

2017

ZOOLOGY

[ Honours ]

PAPER – VI

Full Marks : 90

Time : 4 hours

*The figures in the right hand margin indicate marks*

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

*Illustrate the answers wherever necessary*

[ OLD SYLLABUS ]

GROUP – A

1. Answer any *one* of the following : 12 × 1
- (a) (i) Define cistron. 2
- (ii) Differentiate between plasmid and episome. 3

(iii) Describe molecular aspects of sex determination in drosophila with schematic diagram,  $4\frac{1}{2} + 2\frac{1}{2}$

(b) (i) Characterize mt-DNA. 3

(ii) What is selfish DNA? 2

(iii) Discuss about the genetic phenomena underlying human ABO blood determination. 7

(c) (i) Define gene. 2

(ii) "One gene-one polypeptide" – justify the statement in light of modern understanding. 3

(iii) Discuss molecular events occurring at the Ori C in bacteria (with figures) during replication of DNA. 4 + 2

(iv) Do you think mtDNA has Ori C sequence? 1

2. Answer *three* of the following : 7 × 3

(a) (i) What is C-value paradox? 3

- (ii) Differentiate between -"Ploidy" and "-somy". 2
- (iii) What is "codon degeneracy" ? 2
- (b) (i) What is 'dicentric bridge' ? 2
- (ii) A homozygous claret (ca, claret eye color), curled (cu, curled wings), fluted(fl, creased wing) drosophila is crossed with a pure-breed wild-type fly. The F<sub>1</sub> females are test-crossed and the following progeny resulted :
- fluted : 4 ; claret : 173 ; curled : 26  
 fluted, claret : 24 ; fluted, curled : 167  
 claret, curled : 6 ; fluted, claret, curled :  
 298 wild type : 302
- a. Are the loci linked ? Explain.
- b. If so, determine the gene order, map distances and co-efficient of coincidence. 5
- (c) (i) Compare oncogene with proto oncogene with example 3

- (ii) What is signal peptide? Is it synonymous with leader peptide? 2 + 1
- (iii) What is polysome? 1
- (d) (i) Describe catabolite repression with suitable diagram. 5
- (ii) What is tautomerization? 2
- (e) (i) Describe molecular events during termination of transcription in prokaryotes with diagram. 4 + 2
- (ii) What is auxotroph? 1
3. Answer *three* of the following : 4 × 3
- (a) Prove physical contracts are required for bacterial conjugation with suitable experiment. 4
- (b) (i) What is recombinant DNA? 2
- (ii) Mention few applications of mAb. 2
- (c) (i) Illustrate the role of cyclins in cell cycle. 3

- (ii) What is Holliday structure? 1
- (d) (i) Briefly describe the genetic basis of sickle cell anemia. 3
- (ii) What is Hfr? 1
- (e) (i) Illustrate frame shift mutation. 3
- (ii) What is photoreactivation? 1

#### GROUP – B

4. Answer any *one* of the following : 12 × 1
- (a) (i) Describe ultrastructure of mammalian skeletal muscle with labelled diagram. 5 + 3
- (ii) Compare diffusion and osmosis. 4
- (b) (i) Describe chemical structure of hemoglobin. 6
- (ii) What is chloride shift? What is its physiological significance? 3 + 2
- (iii) Define pH. 1

- (c) (i) What is chemiosmotic coupling ? 2
- (ii) Describe the mechanism of ATP synthesis via oxidative phosphorylation with necessary figures. 6 + 2
- (iii) What is uria bicycle ? 2
5. Answer *three* of the following : 7 × 3
- (a) Describe different phases of Oestrous cycle.  
Where could you find this ? 6 + 1
- (b) (i) What is Gibb's free energy ? 2
- (ii) Describe transmission of nerve impulse across a chemical synapse with neat diagram. 5
- (c) (i) What is limit of resolution ? 2
- (ii) Compare between SEM and TEM. 5
- (d) Describe thermoregulatory responses found in mammals in a cold environment. What is heliothermy ? 6 + 1

- (e) (i) Discuss endocrine regulation of calcium homeostasis. 6
- (ii) What is menarche? 1
6. Answer any *three* of the following : 4 × 3
- (a) Describe physiological significance of buffer in animal systems. 4
- (b) (i) Compare osmoconformers with osmoregulators citing examples. 3
- (ii) What are anomers? 1
- (c) (i) What are the structural features of  $\alpha$ -helix? 3
- (ii) Define entropy. 1
- (d) (i) Illustrate the functions of Juxta-glomerular apparatus. 3
- (ii) What is a co-enzyme? 1
- (e) Compare competitive and non-competitive enzyme inhibition with example. 4

- (f) (i) What is the significance of  $K_m$  and  $V_{max}$ ? 3
- (ii) What is glyconeogenesis? 1
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