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
