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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech.

SEM: III - THEORY EXAMINATION (2021 - 2022) (ONLINE)

Subject: Genetics and Molecule Biology

Time: 02:00 Hours

Max. Marks: 100

General Instructions:

1. *All questions are compulsory. It comprises of two Sections A and B.*
 - *Section A - Question No- 1 has 35 objective type questions carrying 2 marks each.*
 - *Section B - Question No- 2 has 12 subjective type questions carrying 3 marks each. You have to attempt any 10 out of 12 question.*
 - *No sheet should be left blank. Any written material after a Blank sheet will not be evaluated/checked.*

SECTION A

35 x 2 = 70

1. Attempt ALL parts:-

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|-------|--|---|
| 1.1.a | Who coined the term Mutation?
(a) James Watson
(b) Herman Joseph Muller
(c) Hugo de Vries
(d) None of the above | 1 |
| 1.1.b | Name the chromosome found in the cells which are responsible for characters other than sex chromosomes? (CO1)
(a) Autosomes
(b) Genome
(c) Mitochondrial chromosome
(d) Y chromosome | 1 |
| 1.1.c | Which of the following process is an exception of Mendel Law?
(a) Mutation
(b) Variation
(c) Cloning
(d) Linkage | 1 |
| 1.1.d | Carriers of the colour-blindness trait include
(a) Men who are heterozygous for the trait.
(b) Men who are homozygous for the trait.
(c) Women who are heterozygous for the trait.
(d) Women who are homozygous for the trait. | 1 |
| 1.1.e | Mitochondrial disease are received from
(a) Mother
(b) Father
(c) In laws
(d) Environment | 1 |
| 1.1.f | Extranuclear inheritance commonly occur in
(a) Nucleus
(b) Ribosomes | 1 |

- (c) Cytoplasmic organelle
(d) Cell membrane
- 1.1.g Homozygosity and heterozygosity of an individual can be determined by 1
 (a) Back cross
 (b) Self-fertilization
 (c) Test cross
 (d) All of the above
- 1.2.a With respect to microsatellite DNA which of the following is correct? (CO2) 1
 (a) Tandem repeats
 (b) Dinucleotide repeats
 (c) 100 bp units
 (d) Inaccurate duplicating
- 1.2.b Why are chromosomes condensed? 1
 (a) To facilitate accommodation
 (b) Always condensed
 (c) To facilitate cell division
 (d) To facilitate distribution in daughter cells
- 1.2.c In cancer telomerase activity _____ 1
 (a) Increases
 (b) Decreases
 (c) Remains constant
 (d) Plays no role
- 1.2.d Which of the following statements about tandem repetitive DNA are correct? 1
 (a) Tandem means two repeats next to each other.
 (b) STRs are the same as microsatellite DN
 (c) It is usually classified according to the number of repeats.
 (d) VNTRs are not a type of minisatellite DN
- 1.2.e How many kinds of mutation are found in DNA which includes mutation of only one base? 1
 (a) 1
 (b) 2
 (c) 3
 (d) 4
- 1.2.f DNA fingerprinting recognizes the differences in 1
 (a) satellite DNA
 (b) bulk DNA
 (c) Repetitive DNA
 (d) both (a) and (c)
- 1.2.g Nitric oxide (NO) is an important cardiovascular signaling molecule. It has also been 1
 implicated in DNA mutations in bacteria and in human cells, though these mutations are not
 always associated with cancer formation. Therefore, NO would be an example of an:
 (a) Exogenous mutagen
 (b) Endogenous carcinogen
 (c) Exogenous carcinogen
 (d) Endogenous mutagen
- 1.3.a Which of the following combination is a correct observation for the transformation 1
 experiment performed by Griffith?
 (a) Type IIIS (living) + mouse = dead

- (b) Type IIS (heat kille + mouse = dead)
 (c) Type IIR (living) + mouse = dead
 (d) Type IIS (heat kille + type IIR (living) + mouse = living
- 1.3.b What stores the genetic information in DNA? 1
 (a) Sugar
 (b) Phosphate
 (c) Nitrogenous base
 (d) Polymerase
- 1.3.c What is the major type of RNA produced in the cell required for translation? 1
 (a) mRNA
 (b) tRNA
 (c) rRNA
 (d) siRNA
- 1.3.d In one strand of a double stranded DNA the rate of occurrence of A is 3 times C in consecutive 10 bases. So how many G will be there in 100 base pairs of a DNA duplex?[Consider G=T in one strand]. 1
 (a) 30
 (b) 20
 (c) 40
 (d) 60
- 1.3.e Which of the following regarding the basic mechanism of gene expression is correct? 1
 (a) DNA → tRNA → protein
 (b) RNA → cDNA → mRNA → protein
 (c) RNA → DNA → mRNA → protein
 (d) DNA → protein
- 1.3.f Replication fork is the junction between the two _____ 1
 (a) Unreplicated DNA
 (b) Newly synthesized DNA
 (c) Newly separated DNA strands and newly synthesized DNA strands
 (d) Newly separated DNA strands and the unreplicated DNA
- 1.3.g Which of the following enzyme is required for end to end joining of DNA? 1
 (a) DNA ligase
 (b) Restriction endonuclease
 (c) RNA polymerase
 (d) DNA polymerase
- 1.4.a The codon is _____ (CO4) 1
 (a) Singlet
 (b) Duplet
 (c) Triplet
 (d) Quadruplet
- 1.4.b Which of the following is not a termination codon? 1
 (a) UGA
 (b) AGA
 (c) AGG
 (d) UAC
- 1.4.c The wobble hypothesis was proposed by _____ (CO4) 1

- (a) Arthur Kornberg
 (b) Francis Crick
 (c) James Watson
 (d) William Asbury
- 1.4.d Capping is done by the addition of _____ 1
 (a) Methylated A
 (b) Methylated T
 (c) Methylated G
 (d) Methylated C
- 1.4.e The first amino acid to be incorporated in the eukaryotic polypeptide is _____ 1
 (a) Methionine
 (b) Valine
 (c) N-formyl methionine
 (d) N-acyl valine
- 1.4.f Rho dependent termination mechanism doesn't require 1
 (a) ATP
 (b) Stem loop structure
 (c) G-C rich stem
 (d) Sigma factor
- 1.4.g Which of these factors can recognize the UAA stop codon? 1
 (a) RF1
 (b) RF3
 (c) RRF
 (d) Ef-G
- 1.5.a Which of the following enzyme is responsible for making a DNA copy from RNA? (CO5) 1
 (a) Reverse transcriptase
 (b) DNA polymerase
 (c) RNA polI
 (d) RNA polII
- 1.5.b Which of the following name is given to molecular chaperones? (CO5) 1
 (a) Allosteric protein
 (b) Heat shock protein
 (c) Denaturation protein
 (d) Ribonuclease
- 1.5.c Where are promoters typically found in DNA? 1
 (a) Downstream of the coding region of a gene
 (b) In the middle of the coding region of a gene
 (c) In the 3' UTR
 (d) Upstream of the coding region of a gene
- 1.5.d Which of the following does not represent a feature of bacterial transcription that is not found in eukaryotic transcription? 1
 (a) Bacterial RNA polymerase has a number of subunits that interact with initiation factors to form a holoenzyme
 (b) The bacterial genome utilizes 3 kinds of promoter elements
 (c) Transcription and translation are coupled in bacteria
 (d) Bacterial transcription occurs in the cytoplasm
- 1.5.e In lac-operon, which protein is not regulated by the repressor? 1

- (a) Galactosidase
 - (b) Lactose Permease
 - (c) Tryptophan
 - (d) Transacetylase
- 1.5.f The primary control of gene expression takes place at the level of 1
- (a) Translation
 - (b) Replication
 - (c) Transcription
 - (d) None
- 1.5.g The gene sequence that codes for proteins are 1
- (a) Exons
 - (b) Introns
 - (c) Intervening sequences
 - (d) Control regions

SECTION B

10 X 3 = 30

2. Answer any TEN of the following:-

- 2.1.a Describe the Principle of segregation and its importance. (CO1) 2
- 2.1.b What are the three types of gene interaction? 2
- 2.2.a Explain the causes Down syndrome? (CO2) 2
- 2.2.b What causes base substitution? 2
- 2.2.c What is DNA repair system? 2
- 2.3.a What are the 4 steps to DNA replication? 2
- 2.3.b DNA nature is Conservative, Semiconservative or Dispersive? Draw the diagram. (CO3) 2
- 2.3.c What is the role of DNA polymerase -I? 2
- 2.4.a What is mRNA processing? 2
- 2.4.b How many types/class of eukaryotic RNA? 2
- 2.5.a What is the lac operon and how does it work? 2
- 2.5.b How do activators work? 2