

[This question paper contains 4 printed pages.]

(15)

Your Roll No.

2023



Sr. No. of Question Paper : 4517

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

P.T.O.

- (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

(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)

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

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Your Roll No.



Sr. No. of Question Paper : 4773

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

P.T.O.

(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 CaCl₂ method of transformation

(v) Blunt and Sticky end

(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)

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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Your Roll No.



Sr. No. of Question Paper : 4780

Unique Paper Code : 32237910

Name of the Paper : Reproductive Biology (DSE)

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

Semester : VI (LOCF)

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

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

1. (a) Define (**any six**) : (1.5×6=9)

- (i) Endometrial receptivity
- (ii) Mediastinum testis
- (iii) Menarche
- (iv) Cauda Epididymis

P.T.O.

- (v) Ovarian reserve
- (vi) Capacitation
- (vii) Luteolysis
- (viii) PROST

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

- (i) Spermatogenic cycle and wave
- (ii) PCOS and Endometriosis
- (iii) Primary and Secondary follicle
- (iv) Mammogenesis and Lactopoiesis
- (v) GIFT and ZIFT

c) Name the location and function of the following :
(2×5=10)

- (i) Broad ligament
- (ii) Paraventricular nuclei (PVN)
- (iii) Corona radiata
- (iv) Peritubular myoid cells
- (v) Seminal vesicle

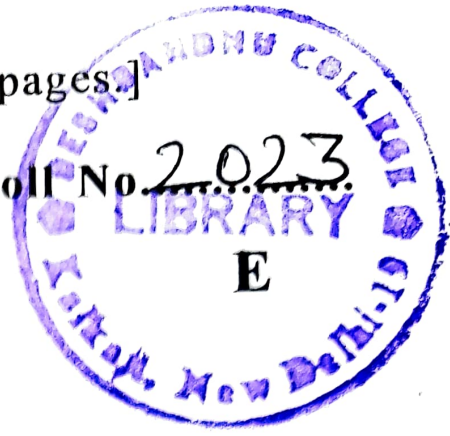
2. Diagrammatically explain the hypothalamo-hypophyseal-gonadal axis along with positive and negative feedback mechanisms in both male and female systems. (12)
3. Describe the steps of spermatogenesis. Explain the changes that happen during sperm transport and maturation in the male genital tract. (4+8=12)
4. Placenta plays an indispensable role in successful maintenance of pregnancy. Justify this statement by elaborating the role of the placental hormones. (12)
5. Discuss the various causes contributing to infertility in females. Add a note on its diagnosis and management. (8+4=12)
6. Explain the hormonal regulation of menstrual cycle and compare it with that of the estrous cycle. Discuss the changes in the genital tract corresponding to the reproductive cycle in female. (8+4=12)

7. Write short notes on any **three** : (3×4=12)
- (a) Role of prostaglandin in parturition
 - (b) Pubertal changes in male
 - (c) Hormonal regulation of ovulation
 - (d) Maternal recognition of pregnancy
 - (e) Natural contraception

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Your Roll No. 2023



Sr. No. of Question Paper : 4797

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

(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)

(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)

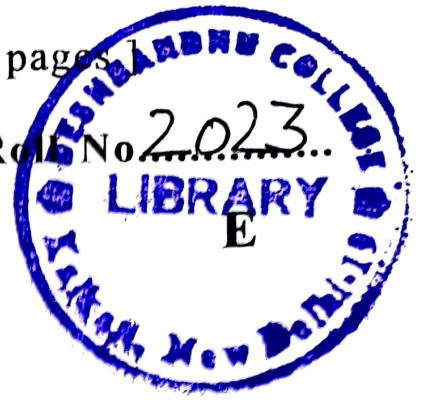
3. (a) What do you understand by isolating mechanisms? Discuss the role of reproductive isolating mechanisms leading to speciation. (8)

- (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)

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Your Roll No. 2023



Sr. No. of Question Paper : 4815

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) ω - Oxidation
- (iii) Shuttle system

P.T.O.

- (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

(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 β -oxidation of an even numbered saturated fatty acid. (8)

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

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Your Roll No.....

Sr. No. of Question Paper : 4895

Unique Paper Code : 32237903

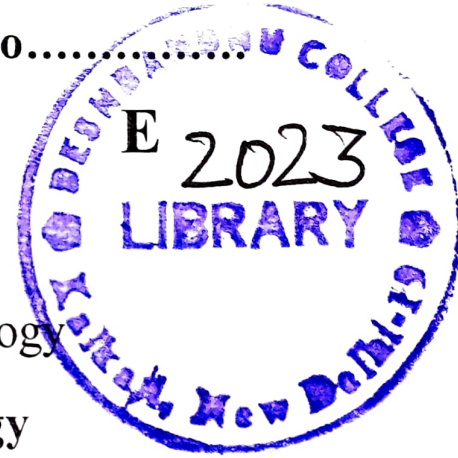
Name of the Paper : Animal Biotechnology

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

Semester : VI (DSE)

Duration : 3 Hours

Maximum Marks : 75



Instructions for Candidates

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

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

- (i) Chimeric DNA
- (ii) Shuttle vector
- (iii) Phagemids
- (iv) Transformation
- (v) Reverse transcription

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

(8)

- (i) Restriction enzyme I and Restriction enzyme II
- (ii) Northern and Western Blot
- (iii) Cloning and expression vector
- (iv) Genomic library and cDNA library
- (v) Probe and Primer

(c) Expand the following : (5)

- (i) CFTR
- (ii) SCID
- (iii) VNTR
- (iv) ES cell
- (v) Ori

(d) Write the contributions of the following scientists : (4)

- (i) Boyer and Cohen
- (ii) Frederick Sanger
- (iii) Kary Mullis
- (iv) Karl Ereky

(e) Fill in the blanks : (5)

- (i) _____ is a thermostable polymerase.

- (ii) _____ cells are the cells that can differentiate into cells of the three primary germ layers.
- (iii) The enzyme _____ is attached to the CRISPR system.
- (iv) The small stretch of DNA fragments that reads same both backwards and forwards are called as _____
- (v) Incubation with calcium ions make the bacterial cells _____ to takes up DNA.

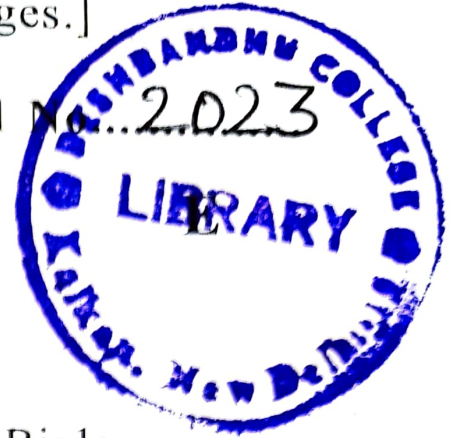
- 2. (a) Describe the DNA fingerprinting technique and its applications. (7)
- (b) Explain the process of construction of genomic library with help of suitable diagrams. (5)
- 3. (a) How can we detect sickle cell anemia using molecular diagnostic methods? Explain with the help of diagrams. (7)
- (b) What are plasmids? Add a note on their significance in biotechnology. (5)
- 4. (a) Explain the method of production of recombinant insulin. (7)

- (b) Briefly explain the Sanger's method of DNA sequencing. (5)
5. (a) What is the role of Ti plasmid in transgenic plants. Explain the complete process of transformation of plant cells using Ti plasmids. (7)
- (b) Explain the technique of northern hybridization with appropriate diagram. (5)
6. (a) Describe the method of production of transgenic animals by DNA micro injection technique. (7)
- (b) Describe the use of Zinc finger nuclease as a tool in gene editing. (5)
7. Write short notes on any **three** of the following : (4×3=12)
- (a) Electroporation
- (b) Somatic cell nuclear transplantation
- (c) Retroviral mediated transgenesis
- (d) Knockout Mice
- (e) CRISPR/Cas9 system

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Your Roll No. 2023



Sr. No. of Question Paper : 4903

Unique Paper Code : 32237910

Name of the Paper : Reproductive Biology

Name of the Course : B.Sc Hons., LOCF (VI), DSE

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. Answer any **FIVE** questions in all. Question No. 1 is compulsory.
3. Draw well labelled diagrams wherever necessary.

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

(i) Ovulation

(ii) Puberty

(iii) Azoospermia

(iv) Hirsutism

(v) Cryptorchidism

(vi) Sperm bank

(b) Differentiate between : (**Any four**) (2×4 =8)

(i) Monoestrous and Polyestrous

(ii) Folliculogenesis and Oogenesis

(iii) Vasectomy and Orchidectomy

(iv) Adenohypophysis and Neurohypophysis

(v) Slow Freezing and Vitrification

(c) Write the source of secretion and any one function of the following : (1×4=4)

(i) Relaxin

(ii) Follistatin

(iii) Anti Mullerian Hormone

(iv) Prolactin

(d) Fill in the Blanks (**Any four**) : (1×4=4)

(i) _____ is the key enzyme for conversion of androgens into estrogens.

- (ii) _____ is the non-reversible mode of contraception in females.
- (iii) Luteinization of granulosa cells takes place under the influence of _____
- (iv) In females, FSHR are located in _____
- (v) Progressive movement of sperm is seen in _____ epididymis.

(e) Expand the following terms (**Any Four**) :

(1×4=4)

- (i) ICSH (ii) GIFT
- (iii) PMSG (iv) PCOS
- (v) DHEA

(f) Give the locations and mention any one function of the following (**Any two**) : (1×2=2)

- (i) Leydig cells
- (ii) Inner cell mass
- (iii) Zona pellucida

2. (a) Give an account of epididymal maturation of spermatozoa. (6)

(b) Give an account of the hormonal methods of female contraception. (6)

3. What is folliculogenesis? List stages of follicular development. Discuss the feedback mechanisms by LH and FSH during the follicular and ovulation phases of the ovarian cycle. (12)
4. (a) Describe the events associated with sperm transport in the female reproductive tract. (7)
- (b) Describe the mode of action of steroid hormones. (5)
5. (a) What are the common female infertility disorders and discuss the role of ET and GIFT in management of female Infertility. (8)
- (b) Write a brief note on the accessory sex glands in males. (4)
6. (a) Describe the hormonal regulation of parturition. (6)
- (b) Discuss the site, significance and hormonal regulation of implantation. (6)
7. Write short note on any **three** of the following : (3×4=12)
- (a) Blood-testis barrier
- (b) Pregnancy diagnosis
- (c) Preimplantation sex-selection
- (d) Delayed implantation
- (e) Puberty