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M.Sc. (Semester -II) Examination, 2023

ZOOLOGY

(Genetics and Cytogenetics)

Time Allowed : Three Hours

Maximum Marks : 70

Note : Question paper is divided into four sections. Attempt questions of all four sections as per direction. Distribution of marks is given in each section.

SECTION-A

(Objective Type Questions)

Note : Attempt all questions. Each question carries 1 mark.

[1×10=10]

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(1)

[P.T.O.]

1. (i) Which of the following is X-linked recessive disorder ?

- (a) Color blindness
- (b) Sickle cell anaemia
- (c) PTC tasting
- (d) Albinism

(ii) Identify the disease which causes excessive production of uric acid:

- (a) Duncan muscular dystrophy
- (b) Lesch-Nyhan Syndrome
- (c) Hunter-Syndrome
- (d) Haemophilia

(iii) In *Drosophila* an organism with the genetic composition $AA+XXY$ will be a normal female. What will be the case for mammal ?

- (a) Normal female
- (b) Normal male
- (c) Klinefelter
- (d) Turner

(iv) Patau syndrome is a result of which of the following :

- (a) Non-disjunction of sex-chromosome in female
- (b) Non-disjunction of sex-chromosome in male
- (c) Non-disjunction of chromosome 21
- (d) Non-disjunction of chromosome 13

(v) The normal human female cells can be identified by the presence of :

- (a) Microbody
- (b) C-banding
- (c) G-banding
- (d) Barr body

(vi) Mutation that arises from the insertion or the deletion of a single base causing the rest of the message downstream to be read out of phase is called _____.

(vii) The intervening sequence of genes are known as :

- (a) Intron
- (b) Exon
- (c) Cistron
- (d) Codon

(viii) Which one among the following RNA viruses carries oncogenes ?

- (a) Hepatitis
- (b) Human Papillomavirus
- (c) Adenovirus
- (d) Rous Sarcoma Virus

(ix) Visible characteristics of an organism are called _____.

(x) Phenomenon in which an allele of one gene suppresses activity of an allele of another gene is known as _____.

SECTION-B

(Very Short Answer Type Questions)

Note: Attempt any five questions. Each question carries 2 marks. (Word limit : 25-30 words) [5×2=10]

2. Write short notes on the following :

- (i) Allele
- (ii) Burkitt's lymphoma
- (iii) Klinefelter syndrome
- (iv) Patau syndrome
- (v) Epistasis
- (vi) Oncogenes
- (vii) Frameshift mutation
- (viii) Pleiotropy

SECTION-C

(Short Answer Type Questions)

Note: Attempt any five questions. Each question carries 4 marks. (Word limit : 250 words) [5×4=20]

3. Write short notes on the following :

- (i) Gene mutation
- (ii) Fine structure of gene
- (iii) Non coding genes
- (iv) Test cross in *Drosophila*
- (v) Dosage compensation in *Drosophila*
- (vi) Suppressor genes
- (vii) Chromosomal anomalies
- (viii) Karyotype

SECTION-D

(Essay Type Questions)

Note: Attempt any three questions. Each question carries 10 marks. (more than 500 words) [3×10=30]

4. (i) Discuss using suitable examples the role of promoters, enhancers and silencers in the regulation of gene expression in eukaryotes.

(ii) Discuss the detailed procedure utilised for detection of sex linked lethal mutations utilizing either CIB method or Muller-5 method.

(iii) What is dosage compensation? How is this achieved? Describe different genes involved in dosage compensation in mammals and Fruit Fly and discuss the difference in the mechanisms involved in humans *Drosophila*.

(iv) What are 'tumour suppressor genes' and how do they check the growth of cancerous cells in normal tissues and allow an uncontrolled division of cells in a cancerous tissue?

(v) Compare and contrast the chromosome theory and the gene balance theory of sex-determination. Describe experiments with suitable examples which indicated a balance between sex-chromosomes and autosomes in *Drosophila* and *Caenorhabditis elegans*.

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M.Sc. (Semester-II) Examination, 2023

ZOOLOGY

(Principle of Gene Manipulation)

Time Allowed : Three Hours

Maximum Marks : 70

Note : Question paper is divided into four sections. Attempt questions of all four sections as per direction. Distribution of marks is given in each section.

SECTION-A

(Objective Type Questions)

Note : Attempt all questions. Each question carries 1 mark.

[10×1=10]

1. (i) Which bond present between the two nitrogen bases?

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(1)

[P.T.O.]

- (a) Hydrogen bond
(b) Carbon bond
(c) Nitrogen bond
(d) Sulphur bond
- (ii) This is important tools of recombinant DNA technology :
- (a) Hydrochloric acid
(b) Restriction Enzyme
(c) Caustic Soda
(d) Dry Ice
- (iii) Equipment which is used in DNA finger printing :
- (a) Microscope
(b) Electrophoresis
(c) Chromatography
(d) None of the above

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(2)

(iv) The full form of PCR :

- (a) Polymerase Chain Reaction
(b) Phosphorus Chain Reaction
(c) Polnucleas Chain Reaction
(d) Primary Chain Reaction

(v) Rounded DNA present in bacteria known :

- (a) Plasmid
(b) Cosmid
(c) Plasmid
(d) Bacteriophage

(vi) What is UV transilluminator?

(vii) In general a length of 18-30 nucleotide for primer is good. (True/False)

(viii) Maximum numbers of existing transgenic animals is of :

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(3)

[P.T.O.]

- (a) Mice
 - (b) Cow
 - (c) Pig
 - (d) Fish
- (ix) Give the name of different types of RNA.
- (x) In gene therapy, the gene defects are cured in a child or stage.

- (a) adult
- (b) teenage
- (c) old
- (d) embryo

SECTION-B

(Very Short Answer Type Questions)

Note: Attempt all questions. Each question carries 2 marks. (Word limit 25-30 words) : [5×2=10]

2. (i) What is the role of ligase enzyme ?

- (ii) What is the role of probe in recombinant DNA technology ?
- (iii) What role is gene library ?
- (iv) What are basic tools required for DNA microarray technique ?
- (v) Why the bacterial cell is considered ideal as a carrier for recombinant DNA ?

SECTION-C

(Short Answer Type Questions)

Note: Attempt all questions. Each question carries 4 marks. (Word limit 250 words) [5×4=20]

3. (i) Give the importance of endonuclease restriction enzyme with suitable example.
- (ii) Give the application of PCR.
- (iii) What is gene expression?
- (iv) State the importance of cloning.
- (v) What is gene therapy and its future significance in medical field?

SECTION-D

(Long Answer Type Questions)

Note: Attempt **any three** questions. Each question carries **10** marks. (Word limit 500 words) [3×10=30]

4. (i) Give the description of recombinant DNA technique and its importance.
- (ii) Give the description of DNA finger printing.
- (iii) Give the ideal protocol for genomic library formation.
- (iv) What is DNA sequencing with suitable example and its importance?
- (v) Give the description of transgenic technology and its importance.

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M.Sc. (Semester-II) Examination, 2023

ZOOLOGY

(Structure and Function of Genes)

Time Allowed : Three Hours

Maximum Marks : 70

Note : Question paper is divided into four sections. Attempt questions of all four sections as per direction. Distribution of marks is given in each section.

SECTION-A

(Objective Type Questions)

Note: Attempt any ten questions. Each question carries 1 mark. [1x5=5]

1. [A] Objective type questions (any five)
 - (i) Example of largest known family of single -standed DNA viruses :

- (a) Microviridae
 - (b) Geminiviridae
 - (c) Inoviridae
 - (d) Spiraviridae
- (ii) An individual collection of genes is called :
- (a) Genotype
 - (b) Phenotype
 - (c) Trait
 - (d) None of the above
- (iii) The allele which is unable to express its effect in the presence of another is called :
- (a) Co-dominant
 - (b) Supplementary
 - (c) Complementary
 - (d) Recessive

- (iv) A plant having the genotype AABbCC will produce.....kind of gametes.
- (a) 5
 - (b) 4
 - (c) 3
 - (d) 2
- (v) DNA viruses are divided into three major categories :
- (a) Double-stranded DNA viruses (eg poxviruses)
 - (b) Single-stranded DNA viruses (eg parvoviruses)
 - (c) Pararetro viruses (eg hepadnaviruses)
 - (d) All of the above
- (vi) The movement of a gene from one linkage group to another is called :

- (a) Inversion
- (b) Trans location
- (c) Duplication
- (d) Crossing over

[B] Fill in the blanks (any five): [1×5=5]

- (vii) A human female with Turner's syndrome has.....
- (viii) If both parents are carriers for thalassemia which is an autosomal recessive disorders what are the chances of pregnancy resulting in an affected child?
- (ix) A trait that 'overpowers' and hide another trait is called.....
- (x) Mendel's law of independent assortment holds good for genes situated on the.....

(xi) The genotype of a plant showing the dominant phenotype can be determined by.....

(xii) All of the following are part of an operon except.....

- (a) Structural genes
- (b) A promoter
- (c) An enhancer
- (d) An operator

SECTION-B

(Very Short Answer Type Questions)

Note: Attempt any ten questions. Each question carries 2 marks. [2×10=20]

2. (i) Define an enhancer of an operon.
- (ii) What is meant by super ceiling of DNA?
- (iii) What is a Genome?

- (iv) What is meant by a regulatory sequence?
- (v) What is meant by a Promoter?
- (vi) What is meant by an intron?
- (vii) Define non-coding RNAs.
- (viii) What is meant by genome instability?
- (ix) What is meant by promoter sequence?
- (x) What is meant by DNA hybridization?
- (xi) What is catalytic RNA?
- (xii) What is translation?

SECTION-C

(Short Answer Type Questions)

Note: Attempt any five questions. Each question carries 4 marks.

[5x4=20]

- 3. (i) Structure of Nucleic Acid.
- (ii) Denaturation of DNA.

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(6)

- (iii) DNA replication.
- (iv) DNA polymerase .
- (v) Elongation and termination of transcription.
- (vi) Alternative splicing.
- (vii) t-RNA

SECTION-D

(Essay Type Questions)

Note: Attempt any two questions. Each question carries 10 marks. [2x10=20]

- 4. (i) Explain in detail the mechanism of DNA repair.
- (ii) Explain in detail the process of transcriptional control of gene expression with reference to positive and negative regulations.
- (iii) Explain in detail translational machinery and translational control.
- (iv) Discuss the process of nuclear import and export and their regulation.

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M.Sc. (Semester-II) Examination, 2023

ZOOLOGY

(Fish-Biology-Aquaculture)

Time Allowed : Three Hours

Maximum Marks : 70

Note : Question paper is divided into four sections. Attempt questions of all four sections as per direction. Distribution of marks is given in each section.

SECTION-A

(Objective Type Questions)

Note : Attempt any ten questions. Each question carries 1 mark.

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(1)

[P.T.O.]

1. (A) Multiple choice questions. (Any five) [1x5=5]

(i) Mariculture includes :

- (a) Mussels
- (b) Oysters
- (c) Sea -weeds
- (d) All of the above

(ii) Freshwater fishes include :

- (a) Carps
- (b) Catfishes
- (c) Murrels
- (d) All of the above

(iii) Brackish water aquaculture includes :

- (a) Asian sea-bass
- (b) Milk fish
- (c) Mulletts and Crabs
- (d) All of the above

(iv) Water quality requirements for aquaculture includes following parameters :

- (a) Temperature
- (b) pH
- (c) Salinity
- ✗(d) All of the above

(v) Which of the following is not a marine fish?

- (a) Hilsa
- (b) Pomfret
- (c) Mackerel
- (d) Singhara

(vi) Which of the following is not an edible marine fish?

- ✗(a) Salmon
- (b) Rohu
- (c) Mackerel
- (d) Sardinella

- (B) Fill in the blanks : (any five) [1×5=5]
- (vii) The practice of catching the fish only available naturally is known as _____.
- (viii) The type of fishery practiced in small water bodies is called as _____.
- (ix) Example of a surface feeder is _____.
- (x) For disinfection of fish pond _____ amount of quicklime is advisable.
- (xi) Dropsy is caused by _____ bacteria.
- (xii) Fish is dipped for 1-2 min in 500 ppm Copper Sulphate for treatment of _____.

SECTION-B

(Very Short Answer Type Questions)

Note : Attempt any ten questions. Each question carries 2 marks. (Word limit : 25 -30 words) [2×10=20]

2. (i) What is BOD?
(ii) Define an aquahouse.

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(4)

- (iii) Define a Hatchery.
- (iv) What is a Mariculture?
- (v) What are Fish Food Organisms?
- (vi) What is Probiotics?
- (vii) What are the two examples of shell-fishes?
- (viii) What is a Cage?
- (ix) What is pH? How it influence aquaculture water requirements?
- (x) What are transgenic fishes?
- (xi) Name two common diseases in fishes.
- (xii) Define Gynogenesis.

SECTION-C

(Short Answer Type Questions)

Note : Attempt any five questions. Each question carries 4 marks. (Word limit : 250 words) [4×5=20]

3. (i) Aquacultural Wastes

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(5)

[P.T.O.]

- (ii) Fish Vaccines
- (iii) Role of genetics in aquaculture.
- (iv) Name two common fish pathogens & how to control the pathogens.
- (v) Name two aquarium fishes and explain the process of setting up of aquarium.
- (vi) What is paddy-cum fish farming?
- (vii) Alternative protein sources in aquaculture diets.

SECTION-D

(Essay Type Questions)

Note : Attempt any two questions. Each question carries 10 marks. (Word limit : 500 words) [2x10=20]

4. (i) Explain in detail the Fish-seed technology. [10]
- (ii) Explain in detail the fish-feed ingredients and their treatments. Explain the use of attractants and growth stimulants in fish feeds. [5+5=10]

- (iii) Write about the impact of GMOs on aquatic biodiversity. [10]
- (iv) Discuss in detail about Fish Vaccines strategy and use in aquaculture. [10]

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