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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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