Subject –Botany

Paper- Phycology and Microbiology (CC1)

Group-A (1 marks each)

1. (a) What is virion?

(b) What is endospore?

(c) Define the Gaidukov Phenomenon.

(d) Name one fresh water Rhodophyta Algae.

(e) What is reserve food material of brown algae?

(f) What is holdfast?

(g) Name one gram negative bacteria.

(h) Define transduction.

(i) Name one non motile green algae.

(j) What is heterocyst?

Group-B (5 marks each)

2. (i) Briefly describe lysogenic life cycle of virus. 5

(ii) Differentiate between gram negative and gram positive bacteria. 5

(iii) Briefly discuss on economic important of algae. 5

(iv) Comment on the sexual life cycle of *Chara.* 5

(v) Brifely describe the asexual reproduction of Ectocarpus. 5

(vi) Comment on T4 bacteriophage Virus. 5

(vii) What is triphasic life cycle? Briefly discuss on this life cycle. 1+4=5

Group –C (10 marks each)

3. (i) Give the outline of Lee system of classification of algae. 10

(ii) Discuss on about on full process of endospore formation of bacteria. 10

(iii) What is nanandrium? Describe in detail the asexual reproduction of *Oedogonium* sp. 1+9=10

(iv) Describe in details of bacterial conjugation system with suitable diagram. 10

(v) Describe the range of thallus organisation of algae. 10

CC-2 (Biomolecules and Cell Biology)

Group-A (1 mark each)

1. What is enantiomer?
2. Name two sulphur containing amino acids.
3. What is mitotic index?
4. Define buffer capacity.
5. What is pH?
6. What is epimer?
7. What is endocytosis?
8. What is entropy?
9. What is suicide bag?
10. What is bioenergetics?

Group-B (5 marks each)

1. Derive Henderson-Hasselbach equation.
2. Differentiate between- prokaryotic and eukaryotic cell.
3. Differentiate between- mitosis and meiosis.
4. Classify enzymes with examples.
5. Describe clover leaf model of the secondary structure of t-RNA with suitable diagram.
6. Describe the structure of nuclear pore complex with suitable diagram.
7. Describe the double-helical structure of DNA as proposed by Watson and Crick.

Group-C (10 marks each)

1. Define Carbohydrates. Briefly discuss the different types of carbohydrates with Examples. (2+8)
2. Discuss the endosymbiotic theory of the origin of mitochondria and chloroplast. Differentiate between passive and active transport. (7+3)
3. Classify carbohydrates with examples. What is mutarotation? (8+2)
4. What is cell cycle? Give an account on the comprehensive roles of different check points in the regulation of cell cycle. (2+8)
5. Define crossing over. Describe the different characteristics of different phases of meiosis-I along with proper sketches. (2+8)

Paper: GE1 & GE3

Paper name: Biodiversity (Microbes, Algae, Fungi and Archegoniate)

Group: A (Objective type) **1 mark (each)**

1. What is capsomere?
2. Name one primitive pteridophyte.
3. Name one common species of *Pinus.*
4. Name one edible pteridophyte.
5. What is lichen?
6. Name one economically important bryophyte.
7. What is bread mold?
8. Name one terrestrial alga.
9. Name one edible fungus.
10. What do you mean by heterospory? Cite examples.

Group: B (Short answer type) **5 marks (each)**

1. Discuss the structure of one RNA virus along with diagram.
2. Differentiate between lytic and lysogenic cycle of virus.
3. What is mycorrhiza? Discuss the different types with examples.
4. Discuss the spore dispersal mechanism in *Funaria*.
5. Briefly discuss the economic importance of gymnosperms.
6. Describe the reproductive structures and reproduction of *Selaginella*.
7. Discuss the anatomy of *Cycas* leaflet with diagram.

Group: C (Essay type) **10 marks (each)**

1. Describe the life cycle of *Polysiphonia* along with proper sketches.
2. What do you mean by genetic recombination in bacteria? What are the different types? Briefly discuss.
3. Discuss the stelar evolution in pteridophytes.
4. What is macrocyclic rust? Discuss the life cycle of one heteroeciuos macrocyclic rust included in your syllabus?
5. Describe the alternation of generation in *Marchantia*. Mention the general characteristics of pteridophytes.

Subject –Botany

Paper- Mycology and Phytopathology (CC3)

Group-A (1 mark each)

1. (a) What is buller phenomenon?

(b) What is ascocarp?

(c) Define the disease triangle.

(d) What is inoculum?

(e) What is chitin?

(f) What is anamorph?

(g) Define heterokaryosis.

(h) What is Kochs Postulates?

(i) What is parasexuality?

(j) What is psedoplasmodium?

Group-B (5 marks each)

2. (i) Briefly describe the application of fungi in food industry. 5

(ii) Briefly describe the disease cycle and environmental relationship. 5

(iii) Give a general account of the significance of mycorrhizal role. 5

(iv) Comment on the nature of association between mycobiont and phycobiont in a lichen thallus. 5

(v) Briefly discuss about on mushroom cultivation. 5

(vi) Discuss the sexual method of reproduction of *Rhizopus* sp. 5

(vii) Name one Ascomycota fungi. Differentiate between heterokariyosis and parasexuality. 1+4=5

Group –C (10 marks each)

(i) Give an illustrated account of the life cycle of *Penicillium.* 10

(ii) Explain briefly the nature of cell wall of true fungi. Discuss the method of ascus development in Ascomycetes with suitable diagram. 5+5

(iii) Describe the symptoms, predisporing factors and the disease cycle of citrus canker. Name of the causal organism. 3+3+3+1

(iv) Briefly discuss the life cycle of *Puccinia graminis tritici*. Give an account on the general characteristic features of Synchytrium sp. 7+3

(v) Briefly describe the general characteristic features of lichens; growth forms and range of thallus organisation. 3+2+5

Paper: CC4

Paper name: Archegoniate

Group: A (Objective type) **1 mark (each)**

1. What is Peristome teeth?
2. Name one aquatic pteridophyte.
3. What is chilgoza?
4. Define apogamy.
5. Name of primitive pteridophyte.
6. What is Pseudoelater?
7. What do you mean by alternation of generation?
8. What is gemma cup?
9. What is coralloid root?
10. Mention one significant use of *Sphagnum*.

Group: B (Short answer type) **5 marks (each)**

1. Comment on economic importance of gymnosperms.
2. Discuss telome theory in brief.
3. Which plant group is known as 'amphibians of plant kingdom'? Comment on the general characteristics of that group?
4. Mention the fern characters of *Cycas*.
5. Describe the reproduction process in *Anthoceros*.
6. Comment on the advanced characters of *Sphagnum*.
7. Discuss the stelar evolution in pteridophytes.

Group: C (Essay type) **10 marks (each)**

1. Compare the anatomical structure of *Cycas* and *Pinus* leaflet in detail.
2. Describe the sporophyte structure of *Funaria* along with diagram.
3. Discuss the origin and evolution of heterospory and seed habit in pteridophytes.
4. Name one advanced gymnosperm. Discuss all the advanced characters of that gymnosperm with special reference to reproductive structures.
5. Comment on the range of thallus organizations found in bryophytes.

Paper: GE2 & GE4

Paper name: Plant Anatomy and Embryology

Group: A (Objective type) **1 mark (each)**

1. What is cleistogamy?
2. Define caruncle.
3. What is tetrasporic embryo sac?
4. What do you mean by intrafascicular cambium?
5. What is malacophily?
6. Define geitenogamy.
7. What is sporopollenin? Where it is found?
8. What is tapetum?
9. What is palisade parenchyma?
10. Define annual ring.

Group: B (Short answer type) **5 marks (each)**

1. Discuss the ultrastructure of mature embryo sac with proper sketch.
2. What are the contrivances and adaptations for cross pollination in plants? Explain with examples.
3. Write a note on heart wood and sap wood.
4. What is ovule? Discuss the different types of ovules.
5. Describe the process double fertilization found in angiosperms. What are the outcomes of this process?
6. Write down the structure of a dicot embryo with diagram.
7. Write a note on the function and seasonal activity of cambium.

Group: C (Essay type) **10 marks (each)**

1. What are the different types of seed dispersal mechanisms found in angiospermic plants? Write down the different types of endosperm with examples.
2. Give a general account on the different adaptations in xerophytes and hydrophytes.
3. Explain the secondary growth in dicot stem.
4. Define polyembryony. Discuss the types and practical applications of polyembryony.
5. Give an outline of different types of simple and complex tissues.

Paper: CC5

Paper name: Morphology and Anatomy of Angiosperms

Group: A (Objective type) **1 mark (each)**

1. What is sunken stomata?
2. Who proposed Korper-Kappe theory?
3. What is lithocyst?
4. Define ray parenchyma.
5. What is rhytidome?
6. Define kranz anatomy.
7. What do you mean by dendrochronology?
8. What is plasmodesmata?
9. What is cork cambium?
10. What do you mean by incrustation?

Group: B (Short answer type) **5 marks (each)**

1. Differentiate between heart wood and sap wood.
2. Write notes on hydathode and laticifers.
3. Discuss the process organogenesis during embryogenic development.
4. Write a short note on trichomes.
5. What do you mean by complex tissues? Mention different types of complex tissues found in plants.
6. Comment on axially and radially oriented elements.
7. Discuss different types of stomata found in plants.

Group: C (Essay type) **10 marks (each)**

1. Define secondary growth. Discuss the detailed process occurred in dicot stem.
2. Write down the anatomical adaptive features of xerophytes and hydrophytes.
3. Discuss about the different theories regarding the shoot apical meristem organization.
4. Write short notes on (a) quiescent centre, (b) ring and diffuse porous wood.
5. Describe the cytodifferentiation of tracheary elements and sieve elements.

Model question CC-6 (Economic Botany)

Group-A (Each with 1 mark)

1. Give the scientific names of two timber-yielding plants.
2. What is coir?
3. Which portion of jute is used as fibre?
4. What is the scientific name of black pepper?
5. Give the scientific names of two important millets.
6. How is potato propagated?
7. Name two habit forming drugs.
8. Which part of saffron is used commercially?
9. Give the scientific name of coffee.
10. What is essential oil?

Group-B (Each with 5 marks)

1. Give an account of the origin of wheat.
2. Differentiate between fatty oils and essential oils.
3. Write the process of tapping and processing of para rubber. (2.5+2.5)
4. Describe the processing and health hazards of tobacco. (2.5+2.5)
5. What is plant introduction. Give a brief account on examples of plant introduction. (1+4)
6. Write short note on importance of germplasm diversity.
7. Briefly discuss about the economic importance of clove.

Group-C (Each with 10 marks)

1. Describe the origin of cultivated plant with reference to Vavilov's work. Write an account on crop domestication. (6+4)
2. Describe the extraction process of essential oil. Give the scientific names, families and plant parts used of two oil-yielding plants. (6+4)
3. Describe the origin, morphology and uses of chickpea. What is the importance of legumes in ecosystem? (7+3)
4. Give scientific name and family of major sugar-yielding plant. Describe the method of processing and its final products and by-products obtained. (2+4+4)
5. What are beverages? Describe the manufacturing process of black and green tea. What are the various uses of tea? (2+6+2)

Paper- CC7 (Genetics)

Group-A (Each for 1 mark)

1. State the law of segregation.
2. What is test cross?
3. What is back cross?
4. What are pseudoalleles?
5. What are coupling and repulsion?
6. Give an example of X-linked inheritance.
7. What is transversion?
8. What is Hardy-Weinberg Law?
9. What is dosage compensation?
10. Name two base analogues.

Group-B (Each for 5 marks)

1. Write the laws of Mendel. What was the advantage in selecting pea plant as an experimental material for study of inheritance? 2+3
2. What is mutation? Describe the CIB method for detection of mutation. 1+4
3. Explain Incomplete dominance with suitable example. 5
4. Differentiate between Incomplete dominance and Codominance. What do you mean by multiple alleles? 3+2
5. Distinguish between: 2.5+2.5
    a. Autopolyploids and Allopolyploids
    b. Paracentric inversion and pericentric inversion
6. Write a note on Base-Exicision repair model of DNA repair mechanism. 5
7. Write short notes on natural selection and genetic drift. 2.5+2.5

Group-C (Each for 10 marks)

1. What is epistasis? Discuss two major epistatic interactions with one example of each. 2+4+4
2. What is linkage? What are coupling and repulsion phases? Explain these with example. 2+2+10
3. Explain frameshift mutation, transition and transversion. What are spontaneous and induced mutations? 9+1
4. What are the different types of translocations? Describe with diagrams the cytology of translocation heterozygote. 4+8
5. State the Hardy-Weinberg law and establish the equation. What are the limitations of the law? 8+2

Model question SEC-1 (Herbal Technology)

Group-A (each for 1 mark)

1. What are secondary metabolites?
2. What is steroid?
3. Name two active principles of *Catharanthus roseus*.
4. Define micropropagation.
5. Name two psychoactive drugs.
6. What is pharmacokinetics?
7. Name two medicinally important triterpenoids.
8. What is the scientific name of Indian Gooseberry?
9. What is the importance of cardiac glycosides?
10. Define herbal foods.

Group-B (each for 5 marks)

1. Briefly describe the importance of herbal medicine. (5)
2. Briefly discuss about the types of drug adulterants. (5)
3. Briefly describe the active principles and actions of *Centella asiatica*. (5)
4. Write a note on the future scope of pharmacognosy. (5)
5. Describe the role of medicinal plants in Siddha medicine. (5)
6. Write an account on the cultivation techniques of medicinal plants. (5)
7. Discuss the roles of phenolic compounds in curing various ailments. (5)

Group-C (each for 10 marks)

1. Discuss in detail the various methods of drug evaluation and standardization. (5+5)
2. Discuss the different methods of cultivation used for propagating medicinal plants. (10)
3. Discuss the process of marketing and utilization of medicinal plants. (10)
4. Describe the process of phytochemical screening of alkaloids and flavonoids. (5+5)
5. Describe the systematic position and medicinal uses of tulsi and ginger. (5+5)

Paper: GE1 & GE3

Paper name: Biodiversity (Microbes, Algae, Fungi and Archegoniate)

Group: A (Objective type) **1 mark (each)**

1. What is capsomere?
2. Name one primitive pteridophyte.
3. Name one common species of *Pinus.*
4. Name one edible pteridophyte.
5. What is lichen?
6. Name one economically important bryophyte.
7. What is bread mold?
8. Name one terrestrial alga.
9. Name one edible fungus.
10. What do you mean by heterospory? Cite examples.

Group: B (Short answer type) **5 marks (each)**

1. Discuss the structure of one RNA virus along with diagram.
2. Differentiate between lytic and lysogenic cycle of virus.
3. What is mycorrhiza? Discuss the different types with examples.
4. Discuss the spore dispersal mechanism in *Funaria*.
5. Briefly discuss the economic importance of gymnosperms.
6. Describe the reproductive structures and reproduction of *Selaginella*.
7. Discuss the anatomy of *Cycas* leaflet with diagram.

Group: C (Essay type) **10 marks (each)**

1. Describe the life cycle of *Polysiphonia* along with proper sketches.
2. What do you mean by genetic recombination in bacteria? What are the different types? Briefly discuss.
3. Discuss the stelar evolution in pteridophytes.
4. What is macrocyclic rust? Discuss the life cycle of one heteroeciuos macrocyclic rust included in your syllabus?
5. Describe the alternation of generation in *Marchantia*. Mention the general characteristics of pteridophytes.

Paper- CC8 (Molecular Biology)

Group-A (Each for 1 mark)

1. What is ribozyme?
2. Give the full name of snRNPs.
3. What is palindrome?
4. What are characteristics of mitochondrial DNA?
5. What are Okazaki fragments?
6. What is Shine-Dalgarno sequence?
7. What is central dogma in molecular biology?
8. What is the role of gyrase in DNA replication?
9. Distinguish between exon and intron.
10. Name two inhibitors of protein synthesis.

Group-B(Each for 5 marks)

1. Differentiate between the three major kinds of DNA. 5
2. Distinguish between: 2.5+2.5
   a. Euchromatin and Heterochromatin
   b. Group I intron and Group II intron
3. Briefly discuss the continuous and discontinuous modes of DNA synthesis? 5
4. What is operon? Discuss the mode of regulation of lactose metabolism in *E.coli*. 1+4
5. What is splicing? Briefly discuss the spliceosome mediated splicing mechanism with diagram. 1+4
6. Discuss the process of charging of tRNA during protein synthesis. 5
7. Write short notes on:
   a. heat shock proteins
   b. θ (theta) mode of DNA replication

Group-C (Each for 10 marks)

1. Give a comparative account of prokaryotic and eukaryotic transcription mechanism. Illustrate the structure of prokaryotic RNA polymerase. 7+3
2. Give an account of protein biosynthesis in prokaryotes. How does it differ from eukaryotic protein synthesis. 7+3
3. Describe the process of DNA replication in prokaryotes. Prove that the replication is semi-conservative in nature. 7+3
4. Discuss the process of capping at 5’ end and addition of poly (A) tail at 3’end of the eukaryotic mRNA with suitable diagrams. 5+5
5. State the different factors involved in initiation of protein synthesis in eukaryotes. Write a short note of post translational modifications of proteins. 6+4

CC-9 (Plant Ecology and Phytogeography)

Group-A (each with 1 mark)

1. What is ecosystem?
2. What is carrying capacity?
3. Define ecological niche.
4. Define heliophytes.
5. What is epilimnion?
6. What is littoral zone?
7. What is water table?
8. What is biome?
9. What is ecotone?
10. What is soil profile?

Group-B (each with 5 marks)

1. Give an account of different components of ecosystem.
2. Write short note on the process of soil formation.
3. Write short note on- endemism.
4. Write short note on- energy flow in ecosystem.
5. Briefly discuss about the concept of ecological amplitude.
6. Write short note on- theory of tolerance.
7. Briefly discuss about homeostasis in ecosystem.

Group-C (each with 10 marks)

1. Describe nitrogen cycle and mention its significance in ecosystem (8+2)
2. What is succession? Describe the various stages of succession in hydrosere. (2+8)
3. Define population density. Explain how intrinsic and extrinsic factors regulate population density? (2+8)
4. Give an account on the phytogeographical regions of India. (10)
5. Define food chain and food web. Discuss about the analytical and synthetic characteristics of community. (4+6)

Paper: CC10

Paper name: Plant Systematics

Group: A (Objective type) **1 mark (each)**

1. What is taxonomic key?
2. Define taxonomic hierarchy.
3. What is homology?
4. Name one important herbarium of West Bengal.
5. What is principle of priority?
6. Define homonym.
7. What do you mean by monograph?
8. What is paraphyly?
9. Name one medicinally important plant species of the family euphorbiaceae.
10. Write the alternative name of the family brassicaceae.

Group: B (Short answer type) **5 marks (each)**

1. Write down the characteristic diagnostic features of the family lamiaceae.
2. What do you mean by species concept? Mention briefly the different types of species concept included in your syllabus.
3. Discuss the functions of botanical gardens and herbarium.
4. Comment on the principles of ICN.
5. Write a note on economic importance of the family gramineae.
6. What do you mean by effective and valid publication? Explain.
7. Define typification. Write a note on different type specimens.

Group: C (Essay type) **10 marks (each)**

1. Illustrate the advanced characters of the family asteraceae along with the suitable diagrams.
2. Explain the different methods of depicting evolutionary relationships. Comment on parallelism and convergence.
3. Describe Bentham and Hooker classification system upto series. Write down the important features of APGIII classification.
4. Write down the role of palynology, cytology and phytochemistry in plant systematics.
5. Compare the family Poaceae, Euphorbiaceae and Solanaceae with special reference to reproductive structures and floral formula.

Paper- SEC2 (Nursery and Gardening)

Group-A (Each for 1 mark)

1. What is the storage procedure for vegetables during post harvest?
2. Mention three common varieties of Onion.
3. What are the factors affecting seed viability?
4. What is shade house?
5. What is soil layering?
6. What is stratification?
7. What is mist chamber?
8. Mention the causes of genetic erosion with example.
9. Write down the scientific names of lady's finger, tomato, and carrot.
10. Explain the term 'air layering'.

Group-B (Each for 5 marks)

1. What is landscaping gardening? Mention the role of computer in landscape gardening. 2+4
2. Write short note on seed bank. 6
3. Write an essay on infrastructure of an ideal nursery. 6
4. What is green house? Enumerate the applications of green house. 2+4
5. What is the role of management of pests and diseases in gardening. 6
6. Write a note on hardening of plants. 6
7. Briefly discuss the cultivation process of cabbage. 6

Group-C (Each for 10 marks)

1. Define seed dormancy. Write the causes of seed dormancy. What are methods for breaking seed dormancy? 2+5+5
2. Give a detail account on cultivation of lady's finger. Name two common varieties of lady's finger. 10+2
3. What is cutting? Write the techniques of cutting. Mention the rooting medium for cutting procedure. 2+6+4
4. Discuss different types of vegetative propagation used in Nursery and gardening practices. 12
5. Give an account of cultivation process of tomatoes. State two common varieties of brinjal. 10+2

Paper: GE2 & GE4

Paper name: Plant Anatomy and Embryology

Group: A (Objective type) **1 mark (each)**

1. What is cleistogamy?
2. Define caruncle.
3. What is tetrasporic embryo sac?
4. What do you mean by intrafascicular cambium?
5. What is malacophily?
6. Define geitenogamy.
7. What is sporopollenin? Where it is found?
8. What is tapetum?
9. What is palisade parenchyma?
10. Define annual ring.

Group: B (Short answer type) **5 marks (each)**

1. Discuss the ultrastructure of mature embryo sac with proper sketch.
2. What are the contrivances and adaptations for cross pollination in plants? Explain with examples.
3. Write a note on heart wood and sap wood.
4. What is ovule? Discuss the different types of ovules.
5. Describe the process double fertilization found in angiosperms. What are the outcomes of this process?
6. Write down the structure of a dicot embryo with diagram.
7. Write a note on the function and seasonal activity of cambium.

Group: C (Essay type) **10 marks (each)**

1. What are the different types of seed dispersal mechanisms found in angiospermic plants? Write down the different types of endosperm with examples.
2. Give a general account on the different adaptations in xerophytes and hydrophytes.
3. Explain the secondary growth in dicot stem.
4. Define polyembryony. Discuss the types and practical applications of polyembryony.
5. Give an outline of different types of simple and complex tissues.

Subject –Botany

Paper- Reproductive Biology of Angiosperms (CC11)

Group-A (each with 1 mark)

1. (a) What is tricolporate?

(b) What is aril?

(c) Define the double fertilisation.

(d) Name one gene for flower development in Angiosperm.

(e) What is cross pollination?

(f) What is perine?

(g) What is the function of pollen aperture?

(h) Define the role of jaculator in seed dispersal.

(i) Give an example of homomorphic self-incompatibility.

(j) What is pollinia?

Group-B (each with 5 marks)

2. (i) Briefly discuss about Sporopollenin. 5

(ii) Write a short note on Cybrid. 5

(iii) Briefly discuss on forensic palynology. 5

(iv) Mentioned the methods to overcome self-incompatibility. 5

(v) Briefly discuss about on pollination. 5

(vi) What is embryo sac? Briefly discuss on seed dispersal mechanism. 1+4= 5

(vii) Write a short note on application of palynology. 5

Group –C (each with 10 marks)

3. (i) Give the general account on Polyembryony and its significance. 10

(ii) What is endosperm? Discuss on different types of endosperm with suitable example. 10

(iii) What is NPC? Discuss in detail the NPC classification. 10

(iv) Discuss in detail flower development with the help of genetic and molecular aspect. 10

(v) Define MGU, Pseudomonads, polyads, massulae, and callose deposition.
2+2+2+2+2=10

CC-12 (Plant Physiology)

Group-A (each with 1 mark)

1. What is vernalization?
2. What is Diffusion Pressure Deficit (DPD)?
3. What are brassinosteroids?
4. Define guttation.
5. Name two antitranspirants.
6. What is root pressure?
7. What is the function of casparian strip?
8. What is aquaporin?
9. Name two long-day plants.
10. What is cryptochrome?

Group-B (each with 5 marks)

1. Distinguish between- active transport and passive transport. (5)
2. Write short note on the factors affecting transpiration. (5)
3. Write short note on- florigen concept. (5)
4. Briefly discuss about the physiological roles of cytokinin. (5)
5. Describe the cohesion-tension theory of ascent of sap.
6. Write short notes on- i) Donnan Equilibrium (2.5 X 2)
   ii) Role of magnesium in plants
7. Discuss the role of abscisic acid in seed dormancy. (5)

Group-C (each with 10 marks)

1. Describe the theories related to stomatal movement with their merits and demerits. (10)
2. Describe the process of phloem loading and unloading. (5+5)
3. Differentiate between symport and antiport. Discuss the role of ATP in ion transport. Write a note on chelating agents. (2+4+4)
4. Give an account on the bioassay and physiological roles of auxin. (3+7)
5. Discuss the mode of action and role of phytochromes in photomorphogenesis. (5+5)

Paper: DSE1

Paper name: Plant Breeding

Group: A (Objective type) **1 mark (each)**

1. What is acclimatization?
2. Define pure line selection.
3. What is germplasm?
4. What do you mean by heterosis?
5. What is clone?
6. Mention one advantage of vegetative propagation.
7. Define distant hybridization.
8. Name one crop species developed through allopolyploidy.
9. What is inbreeding depression?
10. Define quantitative inheritance.

Group: B (Short answer type) **5 marks (each)**

1. Differentiate between monogenic and polygenic inheritance.
2. Comment on the important achievements of plant breeding.
3. What are the different selection methods for self-pollinated crops?
4. Discuss the role of biotechnology in crop improvement.
5. What is polyploidy? Discuss the different types with brief explanation.
6. Compare the dominance and overdominance hypothesis of heterosis.
7. Write down the limitations of hybridization for vegetatively propagated plants.

Group: C (Essay type) **10 marks (each)**

1. Discuss the role of mutations in crop improvement.
2. Explain kernel colour in wheat in the light of quantitative inheritance.
3. Write down the detailed hybridization technique for cross pollinated plants.
4. What is the genetic basis of inbreeding depression? Write down two applications of heterosis.
5. What are the objectives of plant breeding? Write down the undesirable consequences of plant breeding.

Paper- Horticultural Practices and Post-Harvest Technology (DSE2)

Group-A (each with 1 mark)

1. (a) Define urban forestry?

(b) Name two ornamental plants suitable for gardening.

(c) What is biofertiliser?

(d) Define varieties with an example.

(e) What is ecotourism?

(f) Name two common diseases of fruit crops.

(g) What is IPM?

(h) Define seed propagation.

(i) What is crop sanitation?

(j) Define drip irrigation methods.

Group-B (each with 5 marks)

2. (i) Briefly discuss about the importance of flower shows and exhibitions. 5

(ii) Write a short note on food irradiation. 5

(iii) Briefly discuss on policies and practices of urban forestry. 5

(iv) Mentioned the Role of micro propagation. 5

(v) Briefly discuss about on Field and post-harvest diseases. 5

(vi) Mentioned the salient features of gerberas. 5

(vii) Write a short note on quarantine practices. 5

Group –C (each with 10 marks)

3. (i) Discuss about on identification of deficiency symptoms. 10

(ii) Explain in detail the IPM strategies. 10

(iii) Write an essay on ornamental flowering trees and their features. 10

(iv) Discuss about on evaluation of quality traits and food safety. 10

(v) Discuss about the layout of an ideal park for children and plant species suitable for it. 10

Paper- CC13 (Plant Metabolism)

Group A (each for 1 mark)

1. What is the basic chemical difference between chlorophyll-a and chlorophyll-b?
2. Name two mobile electron carriers in photosynthetic electron transport system.
3. What is krantz anatomy?
4. What is red drop phenomena?
5. Name two inhibitors of ETS pathway.
6. Name two non-leguminous nitrogen fixing angiosperms.
7. Which enzyme reduces nitrate to nitrite?
8. Which organelles are involved in photorespiration?
9. Give two example of CAM plant.
10. Mention the net production of ATP after the complete breakdown of one molecule of glucose in aerobic respiration.

Group B (each for 5 marks)

1. Define anabolic and catabolic pathways. Discuss the role of allosteric enzyme in regulation of metabolism. 2+3
2. Write a short note on Q-cycle in photosynthetic electron transport with suitable diagram. 5
3. Write a brief note on anaplerotic reactions for carbon oxidation. 5
4. Differentiate between substrate level phosphorylation and oxidative phosphorylation. Mention the glycolytic steps where substrate level of phosphorylation occurs. 3+2
5. Briefly discuss the structure of ATP synthase with diagram. 5
6. Write a short note on glyoxylate cycle. 5
7. Discuss the role of calcium calmodulin in signal transduction mechanism. 5

Group C (each for 10 marks)

1. What is meant by fixation of CO_2? Give a detailed account of Calvin cycle. 2+8
2. Write a note on the pyruvate decarboxylase enzyme complex. What are the steps for the conversion of pyruvate to acetyle-CoA? 4+6
3. Outline the biochemical events during reduction of N_2 into ammonia. What is leghemoglobin? 8+2
4. Give a detail account of β-oxidation pathway of fatty acid breakdown. State the difference between β-oxidation and α oxidation. 8+2
5. Explain the MAP kinase cascade mediated signal transduction pathway with suitable example. 10

Paper- Plant Biotechnology (CC14)

Group-A (each for 1 mark)

1. (a) What is the full form of MS media?

(b) What is totipotent?

(c) Define the shuttle vector.

(d) What is colony hybridization?

(e) What is GM crop?

(f) What is humulin?

(g) What is the full form of pBR322?

(h) What is the full form of GFP?

(i) What is somatic embryogenesis?

(j) Define the role of BAP hormone in tissue culture.

Group-B (each for 5 marks)

2. (i) Briefly discuss about PCR. 5

(ii) Write a short note on Restriction Enzyme. 5

(iii) Briefly discuss on haploids, triploids and hybrids. 5

(iv) Define micro propagation and its role. 5

(v) Briefly discuss about on androgenises and its significance. 5

(vi) What a short note on selectable marker. 5

(vii) Briefly discuss about on Bt-Cotton. 5

Group –C (each for 10 marks)

3. (i) Give the general account on herbicide resistant plants (Round Up Ready soybean). 10

(ii) Discuss in detail about on *Agrobacterium* mediated genetic transformation 10

(iii) What is gene cloning? Briefly discuss about on cloning vector specially cosmid, plasmid, pUC19 and pBR322. 2+8= 10

(iv) Discuss in detail protoplast culture, fusion and its application. 10

(v) Define cryopreservation, microinjection, cDNA libraries, Golden rice, and reporter genes. 10

DSE-3 (Industrial and Environmental Microbiology)

Group-A (each with 1 mark)

1. What is BOD?
2. What is lyophilization?
3. What is continuous fermentation?
4. Define mycorrhiza.
5. What is ultrafiltration?
6. What is fecal coliform?
7. What is defined medium?
8. What is TOC?
9. What is cryopreservation?
10. What is spray drying?

Group-B (each with 5 marks)

1. Describe the process of isolation of root nodulating bacteria. (5)
2. Differentiate between solid-state and liquid-state fermentation. (5)
3. Briefly describe the process of penicillin production. (5)
4. Write a note on the large-scale application of immobilized enzymes. (5)
5. Describe the process of bioremediation of contaminated soil. (5)
6. Write an account on the selection criteria of microorganisms for fermentation. (5)
7. Discuss the process of selection of microbes for casein hydrolysis. (5)

Group-C (each with 10 marks)

1. Discuss the steps of downstream processing. (10)
2. Describe the method of immobilization of enzymes mentioning its advantages and disadvantages. (7+3)
3. Discuss the significance of microorganisms as the indicator of water quality. (10)
4. Describe the components of a typical bioreactor. Discuss about the types of bioreactors. (5+5)
5. Describe the process of arbuscular mycorrhizal colonization in plant roots with proper diagrams. (10)

Paper- DSE4 (Biostatistics)

Group A: (Each for 1 mark)

1. What is random sampling?
2. Give the formula for determination of mean of a sample by short-cut method.
3. What is the formula for determining median in even number of observations?
4. What is class interval?
5. Give the formula for standard deviation.
6. If the value of coefficient of correlation (r) is -0.9, what would be the type of correlation?
7. What is meant by goodness of fit?
8. What is the formula for t-test calculation?
9. Define linear regression?
10. If two variables are plotted on a graph in the form of dots and you get a scattered diagram, what will you infer regarding the correlation between two variables?

Group B: (Each for 5 marks)

1. Define mean deviation. How does it differ from standard deviation? 2+3
2. Discuss the merits and demerits of standard deviations. 5
3. Distinguish between: 2.5+2.5
   a. Mode and median
   b. Correlation and regression
4. Calculate coefficient-correlation between X and Y for the following data. 5

X	1	3	4	5	7	8	10
Y	2	6	8	10	14	16	20

5. Mention the properties of regression. Discuss the various types of regression. 2+3
6. Write notes on:
   a. Null hypothesis
   b. Goodness of fit
7. The weekly expenditure of 100 families are given below. Find the median of weekly expenditure.

Expenditure	0-10	10-20	20-30	30-40	40-50
Frequency	14	23	27	21	15

Group C: (Each for 10 marks)

1. Calculate the mean, median, mode and standard deviation of the following data: [10]

Height in inches	95-105	105-115	115-125	125-135	135-145
No. of children	19	23	36	70	52

2. In a cross between black and white coat coloured mice, the F2 individual segregated into 787 black and 277 white coat coloured individuals. Find is there any significant association between black and white coat coloured mice. (p= 0.05) [10]

3. In a mutation experiment, the following results were obtained as weight of seeds in control and treated sets. Determine whether the difference is significant or not. [10]
Weight in gram (of 100 seeds)

Control	2.9	3.1	3.5	3.4	3.0	4.0	3.7	3.0	4.0	4.0
Treated	2.7	2.8	3.0	3.5	3.7	3.2	3.0	3.1	2.9	2.8

[tabulated value at 5% level of significance is 2.10]

4. Find coefficient of correlation from the data given below using rank difference method and comment on the result. [10]

Students	A	B	C	D	E	F	G	H	I	J
Marks in English	48	72	54	51	37	43	83	74	58	61
Marks in Bengali	77	81	86	52	51	76	94	79	56	58

5. Define sampling. Explain the different methods of sampling and give the merits and demerits of each. [2+6+2]