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This question paper contains 4 printed pages]

Your Roll No. :

Sl. No. of Q. Paper : **2933** **I**

Unique Paper Code : 2172521201

Name of the Paper : DSC- Chemical
Bonding and Elements
in Biological Systems

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

Semester : II

Time : 2 Hours

Maximum Marks : 60

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

(b) Attempt any **four** questions.

1. (a) Calculate the heat of formation of CsF from
its elements from the following data using
Born-Haber cycle. 5

Electron gain enthalpy of F = -328 kJmol^{-1}

Ionization energy of Cs = $+357.7 \text{ kJmol}^{-1}$

Heat of Sublimation of Cs = $+76.1 \text{ kJmol}^{-1}$

Bond dissociation energy of F_2 = $+158 \text{ kJmol}^{-1}$

Lattice energy of CsF (s) = -740 kJmol^{-1}

P.T.O.

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- (b) Draw the Molecular orbital energy level diagram of NO molecule and also calculate the bond order of NO, NO^{2+} . 5
- (c) What is meant by active transport in Na/K pump? Give the diagrammatic representation of the process and explain the mechanism involved in it. 5
2. (a) The dipole moment of LiF is 6.32 D and the bond distance is 156 pm. What will be the % of ionic character in LiF? ($D = 3.336 \times 10^{-30}$ C.m, charge on one electron = 1.6×10^{-19} C) 5
- (b) Write down the main postulates and Limitations of Valence Bond Theory. 5
- (c) Explain essential and non-essential elements in the bio-system with examples? Draw the Dose-response curve for essential elements in a human body. 5
3. (a) Write a short note on: 5
- (i) Application of Fajan's rule
- (ii) Born-Landé equation and explain the meaning of various terms involved in it.

- (b) Compare the HNH bond angle in NH_3 and FNF bond angle in NF_3 . Which bond angle is higher and why? 5
- (c) Where and in what form iron is stored in human body? How is it taken from the storage sites to the sites for incorporation into hemoglobin? 5
4. (a) Explain inter and intramolecular hydrogen bonding with suitable examples. How it affects the melting/boiling point of compounds. 5
- (b) Draw the Lewis structure of and. Also find out the hybridization and molecular geometry. 5
- (c) Discuss the toxic effects of Cadmium (Cd) and explain the reasons for its toxicity. What are the available methods for its treatment? 5
5. (a) Draw the Molecular orbital energy level diagram of O_2 molecule and arrange the following in increasing order of their bond length, , , , , O_2 . 5

- (b) NF_3 has a dipole moment, while BF_3 has zero dipole moment. Explain it. 5
- (c) Inability to synthesize transferrin may result in anemia as well as overload of iron. Explain. 5
6. (a) Explain the role of magnesium in chlorophyll & in energy production? 5
- (b) Arrange and explain the following molecules in the increasing order of their solubility in water. 5
 LiF , LiCl , LiBr , LiI .
- (c) Explain the role of calcium in the process of blood clotting. 5

[This question paper contains 2 printed pages.]

Your Roll No _____

Sr. No. of Question Paper : 3078
Unique paper code : 2162521201
Name of the Course : B.Sc. Life Science Botany DSC
Name of the Paper : Genetics and Molecular Biology
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 **four** questions in all including **Question No. 1 which is compulsory**.
3. All parts of a question must be answered together.
4. All questions carry equal marks.

1. a) Define the following: (**any five**) 1x5=5

- i. Variation
- ii. Tandem duplication
- iii. Suppressor mutation
- iv. Genotype
- v. Allele
- vi. Autopolyploidy

b) Give one significant contribution of the following: (**any five**) 1X5=5

- i. George Beadle and Edward Tatum
- ii. François Jacob and Jacques Monod
- iii. Alfred Hershey and Martha Chase
- iv. Thomas Hunt Morgan
- v. William Bateson and Reginald Punnett
- vi. Carl Correns

c) Expand the following: (**any five**) 1x5=5

- i. 5-BU
- ii. ORF
- iii. NTP
- iv. F₁
- v. PKU
- vi. hnRNA

2. Write short notes on the following: (any three)

5X3=15

- i. Chemical mutagens
- ii. Chromosomal theory of inheritance
- iii. Central dogma of Molecular Biology
- iv. Turner's syndrome

3. Differentiate between the following: (any three)

5X3=15

- i. Rho-dependent and rho-independent termination of transcription
- ii. Pericentric and paracentric inversion
- iii. tRNA and mRNA
- iv. Euploidy and Aneuploidy

4. Draw a well-labelled diagram of the following: (any three)

5X3=15

- i. B-DNA
- ii. Chloroplast inheritance
- iii. Replication fork
- iv. Ancestry of wheat

5. Answer the following:

8+7=15

- i. Explain variations in chromosome number and structure with the help of well-labelled diagrams.
- ii. What is operon? Explain the working of Lac Operon with the help of suitable diagrams.

6. Attempt the following:

8+7=15

- i. In a species tall (D) is dominant over dwarf (d), and blue flowers (W) is dominant over white (w). Consider two tall plants with blue flowers labelled A and B. Each was crossed to a dwarf plant with white flowers. The seeds resulting from each cross were collected and grown into F₁ plants which showed the following phenotypic classes:

Progeny of A	151 tall, blue 149 dwarf, blue
--------------	-----------------------------------

Progeny of B	74 tall, blue 76 tall, white 75 dwarf, blue 75 dwarf, white
--------------	--

What were the genotypes of A and B? Diagram the cross.

- ii. Define genetic code. Discuss Nirenberg and Matthaei's experiment that led to the deciphering of genetic code.

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[This question paper contains 4 printed pages]

Your Roll No. :

Sl. No. of Q. Paper : **3085** **I**

Unique Paper Code : 2232521201

Name of the Paper : Cell and Developmental
Biology of Animals

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

Semester : II

Time : 2 Hours

Maximum Marks : 60

Instructions for Candidates :

- (a) Write your Roll No. on the top immediately on receipt of this question paper.
- (b) Attempt any **four** questions in **all**, including Question **No.1**, which is compulsory.
- (c) Draw well-labelled diagrams wherever required.
- (d) All parts of a questions are to be attempted together.

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

- (i) Preformation
- (ii) Morphogen
- (iii) Chiasmata
- (iv) Invagination
- (v) Fate map

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

- (i) Protoplasm and Protoplast
- (ii) Blastula and Gastrula
- (iii) Holoblastic and Meroblastic cleavage
- (iv) Area Opaca and Area Pellucida
- (v) Autocrine and Paracrine signaling

(c) Name the germ layers from which the following are derived : 5

- (i) Heart
- (ii) Eye
- (iii) Muscles
- (iv) Intestine
- (v) Spinal cord

2. (a) Describe the process of spermatogenesis in mammals along with a suitable diagram. 10
- (b) Discuss the various types of morphogenetic movements. 5
3. (a) Give an elaborate account of cell cycle regulation in eukaryotes. 10
- (b) Discuss the consequences of a failure in these regulatory mechanisms in the context of cancer. 5
4. What is metamorphosis? Give a detailed account of metamorphosis in amphibians along with its hormonal regulation. 15
5. (a) Discuss the early development of the chick up to gastrulation. 8
- (b) Give a detailed account of the mechanism of neural tube formation in amphibians. 7

6. Write a short notes on any **three of the following :** 5,5,5

- (a) Von bear law
- (b) Extra embryonic membrane in birds
- (c) Types of Egg
- (d) Stem cell

Serial No. 2998

Your Roll No.....

Unique Paper Code: 2162512401

Name of the Paper: Ecology and Evolution

Name of Course B.Sc. Life Science

Semester IV

Duration: 2 hours

Maximum Marks: 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on the receipt of this question paper.
2. Attempt **FOUR** questions in all, including **question number 1 which is compulsory**
3. All questions carry equal marks
4. All parts of a question must be answered together.
5. Draw diagrams wherever required

1. (a) Define the following (any five):

(1×5=5)

- (i) Precipitation
- (ii) Density-dependent factors
- (iii) Neo-endemism
- (iv) Macroevolution
- (v) Ecological pyramid
- (vi) Ecotone

(b) State **True/False** for the following statements (any five)

(1×5=5)

(i) Liebig's Law of the Minimum states that growth is controlled by the most abundant factor.

(ii) Type I survivorship curve shows high mortality in early life.

(iii) Biomes are defined mainly by climatic conditions rather than species composition.

(iv) Nitrogen cycle includes a gaseous phase, whereas phosphorus cycle does not.

(v) Artificial selection mimics natural selection but is controlled by humans.

(vi) Paleo-endemics are recently evolved species.

(1×5=5)

(c) Match the following:

- | | |
|----------------------------|---------------------------------|
| (i) Horizon A | (A) Study of plant distribution |
| (ii) Dispersion | (B) Geographical isolation |
| (iii) Niche | (C) Distribution pattern |
| (iv) Allopatric speciation | (D) Functional role |
| (v) Phyto geography | (E) Mineral layer of soil |

2. With the help of well labelled diagrams, explain any three of the following (5×3=15)

- (i) Thermal stratification in water bodies
- (ii) Levels of ecological organization
- (iii) The concept of the tree of life.
- (iv) Phosphorus cycle

3. Differentiate between the following (any three) (5×3=15)

- (i) Ecosystem and Biome
- (ii) Mutualism and Commensalism
- (iii) Autogenic and Allogenic succession
- (iv) Endemic and Cosmopolitan species

4. (a) Describe natality and mortality and their ecological significance.

(5)

(b) Describe ecological succession and its stages.

(5)

(c) Describe modes of speciation with examples.

(5)

5. (a) Discuss the role of geographical and climatic factors in plant distribution.

(8)

(b) Describe Darwinism and natural selection with examples.

(7)

(5)
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Your Roll No. :

Sl. No. of Q. Paper : 3072 **I**

Unique Paper Code : 2232522401

Name of the Paper : LS-DSC-12: Fundamentals
of Human Physiology

Name of the Course : **B.Sc. (Prog.) Life Sciences
(NEP-UGCF)**

Semester : IV

Time : 2 Hours

Maximum Marks : 60

Instructions for Candidates :

- (a) Write your Roll No. on the top immediately on receipt of this question paper.
- (b) Attempt **four** questions in all.
- (c) Question No. **1** is compulsory.
- (d) Draw well labelled diagrams wherever required.

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

- (i) Emulsification
- (ii) Refractory Period
- (iii) Pacemaker
- (iv) Negative Feedback Mechanism

P.T.O.

- (b) Differentiate between the following: (any **three**) : 6
- (i) Isotropic and Anisotropic Band
 - (ii) Bohr effect and Haldane effect
 - (iii) Multipolar and Bipolar neurons
 - (iv) Spermatogenesis and Spermeiogenesis
- (c) Expand the following: (any **two**) : 1
- (i) EPSP
 - (ii) ADH
 - (iii) MV
- (d) Fill in the blanks: (any **two**) : 2
- (i) and are components of muscle TRIAD.
 - (ii) Hypersecretion of GH during childhood causes
 - (iii)hormones are derived from cholesterol.
- (e) Give the location and function of the following: (any **three**) 3
- (i) Parietal cells
 - (ii) Podocytes
 - (iii) Chromaffin cells
 - (iv) Calsequestrin

2. (a) Give an account on microscopic organization of sarcomere. 6
- (b) Discuss the events involved in excitation-contraction coupling cycle of skeletal muscle. 9
3. (a) Describe the endocrine role of ovary in the female reproductive system. 9
- (b) Explain the factors that contribute to resting membrane potential in the nervous tissue. 6
4. (a) Elucidate the major changes during different phases of Cardiac cycle. 9
- (b) Outline the process of pulmonary ventilation with the help of diagrams. 6
- 5 (a) Describe the digestion of proteins in various regions of gastrointestinal tract. 8
- (b) Explain the process of Counter-current mechanism in formation of urine. 7

3072

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

- (i) Endocrine function of Pancreas
- (ii) Histological Structure of Testis
- (iii) Carbon Dioxide transport in Blood
- (iv) Ultrafiltration

Sr. No. of Question Paper : 2917

L

Unique Paper Code : 2172523601

Name of the Paper : DSC: Conductance, Electrochemistry & Chemical Kinetics

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

Semester : VI

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. Q. No. 1 is compulsory,
3. Each question carries equal marks.
4. Use of Scientific Calculator is permitted.

$$(F = 96500 \text{ C mol}^{-1}, R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1})$$

1. Answer any five. Each carries equal marks. (3×5)
 - (a) Equivalent conductance increases while conductivity decreases with dilution of solution of electrolyte. Explain.
 - (b) Transport number of Cl^- ion in aqueous solution of HCl is 0.16 and it is 0.62 in aqueous solution of NaCl. Explain.
 - (c) Ionic Molar Conductivity at infinite dilution increases as Li^+ , Na^+ , K^+ , Rb^+ . Explain.
 - (d) Explain the terms specificity and selectivity in catalysis with examples.
 - (e) The first order reaction never achieves completion. Explain.
 - (f) If we double all the coefficients in a cell reaction, the charge number 'n' is doubled and the emf is unchanged. Explain.

P.T.O.

2. (a) Draw and discuss the titration curves obtained during the conductometric titration of :

(i) An aqueous solution of CH_3COOH with aqueous solution of NaOH .

(ii) An aqueous solution of HCl with aqueous solution of NH_4OH . (5)

- (b) A cell contains 0.10 mol dm^{-3} aqueous KCl , which at that concentration has a molar conductivity of $129 \text{ ohm}^{-1}\text{cm}^2\text{mol}^{-1}$. The measured resistance was 28.44 ohm . When the same cell was filled with 0.05 mol dm^{-3} NaOH aqueous solution the resistance was 31.6 ohm . Find the molar conductivity of aqueous NaOH at that concentration. (5)

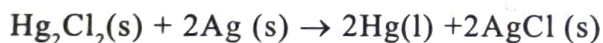
- (c) Define Ionic Mobility. What is its unit? Write the relation between transference number and ionic mobility. (5)

3. (a) Derive the expression for the determination of the pH of the solution using glass electrode. Mention two advantages of glass electrode. (5)

- (b) The emf of the cell



is 0.0455 V at 298 K and the temperature coefficient is $3.38 \times 10^{-4} \text{ V K}^{-1}$. The cell reaction is



Calculate ΔG , ΔH and ΔS at 298 K . (5)

- (c) Explain the potentiometric titration curves Mohr salt and $\text{K}_2\text{Cr}_2\text{O}_7$. Discuss the redox pairs involved in the reaction

(i) Before equivalence point

(ii) After equivalence point (5)

4. (a) What are the advantages of using salt bridge in electrochemical cells? KCl and NH_4NO_3 are frequently used to prepare salt bridge. Explain. (5)

(b) Given that

$$E^{\circ}_{\text{Cu}^{2+}|\text{Cu}} = 0.337\text{V and } E^{\circ}_{\text{Cr}^{3+}|\text{Cr}} = -0.774\text{V}$$

Write the cell representation of the following chemical reaction. Determine, whether the given reaction proceeds in forward or backward direction at 25°C.



(c) Write short notes on :

(i) Daniel cell

(ii) Electrochemical series (2.5×2)

5. (a) Write the integrated rate equation for a first-order reaction.

For a reaction $\text{A} \rightarrow \text{Products}$, the following data is given :

[A] (mol L ⁻¹)	Rate (mol L ⁻¹ s ⁻¹)
0.10	2.0×10^{-3}
0.20	4.0×10^{-3}
0.40	8.0×10^{-3}

(i) Determine the order of reaction. (ii) Calculate the rate constant. (5)

(b) Derive the expression for its half-life of a second order reaction. A second-order reaction has a rate constant $k=3.3 \times 10^{-2} \text{ dm}^3 \text{ mol}^{-1} \text{ s}^{-1}$. If the initial concentration of the reactant is 0.05 mol dm^{-3} calculate its half-life. (5)

(c) Explain the Lineweaver-Burk plot ($1/r \sim 1/[S]$) used in enzyme catalysis kinetics. How are r_{max} and K_m determined from the slope and intercept of this plot? (5)

6. (a) Derive the expression for rate of a reaction involving specific acid catalysis. (5)

P.T.O.

- (b) Using Langmuir adsorption theory, show that a uni-molecular surface reaction follows first order kinetics at low pressures and zeroth law kinetics at high pressures. Support the answer with appropriate expressions and a suitable diagram. (5)
- (c) Define Activation Energy. How does a catalyst change the activation energy (represented on a potential energy diagram)? The rate constants of a reaction at 300 K and 350 K are $2.5 \times 10^{-3} \text{ s}^{-1}$ and $5.0 \times 10^{-3} \text{ s}^{-1}$ respectively. Calculate the activation energy of the reaction. (5)

(3000)

[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 2924

L

Unique Paper Code : 2162523601

Name of the Paper : DSE – ECONOMICS BOTANY AND BIOTECHNOLOGY

Name of the Course : B.SC. LIFE SCIENCE

Semester : VI

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt four questions in all . **Question no. 1 is compulsory.** All parts of question should be answered together.
3. Draw diagrams wherever required.

Q1. (A) Define the following terms (any five)

1 x 5 =5

- a. Totipotency
- b. Molecular Marker
- c. Shuttle vectors
- d. PCR
- e. Nuclease
- f. Edible vaccine

(B) Mention the scientific name, common name, family, economically important plant part of the following (any five)

1 x 5 =5

- a. A spice
- b. A fibre yielding plant
- c. A beverage
- d. A Millet
- e. An oil yielding crop
- f. A pulse

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(C) Fill in the blanks (any five)

1 x 5 = 5

- The enzyme used to join two DNA fragments is
- SDS PAGE separates proteins on the basis of
-is genetically engineered crop to produce Beta-carotene.
- The primary centre of origin for *Oryza sativa* is
- The technique used to introduce DNA into cells using high-voltage electric current is.....
- The positively geotropic stipe in the groundnut is referred to as.....

Q 2. A. Explain the ecological and economic importance of legumes.

5 Marks

B. Explain the mechanism of T-DNA transfer from *Agrobacterium* to plant genome with the help of suitable diagrams?

5 Marks

C. Give detailed account of processing of cotton.

5 Marks

Q 3. A. Draw well labelled diagrams of the following (any three)

3 x 3 = 9

- L.S. of clove bud
- T.S. of peppercorn
- pUC 18
- L.S of wheat caryopsis

B. What is Androgenesis? Write the steps of androgenesis to obtain plantlets and its relevance in tissue culture.

6 Marks

Q 4. Differentiate between (any three)

5 x 3 = 15

- Fatty oils and Essential oils
- Green tea and Black tea
- Southern and Western blotting
- RAPD and RFLP

Q 5. A. How the development of Bt Cotton has impacted agriculture? Highlight its applications and challenges in plant biotechnology.

5

Marks

B. Enumerate DNA fingerprinting. Briefly mention the applications of the technique.

5 Marks

C. Discuss the role of millets in combating malnutrition and lifestyle diseases.

5 Marks

Q 6. Write short notes on (any three)

5 x 3 = 15

- Germplasm conservation
- Vavilov's centres of origin
- Biolistics
- Selection of recombinants

(3000)

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Your Roll No. :
Sl. No. of Q. Paper : **2929** **I**
Unique Paper Code : 2232523601
Name of the Paper : Basics of Immunology
(NEP)
Name of the Course : **B.Sc. Life Sciences**
Semester : VI

Time : 2 Hours

Maximum Marks : 60

Instructions for Candidates :

- (a) Write your Roll No. on the top immediately on receipt of this question paper.
- (b) Attempt **four** questions in all including **Question number 1**, which is compulsory.
- (c) Draw suitable well-labelled diagrams wherever it is necessary.

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1. (a) Define the following terms:

- (i) Interferons
- (ii) Adjuvant
- (iii) Immunodeficiency
- (iv) Variolation

(b) Write the full form of the following:

3

- (i) TNF
- (ii) TLR
- (iii) ADCC
- (iv) PAMP
- (v) CDR
- (vi) SCID

(c) Differentiate between the following:

4

- (i) Subunit vaccine and recombinant vector vaccine
- (ii) MHC I and MHC II

(d) Give the contributions of the following scientists:

2

- (i) G. Snell, J. Dausset and B. Benacerraf
- (ii) Edward Jenner

(e) Give reason for the following: 2

(i) Passive immunity is transient.

(ii) In multivalent antibodies avidity is greater than affinity.

2. Write in detail about the effector function of cell mediated immunity and humoral immunity.

8+7=15

3. Draw a well labelled diagram of an antibody monomer and compare the structure and function of IgG and IgM. Explain how was the structure of antibody deduced?

8+7=15

4. With the help of suitable diagram explain the processing of the exogenous and endogenous antigens.

8+7=15

5. Describe the Classical pathway of complement system. How its activation is different from Lectin pathway?.

8+7=15

6. Write short notes. (any three)

3×5=15

- (i) Inflammation
- (ii) Properties of cytokines
- (iii) Delayed type of hypersensitivity
- (iv) Autoimmune disorders

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 3020

L

Unique Paper Code : 2173522013

Name of the Paper : DSE : RESEARCH
METHODOLOGY FOR
CHEMISTS

Name of the Course : B.Sc. (Prog.) / Life Sciences /
Physical Sciences with
Chemistry

Semester : VI

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 **six** questions in all.
3. **All** questions carry equal marks.

1. (a) A student determines the concentration of a solution (in mol/L) five times: 10.2, 9.8, 10.1, 9.9, 10.0. Calculate the mean and standard deviation.

- (b) The Journal of the American Chemical Society publishes 1,200 papers in year 2023 and their Citations in 2024 is 25,000. It publishes 1,100 papers in the year 2022 and their citations in 2024 is 23,000. Calculate the Impact Factor of the Journal of the American Chemical Society for the year 2025.
- (c) Give full form for ANOVA, TRIPS, IPR, ORCID, APA. (5,5,5)
2. (a) What is research process. Discuss the common steps in the research process.
- (b) What are primary and secondary sources of information. Give example.
- (c) What are the various components of a research article. (5,5,5)
3. (a) Discuss any three key digital resources/databases used in chemistry research.
- (b) What is literature survey. What is its importance.
- (c) The citation counts of a specific research article are given below :

120, 95, 80, 75, 60, 55, 50, 45, 40, 38, 35, 30, 28,
25, 22, 20, 18, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7.

Calculate the i 10-index of the researcher.

(5,5,5)

4. (a) Explain Boolean search techniques with examples.

(b) What is the difference between thesis and dissertation. Name any two the softwares used for writing a thesis.

(c) What is a research poster. Discuss a general layout and content of a poster. (5,5,5)

5. (a) What is science communication. Why is it important.

(b) What is COPE. What are its key guidelines.

(c) What are the duties of an editor of a journal. (5,5,5)

6. (a) Explain

(i) Predatory Journals

(ii) Redundant publication

(b) What is the difference between falsification and fabrication of data.

(c) What is IPR. Mention its types. (5,5,5)

7. (a) What do you understand by scientific conduct and misconduct.

(b) State the features of SPSS and origin.

(c) The following data shows concentration (x) and absorbance (y) in an experiment:

Conc. (x)	1	2	3	4	5
Absorbance (y)	0.2	0.4	0.5	0.4	0.5

Calculate the correlation coefficient (r).

(5,5,5)

8. (a) Explain normal and binomial distribution curve with diagram.

(b) Give abbreviation for :

(i) European Journal of Inorganic Chemistry

(ii) Journal of Analytical Chemistry

(iii) Environmental Science & Technology

(iv) Bulletin of the Chemical Society of Japan

(v) Industrial & Engineering Chemistry
Research

(c) What is the difference between endnote and footnote. (5,5,5)

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Your Roll No. :

Sl. No. of Q. Paper : **107** **I**

Unique Paper Code : 2232014801

Name of the Paper : DSC-20 : Comparative
Physicology of Vertebrates
(NEP-UGCF)

Name of the Course : **B.Sc.(H) Zoology / B.Sc.
(P) Life Science**

Semester : **VIII**

Time : 2 Hours **Maximum Marks : 60**

Instructions for Candidates :

- (a) Write your Roll No. on the top immediately on receipt of this question paper.
- (b) Attempt **four** questions in all.
- (c) Draw neat labelled diagrams wherever necessary.

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

- (i) Thermogenin
- (ii) Hypobaric hypoxia

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- (iii) Hardware stomach
- (iv) Root-effect hemoglobin.
- (v) Ovoviviparity
- (vi) Starvation

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

- (i) Starvation and Fasting
- (ii) Osmoconformers and Osmoregulators
- (iii) Gill and Parabronchial respiration
- (iv) Autoenzymatic and Alloenzymatic Digestion
- (v) Estrous and Menstrual Cycle

(c) Expand the following (attempt any **two**) : 2×1=2

- (i) HVR
- (ii) BAT
- (iii) HPG

2. (a) Compare the mechanisms of thermoregulation in homeotherms and poikilotherms. Add a note on the role of various hormones and ion channels therein. 10

- (b) Describe the mechanisms of thermal regulation in desert animals. 5
3. (a) Delineate the fine structure of the fish gill and the bird lung, and compare the functional similarity between them. 8
- (b) Examine the process of counter-current exchange of O_2 and CO_2 in fish and birds. 7
4. (a) Discuss the challenges and physiological adaptations necessary for air and aquatic respiration. 8
- (b) Discuss the gradual shift in physiological fuels in response to chronic starvation in various vertebrates. 7
5. (a) Explain the general mechanisms of Osmoregulation in animals. 5
- (b) Compare and contrast the challenges of osmoregulation among freshwater and marine vertebrates. 10

6. Write short notes (attempt any **three**):

3×5=15

- (i) High-altitude adaptations in various vertebrate classes.
- (ii) Structure and digestion in different compartments of the rumen.
- (iii) Modes of reproduction in various vertebrates.
- (iv) Physiological responses to desert conditions.

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5267

L

Unique Paper Code : 2234000032

**Name of the Paper : Concept of Evolutionary
Biology (DSC)**

**Name of the Course : B.Sc. (P) (Applied Life
Sciences - Agrochemicals
& Pest**

**Semester : VIII, NEP-UGCF (May/June
2026)**

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **four** questions in all.
3. Question No. **1** is compulsory.
4. Draw well labelled diagram wherever required.

1. Define the followings (any **five**) : (1×5=5)

(a) (i) Mass Extinction

(ii) Allopatric Speciation

(iii) Molecular Clock

(iv) Coacervates

(v) Petrification

(vi) Kin selection

(b) Differentiate the followings (any **four**) :

(4×2.5=10)

(i) Ring species and Sibling Species

(ii) Founder effect and Bottleneck effect

(iii) Lamarkism and Darwinism

(iv) Artificial and Natural Selection

(v) Body fossil and Trace fossil

2. (a) Define reproductive isolation and discuss about various prezygotic and post zygotic methods of reproductive isolation. (9)
- (b) Discuss in brief about biochemical theory of origin of life. (6)
3. (a) Discuss in detail about Neo-Darwinism theory of Evolution. (8)
- (b) Define speciation and discuss about various types of speciation mechanisms. (7)
4. (a) Discuss about different types of genetic variations and their role in evolution. (8)
- (b) Discuss about natural selection and different models of natural Selection. (7)
5. Define and explain the following : (5×3=15)
- (a) RNA World
- (b) Endosymbiotic Theory
- (c) K-T Extinction

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

(a) Biological Species Concept

(b) Geological time Scale

(c) Genetic drift

(d) Adaptive resemblances

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5534

L

Unique Paper Code : 2234000032

**Name of the Paper : Concept of Evolutionary Biology
(DSC)**

**Name of the Course : B.Sc. (P) (Applied Life
Sciences - Agrochemicals
& Pest**

**Semester : VIII, NEP-UGCF (May/June
2026)**

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **four** questions in all.
3. Question No. 1 is compulsory.
4. Draw well labelled diagrams wherever required.

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

- (i) Speciation
- (ii) Chemogeny
- (iii) Sexual Selection
- (iv) Ring Species
- (v) Genetic Load
- (vi) Genetic drift

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

- (i) Darwinism and Neo-Darwinism
- (ii) Microevolution and Macroevolution
- (iii) Founder's Effect and Bottleneck Effect
- (iv) Oxygenic vs Anoxygenic Photosynthesis

(c) Justify the following : (1×4=4)

- (i) Fossils are strong evidence for evolution.
- (ii) The importance of the geological time scale in studying evolution.

(iii) Artificial selection can lead to rapid evolutionary changes.

(iv) The K-T extinction event was a turning point in evolutionary history.

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

(b) Critically analyze the endosymbiotic theory in light of molecular phylogeny. Are there alternative explanations for organelle origin? (6)

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

(b) Critically analyze the multiple hypotheses for the K-T extinction and discuss their combined effects on global ecosystems. (6)

4. (a) Briefly explain the isolating mechanisms of animals in details. (9)

(b) Differentiate between the biological species concept and evolutionary species concept. (6)

5. (a) Discuss about different types of genetic variations and their role in evolution. (9)
- (b) Differentiate between the phylogenetic species concept and ecological species concept. (6)
6. Write short notes on any **three** of the following :
- (a) Migration and Mutation
- (b) Camouflage and Mimicry
- (c) Origin and Evolution of Insects
- (d) Geological time Scale (3×5=15)