3 (Sem–4/CBCS) BOT HC 1

2023

BOTANY

(Honours Core)

Paper : BOT–HC–4016

(Molecular Biology)

Full Marks : 60

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Choose the correct answer of the following : 1×7=7

(a) Which of the following is common to both prokaryotic and eukaryotic chromosomes ?

(i) DNA is circular

(ii) DNA is negatively supercoiled

(iii) DNA is found in the nucleus

(iv) DNA is packaged into nucleosomes

(b) Which one of the following transcription factors binds to TATA box ?

(i) TFIID

(ii) TFIIB

(iii) TFIIIA

(iv) TFIIE

(c) The Wobble hypothesis refers to the less stringent base pairing specificity of the

(i) 5′ end base of the codon

(ii) 3′ end base of the anticodon

(iii) 5′ end base of the anticodon

(iv) None of the above

(d) Synthesis of peptide bond is catalysed by

(i) A site of the ribosome

(ii) P site of the ribosome

(iii) 23S rRNA

(iv) tRNA

(e) How do the sugars of RNA and DNA differ ?

(i) RNA has a six carbon sugar, DNA has a five carbon sugar

(ii) The sugar of RNA has a hydroxyl group that is not found in sugar of DNA

(iii) Sugar in DNA has a phosphorous atom attached, whereas sugar in RNA does not

(iv) All of the above

(f) In its organization, chloroplast DNA is most similar to

(i) bacteria

(ii) archaea

(iii) nuclear DNA of plants

(iv) nuclear DNA of primitive eukaryotes

(g) Eukaryotic mRNAs are transcribed by

(i) RNA polymerase I

(ii) RNA polymerase II

(iii) RNA polymerase III

(iv) All of the above

2. Answer the following questions briefly : 2×4=8

(a) Why is DNA more stable than RNA ?

(b) When does the trp repressor become inactive in a cell ?

(c) What are the difference between euchromatin and heterochromatin ?

(d) Distinguish between denaturation and renaturation of DNA.

3. Answer ***any three*** of the following questions : 5×3=15

(a) DNA as the carrier of genetic information.

(b) Describe process of gene silencing with the help of appropriate diagram.

(c) Discuss the role of transcription factor in eukaryotic transcription.

(d) Briefly describe the salient features of genetic code.

(e) Write short note on Fidelity of translation.

4. Answer ***any three*** of the following : 10×3=30

(a) What are the different possible modes of DNA replication ? Give experimental evidences to prove that replication is semi-conservative. 2+8=10

(b) Write short notes on : 5+5=10

(i) Nucleosomes

(ii) Plasmids

(c) Distinguish between promoters and enhancers. Describe the steps involved in post transcriptional processing in eukaryotes. 3+7=10

(d) "Prokaryotes have an efficient mechanism for metabolizing lactose." Explain elaborately. 10

(e) What are introns ? Why are the introns removed ? Describe the types of introns and its functions. 2+2+6=10

(f) Discuss in detail the various steps involved in the synthesis of proteins. How does post translational modification affect gene expression ? 8+2=10

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3 (Sem–4/CBCS) BOT HC 2

2023

BOTANY

(Honours Core)

Paper : BOT–HC–4026

(Plant Ecology and Phytogeography)

Full Marks : 60

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Choose the correct answer of the following : 1×7=7

   (a) Taxa which have long evolutionary history, once enjoyed a wide distribution but presently restricted to dispersal by barriers or extinction in the remaining areas is :

   (i) Paleoendemics

   (ii) Neoendemics

   (iii) Holoendemics

   (iv) Pseudoendemics

(b) The soil which has abundant humus retain both nutrients as well as water and is suitable for crop cultivation is categories as :

(i) Podsols

(ii) Gleys

(iii) Chernozems

(iv) Latosols

(c) The occurrence of high percentage of therophytes in an area would indicate :

(i) desert climate

(ii) warm and moist climate

(iii) warm and dry climate

(iv) extremely cold climate

(d) Which of the following is incorrectly matched with reference to succession ?

(i) Lithosere-Rock

(ii) Psamnosere-Sand

(iii) Halosere-Saline soil

(iv) Senile-Moist area

(e) The tendency for increased diversity and density of species at the junction between *two* quite different communities is known as :

(i) ecological amplitude

(ii) edge effect

(iii) ecological equivalent

(iv) ecological niche

(f) The order of different layers with respect to thermal stratification of deep water in lakes from top to bottom is :

(i) epilimnion-thermocline-hypolimnion

(ii) hypolimnion-epilimnion-thermocline

(iii) epilimnion-hypolimnion-thermocline

(iv) thermocline-epilimnion-hypolimnion

Contd.

(g) Lianes are interesting group of woody climbers rooted to the ground which show the following interspecific interaction :

(i) parasitism

(ii) commensalism

(iii) neutralism

(iv) symbiosis

2. Write short notes on the following : 2×4=8

(a) Allopatric speciation

(b) Weathering

(c) Allelopathy

(d) Continental drift

3. Write briefly on ***any three*** of the following : 5×3=15

(a) Soil profile

(b) Concept of homeostasis

(c) Adaptive features of plants to fire and wind

(d) Ecological niche and its types

(e) Different vegetation types in Assam

4. Answer ***any three*** of the following : 10×3=30

(a) Distinguish between autogenic and allogenic succession. Describe briefly the various phases involved in the process of primary autotrophic succession in a particular habitat. 2+8=10

(b) With appropriate examples, explain briefly the various types of population growth curves as observed under specific environmental conditions. Write in brief the various limiting factors that the various limiting factors that regulate population growth. 6+4=10

(c) What do you understand by ecosystem energetics ? Discuss briefly the various models of energy flow in an ecosystem with suitable diagrammatic representation. 2+8=10

(d) What is an Eltonian pyramid ? With suitable diagrams, discuss briefly the different types of ecological pyramids along with their significance. Mention *two* limitations of studying ecological pyramids. 2+6+2=10

(e) "In a natural ecosystem, both the grazing food chain and detritus food chain are interlinked and operational at certain trophic levels". Citing suitable examples, discuss briefly in support of the above statement.

(f) List few characteristic features of tundra biomes. Write briefly the climatic conditions and biota found in the various types of tundra biome. 4+6=10

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3 (Sem–4/CBCS) BOT HC 3

2023

BOTANY

(Honours Core)

Paper : BOT–HC–4036

(Plant Systematics)

Full Marks : 60

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following/Choose the correct answer : 1×7=7

   (a) Define cladogram.

   (b) What the term 'Monochlamydeae' stands for ?

   (c) Name the *three* most commonly used infraspecific categories.

   (d) Who is considered as the father of modern genus concept ?

(e) In most of the Indian herbarium, the specimens are arranged according to :

(i) Engler and Prantl's system

(ii) Bentham and Hooker's system

(iii) Charles Edwin Bessey's system of classification

(iv) Hutchinson's system

(f) What do you understand by phyllaries ?

(g) When two or more authors publish a new species or propose a new name, their names are linked using the epithet —

(i) in

(ii) ex

(iii) et

(iv) emend

2. Answer the following : 2×4=8

(a) Differentiate between homology and analogy.

(b) Mention the components of a reliable e-flora.

(c) Write the merits of APG system of classification.

(d) Write the differences between labellum of family zingiberaceae and orchidaceae.

3. Answer ***any three*** of the following questions : 5×3=15

(a) How a phenogram can be constructed ?

(b) Write the full form of ICN. State the principles of priority with example and discuss its limitations.

(c) Morphology of the grass spikelet.

(d) Write short notes on contribution of Carolus Linnaeus and C. E. Bessey to plant taxonomy.

(e) Why is the family asteraceae regarded as highly evolved among dicots ?

4. Answer ***any three*** of the following : 10×3=30

(a) What is herbarium ? Discuss the role of herbarium in teaching and taxonomic research. Write names and their acronyms of *two* herbaria, *one* from India and *one* from abroad. 2+6+2=10

(b) What is meant by co-evolution ? Add a note on the co-evolution of angiosperm and animals. 2+8=10

(c) Enumerate various types of homology. Write a brief note on monophyly, paraphyly and polyphyly. 3+7=10

(d) What is phytochemistry ? Discuss some important sources of taxonomic evidences from phytochemistry. 2+8=10

(e) What is meant by natural and phylogenetic system of classification ? Give an outline classification of angiosperm as proposed by Engler and Prantl. State the merit and demerit of the classification. 2+6+2=10

(f) Give the scientific names of *any two* of the following plants, mention their respective families and also give the salient features of those families with their respective phylogeny. 5+5=10

(i) Tobacco

(ii) Holy Basil

(iii) Banana

(iv) Oat