3 (Sem–4/CBCS) BOT HC1

2022

BOTANY

(Honours)

Paper : BOT–HC–4016

(Molecular Biology)

Full Marks : 60

Time : Three hours

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

1. Answer ***any seven*** of the following as directed : 1×7=7

   (a) Whose experimental findings confirmed that DNA is the genetic material ?

   (i) Avery, MacLeod and McCarty

   (ii) Griffith

   (iii) Alfred D. Hershey and Martha Chase

   (iv) None of the above

   (Choose the correct answer)

(b) Z-form DNA shows

(i) right handed coiling

(ii) left handed coiling

(iii) both left and right handed coiling

(iv) None of the above

(Choose the correct answer)

(c) Transcription is the transfer of genetic information from

(i) DNA to RNA

(ii) DNA to mRNA

(iii) mRNA to tRNA

(iv) tRNA to mRNA

(Choose the correct answer)

(d) mRNA is a _____ RNA.

(genetic/non-genetic)

(Put the correct answer)

(e) The sequence of sense strand of DNA is same as that of

(i) rRNA

(ii) mRNA

(iii) template DNA strand

(iv) tRNA

(Choose the correct answer)

(f) The genetic code for methionine is

(i) UAA

(ii) AUG

(iii) AAU

(iv) AAG

(Choose the correct answer)

(g) Self-splicing occurs for rare introns that form a

(i) hnRNA

(ii) mRNA

(iii) ribozyme

(iv) splicesome

(Choose the correct answer)

(h) Mitochondrial DNA shows

(i) paternal inheritance

(ii) maternal inheritance

(iii) both paternal and maternal inheritance

(iv) None of the above

(Choose the correct answer)

(i) A _____ is the basic structural unit of DNA packaging in eukaryotes, which consists of a segment of DNA wound around eight _____ proteins.
(Fill in the blanks)

(j) RNA primers are synthesized with the help of
(i) RNA polymerase
(ii) topoisomerase
(iii) primase
(iv) ligase
(Choose the correct answer)

2. Answer ***any four*** of the following questions briefly : 2×4=8

(a) What is 'Cot curve'?

(b) What is gene silencing?

(c) What are the functions of DNA polymerase I and DNA ligase in DNA replication?

(d) What are exons and introns?

(e) What is splicesome?

(f) What is central dogma in molecular biology?

(g) How does transcriptional control differ in prokaryotes and eukaryotes?

(h) What are enhancers?

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

(a) Write the difference between constitutive and facultative heterochromatin.

(b) How does nuclear DNA differ from organelle DNA?

(c) Write a note on the properties of genetic code.

(d) Distinguish between denaturation and renaturation of DNA.

(e) Describe with experimental evidence that 'DNA replicates in a semi-conservative way'.

(f) Discuss on fidelity of translation.

(g) Write a short note on Arthur Kornberg's enzyme.

(h) Write a brief note on genetic and non-genetic RNA.

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

(a) With the help of neat labelled diagram describe the structure of DNA. Point out the salient features of the double helic. 6+4=10

(b) Describe the rolling circle mechanism of DNA replication with a neat diagram.

(c) Discuss the detail the *three* main steps involved in the process of transcription in prokaryotes.

(d) Who proposed adaptor hypothesis of central dogma ? Explain on what basis the adaptor hypothesis was framed. 2+8=10

(e) How many structural genes are present in a lac operon ? Explain why the lac operon is considered as inducible operon. 3+7=10

(f) What are different types of DNA ? Describe the structure of B-form DNA with a neat diagram.

(g) What are split genes ? Write a short note on group I and group II intron splicing.

(h) What are ribozymes ? Describe the structure and function of ribozymes.

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3 (Sem–4/CBCS) BOT HC 2

2022

BOTANY

(Honours)

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 : ***(any seven)*** 1×7=7

   (a) The two important ecological factors that determine the distribution of various natural biomes of world are

   (i) temperature and light

   (ii) temperature and precipitation

   (iii) soil and precipitation

   (iv) light and wind

(b) Transitional zone between two or more diverse communities which harbours organisms of overlapping communities besides additional species is called

(i) ecoline

(ii) ecad

(iii) ecotone

(iv) ecotype

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

(i) warm and dry climate

(ii) warm and moist climate

(iii) cold climate

(iv) cold and dry climate

(d) The process of successful establishment and growth of a species in a bare area during the process of succession is called

(i) nudation

(ii) ecesis

(iii) aggregation

(iv) stabilization

(e) The range of ecological conditions which a given species is able to carry on normal vital activities and tolerate various stresses is called the

(i) edge effect

(ii) ecological amplitude

(iii) ecological niche

(iv) ecological equivalent

(f) The zone of a lake which have abundant phytoplanktons is called

(i) littoral zone

(ii) profundal zone

(iii) limnetic zone

(iv) benthic zone

(g) The maximum reproduction rate of a population under ideal environmental conditions along with the absence of competitors and disease is called

(i) natality

(ii) carrying capacity

(iii) fidelity

(iv) biotic potential

(h) Solubility and availability of various nutrients to plants are dependent on

(i) soil plot

(ii) soil porosity

(iii) soil temperature

(iv) soil texture

(i) Myrmecophytes are interesting group of plants that provide special structures for colonization of ants and such association is one best example of

(i) parasitism

(ii) commensalism

(iii) neutralism

(iv) symbiosis

(j) According to Shelford's law of tolerance, the organisms with wide tolerance limit for various environmental factors show

(i) less chances of survival, narrow distribution with low population size

(ii) less chances of survival, narrow distribution with high population size

(iii) better chances of survival, wide distribution with high population size.

(iv) better chances of survival, wide distribution with low population size

2. Write short notes on ***any four*** of the following : 2×4=8

(a) Standing crop

(b) Pedogenesis

(c) Detritus-based food chain

(d) Secondary productivity

(e) Neo-endemism

(f) Photograph

(g) Sympatric speciation

(h) Permafrost

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

(a) Raunkiaer's life forms

(b) Cybernetic nature of ecosystem

(c) Importance of studing ecological pyramids

(d) Theory of tolerance

(e) Ecological efficiencies

(f) Edge effect

(g) Adaptive features of plants to temperature extreme

(h) Concept of multidimensional niche

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

(a) Define age structure with labelled diagram. Describe briefly various types of age pyramids as observed among natural populations. 2+8=10

(b) List various steps involved in the process of succession in a particular habitat. Write briefly the process of ecological succession in xeric ecosystem with special reference to plant community. 3+7=10

(c) Citing suitable examples, discuss briefly various types of biotic interactions as observed between plants and animals.

(d) With reference to biogeochemical cycle, how does sedimentary cycle differ from gaseous cycle ? Discuss briefly various steps involved in nitrogen cycling along with the role of microbes. 3+7=10

(e) What do you mean by ecosystem productivity ? State briefly the relationship between energy flow and productivity in an ecosystem. 2+8=10

(f) Differentiate between r-selected and k-selected species. Discuss the role of density-dependent factors in regulating population growth. 4+6=10

(g) Mention few important features that characterize biome. Write briefly the physico-chemical characteristics and biota of *any one* of the terrestrial biome you have studied. 3+7=10

(h) "In all ecosystems, the arrangement of producers and consumers leads to development of trophic organisation and performs definite functions." Explain the statement.

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3 (Sem–4/CBCS) BOT HC 3

2022

BOTANY

(Honours)

Paper : BOT–HC–4036

(Plant Systematics)

Full Marks : 60

Time : Three hours

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

1. Fill in the blanks/Answer the following : ***(any seven)*** 1×7=7

   (a) Define polytomy.

   (b) _____ is a device for easily identifying an unknown plant by a sequence of choices between two or more statements.

   (c) What is heterogamous head inflorescene ?

   (d) A change in the genetic composition of one species or group in response to a genetic change in another is called _____.

(e) What is taxon ?

(f) The type of fruit of the family Magnoliaceae is _____.

(g) _____ is defined as a genetically distinct geographic variety, population, or race within a species, which is genotypically adapted to specific environmental conditions.

(h) Which plant is the largest number of Poaceae family ?

(i) What is spathe ?

(j) Which link provides the information like publication details, basionym(s) and accepted names in virtual herbarium ?

2. Answer ***any four*** of the following questions : 2×4=8

(a) Write the inflorescence characters of the family Euphorbiaceae.

(b) What are paratype and syntype ?

(c) Write the differences between cladogram and phylogenetic tree.

(d) What is biosystematics ?

(e) Write the differences between diffuse coevolution and gene-for-gene coevolution.

(f) What is velamen ?

(g) What is didynamous stamens ?

(h) What is pseudostem ?

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

(a) Write the principles of international code of botanical nomenclature.

(b) Write the economic importance of Zingiberaceae.

(c) Write the objective and importance of plant taxonomy.

(d) Discuss briefly on cluster analysis.

(e) Write the identifying characters of Lamiaceae

(f) Write the principle of APG system of classification.

(g) What is terpenoid compound ? Classify them and give examples.

(h) State the salient features of Engler and Prantl's system of plant classification.

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

(a) Describe in detail with the help of examples the systematic value of cytological studies.

(b) Describe different theories regarding the origin of Angiosperms.

(c) Discuss the detailed outline of Bentham and Hooker system of plant classification. Why is this classification usually used for classifying herbarium specimens ?

(d) What is numerical taxonomy or taximetrics ? Describe the principles of numerical taxonomy.

(e) Discuss the method constructing the phylogenetic tree amongst the angiospermic taxa.

(f) Why is Orchidaceae considered as the most advanced family amongst the monocotyledons ? Give suitable diagrams wherever necessary.

(g) What is virtual herbarium ? Discuss the functions and importance of herberium.

(h) Discuss on the following :

(i) Morphology of the spikelet in Poaceae

(ii) Unique characters of the family Asteraceae
