[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1274 **F**

Unique Paper Code : 2232521201

Name of the Paper : Cell and Developmental Biology of Animals

Name of the Course : **B.Sc. Life Sciences**

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 any four questions in all including Question No. 1 which is compulsory.
3. Draw well-labelled diagrams whenever necessary.
4. Parts of questions to be attempted together.

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

(i) Metamorphosis

P.T.O.

(ii) Nebenkern

(iii) Polar Body

(iv) Blastopore

(v) Cell theory

(vi) Stem cells

(b) Differentiate between the following (any four): (8)

(i) Protoplast and protoplasm

(ii) Gap junction and tight junction

(iii) Embryogenesis and blastogenesis

(iv) Parturition and hatching

(v) Sertoli cell and interstial cell

(vi) Telolecithal And Centrolecithal eggs

(c) Give the contribution of the following scientists in the field of cell and developmental biology (any three). (3)

(i) Robert Hook

(ii) Purkinje/Huxley

(iii) Singer and Nicolson

(iv) Spemann

(v) August Weisman

2. (a) Define plasma membrane. Describe the various models of plasma membrane.

(b) Explain how "prevention of polyspermy" take place. (9, 6)

3. (a) What is a cell cycle. Describe its various phases.

(b) Give an account of somatic cell division along with diagrams. (5, 10)

4. (a) Describe various stages and process of spermatogenesis.

(b) Give a brief account of different types of morphogenetic movements occurring during gastrulation. (8, 7)

5. (a) Give an account of the assembly and functions of microtubules.

(b) Explain the secretory pathway of endomembrane system in cell. (6,9)

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

(a) Pattern of cleavage

(b) Acrosome reaction

(c) Lysosome

(d) Active transport

(e) Nerve cell (5,5,5)

2

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5780 **E**

Unique Paper Code : 42231202

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

Name of the Course : **BSc. (P) Life Sciences, Theory Exam, May-June 2023**

Semester : II, CBCS, OC

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. There are two sections, **Section A and B.** Attempt **two** questions from each section. Attempt **five** questions in all.

1. (a) Define the following terms (6)

   (i) Monophyodont Dentition

   (ii) True stomach

P.T.O.

(iii) Antlers

(iv) Fertilization

(v) Gastrulation

(vi) Phonoreceptor

(b) Differentiate between the following terms: - (10)

(i) Monocondylic and Dicondylicskull

(ii) External and Internal fertilization

(iii) Epidermal and Dermal derivatives

(iv) Blastula and Gastrula

(v) Bolus and Chyme

(c) Fill in the blanks: (5)

(i) The tongue of mammals is attached to buccal floor by a ligament called _____.

(ii) Poison glands of snake are modified _____.

(iii) Slow block polyspermy is achieved by _____ reaction.

(iv) The process of differentiation of spermatid into spermatozoa is called _____.

(v) The process of attachment of embryo to the

inside of uterine wall in humans is known as _____.

(d) Match the following (6)

A	B
(i) Blastocyst	(a) Brain
(ii) Corpora quadrigemina	(b) Extraembryonic membrane
(iii) Placenta	(c) Inner cell mass
(iv) Nephrostome	(d) Tongue
(v) Chemoreceptors	(e) Nutrition
(vi) Amnion	(f) Kidney

Section A

2. (a) Trace the evolution of lungs in vertebrates (8)

(b) Write a short note on L.S. syrinx in birds (4)

3. Give a detailed account of the evolution of heart in vertebrates, with the help of suitable diagrams. (12)

4. Write short notes on any three of the following: - (4, 4, 4)

(a) Specializations of the alimentary canal

(b) Dentition in mammals

(c) Accessory respiratory organs in fishes

(d) Mammalian brain

Section B

5. (a) Describe the process of gastrulation in frog. (8)

(b) Mention briefly the fate of the three germ layers. (4)

6. (a) Discuss in detail the mechanism of Oogenesis in mammals (6)

(b) Explain various mechanisms involved by oocyte to prevent polyspermy? (6)

7. Write short notes on any threeof the following: -

(a) Implantation of human embryo

(b) Types of Eggs

(c) Neurulation

(d) Embryonic Induction (4, 4, 4)

3

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5774 **E**

Unique Paper Code : 42164401

Name of the Paper : Plant Physiology and Metabolism

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

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. Only **Five** questions are to be attempted in all.
3. Question 1 is compulsory.
4. **All** questions carry equal marks.
5. Attempt all parts of the question together.
6. Illustrate your answers wherever possible.

P.T.O.

1. (a) Give **one** significant contribution of the following **(any five)** : (1×5=5)

(i) *R. Hill*

(ii) T.W. Engelmann

(iii) F.W. Went

(iv) R Mitchell

(v) D. Neljubowa

(vi) M. Chailakhyan

(b) Expand the abbreviations **(any Five)** : (5)

(i) CoA

(ii) UDP

(iii) NR

(iv) Pfr

(v) NADP

(vi) FMN

(c) Name the following **(any five)** : (5)

(i) A Plant species carrying Selenium.

(ii) A natural Chelating agent.

(iii) A nutrient solution for hydroponics.

(iv) An element stimulating pollen tube germination and elongation.

(v) A type of P-protein that occur only in certain legumes.

(vi) Ordinary companion cells with the development of finger like wall ingrowths.

2. (a) Give the schematic representation of Electron Transport Chain in mitochondrion. Tabulate the total ATP produced at various stages in aerobic respiration of a glucose molecule. (5)

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

(i) Feedback inhibition

(ii) Florigen

(iii) Prosthetic group

(iv) Pfr

(v) Vernalization

(vi) Cofactor

(vii) Denitrification

(c) How the K^+ ion channels enhance the diffusion of K^+ across membrane? Discuss. (5)

3. (a) Write a detailed account of photosynthetic dark reaction. Illustrate your answer. (5)

OR

(a) With the help of vectorial arrangement of PSI & PS II, give the account of light reactions.

(b) What are enzymes? How are they classified under broad categories? (5)

(c) Discuss girdling experiment along with the structure of phloem and composition of the phloem sap. (5)

4 (a) Write an explanatory note on **(any four)** : (2.5×4=10)

(i) Discovery of Cytokinins

(ii) Ammonification

(iii) Interplay of hormones during abscission

(iv) *Rhizobium*

(v) Fruit Ripening

(vi) Dinitrogenase

(vii) Nod genes

(b) The value for water potential in the stem tissue was found to be –3.5 bars. If you take the root tissue and place it in a 0.1M solution of sucrose at 20°C in an open beaker, what is the water potential of the solution and in which direction will the net flow of water be? What will happen if we replace 0.1 M sucrose with 0.1 M NaCl. (5)

P.T.O.

OR

(b) Discuss three major factors that contribute to cell water potential. Give significance/uses of concept of water potential.

5. (a) Differentiate between PCO and PCR. (5)

OR

(a) Discuss *Krapz* anatomy in relation to functional features of C4 syndrome.

(b) Describe the process of rhizobial infection and nodule development in a legume root. (5)

(c) Differentiate between **(any two)** : (2.5×2=5)

(i) Phloem loading and Phloem unloading

(ii) Hydroponics and Aeroponics

(iii) Passive transport and Active transport.

6 (a) Discuss the sequential events of Krebs cycle. Which reaction is commonly known a link reaction? (5)

OR

(a) Define RQ. Give its significance in plant metabolism.

(b) Describe briefly about phytochrome with reference to its structure and role in plants. (5)

(c) The driving force of transpiration is the difference in vapor pressure concentration, justify the statement. What pressure difference is needed to lift water 100 meters to a treetop? (5)

7. (a) With the help of a neat illustration, discuss the role of GAs in food reserve mobilization in barley seed. (5)

(b) Explain briefly **(any five)** : (1×5=5)

(i) K_m

(ii) photoperiod

(iii) chromophore

(iv) Active site

(v) Epinasty

(vi) Activation energy

(c) Describe any two mechanisms that can explain the phloem loading. (5)

4

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5875 **E**

Unique Paper Code : 42237904

Name of the Paper : Immunology

Name of the Course : **B.Sc. (P) Life Sciences (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 **five** questions in all. Question **1** is compulsory.
3. Draw well labelled diagrams wherever required.

1. (a) Define : (5)

(i) Cross-reactivity

(ii) Haplotype

(iii) Immunotolerance

P.T.O.

(iv) Epitope

(v) Hapten

(b) Differentiate between the following : (8)

(i) Active Immunization & Passive Immunization

(ii) Primary & Secondary Immune response

(iii) Primary Lymphoid Organs & Secondary Lymphoid Organs

(iv) Innate Immunity & Acquired Immunity

(c) Expand the following : (3)

(i) PALS (ii) ADCC

(iii) GALT (iv) TLR

(v) TCR (vi) IFNγ

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

(i) Cesar Milstein and Georges E. Kohler

(ii) Emil Von Behring

(iii) Lady Mary Wortley Montagu

(iv) Rodney R. Porter

(e) Match the following : (3)

(i) Anaphylatoxins	(a) Tc cells
(ii) Neurophils	(b) C3a
(iii) MHC I	(c) Lungs
(iv) CD 4	(d) Antibodies
(v) Alveolar macrophages	(e) Granulocytes
(vi) Plasma cells	(f) TH cells

(f) Give reasons : (4)

(i) Self antigens do not produce immune response in normal persons.

(ii) Children are immunized with a single dose of BCG.

(iii) Rh incompatibility can be fatal in second pregnancy.

(iv) Certain sites of human body are called immune privilege sites.

2. (a) Explain the various experiments conducted to deduce the structure of immunoglobulin.

(b) Describe the structure and functions Class I and Class II MHC molecules. (8,4)

P.T.O.

3. (a) Give an account of the cells of innate and adaptive immunity.

(b) Differentiate between B cell and T cell epitopes. (8,4)

4. (a) Discuss the production of monoclonal antibody by hybridoma technology.

(b) Describe the initiation and activation of the classical complement pathway. (6,6)

5. (a) Explain the properties of cytokines.

(b) Give an account of different types of vaccines. (8,4)

6. (a) Explain the different types of hypersensitivities on the basis of Gell and Coomb's classification.

(b) Discuss various antibody-mediated effector functions. (8,4)

7. Write short notes on any **three** : (4,4,4)

(a) Clonal Selection Theory

(b) Properties of antigen

(c) Thymus

(d) ELISA

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1261 **F**

Unique Paper Code : 2172521201

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

Name of the Course : **B.Sc. Life Science with Chemistry**

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 any **four** questions.
3. **All** questions carry equal marks.

1. (a) Draw Born Haber cycle and calculate the lattice energy of NaCl from the following data:

Heat of sublimation of sodium = 108 kJ mol^{-1}

Dissociation energyof Cl_2 = 243.0 kJ mol^{-1}

P.T.O.

Ionization energyofsodium= 495.2 kJ mol^{-1}

Electron affinity of chlorine= -348.3 kJ mol^{-1}

Enthalpy of formation ofNaCl= -381.8 kJ mol^{-1}

(b) Explain:

(i) Why H_2 is known while He_2 is not?

(ii) Why is the bond angle of H-O-H in water 104.5° while the bond angle of H-N-H in ammonia is 107°?

(c) Write the toxic effects of Hg (II). Give the reasons for its toxicity. How can it be treated? (5,5,5)

2. (a) Write down the main postulates of VSEPR theory.

(b) Discuss the stability order and magnetic behaviour of the following species:

$$O_2,\ O_2^+,\ O_2^-$$

(c) (i) Calculate the % ionic character for HCl molecule when the electronegativities of H and Cl are 2.2 and 3.16, respectively.

(ii) Discuss the importance of Zinc in the human body. (5,5,5)

3. (a) Draw the MO energy level diagram of NO. Calculate its bond order and discuss the stability of NO and NO^+.

(b) What is hydrogen bonding? Explain with examples how it affects the melting point/boiling points of compounds.

(c) Discuss the working of the sodium-potassium pump. How is it important for a cell? (5,5,5)

4. (a) Predict which of the following molecules have net dipole moment:

(i) $CHCl_3$

(ii) $BeCl_2$

(iii) NF_3

(iv) CO_2

(b) Write short note on:

(i) Resonance

(ii) s-p mixing in molecular Orbitals

(c) What do you understand by essential and non-essential metal ions in the bio-system? Draw the Dose-response curve for essential elements and non-essential metal ions in a human body.(5,5,5)

5. (a) Define Lattice energy and solvation energy. What is the role of these terms in deciding the solubility of ionic solids?

(b) Explain the following:

(i) All three N-O bond lengths in NO_3^- (nitrate ion) are equal.

(ii) PCl_5 is more reactive than SF_6.

(c) Discuss the role of magnesium in chlorophyll & in energy production? (5,5,5)

6. (a) Explain Fajan's Rules and on the basis of these rules compare the covalent character in the following salts:

(i) NaCl and CuCl

(ii) AgI and AgCl.

(b) Discuss the geometry, hybridization and shape of the following molecules/ions on the basis of VSEPR theory:

$$xeO_3,\ SF_6,\ ClF_3$$

(c) Describe the role of iron metal ion along with its impact in case of excess and deficiency of it in the human body? (5,5,5)

(1000)