



**UNIVERSITY OF THE PUNJAB**  
**M.A./M.Sc. Part – I Annual Examination – 2022**

Subject: Zoology

Paper: I (Biochemistry)

Roll No. ....

Time: 3 Hrs. Marks: 75

**NOTE: Attempt any FIVE questions. All question carry equal marks.**

1a	Define the following terms with examples. a) Enantiomers b) Diastereomers c) Anomers d) Epimers	08
1b	Explain oxidative phase of pentose phosphate pathway for the generation of two important precursors for their anabolic role in various biosynthetic pathways.	07
2a	Discuss the role of some biologically important peptides in living organisms.	7.5
2b	Explain the tertiary structure of proteins by using the example of myoglobin.	7.5
3a	Explain the structure of pyruvate dehydrogenase complex and its regulation by different allosteric and covalent modulators.	7.5
3b	Describe biosynthesis of glycogen in liver and skeletal muscles.	7.5
4	How the glucose is broken down into pyruvate? Describe stepwise reactions along with regulation.	15
5a	How long chain fatty acids get their entry into mitochondria? Discuss $\beta$ -oxidation of saturated fatty acids in mitochondria.	08
5b	Discuss the production of Urea in liver cells.	07
6	Give an account of the electron transport chain from NADH to cytochrome c oxidase complex. Also discuss different complexes of electron transport chain.	15
7a	Describe the biosynthesis of fatty acids in animal cells.	07
7b	How ketone bodies are synthesized in liver? Also explain the effect of their overproduction on human body.	08
8	Describe the synthesis and degradation of purines in animals.	15
9	Write a note on any two of the followings. a) Cellulose and chitin. b) Omega oxidation of fatty acids. c) Sphingolipids.	7.5X2 =15



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Roll No. ....

Subject: Zoology

Paper: II (Cell & Molecular Biology)

Time: 3 Hrs. Marks: 75

**NOTE: Attempt any FIVE questions. All question carry equal marks.**

Q. 1	Differentiate between the following 1. Cytosine and cytidine with the help of structural formula 2. Primary constriction and secondary constriction in chromosomes 3. Codon and anticodon.	5x3=15
Q. 2	a) What is semi-conservative replication? Describe fundamental characteristics of semi-conservative DNA replication.	10
	b) A primer is an RNA fragment. Explain how an RNA Primer can bind with template DNA strand during Replication initiation?	5
Q. 3	a) Describe application of genetic engineering in pharmaceutical industry.	7
	b) What is principle of Sanger sequencing method? Describe the procedure for Sanger sequencing method	8
Q. 4	How does replication in prokaryotes differ from that of eukaryotes? Enlist various enzymes involved with their functions.	15
Q. 5	Describe post-transcriptional modifications in eukaryotes	15
Q. 6	What is chemical composition of plasma membrane? Explain transport of materials across the plasma membrane.	15
Q. 7	What is operon? Describe regulation of lac operon in following conditions; 1. In the presence of glucose and absence of lactose. 2. In the presence of lactose and absence of glucose 3. In the presence of glucose and lactose.	15
Q. 8	What is genetic code? Write down genetic codes for Serine, proline, threonine and alanine.	2x5=10
	b) What is deamination? Describe role of deamination in DNA base modifications.	5
9	What are the major causes of DNA damage? Describe in detail various DNA damage repair mechanisms.	15



# UNIVERSITY OF THE PUNJAB

**M.A./M.Sc. Part – I Annual Examination – 2022**

Subject: Zoology

Paper: III (Genetics and Biostatistics)

Roll No. ....

Time: 3 Hrs. Marks: 75

**NOTE: Attempt any THREE Questions from Part – I and TWO Questions from Part – II. Simple calculators and Statistical Tables are allowed.**

Q. 1	PART-I	
	a) Make possible gametes from the following genotypes 1: AaBBCCDd    2: AAbbCCdd    3: AaBb    4: AaBBCcDdEE	8
	b) Cystic fibrosis is a recessive condition that affects about 1 in 2,500 babies in the Caucasian population of the United States. 1. Calculate the frequency of recessive allele and dominant allele in population? 2. Calculate the number of heterozygous individuals?	9
Q. 2	a) What is excision repair of DNA? Describe differences between Base Excision Repair and Nucleotide Excision Repair with the help of a suitable diagram.	8
	b) What is inducible operon? Describe regulation of lac operon in following conditions; 1. In the presence of glucose 2. In the presence of lactose 3. In the presence of glucose and lactose	9
Q. 3	What is Hypoploidy and Hyperploidy? Describe the causes and major genetic disorders associated with Hypoploidy and Hyperploidy.	17
Q. 4	a) A zygote developed from fertilization of sperm containing wild type Y-chromosome and egg containing X-chromosome with tfm mutation. Describe the phenotypic characteristics of individual develop from such zygote.	10
	Which animal has no father but grandfather? Explain with the help of crosses.	7

Q. 5	a) What are jumping genes? Describe the molecular mechanism involved in transposition of jumping genes.	10									
	b) Describe the role of Jumping genes in various human diseases and development of antibiotic resistance in bacteria	7									
Q.6	Write a note on the following 1. Restriction Endonucleases, 2. Heterosis, 3. Co-dominance	17									
<b>PART-II</b>											
Q. 7	A researcher wishes to test the claim that the average cost of tuition and fees at a four- year public college is greater than \$5700. She selects a random sample of 36 four-year public colleges and finds the mean to be \$5950. The population standard deviation is \$659. Is there evidence to support the claim at $\alpha = 0.05$ ? Use the <i>P</i> -value method.	12									
Q. 8	Two drugs were tested on a population of patients suffering from high blood pressure and the data obtained was organized as <table border="1"> <tr> <th>Drug</th><th>Recovered</th><th>Not Recovered</th></tr> <tr> <td>Hypertencol</td><td>1873</td><td>184</td></tr> <tr> <td>Hypersens</td><td>1250</td><td>105</td></tr> </table> Is there a significant association between drugs and recovery of the patients	Drug	Recovered	Not Recovered	Hypertencol	1873	184	Hypersens	1250	105	12
Drug	Recovered	Not Recovered									
Hypertencol	1873	184									
Hypersens	1250	105									
Q. 9	The following table gives the results of 2 drugs formulated for the control of blood pressure. Find out if the 2 drugs have similar activity? <table border="1"> <tr> <th>Drugs</th><th>Patients recovered</th><th>Patients not recovered</th></tr> <tr> <td>A</td><td>100</td><td>30</td></tr> <tr> <td>B</td><td>80</td><td>10</td></tr> </table>	Drugs	Patients recovered	Patients not recovered	A	100	30	B	80	10	12
Drugs	Patients recovered	Patients not recovered									
A	100	30									
B	80	10									



# UNIVERSITY OF THE PUNJAB

M.A./M.Sc. Part – I Annual Examination – 2022

Subject: Zoology

Paper: IV (Physiology)

Roll No. ....

Time: 3 Hrs. Marks: 75

**NOTE:** Attempt any **FOUR** questions. All questions carry equal marks. Elaborate your answer with labelled diagrams and flow charts.

Q. 1.	Explain in detail the rhodopsin-retinal visual cycle? Elaborate the mechanism involved in transduction of photo-potential.	18.75
Q. 2.	a) Describe the mechanism of olfaction by an olfactory receptor b) Explain the source and chemical nature of following hormones: Growth hormone, Aldosterone, Oxytocin, Insulin, Calcitonin, Cortisol, Thyroid hormones, Epinephrine	10.75  08
Q. 3.	Explain the physiological roles of the following hormones: a) Growth Hormone b) Thyroid Hormones	 9.375 9.375
Q. 4.	Throw light, in detail, the mechanisms involved in the self-excitation and automatic rhythmicity of a myogenic heart	18.75
Q. 5.	Write an essay on how the two respiratory gases (oxygen and carbon dioxide) are exchanged at the alveolar and tissue levels?	18.75
Q. 6.	How is an action potential elicited? What are its specific properties?	18.75
Q. 7.	Describing the process of biosynthesis of a protein or peptide hormone, indicate the modifications that occur in their structure after translation.	18.75



# UNIVERSITY OF THE PUNJAB

**M.A./M.Sc. Part – I Annual Examination – 2022**

Subject: Zoology

Paper: V (Developmental Biology)

Roll No. ....

Time: 3 Hrs. Marks: 75

**NOTE: Attempt any FIVE questions. All questions carry equal marks.**

- Q1. DESCRIBE MAMMALIAN SPERMATOGENESIS IN DETAIL**
- Q2. DESCRIBE FERTILIZATION CLEAVAGE AND HATCHING OF THE BLASTOCYST IN HUMANS**
- Q3. WRITE AN ESSAY ON THE EGG TYPES AND CORRESPONDING, PATTERNS OF CLEAVAGE AND GASTRULATION**
- Q4. DISCUSS EGG CELL CYTOPLAST AND ITS REACTIONS IN RELATION TO THE ENTRY OF SPERMATOZOON**
- Q5. WRITE AN ESSAY ON POLYSPERMY AND THE MECHANISMS OF ITS AVOIDANCE**
- Q6. WRITE A DETAILED ACCOUNT ON CLEAVAGE AND GASTRULATION IN AMPHIBIANS**
- Q7. DESCRIBE GASTRULATION, AXIS FORMATION AND NEURULATION IN CHICK EMBRYO**
- Q8. WHAT ARE CADHERINS? HOW DO THEY REGULATE THE PROCESS OF MORPHOGENESIS**
- Q9. WRITE NOTES ON THE FOLLOWING**
  - a. SPERM TAIL PROTEINS**
  - b. ZONA PELLUCIDA**
  - c. DETERMINATE CLEAVAGE**



# UNIVERSITY OF THE PUNJAB

**M.A./M.Sc. Part – I Annual Examination – 2022**

Subject: Zoology

Paper: VI [Animal Diversity and Wild Life]

Roll No. ....

Time: 3 Hrs. Marks: 75

**NOTE: Attempt any FIVE questions. Question # One (1) is compulsory. Select any TWO from each Section. All questions carry equal marks.**

## SECTION I

- Question 1. Write comprehensive note on hierarchical organization of animal diversity, complexity and body size, animal body plan and symmetry 15
- Question 2. Write down adaptations in animals against harsh climate in the following ecosystems? 5x3
- i- Tundra biome
  - ii- Desert biome
  - iii- Marine ecosystems
- Question 3. Discuss in detail the phylogenetic relationship between Porifera, Coelenterates and Platyhelminthes. 15
- Question 4. How evolutionary trends proceeded among the Chordates? Also describe briefly their evolutionary ties with the hemichordates. 15
- Question 5. a. Write down classification and diagnostic features of birds and mammals. 8
- b. Differentiate between Deuterostomes and Protostomes 7

## SECTION II

- Question 6. Define the followings: 1x15
- Zoological garden, zoological museum, ecosystem, home range, safari park, endangered species, extinct species, threatened species, territory, biodiversity, native species, endemic species, carrying capacity, feral animals, prey
- Question 7. a) Differentiate between ex-situ and in-situ conservation. 7
- b) What are National Parks? Write a detailed note any two of them from Pakistan. 8
- Question 8. a) Describe criteria on the basis of which a wetland is classified as Ramsar site? 7
- b). Define protected area and various IUCN categories of protected areas. 8
- Question 9: Write short notes on following animals of Pakistan 5x3
- Dolphin, Snow Leopard, Houbara Bustard