



WEST BENGAL STATE UNIVERSITY
B.Sc. Honours PART-II Examinations, 2018

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) What is particulate theory of inheritance?
 - (b) Mention two differences between TEM and SEM.
 - (c) What are UTR and ORF?
 - (d) What is Chargaff's rule?
 - (e) Name one transposable element in bacteria and one in human.
 - (f) What are auxotrophic and loss-of-function mutations?
 - (g) What is polyadenylation of mRNA?
 - (h) Briefly mention role of p53 gene in cell cycle regulation.
2. Answer any **one** question from the following: 6×1 = 6
- (a) (i) State the genetic basis of Cri-du-chat and Turner's syndrome in human and mention their symptoms. 3
 - (ii) A hemophilic man marries an albino woman and produce one boy and one girl. Will these offspring be normal? Justify your answer. 3
 - (b) (i) In grasshopper rosy body color is caused by a recessive mutation; the wild type body color is green. If the gene for body color is on the X chromosome, what kind of progeny would be obtained in F1 generation from a mating between a homozygous rosy female and a hemizygous wild-type male? (In grasshopper, females are XX and males are XO). 3
 - (ii) Site one example of each of the following: 1+1+1
Sex-influenced inheritance in human, sex-linked inheritance in human and sex-lethal inheritance in *Drosophila* sp.

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

- (a) Singed bristles (sn), crossveinless wings (cv) and vermilion eye color (v) are due to recessive mutant alleles of three X-linked genes in *Drosophila melanogaster*. When a female heterozygous for each of the three genes was testcrossed with a singed, crossveinless, vermilion male, the following progeny were obtained: 2+5+3

Class	Phenotype	No. of Progeny
1.	Singed, crossveinless, vermilion	3
2.	Crossveinless, vermilion	392
3.	Vermilion	34
4.	Crossveinless	61
5.	Singed, crossveinless	32
6.	Singed, vermilion	65
7.	Singed	410
8.	Wild-type	3
	Total	3000

- (i) What is the correct order of these genes on the X chromosome?
 (ii) What are the genetic map distance between sn and cv, sn and v, and cv and v?
 (iii) What is the co-efficient of coincidence for interference between given genes?
- (b) (i) The F1 from a cross of AB/AB × ab/ab is testcrossed resulting in the following phenotypic ratios: 6+2+2
- | | |
|----|-----|
| AB | 308 |
| Ab | 190 |
| ab | 292 |
| aB | 210 |
- What is the frequency of recombination between gene a and b?
- (ii) Why observed double cross over (DCO) classes are usually less in number than expected?
 (iii) What is linkage disequilibrium?

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

- (a) (i) Explain why resolving power of light microscope is limited within 0.2 μm. 2+5
 (ii) What are the contributions of Golgi complex and ER in maturation and secretion of protein outside cell? Discuss with diagram.
- (b) (i) What are the major differences between rho-dependent and rho-independent processes of transcriptional termination in prokaryotes? 3+2+2
 (ii) State the role of sigma factors in the process of transcriptional inhibition in bacteria.
 (iii) What is the function of peptidyl transferase?
- (c) (i) How does a mRNA mature from a pre-mRNA in eukaryotes? Describe with diagram. 6+1
 (ii) What is coupled transcription-translation process?
- (d) (i) State the components that constitute MPF. 2+4+1
 (ii) Explain the molecular mechanism involved in metaphase checkpoint of eukaryotic mitotic cell cycle with diagrammatic illustration.
 (iii) Distinguish between extrinsic and intrinsic membrane proteins.

5. Answer any **one** question from the following: 10×1 = 10
- (a) Write short notes on any **two** of the following: 5×2
- (i) Dideoxy chain termination
 - (ii) cDNA library
 - (iii) Restriction endonucleases and its application
 - (iv) Cloning method.
- (b) (i) What are artificial chromosomes? 2+2+2+2+2
- (ii) What is reverse transcription PCR?
 - (iii) Name one plasmid vector and one GM crop.
 - (iv) What are SNPs?
 - (v) Give one example of biotechnology used in health and medicine industry.

Group-B
[Marks-50]

6. Answer any **five** questions from the following: 2×5 = 10
- (a) State the basic structure of steroid.
 - (b) Write the name of any enzyme stating its E.C. number.
 - (c) What is hn RNA?
 - (d) What is a phosphodiester bond and where is it found?
 - (e) Distinguish between fat and oil.
 - (f) Name any two electron transport inhibitors mentioning their site of action.
 - (g) Name two unusual bases present in tRNA.
 - (h) Why are amino acids amphoteric in nature?
7. Answer any **two** questions from the following: 7×2 = 14
- (a) Name two amino acids which can act as precursors of neoglucogenesis. Name two sites of a mammalian body in which the process takes place. Mention three important bypass reactions of neoglucogenesis. 2+2+3
- (b) Define K_m . What is expected to happen when 7
- (i) $[S]$ is much less than K_m
 - (ii) $[S]$ is much greater than K_m
 - (iii) $[S]$ is equal to K_m
- (c) Distinguish between 3+2+2
- (i) Competitive and non competitive inhibition of enzyme activity
 - (ii) Euchromatin and heterochromatin
 - (iii) D-glucose and L-glucose
- (d) Explain why and how ETC (Electron Transport Chain) and oxidative phosphorylation is termed as a coupled process. Mention the significance of ETC. 4+3
8. Answer any **one** question from the following: 10×1 = 10
- (a) Describe the process of HMP shunt pathway with a flow diagram. Explain the energetics of glycolytic pathway. What is Lineweaver Burk plot? 6+2+2

- (b) What is the role of carnitine in the mitochondrial β -oxidation of fatty acids? In what way does saturated and unsaturated fatty acids differ? Why is Kreb's cycle called amphibolic cycle? 5+3+2
9. Answer any *one* question from the following: 6×1 = 6
- (a) What do you mean by secondary structure of a protein? What are the two main types of secondary structure in protein? How do they differ? Mention the different bonds involved in formation of higher order structure of protein. 1+1+2+2
- (b) Explain retardation factor (R_f) in connection with chromatography. Distinguish between velocity gradient and density gradient ultracentrifugation. How native PAGE is different from SDS-PAGE? 2+2+2
10. Answer any *one* question from the following: 10×1 = 10
- (a) Describe the principle and methodology of Western blotting. Explain Bragg's Law. Write the application of X-ray crystallography. (2+3)+2+3
- (b) Draw and describe the structure of Watson-Crick Model of B-DNA organization. How B-DNA differ from Z-DNA? Name the three distinct segments of a mature or processed eukaryotic m-RNA molecule. 6+2+2



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Group-A

[Marks-50]

1. Answer any *five* questions from the following: 2×5 = 10
 - (a) What is “Law of priority”?
 - (b) What do you mean by parsimony in cladistics?
 - (c) What is ecological equivalent?
 - (d) What is biotic potential?
 - (e) Define key-stone species with example.
 - (f) Name two endemic mammals of western ghats.
 - (g) What is polytypic species?
 - (h) Distinguish between niche and habitat.

2. Answer any *two* questions from the following: 4×2 = 8
 - (a) What is meant by allopatric species? How does it differ from sympatric species? 2+2
 - (b) Discuss alpha(α), beta(β) and gama(γ) taxonomy. 4
 - (c) Differentiate between cladogram and phenogram with suitable diagram. 4
 - (d) Write note on ICZN. 4

3. Answer any *two* questions from the following: 5×2 = 10
 - (a) What is succession? Distinguish between primary and secondary succession. Explain with proper example. 2+3
 - (b) Write a short note on competitive exclusion principle. 5
 - (c) Explain energy flow in an ecosystem. What is primary productivity? 4+1

- (d) Distinguish between food chain and food web. What is the importance of food chain analysis? 3+2
4. Answer any *one* question from the following: 11×1 = 11
- (a) (i) What is logistic model of population growth? How does it differ from exponential form? 2+3
- (ii) Differentiate between competition and predation. 4
- (iii) What is Lindeman's 10% law? 2
- (b) (i) What is survivorship curve? Discuss different types of survivorship curve with example. 2+3
- (ii) How atmospheric nitrogen is fixed biologically during nitrogen cycle? 4
- (iii) What are the two factors that affect the species diversity of an island? 2
5. Answer any *one* question from the following: 11×1 = 11
- (a) (i) What is a megadiversity country? How many megadiversity countries have so far been recognized? Discuss why India has been recognized as a megadiversity country. 1+1+2
- (ii) As per IUCN norms, what are the criteria for rare and endangered species? Give one Indian example of each. 4
- (iii) State the objectives of Biodiversity Act. 3
- (b) (i) Distinguish between National Park and Wild Life Sanctuary. 3
- (ii) Explain ex-situ and in-situ modes of conservation. 3
- (iii) Comment on the habitat and distribution areas of Red Panda and Nilgiri Thar in India. 2.5+2.5

Group-B

[Marks-50]

6. Answer any *five* questions from the following: 2×5 = 10
- (a) Distinguish between endotoxin and exotoxin.
- (b) Give example of capsule producing bacteria and state the significance of capsule.
- (c) Distinguish between innate and acquired immunity.
- (d) What is the difference between polyclonal and monoclonal antibodies?
- (e) What is Loeffler's Syndrome?
- (f) What is hyperparasitism? Cite an example.
- (g) Distinguish between definitive and intermediate hosts with examples.
- (h) State the role of mast cells in immunity.

7. Answer any **one** question from the following: 11×1 = 11
- (a) Classify bacteria according to their shapes and give examples of each types. 3+3+4+1
Briefly discuss the process of chemotaxis in bacteria. Describe the mode of action of cholera toxin and its effect. What is prion diseases?
- (b) What do you mean by Ghon's complex and pulmonary tuberculosis? State 4+3+4
different types of dermatophytosis in man. Describe the pathophysiology of poliomyelitis.
8. Answer any **one** question from the following: 13×1 = 13
- (a) Define Zoonosis with examples. Write down the symptoms and causes of 2+4+5+2
giardiasis. Write down the adaptive features of *Taenia Solium*. What is the term preadaptation mean?
- (b) What is host-parasite interaction? Describe the different types of tissue 2+4+1+3+3
changes occur due to parasitic infection. Name one myiasis causing fly. Name the infecting host and discuss on the damages caused by the fly. What do you know about Maggot Debridement Therapy?
9. Answer any **two** questions from the following: 8×2 = 16
- (a) How do the complement system destroy the pathogens? Mention the 2+5+1
molecular complex formation in APC-T cell interaction and its functional significance in cellular immunity. What is haematopoiesis?
- (b) State the differences between B-cell and plasma cell. State the role of 2+2+4
macrophages. Write down the principle and utilities of RIA as immunological technique.
- (c) Define proinflammatory cytokines. Discuss the significance of Fc region of 2+3+3
antibody in immune response. Draw and describe the structure of MHC class-II molecule.
- (d) Justify the statement "all immunogens are antigens but all antigens are not 4+2+2
immunogens". State the differences between adjuvant and haptens. Define primary lymphoid organ with example.

