

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 2336

IC

Unique Paper Code : 42231202

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

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

Semester : II

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. There are **two** sections, **Section A** and **Section B**. Attempt **two** questions from each section.
4. Attempt **five** questions in all.
5. Draw neat labelled diagrams wherever necessary.

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

- (i) Ontogeny
- (ii) Neopalium
- (iii) Primitive streak
- (iv) Plastron
- (v) Vitellogenesis

P.T.O.

(b) Differentiate between following pairs of terms (**any five**) : (2×5)

- (i) Larynx and Syrinx
- (ii) Epiboly and Emboly
- (iii) Spermatogenesis and Spermiogenesis
- (iv) Epitheliochorial and Haemochorial placenta
- (v) True horns and Antlers
- (vi) Ductus caroticus and Ductus botalli

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

- (i) Acetabulum
- (ii) Sertoli cells
- (iii) Carnassial tooth
- (iv) Jacobson's organ

(d) Match the following : (4)

A

- (i) Acrosome
- (ii) Ceruminous gland
- (iii) Foramen ovale
- (iv) Fate map

B

- (a) Heart
- (b) Sperm
- (c) Blastula
- (d) Sweat gland

(e) Name the germ layers from which the following are derived : (4)

- (i) Notochord
- (ii) Artery
- (iii) Adrenal cortex
- (iv) Testes

SECTION - A

2. (a) Explain the succession of kidney in vertebrates. Support your answer with suitable diagrams.
- (b) Write in brief about various types of uteri in mammals. (8+4)
3. (a) What are receptors? Classify them with suitable examples. (6+6)
- (b) Briefly describe the structure and mechanism of respiration in birds.
4. Write brief notes on **any three** of the following:
- (a) Visceral arches (4+4+4)
 - (b) Pancreas

- (c) Epidermal derivatives
- (d) Ruminant stomach

SECTION - B

5. (a) Give an account of development of frog upto gastrulation with the help of labelled diagrams.
- (b) Add a note on phenomenon of metamorphosis in frog. (8+4)
6. (a) Describe the various types of morphogenetic movements and their role during mammalian development.
- (b) Explain the various phases of oogenesis that form a mature ovum from primordial germ cell. (6+6)
7. Write short notes on any three of the following : (4+4+4)
- (a) Primary organizer
 - (b) Types of cleavage
 - (c) Fate maps
 - (d) Cortical reaction

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 2337

IC

Unique Paper Code : 42161201

Name of the Paper : Plant Ecology and Taxonomy

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

Semester : II

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** and **B** on SEPARATE SHEETS.
3. Question No. 1 of both sections is COMPULSORY.
4. Attempt **three** questions from **Section A** and **three** questions from **Section B** including question number 1 of both sections.
5. Attempt **all** parts of a question together.

SECTION - A

1. (a) Define **any five** of the following terms : (5×1=5)
 - (i) Pedogenesis
 - (ii) Abundance
 - (iii) Heliophytes

P.T.O.

- (iv) Edge effect
- (v) Megatherm
- (vi) Autoecology
- (vii) Food chain

(b) Match the following : (5×0.5=2.5)

- | | |
|---------------------|---|
| (i) Ecesis | (a) Total water present in soil |
| (ii) Weathering | (b) Amount of inorganic substance present at any given time in an ecosystem |
| (iii) Holard | (c) Instrument to measure light intensity |
| (iv) Standing state | (d) Process of successful establishment of a species in a new area |
| (v) Lux meter | (e) Process of breakdown of parent rock material |

2. Differentiate between **any five** of the following : (5×3=15)

- (i) Neoendemism and paleoendemism
- (ii) Primary and secondary succession

- (iii) Epilimnion and hypolimnion
- (iv) Analytical and synthetic characters of community
- (v) Capillary water and hygroscopic water
- (vi) Pyramid of number and pyramid of biomass

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

(3×5=15)

- (i) Light as an ecological factor
- (ii) Phytogeography
- (iii) Shelford's law of tolerance
- (iv) Hydrosere

4. (a) Write an explanatory note on soil profile with the help of a well labeled diagram. (7)

(b) What are biogeochemical cycles? Discuss nitrogen cycle with the help of a diagram. (8)

SECTION - B

1. (a) Fill in the blanks (**any five**): (5×1=5)

- (i) Classification proposed by _____ is considered as phylogenetic system of classification.

P.T.O.

- (ii) The branch of taxonomy based on the information obtained from phytochemical studies is _____.
- (iii) _____ is a specimen or illustration designated by the author of the species to represent nomenclatural type of species.
- (iv) _____ botanical garden is situated in Bengaluru.
- (v) _____ is the father of taxonomy.
- (vi) The Flora of British India is written by _____.
- (vii) The ICN sets the formal starting date of plant nomenclature at _____.

(b) State true or false for the following :

(5×0.5=2.5)

- (i) Adanson is the father of numerical taxonomy.
- (ii) The annotation label is used to write the corrections done for the original label and is appended to the right side of the herbarium sheet.
- (iii) The alternate name for family cruciferae is lamiaceae.

(iv) The head office of BSI is situated at Kolkata.

(v) A clade is a group of organisms that includes a single ancestor and all of its descendants.

2. Differentiate between any five of the following :
(5×3=15)

(i) Artificial and natural system of classification

(ii) Phenogram and cladogram

(iii) Synonym and homonym

(iv) Isotype and neotype

(v) Local flora and regional flora

(vi) Indented (yoked) and parallel key

3. (a) Expand any five of the following terms : (5×1=5)

(i) APG

(ii) ICNCP

(iii) L.

(iv) IAPT

(v) Lamk .

(vi) *sp. nov.*

- (b) Discuss the Principles of ICN. (5)
- (c) Explain the role of palynology in taxonomy. (5)
4. (a) Give the merits and demerits of classification proposed by Engler and Prantl. (6)
- (b) Interpret **any three** of the following: (3×2=6)
- (i) *Delphinium viscosum* Hook.f. et Thomson
 - (ii) *Vallisneria natans* (Lour.) Hara
 - (iii) *Gossypium tomentosum* Nutt. ex Seem.
 - (iv) *Phyllanthus* Linn. emend. Mull.
- (c) Identify the taxonomic rank of **any three** of the following: (3×1=3)
- (i) Lamiales
 - (ii) *Triticum*
 - (iii) Liliaceae
 - (iv) Magnoliopsida

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 2348

IC

Unique Paper Code : 42234406

Name of the Paper : Genetics and Evolutionary
Biology

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

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 sheets.

SECTION A – GENETICS

Answer three questions in all.

Question No. 1 is compulsory.

1. (a) Distinguish between any **three** of the following :

(6)

(i) Autopolyploidy and allopolyploidy

(ii) Paracentric inversion and pericentric inversion

P.T.O.

(iii) Transition and transversion

(iv) Test cross and back cross

(b) Define any **five** of the following : (5)

(i) Frame shift mutations

(ii) Barr body

(iii) Allele

(iv) Epistasis

(v) Linkage

(vi) Aneuploidy

(c) Give a suitable example for the following : (3)

(i) A virus used for fusing somatic cells *in vitro*.

(ii) A syndrome in human due to monosomy.

(iii) A chemical mutagen.

2. (a) Explain any two non-allelic gene interactions that modify Mendelian dihybrid ratio. (6)

(b) Explain the inheritance of Kappa particles in *Paramecium*. (6)

3. (a) Discuss the method of somatic cell hybridization. How is it used for gene mapping? (8)

- (b) Explain pleiotropy with suitable examples. (4)
4. Write short notes on any **three** of the following : (4+4+4)
- (a) Multiple alleles
 - (b) Translocations
 - (c) Sex Determination in *Drosophila*
 - (d) Chromosomal theory of inheritance

SECTION B – EVOLUTIONARY BIOLOGY

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

1. (a) Define any **four** of the following : (4)
- (i) Ring species
 - (ii) Neo-Darwinism
 - (iii) Body fossils
 - (iv) Divergent evolution
 - (v) Coacervate
- (b) Differentiate between the following : (6)
- (i) Peripatric speciation and parapatric speciation
 - (ii) Continuous variations and discontinuous variations

P.T.O.

(iii) Centripetal selection and centrifugal selection

(c) Comment on the following statements: (3)

(i) The frequency of the sickle-cell allele is generally higher in areas endemic to malaria.

(ii) Fossil records support the theory of evolution.

2. (a) Describe the major postulates of Darwin's theory of evolution. (6)

(b) Give the salient features of theory of biochemical origin of life. (6)

3. Explain the various reproductive isolating mechanisms with suitable examples. (12)

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

(a) K-T mass extinction

(b) Macroevolution

(c) Industrial melanism

(d) Organic variations

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 2349

IC

Unique Paper Code : 42164401

Name of the Paper : Plant Physiology and
Metabolism

Name of the Course : B.Sc. (Programme)

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. Attempts Five questions in all.
3. Question No. 1 is compulsory.
4. All questions carry equal marks.

1. (a) Attempt (Any Five)

(5×1=5)

(i) A hormone that was named after a fungus.

(ii) An example each of asymbiotic and symbiotic N₂ fixing bacteria.

P.T.O.

(iii) Name any two mineral ions that are required for photolysis of water.

(iv) Name the most abundant enzyme protein found in green tissues.

(v) Name the end product of glycolysis.

(vi) Name the pigment that exhibits photoreversibility.

(b) Define the following (Any Five) (5×1=5)

(i) Chelating agent

(ii) Plasmolysis

(iii) Coenzyme

(iv) Apical dominance

(v) Vernalization

(vi) Anaerobic respiration

(c) Give one important contribution of the following (Any Five) (5×1=5)

(i) Ernst Münch

(ii) F.F. Blackman

(iii) Robert Hill

(iv) T. Engelmann

(v) J.V. Sachs

(vi) W.W. Garner and H. A. Allard

2. Differentiate between the following (Any Five) :
(5×3=15)

(a) Transpiration and Guttation

(b) Nitrate reductase (NR) and nitrite reductase (NiR)

(c) Macronutrient and Micronutrient

(d) Reversible and irreversible enzyme inhibitors

(e) SDP and LDP

(f) Cyclic and Non-cyclic photophosphorylation

(g) Active and passive absorption

3. Answer (Any Three) : (3×5=15)

(a) What are the criteria for determining the essentiality of mineral elements in plants?

- (b) Explain lock and key model of enzyme action with suitable diagram. Discuss any two factors affecting enzyme activity.
- (c) Describe nodulation process in leguminous plants with suitable diagrams.
- (d) Give brief account on oxidative pentose phosphate pathway.
4. Brief account on the following (Any Five) : (5×3 =15)
- (a) Crown gall
 - (b) Florigen concept
 - (c) Hatch & Slack cycle
 - (d) Ethylene as a hormone
 - (e) Respiratory quotient (RQ)
 - (f) Red drop effect
 - (g) Abscisic acid
5. Attempt the following (Any Three) : (3×5=15)
- (i) Explain GA_3 induced α - amylase synthesis in aleurone layer of cereals giving suitable diagrams.

- (ii) Describe the widely accepted "Cohesion and tension" theory of ascent of sap in higher plants. What are the limitations of this theory?
- (iii) Justify that water potential is an indicator of plant health. Explain its various components and their significance.
- (iv) Describe the activity of RUBISCO under high O_2 concentration (Photorespiratory Glycolate pathway).

6. Attempt the following : (3×5=15)

- (a) Who proposed the Pressure Flow Model for translocation of photoassimilates via phloem? Explain this model with the help of flow diagram.
- (b) Give an account of physiological roles of Auxins or Cytokinins.
- (c) How are lipids converted into sugars during germination of seeds via Glyoxylate pathway?

7. (a) Explain oxidation of pyruvate in mitochondria? Work out how many ATP molecules are produced after oxidation of one molecule of pyruvate.

(8)

P.T.O.

(b) Discuss Calvin cycle in detail mentioning enzymes involved in each step ?

(7)

Explain the role of water potential in the movement of water and solutes in plants.

Describe the activity of RUBISCO under high CO₂ concentration (Photorespiration Glycolate pathway).

Explain the following (3x2=12)

(a) You proposed the Pressure Flow Model for translocation of photoassimilates via phloem. Explain this model with the help of flow diagram.

(b) Give an account of physiological roles of Auxins.

(c) How are lipids converted into sugars during germination of seeds via Glyoxylate pathway?

(d) Explain oxidation of pyruvate in mitochondria? How many ATP molecules are produced after oxidation of one molecule of pyruvate.

(8)

(2000)

[This question paper contains 10 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 2482 IC
Unique Paper Code : 42167901
Name of the Paper : Economic Botany and
Biotechnology
Name of the Course : B.Sc. (Prog.) Life Sciences :
DSE - 1B
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 Section A and B on **SEPARATE SHEETS**.
3. Question No. 1 of both sections is **COMPULSORY**.
4. Attempt **three** questions from Section A and **three** questions from Section B including question number 1 of both sections.
5. Attempt **all** parts of the question together.

SECTION - A

1. (a) Give the **botanical name** and **family** of the plant which is major source of the following : Attempt any five :

(5×1=5)

P.T.O.

- (i) Caffeine
- (ii) Eugenol
- (iii) Cellulosic fibre
- (iv) Bread
- (v) Edible oil
- (vi) A plant which is the richest source of proteins amongst the legumes.
- (vii) A legume plant which is a rich source of oil.

(b) Expand any five of the following : (5×0.5=2.5)

- (i) CIMAP
- (ii) CIMMYT
- (iii) IARI
- (iv) NBPGR
- (v) FAO
- (vi) FRI

2. (a) Differentiate between any two of the following :
(2×2.5=5)

(i) Black tea & Green tea

(ii) Animal fibre & Vegetable fibre

(iii) Assam Tea & China Tea

(iv) Semi drying oil & Drying oil

(b) Give the principal state of India where the following
are extensively grown :
(5×1=5)

(i) Groundnut

(ii) Tea

(iii) Cotton

(iv) Soybean

(v) Pepper

(c) Give botanical names and family of the plants
exhibiting the following special features :

(i) Caryopsis fruit

(5×1=5)

P.T.O.

- (ii) Most plant parts aromatic in nature
- (iii) Dimorphic branching
- (iv) Geocarpic fruit
- (v) Drupe fruit

3. (a) Draw well labelled diagrams of any **two** of the following : (2×2.5=5)

- (i) V.S. of tea leaf
- (ii) L.S. of Clove floral bud
- (iii) C.S. of black pepper
- (iv) L.S. of wheat caryopsis

(b) Write short notes on any four of the following : (4×2.5=10)

- (i) Origin of hexaploid wheat
- (ii) General utilization of spices
- (iii) Significance of antioxidants in fatty oils

(iv) Importance of study of centre of origin of cultivated crops

(v) Economic Importance of Legumes

4. (a) Comment on any **four** of the following statements. Support your answer giving reasons : (4×2.5=10)

(i) Toxic substances in some legumes can cause diseases in humans.

(ii) Hydrogenated end product of fatty oil has better keeping quality than the fatty oil itself.

(iii) Dwarf varieties have played an important role in increasing the productivity in wheat.

(iv) Tea plant is pruned regularly.

(v) The groundnut fruits develop underground but the flowers are aerial.

(b) Fill in the blanks. Attempt any **ten** of the following : (10×0.5=5)

- (i) The term is given to those members of the Poaceae which are cultivated for their fruits (grains).
- (ii), Russian botanist, worked extensively on origin of cultivated crops.
- (iii) Triglycerides of complex organic acids are called
- (iv) Legumes are important source of in daily diet of vegetarians.
- (v) Wonder bean/poor man's meat is botanically known as
- (vi) fibers are epidermal prolongations of the seed coat cells.
- (vii) Botanical name of New world or American Cotton is
- (viii) is known as the King of Spices.
- (ix) non-volatile fraction responsible for the pungency of black pepper.

- (x) The stimulating and refreshing characteristic of tea is due to the presence of alkaloid
- (xi) is the protein which results in the formation of an elastic dough and excellent baking quality of wheat.
- (xii) "Mother of cloves is the ripened of clove.

SECTION - B

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

- (i) Hybridoma
- (ii) Monoclonal antibodies
- (iii) Microprojectile bombardment
- (iv) Somaclonal variation
- (v) Chimeric plant
- (vi) T-DNA

P.T.O.

(b) Fill in any **five** of the blanks : (5×0.5=2.5)

- (i) The technique of DNA fingerprinting was devised by _____ .
- (ii) Crown gall disease in plants is caused by _____ .
- (iii) _____ technique is used in forensics to identify criminals and also for paternity determination.
- (iv) Haploid plants can be produced by _____ culture.
- (v) Incorporation of _____ causes the pre-mature termination of polynucleotide chain in DNA sequencing reaction.
- (vi) _____ genes of Ti plasmid are responsible for T-DNA transfer into plants.

2. (a) Differentiate between any **two** of the following :

(2×2.5=5)

- (i) PCR and RT-PCR
- (ii) Northern and western blotting

(iii) RAPD and RFLP

(b) Match the following :

(5×1=5)

- | | |
|------------------------|-------------------|
| (i) Southern blotting | Kary Mullis |
| (ii) Endosperm culture | Western blotting |
| (iii) PVDF membrane | Genomic DNA |
| (iv) Androgenesis | Triploids |
| (v) PCR | Guha & Maheshwari |

(c) Write explanatory notes on any one :

(5)

(i) Micropropagation

(ii) ELISA

3. (a) Describe in detail Sanger's method of DNA sequencing and its advancement in recent times.

(8)

(b) Describe the process of embryo culture. Mention the applications of the technique.

(7)

4. (a) Illustrate the process of *Agrobacterium*-mediated gene transfer in plants and its role in the production of golden rice.

(8)

P.T.O.

(b) Explain the technique of PCR. Mention a few applications and limitations of the technique.

(7)

(1300)

This question paper contains 3 printed pages.

Your Roll No.

S. No. of Paper : 2602

IC

Unique Paper Code : 42237904

Name of the Paper : Immunology

Name of the Course : B.Sc. Life Sciences : DSE-3B

Semester : VI

Duration : 3 hours

Maximum Marks : 75

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

Attempt five questions in all.

Question No. 1 is compulsory.

1. (A) Define:

5

- i. Opsonin
- ii. Avidity
- iii. Adjuvant
- iv. Anaphylatoxin
- v. Hematopoiesis

(B) Differentiate between the following:

10

- i. Active and Passive Immunity
- ii. Primary and Secondary Immune response
- iii. Exogenous and Endogenous antigens
- iv. Polyclonal and Monoclonal Sera
- v. Innate and Adaptive Immunity

P. T. O.

(C) Write the contribution/s of the following scientists: 2

- i. Cesar Milstein and Georges E. Köhler
- ii. Jules Bordet

(D) Expand the following: 3

- i. HLA
- ii. GM-CSF
- iii. ADCC
- iv. MAC
- v. RIA
- vi. CDR

(E) Write the immunological significance of the following: 4

- i. Interferons
- ii. Bursa of Fabricius
- iii. CLIP
- iv. Rheumatoid Factor

(F) Give reasons: 3

- i. Burn victims are more prone to infections.
- ii. IgA survives the proteolytic degradation in GI tract.
- iii. Self antigens do not produce immune response in normal persons.

2. (a) Describe the basic structure of an antibody. How was the structure of antibody deduced? 8

(b) Differentiate between T cell and B cell epitopes. 4

3. (a) Describe Gell and Coomb's classification of hypersensitivity with suitable examples. 6

(b) Describe the process of Hematopoiesis with a diagram with examples from myeloid and lymphoid lineages. 6

4. (a) Differentiate between primary and secondary lymphoid organs. Write a note on structure and function of spleen. 6
- (b) Briefly discuss major types of vaccines with appropriate examples. 6
5. (a) Describe the formation of MAC through classical pathway of complement activation. 6
- (b) What is a hapten? Describe the factors which determine immunogenicity. 6
6. (a) Illustrate and discuss the cytosolic pathway for processing antigen. 6
- (b) How does Clonal Selection theory justify the four cardinal features of adaptive immune response? 6
7. Write short notes: (any *three*) 4,4,4
- a) Innate immune barriers
 - b) Immunodeficiency
 - c) Cytokines
 - d) Antigen-Antibody interaction as tools in research and diagnosis.