blind. What proportion of their offspring will be color blind. Write the genotype and phenotype of parents and offspring. (3)

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2. (a) What is extrachromosomal inheritance? Explain with suitable examples. (8)

(b) How does sex determination in the XX-XY system differ from sex determination in ZZ-ZW system? (4)

3. (a) Briefly discuss the various types of chromosome structural mutations. (8)

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

Cell Line	Enzyme			Human Chromosomes													
	X	Y	Z	1	2	3	4	5	6	7	8	9	10	11	12		
A	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+	
B	+	+	-	+	+	-	-	-	-	-	-	+	-	-	-	+	
C	-	+	+	-	-	-	-	+	-	-	-	-	-	-	-	+	
D	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	
E	+	-	-	+	-	-	-	-	-	-	+	-	-	-	+	+	

On the basis of these results, which chromosome has the gene that encodes the enzyme X, Y and Z? Justify your answer. (4)

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

- Polyploidy
- Multiple alleles
- Polygenic inheritance
- Lyon hypothesis

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**SECTION B - EVOLUTIONARY BIOLOGY**

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

- I. (i) Define the following (**any five**): (5)
- (a) Vestigial organs
  - (b) Adaptive radiation
  - (c) Paleontology
  - (d) Genetic drift
  - (e) Artificial selection
  - (f) Cambrian explosion
- (ii) Distinguish between (**any three**): (3×2)
- (a) Convergent and Divergent evolution
  - (b) Sympatric and allopatric speciation

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- (c) Darwinism and Neo-Darwinism
  - (d) Coacervates and microspheres
- (iii) State the contribution of following scientists (**any two**): (2)
- (a) Alfred Russel Wallace
  - (b) J. Huxley
  - (c) Georges Cuvier
2. (a) What is macroevolution? Discuss the macroevolutionary principles with the help of evolution of Darwin's Finches. (8)
- (b) What is the significance of fossil records in evolution? (4)
3. What is mass extinction? Briefly describe the five major mass extinctions and the significance of extinction in evolution. (12)

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4. Write short notes on (any three):

(3×4)

(a) Natural Selection

(b) Biological Species Concept

(c) Post-zygotic isolating mechanisms

(d) Hardy-Weinberg Law

(1700)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4773 E

Unique Paper Code : 32237903

Name of the Paper : Animal Biotechnology

Name of the Course : B.Sc. (H) Zoology  
Examination, 2022-LOCF

Semester : VI - Theory Examination

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. Write your Roll No., Name of the paper, Course, Semester, and Date of examination on the first page of answer sheet.
3. Attempt **five** questions in all.
4. Question No. 1 is compulsory.

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

(i) Expression Vector

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(ii) T-DNA

(iii) Plaque

(iv) Pharming

(v) GMO

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

(i) PCR

(ii) YAC

(iii) cDNA

(iv) Taq

(v) SNP

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

(i) Adaptors and linkers

(ii) Cosmid and fosmid

(iii) Western and Southern blotting

(iv) Electroporation and CaCl<sub>2</sub> method of transformation

(v) Blunt and Sticky end

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(vi) DNA polymerase and DNA ligase

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

(i) Kary Mullis

(ii) Maxam and Gilbert

(iii) Sir Alec Jefferey

(iv) Ian Wilmut

(v) Arber, Nathans and Smith

2. (a) Explain the different methods of producing transgenic animals. (9)

(b) Write a note on nuclear transplantation technique for animal cloning. (3)

3. (a) Describe the detailed strategy which was used for the commercial production of insulin. (8)

(b) Write a note on DNA microarrays. (4)

4. What is cDNA library? Explain the process of creating cDNA library. (12)

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5. A student has labelled the cDNA from a cancerous sample in his study with a Cy3 (Cyanine) dye and has labelled cDNA from normal sample with Cy5 (Cyanine) dye. His genes of interest A, B, C gave the following results after scanning;

GENE A: ARRAY SPOT COLOUR-RED

GENE B: ARRAY SPOT COLOUR- GREEN

GENE C: ARRAY SPOT COLOUR-BLACK

Explain the technique in detail and what these results suggest about expression of the genes in two samples. (12)

6. Write short note on the following (Any two):  
(6×2=12)

- (i) Gene Editing Tools
- (ii) BT cotton
- (iii) Phage based cloning vectors
- (iv) DNA fingerprinting

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[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4815

E

Unique Paper Code : 32231403

Name of the Paper : Biochemistry of Metabolic Processes

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. Attempt any **five** questions including.
3. Question No. 1, which is compulsory.

1. (a) Define the following terms :

(1×7=7)

(i) Chemiosmosis

(ii)  $\omega$  - Oxidation

(iii) Shuttle system

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- (iv) Coupled reactions
  - (v) Acidosis
  - (vi) Amphibolic pathway
  - (vii) Transketolase
- (b) Differentiate between the following pairs of terms : (5×2=10)
- (i) Transamination and oxidative deamination
  - (ii) Oxidative phosphorylation and substrate-level phosphorylation
  - (iii) Glucokinase and hexokinase
  - (iv) Catabolism and anabolism
  - (v) Cofactor and Coenzyme
- (c) Expand the following terms : (1×5=5)
- (i) FAS
  - (ii) PLP
  - (iii) HMP
  - (iv) PFK
  - (v) HMG

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- (d) Name the cofactor/coenzyme required for the following enzymes : (1×5=5)
- (i) Pyruvate dehydrogenase
  - (ii) Hexokinase
  - (iii) Citrate synthase
  - (iv) Pyruvate kinase
  - (v) Cytochrome oxidase
2. With the help of chemical structures, illustrate the metabolism of glucose to pyruvate. Add a note on significance of glucose metabolism for a cell. (9+3=12)
3. How highly toxic nitrogenous waste generated from amino acid metabolism in peripheral organs is converted into less toxic nitrogenous waste? Explain the process in detail using structural formulae. (12)
4. (a) Describe the catabolic reactions for the breakdown of glycogen in liver cells. (4)
- (b) Explain the  $\beta$ -oxidation of an even numbered saturated fatty acid. (8)

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5. (a) Give a detailed account of biosynthesis of palmitic acid. (8)
- (b) Illustrate the mechanism involved in generating ATP from reducing equivalents. (4)
6. (a) Describe tricarboxylic acid cycle. (8)
- (b) What are the sources and fates of ketone bodies? (4)
7. Write short notes on **any three** of the following: (4×3=12)
- (a) Gluconeogenesis
- (b) Cori cycle
- (c) ATP synthase
- (d) Compartmentalization of metabolic pathways in a cell

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4517 E

Unique Paper Code : 32231601

Name of the Paper : Developmental Biology

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

Examination, 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 any five questions in all including Question No. 1 which is compulsory. Illustrate your answers with diagrams, wherever necessary.

1. (a) Define the following : (6×1.5=9)

- (i) Amphimixis
- (ii) Capacitation
- (iii) Primitive streak

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- (iv) Blastema
  - (v) Vitellogenesis
  - (vi) Fertilization membrane
- (b) Differentiate between the following : (5×2=10)
- (i) Subgerminal and segmentation cavity
  - (ii) Blastula and gastrula
  - (iii) Splanchnopleure and somatopleure
  - (iv) Cleidoic and non-cleidoic eggs
  - (v) Progenesis and neoteny
- (c) Name the germ layer/s from which each of the following is derived. (5)
- (i) Lungs
  - (ii) Adrenal medulla
  - (iii) Kidney
  - (iv) Heart
  - (v) Retina

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- (d) Give the contribution of the following scientists in the field of developmental biology (any three). (3)
- (i) Walter Vogt
  - (ii) J.F. Gudernatsch
  - (iii) Robert Edwards
  - (iv) E. Conklin
2. (a) Compare the inward movement of prospective mesoderm and endoderm cells in frog and chick. (7)
- (b) Describe different types of animal eggs based on amount and distribution of yolk. (5)
3. (a) Describe the process of implantation of embryo in humans. (9)
- (b) What is ART? Write a note on the Embryonic Stem Cells. (3)
4. (a) Discuss in detail the hormonal control of metamorphosis in insects. (6)
- (b) Explain the three modes of regeneration in animals with suitable examples. (6)

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5. (a) Explain external fertilization in sea urchin. State the importance of sea water pH levels and Resact molecules with respect to the sperm motility. (7)
- (b) How does the internal fertilization in rat differ from the external fertilization in sea urchin. (5)
6. (a) Describe the process of neurulation in detail. (9)
- (b) Briefly describe the role of dorsal lip of blastopore as a primary organizer. (3)
7. Write short notes on *any three* of the following: (3×4=12)
- (a) Fate map
  - (b) Hormonal disruptors as teratogens
  - (c) Theories of Ageing
  - (d) Amniocentesis
  - (e) Cortical reaction
  - (f) Spermatogenesis

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5818

E

Unique Paper Code : 42237904

Name of the Paper : DSE - Immunology

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

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.
3. Draw well labelled diagrams wherever required.

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

(i) Avidity

(ii) Hapten

(iii) Cross Reactivity

(iv) Thymectomy

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(v) Opsonization

(b) Expand the following : (3)

- (i) TAP
- (ii) SCID
- (iii) HAT
- (iv) PAMPs
- (v) MALT
- (vi) ELISA

(c) Differentiate between the following : (10)

- (i) Class I MHC and Class II MHC molecule
- (ii)  $T_H$  cell and  $T_C$  cell
- (iii) Isotype and Allotype
- (iv) Macrophage cell and Dendritic cell
- (v) Active immunity and Passive immunity

(d) Fill in the blanks : (4)

- (i) \_\_\_\_\_ antibody is secreted in primary immune response.

(ii) The smaller fragments, C3a and C5a, resulting from complement cleavage are called \_\_\_\_\_.

(iii) Maturation of B lymphocytes takes place in \_\_\_\_\_.

(iv) Type II hypersensitivity is \_\_\_\_\_ mediated.

(e) Write contribution of the following scientists : (2)

- (i) Louis Pasteur
- (ii) Elie Metchnikoff

(f) Give reasons : (3)

- (i)  $T_C$  cells are said to be MHC class I restricted
- (ii) A hapten cannot stimulate antibody formation.

2. (a) Describe different types of hypersensitivities on the basis of Gell and Coomb's classification.

(b) Give various characteristics of B cell epitopes. (9,3)

3. (a) Define Complement system. Explain alternative pathway of complement activation.

- (b) How does the clonal selection theory justify the basic principles of an immune response? (8,4)
4. (a) Give a detailed account of the production of monoclonal antibodies by hybridoma technology.
- (b) List important properties of Cytokines. (8,4)
5. (a) Describe how the T and B lymphocytes elicit adaptive immune response.
- (b) Explain the result of digestion of antibodies with pepsin, papain and mercaptoethanol. (8,4)
6. (a) Give a detailed account of different types of vaccines.
- (b) Discuss the various attributes of adaptive immunity. (9,3)
7. Write short notes on any three of the following:
- (i) Hematopoiesis
  - (ii) Immunoelectrophoresis
  - (iii) NK Cells
  - (iv) Spleen (4,4,4)

(1300)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4797

E

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 terms : (5)

(i) Adaptation

(ii) Cline

(iii) Kin selection

P.T.O.



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- (iv) Stromatolites
  - (v) Pseudogene
- (b) Differentiate between the following (10)
- (i) Coacervates and Microspheres
  - (ii) Allopatric speciation and Sympatric speciation
  - (iii) Rooted and Unrooted tree
  - (iv) Stabilizing and Disruptive selection
  - (v) Micro and Macro Evolution
- (c) State the contribution of the following Scientists (5)
- (i) Stanley Miller
  - (ii) Jean Baptiste de Lamarck
  - (iii) Motoo Kimura
  - (iv) Alfred Russell Wallace
  - (v) Raymond Dart
- (d) Fill in the blanks : (3)

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- (i) Morphologically similar but reproductively isolated species are called \_\_\_\_\_ species.
  - (ii) \_\_\_\_\_ is the process by which organic material becomes a fossil through the replacement of the original material and the filling of the original pore spaces with minerals.
  - (iii) The most ancestral stage of *Equus* was \_\_\_\_\_.
- (e) Justify the following statements. (4)
- (i) Mutation proposes, Selection disposes.
  - (ii) Mesozoic Era is the Age of Reptiles.
2. (a) What is endosymbiotic theory and how can it explain the origin of eukaryotic cells? (6)
- (b) Explain K-T mass extinction and its biological significance. (6)
3. (a) What do you understand by isolating mechanisms? Discuss the role of reproductive isolating mechanisms leading to speciation. (8)

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- (b) Describe the major changes undergone during the course of evolution of horse. (4)
4. (a) Define 'fossil'. State the process of fossilization, and the importance of fossils in the evolutionary studies. (6)
- (b) How do organic variations contribute to the process of evolution? (6)
5. (a) Explain the pre-requisites for the Hardy-Weinberg equilibrium to operate in a Population. (6)
- (b) Compare and contrast the different concepts of the species proposed in evolution. (6)
6. Give an account of the Darwin's observations on the Galapagos islands which led him to describe the origin of species. (12)
7. Write short notes on any **three** of the following :
- (a) Australopithecines
- (b) Neo-Darwinism
- (c) Genetic drift
- (d) Globin gene family
- (e) Chemogeny (12)

(1000)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4904

E

Unique Paper Code : 32237911

Name of the Paper : Wildlife Conservation and Management

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

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 no. 1 is compulsory.

1. (a) Define the following :-

(1×4=4)

- (i) Habitat
- (ii) Agenda 21
- (iii) Biotic potential
- (iv) Logging
- (v) Ecotourism

P.T.O.

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

- (i) Preservation and Conservation
- (ii) GPS and GIS
- (iii) Active remote sensors and Passive remote sensors
- (iv) Endangered and Vulnerable species
- (v) Crude and ecological density

(c) Expand the following : (1×4=4)

- (i) IUCN      (ii) CITES
- (iii) NBWL    (iv) UNEP

(d) Fill in the blanks : (1×2=2)

- (i) \_\_\_\_\_ are infectious diseases that are spread between animals and human beings.
- (ii) Bovine tuberculosis is caused by \_\_\_\_\_

(e) Briefly explain the following statements : (2×2=4)

- (i) Non-native species should not be rehabilitated or released in the wild.
- (ii) Prescribed fire can only be used at particular locations and time of the year for setting back succession.

(f) Illustrate following with the help of diagrams (no description required) : (1.5×1.5=3)

- (i) Structure of a hair
- (ii) Felid and Canid pugmarks

2. (a) Describe the positive and negative values of wildlife. (6)
- (b) Explain the concept of carrying capacity and briefly explain how this has given rise to man-wildlife conflict? (6)
3. (a) What is bio-telemetry? Describe the bio-telemetric techniques used in wildlife. (6)
- (b) What are the causes for loss of wildlife? Discuss with relevant examples from Indian context. (6)
4. (a) State the difference between *In-situ* and *Ex-situ* conservation strategies? Describe any two *Ex-situ* methods of wildlife conservation by citing relevant examples. (8)
- (b) Write an account on the steps involved in the care of injured and diseased animal. (4)

5. (a) When was project tiger initiated in India? What are its objectives and outcomes? Give any two examples of tiger reserves in India. (6)
- (b) What are the advantages of studying faecal samples in wildlife management? State the differences between the faecal sample of a herbivore and a carnivore. (6)
6. (a) Describe any one disease of wildlife emphasizing on its causative agent, reservoir, symptoms and control measures. (7)
- (b) You find a scat sample in a forest. What can you determine by studying it? Explain using examples. (5)
7. Write short notes on any **three** of the following :  
(4×3=12)
- (i) Ecological Perturbation
  - (ii) Restoration of degraded habitats
  - (iii) Biological parameters in habitat analysis
  - (iv) Census method