

[This question paper contains 4 printed pages.]

(13)

Your Roll No. 2022

Sr. No. of Question Paper : 1018

Unique Paper Code : 32231501

Name of the Paper : Molecular Biology

Name of the Course : B.Sc. (Hons.) Zoology

Semester : V

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question No.1 is compulsory.
3. Attempt **five** questions in all.
4. Draw neat, labelled diagrams wherever necessary.

1. (a) Define the following terms : (1×5=5)

- (i) Replication fork
- (ii) Exon shuffling
- (iii) Enhancer
- (iv) Polyribosome



P.T.O.

(v) Riboswitches

(b) Expand the following : (0.5×6=3)

(i) cccDNA

(ii) TRCF

(iii) MSH

(iv) MTE

(v) ITS

(vi) ORC

(c) State the function of the following : (1×5=5)

(i) TATA Box

(ii) TF II D

(iii) Shine-Dalgarno Sequences

(iv) RNase P

(v) Telomerase

(d) Differentiate between the following : (2×5=10)

(i) Leading and Lagging strands

(ii) RNA polymerase II and RNA polymerase III

(iii) A-site and P-site

(iv) Promoter and Operator

(v) miRNA and siRNA

(e) State the best-known contribution of the following scientists :
(1×4=4)

(i) Roger Kornberg

(ii) Charls Yanofsky

(iii) Robert William Holley

(iv) Phillip Allen Sharp

2. Compare and contrast the process of transcription in prokaryotes and eukaryotes. (12)

3. (a) Discuss the process of activation of amino acids and formation of initiation complex in prokaryotes. (8)

(b) Describe the salient features of Genetic code. (4)

4. (a) Describe the sequence of events during DNA Replication in eukaryotes while explaining the role of various proteins involved in it. (8)

(b) Explain the Rolling circle replication in bacteria with suitable illustration. (4)

5. (a) Explain how the deletion of the following features would affect a eukaryotic pre-mRNA? (6)
- (i) AAUAAA consensus sequence
 - (ii) 5' cap
 - (iii) Poly(A) tail
- (b) Explain (with illustration) the regulation of *Lac* operon. (6)
6. (a) Describe the structure of Globin Gene and explain the molecular mechanism of splicing. (8)
- (b) One gene may code for more than one polypeptide in eukaryotes. Justify the statement. (4)
7. Write short notes on the followings (any three): (3×4=12)
- (i) Structure of tRNA
 - (ii) RNA interference
 - (iii) Mismatch Repair
 - (iv) Synthesis of rRNA

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Your Roll No. 2022

Sr. No. of Question Paper : 1054

Unique Paper Code : 32231502

Name of the Paper : B.Sc. (Honours) Zoology

Name of the Course : **Principles of Genetics-
LOCF**

Semester : V

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **five** questions in all, including question No. 1 which is compulsory.



1. (i) Define any **five** of the following : (5)

(a) Tautomeric shift

(b) Barr body

P.T.O.

(c) Test cross

(d) Idiogram

(e) Sexduction

(f) Chiasma

(ii) Fill in the blanks: (5)

(a) Genes that affect the viability of organisms are termed as _____

(b) The sex of *Drosophila* is _____ when X:A ratio is greater than 1

(c) When a chromosome segment is reversed 180° , it causes _____ mutation

(d) _____ elements in *Drosophila* causes hybrid dysgenesis

(e) Bacterial cells that are able to take up naked DNA in the process of transformation are known as _____ cells

(iii) Expand the abbreviations (**any five**) : (5)

(i) PKU

(ii) SRY

(iii) ITR

(iv) RTF

(v) HAT

(vi) C1B

(iv) What are the contributions of the following scientists (**any four**) : (4)

(i) Barbara Mc Clintock

(ii) Karpechenko

(iii) T.H. Morgan

(iv) Margret Kidwell

(v) Carl Correns

(v) Differentiate between the following pairs
(any 4) : (8)

(i) Pleiotropic and Polygenic traits

(ii) Conservative and Replicative transposition

(iii) Nonsense and Missense mutation

(iv) Penetrance and Expressivity

(v) Auxotroph and Prototroph

2. (a) How does epistatic interaction modify the Mendelian dihybrid ratio? Explain with 3 suitable examples. (6)

(b) Describe Muller's experiment to demonstrate the role of X-rays as mutagens. (6)

3. (a) With a suitable experiment, discuss the cytological basis of crossing over. (5)

(b) In a hypothetical plant species, fruit weight is a polygenic character. A homozygous plant, with 20

gm fruit weight is crossed with a homozygous plant with 50 gm fruit weight. In the F_2 generation of 128 plants, 2 plants have a fruit weight of 20 gm, and 2 plants have fruit weight of 50 gm, and the rest of the plants have fruit weights between 20gm and 50gm.

(i) On the basis of this data, determine how many genes control the fruit weight.

(ii) Determine the genotypes and fruit weights of the progeny of a back cross between an F_1 plant and a plant with 50 gm fruit weight.

(2+5)

4. (a) Diagrammatically explain the process of bacterial transduction and differentiate between generalized and specialized transduction. (8)

(b) Explain the genetic basis of shell coiling in *Limnea peregra*. (4)

5. (a) Discuss sex determination in *Drosophila*. (6)

- (b) What are "jumping genes"? Diagrammatically illustrate the cointegrate model of transposition of Tn3 elements. (6)
6. (a) Explain how the somatic cell hybridization technique is used for mapping genes. (8)
- (b) Differentiate between sex limited and sex-linked traits with examples. (4)
7. Write short note on any **three** of the following : (3×4=12)
- (i) Bombay phenotype
 - (ii) Dosage compensation
 - (iii) Benzer's complementation test
 - (iv) Position effect
 - (v) Chromosomal number aberrations

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Your Roll No. 2022

Sr. No. of Question Paper : 1158

Unique Paper Code : 32237901

Name of the Paper : DSE- Animal Behaviour and Chronobiology

Name of the Course : **B.Sc. (H) Zoology**

Semester : V LOCF

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **Five** questions in all including Question No. 1 which is compulsory.

1. (a) Define the following :

- (i) Phase
- (ii) Reinforcement
- (iii) Supernormal stimulus
- (iv) Code breakers



(v) Innate behaviour

(vi) Ethogram (1×6=6)

(b) Differentiate between the following :

(i) Tropotaxis and klinotaxis

(ii) Habituation and sensitization

(iii) Alpha male and subordinate male

(iv) Ultradian and infradian rhythm

(v) Classical and Operant conditioning

(vi) Allomones and kairomones (2×6=12)

(c) Give Contributions of following :

(i) Wallace Craig

(ii) Ivan Pavlov

(iii) Niko Tinbergen

(iv) Karl von Frisch (1×4=4)

(d) State true or false :

(i) Imprinting takes place during a narrow window of time shortly after birth.

(ii) Genetic makeup and physical characteristics of animals are adaptations over time to the environment they are raised in.

(iii) Animals that have parental care produce more offspring than animals without parental care.

(iv) An example of kin selection is that peacocks have long, showy tails even though it makes them more obvious to predators and more difficult to fly.

(v) Round dance performed by honeybees has no directional component. (1×5=5)

2. (a) Give an account of photic and non photic zeitgebers. (6)

(b) Explain the adaptive significance of biological clock. (6)

6. (a) Explain proximate and ultimate causes of behavior with help of suitable examples. (6)

(b) Explain intersexual selection. Why is it advantageous for species? (6)

4. (a) Describe various methods of studying and recording animal behaviour. (6)

(b) Explain sexual dimorphism and its role in mate choice. (6)

5. (a) Explain the importance of Tinbergen's four questions in the modern study of animal behavior. (6)
- (b) What do you understand by social behavior and explain its advantage and disadvantages. (6)
6. (a) Explain the role of hormones in honeybee society. (6)
- (b) Give the characteristics of a reflex action. Discuss their corresponding complex behavior patterns. (6)
7. Write short notes on any **three** of the following :
- (a) Classical conditioning
- (b) Selfish gene
- (c) Territorial behaviour
- (d) Polyethism
- (e) Parasitic brood care (3x4=12)

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Your Roll No. 2022

Sr. No. of Question Paper : 1166

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Unique Paper Code : 32237909

Name of the Paper : Immunology

Name of the Course : B.Sc. (H) Zoology

Semester : V (CBCS)

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **Five** questions in all. Question No. 1 is compulsory.
3. Attempt **all** the parts of a question together.

1. (a) Define :

- (i) Anaphylaxis
- (ii) Toxoid
- (iii) Paratope
- (iv) Immunodeficiency
- (v) Innate immunity



(vi) Variolation

(1×6)

(b) Differentiate :

(i) Subunit vaccine and DNA vaccine

(ii) Humoral and cell mediated immunity

(iii) Immunogen and immunotoxin

(iv) Allotype and Idiotypic

(v) NK cell and dendritic cell

(vi) B cell and T cell

(2×6)

(c) Expand the following (**any five**) :

(i) ELISA

(ii) PAMP

(iii) TCR

(iv) MALT

(v) DTH

(vi) TLR

(vii) HIV

(1×5)

(d) Write the contributions of (**any two**) :

(i) Edward Jenner

(ii) Jules Bordet

(iii) Rosalyn Yalow (1×2)

(e) Give reasons for the following :

(i) Polio drops are given orally

(ii) Older people are more prone to infections
∴ (1×2)

2. (a) Describe the experiments by which the structure of antibody was deduced?

(b) What are the various antigenic determinants and how they are useful in generating immunoglobulin.
(6,6)

3. (a) With the help of suitable diagram explain the structure of MHCI and MHCII molecules.

(b) Write the important attributes of the adaptive immunity.
(8,4)

4. (a) What is polyclonal serum? Explain the process by which one can generate monoclonal antibodies.
(b) Explain the mechanism of inflammation when the anatomical barrier is broken by a cut or a bruise.
(6,6)
5. (a) With the help of diagram explain the cytosolic pathway of antigen processing and presentation.
(b) Write the function of an adjuvant when added to an immunogen?
(8,4)
6. (a) What is hypersensitivity? Write Gell and Coomb's classification of different types of hypersensitive reactions.
(b) What are the different functions of complement system?
(8,4)
7. Write short notes on any **three** of the following:
- (a) Properties of Cytokines
 - (b) Cross-reactivity
 - (c) Hashimoto Thyroiditis
 - (d) SCID
- (4×3)