**B. Sc. (BIOTECH) 4th Semester (New Scheme)**

**(Fresh & Re-appear) Examination, May–2024**

**ANIMAL DIVERSITY**

**Paper-BT-401**

Time allowed : 3 hours]                    [Maximum marks : 40

Note : *Question No. 1 is compulsory. Attempt four more questions by selecting one question from each unit. All questions carry equal marks.*

1.    Write short notes on following :                    8×1=8

    (a)   Notochord
    (b)   Ciliary feeder
    (c)   Dinosaurs
    (d)   Poikilothermous
    (e)   Jacobson's organ
    (f)   Evolutionary history
    (g)   Diaphragm
    (h)   Aortic arches

### Unit–1

2.    What is the difference between Chordates and Non-Chordates?                    8

3.    Write the note on **any two**:                    2×4=8

    (a)   Parental care in Amphibian
    (b)   Branchiostoma
    (c)   Outline of classification of the Pisces

## Unit–2

4.   Write the note on **any two** :          2×4=8

    (a)   Classification of Reptiles
    (b)   Flight-adaptations in birds
    (c)   Theory of the origin of Aves (Birds)

5.   Describe the origin, classification and economic importance of mammals.          8

## Unit–3

6.   Describe the comparative anatomy of the larynx of vertebrates.          8

7.   Compare the anatomy of various scales of vertebrates. 8

## Unit–4

8.   Describe the comparative anatomy and development of the brain.          8

9.   Write a short note on the comparative anatomy of **any two**:          2×4=8

    (a)   Kidney
    (b)   Eye of vertebrates
    (c)   Urinogenital system

**B. Sc. (Biotech) 4ᵗʰ Semester (New Scheme)**

**(Fesh & Re-appear) Examination, May–2024**

**MOLECULAR BIOLOGY**

**Paper-BT-402**

<u>Time allowed : 3 hours]</u>                          [Maximum marks : 40

**Note :** Question No. 1 is compulsory. Attempt **four** more questions by selecting **one** question from each unit. All questions carry equal marks.

1.   Write the notes on the following:                 8×1=8

  (a)   Semiconservative nature

  (b)   Bidirectional replication

  (c)   Origin of replication

  (d)   Nucleotide

  (e)   Junk DNA

  (f)   Promoter

  (g)   Initiation codon

  (h)   Charging of tRNA

## Unit–1

2.   What is replication? What are the differences between prokaryotic and eukaryotic DNA replication?                 8

3.   Write the notes on **any two** :                 2×4=8

  (a)   Basic structure of DNA

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(b)   DNA polymerases

(c)   Replication complex

## Unit–2

4.   Describe the various causes and types of DNA damage.8

5.   Write the notes on **any two**:                    2×4=8

(a)   Photoreactivation

(b)   Nucleotide excision repair

(c)   Non-homologous end joining

## Unit–3

6.   Describe the mechanism and process of RNA splicing.8

7.   Write the notes on **any two**:

(a)   Basic structure and types of RNA

(b)   Prokaryotic RNA polymerases

(c)   Post-transcriptional modification

## Unit–4

8.   What is gene expression? Explain the gene expression through the Operon model.                    8

9.   Write the notes on **any two**:                    2×4=8

(a)   Genetic code

(b)   Translation in Eukaryotic

(c)   Post-translational modifications of proteins

B. Sc. (Biotech) 4ᵗʰ Semester (New Scheme)
(Fresh and Re-appear) Examination, May–2024
ANIMAL DEVELOPMENTAL BIOLOGY
Paper-BT-403

Time allowed : 3 hours]                    [Maximum marks : 40

Note : Question No. 1 is compulsory. Attempt four more
       questions by selecting one question from each unit.
       All questions carry equal marks.

1.  Write short notes on following:                    4×2=8

    (a)  Vitellogenesis

    (b)  Egg's Membranes

    (c)  Dedifferentiation

    (d)  Importance of stem cells

## Unit–1

2.  What is Development Biology? Describe the Historical
    development of Development Biology.                    8

3.  Write the short note on any two:                    2×4=8

    (a)  Classification of eggs

    (b)  Mechanism of fertilization

    (c)  Similarities between spermatogenesis and
         oogenesis

## Unit–II

4. What is Blastulation? Can you describe its process, types and mechanism?    8

5. Write the short note on **any two** :    2×4=8

   (a) Gastrulation

   (b) Cleavage

   (c) Fate Maps in early embryos

## Unit–3

6. Write the short note on :    2×4=8

   (a) Embryonic induction

   (b) Neural induction

7. Describe the primary, secondary and tertiary types of embryonic induction in detail.    8

## Unit–4

8. What are the extra-embryonic membranes? Describe their functions in detail.    8

9. Write the short note on :    2×4=8

   (a) Development of behavior Constancy and Plasticity

   (b) Development of vertebrate eye

**B. Sc. (Bio-Technology) 4ᵗʰ Semester New Scheme**

**(Fresh and Re-appear) Examination, May–2024**

**PHYSICAL CHEMISTRY**

**Paper-BT-405**

*Time allowed : 3 hours]*      *[Maximum marks : 40*

**Note :** *Attempt five questions in all, selecting **one** question from each sections. **Question No. 1 is compulsory.** All questions carry equal marks.*

## Compulsory Question

1.    (a)    What is Clausius inequality?        1

      (b)    What do you mean by the thermodynamic scale of temperature?        1

      (c)    What is Helmholtz function?        1

      (d)    Write the expression for criteria of spontaneity in terms of entropy change.        1

      (e)    Define electrode potential.        1

      (f)    What do you mean by EMF?        1

      (g)    What is the advantage of quinhydrone electrode over hydrogen electrode?        1

      (h)    What is solubility product?        1

## Section-A

2.    (a)    Derive an expression for entropy change on mixing of ideal gases.        4

      (b)    Calculate the entropy change involved in the conversion of 1 mole of ice at 273 K to water at the same temperature. (Latent heat of fusion of ice is 335 joules per gram).        4

3. (a) Describe Carnot's theorem and the efficiency of reversible heat engines. 4

   (b) Derive an expression for entropy change of an ideal gas when temperature changes from $T_1$ to $T_2$ and volume changes from $V_1$ to $V_2$. 4

## Section-B

4. (a) State and explain the third law of thermodynamics.

   (b) What is residual entropy? 2

   (c) How third law of thermodynamics helps in the determination of absolute entropies of chemical compounds at any desired temperature? 4

5. (a) Derive Gibbs-Helmholtz equation. 4

   (b) Describe Nernst heat theorem. 4

## Section-C

6. (a) Differentiate between electrochemical and electrolytic cell. 3

   (b) Describe the construction and working of standard hydrogen electrode. 3

   (c) What is electrochemical series? 2

7. (a) Describe different types of reversible electrodes with examples. 6

   (b) Explain Nernst equation for a cell. 2

## Section-D

8. (a) Describe the determination of pH of a solution using glass electrode. 4

   (b) What is liquid junction potential? Derive an expression for it. 4

9. (a) Derive an expression for EMF of a concentration cell without transference. 4

   (b) Describe the determination of activity coefficients from EMF measurements. 4

**B. Sc. (Bio-Technology) 4ᵗʰ Semester**

**(Fresh and Re-appear) Examination, May–2024**

**INORGANIC CHEMISTRY**

**Paper-BT-407**

*Time allowed : 3 hours]*     *[Maximum marks : 40*

**Note :** *Attempt five questions in all, selecting **one** question from each section. **Q. No. 1** is compulsory. All questions carry equal marks.*

## Compulsory Question

1. (a) Why most of the lanthanides are coloured?   1

   (b) Out of $La(NO_3)_3$ and $Tm(NO_3)_3$, which is thermally more stable?   1

   (c) Write down the general electronic configuration of actinides.   1

   (d) Name the element formed by $\beta$ decay of neptunium.   1

   (e) What is common ion effect?   1

   (f) Write the chemistry of ring test of nitrates?   1

   (g) What is the role of digestion in precipitation? 1

   (h) Name the precipitating reagent for group-IV radicals.   1

## Section-A

2. (a) What are lanthanides? Why lanthanides are known as rare earth elements?   4

   (b) Describe the cause and effect of lanthanide contraction.   4

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3. (a) Why europium (II) is more stable than cerium (II)?

2

(b) Why lanthanides show similar chemical properties?

2

(c) Why lanthanides have a poor tendency to form complexes?

2

(d) Describe the ion exchange method for the separation of lanthanides.

2

## Section-B

4. (a) What are actinides? Why actinides have uncertain electronic configurations?

3

(b) Why actinides form oxocations while lanthanides do not?

3

(c) What are transuranic elements?

2

5. (a) Differentiate between actinides and lanthanides. 4

(b) Explain the chemistry of separation of Np, Pu and Am from uranium.

4

## Section-C

6. Explain the chemistry of two tests for the following: 4,

(i) Sulphites

(ii) Chlorides

7. (a) How carbonate is detected in the presence of sulphites ?

4

(b) How nitrates are detected in the presence of bromides and Iodides?

4

## Section-D

8. (a) Describe the application of solubility product in inorganic analysis. 4

   (b) Explain co-precipitation and post precipitation. 4

9. (a) Describe the chemistry of separation and confirmation of $Ba^{2+}$, $Ca^{2+}$ and $Sr^{2+}$. 6

   (b) Explain the role of HCl in analysis of basic radicals of group II. 2

**B. Sc. (Bio-Technology) 4ᵗʰ Semester New Scheme**

**(Fresh and Re-appear) Examination, May–2024**

**ORGANIC CHEMISTRY**

**Paper-BT-406**

_Time allowed : 3 hours]_        _[Maximum marks : 40_

_Note : Attempt **five** questions in all, selecting **one** question from each section. Q. No. 1 is compulsory. All questions carry equal marks._

1. **Compulsory question:**

  (a) What are overtones?      1

  (b) What is fingerprint region in IR spectroscopy? 1

  (c) Convert nitrobenzene to aniline.      1

  (d) What is azo dye test?      1

  (e) Convert m-dinitrobenzene into m-nitroaniline. 1

  (f) Convert benzenediazonium chloride into phenol. 1

  (g) Why benzaldehyde can not undergo aldol condensation?      1

  (h) What is Corey's reagent?      1

**Section-A**

2. (a) Differentiate symmetric and asymmetric stretching with examples.      2

  (b) Describe various types of in plane and out of plane bending vibrations.      6

3.   Describe :          2,2,2,2

     (i)   Hooke's Law

     (ii)   Infrared active compounds

     (iii)   Vibrational coupling

     (iv)   Fermi resonance

## Section-B

4.   (a)   Why aniline is less basic than ethanamine?

     (b)   Describe :          3,3

         (i)   Hoffmann bromamide reaction

         (ii)   Gabriel phthalimide reaction

5.   (a)   Compare the reaction of primary, secondary and tertiary amines with nitrous acid.    4

     (b)   Compare the relative basicity of primary, secondary and tertiary amines in aqueous medium.    4

## Section-C

6.   (a)   Describe the mechanism of diazotization. Why arenediazonium salts are more stable than alkanediazonium salts?    5

     (b)   Describe coupling reaction with mechanism.    3

7.   (a)   Explain the mechanism of nitration of benzene. 4

     (b)   Why arenes undergo nitration more easily than alkanes?    2

     (c)   Explain the reduction of nitrobenzene under basic conditions.    2

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## Section-D

8.　(a)　Explain Baeyer-Villiger oxidation with mechanism.　　　3

　　(b)　Compare the Clemmensen and Wolff-Kishner reduction of carbonyl compounds.　　5

9.　Describe with mechanism:　　　4,4

　　(i)　Benzoin condensation

　　(ii)　Mannich reaction