Time: 2.5 hours **Total Time: 75**

Instructions:- Instructions: Please check that you have received the correct question paper.

1) All the questions are compulsory. Choice is internal.
2) Figures to the right indicate full marks.
3) All questions carry equal marks.
4) Draw flowcharts /diagrams wherever necessary.

Q1A) Choose the **MOST** appropriate answer: **(any three)** **3**

i) The lagging strand of DNA is synthesized in_____ direction
(5'-3' ; 3'-5'; any direction)

ii) _____ exhibits 3' - 5' exonuclease activity
(Pol I; Pol II ; Pol I and II)

iii) In _____light thymine dimers may be formed.
(Visible ; UV; IR)

iv) _____ undergoes deamination and becomes uracil
(Adenine; Thymine; Guanine)

v) Replication occurs in _____.
(cytoplasm; nucleus; endoplasmic reticulum)

Q1B) Define and explain **any one** of the following: **2**

i) Central Dogma

ii) Topoisomerases

Q1C) Write a short note on **any one**: **4**

i) Excision repair

ii) Enzymes involved in replication

Q1D) Write a detailed note on **any one**: **6**

i) Mechanism of replication

ii) Direct repair and mismatch repair

Q2A) Choose the **MOST** appropriate answer: **(any three)** **3**

i) DNA is not directly involved in _____
(replication; transcription, repair)

ii) _____nucleotide base is not found in RNA.
(Adenine; Thymine; Cytosine)

iii) With _____mRNA codon, the tRNA with 5'CUA3' will form a codon-anticodon base pairing interaction.
(5'CTA3'; 5'UAG3''; 5'GUA3)

iv) _____ gave the Central Dogma of molecular biology
(Crick; Khurana; Chargaff)

v) Reverse transcriptase is seen in _____
(Gorillas/ Influenza virus; HIV)

Q2B) Define and explain **any one** of the following: **2**

i) Promoter sequences

ii) Shine Dalgarno sequence

Q2C) Write a short note on **any one**: **4**

i) Splicing

ii) Genetic code

Q2D) Write a detailed note on **any one** : **6**

i) Transcription in prokaryotes.

ii) Translation in prokaryotes

Q3A) Choose the **MOST** appropriate answer: **(any three)** 3

i) _____ discovered restriction enzymes.
(Arber/ Kornberg/ Dalgarno)

ii) The DNA to which the gene of interest is integrated is called a _____.
(hybrid / chimeric / duplex)

iii) _____ popularly are called "Molecular stitchers"
(Polymerase / helicase / ligase)

iv) YAC stands for _____. (Yeast American chromosome/Yeast Artificial chromosome/ Young's American chromosome)

v) Reverse transcriptase forms a DNA hybrid that is known as _____.
(hybrid DNA/complementary DNA/new DNA)

Q3B) Define and explain, **any one**: 2

i) Cosmid

ii) RDT

Q3C) Write a short note on **any one** : 4

i) Significance and labelling of probes

ii) Shuttle vectors

Q3D) Write an elaborate note on Write a short note on **any one** :: 6

i) Plasmids

ii) Applications of RDT

Q4A) Choose the **MOST** appropriate answer: **(any three)** 3

i) DNA is injected through _____in micro projectile technique.
(shot gun/ liposomes / both shotgun and liposomes)

ii) Heating of nitrocellulose at high temperature is known as __ (annealing / baking/ hybridization)

iii) Transfer of recombinant plasmid into *E. coli* cells needs ___ ($MgCl_2$; $CaCl_2$; NaCl)

iv) The process of introduction of foreign DNA into an animal cells is called __(Transfection/ transduction/ transformation)

v) Polymerase used for PCR is extracted from _____ (*Escherichia coli*; *Thermus aquaticus*; *Saccharomyces cerevisiae*)

Q4B) Define and explain **any one**: **2**

i) Chimeric DNA

ii) Colony hybridization

Q4C) Write a short note on **any one**: **4**

i) Methods for transfer of recombinant gene into the host.

ii) PCR

Q4D) Write a detailed note on **any one**: **6**

i) Southern blotting technique

ii) Gene library and cDNA library

Q5 A) Write brief note on **any four**, as directed: **12**

i) Modes of DNA replication

OR

i) SOS repair mechanism

ii) Split genes

OR

ii) Initiation of translation

iii) Expression vectors

OR

iii) Role of ligase in RDT

iv) Use of Liposomes in RDT

OR

iv) Colony hybridization.

Q5B) State TRUE or FALSE: **(<u>any three</u>)** **3**

i) Restriction enzymes act only as endonucleases

ii) Transcription starts at origin of replication.

iii) Plagemids are always smaller than bacteriophages

iv) All Polymerase are present in the cytoplasm

v) Introduction of genes using a virus is termed as Transfection

vi) Rho factor is involved in initiation of Replication

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