

**DECEMBER,2025
Archegoniatae**

Full Marks-100

Time-3.00 hours

Part A

Q.1 Multiple Choice Questions (compulsory)

(10x1 =10)

- i. Dominant phase in the life cycle of bryophytes is
a) Sporophyte b) Gametophyte c) Protonema d) Zygote
- ii. Elaters are present in
a) Riccia b) Funaria c) Anthoceros d) Marchantia
- iii. Bryophytes are called “amphibians of plant kingdom” because
a) They live only in water b) They require water for fertilisation
c) They produce spores d) They lack vascular tissues
- iv. Pteridophytes are the first plants to develop
a) Seeds b) Flowers c) Vascular tissues d) Fruits
- v. Marsilea is commonly known as
a) Water fern b) Club moss c) Horsetail d) Whisk fern
- vi. Coralloid roots are found in
a) Pinus b) Cycas c) Ginkgo d) Gnetum
- vii. Which gymnosperm shows vessel elements in xylem?
a) Cycas b) Pinus c) Gnetum d) Ginkgo
- viii. Endosperm in gymnosperms is
a) Diploid b) Triploid c) Haploid d) Tetraploid
- ix. Palaeobotany deals with the study of
a) Fossil plants b) Living plants c) Algae d) Microorganisms
- x. Geological time scale divides Earth history into
a) Eras and periods b) Species and genera c) Kingdoms and phyla d) Ages and species

Part B

Q.2 Short Questions type maximum 50 words (compulsory)

(9x2)

- i. What is protonema? Mention its function.
- ii. Ecological importance of bryophytes?
- iii. What is a prothallus?
- iv. Define apospory.
- v. Write two distinguishing features of Psilotum
- vi. Why are gymnosperms called naked seed plants?
- vii. Write two anatomical features of Pinus wood.
- viii. What is fossilization?
- ix. What is petrification?

Part C

Q.3 Answer any eight question maximum 250 words

(8×5)

- i. Give an account of anatomical structure of Riccia thallus.
- ii. Explain alternation of generations in bryophytes with a neat diagram.
- iii. Describe the morphology and anatomy of Marchantia.

- iv. Explain heterospory and its significance in plant evolution.
- v. Explain the structure of Selaginella stem with diagram.
- vi. Write an account of Gnetum and its angiosperm-like characters.
- vii. Describe the ecological and economic importance of gymnosperms.
- viii. Describe different types of fossils.
- ix. Describe Calamites and its affinities with modern plants.
- x. Give the classification of gymnosperms up to family level.

Part D

Q.4 Answer any four-question maximum 800 words (4×8)

- i. Define archegoniates and discuss their unifying features with suitable examples.

OR

Describe the structure and function of the sporophyte in bryophytes.

- ii. Explain the telome theory and its role in the evolution of vascular plants.

OR

Give a detailed account of the morphology, anatomy and reproduction of Psilotum.

- iii. Explain the structure and development of male and female cones of Cycas.

OR

Give an account of Ginkgo and explain why it is called a living fossil.

- iv. Explain the geological time scale with suitable examples.

OR

Describe the morphology, anatomy and affinities of Lepidodendron.

Dec,2025

Anatomy of Angiosperm and Economic Botany

Full Marks-100/ Time-3.00 hours

Part A

Q.1 Multiple Choice Questions (compulsory) **(10x1=10)**

- I. Which of the following is a simple tissue?
a) Xylem b) Phloem c) Parenchyma d) Vascular bundle
- II. Sieve tubes are associated with
a) Xylem b) Phloem c) Cambium d) Pericycle
- III. Trichomes are outgrowths of
a) Cortex b) Epidermis c) Vascular tissue d) Cambium
- IV. Which tissue is absent in monocot stem?
a) Epidermis b) Ground tissue c) Cambium d) Vascular bundles
- V. Radial vascular bundles are typical of
a) Leaf b) Stem c) Root d) Flower
- VI. Endodermis is characterized by
a) Casparian strips b) Stomata c) Lenticels d) Trichomes
- VII. Wheat belongs to the family
a) Fabaceae b) Poaceae c) Solanaceae d) Malvaceae
- VIII. Potato is propagated mainly by
a) Seed b) Root c) Stem tuber d) Leaf
- IX. Cotton fibre is obtained from
a) Stem b) Root c) Seed hair d) Leaf
- X. Black pepper is obtained from
a) Root b) Leaf c) Fruit d) Stem

Part B

Q.2 Short Questions type maximum 50 words (compulsory) **(9x2)**

- I. Define sieve elements and state their function.
- II. What are plasmodesmata? Mention their role.
- III. Define ergastic substances with one example.
- IV. What is meant by root–stem transition?
- V. What is the quiescent centre in root apex?
- VI. Mention importance of leguminous crops.
- VII. What are millets? Give one example.

- VIII. What is meant by drug-yielding plants?
IX. Define fibres based on origin.

Part C

Q.3 Answer any eight question maximum 250 words (8x5)

- I. Describe the structure and functions of tracheary elements.
- II. Write an account of adcrustation and incrustation.
- III. Explain Kranz anatomy and its physiological significance.
- IV. Explain the organization of root apex including quiescent centre and root cap.
- V. Write an account of the importance of germplasm diversity in crop improvement.

- VI. Write an account of leguminous crops and their ecological importance.
- VII. Explain the classification and uses of edible oils.
- VIII. Describe pine as a timber plant, mentioning its economic importance.
- IX. Describe the cultivation and economic importance of rice.
- X. Give an account of the anatomy of monocot stem.

Part D

Q.4 Answer any four-question maximum 800 words (4x8)

- I. Give a detailed account of the classification of plant tissues, explaining simple and complex tissues with suitable examples.

OR

Explain the anatomical adaptations of xerophytes and hydrophytes with suitable examples.

- II. Describe the organization of shoot apex according to apical cell theory, histogen theory and tunica–corpus theory.

OR

Describe the process of secondary growth in dicot stem, including normal and anomalous secondary growth.

- III. Explain the concept of centres of origin of cultivated plants with reference to Vavilov’s work.

OR

Describe the process of plant domestication, its causes and consequences.

- IV. Give a detailed account of drug-yielding plants, with special reference to Cinchona and Cannabis.

OR

Describe the classification of fibres based on origin, explaining cotton and jute in detail.

Dec,2025
Genetics
Full Marks-100/ Time-3.00 hours

Part A

Q.1 Multiple Choice Questions (compulsory) **(10x1 =10)**

- I. A single gene affecting multiple traits is called
a) Polygenic inheritance b) Epistasis c) Pleiotropy d) Codominance
- II. Shell coiling in snail is an example of
a) Sex-linked inheritance b) Polygenic inheritance c) Maternal effect
d) Incomplete dominance
- III. In incomplete dominance, the heterozygote shows
a) Dominant phenotype b) Recessive phenotype c) Intermediate phenotype
d) Lethal phenotype
- IV. Crossing over occurs during
a) Prophase I b) Metaphase I c) Anaphase I d) Telophase I
- V. Maximum recombination frequency between two genes is
a) 25% b) 50% c) 75% d) 100%
- VI. Down syndrome is an example of
a) Euploidy b) Polyploidy c) Aneuploidy d) Deletion
- VII. Transposons are also called
a) Silent genes b) Jumping genes c) Structural genes d) Lethal genes
- VIII. p^2 represents frequency of
a) Homozygous dominant b) Heterozygous c) Homozygous recessive d) Allele
- IX. Speciation results due to
a) Gene flow b) Random mating c) Reproductive isolation d) Panmixia
- X. Genetic drift is more effective in
a) Large populations b) Small populations c) Stable populations
d) Panmictic populations

Part B

Q.2 Short Questions type maximum 50 words (compulsory) **(9x2)**

- I. What is codominance? Mention a suitable example.
- II. What are Kappa particles?
- III. Define pleiotropy.
- IV. What is a chiasma?
- V. What are point mutations?
- VI. Define euploidy.
- VII. What is sex linkage?
- VIII. Define gene pool.
- IX. Define speciation.

Part C

Q.3 Answer **any eight** question maximum 250 words **(8×5)**

- I. Explain Mendel's experiments and laws of inheritance with suitable crosses and ratios.
- II. Write a short note on infective heredity with reference to Kappa particles.
- III. Explain polygenic inheritance and its role in continuous variation.
- IV. Explain sex linkage and sex-linked inheritance with suitable examples.
- V. Explain recombination frequency and its application in gene mapping.
- VI. Describe different DNA repair mechanisms in cells.
- VII. Explain the CIB method for detection of sex-linked lethal mutations.
- VIII. Describe natural selection and its role in evolution.
- IX. Explain the cis–trans complementation test for functional allelism.
- X. Describe the fine structure of gene with reference to the rII locus of T4 phage.

Part D

Q.4 Answer **any four**-question maximum 800 words **(4×8)**

- I. Write an essay on extranuclear inheritance, including maternal effects shell coiling in snail.

OR

Discuss details about chromosomal theory of inheritance and its significance in genetics.

- II. Three-factor test cross, the following progeny were obtained:

	Phenotype	Number
Questions:	ABC	360
	abc	350
	Abc	90
	aBC	80
1. Determine the gene order.	ABc	45
2. Calculate the map distance between genes.	abC	40
3. Calculate the coefficient of coincidence and interference	AbC	18
	aBc	17

OR

Describe the cytological basis and mechanism of crossing over with neat diagrams.

- III. Write an essay on transposons and their role in mutation and genome evolution.

OR

Explain numerical chromosomal aberrations including euploidy and aneuploidy.

- IV. Explain genetic drift with reference to founder effect and bottleneck effect.

OR

State and explain the Hardy–Weinberg law with assumptions and applications.

Dec,2025

Cell Biology
Full Marks-100/ Time-3.00 hours

Part A

- Q.1 Multiple Choice Questions (compulsory) **(10x1 =10)**
- I. Major component of plant cell wall is
a) Chitin b) Cellulose c) Pectin d) Hemicellulose
 - II. Which of the following is absent in prokaryotic cells?
a) Ribosomes b) Plasma membrane c) Membrane-bound nucleus d) Cell wall
 - III. Cytoskeleton plays a role in
a) DNA replication only b) Cell movement and transport c) Photosynthesis d) Respiration
 - IV. Fluid mosaic model of membrane was proposed by
a) Singer and Nicolson b) Davson and Danielli c) Robertson d) Watson and Crick
 - V. Golgi apparatus is mainly responsible for
a) DNA replication b) Protein modification and packaging c) Photosynthesis d) ATP synthesis
 - VI. Endocytosis involves
a) Release of substances b) Intake of substances c) Diffusion d) Osmosis
 - VII. Semi-autonomous nature of mitochondria is due to
a) Presence of enzymes b) Presence of DNA and ribosomes c) Double membrane d) Cristae
 - VIII. Site of photosynthesis in plant cells is
a) Mitochondria b) Chloroplast c) Ribosome d) Golgi body
 - IX. Crossing over occurs during
a) Prophase I b) Metaphase I c) Anaphase I d) Telophase I
 - X. Cyclins regulate
a) DNA structure b) Ribosome synthesis c) Cell cycle progression d) Chromosome number

Part B

- Q.2 Short Questions type maximum 50 words (compulsory) **(9x2)**

- I. What are microtubules?
- II. What are intermediate filaments?
- III. What is the chemical nature of plant cell wall?
- IV. Define active transport.
- V. Why are lysosomes called “suicide bags”?
- VI. Write the function of nuclear pore complex.

- VII. What is mitochondrial matrix?
- VIII. What is chromatin?
- IX. What is a nucleosome?

Part C

Q.3 Answer any eight question maximum 250 words (8×5)

- I. Describe the structure and functions of plasmodesmata.
- II. Compare prokaryotic and eukaryotic cells with neat diagrams.
- III. Describe the structure and functions of primary and secondary cell walls.
- IV. Explain the chemical composition of biological membranes.
- V. Describe the structure and functions of plant vacuole.
- VI. Describe the structure and functions of endoplasmic reticulum.
- VII. Explain the organization and functions of nuclear pore complex.
- VIII. Describe the functional significance of chloroplast structure.
- IX. Explain Structure and function of A, B, Z types of DNA?
- X. Explain the stages of meiosis I.

Part D

Q.4 Answer any four-question maximum 800 words (4×8)

- I. Describe the cell theory in detail and explain the cell as the structural and functional unit of life.

OR

Explain the origin of eukaryotic cells with special reference to the endosymbiotic theory, including evidences and criticisms.

- II. Describe different mechanisms of membrane transport with suitable examples.

OR

Give a detailed account of Golgi apparatus and its role in secretion.

- III. Discuss the coordination between nucleus and cytoplasmic organelles.

OR

Discuss the biogenesis and semi-autonomous nature of mitochondria and chloroplast.

- IV. Explain the role of cyclins and CDKs in cell cycle control.

OR

Describe the structure and types of nucleic acids with special reference to DNA.

DECEMBER, 2025
Herbarium Preparation

Full Marks-100

Time-3 hours

Answer as per instructions.
figures in the right-hand margin indicates marks

Part A

Q.1 Multiple Choice Questions (compulsory) **(10x1)**

- i. A herbarium is mainly a collection of:
a) Living plants b) Preserved plant specimens c) Seeds only d) Plant photographs
- ii. Who is known as the “Father of Herbarium”?
a) Linnaeus b) Tournefort c) Luca Ghini d) Darwin
- iii. Which of the following is NOT a type of herbarium specimen?
a) Dry plant sheets b) Spirit-preserved specimens
c) Living plants in pots d) Microscope slides
- iv. Herbarium specimens are mainly used in:
a) Plant breeding b) Plant taxonomy c) Plant pathology d) Plant physiology
- v. The first step in herbarium preparation is:
a) Mounting b) Collection c) Labeling d) Storage
- vi. Stitching of specimens is done to:
a) Improve color b) Fix specimen firmly c) Dry faster d) Kill insects
- vii. Algae and fungi are often preserved by:
a) Dry mounting only b) Pressing only
c) Special methods like liquid preservation d) Freezing
- viii. Moisture control in herbarium is important to prevent:
a) Drying b) Fungal growth c) Mounting d) Labeling
- ix. Digital herbarium refers to:
a) Printed herbarium sheets b) Online database of specimens
c) Field notebook d) Living plant garden
- x. Maintenance of herbarium specimens includes:
a) Regular checking b) Cleaning c) Protection from pests d) All of the above

Part B

Q.2 Answer the following questions in 50 words **(9x2)**

- i. Define herbarium specimen.
- ii. Why are bulky plant parts preserved separately?
- iii. What is fluid preservation in herbarium?
- iv. What are field notes?
- v. What is mounting of herbarium specimens?
- vi. Mention two methods of identification of plant specimens.
- vii. What is fumigation in herbarium?
- viii. What are type collections?
- ix. What is herbarium exchange?

Part C

Q.3 Answer any eight question in 250 words **(8×5)**

- i. Describe the history and development of herbarium.

- ii. Explain the role of herbarium in plant taxonomy.
- iii. Describe different types of herbarium specimens.
- iv. Write a short note on modern uses of herbarium in plant science.
- v. Describe the steps involved in collection of plant specimens.
- vi. Explain the preservation techniques of fungi and bryophytes.
- vii. Explain common problems faced during herbarium preparation.
- viii. Describe methods of long-term storage of herbarium specimens.
- ix. Explain herbarium services and activities for education and research.
- x. Explain the handling and care of herbarium specimens.

Part D

Q.4 Answer any four-question maximum 800 words (4×8)

- i. Describe long-term storage, maintenance, and protection of herbarium specimens, including moisture and pest control.

OR

Write a detailed account of major herbaria of India and their contributions to botany.

- ii. Explain mounting, stitching, and labeling of herbarium specimens in detail.

OR

Describe the identification of plant specimens using floras and taxonomic keys.

- iii. Discuss common problems faced during herbarium preparation and their solutions.

OR

Describe the tools, materials, and chemicals used in herbarium preparation.

- iv. Describe the handling, repair, and care of old and damaged herbarium specimens.

OR

Discuss herbarium exchange programmes and their importance in research.
