

2023

ZOOLOGY — HONOURS

Paper : CC-11

(Ecology)

Full Marks : 50

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

Question no. 1 is compulsory and answer **any four** questions from the rest.

- ✓ 1. Answer **any five** questions : 2×5
- (a) What is an isocline?
 - ✓ (b) Why is tiger considered as umbrella species?
 - ✓ (c) What is ecotone?
 - (d) What is biotic potential?
 - (e) What is standing crop?
 - ✓ (f) What is inverted pyramid?
 - ✓ (g) Define gamma diversity.
 - ✓ (h) What is germplasm bank?
- ✓ 2. Distinguish between the following : 2×5
- ✓ (a) *In situ* and *Ex situ* conservation
 - ✓ (b) 'r'-selected and 'k'-selected species
 - ✓ (c) Primary succession and Secondary succession
 - ✓ (d) Gross Primary Productivity and Net Primary Productivity
 - ✓ (e) Unitary and Modular Populations.
- ✓ 3. Write short notes on the following : 2½×4
- ✓ (a) Biological Nitrogen fixation .
 - ✓ (b) Lindeman's Ten Percent Law
 - ✓ (c) Food web and its types .
 - ✓ (d) Climax community.

Please Turn Over

4. (a) Explain how the first Law of thermodynamics is obeyed in energy flow in an ecosystem.
(b) What do you mean by 'trophic efficiency'?
(c) Draw and explain Y-shaped energy flow model.
(d) Comment on role of decomposer in ecosystem. 3+2+3+2
5. (a) Draw and describe the different types of survivorship curves.
(b) How carrying capacity can influence the logistic growth curve?
(c) Comment on intrinsic factors of population regulation. 4+3+3
6. (a) Describe the facilitation model and inhibition model of succession.
(b) Draw and explain the resource ratio hypothesis of Tilman in ecological succession.
(c) State the advantages of wildlife corridor. How this can also be harmful for wild animals? 4+3+(1½+1½)
7. (a) Distinguish between species richness and species evenness.
(b) Briefly describe the vertical stratification of a forest ecosystem.
(c) What do you mean by Shannon Wiener diversity index? 4+3+3
8. (a) Establish competitive exclusion principle with one field example.
(b) Distinguish between autecology and synecology.
(c) What is population oscillation?
(d) What do you mean by biodiversity hotspot? Give one example from India. 3+2+2+3
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2023

ZOOLOGY — HONOURS

Paper : CC-12

(Principle of Genetics)

Full Marks : 50

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words
as far as practicable.

Answer **Question no. 1** and **any four** questions from the rest.

1. Answer **any five** of the following :

2×5

- (a) Distinguish between complete and incomplete P-elements in *Drosophila*.
 (b) Define extrachromosomal hereditary factors.
 (c) What is intercalary deficiency? Give example from *Drosophila*.
 (d) Distinguish between composite and non-composite transposon.
 (e) Define the terms dominant epistasis and duplicate epistasis.
 (f) What is Gynandromorph?
 (g) Define isochromosome.
 (h) Distinguish between amorphic and hypomorphic mutation.

- (a) Define with example numerator and denominator elements in *Drosophila* sex determination. 2
 (b) How X:A ratio determines embryonic and adult functional Sxl production in *Drosophila*? 4
 (c) Define pleiotropic gene effect. (2+2)+4+2

3. (a) Describe how studies using the *Drosophila* lozenge locus revealed that recombination could occur within a gene.
 (b) Define prototroph and auxotroph in *Neurospora* sp.
 (c) Explain position effect of translocation.
 (d) Give an example of terminal translocation in human. 5+2+2+1

4. (a) Describe Ac-Ds Element in Maize.
 (b) Plumage colour in mallard ducks is dependent upon a set of 3 alleles : M^R for restricted mallard pattern, M for mallard and m for dusky mallard. The dominance hierarchy is $M^R > M > m$. Determine the genotypic and phenotypic ratios expected in F1 from a cross (i) $M^R M \times M m$ and (ii) $M^R M \times m m$.

Please Turn Over

- (c) A non-hemophilic woman, whose father was hemophilic, was paired with a non-hemophilic man.
- What is the probability that they will have a hemophilic male child?
 - What is the probability that they will have a hemophilic daughter?
 - What is the genotype of the offspring? 3+(2+2)+(1+1+1)

5. (a) In *Drosophila*, the male X chromosome transcription is upregulated approximately two-fold in somatic tissues. — Explain including epigenetics of the control.
- (b) In corn, the kernel colour may be white, purple or red and is controlled by 2 genes, I and P. Corn that is I_ P_ is red; corn that is I_ pp is purple and corn that is iiP_ or iipp is white. A dihybrid cross shows a ratio 9 red: 3 purple: 4 white. Explain the gene interaction involved.
- (c) Write two important applications of transposable genetic element. 5+3+2
6. (a) Explain with example the process of mutation in DNA by (i) base analogue, and (ii) UV light.
- (b) Design a cross to explain Primary Non-disjunction in *Drosophila*. State the inference drawn from the result. (2+2)+(5+1)

7. (a) Inversions are often called 'Crossover Suppressors'. — Explain.
- (b) Delineate the role of SRY, SOX9 and DAX1 in human sex determination.
- (c) How a mosaic XX/XO human can be formed? 2+(2+2)+2

8. A cross in *Drosophila* involved the recessive, X-linked genes yellow (y), white (w) and cut (ct). A yellow-bodied, white-eyed female with normal wings was crossed to a male whose eyes and body were normal but whose wings were cut. The F1 females were wild type for all three traits, while the F1 males expressed the yellow-body and white-eye traits. The cross was carried to an F2 progeny, and only male offspring were tallied. On the basis of the data shown here, a genetic map was constructed.

Phenotype	Male Offspring
y + ct	9
+ w +	6
y w ct	90
+ + +	95
+ + ct	424
y w +	376
y + +	0
+ w ct	0

~~y~~ ~~w~~ ct
 —————
 —————
 y w ct

- Determine the genotypes of the F1 parents.
- Find correct gene order.
- Construct a map, assuming that white gene is at locus 1.5 cM on the X chromosome.
- Find CC and interference. 2+2+4+2

2023

ZOOLOGY — HONOURS

Paper : DSE-A-1 and DSE-A-2

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as far as practicable.

Paper : DSE-A-1

(Parasitology)

Full Marks : 50

Answer question no. 1 and any four questions from the rest.

1. Answer any fifteen questions :

2×15

- (a) Define parasitism. Give example of hyperparasitism.
- (b) What are the differences between obligate and facultative parasite?
- (c) What is Katayama fever?
- (d) Mention the striking features of posterior region of male *Ascaris lumbricoides*.
- (e) What are the diseases transmitted by *Cimex* sp.?
- (f) What is cysticercosis?
- (g) Mention the diagnosis of *Schistosoma haematobium*.
- (h) Draw a labelled diagram of trophozoite of *Giardia intestinalis*.
- (i) Name two species of louse that infect man.
- (j) Mention the drugs for treatment of Ascariasis and Taeniasis.
- (k) Distinguish between tick and mite.
- (l) Name the host choice and parasitic behaviour of Vampire bat.
- (m) Comment on prophylaxis of *A. duodenale*.
- (n) What is Kala-azar? Why is it called so?
- (o) What is cutaneous larva migrans?
- (p) Name one example of root lesion and one root knot nematode.
- (q) What is VSG? Mention its function.
- (r) How does biological vector differ from mechanical vector?
- (s) What is metacyclic trypomastigote?
- (t) Comment on microfilarial periodicity of *Wuchereria bancrofti*.

Please Turn Over

2. (a) Schematically represent the migration of larval forms of *Ascaris lumbricoides*.
(b) Distinguish between male and female *Ancylostoma duodenale*. 3+2
3. (a) Comment on pathogenicity and control measures of *Schistosoma haematobium*.
(b) Describe the life cycle of *Giardia intestinalis*. 2+3
4. (a) Name the vector responsible for Sleeping Sickness.
(b) What is L-D body?
(c) Briefly describe the epidemiology and pathogenicity of *Leishmania donovani*. 1+1+(1+2)
5. (a) What is a gall in plants?
(b) Name two gall forming plant nematodes.
(c) Describe the structure of *Meloidogyne* sp. 1+2+2
6. (a) Name two diseases transmitted by *Ixodes* sp. and *Cimex* sp.
(b) Mention the feeding habit of Cookie-Cutter Shark.
(c) Comment on the changes in growth pattern of host in parasitic infection. 2+2+1
7. (a) What are the diseases transmitted by *Ornithodoros* sp.?
(b) Discuss the control management of bed bug.
(c) Mention medical importance of *Pediculus* sp.? 1+2+2
8. (a) Schematically represent the life cycle of *Taenia solium*. What is the infective stage of this parasite?
(b) Discuss about the prophylactic measures of *Giardia intestinalis*. (2+1)+2
9. Write short notes on (any two) : $2\frac{1}{2}\times 2$
(a) Sex reversal in Parasitism
(b) Scolex structure of *Taenia solium*
(c) Hood Mocking bird
(d) Parasitoid.

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ZOOLOGY — HONOURS

Paper : DSE-B-1 and DSE-B-2

Full Marks : 50

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Paper : DSE-B-1

(Endocrinology)

Full Marks : 50

Answer *question no. 1* and *any four* questions from the rest.

1. Answer *any five* questions :

2×5

- ✓ (a) What do you mean by autocrine regulation?
- ✓ (b) Name two neurohormones.
- (c) Define : Insulin resistance.
- ✓ (d) State the role of calcitonin.
- ✓ (e) What is atretic follicle?
- ✓ (f) What do you mean by Spontaneous ovulator? Give one example.
- (g) Name the hormone secreted by D-cells. State one function of it.
- (h) What is the nature of the receptor of protein hormone and steroid hormone?

✓ 2 ✓ (a) Discuss the mechanism of hormone action using IP₃ and DAG pathways.

✓ (b) State the functions of thyroid hormones.

6+4

3. (a) Distinguish between competitive and non-competitive ELISA.

(b) Discuss the role of prolactin in fish.

6+4

4. (a) Classify steroid hormones with example.

(b) Discuss the role of glucagon in glucose homeostasis.

6+4

✓ 5 ✓ (a) Describe the histology of ovary with diagram.

(b) State the functions of melanotropin in amphibia.

(c) Mention the uses of RIA.

6+2+2

Please Turn Over

✓6. (a) Describe the stages of estrous cycle with diagram.

✓(b) State the functions of testosterone.

✓(c) What is Sella turcica?

6+2+2

✓7. (a) What is the source of corticosterone?

✓(b) What do you mean by proliferative stage in menstrual cycle? Mention the changes found in ovary, ovarian and pituitary hormones during this stage.

2+8

8. Write short notes on the following :

5×2

(a) Type 2-Diabetes Mellitus

(b) Feed back mechanism.