



# INDIAN SCHOOL DARSAIT DEPARTMENT OF BIOLOGY



Subject : Biology

Topic : Molecular basis of  
Inheritance

Date of worksheet : 27-4-2017

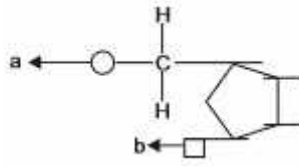
Resource Person: Zehra Fatima

Date of Submission : \_\_\_\_\_

Name of the Student : \_\_\_\_\_

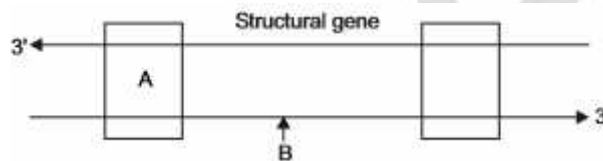
Class & Division : XII A & B Roll Number : \_\_

S.No.	Very Short Answer Questions	Marks
1	Name the components 'a' and 'b' in the nucleotide with a purine, given below:	1



(CBSE Delhi & Foreign, 2008)

2	Name the parts 'A' and 'B' of the transcription unit given below.	1
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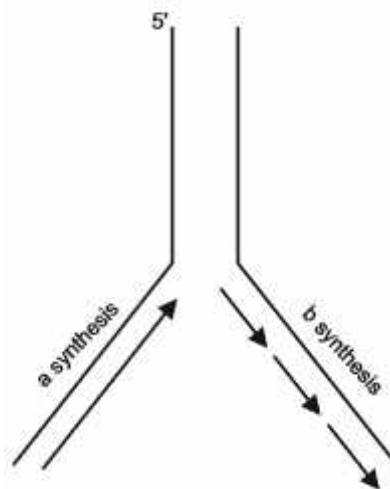
(CBSE Delhi 2008)

3	Name the technique used for separating DNA fragments in the laboratory.	1
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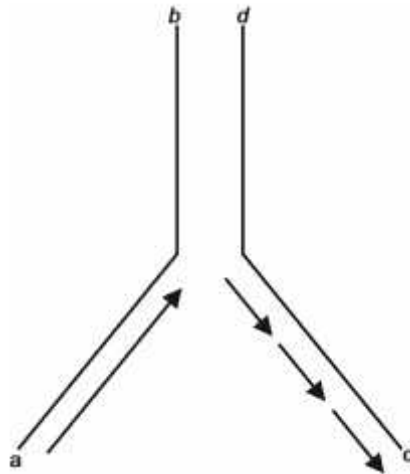
(CBSE Delhi 2008)

4	Name the types of synthesis 'a' and 'b' occurring in the replication fork of DNA as shown below:	1
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(CBSE Delhi 2008)

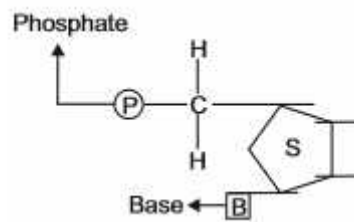


- 5 Mention the polarity of the DNA strands a—b and c—d shown in the replicating fork given below. 1



(CBSE AI 2008)

- 6 Mention the carbon positions to which the nitrogenous base and the phosphate molecule are respectively linked in the nucleotide given below: 1

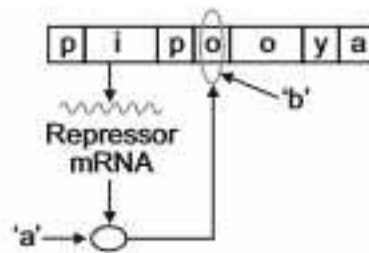


(CBSE AI 2008)

- 7 What is the significance of the process of RNA interference (RNAi) in eukaryotic organisms? 1

(CBSE Foreign 2008)

- 8 Given below is a schematic representation of a lac operon in the absence of an inducer. Identify 'a' and 'b' in it. 1



(CBSE Foreign 2008)

- 9 What are a and b in the transcription unit represented below? 1

(CBSE Foreign 2008)



- 10 Why hnRNA is required to undergo splicing? 1

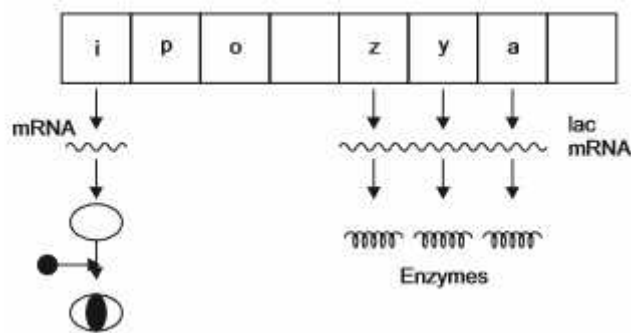
(CBSE Delhi 2009)

- 11 Mention the two additional processings which hnRNA needs to undergo after splicing so as to become functional. (CBSE Delhi 2009) 1
- 12 When and at what end does the 'tailing' of hnRNA take place? (CBSE AI 2009) 1
- 13 What type of virus causes AIDS? Name its genetic material. (CBSE AI 2009) 1
- 14 At which ends do 'capping' and 'tailing' of hnRNA occur respectively? (CBSE Foreign 2009) 1
- 15 Mention two functions of the codon AUG. (CBSE Delhi 2010) 1
- 16 Name the enzyme involved in the continuous replication of DNA strand. Mention the polarity of the template strand. (CBSE AI 2010) 1
- 17 How is the action of exonuclease different from that of endonuclease? (CBSE AI 2010) 1
- 18 Mention the role of the codons AUG and UGA during protein synthesis. (CBSE Delhi 2011) 1
- 19 Mention the contribution of genetic maps in human genome project. (CBSE AI 2011) 1
- 20 Name the enzyme and state its property that is responsible for continuous and discontinuous replication of the two strands of a DNA molecule. (CBSE Delhi 2013) 1
- 21 How does the flow of genetic information in HIV deviate from the 'Central dogma' proposed by Francis Crick? (CBSE Foreign 2013) 1
- 22 Mention how does DNA polymorphism arise in a population. (CBSE Delhi 2014) 1
- 23 How is repetitive/satellite DNA separated from bulk genomic DNA for various genetic experiments? (CBSE Delhi 2014) 1
- 24 Name the transcriptionally active region of chromatin in a nucleus. (CBSE Delhi 2015) 1
- 25 What is Cistron? (CBSE AI 2015) 1
- 26 How does a degenerate code differ from an unambiguous one? (CBSE Foreign 2015) 1
- 27 Write the function of RNA polymerase II. (CBSE Foreign 2015) 1
- 28 Give an example of a codon having dual function. (CBSE Delhi 2016) 1

- 29 Mention one difference to distinguish an exon from an intron. (CBSE Foreign 2016) 1
- 30 A region of a coding DNA strand has the following nucleotide sequence: 1  
**-ATGC-**  
 What shall be the nucleotide sequence in  
 i) sister DNA segment it replicates, and  
 ii) m-RNA polynucleotide it transcribes. (CBSE Foreign 2017)
- 31 What is the role of histone protein in packaging of DNA in Eukaryotes. 1  
 (CBSE Foreign 2017)
- 32 How many base pairs would a DNA segment of length 1.36mm have? 1  
 (CBSE Foreign 2017)

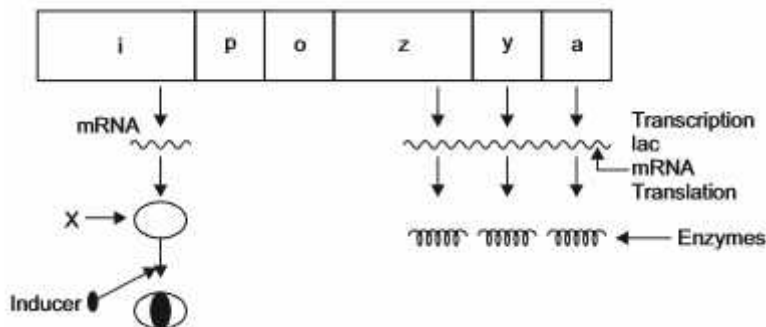
### Short Answer Questions

- 33 How is the translation of mRNA terminated? Explain. (CBSE Delhi 2009) 2
- 34 Study the figure given below and answer the questions: 2



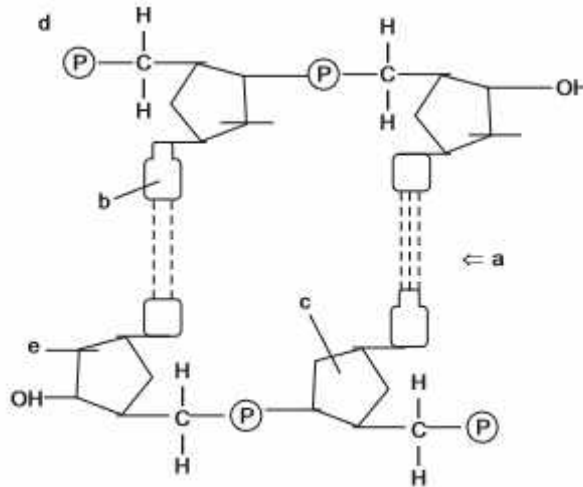
- (a) How does the repressor molecule get inactivated?  
 (b) When does the transcription of lac mRNA stop?  
 (c) Name the enzyme transcribed by the gene 'z'. (CBSE Delhi 2009)

- 35 2



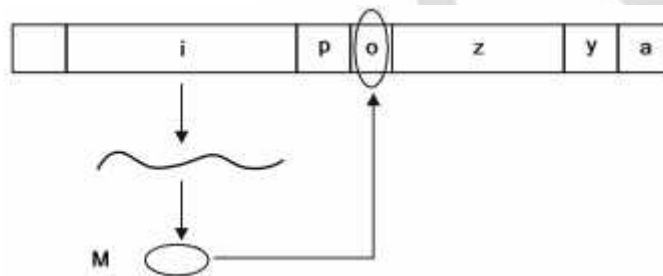
- (a) Name the molecule 'X' synthesised by 'i' gene. How does this molecule get inactivated?  
 (b) Which one of the structural genes codes for b-galactosidase?  
 (c) When will the transcription of this gene stop? (CBSE AI 2009)
- 36 Explain the dual function of AUG codon. Give the sequence of bases it is transcribed from and its anticodon. 2  
 (CBSE AI 2009)

- 37 Study the given portion of double stranded polynucleotide chain carefully. Identify a, b, c and the 5' end of the chain. (CBSE AI 2009) 2



- 38 Name the category of codons UGA belongs to. Mention another codon of the same category. Explain their role in protein synthesis. (CBSE Foreign 2009) 2

- 39 2



- (a) Name the molecule 'M' that binds with the operator.  
 (b) Mention the consequences of such binding.  
 (c) What will prevent the binding of the molecule 'M' with the operator gene? Mention the event that follows. (CBSE Foreign 2009)

- 40 Differentiate between a template strand and a coding strand of DNA. (CBSE Foreign 2009) 2

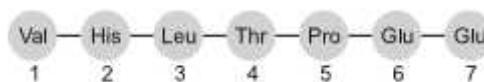
- 41 Mention the role of ribosomes in peptide-bond formation. How does ATP facilitate it? (CBSE AI 2010) 2

- 42 How do histones acquire positive charge? (CBSE Delhi 2011) 2

- 43 Explain the process of RNA interference. (CBSE Delhi 2011) 2

- 44 Write the full form of VNTR. How is VNTR different from 'probe'? (CBSE AI 2011) 2

- 45 A relevant portion of  $\alpha$ -chain of haemoglobin of a normal human is given below: 2




The codon for the sixth amino acid is GAG. The sixth codon GAG mutates to GAA as a result of mutation 'A' and into GUG as a result of mutation 'B'. Haemoglobin structure did not change as a result of mutation 'A' whereas haemoglobin structure changed because of mutation 'B' leading to sickle shaped RBCs. Explain giving reasons how could mutation 'B' change the haemoglobin structure and not mutation 'A'. (CBSE AI 2011)

- 46 Draw a neat labelled sketch of a replicating fork of DNA. (CBSE Delhi 2012) 2
- 47 Draw a schematic diagram of a part of double stranded dinucleotide DNA chain having all the four nitrogenous bases and showing the correct polarity. (CBSE Delhi 2012) 2
- 48 (a) Draw a neat labelled diagram of a nucleosome. 2  
(b) Mention what enables histones to acquire a positive charge. (CBSE AI 2012)
- 49 State the functions of the following in a prokaryote: (i) tRNA (ii) rRNA 2  
(CBSE AI 2012)
- 50 Draw a labelled schematic diagram of a transcription unit. (CBSE Foreign 2012) 2
- 51 Draw the structure of a tRNA charged with methionine. (CBSE Foreign 2012) 2
- 52 Draw a schematic diagram of lac operon in its 'switched off' position. Label the following: 2  
(i) The structural genes  
(ii) Repressor bound to its correct position  
(iii) Promoter gene  
(iv) Regulatory gene. (CBSE Foreign 2012)
- 53 (i) Name the scientist who suggested that the genetic code should be made of a 2  
combination of three nucleotides.  
(ii) Explain the basis on which he arrived at this conclusion. (CBSE Delhi 2014)
- 54 State the difference between the structural genes in a transcription unit of prokaryotes and 2  
eukaryotes. (CBSE AI 2014)
- 55 Explain the two factors responsible for conferring stability to double helix structure of 2  
DNA. (CBSE AI 2014)
- 56 A template strand is given below. Write down the corresponding coding strand and the 2  
mRNA strand that can be formed, along with their polarity.  
3 ATGCATGCATGCATGCATGC 5 (CBSE Foreign 2014)
- 57 One of the salient features of the genetic code is that it is nearly universal from bacteria to 2  
humans. Mention two exceptions to this rule. Why are some codes said to be degenerate?  
(CBSE Foreign 2014)
- 58 Draw a labelled diagram of a nucleosome. Where is it found in a cell?(CBSE Foreign 2014) 2

- 59 Discuss the role the enzyme DNA ligase plays during DNA replication. 2  
(CBSE Delhi 2016)
- 60 Following are the features of genetic codes. What does each one indicate ? 2  
Stop codon; Unambiguous codon; Degenerate codon; Universal codon. (CBSE AI 2016)
- 61 Mention two applications of DNA polymorphism. (CBSE Foreign 2016) 2  
Genetic mapping  
DNA finger printing
- 62 Differentiate between the genetic codes given below : (CBSE 2017) 2  
(a) Unambiguous and Universal (b) Degenerate and Initiator

### Short Answer Questions

- 63 One of the codons on mRNA is AUG. Draw the structure of tRNA adapter molecule for this codon. Explain the uniqueness of this tRNA. 3  
(CBSE Delhi 2008)
- 64 (a) One of the codons on mRNA is AUG. Draw the structure of tRNA adapter molecule for this codon. 3  
(b) Name the RNA polymerase that transcribes tRNA in eukaryotes.  
(c) What is unique about the amino acid this tRNA binds with? (CBSE Foreign 2008)
- 65 Given below is a part of the template strand of a structural gene: (CBSE Delhi 2008) 3  
TAC CAT TAG GAT  
(a) Write its transcribed mRNA strand with its polarity.  
(b) Explain the mechanism involved in initiation of transcription of this strand.
- 66 The length of a DNA molecule in a typical mammalian cell is calculated to be approximately 2.2 metres. How is the packaging of this long molecule done to accommodate it within the nucleus of the cell? 3  
(CBSE Delhi 2008)
- 67 Explain the process of charging of tRNA. Why is it essential in translation? 3  
(CBSE Delhi 2008)
- 68 (a) Draw the structure of the initiator tRNA adaptor molecule. 3  
(b) Why is tRNA called an adaptor molecule? (CBSE AI 2008)
- 69  3

Study the mRNA segment given above which is complete to be translated into a polypeptide chain.

- Write the codons 'a' and 'b'.
- What do they code for?
- How is peptide bond formed between two amino acids in the ribosome?

(CBSE AI 2008)

70 What is hnRNA? Explain the changes hnRNA undergoes during its processing to form mRNA. (CBSE Foreign 2008) 3

71 Draw a labelled schematic sketch of replication fork of DNA. Explain the role of the enzymes involved in DNA replication. (CBSE Delhi 2009) 3

72 (a) Draw a schematic representation of the structure of a transcription unit and show the following in it: 3

- (i) Direction in which the transcription occurs
- (ii) Polarity of the two strands involved
- (iii) Template strand
- (iv) Terminator gene

(b)Mention the function of promoter gene in transcription. (CBSE AI 2009)

73  3

- (a) Identify the polarity from a to a' in the above diagram and mention how many more amino acids are expected to be added to this polypeptide chain.
- (b) Mention the DNA sequence coding for serine and the anticodon of tRNA for the same amino acid.
- (c) Why are some untranslated sequence of bases seen in mRNA coding for a polypeptide? Where exactly are they present on mRNA? (CBSE Foreign 2009)

74 Describe the initiation process of transcription in bacteria. (CBSE Delhi 2010) 3

75 Describe the elongation process of transcription in bacteria. (CBSE Delhi 2010) 3

76 Describe the termination process of transcription in bacteria. (CBSE Delhi 2010) 3

77 In a series of experiments with Streptococcus and mice F. Griffith concluded that R-strain bacteria had been transformed. Explain. (CBSE AI 2010) 3

78 Draw a schematic representation of dinucleotide. Label the following: 3

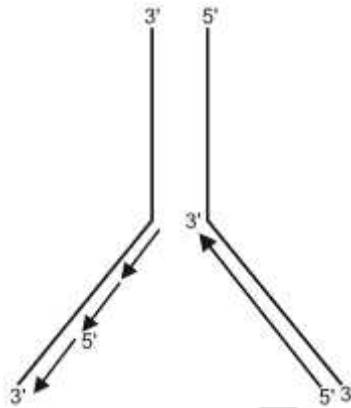
- (i) The components of a nucleotide
- (ii) 5' end
- (iii) N-glycosidic linkage
- (iv) Phosphodiester linkage.

(CBSE Foreign 2010)



- 79 The base sequence in one of the strands of DNA is TAGCATGAT. 3
- Give the base sequence of its complementary strand.
  - How are these base pairs held together in a DNA molecule?
  - Explain the base complementarity rules. Name the scientist who framed this rule. (CBSE Delhi 2011)

- 80 3



Why do you see two different types of replicating strands in the given DNA replication fork? Explain. Name these strands. (CBSE Delhi 2011)

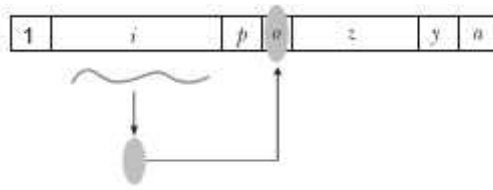
- 81 (i) Name the enzyme that catalyses the transcription of hnRNA. 3
- (ii) Why does the hnRNA need to undergo changes? List the changes that hnRNA undergoes and where in the cell such changes take place. (CBSE AI 2011)

- 82 Unambiguous, universal and degenerate are some of the terms used for the genetic code. 3
- Explain the salient features of each one of them. (CBSE AI 2011)

- 83 (a) Name the scientist who called tRNA an adaptor molecule. 3
- (b) Draw a clover leaf structure of tRNA showing the following:
- Tyrosine attached to its amino acid site.
  - Anticodon for this amino acid in its correct site (codon for tyrosine is UCA).
- (c) What does the actual structure of tRNA look like? (CBSE AI 2011)

- 84 Answer the following questions based on Meselson and Stahl's experiment: 3
- Write the name of the chemical substance used as a source of nitrogen in the experiment by them.
  - Why did the scientists synthesise the light and the heavy DNA molecules in the organism used in the experiment?
  - How did the scientists make it possible to distinguish the heavy DNA molecule from the light DNA molecule? Explain.
  - Write the conclusion the scientists arrived at after completing the experiment. (CBSE AI 2011)

- 85 Given below is a schematic representation of lac operon: 3



- (a) Identify i and p.  
 (b) Name the 'inducer' for this operon and explain its role. (CBSE Foreign 2011)
- 86 It is established that RNA is the first genetic material. Explain giving three reasons. 3  
 (CBSE Delhi 2012)
- 87 (a) Name the enzyme responsible for the transcription of tRNA and the amino acid the initiator tRNA gets linked with. 3  
 (b) Explain the role of initiator tRNA in initiation of protein synthesis. 3  
 (CBSE Delhi 2012)
- 88 (a) Construct a complete transcription unit with promoter and terminator on the basis of the hypothetical template strand given below: 3
- 
- (b) Write the RNA strand transcribed from the above transcription unit along with its polarity. (CBSE Delhi 2012)
- 89 List the salient features of double helix structure of DNA. (CBSE AI 2012) 3
- 90 How are the structural genes activated in the lac operon in E. coli? (CBSE AI 2012) 3
- 91 Why is DNA considered a better hereditary material than RNA? 3  
 (CBSE Foreign 2012)
- 92 How is hnRNA processed to form mRNA? (CBSE Foreign 2012) 3
- 93 How are the DNA fragments separated and isolated for DNA fingerprinting? Explain. 3  
 (CBSE Foreign 2012)
- 94 State the conditions when 'genetic code' is said to be 3  
 (i) degenerate,  
 (ii) unambiguous and specific,  
 (iii) universal. (CBSE Foreign 2012)
- 95 Explain the process of translation in a bacterium. (CBSE Foreign 2012) 3
- 96 Explain the process of transcription in a bacterium. (CBSE Foreign 2012) 3
- 97 Describe the structure of a RNA polynucleotide chain having four different types of nucleotides. 3  
 (CBSE Delhi 2013)
- 98 (a) Explain DNA polymorphism as the basis of genetic mapping of human genome. 3

- (b) State the role of VNTR in DNA fingerprinting. (CBSE Delhi 2013)
- 99 In a maternity clinic, for some reasons the authorities are not able to hand over the two newborns to their respective real parents. Name and describe the technique that you would suggest to sort out the matter. (CBSE Delhi 2013) 3
- 100 Explain the role of RNA polymerase in transcription in bacteria. (CBSE Foreign 2013) 3
- 101 Describe the experiment that demonstrated the semi-conservative mode of DNA replication (CBSE Foreign 2013) 3
- 102 Describe the experiment that proved that DNA is the genetic material. (CBSE Foreign 2013) 3
- 103 Describe the experiment with *Streptococcus pneumoniae* that demonstrated the existence of some “transforming principle”. (CBSE Foreign 2013) 3
- 104 (a) Name the scientist who postulated the presence of an adapter molecule that can assist in protein synthesis. 3  
(b) Describe its structure with the help of a diagram. Mention its role in protein synthesis. (CBSE Foreign 2014)
- 105 (a) A DNA segment has a total of 1000 nucleotides, out of which 240 of them are adenine containing nucleotides. How many pyrimidine bases this DNA segment possesses? 3  
(b) Draw a diagrammatic sketch of a portion of DNA segment to support your answer. (CBSE Delhi 2015)

**OR**

- a) A segment has a total of 1,500 nucleotides, out of which 410 are Guanine containing nucleotides. How many pyrimidine bases this segment possesses ?  
(b) Draw a diagrammatic sketch of a portion of DNA segment to support your answer.

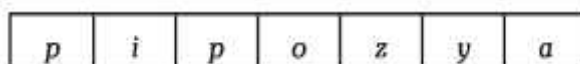
**OR**

- (a) A DNA segment has a total of 2,000 nucleotides, out of which 520 are adenine containing nucleotides. How many purine bases this DNA segment possesses ?  
(b) Draw a diagrammatic sketch of a portion of DNA segment to support your answer.

- 106 Following the collision of two trains a large number of passengers are killed. A majority of them are beyond recognition. Authorities want to hand over the dead to their relatives. Name a modern scientific method and write the procedure that would help in the identification of kinship. (CBSE Delhi 2015) 3
- 107 Explain the significance of satellite DNA in DNA fingerprinting technique. (CBSE AI 2015) 3
- 108 How was a heavy isotope of nitrogen used to provide experimental evidence to semi-conservative mode of DNA-replication ? (CBSE Foreign 2015) 3

- 109 Describe the experiment that helped demonstrate the semi-conservative mode of DNA replication. (CBSE Delhi 2016) 3
- 110 (a) What do 'Y' and 'B' stand for in 'YAC' and 'BAC' used in Human Genome Project (HGP). Mention their role in the project. 3  
 (b) Write the percentage of the total human genome that codes for proteins and the percentage of discovered genes whose functions are known as observed during HGP.  
 (c) Expand 'SNPs' identified by scientists in HGP. (CBSE AI 2016)
- 111 (a) Why did Hershey and Chase use radioactive sulfur and radioactive phosphorus in their experiment? 3  
 (b) Write the conclusion they arrived at and how. (CBSE Foreign 2016)
- 112 (a) List the two methodologies which were involved in human genome project. Mention how they were used. 3  
 (b) Expand 'YAC' and mention what was it used for. (CBSE 2017)
- 113 Describe the experiments that established the identity of 'transforming principles' of Griffith. (CBSE Foreign 2017) 3
- 114 (a) Draw a labelled schematic diagram of a replication fork showing continuous and discontinuous replication of DNA strands. 3  
 (b) State a reason why is the replication continuous and discontinuous in the diagram drawn. (CBSE Foreign 2017)
- Long Answer Questions**
- 115 Explain Hershey-Chase experiment. What was proved through this experiment? (CBSE Delhi 2008, AI 2009, Delhi 2015) 5
- 116 (a) Explain Griffith's series of experiments where he witnessed transformation in bacteria he worked with. 5  
 (b) Name the scientists responsible for determining the biochemical nature of "transforming principle" in Griffith's experiments. What did they prove? (CBSE Delhi 2008)
- 117 What is 'semi-conservative' DNA replication? How was it experimentally proved and by whom? (CBSE AI & Foreign 2008) 5
- 118 (a) Why is DNA molecule a more stable genetic material than RNA? Explain. 5  
 (b) "Unambiguous", "degenerate" and "universal" are some of the salient features of genetic code. Explain. (CBSE AI 2008)
- 119 Draw a labelled schematic structure of a transcription unit. Explain the function of each component in the unit in the process of transcription. (CBSE AI 2008) 5

- 120 (i) Who explained the 'transforming principle' in an organism? How did the scientist perform the experiment to explain this principle?  
(ii) How was the biochemical nature of the transforming material determined? Explain. (CBSE Foreign 2008)
- 121 (a) Explain the experiment performed by Griffith on *Streptococcus pneumoniae*. What did he conclude from this experiment?  
(b) Name the three scientists who followed up Griffith's experiments.  
(c) What did they conclude and how? (CBSE Delhi 2009) 5
- 122 How did Hershey and Chase prove that DNA is the hereditary material? Explain their experiment with suitable diagrams. (CBSE Delhi & AI 2009) 5
- 123 (a) What did Meselson and Stahl observe when  
(i) they cultured *E. coli* in a medium containing  $^{15}\text{NH}_4\text{Cl}$  for a few generations and centrifuged the content?  
(ii) they transferred one such bacterium to the normal medium of  $\text{NH}_4\text{Cl}$  and cultured for 2 generations?  
(b) What did Meselson and Stahl conclude from this experiment? Explain with the help of diagrams.  
(c) Which is the first genetic material? Give reasons in support of your answer (CBSE Delhi 2009,2012,Foreign 2009) 5
- 124 (a) How did Griffith explain the transformation of R strain (non-virulent) bacteria into S strain (virulent)?  
(b) Explain how MacLeod, McCarty and Avery determined the biochemical nature of the molecule responsible for transforming R strain bacteria into S strain bacteria. (CBSE AI 2009) 5
- 125 Explain the steps of DNA fingerprinting that will help in processing of the two blood samples A and B picked up from the crime scene. (CBSE Foreign 2009) 5
- 126 How did Alfred Hershey and Martha Chase arrive at the conclusion that DNA is the genetic material? (CBSE AI 2010) 5
- OR
- Describe the Hershey–Chase experiment. Write the conclusion they arrived at after the experiment. (CBSE Foreign 2012)
- 127 Where do transcription and translation occur in bacteria and eukaryotes respectively? Explain the complexities in transcription and translation in eukaryotes that are not seen in bacteria. (CBSE Foreign 2010) 5
- 128 Study the schematic representation of the genes involved in the lac operon given below and answer the questions that follow: 5



- (i) Identify and name the regulatory gene in this operon. Explain its role in 'switching off' the operon.
- (ii) Why is lac operon's regulation referred to as negative regulation?
- (iii) Name the inducer molecule and the products of the genes 'z' and 'y' of the operon. Write the functions of these gene products. (CBSE Foreign 2010)
- 129 (i) Describe the role of RNA polymerases in transcription in bacteria and in eukaryotes. 5
- (ii) Name the scientist who postulated the role of an 'adapter' in protein synthesis. Name the adapter molecule. (CBSE Foreign 2010)
- 130 (i) DNA polymorphism is the basis of DNA finger printing technique. Explain. 5
- (ii) Mention the causes of DNA polymorphism. (CBSE Foreign 2010)
- 131 (a) State the arrangement of different genes that in bacteria is referred to as 'operon'. 5
- (b) Draw a schematic labelled illustration of lac operon in a 'switched on' state.
- (c) Describe the role of lactose in lac operon. (CBSE AI 2011)
- 132 (a) Explain the process of aminoacylation of tRNA. Mention its role in translation. 5
- (b) How do ribosomes in the cells act as factories for protein synthesis?
- (c) Describe 'initiation' and 'termination' phases of protein synthesis. (CBSE Foreign 2011)
- 133 (a) Explain the role of DNA dependent RNA polymerase in initiation, elongation and termination during transcription in bacterial cell. 5
- (b) How is transcription a more complex process in eukaryotic cells? Explain. (CBSE Foreign 2011)
- 134 (a) Write the scientific name of the bacterium used by Frederick Griffith in his experiment. 5
- (b) How did he prove that some 'transforming principle' is responsible for transformation of the non-virulent strains of bacteria into the virulent form?
- (c) State the biochemical nature of 'transforming principle'.
- (d) Name the scientists who proved it. (CBSE Foreign 2011)
- 135 The average length of a DNA double helix in a typical mammalian cell is approximately 2.2 metres and the dimension of the nucleus is about 10–6 m. 5
- (a) How is it possible that long DNA polymers are packed within a very small nucleus?
- (b) Differentiate between euchromatin and heterochromatin.
- (c) Mention the role of non-histone chromosomal protein. (CBSE Foreign 2011)
- 136 Name the scientists who proved experimentally that DNA is the genetic material. Describe their experiment. 5 (CBSE Delhi 2012)
- 137 Describe Frederick Griffith's experiment on *Streptococcus pneumoniae*. Discuss the conclusion he arrived at. 5 (CBSE AI 2012)

- 138 (a) Describe the process of synthesis of fully functional mRNA in a eukaryotic cell. 5  
 (b) How is this process of mRNA synthesis different from that in prokaryotes?  
 (CBSE AI 2012)
- 139 Answer the following questions based on Messelson and Stahl's experiment: 5  
 (a) Why did the scientists use  $^{15}\text{NH}_4\text{Cl}$  and  $^{14}\text{NH}_4\text{Cl}$  as sources of nitrogen in the culture medium for growing *E. coli*?  
 (b) Name the molecule(s) that  $^{15}\text{N}$  got incorporated into.  
 (c) How did they distinguish between  $^{15}\text{N}$  labelled molecules from  $^{14}\text{N}$  ones?  
 (d) Mention the significance of taking the *E. coli* samples at definite time intervals for observations.  
 (e) Write the observations made by them from the samples taken at the end of 20 minutes and 40 minutes respectively.  
 (f) Write the conclusion drawn by them at the end of their experiment.  
 (CBSE Foreign 2012)
- 140 (a) Write the conclusion drawn by Griffith at the end of his experiment with *Streptococcus pneumoniae*. 5  
 (b) How did O. Avery, C MacLeod and M. McCarty prove that DNA was the genetic material? Explain  
 (CBSE Delhi 2013)
- 141 (a) Write the specific features of the genetic code AUG. 5  
 (b) Genetic codes can be universal and degenerate. Write about them, giving one example of each.  
 (c) Explain aminoacylation of the tRNA. (CBSE Delhi 2013)
- 142 (a) Explain the process of DNA replication that occurs in a replication fork in *E. coli*. 5  
 (b) How are translational unit and untranslated regions in mRNA different from each other?  
 (CBSE Foreign 2013)
- 143 (a) Explain the process of DNA replication with the help of a schematic diagram. 5  
 (b) In which phase of the cell cycle does replication occur in Eukaryotes? What would happen if cell division is not followed after DNA replication? (CBSE Delhi 2014)
- 144 (a) Describe the various steps of Griffith's experiment that led to the conclusion of the 'Transforming Principle'. 5  
 (b) How did the chemical nature of the 'Transforming Principle' get established?  
 (CBSE AI 2014)
- 145 Describe how the lac operon operates, both in the presence and absence of an inducer in *E. coli*. 5  
 (CBSE AI 2014)
- 146 Describe the Hershey and Chase experiment. Write the conclusion drawn by the scientists after their experiment. 5  
 (CBSE AI 2014)
- 147 Describe Meselson and Stahl's experiment and write the conclusion they arrived at. 5  
 (CBSE 2014)

- 148 Name the major types of RNAs and explain their role in the process of protein synthesis in a prokaryote. (CBSE Foreign 2014) 5
- 149 How does m-RNA, t-RNA and ribosomes help in the process of translation? (CBSE AI 2015) 5
- 150 (a) Describe the experiment which demonstrated the existence of “transforming principle”.  
(b) How was the biochemical nature of this “transforming principle” determined by Avery, MacLeod and McCarty ? (CBSE Foreign 2015) 5
- 151 How did Alfred Hershey and Martha Chase conclusively establish that DNA is the genetic material ? Explain. (CBSE Foreign 2015) 5
- 152 Explain the process of transcription in Eukaryotes. (CBSE Foreign 2015) 5
- 153 (a) How are the following formed and involved in DNA packaging in a nucleus of a cell?  
(i) Histone octamer  
(ii) Nucleosome  
(iii) Chromatin  
(b) Differentiate between Euchromatin and Heterochromatin. (CBSE Delhi 2016) 5
- 154 Explain the role of lactose as an inducer in a lac operon. (CBSE Delhi 2016) 5
- 155 List the criteria a molecule that can act as genetic material must fulfill. Which one of the criteria are best fulfilled by DNA or by RNA thus making one of them a better genetic material than the other ? Explain. (CBSE Delhi 2016) 5
- 156 Answer the following questions based on Hershey and Chases’s experiments :  
(a) Name the kind of virus they worked with and why ?  
(b) Why did they use two types of culture media to grow viruses in ? Explain.  
(c) What was the need for using a blender and later a centrifuge during their experiments?  
(d) State the conclusion drawn by them after the experiments. (CBSE Delhi 2016) 5
- 157 Describe Meselson and Stahl's experiment that was carried in 1958 on E.Coli. Write the conclusion they arrived at after the experiment. (CBSE AI 2016) 5
- 158 (a) Describe the process of transcription in bacteria.  
(b) Explain the processing the hnRNA needs to undergo before becoming functional mRNA in eukaryotes. (CBSE AI 2016) 5
- 159 (a) Describe the series of experiments of F. Griffith. Comment on the significance of the results obtained.  
(b) State the contribution of Macleod, McCarty and Avery. (CBSE AI 2016) 5
- 160 (a) Name the stage in the cell cycle where DNA replication occurs.  
(b) Explain the mechanism of DNA replication. Highlight the role of enzymes in the 5

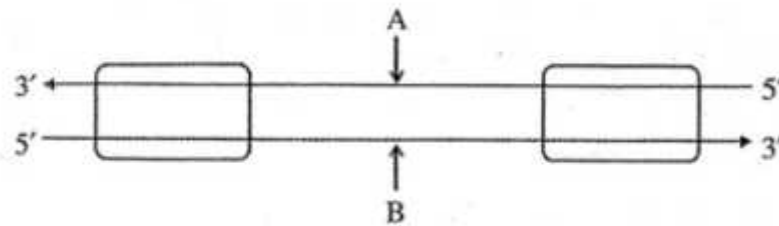


Process

(c) Why is DNA replication said to be semiconservative ?

(CBSE AI 2016)

161



5

(a) Identify strands 'A' and 'B' in the diagram of transcription unit given above and write the basis on which you identified them.

(b) State the functions of Sigma factor and Rho factor in the transcription process in a bacterium.

(c) Write the functions of RNA polymerase-I and RNA polymerase-III in eukaryotes.

(CBSE Foreign 2016)

162

Describe the packaging of DNA helix in a prokaryotic cell and an eukaryotic nucleus.

5

(CBSE Foreign 2016)

163

Describe the interaction of t-RNA, m-RNA and ribosomes during the events of translation.

5

(CBSE Foreign 2017)

164

(a) Describe the structure and function of a t-RNA molecule. Why is it referred to as an adapter molecule ?

5

(b) Explain the process of splicing of hn-RNA in a eukaryotic cell.

(CBSE 2017)

165

Write the different components of a lac-operon in *E. coli*. Explain its expression while in an 'open' state.

5

(CBSE 2017)