

Total number of printed pages-3

3 (Sem-5/CBCS) ZOO HE 1

2024

ZOOLOGY

(Honours Elective)

Paper : ZOO-HE-5016

(Computational Biology and Biostatistics)

Full Marks : 60

Time : Three hours

***The figures in the margin indicate
full marks for the questions.***

1. Fill in the blanks : **(all seven)** $1 \times 7 = 7$
- (a) RDBMS stands for _____.
- (b) GenBank is a _____ sequence database.
- (c) _____ is regarded as father of Biostatistics.
- (d) The information retrieval tool of NCBI GenBank is _____.
- (e) Genomics refers to the study of _____.

Contd.

- (f) DNA microarray is a technique to study _____.
- (g) Edman degradation is the method of sequencing _____.

2. Answer the following questions : $2 \times 4 = 8$

- (a) Write the differences between primary database and secondary database.
- (b) What is FASTA format ? Give an example of nucleotide sequence in FASTA format.
- (c) What is Pharmacogenomics ?
- (d) Write the applications of Chi-square tests.

3. Answer the following questions : **(any three)**
 $5 \times 3 = 15$

- (a) Briefly describe the different branches of Genomics.
- (b) Describe the chain termination method of DNA sequencing.
- (c) Briefly explain essential aspects of local and global sequence alignment.
- (d) Write the similarities and differences between BLAST and FASTA.

- (e) Explain the methods of optimizing sequence alignments.

4. Answer the following questions : $10 \times 3 = 30$

- (a) Describe the role of a bioinformatician in present biological research and development area.

OR

What are the different components of a phylogenetic tree ? Describe the different methods of molecular phylogenetic analysis. $3+7=10$

- (b) What is BLAST ? Describe the different variants of BLAST. $2+8=10$

OR

Describe the major categories of biological database with examples.

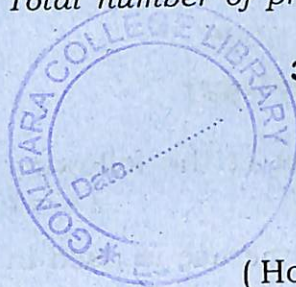
- (c) Describe the different methods of protein tertiary structure prediction.

OR

Calculate the standard deviation and standard error from the following data :

X:	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Y:	26	70	65	58	15	45	30

Total number of printed pages-19



3 (Sem-5/CBCS) ZOO HE 2/3/4

2024

ZOOLOGY

(Honours Elective)

Answer the Questions from any one Option.

OPTION-A

Paper : ZOO-HE-5026
(Animal Biotechnology)

OPTION-B

Paper : ZOO-HE-5036
(Endocrinology)

OPTION-C

Paper : ZOO-HE-5046
(Parasitology)

Full Marks : 60

Time : Three hours

The figures in the margin indicate full marks for the questions.

Contd.

OPTION-A

Paper : ZOO-HE-5026

(Animal Biotechnology)

1. Choose the correct answer of the following questions : $1 \times 7 = 7$

(i) The enzyme Taq polymerase is used in PCR reaction due to its

- (a) Thermal stability
- (b) Efficient polymerase activity
- (c) High proofreading activity
- (d) Easy availability

(ii) Which of the following techniques is based on the presence of 'VNTR'?

- (a) DNA barcoding
- (b) DNA fingerprinting
- (c) AFLP
- (d) RAPD

(iii) Which of the following genetic diseases occurred due to single nucleotide polymorphism (SNP)?

- (a) Chronic myelogenous leukemia
- (b) Retinoblastoma
- (c) Diabetes mellitus
- (d) Sickle cell anemia

(iv) Southern blotting technique is used for the detection of

- (a) An RNA fragment with specific nucleotide sequence
- (b) A DNA fragment with specific nucleotide sequence
- (c) Both DNA and RNA fragments
- (d) A peptide with specific amino acid sequence

(v) Mutation or defect in functioning of which of the following ion transporter causes cystic fibrosis?

- (a) Na^+ ion transporter
- (b) Cl^- ion transporter
- (c) K^+ ion transporter
- (d) Both Na^+ and K^+ are ion transporter

(vi) Which of the following mechanisms protects bacterial DNA against its own restriction endonuclease?

- (a) Methylation
- (b) Nucleotide excision repair
- (c) Homologous recombination
- (d) None of the above

(vii) In case of human cell culture, the limited replicative capacity of the cultured cells is called

- (a) Brownian effect
- (b) Contact inhibition
- (c) Hayflick effect
- (d) Bruce effect

2. Answer the following questions : $2 \times 4 = 8$

- (a) What is cDNA library?
- (b) What is contact inhibition in cell culture?
- (c) Write with example what is an insect-resistant transgenic plant.
- (d) Why are plasmids considered as efficient cloning vectors?

3. Answer **any three** of the following questions briefly : $5 \times 3 = 15$

- (a) Write the principle and significance of DNA microarray technology.
- (b) Write with illustration about retroviral mediated gene transfer technique.
- (c) What is recombinant human insulin and why is it considered best over animal derived insulin for diabetic patients?

(d) What is blue-white selection method adopted during gene cloning?

(e) Write about the significance of *Thermophilus aquaticus* and *Agrobacterium tumefaciens*.

4. (a) What is blotting technique? Write in detail about the application and procedure of Western blotting technique with suitable illustration. $3 + 7 = 10$

OR

(b) What are restriction endonucleases and how they differ from only endonuclease? Write briefly about the application of restriction endonuclease in gene cloning. $2 + 2 + 6 = 10$

5. (a) Define genetically modified organism (GMO). Explain the concept and generation of knockout mice with suitable illustration. $2 + 8 = 10$

OR

(b) Discuss about different gene transfer methods to create transgenic animals with suitable example. 10

6. (a) What is primary cell culture? Write about the procedure of primary cell cultures with a note on the growth curve of the cultural cells.

2+6+2=10

OR

- (b) What is gene therapy? Write with suitable example about the application of gene therapy in the management of human diseases.

3+7=10

OPTION-B

Paper : ZOO-HE-5036

(Endocrinology)

1. Choose the correct answer : 1×7=7

- (a) Under the influence of aldosterone reabsorption of _____ and excretion of _____ occur.

- (i) Na^+ , K^+ respectively
- (ii) Ca^{2+} , Mg^{2+} respectively
- (iii) Mg^{2+} , K^+ respectively
- (iv) K^+ , Na^+ respectively

- (b) Which of the following hormones is not synthesized in GI tract?

- (i) Gastrin
- (ii) Renin
- (iii) Secretin
- (iv) Cholecystokinin

- (c) Juxtaglomerular cells of the kidney produce a hormone called

- (i) Choles cystokinin
- (ii) Erythropoietin
- (iii) ADH
- (iv) ANF

- (d) GIP function antagonistic to
- ANF
 - CCK
 - Renin
 - Gastrin
- (e) The hormone not released by pars distales in man is
- Growth hormone
 - Prolactin
 - Melanocyte stimulating hormone
 - Luteinizing hormone
- (f) Dwarfism occurs when there is
- Oversecretion of growth hormone
 - Undersecretion of growth hormone
 - Oversecretion of somatostatin
 - Undersecretion of somatostatin
- (i) and (iii)
 - Only (ii)
 - (ii) and (iii)
 - (ii) and (iv)

- (g) Graffian follicle gets converted into _____ after ovulation under the effect of _____.

- Corpus callosum, GnRH
- Corpus luteum, LH
- Corpus albicans, FSH
- Ovarian follicle, prolactin

2. Answer the following questions : $2 \times 4 = 8$

- Write the function of melatonin.
- Which gland of the body is called emergency gland? Write the names of emergency hormones. Why are they called 3F hormones? $\frac{1}{2} + \frac{1}{2} + 1 = 2$
- What is the function of cyclic AMP?
- Write a short note on CCK.

3. Answer **any three** of the following :

$5 \times 3 = 15$

- Write on the mechanisms of action of protein hormones by extracellular receptors.

(b) Write a note on disorders of thyroid hormones.

(c) What is hypothalamus? Write the releasing and inhibiting hormones of hypothalamus and their roles on specific hormones they control.

(d) Write a note on hormonal control of calcium homeostasis.

(e) What are the similarities between—
 $2\frac{1}{2}+2\frac{1}{2}=5$

(i) Oxytocin and Vasopressin, and

(ii) Testosterone and estrogen?

4. (a) What are hormones? What are the different types of hormones? Write the names, functions and their target organs of different types of hormones secreted by adeno hypophysis.

$1+1+1+4+3=10$

OR

(b) Write the names of different hormones and their functions on heart, liver, kidney and Gastro-intestinal tract.

$2\frac{1}{2}+2\frac{1}{2}+2\frac{1}{2}+2\frac{1}{2}=10$

5. (a) What do you know about hormone receptor? Describe the mechanism of steroid hormone action. $2+8=10$

OR

(b) What do you know about lactation? Describe briefly and diagrammatically the neuroendocrine mechanisms of lactation. $1+6+3=10$

6. (a) Write the functions of different types of hormones secreted by adrenal gland. Write a short note on disorders of adrenal gland. $7+3=10$

OR

(b) What are the two parts of pancreas? Describe and draw the histological structure of pancreas. How do glucagon and insulin maintain the homeostasis of glucose? $1+5+4=10$



OPTION-C

Paper : ZOO-HE-5046

(Parasitology)

Answer **either** in English **or** in Assamese.

1. Choose the correct option : $1 \times 7 = 7$

শুদ্ধ বিকল্পটো বাচি উলিওৱা :

(i) Hyperparasitism is a phenomenon in which

হাইপাৰপেৰাচাইটিজম (Hyperparasitism) বা অতিপৰজীৱিতা হৈছে এনে এক পৰিঘটনা য'ত

(a) a parasite depends on another parasite for its food and shelter.

এটা পৰজীৱিয়ে নিজৰ খাদ্য আৰু আশ্ৰয়ৰ বাবে আন এটা পৰজীৱৰ ওপৰত নিৰ্ভৰশীল।

(b) a parasite kills its host

এটা পৰজীৱীয়ে ইয়াৰ পোষকক হত্যা কৰে

(c) a parasite undergoes asexual life cycle in a host.

এটা পৰজীৱীয়ে কোনো পোষকত অযৌন জীৱনচক্ৰৰ মাজেৰে পৰা হয়।

(d) a parasite needs two hosts to complete its life cycle

এটা পৰজীৱীৰ জীৱনচক্ৰ সম্পূৰ্ণ কৰিবলৈ দুটা পোষক প্ৰয়োজন হয়।

(ii) Giardiasis in human is caused by

তলৰ কোনটোৱে মানুহৰ ক্ষেত্ৰত জিয়াৰ্ডিয়াছিছ ৰোগৰ সৃষ্টি কৰে?

(a) *Giardia intestinalis*

(b) *Giardia agillis*

(c) *Giardia caviae*

(d) *Giardia muris*

(iii) The secondary host of *Taenia solium* is

Taenia solium ৰ গৌণ পোষকটি হ'ল

(a) Man

মানুহ

(b) Snail

শামুক

(c) Pig

গাহৰি

(d) Sheep

ভেড়া

(iv) Which of the following is known as 'root-knot nematode'?

তলৰ কোনটোক 'মূল-গাঁঠি নেমাটোড বা ঘূৰণীয়া কৃমি' বুলি জনা যায়?

(a) *Meloidogyne nematode*

(b) *Ascaris lumbricoides*

(c) *Ancylostoma duodenale*

(d) *Trichinella nematode*

(v) The vector of elephantiasis is

গোধ ৰোগৰ বাহকবিধ হ'ল

(a) *Culex mosquito*

কিউলেক্স মহ

(b) Housefly

মাখি

(c) Sandfly

বালিমাখি

(d) Tse tse fly

চি চি মাখি

(vi) Epidemic typhus is transmitted by
মহামাৰী টাইফাছ ৰোগটো কাৰ দ্বাৰা সংক্ৰমিত হয়?

(a) *Pediculus humanus*

(b) *Xenopsylla cheopis*

(c) *Cimex lectularius*

(d) *Culex mosquito*

(vii) Which of the following is known as 'vampire fish'?

তলৰ কোনটোক 'ভেম্পায়াৰ মাছ' বুলি জনা যায়?

(a) Cookiecutter shark

(b) Candiru

(c) Cat fish

(d) None of the above

2. Answer the following questions : 2×4=8

তলত দিয়া প্ৰশ্নবোৰৰ উত্তৰ দিয়া :

(i) What is the difference between mechanical and biological vectors?

যান্ত্ৰিক আৰু জৈৱিক বাহকৰ মাজত পাৰ্থক্য কি?

- (ii) Why is the living *Ascaris lumbricoides* not digested in the human intestine?

মানুষৰ অন্তত জীৱিত *Ascaris lumbricoides* বোৰৰ কিয় পাচন নহয়?

- (iii) Distinguish between ticks and mites.

টিকৰা আৰু চাহিৰ মাজত পাৰ্থক্য কি?

- (iv) What is the scientific name of the 'hood mockingbird'? Name the place where it is endemic to.

হু'ড মকিংবোৰ্ড নামৰ চৰাইবিধৰ বৈজ্ঞানিক নাম কি? ইয়াক স্থানীয়ভাৱে দেখা পোৱা ঠাইখনৰ নাম লিখা।

3. Answer the following questions : **(any three)**

5×3=15

তলত দিয়া প্ৰশ্নবোৰৰ উত্তৰ দিয়া : (যিকোনো তিনিটা)

- (i) How do parasites get benefit from a host-parasite relationship? Explain it with suitable examples.

পোষক-পৰজীৱী সম্পৰ্কৰ পৰা পৰজীৱীয়ে কেনেকৈ লাভৱান হয়? উপযুক্ত উদাহৰণেৰে বুজাই দিয়া।

- (ii) Name the organism which causes amoebic dysentery. Write about the pathogenicity of the organism. 1+4=5

এমিবিচ গ্ৰহণী ৰোগ সৃষ্টিকাৰী জীৱটোৰ নাম কি? জীৱটোৰ ৰোগ সৃষ্টিকাৰীতাৰ বিষয়ে লিখা।

- (iii) Describe the structure of Scolex of *Taenia solium* with a labelled diagram.

*Taenia solium*ৰ স্কোলেক্সৰ গঠন চিহ্নিত চিত্ৰৰ সৈতে বৰ্ণনা কৰা।

- (iv) Write about the pathogenicity and treatment of *Ascaris lumbricoides*.

1+4=5

*Ascaris lumbricoides*ৰ ৰোগ সৃষ্টিকাৰীতা আৰু চিকিৎসাৰ বিষয়ে লিখা।

- (v) Give a brief account of the life cycle of *Xenopsylla cheopis*.

*Xenopsylla cheopis*ৰ জীৱনচক্ৰৰ চমু বিৱৰণ দিয়া।

4. Answer the following questions : **(any three)**

10×3=30

তলত দিয়া প্ৰশ্নবোৰৰ উত্তৰ দিয়া : (যিকোনো তিনিটা)

- (i) Which organism causes the disease 'sleeping sickness'? Describe its life cycle with suitable diagrams.

1+9=10

কোনটো জীৱই 'নিদ্ৰা ৰোগ' সৃষ্টি কৰে? উপযুক্ত চিত্ৰৰ সৈতে ইয়াৰ জীৱনচক্ৰটো বৰ্ণনা কৰা।

- (ii) Which organism is known as urinary blood fluke? Describe the different larval forms of the organism with labelled diagrams. 1+9=10

কোনটো জীৱক প্ৰস্ৰৰ ৰক্ত কৃমি ফ্লুক বুলি জনা যায়?
চিহ্নিত চিত্ৰৰ সৈতে জীৱনটোৰ বিভিন্ন পলু-ৰূপৰ বৰ্ণনা
কৰা।

- (iii) Describe the life cycle of *Taenia solium* with labelled diagrams of different stages.

বিভিন্ন অৱস্থাৰ চিহ্নিত চিত্ৰৰ সৈতে *Taenia solium* ৰ
জীৱনচক্ৰটো বৰ্ণনা কৰা।

- (iv) Describe the life cycle of *Fasciolopsis buski* with labelled diagrams of different stages.

বিভিন্ন অৱস্থাৰ চিহ্নিত চিত্ৰৰ সৈতে *Fasciolopsis buski* ৰ
জীৱনচক্ৰটো বৰ্ণনা কৰা।

- (v) Write about the pathogenesis caused by *Wuchereria bancrofti* and *Trichinella spiralis* and also mention their control measures. 5+5=10

Wuchereria bancrofti আৰু *Trichinella spiralis* ৰ দ্বাৰা হোৱা ৰোগ-সৃষ্টিকাৰীতাৰ বিষয়ে লিখা
আৰু ইহঁতৰ নিয়ন্ত্ৰণ ব্যৱস্থা?ও উল্লেখ কৰা।

- (vi) Describe the life cycle of *Ancylostoma duodenale* with suitable diagrams.

উপযুক্ত চিত্ৰৰ সৈতে *Ancylostoma duodenale* ৰ
জীৱনচক্ৰটো বৰ্ণনা কৰা।

