# BIOLOGY

# BOOKS - ARIHANT PUBLICATION

# MOLECULAR BASIS OF INHERITANCE

## Part I Questions For Practice Very Short Answer Type Questions

**1.** The enzyme not associated with DNA replication is

A. polymerase

B. helicase

C. topoisomerase

D. transcriptase

**Answer: D**

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**2.** In a DNA strand the nucleotides are linked together by :

A. glycosidic bonds

B. phosphodiester bonds

C. peptide bonds

D. hydrogen bonds

**Answer: B**

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**3.** Discontinuous synthesis of DNA occurs in one strand because :

A. Discontinuous synthesis of DNA occurs in one strand, because

B. DNA dependent DNA polymerase catalyses polymerisation only in one direction (5' $\rightarrow$ 3' )

C. it is a more efficient process

D. DNA ligase has to have a role

**Answer: B**

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**4.** Semiconservative mode on replication of DNA was proved by :

A. Hershey and Chase

B. Griffith

C. Watson and Crick

D. Meselson and Stahl

**Answer: D**

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**5.** Fill in the blanks:To form a continuous DNA molecule, the enzyme _____ joins okazaki fragments.

A. primase

B. polymerase

C. helicase

D. ligase

**Answer: D**

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**6.** In eukaryotic cells, the RNA transcribed from DNA is called-..... .

A. rRNA

B. cistron

C. cDNA

D. heterogenous mRNA

**Answer: D**

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**7.** $\underline{\text{Watson and Griffith}}$ proposed the double helical structure of DNA

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**8.** The helical turns are $\underline{\leq ft - h \text{ and } ed}$ in Z-DNA.

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**9.** Okazaki fragments are formed in both leading and lagging strand of DNA .

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**10.** Cytosine is common for both DNA and RNA

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**11.** RNA does not have guanine as nitrogenous base.

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**12.** One of the nitrogenous bases of RNA is thymine.

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**13.** One turn of helix of a B-DNA is approximately:

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**14.** Frederich Griffith discovered the phenomenon called _____.

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**15.** The two strands of polynucleotides forming DNA are..... and antiparallel

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**16.** The enzyme which joins Okazaki fragments to form a continuous DNA molecule is?

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**17.** The organism on which Meselson and Stahl (1958) provided strong evidence for semiconservative mode of DNA replication?

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**18.** The strand which is transcribed into mRNA (RNA transcript).

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**19.** The scientist who formulated central dogma of molecular biology in 1958?

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## Part I Questions For Practice Short Answer Type Questions

**1.** Write a short note on nitrogenous bases.

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**2.** If adouble-stranded DNA has 20% of cytosine, calculate the percentage of adenine in the DNA.

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**3.** The base sequence in one of the strands of DNA is TAGCATGAT.

(i) Give the base sequence of the complementary strand.

(ii) How are these base pairs held together in a DNA molecule?

(iii) Explain the base complementarity rule. Give the name of the scientist who framed this rule?

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**4.** A DNA segment has a total of 1000 nucleotides, out ofwhich240 of them are adenine containing nucleotides. How many pyrimidine bases this DNA segment possesses?

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**5.** It is established that RNA is the first genetic material. Explain giving reasons.

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**6.** Write short note on RNA.

Watch Video Solution

**7.** Write a short note on tRNA

Watch Video Solution

**8.** Explain the two factors responsible for conferring stability to double helix structure of DNA

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**9.** Which property of DNA double helix led Watson and Crick to hypothesise semiconservative mode ofDNAreplication? Explain.

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**10.** Name a few enzymes involved in DNA replication other than DNA polymerase and

ligase. Name the key functions for each of them.

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**11.** State the dual role of deoxyribonucleoside triphosphates during DNA replication.

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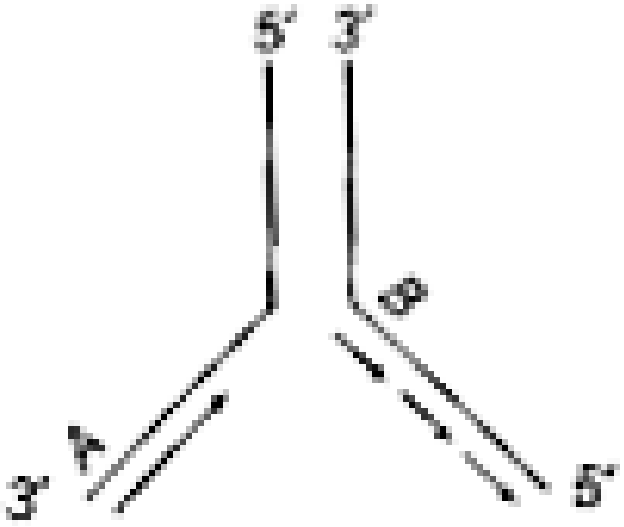
12. 


Why do you see two different types of replicating strands in the given DNA replication fork? Explain. Name of these strands.

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**13.** Write a short note on central dogma.

Watch Video Solution

**14.** Explain transcription ?

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**15.** Describe the initiation process of transcription in bacteria

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**16.** Explain {in one or two lines) the function of the following

(i) Introns (ii) Exons

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**17.** State the difference between the structural' genes in a transcription unit of prokaryotes and eukaryotes.

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**18.** Depending upon the chemical nature of the template (DNA or RNA) and the nature of nucleic acids synthesised from it (DNA or RNA), list the types of nucleic acid polymerases.

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**19.** Why hnRNA is required to undergo splicing?

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## Part I Questions For Practice Long Answer Type Questions

**1.** Describe the structure of DNA with a neat and labelled diagram.

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**2.** Give an account of Griffith's experiment on transformation.

Watch Video Solution

**3.** Meselson and stahl experiment proved

Watch Video Solution

**4.** Describe the process replication of DNA with suitable diagram.

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**5.** In which phase of the cell cycle does replication occur in eukaryotes? What would

happen if cell division is not followed after DNA replication?

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**6.** Draw a labelled diagram of a 'replicating fork' showing the polarity. Why does DNA replication occur within such 'forks'?

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**7.** Name two enzymes involved In the process of DNA replication, along with their properties.

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## Part I Questions For Assessment Very Short Answer Type Questions

**1.** At 5' end of a polynucleotide chain

A. H-bond is present

B. — OH group is attached

C. $P0_4$ group is attached

D. pentose sugar is attached

**Answer: C**

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**2.** In which one of the following, double-stranded RNA is present?

A. Bacteria

B. Chloroplast

C. Mitochondria

D. Reovirus

**Answer: D**

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**3.** DNA replication is

A. semiconservative, directional and continuous

B. semiconservative, bidirectional

C. semiconservative and semidiscontinuous

D. only semiconservative

**Answer: C**

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**4.** A double-stranded RNA segment has 120 adenine and 120 cytosine bases. The total number of nucleotides present in the segment is

A. 120

B. 240

C. 60

D. 480

**Answer: B::D**

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**5.** $DNApolymerase - I$ is mainly responsible for synthesis of new strand during DNA replication

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**6.** A ..... is located towards 3' end of the polynucleotide chain

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**7.** The first X-ray diffraction pattern of DNA was given, by which scientist?

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## Part I Questions For Assessment Short Answer Type Questions

**1.** What background information does Watson and Crick had, that helped them in developing a model of DNA? What was their contributions in the history of DNA?

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**2.** There are certain complexities in eukaryotic transcription. Bring out the significance of

such complexities.

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## Part I Questions For Assessment Long Answer Type Questions

**1.** Describe the various components of DNA. Briefly explain the primary and secondary structure of DNA.

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**2.** With the help of a diagram, explain the Meselson-Stahl experiment of semiconservative replication

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## Part Ii Questions For Practice Very Short Answer Type Questions

**1.** Termination codon which stops further addition of amino acids to the polypeptide chain is :

A. AAU

B. GUG

C. AUG

D. UAG

**Answer: D**

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**2.** Gene which is responsible for the synthesis of a polypeptide chain is called :

A. operator gene

B. regulatory gene

C. promoter gene

D. structural gene

**Answer: D**

Watch Video Solution

**3.** Fill in the blanks: Operon concept was given by _____.

A. Hershey and Chase

B. Khorana and Ochoa

C. Watson and Crick

D. Jacob and Monod

**Answer: D**

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**4.** Translation is the synthesis of

A. DNA from a mRNA template

B. protein from a mRNA template

C. RNA from a mRNA template

D. RNA from a DNA template

**Answer: B**

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**5.** A phenomenon where the third base of t-RNA at its 5 end can pair with a non-complementary base of m-RNA is called :

A. universaiity

B. colinearity

C. degenerency

D. wobbling

**Answer: D**

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**6.** The peptide bonds are present between :

A. nucleic acid

B. organic acids

C. fatty acids

D. amino acids

**Answer: D**

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**7.** Which one is not a non-sense codon ?

A. UAA

B. UGA

C. UCA

D. UAG

**Answer: C**

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**8.** Correct the statements, if required, by changing the underlined word(s)

The genetic information from DNA transferred to ribosomes through $\underline{ribosomal RNA}$.

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**9.** Correct the statements, if required, by changing the underlined word(s)

The initiation codon AUG normally codes for formylated $\underline{cyst \in e}$.

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**10.** Correct the statements, if required, by changing the underlined word(s)

$\underline{\mathbb{C}C}$is the initiation codon.

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**11.** Correct the statements, if required, by changing the underlined word(s)

The $\underline{split}$ genes are needed constantly for cellular activity.

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**12.** The lac operon consists of :

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**13.** Correct the statements, if required, by changing the underlined word(s)

A regulated unit of genetic material for prokaryotic gene expression is called $\underline{operon}$.

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**14.** $\underline{64 codons}$ code for all the 20 essential amino acids.

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**15.** Prokaryotic mRNA is $\underline{monocistronic}$.

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**16.** The structural genes are regulated as a unit by a single $\underline{rega} \rightarrow r$ in operon.

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**17.** The correspondence between triplets in DNA (or RNA) and amino acids in protein is

known as.....


**18.** ..... is a short sequence of DNA where the repressor binds, preventing RNA polymerase from attaching to the..... .


**19.** DNA fingerprinting works on the principle of ..... _ In DNA sequences.

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**20.** The scientist who suggested that the genetic code should be made of a combination of three nucleotides.

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**21.** The codon which acts as initiation codon and also codes for-amino acid methionine.

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## Part Ii Questions For Practice Short Answer Type Questions

**1.** Write short note on peptide bonds

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**2.** Unambiguous, universal and degenerate are some of the terms used for the genetic code. Explain the salient features of each of them.

 Watch Video Solution

**3.** Write short note on aminoacylation in translation.

Watch Video Solution

**4.** List two essential roles of ribosome during translation.

Watch Video Solution

**5.** Write short note on operon

Watch Video Solution

**6.** What is DNA fingerprint ? Mention its application.

Watch Video Solution

**7.** Explain DNA polymorphism as the basis of genetic mapping of human genome.

Watch Video Solution

**8.** State the role of VNTR in DNA fingerprinting.

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## Part Ii Questions For Practice Long Answer Type Questions

**1.** How do mRNA, tRNA and ribosomes help in the process of translation?

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**2.** Describe the transiation of prokaryotes.

Watch Video Solution

**3.** Describe the transiation of prokaryotes.

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## Part Ii Questions For Assessment Very Short Answer Type Questions

**1.** In split genes coding sequences are _____

A. cistrons

B. operons

C. exons

D. introns

**Answer: C**

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**2.** The non-sense codons

A. have no role in biological systems

B. act as terminators during protein synthesis

C. are of little value in transcription

D. have a poor role in transcription

**Answer: B**

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**3.** If a cell is treated with a chemical that blocks nucleic acid synthesis, which of the following processes is the most likely one to be affected first?

A. DNA replication

B. tRNA synthesis

C. mRNA synthesis

D. Protein synthesis

**Answer: A**

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**4.** Fill In The blank : Aminoacyl synthetase enzyme take part in .....

A. attachment of mRNA to 30S ribosome

B. transfer of activated amino acids to tRNA

C. activation of amino add

D. hydrolysis of ATP to AMP

**Answer: C**

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**5.** Correct the statement, if required, by changing the word " Galactose" is an inducer molecule

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**6.** Correct the statement, if required, by changing the underlined word

. $\underline{tRNA}$ carries the codes for amino acid sequence.

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**7.** RNA can give rise to DNA through the enzyme .....

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**8.** The movement of a ribosome from 5' -3' end of mRNA to recognise all codons during protein synthesis is called ..... .

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**9.** All the termination codons begin with the nucleotide of :

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**10.** The scientist who proposed the operon concept?

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## Part Ii Questions For Assessment Short Answer Type Questions

**1.** Write short note on wobble hypothesis

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**2.** A genetic code is specific and nearly universal. Justify

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**3.** There are 64 codons in the genetic code dictionary.

(i)How many of them code for amino acids?

(ii) How many amino acids are coded?

(iii) What term would you give to those codons, which do not code for amino acids?

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**4.** A tRNA is charged with the amino acid methionine.

(i) N rune the process involved in attachment.

(ii) Point out the mRNA codon and anticodon on tRNA for this amino acid.

(iii) Name the enzyme responsible for this attachment.

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**5.** Write down the possible levels of regulation of gene expression in eukaryotes.

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## Part Ii Questions For Assessment Long Answer Type Questions

**1.** Describe the transiation of prokaryotes.

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## Part Ii Questions For Assessment Differentiate Between The Following

**1.** Differentiate between the following

Template and Coding strand.

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**2.** Differentiate between the following

mRNA and tRNA

 Watch Video Solution

**3.** Differentiate between the following

DNA polymerase and DNA ligase.

 Watch Video Solution

**4.** Differentiate between the following

Codons and Anticodons


**5.** Differentiate between the following

Unambiguous and Degenerate codons.


**6.** Differentiate between the following

S-type cells and R-type cells.

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**7.** Differentiate between the following

VNTR and Probe.

Watch Video Solution

**8.** Differentiate between the following

Regulator gene and Operator gene.

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**9.** Differentiate between the following

Promoter gene and Structural gene.

Watch Video Solution

**10.** Distinguish between:Leading strand and lagging strand

Watch Video Solution

**11.** Differentiate between the following

Induction and Repression.

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**12.** Differentiate between the following

Translation in prokaryotes and Translation in eukaryotes.

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**13.** Differentiate between the following Transcription in prokaryotes and Transcription in eukaryotes.

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## Odisha Bureau S Textbook Solutions Very Short Answer Type Questions

**1.** In split genes coding sequences are _____

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**2.** The smallest part of gene is called as _____

Watch Video Solution

**3.** The enzyme referred to as Kornberg enzyme is _____

Watch Video Solution

**4.** The polymerase that has 5'-3' exonuclease property is known as ..... .(DNA pol-I, DNA pol-II, RNA pol, DNA ligase)

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**5.** The termination factor that recognises the termination codon UAG is ..... . (only RF1, only RF2, both RF1 and.RF2. neither RF1 and RF2)

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**6.** The enzyme that removes formyl group from the first amino acid methionine of a newly synthesised polypeptide is-……. (R$F_3$ translocase, deformylase, exoaminopeptidase)

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**7.** The term gene was coined by _____

Watch Video Solution

**8.** In 1869 , _____ discovered the DNA .

Watch Video Solution

**9.** The virulent, pneumococcus possessed a ..... coat for its protection. (protein, lipid, phospholipid, ·polysaccharide)'

Watch Video Solution

**10.** Complete sequence of amino acids in_ ..... Was proposed by Sanger.

(insulin, haemoglobin, kinetin, polymerase)

Watch Video Solution

**11.** RNAs lack ..... as nitrogenous base.

(adenine, guanine, cytosine, thymine)

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**12.** One complet turn of B-DNA contains ..... .. number of nitrogenous bases. (10, 11,9,12)


**13.** The most stable form of RNA is ..... RNA (messenger, transfer, ribosomal)

**14.** When more than one codon codes for same amino acid, it is called ..... codon.

(degenerate, nonsense, universal)

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**15.** The start codon is.....

UM, UGA, AUG, UGA

Watch Video Solution

**16.** If in a double-stranded DNA there is 25% of thymine, then calculate the per cent of guanine.

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**17.** What is the complementary base of adenine in RNA?

Watch Video Solution

**18.** In a double helix if one strand is on 5' $\rightarrow$ 3', what will be arrangement of other strand?

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**19.** What are the basic proteins called in eukaryotic DNA?

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**20.** Some amino acids are coded by more than one codon hence the code is :

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**21.** What type of genes do express continuously?

 Watch Video Solution

**22.** What type of RNAs do carry amino acids to the site of protein synthesis ?

Watch Video Solution

**23.** Watson and Griffith proposed the double helical structure of DNA

Watch Video Solution

**24.** Correct the sentences in each bit without changing the underlined words

A nucleoprotein is building block of all nucleic acid

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**25.** Correct the sentences in each bit without changing the underlined words

The strand of the DNA double helix

represent nucleotide phosphate backbone and are antiparallel

Watch Video Solution

**26.** Correct the sentences in each bit without changing the underlined words

The helical turns are right handed is $\underline{Z}$ DNA.

Watch Video Solution

**27.** Correct the sentences in each bit without changing the underlined words

Avery, Mc Carty and Macleod experimentally proved that the transforming principle is a protein.

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**28.** Correct the sentences in each bit without changing the underlined words

Meischer proposed the transforming principle

Watch Video Solution

**29.** Correct the sentences in each bit without changing the underlined words

The enzyme ligase is responsible for $\underline{transcription}$

Watch Video Solution

**30.** Correct the sentences in each bit without changing the underlined words

The operator is under the control of a

repressor molecule synthesised by structural gene which is not a part of operon.

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**31.** Correct the sentences in each bit without changing the underlined words

The example of regulatory gene is genes of respiratory enzymes.

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**32.** Correct the sentences in each bit without changing the underlined words

$\underline{P-site}$ in prokaryotes only accepts $(tRNA)^{met}$

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**33.** Correct the sentences in each bit without changing the underlined words

The coding or translatable sequences are $\underline{\int rons}$

Watch Video Solution

**34.** Correct the sentences in each bit without changing the underlined words

The structural genes transcribe $\underline{tRNA \text{ and } rRNA}$.

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**35.** Correct the sentences in each bit without changing the underlined words

A $\underline{\text{primer}}$ is a small DNAor RNA strand hydrogen bonded to a template

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**36.** Correct the sentences in each bit without changing the underlined words

In $\underline{DNAreplication}$ as per semiconservative model, two new strands synthesised, form new DNA molecules.

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**37.** The enzyme .....hydrolyses DNA molecules.

Watch Video Solution

**38.** Clover leaf model of tRNA was proposed by ..... .

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**39.** The segment of DNA that expresses specific character is called .....

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**40.** The enzyme ..... helps to join nucleotides.

Watch Video Solution

**41.** The DNA strand which takes part in transcription is called .. ..... .

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**42.** UAG is .. ..... codon.

Watch Video Solution

**43.** The gene which becomes active due to the presence of specific substance is called ..... .... .. gene.

Watch Video Solution

**44.** To identify criminals DNA." ..... ..... is done.

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## Odisha Bureau S Textbook Solutions Short Answer Type Questions

**1.** Inducible operon

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**2.** Repressible operon

Watch Video Solution

**3.** Housekeeping gene

Watch Video Solution

**4.** Adaptor molecules

Watch Video Solution

**5.** Split genes

Watch Video Solution

**6.** RNA splicing

Watch Video Solution

**7.** Termination of translation

Watch Video Solution

**8.** Okazaki fragments are :

Watch Video Solution

**9.** Write a short note on central dogma.

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## Odisha Bureau S Textbook Solutions Differentiate With Atleast 2 Valid Points

**1.** Genes and Chromosomes

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**2.** DNAandRNA

Watch Video Solution

**3.** Purines and Pyrimidines

Watch Video Solution

**4.** Explain {in one or two lines) the function of the following

(i) Introns (ii) Exons

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**5.** B-DNA and Z-DNA.

Watch Video Solution

**6.** Distinguish between:Replication and transcription

Watch Video Solution

**7.** Distinguish between:Transcription and translation

Watch Video Solution

**8.** Housekeeping gene and Inducible gene

Watch Video Solution

**9.** Degenerate codon and Nonsense codon.

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## Odisha Bureau S Textbook Solutions Long Answer Type Questions

**1.** What are different forms of DNA?

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**2.** Describe the semiconservative model of DNA replication

Watch Video Solution

**3.** Describe the transiation of prokaryotes.

Watch Video Solution

**4.** Give an account of the operon model.

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## Chapter Practice Very Short Answer Type Questions

**1.** One of the following is true with respect to AUG :

A. It codes for methionine only

B. It is also an initiation codon

C. It codes for methionine in both prokaryotes and eukaryotes

D. All of the above

**Answer: D**

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**2.** Which of the following are the functions of RNA ?

A. It is a carrier of genetic information from DNA to ribosomes

B. It carries amino acids to ribosomes

C. It is a constituent component of ribosomes

D. All of the above

**Answer: A**

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**3.** The two strands of DNA are

A. similar in nature and complementary

B. antiparallel and complementary

C. basically different in nature

D. parallel and complementary

**Answer: D**

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**4.** A polypeptide is assembled on :

A. DNA molecule

B. nuclear membrane

C. nuclear pore

D. ribosome

**Answer: D**

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**5.** Which one of the following codons are not recognised by any aminoacyl tRNA?

A. UAA

B. UAG

C. UGA

D. All of these

**Answer: D**

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**6.** Correctthe statements, if required, by changing the underlined word (s)

Semiconservative type ofDNAreplication was postulated by $\underline{Meselson \text{ and } Stahl}$

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**7.** Correct the statements, if required, by changing the underlined word(s)

$\underline{\mathbb{C}C}$is the initiation codon.

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**8.** Termination codons are called Ochre, Amber and _____.

Watch Video Solution

**9.** New strands of DNA are formed only in the _____ direction.

Watch Video Solution

**10.** DR. Hargobind khurana has been awarded Nobel prize for research on :

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**11.** Express in one or two word(s)

Name the smallest unit that is capable of polynucleotide synthesis.

Watch Video Solution

**12.** Express in one or two word(s)

Name any two stop codons

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## Chapter Practice Short Answer Type I Questions

**1.** Write short note on Z-DNA.

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**2.** Write short note on Chargaff's rule

Watch Video Solution

**3.** What are the functions of

(i) methylated guanosine cap?

(ii) poly-A 'tail'in a mature RNA?

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**4.** What are 5'-end and 3'-end of a polynucleotide

Watch Video Solution

**5.** Write down the possible levels of regulation of gene expression in eukaryotes.

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## Chapter Practice Short Answer Type Ii Questions

**1.** Differentiate between A-DNA and Z-DNA

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## Chapter Practice Long Answer Type Questions

**1.** With the help of a diagram explain the structure of DNA.

Watch Video Solution

**2.** Discuss the process of translation in detail.

Watch Video Solution