

Total number of printed pages-4

3 (Sem-5/CBCS) ZOO HE 1

2022

ZOOLOGY

(Honours Elective)

Paper : ZOO-HE-5016

(DSE(H)-1)

(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 : **(any seven)** $1 \times 7 = 7$

(a) SWISPROT protein sequence database began in the year _____ .

(b) Bioinformatics database was first created by _____ .

(c) The human genome contains approximately _____ base pairs.

Contd.

(d) COPIA is used for identification of _____.

(e) STAG is maintained by _____.

(f) The information retrieval tool of NCBI Gene Bank is _____.

(g) Proteomics refers to the study of _____.

(h) EMBL is a _____ sequence database.

(i) Phylogenetic relation can be shown by _____.

(j) The first molecular biology server expasy was used in the year _____.

(k) _____ is the first completed and published gene sequence.

(l) The identification of drugs through the genome study is called _____.

2. Answer the following : **(any four)**

2×4=8

(a) EMBL

(b) Global alignment

(c) Standard error

(d) Phylogram

(e) DNA database of Japan

(f) Goodness-of-fit

(g) OMIM

(h) Genetic Code

3. Answer the following questions : **(any three)**
5×3=15

(a) Explain the hierarchical method of multiple sequence alignment.

(b) Discuss the database that contain the information of protein sequences.

(c) Explain the secondary database.

(d) What is dendrogram ?

(e) What are biological databases based on data type and database design ?

(f) Explain co-efficient of variance and its importance.

(g) How standard deviation is differed from standard error ?

(h) Application of Chi-square tests.

4. Answer the following questions : *(any three)*
10×3=30

- (a) What is phylogeny ? Discuss the various method for phylogenetic analysis.
- (b) Elaborate different file formats in biological resources with the help of an arbitrary example each.
- (c) Give various types of BLAST. Explain briefly the algorithm of BLAST.
- (d) Discuss STRING database. Describe its various features.
- (e) How can you predict the structure of a protein sequence ? Explain in detail one of the knowledge-based method to predict the protein structure.
- (f) Explain the various apparatus used in pairwise sequence alignment.
- (g) What is Biostatistics ? How biostatistics help in biological sequence analysis ?
- (h) Calculate the standard deviation from the following data :

X :	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Y :	30	58	62	85	112	70	57	26

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

2022

ZOOLOGY

(Honours Elective)

Answer the Questions from any one Option.

OPTION-A

(Animal Biotechnology)

Paper : ZOO-HE-5026

OPTION-B

(Endocrinology)

Paper : ZOO-HE-5036

OPTION-C

(Parasitology)

Paper : ZOO-HE-5046

Full Marks : 60

Time : Three hours

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

Contd.

OPTION-A

(Animal Biotechnology)

Paper : ZOO-HE-5026

1. Answer the following questions as directed :
(any seven)

1×7=7

- (a) GM crops has detrimental effects on human health. (True/False)
- (b) What is Taq DNA polymerase ?
- (c) Name a natural media used in plant cell culture.
- (d) The sheep 'Dolly' is the first mammal cloned from adult somatic cells. (True/False)
- (e) What is a plaque hybridization ?
- (f) Vaccine was discovered by _____. (Fill in the blank)
- (g) Define DNA probe.
- (h) What is the starting material in construction of genomic library ?
- (i) Name a restriction endonuclease which produces a blunt cut.

- (j) What is a Ti Plasmid ?

- (k) _____ is the source of stem cell in adults. (Fill in the blank)

- (l) HeLa is a mammalian cell line. (True/False)

2. Answer the following questions very briefly :
(any four)

2×4=8

- (a) What is Golden Rice ?
- (b) What are isoschizomers ?
- (c) Name a cryoprotectant used in cell preservation.
- (d) What is electroblotting ?
- (e) What is a knock out mice ?
- (f) Define shuttle vectors.
- (g) What is annealing temperature in PCR ?
- (h) Mention the main disadvantages of YAC.

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

- (a) How a retrovirus is used in gene transfer?
- (b) What is a microsatellite marker?
- (c) What are the characteristics of type II restriction enzymes?
- (d) Write a short note on DNA fingerprinting in crime detection.
- (e) How transgenic animals are used as bioreactors?
- (f) Write the principle of Sanger sequencing technique.
- (g) Discuss the utilities of gene therapy for human welfare.
- (h) What are the advantages of serum free media in cell culture?

4. Answer **any three** of the following questions : $10 \times 3 = 30$

- (a) What is DNA cloning? Write a note on methods of construction of large capacity vectors M13 and BAC.

$2 + 8 = 10$

(b) Illustrate the transformation techniques by calcium chloride method and electroporation in gene manipulation. $5 + 5 = 10$

(c) Discuss the technique of Western blotting and its applications. $6 + 4 = 10$

(d) What is a DNA library? Discuss the method for construction of cDNA library. $2 + 8 = 10$

(e) Who discovered PCR? What is the principle of PCR? Elaborate the use of PCR in biotechnology. $1 + 3 + 6 = 10$

(f) What is transgenic plant? Write a note on insect resistant and herbicide resistant plants. $2 + 4 + 4 = 10$

(g) What is Recombinant DNA technology? Discuss about the production of Recombinant insulin and human growth hormone by Recombinant DNA technology. $2 + 4 + 4 = 10$

(h) What is a primary cell culture? Elaborate different procedure to develop a primary cell line. $2 + 8 = 10$

OPTION-B

(Endocrinology)

Paper : ZOO-HE-5036

1. Answer the following question as directed :
(any seven) $1 \times 7 = 7$

(a) Which of the following hormones is a glycoprotein ?

- (i) Thyrotropin
- (ii) Cortisone
- (iii) Oxytocin
- (iv) Adrenaline

(Choose the correct answer)

(b) In adrenal gland, glucocorticoids are secreted by _____.

(Fill in the blank)

(c) The hormone transported by the hypothalamo-hypophysial portal system is

- (i) Oxytocin
- (ii) Prolactin
- (iii) Gonadotropin-releasing hormone
- (iv) Adrenocorticotrophic hormone

(Choose the correct answer)

(d) Estrogen/Progesterone/Cortisol/
Glucagon is not a steroid hormone.

(Choose the correct answer)

(e) Islets of Langerhans produce a hormone which controls diabetes is _____.

(Fill in the blank)

(f) State the function of the hormone 'vasopressin'.

(g) Hypothalamus controls the secretion of melanophore stimulating hormone (MSH).

(Write True or False)

(h) Which of the following is a neurohormone ?

- (i) Thyronine
- (ii) Prolactin
- (iii) Gonadotropin-releasing hormone
- (iv) Cortisol

(Choose the correct answer)

(i) What is calcitonin ?

(j) The hormone which acts through a nuclear receptor is

(i) Growth hormone

(ii) Insulin

(iii) Oxytocin

(iv) Thyroid hormone

(Choose the correct answer)

(k) Regression of corpus luteum is associated with the withdrawal of progesterone.

(Write True **or** False)

(l) What is calmodulin ?

2. Answer the following questions : **(any four)**

2×4=8

(a) Write a brief note chemical nature of hormone.

(b) Mention the adenohypophysis hormones.

(c) Distinguish between corpus luteum and corpus albicans.

(d) Name *two* adrenal medullary hormones.

(e) What is pinealocytes ?

(f) What are hormone receptors ?

(g) Name the cells present in parathyroid gland.

(h) Why is iodine as a nutrient, important to our body ?

3. Write short notes on : **(any three)**

5×3=15

(a) Physiological functions of endocrine pancreas

(b) Histological structure of adrenal gland with suitable diagram

(c) Functions of Glucocorticoid hormones

(d) Disorders of thyroid gland

(e) Hypothalamo-hypophysial axis

(f) Genetic control of hormone regulation

(g) Growth hormone

(h) Mechanism of action of protein hormones

4. Answer **any three** from the following questions : $10 \times 3 = 30$

- (a) Describe the histological structure of thyroid gland with suitable diagram. Give an account of the functions of thyroid hormones. $5+5=10$
- (b) What is Rathke's pouch? Discuss various physiological functions of the posterior pituitary hormones. $2+8=10$
- (c) Describe the histology and endocrine functions of mammalian ovary with suitable diagrams. $5+5=10$
- (d) Explain the feedback mechanisms of hormone secretion.
- (e) Give an account of the chemical classes of hormones.
- (f) Discuss the hormonal control of calcium homeostasis.
- (g) Define tropic hormone. Discuss major tropic hormones secreted by pituitary gland. $2+8=10$
- (h) What is neuro-hormone? Describe the secretion and regulation of neuro-hormone. $2+4+4=10$

OPTION-C

(Parasitology)

Paper : ZOO-HE-5046

1. Choose the correct option : **(any seven)** $1 \times 7 = 7$
- (i) Culex species acts as a vector for
- (a) Loiasis
 - (b) Malaria
 - (c) Filariasis
 - (d) Babesiosis
- (ii) Hepatomegaly is observed in
- (a) Leishmaniasis
 - (b) Taeniasis
 - (c) Malaria
 - (d) None of the above
- (iii) Disease that affects large no. of animal population in a particular region within a short period and time is
- (a) Zoonotic disease
 - (b) Sporadic disease
 - (c) Epizootic disease
 - (d) Exotic disease

- (iv) The condition when the parasite remains alive after killing the host is known as
- (a) Parasitoidism
 - (b) Hyperparasitoidism
 - (c) Hyperparasitism
 - (d) Parasitism
- (v) The phase responsible for amoebiasis is
- (a) Trophozoite
 - (b) Metacystic stage
 - (c) Cyst stage
 - (d) None of the above
- (vi) 80% of the malarial infection cases occur worldwide by
- (a) *P. vivax*
 - (b) *P. falciparum*
 - (c) *P. ovale*
 - (d) *P. malarial*
- (vii) Body consist with a false head one
- (a) Ticks
 - (b) Mitu
 - (c) Both
 - (d) None of the above

- (viii) Cercaria larva of *F. hepatica* is the
- (a) 1st larval stage
 - (b) 2nd larval stage
 - (c) 3rd larval stage
 - (d) 4th larval stage
- (ix) Man, Monkeys, Baboons and Chimpanzees are the definitive host of
- (a) *Schistosoma haematobium*
 - (b) *S. mansoni*
 - (c) Both
 - (d) None of the above
- (x) *Wucheria bancrofti* causes
- (a) Wuchereria
 - (b) Lymphatic filariasis
 - (c) Elephantiasis
 - (d) All of the above
- (xi) Which of the following is the dormant stage of *Giardia*?
- (a) Cyst
 - (b) Trophozoite
 - (c) Tachyzoite
 - (d) Oocyst

(xii) The mode of transmission for Wuchereria is

- (a) blackfly bite
- (b) deer fly bite
- (c) flees
- (d) mosquito bite

2. Answer **any four** of the following : $2 \times 4 = 8$

- (i) Parasitoidism
- (ii) Obligatory parasite
- (iii) Reservoir host
- (iv) Pandemic disease
- (v) Zoonotic Leishmaniasis
- (vi) Characteristics of miracidium larva
- (vii) Infection of head and body louse
- (viii) Parasitic vertebrates

3. Short answer type questions : **(any three)** $5 \times 3 = 15$

- (i) Describe morphology, pathogenicity and laboratory diagnosis of *Fasciolopsis buski*.

(ii) Highlight on some diseases transmitted by mosquitoes.

(iii) Write about the host-parasitic relationship citing some examples.

(iv) Write about the epidemiology and pathogenicity of *Trypanosoma gambienses*.

(v) Write about the biology, importance and control of ticks and mites.

(vi) Write about different parasitic vertebrates focussing on vampire bat.

(vii) Write about the pathogenicity and laboratory diagnosis of *Plasmodium vivax*.

(viii) Write about the life cycle and importance of pretylencus (*Lesion nematode*).

4. Answer the following : **(any three)** $10 \times 3 = 30$

- (i) Elaborate the concept of parasitoid and vector. What is hyperparasitism? Define mechanical and biological vector with examples. $4 + 2 + 4 = 10$

- (ii) Describe the morphology, pathogenicity, life cycle and prophylaxis and treatment of *Taenia Solium*.
 - (iii) Describe *four* parasitic diseases transmitted by vectors along with their prophylaxis and treatment.
 - (iv) Describe the morphology life cycle, diagnosis prophylaxis and treatment of *Entamoeba histolytica*.
 - (v) Describe how arthropodan parasites can be harmful to human. Write about the biology of some of the important arthropodan parasites of human being.
- 3+7=10
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