

2018

M.Sc. Part-I Examination

ZOOLOGY

PAPER—II (Group—A)

Full Marks : 50

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 any four questions taking two from each unit.

Unit—I

[Cytogenetics]

1. (a) The ABO blood types of 1000 individuals from an isolated village were determined and the following data was obtained :

<u>Blood Type</u>	<u>No. of People</u>
A	430
B	140
AB	50
O	380

(Turn Over)

Calculate the frequencies of I^A , I^B and i alleles of the ABO blood group from these data and predict whether the population is in H. W. Equilibrium.

- (b) Albinism, an autosomal recessive trait, is found in 1 person/10000 individuals. What percent of the population is carrier for the disorder ? $7\frac{1}{2}+5$
2. (a) Distinguish generalized transduction from specialised transduction. 4
- (b) Explain the process of conjugation between F^+ and F^- bacteria. $4\frac{1}{2}$
- (c) Comment on Hfr strain and episome. 4
3. (a) Crosses of three different Hfr strains with separate samples of an F^- strain are carried out, and the following mapping data are provided from studies on interrupted conjugation : $7+5\frac{1}{2}$

Appearance of genes in F^- cells

Hfr 1	Genes	b^+	d^+	c^+	f^+	g^+
	Time	3	5	16	27	59
Hfr 2	Genes	e^+	f^+	e^+	d^+	b^+
	Time	6	24	35	46	48
Hfr 3	Genes	d^+	c^+	f^+	e^+	g^+
	Time	4	15	26	44	58

Construct a genetic map for these genes, indicating their order on the bacterial chromosome and distances between them.

- (b) DNA from a strain of *Bacillus subtilis* with the genotype $trp^+ tyr^+$ was used to transform a recipient strain with the genotype $trp^- tyr^-$. The following numbers of transformed cells were recovered.

Genotype	Number of transformed cells
$trp^+ tyr^-$	154
$trp^- tyr^+$	312
$trp^+ tyr^+$	354

What do these results suggest about the linkage of the trp and tyr gene ?

4. Write short notes on (any five) : $2\frac{1}{2}\times 5$
- (a) Specialized transduction ;
- (b) rII Locus ;
- (c) Photoreactivation ;
- (d) Degeneracy of genetic code ;
- (e) Hybrid dysgenesis ;
- (f) Fusion oncogenes ;
- (g) MTOC.

Unit—II

[Molecular Biology]

5. (a) What is the significance of primer-template junction ?
- (b) With a neat diagram briefly describe the composition of DNA pol III holoenzyme.

- (c) What is the function of RNase H ?
- (d) What is the telomere sequence of human ?
2½+5+2½+2½
6. (a) Does the termination sequence of transcription differ in rho dependent and rho independent termination of transcription ? 3
- (b) Which amino acid is bound to seryl tRNA^{leu} ? 2
- (c) How does prepriming proteins interact with OriC in *E. Coli* to form a replication bubble ? 5½
- (d) What is the sequence of mRNA which is complimentary to a sequence near the 3'terminus of the 16S ribosomal RNA ? 2
7. (a) Outline the process of aminoacyl-tRNA formation in *E. Coli* translation. 4
- (b) State the termination codons recognised by release factor 1 and release factor 2, in *E. Coli* translation. 2
- (c) What are the elements involved in the initiation process in *E. Coli*. 2
- (d) State the function of β -clamo in *E. Coli* replication. 4½
8. Write down the steps of initiation of replication. What is rho factor ? Mention how it assists in termination of transcription. What is EFTu cycle ? 5+1½+3½+2½