



WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 4th Semester Examination, 2022

BOTACOR08T-BOTANY (CC8)

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.*

1. Answer the following questions in brief: 1×6 = 6
- (a) What is central dogma in molecular biology?
 - (b) What do you mean by rolling circle replication?
 - (c) Calculate the length of a 100 bp DNA molecule.
 - (d) What is the major function of snRNA?
 - (e) Tobacco Mosaic Virus (TMV) and Holmes Ribgrass Virus (HRV) produce symptoms of mottling and ring patterned spots in tobacco leaves, respectively. A virus is reconstructed using RNA from TMV and the protein coat from HRV. What will be the symptoms of infection in tobacco leaves by the reconstructed virus?
 - (f) State the difference between group I and group II introns.
2. Answer any *eight* questions from the following: 3×8 = 24
- (a) Why were ^{32}P and ^{35}S chosen for use in Hershey and Chase experiment? State the conclusion of this experiment. 1+2
 - (b) The genetic code is 'nearly universal'. Explain with example. 3
 - (c) Give a brief account of protein synthesis inhibitors. 3
 - (d) Eukaryotes require telomerases but prokaryotes do not. Explain. 3
 - (e) What is Shine-Dalgarno sequence? Which end of the mRNA molecule is translated first? If the DNA molecule given below is transcribed from left to right, what will be the sequences of the mRNA? 1+1+1
- 5' - AGACTTCAGGCTCAACGTGGT - 3'
3' - TCTGAAGTCCGAGTTGCACCA - 5'
- (f) Briefly describe the roles of EF-Tu, EF-Ts, and EF-G play in bacterial translation. 3
 - (g) Mention the significance of alternative splicing. What are split genes? 2+1
 - (h) Compare the structural and functional properties of different DNA polymerase. 3

- (i) What do you mean by degeneracy of genetic code? Write a brief note on 'Wobble Hypothesis'. 2+1
- (j) Distinguish between prokaryotic and eukaryotic ribosomal subunits and their rRNA composition. 2+1
- (k) How does the replication of linear form of DNA in eukaryotic cell differ from that of circular DNA in bacteria? Mention the major functions of 'Kornberg enzyme'. 2+1
- (l) What do you mean by 'inducible' and 'repressible' operon. Cite example. 2+1
- (m) Distinguish between the holoenzyme and core enzyme of RNA polymerase in bacteria. What would be the effect on transcription if a bacterial cell do not possess sigma (σ) factor? 2+1
3. Answer any *two* questions from the following: 5×2 = 10
- (a) Describe the triplet binding assay in deciphering genetic code. 5
- (b) What is Kozak sequence? Explain the process of aminoacylation of t-RNA with diagram. 1+4
- (c) What is gene silencing? Briefly discuss the role of RNA-induced Silencing Complex (RISC) in post transcriptional gene silencing. 1+4
- (d) How does lactose trigger the co-ordinate induction of the synthesis of β -galactosidase permease and transacetylase? Why the synthesis of these enzymes do not occur when glucose is also present in the medium? 3+2

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WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 4th Semester Examination, 2022

BOTACOR09T-BOTANY (CC9)

Time Allotted: 2 Hours

Full Marks: 40

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1. Answer the following questions: 1×6 = 6
- (a) What do you mean by ecotone?
- (b) What is an edge effect?
- (c) Mention two important plants of Eastern Himalayas.
- (d) Define biotic factors.
- (e) Name the first trophic level and last trophic level of ecosystem.
- (f) Name two producers of Tundra biome.
2. Answer any **eight** questions from the following: 3×8 = 24
- (a) Distinguish between niche and habitat. 3
- (b) Remark on the concept of ecological amplitude. 3
- (c) Briefly discuss the effects of fire on plants. 3
- (d) Write a short note on soil profile with a diagram. 3
- (e) Draw and describe detritus food chain. 1+2
- (f) Give a schematic diagram of the 'Hydrological Cycle'. 3
- (g) Define plant succession. Mention different stages of hydrosere and their vegetation. 1+2
- (h) Compare commensalism and parasitism. 3
- (i) What is Biodiversity hotspot? Why is it important? 2+1
- (j) What are the types of ecological pyramid? 3
- (k) What are the characteristics of tropical rain forests? 3
- (l) Define endemism. What is meant by continental drift? 1+2

3. Answer any *two* questions from the following:
- (a) Describe different steps of Nitrogen Cycle indicating the role of microbes in each step.
 - (b) Briefly describe different trophic organizations.
 - (c) Briefly describe the process of ecological speciation. 5
 - (d) Discuss briefly, the principles and models of energy flow. 2+3

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WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 4th Semester Examination, 2022

BOTACOR10T-BOTANY (CC10)

Time Allotted: 2 Hours

Full Marks: 40

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1. Answer the following questions: 1×6 = 6
- (a) What is omega taxonomy?
 - (b) Give one example of autonym.
 - (c) What do you mean by the word phylogeny?
 - (d) Why is Artificial System of classification named so?
 - (e) Name the graphical diagrams which show phenetic and phylogenetic relationship respectively.
 - (f) The species which are reproductively isolated but morphologically similar are designated by which name?
2. Answer any **eight** questions from the following: 3×8 = 24
- (a) Enumerate the functions of Botanical Gardens. 3
 - (b) What is e-flora? Discuss its applications. 1+2
 - (c) Write the principles of ICBN in correct sequence. 3
 - (d) Write the conditions for rejection of taxonomic names. 3
 - (e) Write salient features of taxonomic hierarchy structure. 3
 - (f) What do you mean by principle of priority and mention its limitations. 2+1
 - (g) What is meant by plesiomorphy? Differentiate between synapomorphy and symplesiomorphy. 1+2
 - (h) Explain with one example the meanings of “ex”, “in” and parenthesis in authors’ citation. 3
 - (i) Differentiate between Manual and Monograph. What is virtual herbarium? 2+1
 - (j) Write the conditions for valid publication. 3
 - (k) Differentiate character and character states. What is Morphocline? 2+1
 - (l) Mention the significant contributions of Linnaeus. 3

3. Answer any *two* questions from the following:
- (a) Give the outline of Bentham and Hooker's system of classification up to series. Mention two prime merits and demerits of this classification.
 - (b) What do you understand by nomenclatural types? Explain any four of that with examples. 1+4
 - (c) What are secondary metabolites? Mention with examples the role played by secondary metabolites in taxonomy. 1+4
 - (d) Differentiate between Homology and Analogy. Explain the terminologies — Monophyly, Paraphyly and Polyphyly with line drawing. 2+3

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WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 4th Semester Examination, 2021

BOTACOR08T-BOTANY (CC8)

Time Allotted: 2 Hours

Full Marks: 40

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1. Answer the following questions in brief: 1×6 = 6
- (a) What is facultative heterochromatin? Give an example.
 - (b) Why in Griffith's experiment the healthy mouse die when a mixture of non-virulent type IIR bacteria and heat killed virulent Type IIS bacteria of *Streptococcus pneumoniae* are injected into a healthy mouse?
 - (c) Name one organism having linear single stranded DNA.
 - (d) Name the enzyme responsible for replication of eukaryotic chromosomal ends.
 - (e) What are SSB proteins?
 - (f) Name an inhibitor of protein synthesis.
2. Answer any **eight** questions from the following: 3×8 = 24
- (a) Distinguish among A-DNA, B-DNA and Z-DNA.
 - (b) Give a concise account of mt-DNA.
 - (c) Differentiate between the m-RNA of prokaryotes and eukaryotes.
 - (d) Distinguish between Euchromatin and Heterochromatin.
 - (e) Describe the mechanism of prokaryotic termination of translation.
 - (f) What is open promoter complex? Mention the role of σ (sigma) factor in transcription initiation.
 - (g) Describe the experiment that demonstrated semi-conservative nature of DNA replication.
 - (h) Distinguish between repressible and inducible operon.
 - (i) What does 'export ready' mRNA mean? What distinguishes an 'export ready' mRNA from an mRNA that is detained in the nucleus?
 - (j) Discuss the splicing mechanism of introns mediated by spliceosomes.

- (k) Write a short note on cot curve.
- (l) Circle the initial codon and stop codon present in the following bacterial mRNA sequences 5' UUUGGGCUUAUGUUUAAAUUUAAAUUUUGAAAUGAU 3'.

What are isoacceptor tRNAs?

3. Answer any *two* questions from the following: 5×2 = 10

- (a) Briefly describe how Hershey and Chase demonstrated that DNA is passed to new phages during phage reproduction.
- (b) How does a dsDNA denatured? State the characteristic features of denatured DNA. What is melting temperature (T_m) of DNA? Melting temperatures of double-stranded DNA molecules for three organisms A, B and C are 70°C, 85°C and 75°C respectively. Arrange these organisms in ascending order as per the G–C content of DNA. Explain citing proper reasons.
- (c) Explain the mechanism of 5' capping of mRNA and mention its function.
- (d) Describe the structure of Tryptophan operon. Add a note on Attenuation.

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WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 4th Semester Examination, 2021

BOTACOR09T-BOTANY (CC9)
PLANT ECOLOGY AND PHYTOGEOGRAPHY

Time Allotted: 2 Hours

Full Marks: 40

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1. Answer the following questions: 1×6 = 6
- (a) Define humus.
 - (b) What are Hekiskotherms?
 - (c) Name one area of India which is concerned with endemic vascular plants.
 - (d) What is sedimentary cycle?
 - (e) What do you mean by ecological efficiency?
 - (f) What is meant by Ecesis?
2. Answer any **eight** questions from the following: 3×8 = 24
- (a) Give a brief account on different steps of soil formation. 3
 - (b) Write a short note on hydrological cycle with a schematic diagram. 3
 - (c) Write a short note on climax concepts. 3
 - (d) Comment on the different types of biotic interrelationships. 3
 - (e) Define endemism. Give one example. Who had coined the term? 1+1+1
 - (f) Distinguish between grazing and detritus food chain. 3
 - (g) What is the difference between r selected and k selected species? 3
 - (h) Characterise with equation and one example each for Exponential and Logistic growth pattern. 1 $\frac{1}{2}$ + 1 $\frac{1}{2}$
 - (i) Define biome. What type of vegetation is observed in tropical rain forests? 2+1
 - (j) Write about the concept of ecological amplitude. 3
 - (k) Give the principal adaptational features which protect plants against high temperature injury. 3
 - (l) Give a schematic diagram of the Carbon Cycle. 3

3. Answer any *two* questions from the following:
- (a) Explain the succession processes and types. 5
 - (b) Give an account on the energy flow in ecosystems. 3+2
 - (c) Write an account on the effects of wind on plants. Illustrate Shelford's law of tolerance. 2+3
 - (d) Write the phytogeographical divisions of India according to the BSI (1996) with their local vegetation. 2+3

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WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 4th Semester Examination, 2021

BOTACOR10T-BOTANY (CC10)

PLANT SYSTEMATICS

Time Allotted: 2 Hours

Full Marks: 40

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1. Answer the following questions: 1×6 = 6
- (a) What is monotypic family?
- (b) Who are the authors of 'Genera Plantarum' (1862-1883)?
- (c) Who introduced Binomial system of Nomenclature?
- (d) What is Morphocline?
- (e) Expand CNH.
- (f) What do you mean by *nomen nudum*?
2. Answer any **eight** questions from the following: 3×8 = 24
- (a) Write a note on effective and valid publication. 3
- (b) What is Priority of Publication? Write the acronym of Central National Herbarium. 2+1
- (c) State the cytological features that are used for taxonomic delimitation with suitable examples. 3
- (d) Discuss the concept of OTU and OEU in taxonomy and Systematics. 3
- (e) What is taxonomic hierarchy? Arrange the following according to hierarchy: 2+1
Tribe, Order, Genus, Class, Family
- (f) What is typification in taxonomy? Differentiate between Holotype and Isotype. 1+2
- (g) Discuss briefly the function of Botanical Garden in taxonomic study. 3
- (h) Give a brief idea of taxonomic and evolutionary species concept. 1 $\frac{1}{2}$ + 1 $\frac{1}{2}$
- (i) What is the importance of herbaria in taxonomic studies? Arrange the following steps in correct sequence: 2+1
labelling, pressing, collection, drying, mounting, poisoning
- (j) What is a Clade? Differentiate between Cladogram and Phenogram. 1+2

- (k) Distinguish between monographs and journals and write their significance in taxonomy.
- (l) Discuss briefly the advantages of e-flora and virtual herbarium.

3. Answer any *two* questions from the following: 5×2 = 10
- (a) What is author citation? Mention different types of multiple author citation. 1+4
 - (b) Mention the basic differences between natural and phylogenetic system of classification. Give an outline of Engler and Prantl's system of classification of seed plants up to subclass with characters. 2+3
 - (c) What is Numerical Taxonomy? Mention the major advantages and disadvantages of Numerical Taxonomy. 1+4
 - (d) Differentiate between Monophyly and Polyphyly. What do you understand by 'primitive' and 'advanced' character? 3+2

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Full Marks: 40

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1. Answer the following questions in brief: 1×6 = 6
 - (a) What is central dogma?
 - (b) The base composition of M13 phage DNA is – A-23%; T-36%; G-21% and C-20%, what is the nature of M13 phage DNA?
 - (c) What is Shine-Dalgarno sequence?
 - (d) What are linker histones?
 - (e) What are Okazaki fragments?
 - (f) What are peptide hormones?

2. Answer any **eight** questions from the following: 3×8 = 24
 - (a) Briefly describe the Avery-McLeod-McCarty experiment to prove DNA as genetic material. 3
 - (b) Give an account of cp-DNA. 3
 - (c) What is proof reading activity in replication? What will happen if the function is mutated? 2+1
 - (d) Briefly mention the specific role of all the enzymes required for DNA replication in prokaryotes. 3
 - (e) Distinguish between rho-dependent and rho-independent termination of transcription. 3
 - (f) Describe the reactions involved in the aminoacylation (charging) of a tRNA molecule. 3
 - (g) Distinguish between constitutive and facultative heterochromatin. 3
 - (h) Discuss the similarities and differences between *E. coli* RNA polymerase and eukaryotic RNA polymerase. 3
 - (i) What are transcription factors? Describe the promoter sites for initiation of transcription in eukaryotes. 1+2
 - (j) At which end of m RNA is poly A? What is cap? Are there eukaryotic mRNA molecules that do not contain either feature? 1+1+1
 - (k) Differentiate between the mechanisms of RNA splicing between group I and group II introns. 3
 - (l) State the properties of Ribozymes. What major roles are played by Ribozymes in cells? 1+2

3. Answer any *two* from the following:
- (a) With suitable sketches briefly describe the leading strand and lagging strand synthesis in prokaryotes. Why primers are required for DNA synthesis? 1+4
 - (b) What is spliceosome? With suitable diagram discuss the splicing mechanism of splicing introns. 1+3+1
 - (c) What do you mean by degeneracy of genetic code? Discuss the triplet binding technique of deciphering the genetic code. Is genetic code strictly universal? 2+3
 - (d) What makes the lac operon turn on? Briefly describe the mechanism of negative control of lac operon. 2+3

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BOTACOR09T-BOTANY (CC9)

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Full Marks: 40

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1. Answer the following questions: 1×6 = 6
- (a) What is homeostasis?
 - (b) Define the term fundamental niche.
 - (c) What is water table?
 - (d) Write the trophic levels of detritus food chain.
 - (e) Define biome.
 - (f) Name two regions where temperate grassland is found.
2. Answer any **eight** questions from the following: 3×8 = 24
- (a) What is a soil profile? Give diagram. 2+1
 - (b) Write briefly on the climax concept. 3
 - (c) Write the advantages and disadvantages of natural forest fire in an ecosystem. 1 $\frac{1}{2}$ +1 $\frac{1}{2}$
 - (d) Define symbiosis, commensalism and parasitism with an example for each. 3
 - (e) Write in brief the importance of ecological speciation. 3
 - (f) Differentiate between gross and net primary productivity. 3
 - (g) Write briefly on ecological pyramids. 3
 - (h) With the help of diagram explain the Shelford's law of tolerance. 3
 - (i) Write a very brief note on the continental drift. 3
 - (j) Comment on the role of microbes in N cycle. 3
 - (k) Characterise the tropical rain forest biome. 3
 - (l) Define any three different types of endemism, giving example for each. 3
3. Answer any **two** questions from the following: 5×2 = 10
- (a) Define population. Characterise the r & K selection life history strategies with examples. 1+4

- (b) What is plant succession? Write about the processes of primary succession.
- (c) With a schematic diagram, describe the phosphorus cycle.
- (d) Write a note on the Phytogeographical division of India (BSI 1996).

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WEST BENGAL STATE UNIVERSITY

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BOTACOR10T-BOTANY (CC10)

Time Allotted: 2 Hours

Full Marks: 40

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1. Answer the following questions: 1×6 = 6
 - (a) What is virtual herbarium?
 - (b) Define taxon.
 - (c) What is lectotype?
 - (d) What is cladogram?
 - (e) What is meant by OTU?
 - (f) What is tautonym?

2. Answer any **eight** questions from the following: 3×8 =24
 - (a) State the functions of botanical garden. 3
 - (b) Write briefly on e-flora and monographs. 3
 - (c) Write a short note on biological species concept. 1 $\frac{1}{2}$ +1 $\frac{1}{2}$
 - (d) Mention the situations leading to the rejection of name of any taxon. 3
 - (e) What are the limitations to the principle of priority? 3
 - (f) State the merits of Angiosperm Phylogeny Group (APG III) classification. 3
 - (g) Differentiate between parallelism and convergence. 3
 - (h) Give a brief idea on monophyly, paraphyly and polyphyly. 3
 - (i) Explain the importance of palynology in taxonomic elucidation citing two specific examples. 3
 - (j) Explain double citation with an example. 3
 - (k) What is meant by artificial, natural and phylogenetic system of classification? 3
 - (l) Explain the terms homology and analogy. Give examples of organs met in plants. 2+1

3. Answer any **two** questions from the following: 5×2 =10
 - (a) State the major categories of secondary metabolites having taxonomic significance. 5
 - (b) Write a note on the basic principles of numerical taxonomy. 5
 - (c) Write down the principles of ICN. 5
 - (d) Give the outline of Bentham & Hooker's system of classification of seed plants (up to series). Name the book where this system was proposed. 4+1

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