

Total number of printed pages-7

3 (Sem-5/CBCS) ZOO HC 1

2024

ZOOLOGY

(Honours Core)

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 : $1 \times 7 = 7$

(i) The coding sequences in a slip gene are known as -

- (A) Introns
- (B) Operons
- (C) Exons
- (D) Cistrons



Contd.

(ii) Isotopes used by Meselson and Stahl, in proving semiconservative replication of DNA were –

(A) ^{14}N ^{14}C

(B) ^{14}N ^{15}N

(C) ^{14}N ^{31}P

(D) ^{14}C ^{31}P

(iii) A particular triplet of bases in the template strand of DNA is 5' AGT 3'. The corresponding codon for mRNA transcribed is –

(A) 5' TCA 3'

(B) 3' UCA 5'

(C) 3' ACU 5'

(D) *Either UCA or TCA, depending on wobble in the first base*

(iv) Which is the most abundant type of RNA ?

(A) mRNA

(B) tRNA

(C) rRNA

(D) hnRNA

(v) The repeat sequence of nucleotides in telomere is –

(A) TTGGGA

(B) TTAGGG

(C) GGGATT

(D) TTGAGG

(vi) Which of the following RNAs can induce gene silencing ?

- (A) ssRNA
- (B) snoRNA
- (C) miRNA
- (D) ncRNA

(vii) TBP stands for –

- (A) TATA box polymerase
- (B) Transcription factor binding protein
- (C) TATA box binding protein
- (D) None of the above

2. Write short notes on the following :

2×4=8

- (a) Replicons
- (b) Transcription unit

(c) RNA interference

(d) Globin mRNA

3. Answer the following questions : **(any three)**

5×3=15

- (a) Write the mechanism of rolling circle replication.
- (b) Discuss the salient features of Watson and Crick model of DNA.
- (c) Write a note on mismatch repair system.
- (d) Write a brief account of structure and assembly of ribosomes in prokaryotes.
- (e) State the role of Activator and Silencer in regulation of eukaryotic gene expression.

4. Why is DNA replication known as semi-discontinuous ? Discuss the role of various enzymes involved in eukaryotic DNA replication.

2+8=10

Or

Define spliceosome. Describe the process of mRNA splicing with suitable diagram. Why is alternative splicing significant ?

2+6+2=10

5. What is an operon ? Briefly describe about regulation of trp operon in *E. coli*. How do mutations in leader sequence affect regulation process ?

2+6+2=10

Or

Define Transcription. Briefly discuss the differences between prokaryotic and eukaryotic transcription.

2+8=10

6. What is genetic code ? Write the characteristics of genetic code. Explain degeneracy of genetic code with special reference to 'Wobble hypotheses'.

1+4+5=10

Or

Give a detailed account of mechanism of translation in eukaryotes. How inhibitors of protein synthesis affect translation process ?

8+2=10



Total number of printed pages-4

3 (Sem-5/CBCS) ZOO HC 2

2024

ZOOLOGY

(Honours Core)

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. Answer the following questions as directed :
1×7 = 7

(a) Which law of Mendel's is also known as 'purity of gametes' ?

(b) Phenylketonuria is due to the presence of lethal gene/pleiotropic gene/homeotic gene.

(Choose the correct answer)

Contd.



- (c) Translocation involves exchange of segments between non-homologous chromosomes. (State True/False)
- (d) The point at which homologous chromosome forms a cross is called _____. (Fill in the blank)
- (e) The inactivation of X-chromosome by hyperproduction occur in _____. (Fill in the blank)
- (f) 5-bromouracil is a base analogue of cytosine/adenine/thymine. (Choose the correct answer)
- (g) The terminal inverted repeats are characteristic for each transposable elements. (State True/False)

2. Answer the following briefly : $2 \times 4 = 8$

- (a) What is tautomerization ?
- (b) Write the differences between transformation and transduction in bacteria.
- (c) What do you mean by polygenic inheritance ?
- (d) How can the mitochondrial DNA be distinguished from nuclear DNA ?

3. Answer the following questions : (any three)

$5 \times 3 = 15$

- (a) Illustrate the structure and function of synaptonemal complex. 5
- (b) How can sex-linked mutations be detected in Drosophila ? Add a note on chemical mutagen. $2+3=5$
- (c) What is dosage compensation ? Discuss the 'Genic balance theory' of sex determination. $1+4=5$
- (d) Define cytoplasmic inheritance. Discuss the maternal effects with special reference to coiling of shell in snail. $1+4=5$
- (e) Explain the Mendel's law of Independent assortment with suitable illustration. 5

4. (a) Define linkage. How does linkage differ from independent assortment of genes ? Describe complete and incomplete linkage with suitable examples. $1+2+7=10$

Or

- (b) What is sex-linked inheritance ? Explain the X-linked inheritance phenomenon with suitable example. Add a note on sex-influenced and sex-limited traits. $1+5+4=10$



5. (a) Explain with suitable diagram the possible structural changes in chromosome due to which alteration in phenotypes occur. 10

Or

- (b) What is epistasis ? Distinguish between recessive and dominant epistasis. Describe the complementary gene interaction with proper illustration. 1+3+6=10

6. (a) What are bacteriophages ? Describe the life cycle of lytic phage. Add a note on lysogenic cycle of a phage. 1+5+4=10

Or

- (b) What are Ac-Ds elements ? Why transposons are sometimes referred to as "Jumping genes" ? Give an account of different types of Prokaryotic and Eukaryotic transposons. 1+1+8=10

