M.Sc.

2015

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) Based on the analogy to a hand, what are the functions of *palm domain* of DNA polymerase ?

(b) What is processivity and how increased processivity is fascilitated in DNA polymerase ?

(c) If the nontemplate strand of a gene in *E.coli* had the sequence:

5′ TTGACA – (18 bases) – TATAAT – (8 bases) – GCCTCCAG – 3′

What nucleotide sequence would be present in the RNA transcript of this gene ?

(d) The human α-globin chain is 141 amino acids long. How many nucleotides in mRNA are required to encode human α-globin gene.

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

(a) What is the significant contribution of the Shine-Dalgarno sequence in prokaryotic mRNA ? What effect does the deletion of the Shine-Dalgarno sequence from a mRNA have on its translation ? 3+1

(b) Describe briefly the interaction of the basal transcription factors in correct sequence in the process of initiation complex by RNA polymerase II. 4

(c) How RNA primer is removed from primer : template junction ? How sliding DNA clamp loading function is controlled by ATP binding and hydrolysis ?

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

(d) How might the concentration of glucose in the medium in which an *E.coli* is growing regulate the intracellular level of cyclic AMP ? 4

3. Answer any *one* question of the following : 8×1

(a) (i) The following table gives the relative activities of the enzyme β–galactosidase and permease in cells with different genotype at the *lac locus* in *E.coli*. The levels of activity of each enzyme in wild type E.coli was arbitrarily set at 100, all other values are relative to the observed level of activity. Based on the data given in the table, fill in the level of enzyme activity that would be expected & give explanation.

	β–galactosidase		*Permease*	
Genotype	– inducer	+ inducer	– inducer	+ inducer
$I^+O^+Z^+Y^+$	0.1	100	0.1	100
$I^-O^+Z^+Y^+$	100	100	100	100
$I^+O^cZ^+Y^+$	25	100	25	100
$I^-O^+Z^+Y^-/F'I^-O^+Z^+Y^+$	–	–	–	–
$I^-O^cZ^-Y^+/F'I^+O^+Z^+Y^+$	–	–	–	–
$I^+O^cZ^+Y^+/I^+O^+Z^+Y^+$	–	–	–	–

5

(d) Match the following oncogenes with its respective functions :

Oncogenes	*Protein functions*
raf	Epidermal Growth Factor Receptor
H–ras	Transcription factor
myc	GTPase enzyme
erb–B1	Serine threonine Kinase

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

(a) Illustrate the molecular events of degradation of Basement membrane and extracellular matrix. 4

(b) What is retroposons ? State the mechanism of Non-LTR transposition. Give an example of active SINE in human genome. 1+2+1

(c) Explain the role of CFTR (cystic fibrosis transmembrane conductance regulator) protein in controlling the cystic fibrosis. 4

(d) Define Genomic imprinting. Corelate methylation and deacetylation of histone Protein in genomic inprinting. 4

6. Answer any *one* question of the following : 8×1

(a) (i) Describe the strategies of cancer cell to escape Immune System mediated elimination.

(ii) Cellular proto oncogenes and Viral oncogenes are related in sequences but they are not identical. What is the fundamental difference between the two ? 5+3

(b) (i) Illustrate the structure of Dystrophin associated protein complex (DAPC).

(ii) What is the functional difference between α and γ secretase in conjunction with Alzheimer's disease ? 6+2
