

2023

Time :As in Programme

Full Marks : 60

The figures in the right-hand margin indicate marks.

*Answer **all** questions.*

Draw diagrams wherever necessary.

PART-I

1. Fill in the blanks. Answer all questions. 1x8

- a. The length of one Nucleotide is ____.
- (i) 10A° (ii) 20A°
(iii) 10nm (iv) 20nm
- b. Semi conservative replication process was proved by ____ experiment.
- (i) messelson & stahl (ii) Lederberg
(iii) Tatum & Stahl (iv) Watson & crick.
- c. DNA replication originated from ____ point.
(initiation, origin, replicon, none)
- d. t-RNA synthesized by ____.
- (RNA Polymerase-I, RNA Polymerase-II, RNA Polymerase-III, t-RNA synthetase)
- e. ____ is initiation Codon in m-RNA.
(AUG, GUĠ, AUA, GUA)

- f. Coding zone of DNA is _____.
(exon, intron, recon, codeon)
- g. _____ stimulate +ve regulation.
(CAP-CAMP, CAP-CRP, Lactose, Trp)
- h. Chargaff's rule applicable to _____.
(SSRNA, SSDNA, dsDNA, ssDNA&RNA)

PART-II

2. Answer any eight within two to three sentences. 1.5x8

- a. ✓ What is mismatch repair ?
- b. ✓ What is bidirectional replication ?
- c. ✓ What are okazaki fragments ?
- d. ✓ What is core enzyme ?
- e. What are inhibitors of protein synthesis ?
- f. ✓ What are exons ?
- g. ✓ Why codes are Commaless ?
- h. ✓ Why tryptophan is co-repressor ?
- i. Name enhancers of eukaryotic Transcription.
- j. ✓ Why regulator gene is Housekeeping gene ?

PART-III

3. Answer any eight of the following (in maximum 75 words.) 2x8

- a. What do you mean by replicon ?
- b. State Chargaff's rule ?
- c. What are Cot Curves ?
- d. What are primers ?

- e. What is rho-dependent termination ?
- f. What do you mean by 'poly A' region ?
- g. What are role of sigma factor ?
- h. What are functions of B-Galactosidaese ?
- i. What is Splicing ?
- j. What is a silencer element ?

PART-IV

Answer within 500 words each.

6x4

4. Describe Watson & crick's model of DNA Double helix.

OR

Describe Mechanism of DNA replication in prokaryotes.

5. Describe characters of Genetic code.

OR

Describe Transcription in Pro Karyotes.

6. Describe mechanism of RNA splicing.

OR

Notes on :

- a. RNA editing
 - b. Processing of t-RNA
7. Describe lac-operon & Trp-operon on controlling protein synthesis.

OR

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Notes on :

- a. Gene silencing
- b. RNA interference



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PART-I

1. Fill in the blanks. Answer all questions. 1x8
- _____ unit is used to indicate distance between two genes.
 - The Genotypic ratio of codominance is _____.
 - F₂ phenotypic ratio of recessive epistasis is represented as _____.
 - TDF is related to _____ sex-chromosome.
 - Crossing over starts at _____ stage.
 - X-ray induced mutation discovered by _____.
 - T₂ has _____ as genetic material.
 - Transformation experiment was performed in _____ bacteria.

PART-II

2. Answer any eight within two to three sentences. 1.5x8
- What is epistasis ?
 - What is pleiotropy ?
 - What are sex-limited characters ?
 - What is incomplete linkage ?
 - What is Terminalisation ?
 - What do you mean by interference ?
 - What are Base Analogue ?
 - What is P-cytotype ?
 - What is maternal effect ?
 - What are transposons ?

(Turn Over)

PART-III

3. Answer any eight of the following (in maximum 75 words.) 2x8
- What is multiple allele ?
 - What are significance of linkage ?
 - What is crossover frequency ?
 - What is Numerical aberration ?
 - What is sex-influenced Trait ?
 - What is Genic balance ratio ?
 - What are role of dsx gene in drosophila.
 - What do you mean by retroposons ?
 - What are role of chemical mutagens ?
 - What is Ac-ds element ?

PART-IV

Answer within 500 words each.

6x4

4. Describe Mendel's principles of inheritance.

OR

- Notes on :
- Complete linkage & incomplete linkage
 - Somatic Cell fusion

5. Describe molecular Basis of mutation.

OR

- Notes on :
- Chromosomal aberration
 - CLB method

6. Describe sex-determination in man & Drosophila.

OR

- Notes on :
- Antibiotic Resistance in chlamydomonas
 - Mitochondrial mutation

7. What are Transposons ? Give an account of Transposons in man.

OR

What is Trnasformation ? Discuss mechanism of Transformation.



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GROUP-A

(Animal Behaviour & Chronobiology)

PART-I

1. Fill in the blanks. Answer all questions. 1x8
- a. Altruism will only occur when the fitness benefit of a given act is _____ than the fitness cost.
 - b. A honeybee uses _____ dance to communicate the location of a distant food source to its hive-mates.
 - c. Sleeping through an alarm clock is an example of _____
 - d. Geotaxis is a response to the force of gravity. Fruit flies placed in a vial will move to the top of the vial. This is an example of _____ geotaxis.
 - e. In a _____ mating system, one male mates with many different females.

(Turn Over)

- f. In birds and some mammals, males display in designated communal courting areas called _____ where females come to these areas specifically to find a mate.
- g. Chimpanzees and bonobos are somewhat show _____ mating system where each male mates with many females and vice versa.
- h. A movement in response to a stimulus, but one that is not directed toward or away from the source of the stimulus is known as _____

PART-II

2. Answer any eight within two to three sentences. 1.5x8

- a. Niko Tinbergen
- b. Code breakers
- c. Orientation
- d. Altruism
- e. Waggle dance
- f. Mate choice
- g. Sexual behavior
- h. Circadian rhythm
- i. Lunar rhythm
- j. Role of melatonin in behavior

PART-III

3. Answer any eight of the following (in maximum 75 words.) 2x8

- a. Associative learning
- b. Imprinting

- c. habituation vs. Sensitization
- d. Classical conditioning
- e. Social behavior
- f. Sexual conflict in parent care
- g. Male rivalry
- h. Insect society
- i. Circadian rhythm
- j. Biological oscillations

PART-IV

Answer within 500 words each.

6x4

Discuss the evolution of behavior particularly kinship and parental care in animals.

OR

Give an account of contribution of three ethologists, Konrad Lorenz, Niko Tinbergen and Karl von Frisch to the field of animal behavior.

5. Describe the mechanism of orientation used by birds during their navigation.

OR

Give an account associative learning seen in animals.

6. What is altruism ? Discuss its principle and give brief accounts of altruism seen in animal kingdom.

OR

Describe different strategies used by honey bee during foraging.

(3)

(Turn Over)

7. Discuss different types of mating system seen in animals and give comments on its importance in parental care.

OR

Write an essay on role of communication in social behavior in animals.

GROUP-B
(Animal Biotechnology)

PART-I

1. Answer the following questions. 1x8
- a. Clustered restriction sites to allow insertion of cloned DNA is known as _____.
 - b. _____ is a biophysical phenomenon in which cell membrane permeability is increased through externally applied pulsed electric fields which is used for many applications in biotechnology such as transfection and transformation.
 - c. The key principle of the Sanger method was the use of _____ as DNA chain terminators.
 - d. A _____ is a laboratory tool used to detect the expression of thousands of genes at the same time.
 - e. _____ refers to a technique wherein substances are infected into single cells using a very thin needle and is commonly used for creation of transgenic animals.
 - f. An animal whose genome is altered by adding one or more transgenes (foreign gene) is said to be _____.
 - g. _____ was an English surgeon, who discovered a vaccination for smallpox.
 - h. The first and the most publicized human gene therapy was carried out to correct the deficiency of the enzyme _____.

PART-II

2. Answer any eight within two to three sentences. 1.5x8
- Bacteriophage
 - Biotechnology
 - Restriction modification systems
 - Taq DNA polymerase
 - Nylon membrane
 - DNA finger printing
 - GMO
 - Transgenic founder
 - Primary cell culture
 - Gene augmentation therapy

PART-III

3. Answer any eight of the following (in maximum 75 words.) 2x8
- Nomenclature of restriction enzymes.
 - Expression vectors
 - Colony hybridization.
 - Differentiate Southern and Northern blotting
 - Microarray
 - Xeno-mouse
 - Retroviral method for creation of transgenic animal
 - Knockout mouse
 - Humulin
 - Molecular diagnosis of haemophilia

PART-IV

Answer within 500 words each.

6x4

4. What are cloning vectors ? Describe the characteristics and types of cloning vectors.

OR

Give a detailed account on construction of cDNA libraries.

5. Describe Western blotting and its applications.

OR

Give a detailed account on PCR. Add a note on its advantages and applications.

6. Describe in detail the nuclear transplantation method of creation of transgenic animals.

OR

What are transgenic animals ? Elaborate how transgenic animals can be used for production of pharmaceuticals.

7. Elaborate animal cell culture and its importance.

OR

Describe the importance of recombinant DNA in the field of medicine.



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GROUP-A

(Reproductive Biology)

PART-I

1. Fill in the blanks. Answer all questions. 1x8
- a. _____ duct develops female reproductive system.
 - b. Androgen binding protein produced by _____.
 - c. Maturation of sperm occurs at _____.
 - d. _____ is permanent method of Birth control.
 - e. _____ is first test tube Baby.
 - f. The pill approved by CDRI is _____.
 - g. _____ Hormone causes lactation.
 - h. _____ Hormone in urine detect pregnancy.

PART-II

2. Answer any eight within two to three sentences. 1.5x8
- a. What are advantage of Barriers ?
 - b. What do you mean by ZIFT ?
 - c. What is Tubectomy ?
 - d. What is parturition ?
 - e. What is puberty ?
 - f. What are Graafian follicles ?
 - g. What is spermiogenesis ?
 - h. What are role of Hypothalamus ?
 - i. What is Rete testis ?
 - j. What are IUCD ?

(Turn Over)

PART-III

3. Answer any eight of the following (in maximum 75 words.) 2x8
- What is sex-differentiation ?
 - What is Gonadal axis ?
 - What are Prostaglandins ?
 - Name male Accessory glands of reproductive system.
 - What are functions of sertolicell ?
 - What is corpus luteum ?
 - What is chemotaxis ?
 - What is IVF ?
 - What are significance of family planning ?
 - What is implantation ?

PART-IV

Answer within 500 words each.

6x4

4. Describe mechanism of Development & differentiation of Gonads.

OR

Notes on :

- Gonadal axis
 - Regulation of GH secretion
5. Describe spermatogenesis in detail.

OR

Discuss epididymal function on sperm maturation & Add a note on its transport.

6. Describe mechanism of fertilization.

OR

Notes on :

- Mechanism of parturition
 - Histology of ovary
7. Discuss the process of In-vitro fertilization.

OR

Notes on :

- Infertility
- Contraceptive methods

GROUP-B
(Immunology)
PART-I

1. Fill in the blanks. 1x8
- a. Emigration of phagocytes between the capillary endothelial cells into the tissue is known as ____.
 - b. HIV attacks ____ immune cells present in our body and causes AIDS.
 - c. ____ are the immunologically active regions of an immunogen that bind to antigen-specific membrane receptors on lymphocytes or to secreted antibodies.
 - d. Antibody found in breast milk is ____.
 - e. The activation of complement by the ____ pathway begins with the formation of the antigen - antibody complex.
 - f. In endogenous antigen presentation, MHC-I molecules present antigen to ____ T cells.
 - g. Antigens that elicit strong hypersensitivity reactions are referred to as ____.
 - h. Transfusion reaction is an example of ____ type of hypersensitivity.

PART-II

2. Answer any eight within two to three sentences. 1.5x8
- a. Primary lymphoid organs.
 - b. Active immunity.
 - c. Mast cells
 - d. Haptens
 - e. Opsonization.
 - f. ELISA
 - g. Membrane attack complex
 - h. Interferons
 - i. Hypersensitivity
 - j. Recombinant vaccines.

(3)

(Turn Over)

PART-III

3. Answer any eight of the following (in maximum 75 words.) 2x8
- Germ theory of diseases.
 - Differentiate between natural and artificial immunity.
 - Interferons
 - Antibody-antigen interactions
 - RIA
 - Exogenous pathway of antigen presentation.
 - Therapeutics Cytokines.
 - The Mannan Binding Lectin Pathway
 - Live attenuated vaccines
 - Immune complex mediated hypersensitivity

PART-IV

Answer within 500 words each. 6x4

4. Describe the various theories associated with immunology.

OR

What is immune dysfunction? Describe the various immune dysfunction.

5. Differentiate antigenicity and immunogenicity. What are the factors affecting immunogenicity?

OR

Describe the structure and function of IgG

6. Elaborate the structure and function of MHC molecules.

OR

Give a detailed account on alternative pathway of complement activation.

7. Describe Type I Hypersensitivity.

OR

What are vaccines? Elaborate advances in vaccine production.



(4)