WEST BENGAL STATE UNIVERSITY
B.Sc. Honours PART-II Examinations, 2017

ZOOLOGY-HONOURS

PAPER-ZOOA-IV

Time Allotted: 4 Hours   Full Marks: 100

The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.

Use separate Answer Scripts for each Group and mention the Group on Answer Scripts.

Group-A

[Marks-50]

1.   Answer any *five* questions from the following: 2×5 = 10

(a) How many Barr bodies are present in Turner's patient? Justify.

(b) What is Philadelphia chromosome? How is it formed?

(c) Distinguish between endonuclease and exonuclease.

(d) What is Shine-Dalgarno Sequence?

(e) State the role of Checkpoints in stage of cell cycle.

(f) Differentiate between euploidy and aneuploidy.

(g) What do you know about test-cross and back cross.

(h) What is corepressor? Give example.

2.   Answer any *one* question from the following: 6×1 = 6

(a) (i)   A boy is colour-blind (a sex-linked recessive trait) but his parents and   3+3
grandparents had normal vision. What are genotypes of his mother and
maternal grandparents? Use x^B for the dominant wild condition and x^b for the
recessive colour-blind type.

(ii)   How is Down's Syndrome produced?

(b) (i)   Which factor is absent in Haemophilia B?   1+2+3

(ii)   How Sickle cell anaemia occurs?

(iii) Explain the molecular aspect of thalassemia.

3.   Answer any *one* question from the following: $10 \times 1 = 10$

(a) In a Chinese Primrose, slate-coloured flower(s) is recessive to blue flower (S), red   2+5+3
stigma (r) is recessive to green stigma (R), and long style (l) is recessive to short
style (L). All three genes involved are of the same chromosome. The F_1, of a cross
between two breeding strains when test-crossed, gave the following progeny.

Phenotype	No. of Progeny
Slate flower, green stigma, short style	27
Slate flower, red stigma, short style	85
Blue flower, red stigma, short style	402
Slate flower, red stigma, long style	977
Slate flower, green stigma, long style	427
Blue flower, green stigma, long style	95
Blue flower, green stigma, short style	960
Blue flower, red stigma, long style	27
	3000

(i)   What are the genotypes of parents in the cross of the two true breeding
       strains?

(ii)   Make a map of these genes showing their order and distance between them
       with proper illustration.

(iii) Derive the coefficient of confidence for interference between given genes.

(b) (i)   What is pleiotropy? Give an example.   2+4+2+2

(ii)   Give the difference between frame shift and tautomeric shift.

(iii) What is C value paradox?

(iv)   Give an example of each of the following in human beings— Autosomal-
       linked recessive, X-linked recessive, Autosomal-linked dominant and
       Y-linked.

4.   Answer any *two* questions from the following: $7 \times 2 = 14$

(a) (i)   Discuss with diagram the fluid mosaic model of Singer and Nicolson on   (3+2)+2
           plasma membrane architecture.

(ii)   State two evidences in support of fluidity and mosaic pattern of membrane.

(b) "DNA replication is neither conservative nor dispersive but semi-conservative"-   7
    Prove this statement with a suitable experiment.

(c) (i) What is active transport? How does it differ from passive transport?   (2+2)+3

     (ii) What do you know about facilitated diffusion?

(d) (i) What are the post-transcriptional modifications of proteins in eukaryotes?   3+4

     (ii) Draw and label a structure of RNA in work.

5.   Answer any *one* question from the following: 10×1 = 10

     (a) Write short notes on any *two* from the following: 5×2

         (i)   RFLP

         (ii)   ELISA

         (iii) RIA

         (iv) DNA Finger Printing

     (b) (i) What is Chimeric DNA? Discuss the process of construction of this DNA.   5+(3+2)

     (ii) How cDNA is produced from mRNA? What is the use of cDNA?

Group–B

[Marks–50]

6.   Answer any *five* questions from the following: 2×5 = 10

     (a) Name the sugars present in sugarcane and milk.

     (b) What are coacervates?

     (c) What is micro RNA?

     (d) Name the co-valent bonds present in polysaccharides and proteins.

     (e) What is Saponification number?

     (f) What are acidic and basic amino acids?

     (g) What is X-ray crystallography?

     (h) What do you understand by primary and secondary constriction of chromosome?

7.   Answer any *two* questions from the following: 7×2 = 14

     (a) Distinguish between: 2+2+3

         (i)   Co-enzyme and co-factors

         (ii)   Glycosidic bond and Peptide bond

         (iii) Preparatory and pay off phases in Glycolysis.

(b) Why phosphofructokinase-1 (PFK-1) is considered as the principal rate-timing enzyme of glycolysis? Mention two separate steps of glycolysis with enzyme names where substrate level phosphorylation takes place. What are the possible fates of pyruvate at the end of glycolysis? 2+2+3

(c) What is Michaelis-Menten equation? Explain the relationship between substrate concentration and rate of enzyme-reaction. State the effect of temperature on enzyme action. 2+3+2

(d) What is β-oxidation of fatty acids? How fatty acids are transported to mitochondrial matrix prior to their oxidation? Name any two enzymes involved in Knoop's β-oxidation pathway. Mention the significances of β-oxidative of fatty acids. 1+3+1+2

8. Answer any *one* question from the following: 10×1 = 10

(a) Mention the possible synthesis of amino acid of pre-biotic earth. State the importance of water in biological world. What is oxidative phosphorylation? State the significances of HMP shunt pathway. 3+2+3+2

(b) Describe the steps of Kreb's cycle. Explain the energetics of Kreb's cycle. 7+3

9. Answer any *one* question from the following: 6×1 = 6

(a) Write down the principle of Thin layer chromatography (TLC)? What are the applications of ultracentrifugation? 3+3

(b) Distinguish between primary and secondary structure of protein conformation. Explain the tertiary structure of protein. 3+3

10. Answer any *one* question from the following: 10×1 = 10

(a) State the principles of SDS-PAGE and immunoelectrophoresis. 5+5

(b) Describe the nucleosome model of chromosome structure with suitable diagram. Write the names of three unpaired loops in t-RNA secondary structure. What is telomeric DNA? 4+3+1+2