

2017

Full Marks - 60

Time - 3 hours

The figures in the right-hand margin indicate marks

Answer *all* questions selecting either {(a),(b)}
or {(c),(d)} from each question

1. a) Describe the principles of inheritance with reference to chromosomal theory of inheritance. 8
- b) Write short notes on any *two* : 2 × 2
- i) Polygenic inheritance
 - ii) Incomplete dominance
 - iii) Lethal alleles.

OR

- c) Give some examples of recessive and dominant traits. Describe the mechanisms of inheritance of these traits. 8

[2]

- d) Write short notes on any *two* : 2 × 2
- i) Pleiotropy
 - ii) Sex Chromosomes
 - iii) Pedigree analysis.

2. a) How does variegation in four o' clock plant occur ? 8
- b) Write short notes on any *two* : 2 × 2
- i) Kappa particles
 - ii) Shell coiling in snail
 - iii) Significance of Mitochondrial mutation.

OR

- c) Describe the mitochondrial mutation in Yeast. 8
- d) Write short notes on any *two* : 2 × 2
- i) Infective heredity
 - ii) Define Maternal effects and give example
 - iii) Evolutionary significance of extra-chromosomal inheritance.
3. a) What do you mean by Crossing over ? Describe in detail the cytological basis of crossing over. 8

[3]

- b) Write short notes on any *two* : 2 × 2
- i) Sex linkage
 - ii) Coefficient of coincidence
 - iii) Recombination frequency calculation.

OR

- c) Define linkage. How linkage can be analysed ? 8
- d) Write short notes on any *two* : 2 × 2
- i) Interference
 - ii) Three factor crosses
 - iii) Gene map units and map distance.
4. a) What do you mean by euploidy and aneuploidy ?
How do these types of chromosomal changes take place and mention their significance. 8
- b) Write short notes on any *two* : 2 × 2
- i) Chemical mutagens
 - ii) Translocation
 - iii) DNA repair.

OR

- c) Describe the molecular basis of mutation. 8

[4]

- d) Write short notes on any *two* : 2 × 2
- i) Inversion
 - ii) Transposons in mutations
 - iii) Physical mutagens.

5. a) Give a critical analysis on classical vs molecular concepts of gene. 8

b) Write short notes on any *two* : 2 × 2

- i) Structure of Phage T₄
- ii) Genetic drift
- iii) Genotype frequencies.

OR

c) Describe the Hardy-Weinberg Law with reference to Population and evolutionary genetics. 8

d) Write short notes on any *two* : 2 × 2

- i) Cis-Trans Complementation test
- ii) Allele frequencies
- iii) Genetic variation and speciation.

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Answer *all* questions

Draw labelled diagrams wherever necessary

1. a) Describe the types of plant tissues. 8
- b) Write short notes on the following : 2 × 2
 - i) Application of plant anatomy in forensics.
 - ii) Sclerenchyma.

OR

- c) Describe different tissue systems in plants. 8
 - d) Write notes on the following : 2 × 2
 - i) Application of plant anatomy in systematics.
 - ii) Parenchyma.
-
2. a) Explain the theories of shoot apex organisation in Angiosperms. 8

[2]

- b) Write notes on the following : 2 × 2
- i) Kranz anatomy
 - ii) Types of vascular bundles.

OR

- c) Describe the organisation of root apex in angiosperms. 8
- d) Write notes on the following : 2 × 2
- i) Quiescent centre
 - ii) Root-stem transition.
3. a) Explain secondary growth in dicot stem. 8
- b) Write notes on the following : 2 × 2
- i) Cambium
 - ii) Secondary growth in monocot stem.

OR

- c) Describe Anomalous secondary growth in dicot stem. 8
- d) Write notes on the following : 2 × 2
- i) Secondary growth in root.
 - ii) Seasonal activity of cambium.

[3]

4. a) Explain anatomical adaptations of Xerophytes. 8
- b) Write notes on the following : 2 × 2
- i) Classification of Stomata
 - ii) Epiphytes.

OR

- c) Describe the anatomical adaptations found in hydrophytes. 8
- d) Write notes on the following : 2 × 2
- i) Cuticle
 - ii) Lithophytes.
5. a) Describe the structure, types and functions of mechanical tissues. 8
- b) Write notes on the following : 2 × 2
- i) Hydathodes
 - ii) Laticifers.

OR

- a) Explain the structure and functions of secretory tissues. 8

[4]

b) Write notes on the following : 2 × 2

i) Lithocytes

ii) Distribution of mechanical tissues in stem.

L-5-9



2017

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Answer *all* questions selecting either {(a),(b)}
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Give labelled diagrams wherever necessary

1. a) Describe various centres of origin of cultivated plants with reference to Vavilov's work. 8
- b) Write short notes on the following : 2 × 2
 - i) Importance of germplasm diversity
 - ii) Crop domestication and loss of genetic diversity.

OR

- c) Describe major plant introductions in India with examples. 8
- d) Write short notes on the following : 2 × 2
 - i) Evolution of new crops
 - ii) Indian Centre of Origin of Cultivated plants.

[2]

2. a) Describe the origin, morphology, processing and uses of Rice plant. 8
- b) Write short notes on the following : 2 × 2
- i) Importance of legumes to man
 - ii) Products and by-products of sugarcane industry.

OR

- c) Describe the morphology, propagation and uses of Potato plant. 8
- d) Write short notes on the following : 2 × 2
- i) Importance of legumes to ecosystem
 - ii) Millets.
3. a) Describe the morphology, processing and uses of Tea. 8
- b) Write short notes on the following : 2 × 2
- i) Family, parts used and economic importance of *Cinchona*.
 - ii) Family, parts used and economic importance of Clove.

OR

- c) Describe the morphology, processing, uses and health hazards of Tobacco. 8
- d) Write short notes on the following : 2 × 2
- i) Family, parts used and economic importance of *Papaver*.
 - ii) Family, parts used and economic importance of Saffron.
4. a) Describe the botanical description, extraction of oil and the uses of ground nut. 8
- b) Write short notes on the following : 2 × 2
- i) Botanical name, family and uses of coconut.
 - ii) Botanical name, family and uses of *Brassica*.

OR

- c) Describe the botanical description, extraction of oil and the uses of *Brassica*. 8
- d) Write short notes on the following : 2 × 2
- i) Essential oils
 - ii) Botanical name, family and uses of linseed.

[Turn Over

[4]

5. a) Describe the morphology, extraction of fiber and uses of Jute plant. 8
- b) Write short notes on the following : 2 × 2
- i) Botanical name, family and uses of Teak plant
- ii) Botanical name, family and uses of para rubber plant.

OR

- c) Describe the morphology, extraction of fiber and use of Cotton plant. 8
- d) Write short notes on the following : 2 × 2
- i) Botanical name, family and use of Pine plant
- ii) Tapping of Rubber.

2018

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Give labelled diagrams wherever necessary

1. a) Citing examples of major plant introductions, describe how it has triggered the loss of genetic diversity of Indian crops. 8
- b) Write short notes on : 2 × 2
- i) Indian centres of diversity
- ii) Crop domestication.

OR

- c) Discuss how crop domestication has given opportunity for evaluation of new crops. 8
- d) Write notes on : 2 × 2
- i) Importance of germplasm diversity
- ii) Secondary centres.

[2]

2. a) Describe the origin, morphology and processing of wheat. 8
- b) Write short notes on : 2 × 2
- i) By-products of sugarcane industry
- ii) Propagation of Potato.

OR

- c) Discuss the propagation and processing of sugarcane. 8
- d) Write short notes on : 2 × 2
- i) Environmental importance of legumes.
- ii) Morphology of Potato plant.
3. a) Describe the morphology, processing and uses of coffee. 8
- b) Write short notes on : 2 × 2
- i) Economic importance of fennel
- ii) Therapeutic use of *cannabis*.

OR

[3]

- c) Describe the processing, uses and health hazards of tobacco. 8
- d) Write short notes on : 2 × 2
- i) Economic importance of black pepper
 - ii) Processing of tea.
4. a) Give an account of the classification, extraction and uses of plant fats. 8
- b) Write short notes on : 2 × 2
- i) Uses of essential oils
 - ii) Health implication of consumption of Coconut.

OR

- c) Describe the methods of extraction and uses of lemon grass essential oil. 8
- d) Write the botanical name, family and uses of 2 × 2
- i) Mustard
 - ii) Linseed.

[4]

- 5 a) Describe the tapping, processing and uses of natural rubber. 8
- b) Write notes on : 2×2
- i) Properties of pinewood
 - ii) Morphology of cotton fibre.
- c) Describe the extraction and uses of Jute fibre. 8
- d) Write short notes on : 2×2
- i) Para-rubber
 - ii) Classification of fibres.

2018

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1. a) Explain clearly the law of segregation and law of independent assortment with example. 8
- b) Write notes on the following : 2 × 2
- i) Epistasis
- ii) Multiple alleles.

OR

- c) Explain the present status of Mendel's theory. How the present knowledge can modify the Mendel's concept of inheritance. 8
- d) Write notes on the following : 2 × 2
- i) Lethal alleles
- ii) Co-dominance.

2. a) What is an extranuclear inheritance ? Describe it in relation to plastidial inheritance in plants. 8

b) Write notes on the following : 2 × 2

i) Maternal effect

ii) Kappa particles.

OR

c) Describe the mitochondrial mutation in Yeast. 8

d) Write notes on the following : 2 × 2

i) Shell coiling in Snail.

ii) Variegation in Four O' clock plant.

3. a) Define crossingover. Give a detail account of cytological bases of crossing over with example. 8

b) Write notes on the following : 2 × 2

i) Sex Linkage

[3]

ii) Interference and coincidence.

OR

- c) How recombination frequency affected by two factors and three factor cross explain ? 8
- d) Write notes on the following : 2 × 2
- i) Gene mapping
 - ii) Linkage.
4. a) Write about the origin, cytology and genetic effect of traslocation heterozygotes. 8
- b) Write notes on the following : 2 × 2
- i) Base analogue
 - ii) DNA repair mechanism.

OR

- c) What is mutation ? Give a detail account of molecular basis of point mutation with example. 8

[4]

- d) Write notes on the following : 2×2
- i) Physical Mutagens.
 - ii) Detection of Mutation.
5. a) Describe the cis-Trans complementation test for functional allelism with example. 8
- b) Write notes on the following : 2×2
- i) Genetic drift
 - ii) Allele frequencies.

OR

- c) Define Hardy-Weinberg's Law, How it will help the population and evolutionary genetics. $8 \times 1 = 8$
- d) Write notes on the following : 2×2
- i) Structure of phase T_4
 - ii) Classical concept of Gene.

2019

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Answer *all* questions.

1. a) Discuss Mendel's law of Inheritance with help of dihybrid ratio. 8
- b) Write notes on the following : 2 × 2
- i) Pleiotrophism
 - ii) Co-dominance.

OR

- c) Define multiple allelism ? Explain the phenomenon with suitable example. 8
- d) Write notes on the following : 2 × 2
- i) Independent Assortment
 - ii) Polygenic Inheritance.

[2]

2. a) Give an account of plastid inheritance in Four o'clock plant. 8
- b) Write notes on the following : 2×2
- i) Cytoplasmic Inheritance
 - ii) Petite in yeast.

OR

- c) Comment on cytoplasmic inheritance in Paramecium. 8
- d) Write notes on the following : 2×2
- i) Types of Coiling in snails
 - ii) Chloroplast Mutation.
3. a) Give an account of coupling and Repulsion hypothesis ? 8
- b) Write notes on the following : 2×2
- i) Linkage group
 - ii) Factor affecting crossing over.

OR

[3]

- c) Explain the Stern's Experiment in *Drosophila* to prove Cytological observation during crossing over. 8
- d) Write notes on the following : 2 × 2
- i) Chromosome mapping
 - ii) Complete Linkage.
4. a) What is Inversion, Mention its types Behaviours and significance during chromosem mutation. 8
- b) Write notes on the following : 2 × 2
- i) Types of Deletion
 - ii) Alkylating agents.

OR

- c) Define Mutagens ? Give an account of effect of radiation on nucleotide sequence. 8
- d) Write notes on the following : 2 × 2
- i) CIB Method
 - ii) Types of Aneuploidy.

[4]

5. a) Discuss the structure of Genes in T_4 phages. 8
- b) Write notes on the following : 2×2
- i) Modern Definition of Gene
 - ii) Genetic speciation.

OR

- c) Explain the role of natural selection in the process of Evolution. 8
- d) Write notes on the following : 2×2
- i) Cis-Trans Complement
 - ii) Hardy-Weinberg's law.

2019

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Answer *all* questions.

Give labelled diagrams wherever necessary.

1. a) Describe the various centres of origin of cultivated plants given by Vavilov. What was the basis of his theory. 8
- b) Write notes on the following : 2 × 2
 - i) Plant Domestication
 - ii) Evolution of new crop species.

OR

- c) What do you mean by plant introduction ? Discuss major examples of plant introductions. 8
- d) Write notes on the following : 2 × 2
 - i) Loss of genetic diversity
 - ii) Importance of germplasm diversity.

[2]

2. a) Give an account of origin, morphology, cultivation and uses of Rice. 8

b) Write notes on the following : 2 × 2

i) Millets

ii) Byproducts of sugar-cane industry.

OR

c) Describe origin, morphology, cultivation and uses of Wheat. 8

d) Write notes on the following : 2 × 2

i) Processing of sugar cane

ii) Uses of potato.

3. a) What are spices ? Give families, botanical names, parts used and economic importance of any three important spices studied by you. 8

b) Write notes on the following : 2 × 2

i) Cinchona as drug yielding plant

ii) Processing of tobacco.

OR

[3]

- c) What are the main centres of coffee plantation in India ? Write about the processing and uses of coffee. 8
- d) Write notes on the following : 2 × 2
- i) Medicinal importance of papaver
 - ii) Black pepper as a spices.
4. a) Give an account of the botanical name, family, uses and health implications of groundnut oil. 8
- b) Write notes on the following : 2 × 2
- i) Essential oils
 - ii) Classification of oils.

OR

- c) Give a general account, extraction methods of any two essential oils studied by you. 8
- d) Write notes on the following : 2 × 2
- i) Coconut oil
 - ii) Health implications of linseed oil.

5. a) Write briefly about the importance of teak and sal as timber yielding plants. Add a note on the areas of their plantation and properties of their woods. 8
- b) Write notes on the following : 2 × 2
- i) Uses of para-rubber
 - ii) Jute fibres.

OR

- c) Describe the morphology extraction and uses of cotton fibres. 8
- d) Write notes on the following : 2 × 2
- i) Processing of rubber
 - ii) Pine wood-their properties.

2019

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Answer *all* questions.

Draw labelled diagrams wherever necessary.

1. a) What do you mean by meristem ? Classify the meristematic tissue system with their characteristics. 8
- b) Write short notes on the followings : 2 × 2
- Applications of plant anatomy in systematics
 - Applications of plant anatomy in pharmacognosy.

OR

- c) Give an account of the nature and classification of permanent tissue system found in the plant kingdom. 8

[2]

- d) Write short notes on the followings : 2×2
- i) Vascular tissue system
 - ii) Epidermal tissue system.

2. a) Discuss the different theories of the organisation of the shoot apex in dicotplants. 8

- b) Write short notes on the followings : 2×2
- i) Kranz anatomy
 - ii) Quiscentcentre.

OR

c) Describe different theories of the organisation of the root apex of plant. 8

- d) Write short notes on the followings : 2×2
- i) Origin of lateral, root
 - ii) Organisation and types of vascular bundles.

3. a) Describe the sturcture, function and seasonal activities of cambium and its consequence. 8

[3]

b) Write short notes on the followings : 2×2

i) Secondary growth in monocot stem

ii) Normal secondary growth in dicot root.

OR

c) What is abnormal secondary growth and how many types they are ? Point out the causes of abnormal secondary growth. 8

d) Write short notes on the followings : 2×2

i) Heart wood vs sap wood

ii) Extra stelar secondary growth.

4. a) Describe the characters of different components of epidermal tissue system in plants. 8

b) Write short notes on the followings : 2×2

i) Types of stomata

ii) Adaptations in Lithophytes.

OR

c) Discuss the anatomical adaptations of Xerophytes. 8

- d) Write short notes on the followings : 2×2
- i) Adaptations in leaf system of hydrophytes
 - ii) Adaptions in shoot and root systems of hydrophytes.
5. a) What do you mean by mechanical tissue ?
Describe their characters and types. 8
- b) Write short notes on the followings : 2×2
- i) Laticifers
 - ii) Cavities.

OR

- c) What is secretory tissue system ? Give an account of different types of secretory tissues found in different types of plants. 8
- d) Write short notes on the followings : 2×2
- i) Principles of distribution of mechanical process
 - ii) Structure and functions of hydathodes.



2021

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Answer *all* questions

Part-I

1. Fill in the blanks : 1 × 8
- a) The most functional simple tissue is ____.
 - b) The first person to present plant anatomy as forensic evidence in the court of law was ____.
 - c) Closed vascular bundles characterize by ____.
 - d) The tissue of the leaf that lies between the upper and lower epidermis is known as ____.
 - e) The lateral roots originate from ____.
 - f) The older non-functional secondary xylem in the centre of a tree trunk is ____.
 - g) A single subsidiary cell surrounding a stoma lying at the parietal position is known as ____.
 - h) ____ cells are usually present which provide support to the thin walls of air chambers.

Part-II

2. Answer any *eight* of the following : $1\frac{1}{2} \times 8$

- a) Define forensic botany.
- b) Define adcrustation.
- c) What is Kranz anatomy ?
- d) What is casparian stripes ?
- e) Define laticifers.
- f) Define tyloses.
- g) What is lithocysts ?
- h) Differentiate between conjoint and radial vascular bundle.
- i) What are the functions of plasmodesma strands ?
- j) Define lenticels.

Part-III

3. Answer any *eight* of the following : 2×8

- a) Briefly describe the role of nodal anatomy in plant systematics.

- b) What are the characteristics of parenchyma ?
- c) What is bark ?
- d) Define trichomes with their types.
- e) What is Rhytidome ?
- f) What is mesophyll tissue ? Describe different types of mesophyll tissue.
- g) What are plasmodesmata ? Give a brief structure of plasmodesmata.
- h) Differentiate between tension wood and compression wood.
- i) Write adaptation of floating hydrophytes.
- j) Describe the structure of stomata.

Part-IV

4. a) Explain in detail about the application of plant anatomy in systematics. 6

OR

- b) Explain the role of plant anatomy to solve taxonomic problems.

5. a) Briefly discuss the theories of structural development and differentiation of shoot apex flowering plants. 6

OR

- b) Describe the anatomical features of a dorsiventral leaf. How does it differ from that of an isobilateral and centric type of leaf.
6. a) Discuss various theories relating to the growth and development of root apex. 6

OR

- b) Give a note on the development and composition of Periderm.
7. a) Describe in brief the epidermal tissue system with special reference to epidermal outgrowths. 6

OR

- b) Give an illustrated account of the adaptive features of hydrophytes and Xerophytes.

2021

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Answer *all* questions

Part-I

1. Fill in the blanks : 1 × 12
- a) *Azolla pinnata* has been found to be an important biofertilizer for paddy crops. This quality is due to the presence of ____.
 - b) The symbiotic association between fungi and roots of higher plants is referred to as ____.
 - c) ____ bacteria provides nitrogen to the plants from soil.
 - d) Cyanobacteria are used as biofertilizers because they ____.
 - e) Biofertilizers are ____.
 - f) Organic farming does not include ____.
 - g) A nitrogen fixing microbe associated with the fern *Azolla* in rice fields is ____.
 - h) The main function of biofertilizer is ____.

[2]

- i) Organic farming is the technique of raising crops through uses of _____.
- j) Presence of _____ element is required for bitrogen fixation.
- k) _____ aquatic fern is used to increase the yield in paddy crop.
- l) _____ algae played important role in rice cultivation.

Part-II

2. Answer any *eight* of the following : 2 × 8
- a) State three important advantages of vermicomposting.
 - b) Write advantages of use of green manure.
 - c) Defin biofertilizer.
 - d) How do the *Azolla* serve as main source of biofertilizer.
 - e) Define vermicomposting.
 - f) What are mycorrhizae ?
 - g) Which is the suitable medium for *Azotobacter* ?
 - h) Enlist the species of *Azotobacter* that occur commonly in India.
 - i) Define industrial waste.
 - j) Write uses of VAM fungi.

Part-III

3. Answer any *eight* of the following : 3 × 8
- a) What are the conditions required for getting biofertilizers certified with ISI mark ?
 - b) State the advantages of organic farming.
 - c) Give names of biofertilizers recommended for crop production.
 - d) Describe the use of warm castings.
 - e) Mention the types and methods of vermicomposting.
 - f) Differentiate between agricultural and industrial wastes.
 - g) Mention the factors affecting the growth of *Azolla*.
 - h) Describe the process of making biocompost.
 - i) Mention methods of collection of Municipal solid waste ?
 - j) Describe the brief about the crop response to *Azotobacter inoculum*.

Part-IV

4. a) Define biofertilizer. Describe the main sources of biofertilizer. Add a note on application of biofertilizer. 7

OR

[4]

- b) Discuss the role of *Azotobacter* in maintaining soil fertility or productivity.
5. a) What is biological nitrogen fixation ? Give an account of symbiotic nitrogen fixation in plants. Name two organisms each which fix nitrogen asymbiotically and symbiotically. 7

OR

- b) Describe the role of blue green algae and *Azolla* in rice cultivation.
6. a) Explain the role of vesicular-arbuscular mycorrhiza (VAM) on growth and yield of crop plants. 7

OR

- b) Write short notes on the following :
- i) Colonization of VAM
 - ii) VAM isolation.
7. a) Discuss the importance and scope of organic farming. 7

OR

- b) Write short notes on the following :
- i) Agricultural wastes
 - ii) Vermicomposting.

□□