



# BIOLOGY

## BOOKS - USHA BIOLOGY (ODIA ENGLISH)

### MOLECULAR BASIS OF INHERITANCE

#### Exercise

1. The term gene was coined by \_\_\_\_\_

A. Garrod

B. Johanssen

C. Meischer

D. Griffith

**Answer: B**



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2. A nucleoside differs from nucleotide is not having the :

A. Sugar

B. Nitrogen base

C. Glucose

D. Phosphate group

**Answer: D**



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**3. Nucleic acid can be fragmented by the enzyme :**

A. Polymerases

B. Nucleases

C. Proteases

D. Ligases

**Answer: B**



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**4. Wobble hypothesis was given by :**

A. R.W. Holley

B. H.G. Khorana

C. M. Nirenberg

D. F.H.C. Crick

**Answer: D**



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5. Out of 64 codons , 61 codons code for 20 types of amino acids , it is called :

A. Degeneracy of genetic code

B. Overlapping of gene

C. Wobbling of codon

D. Universality of codon

**Answer: A**



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**6.** Exons are the expressible part of DNA . They express to form :

A. Sugars

B. Lipid

C. Protein

D. Fatty acid

**Answer: C**



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7. If a type of bacteria can grow on minimal medium containing streptomycin , what can be the probable reason for this action ?

A. A gene was already present in bacteria which detoxify the action of streptomycin

B. On growing in the medium the bacteria acquire the resistance against streptomycin

C. They secrete enzymes against streptomycin

D. Bacteria have cell wall , so streptomycin cannot work against it



**Answer: A**



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8. Which one of the following can give a complimentary and palindromic sequence ?

A. 5' ATATCC 3'

B. 5' CCGAT 3'

C. 5' GAATTC 3'

D. 5' AGGTTC 3'

**Answer: C**



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**9.** An extrachromosomal DNA which can be used as vector in gene cloning is called :

A. Transposon

B. Intron

C. Exon

D. Plasmid

**Answer: D**



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**10.** Which of the following enzymes is used in DNA multiplication ( replication ) ?

- A. RNA polymerase
- B. DNA endonuclease
- C. Exonuclease
- D. DNA polymerase

**Answer: D**



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**11. DNA and RNA differ by**

- A. N - bases and phosphate groups
- B. Number of C - atoms in sugars
- C. N - bases and sugars
- D. Sugar and phosphate groups

**Answer: C**



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12. A bacteriophage with radioactive DNA and protein when infects a bacterium the radioactivity inside the bacterium will be located :

- A. In DNA
- B. In protein
- C. Both in DNA and protein
- D. In all parts of bacterial cell

**Answer: A**



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**13.** The four nitrogen base sequences which form the code words for DNA language are :

A. UTAC

B. ACTU

C. AGGU

D. ATCG

**Answer: D**



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**14.** Which one of the following pairs of terms / names mean one and the same thing ?

A. Gene pool -genome

B. Codon -gene

C. Cistron -triplet

D. DNA fingerprinting -DNA profiling

**Answer: D**



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**15.** The modern concept of gene is :

A. A segment of chromosome

B. A segment of DNA

C. A functional unit of DNA

D. A segment of DNA capable of crossing

over



**Answer: C**



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**16.** If during the initiation of meiosis there is 16 pg of DNA in a gametocyte . Then the amount of DNA present in the gamete will be :

A. 8 pg

B. 16 pg

C. 4 pg

D. 32 pg

**Answer: A**



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**17. Which of the following has clover leaf shape ?**

A. m - RNA

B. r - RNA

C. t - RNA

D. Sn - RNA

**Answer: C**



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**18. Recognition sequence in EcoRI is :**

A. GAATTC

B. GGCC

C. AAGCTT

D. CTGCAG

**Answer: A**



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**19. AUG codes for :**

A. Valine

B. Histidine

C. Phenyl alanine

D. Methionine

**Answer: D**



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20. The repressor in case of lac operon will bind in absence of lactose :

- A. Promotor site
- B. Operator site
- C. Regulator site
- D. Structural gene

**Answer: B**



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21. Identify the plasmid

A. AIUI

B. Hind III

C. EcoRI

D. pBR 322

**Answer: D**



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22. Hn - RNA is :

A. Heterogenous RNA

B. Heterogenesis RNA

C. Homonuclear RNA

D. Useful RNA

**Answer: A**



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**23.** Southern blotting is done for :

A. DNA

B. RNA

C. m - RNA

D. Protein

**Answer: A**



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24. Replication of DNA is in :

A. 3' to 5' direction

B. 5' to 3' direction

C. Both 3' 5' and 5' 3' direction

D. None of the above

**Answer: B**



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25. c - DNA probes are copied from the messenger RNA molecules with the help of :

- A. Restriction enzymes
- B. Reverse transcriptase
- C. DNA polymerase
- D. Adenosine deaminase

**Answer: B**



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26. Which is not correct about translation ?

- A. It starts with AUG
- B. Stopped at termination codon
- C. Based on operon model
- D. Occurs in nucleus

**Answer: D**



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27. During protein synthesis AUG functions as the initiator codon in m - RNA . What should be the anticodon on the t - RNA molecule that picks up and brings the amino acid specified by this codon ?

A. UAC

B. TAC

C. CAU

D. GUA

**Answer: A**



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28. Which of the following hydrolyses internal phosphodiester bonds in a polynucleotide chain ?

A. Lipase

B. Protease

C. Exonuclease

D. Endonuclease

**Answer: D**



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29. In DNA , the two chains of double head to tail arrangement is called :

- A. Anti - parallelism
- B. Semi - conservation
- C. Auto - conservation
- D. Alternation

**Answer: A**



30. In DNA when AGCT occurs , their association is as per which of the pair :

A. AC - GT

B. AG - CT

C. AT - GC

D. All of these

**Answer: C**



**31.** Which one of the following statements is incorrect about the properties of DNA ?

A. DNA is denatured when heated to  $80^{\circ}C$   
or more

B. DNA shows high absorption of UV -  
radiation at 260 nm

C. DNA directly participates in protein  
synthesis



D. Pyrimidines of DNA are cytosine and thymine

**Answer: C**



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**32. Polymerase chain reaction is most useful in**

:

A. DNA synthesis

B. DNA amplification

C. Protein synthesis

D. Amino acid synthesis

**Answer: B**



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**33. What is C - value paradox ?**

A. Haploid DNA content

B. Huge variations in C - values between  
species

C. Constant C - value for all species

D. Diploid DNA content

**Answer: A**



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**34.** If a length of DNA has 45,000 base pairs ,  
how many complete turns will the DNA  
molecule take ?

A. 4500

B. 45000

C. 45

D. 450

**Answer: A**



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**35.** The length of DNA molecule greatly exceeds the dimensions of the nucleus in eukaryotic cells . How is this DNA accommodated ?

A. Super - coiling in nucleosomes

B. DNAase digestion

C. Through elimination of repetitive DNA

D. Deletion of non - essential genes

**Answer: A**



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**36.** E. coli cells with a mutated Z gene of the lac operon cannot grow in medium containing only lactose as the source of energy because :

- A. In the presence of glucose , E. coli cells do not utilize lactose
- B. They cannot transport lactose from the medium into the cells
- C. The lac operon is constitutively active in these cells
- D. They cannot synthesize functional galactosidase

**Answer: D**



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**37. DNA finger printing refers to :**

A. Molecular analysis of profiles of DNA samples

B. Analysis of DNA samples using imprinting device

C. Techniques used for molecular analysis of different specimens of DNA'

D. Techniques used for identification of  
finger prints of individuals

**Answer: A**



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**38.** Which of the following pairs is correctly  
matched ?

A. Central dogma - codon

B. Okazaki fragments - splicing



C. RNA polymerase -Reverse transcription

D. Restriction enzyme - Genetic engineering

**Answer: D**



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**39.** Which one of the following pairs of nitrogenous bases of nucleic acids is wrongly matched with the category mentioned against it ?

A. Guanine , Adenine - Purines

B. Adenine , Thymine - Purines

C. Adenine - Purine

D. Uracil , Cytosine - Pyrimidines

**Answer: B**



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**40.** The number of triplet codons having all the three bases same in 64 triplet codons is :

A. 2

B. 4

C. 6

D. 8

**Answer: B**



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**41.** From bacteria to men nearly universal code for phenyl alanine is :

A. UUU

B. UUG

C. UUA

D. CUU

**Answer: A**



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**42.** True replication of DNA is possible due to :

A. Hydrogen bonding

B. Phosphate backbone

C. Complementary base pairing rule

D. None of the above

**Answer: C**



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**43.** Out of A - T , G - C pairing , bases of DNA may exist in alternate valency state owing to arrangement called :

A. Tautomerisational mutation

B. Analogue substitution

C. Point mutation

D. Frameshift mutation

**Answer: A**



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**44.** The length of DNA having 23 base pairs is :

A. 78

B. 78.4

C. 74.8

D. 78.2

**Answer: C**



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**45.** Which of the following codons has no t -  
RNA ?

A. UAA

B. UAU

C. UGU

D. UGC

**Answer: A**



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**46.** In split genes coding sequences are

\_\_\_\_\_

A. Introns



B. Operons

C. Exons

D. Cistrons

**Answer: C**



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**47.** The smallest part of gene is called as

\_\_\_\_\_

A. Recon

B. Muton

C. Exon

D. Cistron

**Answer: B**



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**48.** In 1869 , \_\_\_\_\_ discovered the DNA .

A. Garrod

B. Meisecher

C. Watson

D. Johannsen

**Answer: C**



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

A. Four regulatory genes only

B. One regulatory gene and three structural genes

C. Two regulatory genes and two structural genes

D. Three regulatory genes and three structural genes

**Answer: B**



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**50.** In Lac operon , i gene codes for :

A. Inducer of lac operon

B. Repressor of lac operon

C. Hydrolysis of disaccharide

D. Permease

**Answer: B**



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**51.** Which one of the following has dual functions ? It codes for methionine and also acts as initiator codon ?

A. AUG

B. ACU

C. AUC

D. ACA

**Answer: A**



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**52. Purines possess nitrogen at :**

A. 1 , 2 , 4 and 6 position

B. 1 , 3 , 5 and 7 position

C. 1, 3 , 7 and 9 position

D. 1, 2, 6 and 8 position

**Answer: C**



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**53.** Mobile genetic sequence are called :

A. Exons

B. Introns

C. Cistrons

D. Transposons

**Answer: D**



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**54.** The portion of DNA which contains information for an entire polypeptide is called

:

A. Operon



B. Cistron

C. Muton

D. Recon

**Answer: B**



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**55.** The place where RNA - polymerase attaches with the DNA is called :

A. Promoter site

B. Operator site

C. Activator site

D. Repressor site

**Answer: A**



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**56.** RNA directs the building of proteins through a sequence of :

A. Exons

B. Introns

C. Codons

D. Anticodons

**Answer: C**



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**57.** Choose the correct option : 1) Six codons do not code for any amino acid 2) Codon is read in m - RNA in a continuous fashion 3)

Three codons function as stop codons 4) The initiator codon AUG codes for methionine

A. 1, 2 and 4 are wrong

B. 1, 2 and 3 are wrong

C. 2, 3 and 4 are wrong

D. 2 alone is wrong

**Answer: C**



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58. The unequivocal proof of DNA as the genetic material came from the studies on :

A. Fungus

B. Viroid

C. Bacterium

D. Bacterial virus

**Answer: C**



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59. DNA contains nucleobases , sugars and phosphate . Removal of which among these from a DNA sample will not significantly affect the length of DNA ?

A. Nucleobases

B. Sugar

C. Phosphate

D. None of these

**Answer: A**



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**60.** Removal of introns and joining the exons in a definite order in a transcription unit is called :

A. Capping

B. Splicing

C. Tailing

D. Transformation

**Answer: B**



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61. The enzyme referred to as Kornberg enzyme is \_\_\_\_\_

- A. DNA polymerase I
- B. DNA polymerase II
- C. RNA polymerase
- D. Ligase

**Answer: A**



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62. Which one of the following is not a part of a transcription unit in DNA ?

- A. The inducer
- B. A terminator
- C. A promoter
- D. The structural gene

**Answer: A**



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63. Which enzyme joins DNA fragments ?

A. DNA ligase

B. DNA polymerase

C. DNA gyrase

D. Topoisomerase

**Answer: A**



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**64.** A single strand of nucleic acid tagged with a radioactive molecule is called :

A. Vector

B. Selectable marker

C. Plasmid

D. Probe

**Answer: D**



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65. Which one is a true statement regarding DNA polymerase used in PCR ?

- A. It is used to ligate introduced DNA in recipient cell
- B. It serves as a selectable marker
- C. It is isolated from a virus
- D. It remains active at high temperature

**Answer: D**



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**66.** If one strand of DNA has the nitrogenous base sequence as ATCTG , what would be the complementary strand sequence ?

A. TTAGU

B. UAGAC

C. AACTG

D. ATCGU

**Answer: B**



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**67.** What is it that forms the basis of DNA fingerprinting ?

A. The relative proportions of purines and pyrimidines in DNA

B. The relative difference in the DNA occurrence in blood , skin and saliva

C. The relative amount of DNA in the ridges and I grooves of the fingerprints

D. Satellite DNA occurring as highly repeated short DNA segments

**Answer: D**



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**68.** DNA fragments generated by the restriction endonucleases in a chemical reaction can be separated by :

A. Polymerase chain reaction

B. Electrophoresis

C. Restriction mapping

D. Centrifugation

**Answer: A**



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**69.** Which enzymes will be produced in a cell in which there is a nonsense mutation in the lac Y gene ?



A. Lactose permease

B. Transacetylase

C. Lactose permease and transacetylase

D.  $\beta$  galactosidase

**Answer: B**



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**70.** The largest gene in human is

A. Oncogene

B. Tumor suppresser gene

C. Dystrophin

D. Insulin gene

**Answer: D**



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**71. Which one of the following is wrongly matched ?**

A. Operon - Structural genes , operator and promoter

B. Transcription - Writing information from DNA to t - RNA

C. Translation - information in m - RNA to make protein

D. Repressor protein - Binds to operator to stop enzyme synthesis

**Answer: C**



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72. An analysis of chromosomal DNA using the southern hybridization technique does not use :

A. PCR

B. Electrophoresis

C. Blotting

D. Autoradiography

**Answer: B**



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73. Which vector can clone only a small fragment of DNA ?

A. Cosmid

B. Bacterial artificial chromosome

C. Yeast artificial chromosome

D. Plasmid

**Answer: A**



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74. Commonly used vectors for human genome sequencing are :

A. *T / A* cloning vectors

B. T DNA

C. BAC and YAC

D. Expression vectors

**Answer: D**



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## 75. Gene regulation governing lactose Operon

E. Coli that involves the Lac i gene product is

A. Feedback inhibition because excess of

galactosidase can switch off

transcription

B. Positive and inducible because it can be

induced by lactose

C. Negative and inducible because

repressor protein Prevents transcription

D. Negative and repressible because repressor protein prevents transcription

**Answer: C**



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**76.** In sea urchin DNA , which is double stranded , 17 of the bases were shown to be cytosine . The percentages of other three bases expected to be present in this DNA are :



A.  $G = 8.5\%$  ,  $A = 50\%$  ,  $T = 24.5\%$

B.  $G = 34\%$  ,  $A = 24.5\%$  ,  $T = 24.5\%$

C.  $G = 17\%$  ,  $A = 16.5\%$  ,  $T = 32.5\%$

D.  $G = 17\%$  ,  $A = 33\%$  ,  $T = 33\%$

**Answer: C**



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**77. Lactose ( lac ) operon is regulated by :**

A. Lac repressor only

B. Lac repressor and CAP - cGMP complex

C. Lac repressor and CAP - cAMP complex

D. CAP - cAMP and CAP - cGMP complex

**Answer: D**



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**78.** The enzyme peptidyl transferase of prokaryotes resides in :

A. 50 S

B. 40 S

C. 30 S

D. 60 S

**Answer: C**



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**79.** The tRNA anticodon 3' - UAC - 5' will pair with the mRNA codon :

A. 5' - AUU - 3'

B. 5' - UAC - 3'

C. 5' - AUG - 3'

D. 3' - GUA - 5'

**Answer: A**



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

A. Glycosidic bonds

B. Phosphodiester bonds

C. Peptide bonds

D. Hydrogen bonds

**Answer: C**



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**81.** A nucleoside differs from a nucleotide . It lacks the :

A. Base

B. Sugar

C. Phosphate group

D. Hydroxyl group

**Answer: B**



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**82.** Both deoxyribose and ribose belong to a class of sugars called :

A. Trioses

B. Hexoses

C. Pentoses

D. Polysaccharides

**Answer: C**



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**83.** The fact that a purine base always paired through hydrogen bonds with a pyrimidine base leads to , in the DNA double helix :

- A. The antiparallel nature
- B. The semiconservative nature
- C. Uniform width throughout DNA
- D. Uniform length in all DNA

**Answer: C**



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**84.** The net electric charge on DNA and histones is :



A. Both positive

B. Both negative

C. Negative and positive respectively

D. Zero

**Answer: C**



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**85.** The promoter site and the terminator site for transcription are located at :

- A. 3' ( downstream ) end and 5' ( upstream )  
end respectively of the transcription unit
- B. 5' ( upstream ) end and 3' ( downstream )  
end , respectively of the transcription  
unit
- C. The 5' ( upstream ) end
- D. The 3' ( downstream ) end

**Answer: C**



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**86.** Which of the following statements is the most appropriate for sickle cell anaemia ?

A. It cannot be treated with iron supplements

B. It is a molecular disease

C. It confers resistance to acquiring malaria

D. All of the above

**Answer: B**



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**87.** 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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**88.** The first genetic material could be :

A. Protein

B. Carbohydrates

C. DNA

D. RNA

**Answer: D**



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**89.** With regard to mature mRNA in eukaryotes

:

A. Exons and introns do not appear in the

mature mRNA

B. Exons appear but introns do not appear

in the mature RNA

C. Introns appear but exons do not appear

in the mature mRNA

D. Both exons and introns appear in the mature mRNA

**Answer: D**



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**90.** The human chromosome with the highest and least number of genes in them are respectively :

A. Chromosome 21 and Y

B. Chromosome 1 and X

C. Chromosome 1 and Y

D. Chromosome X and Y

**Answer: B**



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**91.** Who amongst the following scientists had no contribution to the development of the double helix model for the structure of DNA ?



A. Rosalind Franklin

B. Maurice Wilkins

C. Erwin Chargaff

D. Messelson and Stahl

**Answer: C**



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**92.** DNA is a polymer of nucleotides which are linked to each other by 3' - 5' phosphodiester bond . To prevent polymerisation of

nucleotides , which of the following modifications would you choose ?

A. Replace purine with pyrimidines

B. Remove / Replace 3' OH group in deoxyribose

C. Remove / Replace 2' OH group with some other in deoxyribose

D. Both ( B ) and ( C )

**Answer: D**



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

A. DNA molecule being Synthesised is very long

B. DNA dependent DNA polymearse catalyses polymerisation only in one direction

C. It is a more efficient process

D. DNA ligase has to have a role

**Answer: B**



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**94.** Which of the following steps in transcription is catalysed by RNA polymerase ?

A. Initiation

B. Elongation

C. Termination

D. All of these

**Answer: B**



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

A. DNA pol I

B. DNA pol II

C. RNA pol

D. DNA ligase

**Answer: C**



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**96.** Regulatory proteins are the accessory proteins that interact with RNA polymerase and affect its role in transcription . Which of the following statements correct about regulatory protein ?

A. They only increase expression

B. They only decrease expression

C. They interact with RNA polymerase but do not affect the expression

D. They can act both as activators and as repressors

**Answer: B**



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**97. Which was the last human chromosome to be completely sequenced :**

A. Chromosome 1

B. Chromosome 11

C. Chromosome 21

D. Chromosome X

**Answer: D**



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



- A. It is a carrier of genetic information from DNA to ribosomes synthesising polypeptides
- 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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**99.** While analysing the DNA of an organism a total number of 5386 nucleotides were found out of which the proportion of different bases were : Adenine = 29 % Guanine = 17 % , Cytosine = 32 % , Thymine = 17 % Considering the Chargaffs rule it can be concluded that :

- A. It is a double stranded circular DNA
- B. It is single stranded DNA
- C. It is a double stranded linear DNA
- D. No conclusion can be drawn

**Answer: D**



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**100.** In some viruses , DNA is synthesised by using RNA as template . Such a DNA is called :

A. A - DNA

B. B - DNA

C. c DNA

D. rDNA

**Answer: B**



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**101.** If Meselson and Stahl's experiment is continued for four generations in bacteria , the ratio of  $^{15}N / ^{15}N : ^{15}N / ^{14}N : ^{14}N / ^{14}N$  containing DNA in the fourth generation would be :

A. 1 : 1 : 0

B. 1 : 4 : 0

C. 0:1:3

D. 0:1:7

**Answer: C**



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**102.** If the sequence of nitrogen bases of the coding strand of DNA in a transcription unit is : 5' - AT G AA T G 3' , the sequence of bases in its RNA transcript would be :

A. 5' - AUGAAUG - 3'

B. 5' - UACUUAC - 3'

C. 5' - CAUUCAU - 3'

D. 5' - GUAAGUA - 3'

**Answer: D**



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**103.** The RNA polymerase holoenzyme transcribes :

- A. The promoter , structural gene and the terminator region
- B. The promoter and the terminator region
- C. The structural gene and the terminator region
- D. The structural gene only

**Answer: A**



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**104.** If the base sequence of a codon in mRNA is 5' - AUG 3' , the sequence of tRNA pairing with it must be :

A. 5' - UAC - 3'

B. 5' - CAU - 3'

C. 5' - AUG - 3'

D. 5' - GUA - 3'

**Answer: B**



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**105.** The amino acid attaches to the tRNA at its

:

A. 5' - end

B. 3' - end

C. Anticodon site

D. DHU loop

**Answer: B**



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**106.** To initiate translation , the mRNA first binds to :

- A. The smaller ribosomal sub - unit
- B. The larger ribosomal sub - unit
- C. The whole ribosome
- D. No such specificity exists

**Answer: A**



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**107.** In *E. coli*, the lac operon gets switched on when :

- A. Lactose is present and it binds to the repressor
- B. Repressor binds to operator
- C. RNA polymerase binds to the operator
- D. Lactose is present and it binds to RNA polymerase

**Answer: A**





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**108.** Fill In The blank : Protein synthesis is translation of .....



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**109.** Fill In The blank : Information in DNA in the nucleus is transferred to the ribosomes by .....



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**110.** Fill In The blank : A sequence of three nucleotides in DNA corresponds to the .....



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**111.** Fill In The blank : The synthesis of RNA on DNA template is called .....



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**112.** Fill In The blank : Transcription begins when ..... binds to a promoter site .



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**113.** Fill In The blank : Elongation of RNA polynucleotide chain always takes place in ..... direction with new nucleotide always added at



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**114.** Fill In The blank : Termination signals on DNA template during formation of mRNA lies in the region rich in .....



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**115.** Fill In The blank : Each codon on mRNA consists of .....



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**116.** Fill In The blank : Activation of amino acids during protein synthesis requires .....



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



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**118.** Fill In The blank : Peptidyl and aminoacyl sites are associated with .....



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**119.** Fill In The blank : The first tRNA that is brought to the initiating codon is always .....



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**120.** Fill In The blank : ..... codons are not recognised by any aminoacyl tRNA



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**121.** Fill In The blank : The major function of mRNA is to .....



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**122.** Fill In The blank : In protein synthesis , the codon used as a start signal is .....



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**123.** Distinguish between: DNA and RNA



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**124.** Distinguish between:Repetitive DNA and satellite DNA



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**125.** Distinguish between: Prokaryotic DNA and eukaryotic DNA



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**126.** Distinguish between: m-RNA and t-RNA



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**127.** Distinguish between: Euchromatin and heterochromatin



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



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**129.** Distinguish between: Template strand  
coding strand



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



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



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**132.** Distinguish between: RNA polymerase and DNA polymerase



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**133.** Distinguish between: Codon and anticodon



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**134.** Distinguish between: Induction and repression



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**135.** Distinguish between: Initiation codon and termination codon



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