[This question paper contains 4 printed pages.]

Your Roll No.....

G

Sr. No. of Question Paper : 1767

Unique Paper Code : 2162521101

Name of the Paper : Plant Diversity and Systematics

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

Semester : I

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, **first** question is compulsory.
3. **All** questions carry equal marks.
4. Attempt **all** parts of the questions together.
5. Draw well labelled diagrams wherever required.

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(a) Match the following **(any five)** : (1×5=5)

(i) Phaeophyceae	(a) Verticillaster
(ii) *Marchantia*	(b) Winged Pollen
(iii) Lamiaceae	(c) Laminarin starch
(iv) *Pinus*	(d) Spiral chloroplast
(v) *Spirogyra*	(e) Gemma Cup
(vi) TMV	(f) *Chlamydomonas nivalis*
(vii) Red Snow	(g) ssRNA

(b) Fill in the blanks **(Attempt any five)** : (1×5=5)

(i) _____ established the binomial system.

(ii) Number of teeth in the outer peristomial ring of *Funaria* is _____.

(iii) Spores bearing leaves of Pteridophytes are called _____.

(iv) According to ICN the name of the family should end with the suffix _____.

(v) _____ is an edible mushroom.

(vi) Ligulate and appendiculate scales are found in _____.

(c) Define the following **(Attempt any five)** : (1×5=5)

(i) Heterocyst

(ii) Topotype

(iii) False indusium

(iv) *Nomen conservandum*

(v) Basidiocarp

(vi) Catkin

2. Draw well-labelled diagrams of **any three** : (3×5=15)

(i) L.S. sporophyte of *Marchantia*

(ii) Coenobium of *Volvox* with daughter Coenobia

(iii) V.S. Sporophyll of *Pteris*

(iv) L.S. antheridial branch of *Funaria*

(v) Conidiophore of *Penicillium*

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

(i) Lytic and Lysogenic cycle

(ii) Long shoot and Dwarf shoot of *Pinus*

iii) Natural and Phylogenetic system of classification

P.T.O.

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(iv) Gymnosperms and Pteridophytes

(v) Homonym and Synonym

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

(i) Mycoplasma

(ii) Chief characteristic features of Algae

(iii) Gram-positive and Gram-negative Bacteria

(iv) Asexual Reproduction in *Rhizopus*

(v) Adaptations in bryophytes which made them survive on land

(vi) Morphological types of lichens

5. (a) Discuss briefly the various food reserves and photosynthetic pigments in algae of major 4 classes studied by you. (8)

(b) Explain Bentham & Hooker's system of classification. Write its merits & demerits. (7)

6. (a) Write a short note on different modes of genetic recombination in bacteria explaining one of them in detail. (7)

(b) Discuss the principles of ICN. Explain principle of priority with its limitations. (8)

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[This question paper contains 4 printed pages.]

Your Roll No.....

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Sr. No. of Question Paper : 1762

Unique Paper Code : 2162522301

Name of the Paper : Plant Cell and Developmental Biology

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

Semester : III

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. Question No. **1** is compulsory.
3. Attempt any **four** questions in all.
4. Attempt **all** parts of the question together.
5. Draw diagrams wherever required.

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

   (i) The Kõrper-Kappe theory of root apex organization was proposed by _____.

   (ii) Living mechanical tissue of a dicot plant _____.

P.T.O.

(iii) Mesophyll is undifferentiated into palisade and spongy parenchyma in _____ leaf.

(iv) The ovule which has the micropyle and chalaza at the opposite ends is _____.

(v) Perisperm is different from endosperm because _____.

(vi) Intine of pollen grains is composed of _____ and _____.

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

(i) Meristematic tissue

(ii) Cork cambium

(iii) Megasporogenesis

(iv) Mesogamy

(v) Sclereids

(vi) Pollination

(c) State whether the following statements are True or False. (1×5=5)

(i) In leaves, the vascular bundles are collateral and closed.

(ii) Presence of lignin in cell wall is characteristic feature of Parenchyma.

(iii) Cork is made up of suberin.

(iv) Tapetum is the outermost layer of anther wall.

(v) Chalaza is the basal part of the ovule.

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

(i) Monocot and Dicot leaf.

(ii) Collenchyma and Sclerenchyma

(iii) Atropous and Amphitropous ovules

(iv) Amoeboid and secretory tapetum

(v) Bisporic and tetrasporic embryo sac

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

(i) Endoplasmic Reticulum

(ii) Ovule

(iii) Waiting meristem theory

(iv) Significance of double fertilization

(v) Functions of tapetum

P.T.O.

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4. Draw a well-labelled diagram of **any three** of the following :– (5×3=15)

(i) Plant cell

(ii) Nucleus

(iii) Circinotropous ovule

(iv) T. S. Mature Anther

(v) T.S. monocot root

5. Attempt the following **(any two)** :

(a) Describe the anomalous secondary growth in *Bignonia stem* (7.5)

(b) Explain the detailed structure of endosperm and its function (7.5)

(c) Explain the detailed structure and function of cell wall (7.5)

(3)

[This question paper contains 4 printed pages.]

Your Roll No.....

G

Sr. No. of Question Paper : 4809

Unique Paper Code : 42234301

Name of the Paper : Physiology and Biochemistry

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

Semester : III

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. Draw neat, well labeled diagrams, wherever required.
3. Attempt **Five** questions in all.
4. Question No. **1** is compulsory.

1. (a) Define **(any four)** : (4)

   (i) Sinoatrial node

   (ii) Amphibolic pathway

P.T.O.

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(iii) Prosthetic group

(iv) Glial cells

(v) Emulsification

(b) Differentiate between the following (**any five**): (5)

(i) Endopeptidase and exopeptidases

(ii) Epimerase and Isomerase

(iii) Tidal volume & Residual volume

(iv) Osteoclasts and osteoblasts

(v) Glucogenic and Ketogenic amino acids

(vi) Multipolar and Bipolar neurons

(c) Draw the structures of the following (**any four**): (8)

(i) Citrulline

(ii) Fructose 1,6 Bisphosphate

(iii) HMG-CoA

(iv) Myelinated nerve fiber

(v) Micelles

(d) Write the importance of the following (**any five**) : (5)

(i) Carnitine

(ii) Renin-Angiotensin-Aldosterone pathway

(iii) Acyl carrier protein

(iv) NADH

(v) Resting membrane potential

(vi) Spermatogenesis

(e) Expand the following (**any five**) : (5)

(i) DHAP

(ii) ADH

(iii) ATP

(iv) IGFs

(v) GBHP

(vi) PDH

2. (a) What is the sliding filament mechanism?

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Describe the role of calcium and regulator proteins in the sliding of filaments.

(b) Glomerular filtration rate is directly related to the pressure that determines net filtration pressure. Explain it. (8+4)

3. Describe the menstrual cycle in human females and add a note on its hormonal control? (12)

4. Give a detailed account of activation of fatty acid and beta-oxidation of Palmitic acid. (12)

5. Describe the various components of mitochondrial respiratory chain and the basics of Chemiosmotic theory for ATP synthesis. (8+4)

6. Short Notes (**Any three**) : (4+4+4)

(i) Glycogenolysis

(ii) Oxidative Phase of pentose phosphate pathway

(iii) Induced Fit Theory

(iv) Transport of carbon-dioxide in blood

[This question paper contains 4 printed pages.]

Your Roll No.....

G

Sr. No. of Question Paper : 1775

Unique Paper Code : 2232521101

Name of the Paper : Diversity of Animals (DSE-3)

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

Semester : I

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. Illustrate your answers with diagram wherever necessary.

P.T.O.

1. (a) Define the following : (1×6=6)

(i) Enterocoelom

(ii) Mantle

(iii) Lobopodia

(iv) Madreporite

(v) Gnathostomata

(vi) Keel

(b) Give the scientific name of the following : (2)

(i) Glass rope sponge

(ii) Sea Star

(iii) Slipper animalcule

(iv) Flying lizard

(c) Differentiate between :

(i) Amniotes and Anamniotes

(ii) Endothermy and Ectothermy

(iii) Ocellus and Ommatidium

(iv) Scolex and Acetabulum

2. (a) Give an account of types of metamorphosis and its hormonal control in Insects. (9)

(b) How does pearl formation occur in molluscs? (6)

3. (a) Discuss the parasitic adaptations in Helminthes. (9)

(b) Discuss the process of Torsion in Gastropods. (6)

4. (a) Explain retrogressive metamorphosis in Urochordates. (7)

(b) Discuss the types of migration in birds with examples. (8)

5. (a) Discuss the parental care in fishes with examples. (5)

(b) Write a detailed account of flight adaptations in birds. (10)

P.T.O.

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

(i) Taxonomic hierarchy and binomial nomenclature

(ii) Life cycle of *Ascaris*

(iii) Biting mechanism in snakes

(iv) Locomotion in Protozoa

[This question paper contains 8 printed pages.]

Your Roll No.....

G

Sr. No. of Question Paper : 4876

Unique Paper Code : 42164301

Name of the Paper : Plant Anatomy and Embryology

Name of the Course : **B.Sc. (Programme) Life Science – DSE**

Semester : III

Maximum Marks : 75

Duration : 3 Hours

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.
3. All parts of a question must be answered together.
4. Supplement your answer with well labelled diagram.

P.T.O.

Section A (37 marks)

Attempt **three** *questions from* **Section A** *including* *Question number* **1**, *which is compulsory.*

1. (a) Give one word answer **(attempt any three)** (1×3=3)

(i) The multiple epidermis to prevent loss of water is present in which type of plants?

(ii) Lateral roots originate from which part of the primary root?

(iii) Which type of collenchyma has thickening mainly at the angles of the cells?

(iv) Name the cell in which cystolith occurs.

(v) What is the name of the vascular bundle that has phloem on either side of the xylem?

(b) Match the following **(attempt any four)** (1×4=4)

(i) Aerenchyma	*Nerium*
(ii) Quiescent centre	Endodermis
(iii) Casparian strips	Root
(iv) Sunken stomata	*Zea mays*
(v) Bulliform cells	Korper-kappe theory
(vi) Schuepp	hydrophytes

2. Attempt **any three** of the following : (5×3=15)

(i) Describe Kranz anatomy.

(ii) Differences between simple and complex tissues.

(iii) Anatomical differences between monocot and dicot Stem.

(iv) Draw well labelled diagram of T.S. *Hydrilla* stem.

(v) Seasonal activity of cambium.

3. (a) Describe secondary growth in dicot roots with the help of suitable diagrams. (7.5)

(b) Describe anatomical adaptations of hydrophytes with suitable examples. (7.5)

4. (a) Describe the Metcalfe and Chalk's classification of stomata with suitable diagrams. (10)

(b) Discuss various theories explaining the organisation of root apex. (5)

SECTION B (38 marks)

Attempt **three** *questions from* **Section B** *including Question number* **1**, *which is compulsory.*

1. (a) Define the following **(attempt any four)** (1×4=4)

(i) Porogamy

(ii) Hydrophily

(iii) Endothelium

(iv) Aril

(v) Perisperm

(vi) Aleurone layer

(b) Match the following **(attempt any four)** (1×4=4)

(i) Composite endosperm Absence of endosperm

(ii) Double fertilization	Loranthceae
(iii) Pollination by bats	S.G. Nawaschin
(iv) Podostemaceae	Synergids
(v) Circinotropous ovule	Chiropterophily
(vi) Filliform apparatus	Cactaceae

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

(i) Anther wall layers.

(ii) Double Fertilization in angiosperms.

(iii) Types of Tapetum.

(iv) Differences between Nuclear and Cellular endosperm.

(v) Structure and organization of egg apparatus.

3. Attempt **any three** of the following: (5×3=15)

(i) Draw well labelled diagram of T.S. tetrasporangiate anther at tetrad stage.

(ii) Draw well labelled diagram of L.S. monocot embryo.

(iii) Draw well labelled diagram of L.S. anatropus, bitegmic ovule showing *Polygonum* type of embryo sac.

(iv) Differences between Monosporic and Tetrasporic embryo sac.

(v) Discuss embryo-endosperm relationship.

4. Attempt **any two** of the following: (7.5×2=15)

(a) Discuss the adaptive features of anemophilous plants

(b) Describe different types of ovules found in angiosperms.

P.T.O.

(c) Name five eminent embryologists along w their significant contributions in the field embryology.

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[This question paper contains 4 printed pages.]

Your Roll No.....

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Sr. No. of Question Paper : 4852

Unique Paper Code : 42167902

Name of the Paper : Cell and Molecular Biology

Name of the Course : B.Sc. (P) Life Sciences – DSE

Semester : V

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. All Questions carry equal marks.
3. Question No. 1 is compulsory.
4. Attempt five questions in all including Question No. 1.

1. (a) Define **(any five)** :

   (i) Repressor

   (ii) Signal transduction

P.T.O.

(iii) Nucleosome

(iv) Integral Proteins

(v) Transcript

(vi) Apoptosis (1×5=5)

(b) Expand the following :

(i) ADP

(ii) TMV

(iii) NADH

(iv) TEM

(v) ETC (1×5=5)

(c) What is the function of each of the following components of the protein-synthesizing apparatus :

(i) tRNA

(ii) rRNA

(iii) Peptidyl transferase

(iv) Initiation factors

(v) Elongation factor G (1×5=5)

2. Differentiate between **(any five)** :

   (i) Eukaryotes and Prokaryotes

   (ii) Light microscope and Electron microscope

   (iii) Active transport and Passive transport

   (iv) Gram Positive and Gram Negative Bacteria

   (v) Z-DNA and B-DNA (3×5=15)

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

   (i) Function of Membrane Proteins

   (ii) Composition of Cell Wall

   (iii) Replication of 5' end of linear DNA

   (iv) Confocal Microscope (5×3=15)

4. Draw well labelled diagrams for the following **(any three)** :

   (i) Ultrastructure of Mitochondria

   (ii) Fluid Mosaic Model of cell membrane

   (iii) Replication Fork (5×3=15)

5. (a) Describe with suitable diagrams experimental evidences that proved DNA to be the genetic material. Discribe with suitable diagrams experimentel. (7)

(b) Explain structure and function of Chloroplast. (8)

6. (a) Name the enzymes involved in DNA replication in Prokaryotes along with their functions. (7)

(b) Describe the role of Golgi in despatching packaged proteins and vesicular transport of proteins. (8)

7. (a) Discuss and illustrate the Lac operon. What is the advantage of having the Lac-operon in prokaryotes? (7)

(b) Describe the Fluid Mosaic Model for structure of cell membrane. Describe briefly the functions of the cell membrane. (8)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4955 G

Unique Paper Code : 42167902

Name of the Paper : Cell and Molecular Biology

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

Semester : V

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 any **five** questions in all.
3. Question No. **1** is compulsory.
4. **All** questions carry equal marks.
5. Attempt **all** parts of a question together.

1. (a) Comment on the following **(any five)** (5×1=5)

   (i) Heterochromatin

   (ii) Marker enzyme

   (iii) Exon

   (iv) Promoter

P.T.O.

(v) Fluorochrome

(vi) Idiogram

(vii) Resolving power

(b) Fill in the blanks **(any five)** (5×1=5)

(i) A microscope has a 4x ocular lens and a 10x objective, the microscope's total magnification is _____ x.

(ii) Spindle apparatus is formed during _____ stage of mitosis

(iii) X-ray diffraction is based on the principle of _____ .

(iv) The enzyme _____ binds to a region of a gene called the promoter to initiate transcription.

(v) A non-membranous organelle of a cell is _____ .

(vi) The "cell theory" was proposed by _____ .

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

(i) CPD

(ii) SER

(iii) CDS

(iv) cAMP

(v) hnRNA

(vi) UTR

(vii) GTF

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

(i) Light Microscope and Electron microscope

(ii) Prokaryotic transcription and Eukaryotic transcription

(iii) Mitosis and Meiosis

(iv) A-DNA and Z-DNA

(v) Lac operon and Tryptophan operon

3. Comment, in brief, on the following **(any three)** (3×5=15)

(i) Confocal Microscope

(ii) Nuclear pore complex

(iii) Ultrastructure of mitochondria

(iv) Fluidity of Plasma membrane

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

(i) DNA packaging in Eukaryotes

(ii) Semiautonomous nature of chloroplast

(iii) Theta mode of replication

(iv) Carbohydrates in the membrane

5. (a) Draw the ultrastructure of nucleus and mention its functions. (5)

(b) Discuss the salient features of genetic code. (5)

(c) Describe the experiment that demonstrated that DNA is the genetic material using radioisotopes. (5)

6. (a) Lysosomes are known as suicidal bags. Comment. (5)

(b) What is cell cycle? Discuss the molecular control of the cell cycle. (5)

(c) Differentiate between transmission electron microscope and scanning electron microscope. (5)

7. (a) Elaborate the various steps of translation in prokaryotes. What are the differences in translation process between eukaryotes and prokaryotes? (8)

(b) Draw well labelled diagrams of Prokaryotic and Eukaryotic cell, highlighting the similarities and differences. (7)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4962 **G**

Unique Paper Code : 42237903

Name of the Paper : DSE: Animal Biotechnology

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

Semester : V

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 **ANY FIVE** questions.
3. Question number 1 is compulsory.
4. Substantiate your answer with diagrams wherever necessary.

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

(i) Blocking agent

P.T.O.

(ii) Genetically Modified Organisms

(iii) Metagenomics

(iv) Shuttle vector

(v) Transformation

(b) Expand the following terms : (4)

(i) Taq

(ii) ddNTP

(iii) YAC

(iv) IPTG

(c) Distinguish between the followings : (10)

(i) Genomic and cDNA library

(ii) Cohesive and Blunt ends

(iii) Probe and Primer

(iv) Transgenic animal and Cloned animal

(v) Restriction Endonuclease and Exonuclease

(d) What is the contribution of following scientists in the field of Biotechnology : (5)

(i) E.M. Southern

(ii) Frederick Sanger

(iii) Sir Alec Jefferey

(iv) Karl Ereky

(v) Hamilton Smith, D. Nathans & Arber

(e) Write the importance of the following : (3)

(i) EDTA

(ii) Ethidium Bromide

(iii) Agarose

2. (a) Give a brief account of *in-vivo* gene therapy. (4)

(b) Explain the method of production of 'Humulin' by recombinant DNA technology. (8)

3. Describe in detail two methods used for production of transgenic animals. Add a note on the application of transgenic animals. (12)

P.T.O.

4. (a) What is western blot hybridization technique? Explain with diagrammatic representation. (7)

(b) What are cloning vectors? Describe any one in detail. (5)

5. (a) How are *Agrobacterium* mediated transgenic plants produced? Explain in detail. (8)

(b) What are edible vaccines? Explain. (4)

6. (a) What are DNA modifying enzymes? Discuss the role of any three enzymes used in gene cloning. (7)

(b) Describe the colony hybridization method of screening of genomic library. (5)

7. Write short note on **any three** of the following :

(i) CRISPR Cas-9

(ii) Calcium chloride method of transformation

(iii) Golden rice

(iv) DNA Microarray (3×4=12)