(3 hours) **(Total Marks : 100)**

Instructions to the candidates, if any:-

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)	Fill in the blanks: (**any three**)	**3**
i)	The leading strand of DNA is synthesized in_____ direction	
ii)	_____ exhibits 3' - 5' exonuclease activity	
iii)	In _____light thymine dimers may be formed.	
iv)	_____ undergoes deamination, and becomes Uracil	
Q1B)	Define and explain **any one** of the following:	**3**
i)	DNA repair	
ii)	Topoisomerases	
Q1C)	Write a detailed note on **any one** :	**6**
i)	Excision repair	
ii)	Proteins involved in replication	
Q1D)	Answer **any one** of the following:	**8**
i)	In detail discuss the mechanism of replication	
ii)	Elaborate on direct repair and mismatch repair	
Q2A)	Fill in the blanks: (**any three**)	**3**
i)	Rifampicin is an inhibitor of _____	
ii)	_____is present in DNA but not in RNA	
iii)	With _____mRNA codon, the tRNA with 5'GAG3' will form a codon-anticodon base pairing interaction.	
iv)	Transcription takes place in the _____.	
Q2B)	Define and explain **any one** of the following:	**3**
i)	Promoter	
ii)	Stop codons	
Q2C)	Write a detailed note on **any one** :	**6**
i)	Activation of tRNA	
ii)	Capping and tailing of RNA	
Q2D)	Answer **any one** of the following:	**8**
i)	Describe the post translational modifications transcription in prokaryotes.	

ii) Write short notes on : a) RNA Polymerase (ii) Initiation of transcription

Q3A) Fill in the blanks: (Any three) **3**

i) Klenow fragment is obtained by proteolytic cleavage of _____.
ii) In the restiction endonuclease EcoRI, "R" stands for _____
iii) _____ enzyme is used to seal the nick in DNA
iv) The vector used to study protein expression is a _____ vector

Q3B) Define and explain, **any one:** **3**

i) Palindrome
ii) Cosmid

Q3C) Answer **any one** of the following: **6**

i) State true or false giving detailed reasons: "Shuttle vectors are superior to conventional vectors."
ii) Give the role and mechanism of action of **any two** enzymes involved in RDT.

Q3D) Answer **any one**: **8**

i) "RDT has transformed the field of medicine and agriculture." Explain the statement giving suitable examples.
ii) Elaborate on the characteristics of plasmids and bacteriophages that makes them ideal cloning vectors?

Q4A) Fill in the blanks: **(Any three)** **3**

i) DNA is injected directly into cells by _____
ii) Heating of nitrocellulose at high temperature is known as __
iii) Transfer of recombinant plasmid into *E. coli* cells needs ___
iv) The process of introduction of foreign DNA into an animal cells is called _____

Q4B) Define / explain **any one** of the following: **3**

i) Chimeric DNA
ii) Colony hybridization

Q4C) Attempt **any one** of the following: **6**

i) Discuss any two methods of recombinant gene transfer into the host.
ii) Write a note on the contribution of E.M. Southern in the field of RDT

Q4D) Answer **any one:** **8**

i) Elaborate on Kary Mullis's technique of DNA amplification.
ii) Compare and contrast: Gene library and cDNA library.

Q5 A) Answer **any four** of the following: **16**

i) Explain the different modes of DNA replication

OR

i) Describe SOS repair mechanism.

ii) Write a note on split genes

OR

ii) Explain the process of initiation of translation.

iii) Give a comparative account of cloning and expression vectors.

OR

iii) In detail, explain the role of ligase in RDT.

iv) Justify: 'Liposomes are ideal vectors for introduction of exogenous DNA'

OR

iv) Elaborate on the technique of colony hybridization.

Q5B) State TRUE or FALSE: **(<u>any four</u>)** **4**

i) Restriction enzymes act only as exonucleases

ii) Replication starts at origin of replication.

iii) Plasmids are always smaller than bacteriophages

iv) All Polymerase are present in the cytoplasm

Introduction of genes using a virus is termed as

v) Transformation

vi) Rho factor is involved in initiation of Replication
