# U.G. 4th Semester Examination - 2022

## BOTANY

### [HONOURS]

**Course Code : BBOTCCHC401**

**Course Title : Molecular Biology**

Full Marks : 30 Time : 2 Hours

*The figures in the right-hand margin indicate marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

*Provide neat diagrams wherever necessary.*

1. Answer any **ten** of the following questions: 1×10=10

a) What do you mean by reannealing of DNA?

b) Define linking number (L).

c) What is Hoogsteen base pairing?

d) What do you mean by replication fork?

e) What is 'Ter' sequence?

f) Which protein can break covalent bonds?

g) Which mechanism contributes to accuracy during DNA replication?



h) Mention the functions of the carboxy-terminal domain of TFII-H.

i) What is leucine zipper domain?

j) Which characteristic is shared by both RNA polymerase and DNA pol III in E. coli?

k) What do you mean by pribnow box?

l) What is Histone code?

m) What do you mean by coupled transcription-translation process?

n) Define linker DNA.

o) What is cosmid?

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

a) What is the role of Sugar puckering in DNA structure?

b) What is Cot analysis? Draw an appropriate plot showing the kinetics of eukaryotic DNA renaturation.

c) If DNA polymerase I were mutated so that all its enzymatic activities were inactive, which part of replication would be most affected and why?

d) A mutated strain of E. coli replicates DNA normally at 22°C, but replication stops

immediately when the temperature is raised to 37°C. Which factor is likely to be associated with this?

e) A mutated eukaryotic cell contains a mutation in the middle of an exon in gene X. What will be the most likely result of this mutation?

f) What do you mean HAT & HDAC?

g) What is RNAi mechanism?

h) What are 21st and 22nd amino acids? Mention their respective codons?

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

a) What is cis-trans regulation? Point out mode of regulation of β-galactosidase gene in four cases given below: 2+3

| | | | |
|---|---|---|---|
| 1. | $i^+$ | $O^+$ | $z^1$ |
| | $1^-$ | $O^+$ | $z^2$ |
| 2. | $i^+$ | $O^C$ | $z^1$ |
| | $i^+$ | $O^C$ | $z^2$ |
| 3. | $i^-$ | $O^+$ | $z^1$ |
| | $i^+$ | $O^C$ | $z^2$ |
| 4. | $i^+$ | $O^C$ | $z^1$ |
| | $i^+$ | $O^C$ | $z^2$ |



$i^+$ Lac inhibitor wild type

$i^-$ Lac inhibitor mutated

$O^+$ Operator inducible

$O^C$ Operator constitutive

$z^1$ and $z^2$ Genes encoding β-galactosidase

b) What is fidelity of translation? Briefly explain the process amino-acylation of t-RNA. Mention the role of cycloheximide in inhibition of translation process. 2+2+1

c) What is Protein disulfide isomerase (PDI)? Write a short note on the mechanism of group II splicing mechanism. 1+4