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3 (Sem-4/CBCS) BOT HC 1

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)

Contd.

- (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) spliceosome

(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 : $2 \times 4 = 8$

- (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 spliceosome ?
(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 : $5 \times 3 = 15$

- (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 : $10 \times 3 = 30$

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

(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.
