

Total number of printed pages-4

3 (Sem-5 /CBCS) ZOO HC 1  
2021

(Held in 2022)

**ZOOLOGY**

(Honours)

Paper : ZOO-HC-5016

(Molecular Biology)

Full Marks : 60

Time : Three hours

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

1. Choose the correct answer : 1×7=7
- (a) Which of the following is not a post-transcriptional modification ?
- (i) Splicing
  - (ii) 5' capping
  - (iii) 3' adenylation
  - (iv) Glycosylation
- (b) In the carbon skeleton of the pentose sugar in DNA, the attachment point of a base to form a nucleoside is
- (i) C<sub>1</sub>
  - (ii) C<sub>2</sub>

Contd.

- (iii)  $C_3$   
(iv)  $C_5$
- (c) The DNA binding protein that initiates the transcription of bacterial genes is called
- (i) operator
  - (ii) sigma factor
  - (iii) repressor
  - (iv) promoter
- (d) Which of the following amino acids has the greatest number of codons ?
- (i) Proline
  - (ii) Leucine
  - (iii) Tryptophan
  - (iv) Aspartic acid
- (e) Tryptophan operon in *E. coli* is an example of
- (i) inducible operon
  - (ii) positively regulated operon
  - (iii) repressible operon
  - (iv) All of the above
- (f) In the process of DNA synthesis in *E. coli*, the RNA primers are excised by the exonuclease activity of
- (i) DNA polymerase I

- (ii) DNA polymerase II
  - (iii) DNA polymerase III
  - (iv) DNA ligase
- (g) During elongation of polypeptide chain in translation, the peptide bonds are formed by the enzyme
- (i) peptidyl transferase
  - (ii) peptidyl ligase
  - (iii) aminoacyl tRNA synthetase
  - (iv) peptidyl polymerase

2. Write short notes on the following : **(any four)**  
 $2 \times 4 = 8$

- (a) Degeneracy of the genetic code
- (b) Riboswitches
- (c) rho-independent termination
- (d) RNA splicing
- (e) Watson-Crick model of DNA.

3. Answer **any three** from the following questions :  $5 \times 3 = 15$

- (a) Write the salient features of B-form of DNA. 5
- (b) What do you mean by gene silencing? Write the role of silencers in the process of transcription. 2+3=5

(c) What is pyrimidine dimerization ?  
Explain the photoreactivation repair of  
thymine dimers in DNA. 1+4=5

(d) Write a note on replication of telomeres. 5

(e) Citing proper examples, write the role of  
inhibitors of protein synthesis. 5

4. Briefly explain the mechanism of DNA  
replication in prokaryotes. 10

**Or**

What do you mean by a promoter site ?  
Explain the mechanism of transcription in  
prokaryotes with suitable diagrams. 2+8=10

5. What is the difference between prokaryotic and  
eukaryotic ribosome ? Briefly explain the  
assembly of a prokaryotic ribosome and  
discuss about the functional sites or active  
sites of a ribosome. 1+(5+4)=10

**Or**

Explain the mechanism of protein synthesis in  
prokaryotes. 10

6. Give an illustrative account on the regulatory  
mechanism of *lac* operon in *Escherichia*  
*coli*. 10

**Or**

Write the role of activators and enhancers in  
transcription regulation of eukaryotes. 5+5=10

*Total number of printed pages-4*

**3 (Sem-5/CBCS) ZOO HC 2**

**2021**

**(Held in 2022)**

**ZOOLOGY**

(Honours)

Paper : ZOO-HC-5026

***(Principles of Genetics)***

*Full Marks : 60*

Time : Three hours

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

1. Fill in the blanks : 1×7=7
- (a) The term 'gene' is coined by \_\_\_\_\_.
- (b) When both alleles express together, it is known as \_\_\_\_\_.
- (c) The distance between genes is called \_\_\_\_\_ unit.

*Contd.*

- (d) The phenomenon of one gene masks the expression of another gene is called \_\_\_\_\_.
- (e) Barr body is an inactivated form of \_\_\_\_\_ chromosome.
- (f) The full form of SINE is \_\_\_\_\_.
- (g) A virus that infects bacteria is called \_\_\_\_\_.

2. Answer the following briefly : **(any four)**  
2×4=8

- (a) Write the differences between sex-linked and sex-influenced inheritance.
- (b) What is a CLB method ? What is its use ?
- (c) Explain polygenic inheritance with suitable examples.
- (d) What do you mean by Kappa particles ?
- (e) Write the significance of mutation.

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

- (a) Discuss the complementary gene interaction with suitable illustration.

5

(b) Describe the mechanism of linkage in the context of coupling and repulsion hypothesis. 5

(c) What is somatic cell hybridization ? Write the application of somatic cell hybridization. 2+3=5

(d) What is sex determination ? Write about the 'genic balance theory' of sex determination. 2+3=5

(e) What do you mean by frame-shift mutation ? Discuss its probable causes. 3+2=5

4. What is multiple allele ? Write the characteristics of multiple alleles. Discuss the phenomenon of multiple allele in the light of inheritance of blood group in human. 2+3+5=10

**Or**

What do you mean by mitochondrial inheritance ? Mention the characteristics of extra-chromosomal inheritance. Discuss the maternal effect in Snail's shell coiling with proper illustration. 2+3+5=10

5. Define crossing over. Discuss the molecular mechanism of crossing over with suitable diagram. Give a brief note on its significance.

2+6+2=10

**Or**

What is transduction ? Discuss the phenomenon of generalized and specialized transduction with suitable diagram.

2+8=10

6. Define mutation. Describe different types of chromosomal aberration in context to structural changes with suitable examples.

2+8=10

**Or**

What is transposable element ? Mention different types of transposable elements in human. Discuss the medical significance of transposable element.

3+5+2=10