Total Pages : 8

H-6521

M.Sc. (Semester-II) Examination, 2022

ZOOLOGY

(Genetics and Cytogenetics)

Time Allowed : Three Hours

Maximum Marks : 70

Minimum Passing Marks : 25

Note : This question paper is divided into four sections. All sections are **compulsory**. Attempt questions as per given instruction in each section.

SECTION-A

(Objective Type Questions)

Note : Attempt **all** questions. Each question carries **1** marks. [1x10=10]

1. (i) The normal human female cells can be identified by the presence of:

(a) Microbody

(b) C-banding

(c) G-banding

(d) Barrbody

(ii) 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 :

(a) Frameshift

(b) Chemical

(c) Suppressor

(d) Non-sense

(iii) RNA can sometimes be copied into DNA. This process is facilitated by :

(a) Ribozyme

(b) RNA primase

(c) Reverse transcriptase

(d) RNA polymerase

(iv) How dosage compensation is achieved in Drosophila?

(a) One of the X-chromosome in females is inactivated

(b) The activity of the single X-chromosome in males is upregulated

(c) The activity of the two X-chromosomes in females is downregulated

(d) The activity of the autosomes in females is downregulated

(v) The intervening sequences of 'gene' are known as:

(a) Introns

(b) Exons

(c) Cistrons

(d) Codons

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

(a) Hepatitis

(b) Human papilloma virus

(c) Adenovirus

(d) Rous sarcoma virus

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

(viii) Due to incomplete dominance a cross between blue and white Andalusian fowls results into :

(a) 50% blue and 50% black fowls

(b) 25% blue and 75% white fowls

(c) 25% black and 75% white fowls

(d) 50% blue and 50% white fowls

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

(x) Inheritance of skin colour in mammals is usually:

(a) Monogenic

(b) Multiple allelism

(c) Polygenic

(d) Pseudoallelism

SECTION-B

(Very Short Answer Type Questions)

Note : Attempt **any five** questions. Each question carries **02** marks. [5x2=10]

2. Write short notes on the following in 25-30 words:

(i) Epistasis

(ii) Allele

(iii) Gene mutation

(iv) Oncogenes

(v) Leukemia

(vi) Retinoblastoma

(vii) X-linked genes

(viii) Pleiotropy

SECTION-C

(Short Answer Type Questions)

Note : Attempt **any five** questions. Each question carries **04** marks. [5x4=20]

3. Write short notes on the following in **250** words:

(i) Illustrate incomplete dominance with suitable example.

(ii) Non-coding genes

(iii) Burkitt's lymphoma

(iv) Dosage compensation

(v) Karyotype

(vi) Sex-linked genes

(vii) Chromosomal anomalies

(viii) Suppressor genes

SECTION-D

(Essay Type Questions)

Note : Attempt **any three** questions. Each question carries **10** marks. (Word limit: more than **500** words) [3x10=30]

4. (i) Describe the different mechanisms known for regulation of gene activity at post-transcriptional level in eukaryotes.

(ii) Discuss the role of 'enhancers and silencers' in regulation of activity of genes.

(iii) Discuss the various syndromes in humans that are known to result from chromosomal anomalies.

(iv) What is Dosage Compensation? How is this achieved? Describe different genes involved in dosage compensation in mammals and fruitfuly and discuss the difference in the mechanisms involved in humans and drosophila.

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

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H-6522

M.Sc. (II Semester) Examination, 2022

ZOOLOGY

Paper - II

(Principles of Gene Manipulation)

Time Allowed: Three Hours

Maximum Marks: 70

Section-A

Note:- Attempt any ten questions. Each question carries one mark.

Q.I. Objective Type Questions **1x10**

1. An example of RNA dependent DNA polymerase is.....
2. *Taq* polymerase is isolated from bacteria .....
3. The organism of choice for heterologous production of insulin would be.....
4. An example of retro-virus based vector is .....
5. SCID, a disease that can be cured by Gene therapy, is due to the deficiency of.....enzyme.

6. Name the first transgenic plant to have been developed is.....
7. The Klenow fragment is obtained by:
   a) DNA Polymerase-I b) DNA Polymerase-II
   c) RNA Polymerase-II d) Reverse transcriptase
8. The expression of a transgene in the target tissue is identified by:
   a) Promoter b) Reporter
   c) Adapter d) None of the above
9. Which of the following is associated with DNA-fingerprinting?
   a) Hybridoma b) RFLP
   c) Site Specific Recombination d) Microarray
10. The PCR variant used for detection of COVID-19 infection is:
    a) Real Time PCR b) Hot Start PCR
    c) Reverse Transcriptase PCR d) Touch Down PCR
11. The main aim of the human genome project was to identify and sequence all the genes present in the human genome. **(State whether true or false).**
12. A vector into which a gene of interest has been inserted may be called as a recombinant DNA. **(State whether true or false).**

Section-B

Note:- Attempt any five questions. Each question carries two marks.

Q. II. Very Short Answer Type (25-30 Words) 2x5

1. Define recombinant DNA?
2. Define vector.
3. What are components present in PCR master mix?
4. What is a restriction map?
5. What are GMOs?
6. Define DNA fingerprinting.
7. What is meant by DNA sequencing?

Section-C

Note:- Attempt any five questions. Each question carries four marks.

Q.III. Short Answer Type (250 Words) 4x5

1. Differentiate between genomic and cDNA library.
2. Differentiate between cloning and expression vectors.
3. Briefly describe southern blotting technique.
4. Describe DNA-microinjection based technique of gene transfer

in animals.

5. Briefly describe site directed mutagenesis.
6. Discuss the properties of a good cloning vector.
7. Give a brief account on DNA microarrays.

Section-D

Note:- Attempt any three questions. Each question carries ten marks.

Q.IV. Essay type (more than 500 Words) 3x10

1. Give a detailed account on various enzymes used in genetic engineering along with their functions.
2. Briefly describe the steps involved in PCR. Also write a short account on types and applications of PCR.
3. Describe protein engineering in microbes with suitable examples.
4. What is meant by gene therapy? Discuss somatic and germline gene therapy approach in brief.

Total Pages : 8

H-6523

M.Sc. (Semester-II) Examination, 2022

ZOOLOGY

(Structure and Function of Genes)

Time Allowed : Three Hours

Maximum Marks : 70

Minimum Passing Marks : 28

Note : This question paper is divided into four sections. Attempt questions of all four sections as per given directions. Distributions of marks is given in each section.

SECTION-A

(Objective Type Questions)

Note : Attempt **any ten** questions. Each question carries **1** mark. [1x10=10]

1. (A) Multiple Choice Type Questions: **(any five)** :

(i) DNA is a ____ sugar.

(a) Pentose

(b) Hexose

(c) Nanose

(d) Double

(ii) A genomic DNA possesses functioning units, a group of genes under the influence of promoters is known as :

(a) Genes

(b) Operons

(c) Anticodon

(d) Codon

(iii) All regulatory proteins possess a common DNA binding motif that is specific flexes in their protein chains permitting them to interlock with :

(a) the outside groove of DNA helix

(b) the major groove of DNA helix

(c) the minor groove of DNA helix

(d) the inner groove of DNA helix

(iv) Regulatory proteins turn transcription off through binding to a site rapidly at the front of the promoter and many times even overlaps the promoter, this site is the :

(a) Regulatory site

(b) Operator site

(c) Suppressor site

(d) Transcriptional control site

(v) Basic tools of genetic regulation are the ability of some proteins to bind to specific :

(a) regulatory DNA sequences

(b) regulatory RNA sequences

(c) enzymes of cells

(d) promoter portions of genes

(vi) How many histones are there in the core of a nucleosome?

(a) 8

(b) 6

(c) 4

(d) 2

(B) Fill in the blanks :(**any five**)

(vii) In eukaryotes and bacteria, the most common form of regulation is _____.

(viii) The vertebrate cells contain a protein which binds to clusters of 5-methyl cystosine ensuring that the bound gene stays in the 'off' position. The regulation on the role of gene regulation is an outcome of _____.

(ix) A chromosome with a very short arm and a very long arm is referred to as _____.

(x) The diagrammatic representation of karyotype (morphological representation of chromosomes) of a species is known as _____.

(xi) A human female with Turner's syndrome has ____.

(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 **02** marks.(Word limit: **25-30** words) [10x2=20]

2. (i) What is a Promoter Gene?

(ii) Define Lac Operon.

(iii) What is a Transducer?

(iv) Define Transcription.

(v) Define Translation.

(vi) What are the two major functions of t-RNA?

(vii) What are the two major functions of m-RNA?

(viii) What are the functions of nucleolus?

(ix) What is a Genome?

(x) What are the major functions of ribosome?

(xi) Explain the term 'allelle'.

(xii) What is the structure of DNA? Why it is called so?

SECTION-C

(Short Answer Type Questions)

Note : Attempt **any five** questions. Each question carries **04** marks. Answer in about **250** words. [5x4=20]

3. (i) Mechanism of DNA repair

(ii) Genome instability.

(iii) Regulation of Pre-mRNA processing

(iv) Non-coding RNAs

(v) Degradation of RNA

(vi) Translation inhibitors

(vii) Micro RNA

(viii) Nuclear import

SECTION-D

(Essay Type Questions)

Note : Attempt **any two** questions. Each question carries **10** marks. Answer in more than **500** words. [2x10=20]

4. (i) Define catalytic RNA. What is meant by alternative splicing and proteome diversity? [5+5=10]

(ii) Explain in detail the structure of chromatin. What is meant by denaturation and renaturation of DNA? [5+5=10]

(iii) What is a Promoter? What are regulatory sequences? Discuss the activators and repressors of transcription. [2+2+6=10]

(iv) Define tRNAs and their modifications. Explain the regulation of initiation of translation in eukaryotes. [5+5=10]

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Total Pages : 8

H-6528

M.Sc. (Semester-II) Examination, July 2022

ZOOLOGY

(Fish Biology - Aquaculture)

Time Allowed : Three Hours

Maximum Marks : 70

Minimum Passing Marks : 25

Note : Question paper is divided into four Units. Attempt questions from all Units as per given directions. Distribution of marks is given in each Unit.

UNIT-I

1.(A) Multiple choice type questions. **(Any five)** [1×5=5]

(i) National Fisheries Development Board is located in _____

(a) Hyderabad

(b) Goa

(c) Mumbai

(d) Chennai

(ii) What are the common fishes selected for pond culture systems ?

(a) Sharks and rays

(b) Sardines and mackerels

(c) Mullets, bhetki and pearl spots

(d) Catlas, rohu, mrigals, common carps and grass carps

(iii) _____ is the term used for breeding of fish in specially constructed tanks and ponds.

(a) Viticulture

(b) Agriculture

(c) Horticulture

(d) Pisciculture

(iv) Common carp, Silver carp and Grass carp are varieties of _____ commonly found in Madhya Pradesh.

(a) Fish

(b) Rice

(c) Oranges

(d) Pulses

(v) 'Blue Revolution' is related with the following :

(a) Foodgrain production

(b) Oilseed production

(c) Fish production

(d) Milk production

(vi) Which of the following fish/fishes used for fish culture in paddy fields ?

(a) Catla only

(b) Rohu only

(c) Mrigal and Catla only

(d) All of the above

(B) Fill in the blanks : **(Any five)** [1x5=5]

(i) The state with leading production of inland fishes is _____.

(ii) _____ harbour in Kerela is the largest fishing harbour in Asia.

(iii) _____is the common name used for the genera Tor.

(iv) Chinese dip nets are most common in _____.

(v) The most efficient gear used for exploiting the pelagic fishery resources along Karnataka coast is _____.

(vi) The national fish of India is _____.

UNIT - II

(Very Short Answer Type Questions)

2. Attempt **any ten** questions : [2x10=20]

(i) Define Exclusive Economic Zone (EEZ).

(ii) Define induced breeding.

(iii) Define inland fisheries.

(iv) What are placoid scales ? Where are placoid scales present ?

(v) What is monosex culture ?

(vi) What are exotic fishes ?

(vii) Name two diseases in carp variety of fishes.

(viii) What is integrated farming ?

(ix) What is cage fishery ?

(x) Define pen fishery.

(xi) Define bundh breeding.

(xii) What is meant by hypernutrification ?

UNIT - III

(Short Answer Type Questions)

3. Attempt **any five** questions : [4×5=20]

(i) Fish food organisms.

(ii) Paddy-cum-fish farming.

(iii) Role of probiotics in nutrition.

(iv) Use of attractants and growth stimulants in fish feeds.

(v) Impact of GMOs on aquatic biodiversity.

(vi) Fish Pathogens.

(vii) Fish feed types and purposes.

UNIT - IV

(Essay Type Questions)

4. Attempt **any two** questions. [2×10=20]

(i) Explain the process of sitting up of display aquarium. Explain the process of breeding of aquarium fishes. [5+5=10]

(ii) Explain the different infection and diseases in fishes. Write a note on common routes of pathogen entry in fishes. [7+3=10]

(iii) Discuss in detail about fish seed technology. [10]

(iv) Explain the water quality requirements for aquaculture in detail. Write a short note on Chemical Oxygen Demand. [6+4=10]

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