Your Roll No...............

Sr. No. of Question Paper : 766   B

Unique Paper Code   : 42161201

Name of the Paper   : Plant Ecology and Taxonomy

Name of the Course   : B.Sc. Life Science

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 **Section B** on separate sheets Question no. **1** is compulsory from **both** sections.

3. In total, attempt **three** questions from **Section A** and **three** questions from **Section B** including question number 1 of **both** sections.

Section A : Plant Ecology

1. (a) Match the following :   (5×½=2½)

(i) Zone of illuviation   (a) B-Horizon

(ii) Life forms   (b) Qualitative character

(iii) Stratification   (c) Anemometer

(iv) Zone of leaching   (d) Raunkiaer

(v) Wind Velocity   (e) A-Horizon

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

   (i) Homeostasis

   (ii) Humus

   (iii) Phanerophytes

   (iv) Ecesis

   (v) Climax community

   (vi) Ecotone

2. Write short notes (any three) :   (3×5=15)

   (i) Soil Profile

   (ii) General Process of Succession

(iii) Ecological Pyramids

(iv) Shelford Law of Tolerance

3. (a) Define the term Phytogeography. Name the different botanical provinces of India. Give an elaborate account of any one. (8)

(b) Describe the role of Biogeochemical cycles in the ecosystem. Explain Nitrogen cycle in detail. (7)

4. Differentiate between (any three) : (3×5=15)

(i) Sciophytes and Heliophytes

(ii) Food Chain and Food Web

(iii) Colluvial and Alluvial soil

(iv) Autotrophic Succession and Heterotrophic Succession

(v) Paleo-endemism and Neo-endemism

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Section B : Taxonomy

1. (a) Expand the following : (½=2½)

   (i) DC

   (ii) *nom. cons.*

   (iii) L.

   (iv) IAPT

   (v) *ex.*

   (b) Match the following : (5×1=5)

   (i) Binomial Nomenclature   (a) J.D. Hooker

   (ii) Phylogenetic classification   (b) Bengaluru

   (iii) Numerical Taxonomy   (c) Robert and Sneath

   (iv) Lal Bagh Botanical Garden (d) Takhtajan

   (v) Flora of British India   (e) 1st May 1753

2. (a) Give an outline of Engler and Prantl's system of classification. Discuss any two merits and two demerits of this system. (4+4=8)

(b) Give the alternate name of: (4×1=4)

    (i) Gramineae

    (ii) Compositae

    (iii) Cruciferae

    (iv) Labiatae

(c) Interpret the following: (3×1=3)

    (i) *Delphinium viscosum* Hook.f. *et.* Thompson

    (ii) *Phyllanthus* (Toume.) L.

    (iii) *Stellaria media* (L.) Will.

3.   Differentiate between **(any three)** : (3×5=15)

    (i) Alpha and Omega Taxonomy

    (ii) Holotype and Neotype

    (iii) Valid and Effective Publication

    (iv) Bracketed and Parallel keys

    (v) Cladogram and Phenogram

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4. Write short notes on (any three) : (3×5=15)

  (i) Importance of Botanical Gardens

  (ii) Taxonomic categories

  (iii) Principles of Priority and its limitations

  (iv) Principles of Numerical Taxonomy

Your Roll No..............

B

Sr. No. of Question Paper : 774

Unique Paper Code : 42231202

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

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

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 including question **1**.

5. Draw well-labeled diagrams wherever necessary.

P.T.O.

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

    (i) Arbor vitae

    (ii) Fovea centralis

    (iii) Unguis

    (iv) Organizer

    (v) Gray crescent

    (vi) Zona pellucida

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

    (i) Horns and Antlers

    (ii) Physostomous and Physoclistous

    (iii) Crista and Macula

    (iv) Epigenesis and Preformation

    (v) Epitheliochorial placenta and Haemochorial placenta

    (vi) Invagination and Involution

(c) Give the exact location and function of the following : (1×6=6)

    (i) Meibomian glands

    (ii) Proprioceptors

    (iii) Spiral valve

(iv) Corpus luteum

(v) Inner cell mass

(vi) Chorionic villi

(d) Fill in the blanks (any five) :   (1×5=5)

(i) Mammary glands are modified ————— glands.

(ii) ————— is a unique sensory structure in snakes for detecting infrared radiations.

(iii) ————— scales are found on the skin of sharks, skates and rays.

(iv) The notochord in a developing embryo is derived from —————.

(v) ————— is a method of tracing cell lineages.

(vi) Mammalian blastula is known as —————.

SECTION A

2. (a) Describe the succession of kidney in vertebrates.

   (b) Give the comparative account of brain in amphibians and reptiles.   (6+6=12)

3. (a) Trace the evolution of aortic arches in vertebrates.

   (b) Discuss the various types of feathers. (8+4=12)

P.T.O.

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4. Write a note on the following (any 3) : (4×3=12)

(a) Types of Centra in vertebral column

(b) Visceral arches

(c) Digestive glands

(d) Avian Lungs

SECTION B

5. (a) What is spermatogenesis? Explain diagrammatically the different phases of spermatogenesis.

(b) Enumerate the various planes and patterns of cleavage. Describe the role of egg yolk in early embryonic divisions. (6+6=12)

6. (a) Elucidate the methods of prevention of polyspermy.

(b) Discuss the morphological changes associated with metamorphosis in frog. (8+4=12)

7. Write a note on the following (any 3) : (4×3=12)

(a) Implantation

(b) Fate Maps

(c) Vitellogenesis

(d) Gastrulation in frog

(2000)

Sr. No. of Question Paper : 1498

Unique Paper Code : 42174404

Name of the Paper : Chemistry of s and p block Elements, States of Matter and Chemical Kinetics

Name of the Course : B.Sc. Physical Science/Life Science

Semester : IV

Duration : 3.5 Hours   Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.

2. Attempt **six** questions in all, three questions from **SECTION A** and **three** questions from **SECTION B**.

3. Use separate answer sheets for **Section A** and **Section B** and indicate the section you are attempting by putting a heading of Section.

4. The questions should be numbered in accordance to the number in the question paper.

5. Use of Scientific Calculator is permitted.

P.T.O.

SECTION A

(Inorganic Chemistry)

Attempt any three questions from this section.

1.   (a) What is Ellingham's diagram? Draw it for metal oxides and give its salient features.   (4.5)

   (b) List the three different scales of Electronegativity. Briefly describe the Pauling scale.   (4)

   (c) Why first element in each of main groups differs from the rest of the group? Give anomalous behavior shown by Lithium.   (4)

2.   (a) Explain the hybridization in ortho-phosphoric acid. Give its structure and mechanism of its preparation from phosphorous pentoxide.   (4.5)

   (b) Why graphite is a good conductor of electricity but diamond is not?   (4)

   (c) Why first ionization enthalpy does not continue the decreasing trend from Al to Ga and In to Tl?   (4)

3. (a) What are carbides? What happens when CaC_2, Al_4C_3 and Mg_2C_3 are hydrolysed?   (4.5)

   (b) Using diborane, explain the concept of multi centre bonding.   (4)

   (c) Complete any **four** reactions   (4)

      (i) $SOCl_2 + H_2O \rightarrow$

      (ii) $P_4O_{10} + 6PCl_5 \rightarrow$

      (iii) $6HN_3 + 4\,Li \rightarrow$

      (iv) $4NH_3 + 3O_2 \rightarrow$

      (v) $SiC + 2NaOH + 2O_2 \rightarrow$

4. (a) Give the names of four different types of oxo acids of chlorine. Arrange them in order of increasing strength and give the justification in support of order.   (4.5)

   (b) Short note on the following :   (4×2)

      (i) van Arkel De Boer process

      (ii) Zone refining

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$R = 8.314$ J K^{-1} mol^{-1} $\qquad$ $k = 1.38 \times 10^{-23}$ J K^{-1}

$N_A = 6.023 \times 10^{23}$

5. (a) Write the postulates of kinetic theory of gases. Is it possible to liquify an ideal gas? $\hfill$ (2.5)

(b) The van der Waals constant 'a' for N_2 and NH_3 are 1.39 and 4.17 dm^6 atm mol^{-2}, respectively. Which one of these two gases can be liquefied more easily and why? $\hfill$ (2)

(c) In a crystal, the planes cut through the crystal axes at (2a, 3b, c) and (2a, −3b, −3c). Identify the Miller indices of these planes. $\hfill$ (2)

(d) It is not possible to distinguish between K$^+$ and Cl$^-$ ions by X-ray diffraction method. Explain. $\hfill$ (2)

(e) Explain the effect of temperature on rate of a reaction. Give reasons for your answer. $\hfill$ (2)

(f) The viscosity of liquids deceases while that of gases increases with rise in temperature. Explain. (2)

6. (a) Using the van der Waals equation, derive the relationships between critical constants and van der Waals constants of a real gas. (4)

(b) The viscosity of oxygen is at 7°C is 208 micropoise. Calculate the mean free path and collision diameter of oxygen molecules at STP. (4)

(c) What do you understand by the term surface tension? What are its units? Describe the stalagmometer method using water as reference for the measurement of surface tension of a liquid giving expression. (4.5)

7. (a) What are elements of symmetry in crystal systems? Describe number of various symmetry elements in cubic crystal system. (4)

(b) The density of $LiBH_4$ crystal is 0.668 g cm^{-3} and the unit cell dimensions are a = 6.81 Å, b = 4.43 Å and c = 7.17 Å. Determine whether the lattice is f.c.c. or b.c.c. The molar mass of $LiBH_4$ = 21.76 g mol^{-1}. (4)

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(c) Write expression of Maxwell distribution law molecular speeds. Name the terms involved in expression. Calculate the most probable, average and root mean square velocity of hydrogen gas molecules at 27°C.

(4.5)

8. (a) Derive integrated rate expression for second order reaction assuming reactants to be different.

(4)

(b) Derive expressions to determine order of reaction using half-life method and van't Hoff differential rate method.

(4)

(c) What is the rate constant (k) of a reaction, $2N_2O_5 \longrightarrow 4NO_2 + O_2$ at 27°C? The activation energy and pre-exponential factor for the reaction are found to be 103.35 kJ mol^{-1} and 4.3×10^{13} s^{-1}, respectively.

(4.5)

Unique Paper Code : 42164401

Name of the Paper : Plant Physiology and

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

Semester : IV

Duration : 3.5 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.

2. Only Five questions are to be attempted in all.

3. Question 1 is compulsory.

4. All questions carry equal marks.

Attempt all parts of the question together.

Illustrate your answers wherever possible.

P.T.O.

Q1. **(a)** Fill in the blanks (*any ten*): (1×10=10)

(i) RQ is defined as a ratio ....

(ii) ....is the first stable product of dark reaction.

(iii) Glyoxysomes contain enzymes for β- oxidation of ....

(iv) ....is the anti- ageing phytohormone.

(v) Mobilization of food reserves through α-amylase in barley seeds is due to the phytohormone ....

(vi) Photolysis of water in light reaction is associated with .... ions.

(vii) Letham is associated with the discovery of ....

(viii) The word enzyme was coined by ....

(ix) The occurrence of break in the continuity of water column in the xylem is known as ....

(x) The protein part of enzyme is called as......................

(xi) Blue Green Algae fix .... directly from air to enhance fertility of crops.

(xii) The movement of water or solutes from cell to cell through cytoplasm with the help of plasmodesmata is called ....

(xiii) The process by which bacteria reduce nitrate to dinitrogen is known as ....

(b) Expand the following (*any five*): (1×5=5)

(i) NAA   (ii) SE-CC complex

(iii) PMF   (iv) EDTA

(vii) CEC

Q2. Differentiate between (*any five*): (3×5=15)

(i) C3 and C4 plants.

(ii) Aerobic respiration and Anaerobic respiration.

(iii) Oxidative Phosphorylation and Photophosphorylation

(iv) Competitive and non-competitive inhibition

(v) Coenzyme and cofactor

(vi) Carrier proteins and Channel proteins

(vii) V-type ATPase and P-type ATPase

Q3. (a) 'Photorespiration is a wasteful process in plants'. Comment. (5)
(b) Write an explanatory note on phytochrome. (5)
(c) Discuss the theory that best explains the mechanism of stomatal movements. (5)

Q4. (a) Give the discovery and enumerate the commercial applications of Auxins. (5)
(b) What is photoperiodism? Discuss three general categories of plants with reference to day length. (5)
(c) Describe the most widely accepted mechanism of phloem translocation in angiosperms with the help of suitable diagram. (5)

Q5. (a) With the help of a flow chart, give a detailed account of glycolysis. What is the fate of pyruvate in plant respiration? (5)

OR

(a) Discuss the structure and function of reaction center and antenna complex.
(b) Describe properties and mechanism (hypothesis) of action of enzymes. (5)
(c) Discuss essential nutrient elements, criteria of essentiality and role of any two essential elements in plants. (5)

Q6. (a) Write a short note on the following (any two): (2.5×2=5)
(i) Bolting
(ii) Apical dominance
(iii) Witches broom
(b) Discuss the mechanism of biological nitrogen fixation and give its significance to plants. (5)

OR

(b) Explain the biogeochemical cycle of Nitrogen.

(c) Describe different methods of studying mineral requirements. Explain how nutrient solution can sustain rapid plant growth? (5)

Q7. (a) Explain with the help of a diagram, the processing of fatty acids in glyoxysomes. How succinate produced in glyoxysomes is processed to form sugars (gluconeogenesis)? (5)
(b) How different amino acids are synthesized in plants by ammonium assimilation and transamination? (NO chemical formula required). (5)

OR

P.T.O.

(b) What is leghaemoglobin? Discuss its role in symbiotic nitrogen fixation.

(c) Discuss the water potential, its components and its significance. (5)

OR

(c) Explain why transpiration is considered as a necessary evil.

Your Roll No...............

Sr. No. of Question Paper : 1689

A

Unique Paper Code : 42234406

Name of the Paper : Genetics and Evolutionary Biology

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

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 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** the following :

(2×3)

P.T.O.

(i) Induced mutations & Spontaneous mutations

(ii) Dominant epistasis and recessive epistasis

(iii) Aneuploidy and polyploidy

(iv) Coupling phase and repulsion phase

(v) Intersex and gynandromorph

(b) Define any four of the following :   (1×4)

(i) Lethal alleles

(ii) Heterogametic sex

(iii) Holandric inheritance

(iv) Pleiotropy

(v) Interference

(c) Justify the following statements (any two) :

(1×2)

(i) Shell coiling pattern in the Limnaea offspring is determined by the genotype of the mother.

(ii) Recombination frequency between two genes cannot exceed 50%.

(iii) The Drosophila with chromosome combination as XXY is female

(d) Name a human syndrome associated with the following :   (½×4)

    (i) Monosomy

    (ii) Trisomy

    (iii) Chromosomal Deletion

    (iv) Chromosomal translocation

2.   (a) What is epistasis? Name different types of epistasis and explain any two.   (7)

   (b) Determine the sex of the individuals for the given chromosomal arrangements in Drosophila: (5)

    (i) 3X 4A

    (ii) 2X 3A

    (iii) 1X 3A

    (iv) 2X 2A

Briefly explain the basis of sex determination.

3. (a) The data obtained from a three factor test-cross is as follows :

Genotype	Number of progenies
XYz/xyz	475
xyZ/xyz	495
XYZ/xyz	14
xyz/xyz	16
xYZ/xyz	98
Xyz/xyz	102
xYz/xyz	144
XyZ/xyz	156

Based on the given data,

(i) Determine the order of gene

(ii) Draw a linkage map and calculate the map distance between the genes

(iii) Calculate the coefficient of coincidence and interference.   (9)

(b) How Somatic cell genetics can be used in gene mapping in eukaryotes.   (3)

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

(a) Cytoplasmic inheritance

(b) Inversion

(c) Dosage compensation

(d) Chromosomal theory of inheritance

SECTION B – EVOLUTTONARY BIOLOGY

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

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

    (i) Coprolites

    (ii) Directional selection

    (iii) Coacervates

    (iv) Cline

    (v) Ring species

    (vi) Organic variation

(b) Differentiate **(any three)** : (2×3)

    (i) Mold and cast

    (ii) Allopatric and sympatric speciation

(iii) Homology and analogy

(iv) Microevolution and Macroevolution

(c) State the contributions of the following scientists (any two) : (1×2)

(i) Georges Cuvier

(ii) Ernst Mayr

(iii) Miller and Urey

2. What are isolating mechanisms? Describe various isolating mechanisms with suitable examples. (12)

3. Illustrate the role of fossil records in understanding the evolution of horse. (12)

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

(a) Endosymbiotic theory

(b) Mass extinction

(c) Genetic drift

(d) Adaptive radiation

(e) Neo-Darwinism