

**M.Sc.**

**2016**

**2nd Semester Examination**

**ZOOLOGY**

**PAPER—ZOO-203**

*Full Marks : 40*

*Time : 2 Hours*

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

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

*Illustrate the answers wherever necessary.*

*Answer all questions of the following.*

**Group — A**

**(Molecular Biology)**

**1. Answer any two questions of the following : 2×2**

**(a) The following figure shows the transcribed region of a typical eukaryotic protein-coding gene :**

EXON 1 — INTRON — EXON 2 — INTRON — EXON 3 — Poly A  
←100→ ←75→ ←50→ ←70→ ←25→ ←200→

**What is the size of the fully processed matured m RNA ?**

*(Turn Over)*

(b) Match each term (1-2) with its corresponding descriptions in (a-e) noting that each term may have more than one description & each description may apply to more than one term :

1. Ribosomal RNAs.

2. Prokaryotic m RNAs.

a - are synthesized by RNA polymerases.

b - are the four types in eukaryotes & only three types in *E. coli*.

c - are synthesized by RNA polymerase.

d - are the template of genetic information during translation.

e - contain exon and intron.

(c) What is the sequence of m RNAs which is complimentary to a sequence near the 3' terminus of the 16 s ribosomal RNA.

(d) State the basic component of replisome.

2. Answer any *two* questions of the following : 2×4

(a) In presence of high intracellular concentration of tryptophan, only short transcripts of the trp operon are synthesized because of attenuation of transcription to the structural genes. This is mediated by the recognition of two Trp Codons in the leader

sequence. What effect would mutating these two codons to UAG stop codons have on the regulation of the operon in the presence or absence of tryptophan? Explain.

- (b) For each of the following transcription factors, how would eukaryotic transcriptional initiation be affected if it were missing :

I TF II B

II TF II D

III TF II H

- (c) (i) State the role of G protein in translation in *E.coli*.

- (ii) What is the special initiator tRNA in eukaryotes?

$2\frac{1}{2} + 1\frac{1}{2}$

- (d) What is end replication problem? Describe the structure of human telomere.

2+2

3. Answer *one* from the following : 1×8

- (a) (i) Why telomerase is called a novel DNA polymerase?

- (ii) State the features of the "trombone model" for co-ordinating replication by two DNA polymerase at the *E.coli* replication fork with a neat diagram.

3

- (b) The following table shows genotypes for a number of lac operons in which Z gene has been genetically engineered. The symbol *Zgfp* represents an engineered gene that encodes a green fluorescent protein, cells that produce this protein fluoresce green. The symbol *Zrfp* represents an engineered gene that encodes a red fluorescent protein, cells that produce this protein fluoresce red. Cells that produce neither protein do not fluoresce and those that produce both proteins fluoresce yellow (resulting from the mixture of green and red). Complete the table by entering red, green, yellow or none corresponding to the fluorescence of cells of each genotype when grown in the absence (-) or presence (+) of inducer.

<i>Genotype</i>	<i>+ inducer</i>	<i>- inducer</i>
a. $i^+ O^C Zgfp$		
b. $i^- O^+ Zgfp$		
c. $i^S O^+ Zgfp$		
d. $F^1 i^+ O^C Zrfp / i^+ O^+ Zgfp$		
e. $F^1 i^+ O^+ Zrfp / i^+ O^C Zgfp$		
f. $F^1 i^- O^C Zrfp / i^+ O^+ Zgfp$		
g. $F^1 i^- O^+ Zrfp / i^+ O^C Zgfp$		
h. $F^1 i^S O^C Zrfp / i^+ O^+ Zgfp$		
i. $F^1 i^S O^+ Zrfp / i^+ O^C Zgfp$		

**Group — B**  
**(Human Genetics)**

4. Answer any *two* questions of the following : 2×2
- (a) State the role of Serine Proteinases in Cancer metastasis.
  - (b) Write down the major steps of tumor angiogenesis.
  - (c) What is Endogenous angiogenic factor ?
  - (d) What is genomic imprinting ?
5. Answer any *two* questions of the following : 2×4
- (a) Illustrate with figures the alterations of transformed (carcinoma) epithelial cells. 4
  - (b) What is Matrix metalloproteinase ? How is activity of matrix metalloproteinase regulated ? 2+2
  - (c) In what way cancer cells evade immune system to form an established tumor micro-environment. 4
  - (d) What is contig ? What are differences between minisatellite and micro statellite ? 2+2

6. Answer any *one* question of the following : 1×8
- (a) (i) What is "Poly glutamine (Poly Q) disease"?  
Explain the relationship between Polymorphic CAG repeat with "Huntington's disease".
- (ii) What are the difference between Retrovirus like Elements and Retroposous? Explain with proper diagram. 2+3+3
- (b) (i) Explain involvement of Tan Protein in the development of Alzheimer disease. 4
- (ii) How are alterations in extra cellular matrix associated with Muscular dystrophies? 4
-