



BIOLOGY

BOOKS - GR BATHLA & SONS BIOLOGY (HINGLISH)

GENE EXPRESSION AND REGULATION

Multiple Choice Questions

1. Some genes are constantly expressed in the bacterial cells. These genes are called:

A. link genes

B. active genes

C. jumping genes

D. constitutive genes

Answer: D



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2. Genes that are continuously functional and whose regulations at tissue level as in kidney, liver are known as :

A. luxury gene

B. gene battery model

C. house keeping gene

D. mild genes (functional genes)

Answer: C



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3. Which type of prokaryotic cell would be more successful as judged by its growth potential ?

- A. One that is able to express all its genes all the time
- B. One that expresses some of its genes some of the time
- C. One that is unable to express any of its genes any of the time
- D. One that divides only when all types of amino acids and sugars are present in the medium

Answer: B



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4. An environmental agent that triggers transcription from an operon is a/an:

- A. inducer
- B. regulator
- C. derepressor
- D. controlling element

Answer: A



5. Gene regulation in prokaryotes was discovered by :

- A. Lederberg
- B. Beadle and Tatum
- C. Jacob and Monod
- D. Nirenberg and Mattaei

Answer: C



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6. A functional complex comprising a cluster of genes including structural genes, a promoter gene, an operator region and a regulatory gene was discovered by :

- A. Jacob and Monod (1961)
- B. Beadle and Tatum (1958)
- C. Waston and Crick (1953)
- D. Britten and Davidson (1969)

Answer: A



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7. The concept of 'operon' was proposed by :

- A. Watson and Crick
- B. Jacob and Monod
- C. Khorana and Ochoa
- D. Hershey and Chase

Answer: B



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8. Operon is :

- A. a set of closely linked genes regulating a metabolic pathway in prokaryotes
- B. the sequence of three nitrogen bases determining a single amino acid
- C. the sequence of nitrogen bases in m-RNA which codes for a single amino acid
- D. a gene responsible for switching on or off other genes

Answer: A



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9. Which one of the following is the correct sequence of genes within an operon ?

- A. Regulator, promoter, operator, structural
- B. Regulator, operator, promoter, structural
- C. Structural, operator, regulator, promoter
- D. Promoter, operator, structural, regulator

Answer: A



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10. The sequence of genes in lac operon in E. coli is :

A. structural genes → operator gene → promoter gene

B. promoter gene → operator gene → structural gene

C. structural genes → promoter gene → operator gene

D. operator gene → promoter gene → structural gene

Answer: B



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11. A gene which synthesis a repressor protein is :

- A. operator gene
- B. promoter gene
- C. structural gene
- D. regulator gene

Answer: D



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12. Repressor protein is produced by :

- A. regulator gene
- B. operator gene
- C. structural gene
- D. promoter gene

Answer: A



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13. In operon concept, regulator gene functions as:

- A. inhibitor
- B. initiator
- C. repressor
- D. regulator

Answer: C



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14. In operon model, regulator gene :

- A. prevents the movement of RNA
- B. stops the formation of r-RNA
- C. inactivates the substrate
- D. stops the transcription

Answer: D



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15. The regulatory genes are located :

- A. in front of the structural genes
- B. along with the structural genes
- C. at the end of the structural genes
- D. in the middle of the structural genes

Answer: A



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16. Genes that are involved in turning on or off the transcription of set of structural genes are

called Or Functioning of structural genes is controlled by

- A. operator gene
- B. regulator genes
- C. reduntant genes
- D. polymorphic genes

Answer: B



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17. In inducible operon concept of gene, a regulator gene produces:

A. regulator

B. inducer

C. repressor

D. inhibitor

Answer: C



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18. In the operon system, the repressor protein can bind only to the :

- A. operator gene
- B. regulator gene
- C. promoter gene
- D. structural gene

Answer: A



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19. In the 'operon concept' the regulator gene regulates chemical reactions in the cell by :

- A. inhibiting transcription of m-RNA
- B. inhibiting substrate in the reaction
- C. inactivating enzymes in the reaction
- D. inhibiting migration of m-RNA into cytoplasm

Answer: A



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20. During expression of an operon , RNA polymerase binds to

- A. operator gene
- B. regulator gene
- C. promoter gene
- D. structural gene

Answer: C



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21. The promoter gene in lac operon :

A. inhibits m-RNA transcription

B. inhibits enzyme synthesis

C. inhibits t-RNA translation

D. both (a) and (b)

Answer: D



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22. RNA polymerase which is on the promoter, moves to the structural genes to transcribe them.

However, it happens when:

- A. regulator gene induces promoter
- B. inducer binds to structural genes
- C. there is repressor on the operator
- D. there is no repressor on the operator

Answer: D



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23. A short sequence of DNA where the repressor binds, preventing RNA polymerase from attaching to the promoter is called :

- A. regulator
- B. operator
- C. promoter
- D. none of these

Answer: B



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24. Functioning of structural gene is controlled by:

A. operator

B. ligase

C. promoter

D. regulator gene

Answer: A



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25. In operon concept, the operator gene combines with :

A. regulator gene to switch off structural gene transcription

B. inducer to switch off structural gene transcription

C. regulator protein to switch on structural gene transcription

D. regulator protein to switch off structural gene transcription

Answer: D



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26. The segment of a DNA molecule determining the amino acid sequence of a protein, is known as :

- A. operator gene
- B. regulator gene
- C. structural gene
- D. modifier gene

Answer: C



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27. Jacob and Monod studied lactose metabolism in *E. coli* and proposed operon concept which is applicable for all :

- A. prokaryotes
- B. prokaryotes and all eukaryotes
- C. prokaryotes and some eukaryotes
- D. prokaryotes and some protozoans

Answer: A



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28. The lac operon is an example of :

- A. arabinose operon
- B. inducible operon
- C. repressible operon
- D. overlapping genes

Answer: B



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29. Lac operon is related with :

- A. synthesis of lac by lac insect
- B. synthesis of enzyme of lactose anabolism
- C. synthesis of enzyme of lactose catabolism
- D. degradation of lac in the body of lac insect

Answer: C



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30. The sequence of structural genes in lac operon is

A. lac A, lac Y, lac Z

B. lac A, lac Z, lac Y

C. lac Y, lac Z, lac A

D. lac Z, lac Y, lac A

Answer: D



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31. In lac operon system lac-I-gene codes for :

- A. inducer
- B. repressor
- C. promoter
- D. β -galactosidase

Answer: B



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32. In the lactose operon of *Escherichia coli* what is the function of promoter ?

- A. Binding of gyrase enzyme
- B. Codes for RNA polymerase
- C. Binding of RNA polymerase
- D. Processing of messenger RNA

Answer: C



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33. In the lac operon, the structural genes are switched off when

- A. repressor binds to the inducer
- B. repressor binds to the operator
- C. repressor binds to the promoter
- D. repressor binds to the regulator

Answer: B



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34. The wild type *E. coli* cells are growing in normal medium with glucose. They are transferred to a medium containing only lactose as sugar. Which of the following changes take place ?

- A. All operons are induced
- B. *E. coli* cells stop dividing
- C. The lac operon is induced
- D. The lac operon is repressed

Answer: C



35. In the lac operon model, lactose molecules functions as :

- A. inducers which bind with the operator gene
- B. repressors which bind with the operator gene
- C. inducers which bind with the repressor protein
- D. corepressors which bind with repressor protein

Answer: C



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36. In *Escherichia coli*, lac operon is induced by :

- A. Lactose
- B. I-gene
- C. Promoter gene
- D. β -galactosidase

Answer: A



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37. Which one of the following acts as an inducer in the regulatory of operon model ?

A. Glucose

B. Lactose

C. Sucrose

D. Fructose

Answer: B



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38. When lactose is present :

A. the repressor is able to bind to the operator

B. the repressor is unable to bind to the operator

C. the repressor of lac Y, lac Z and lac A genes occurs

D. both (b) and (c) are correct

Answer: D



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

A. the lac operon is constitutively active in these cells

B. they cannot synthesize functional β -galactosidase

C. in the presence of glucose, E. coli cells do not utilize lactose

D. they cannot transport lactose from the medium into the cell

Answer: B



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40. In lac operon structural gene 'Z' is responsible for the synthesis of the enzyme:

A. galactosidase transacetylase

B. galactosidase permease

C. β -galactosidase

D. none of the above

Answer: C



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41. When lactose is added to the culture of *E. coli*, a few of its molecules get into the cells with help of:

A. lactase

B. permease

C. galactosidase

D. transacetylase

Answer: B



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42. The protein required for the transport of galactose across the cell membrane in E.coli is :

A. allolactase

B. transcriptase

C. β -galactosidase

D. galactose permease

Answer: D



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43. How many structural genes are present in the tryptophan operon of *Escherichia coli* ?

A. Three

B. Five

C. Seven

D. One only

Answer: B



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44. Which one of the following is not a component of lac operon model ?

- A. Primer gene
- B. Regulator gene
- C. Promoter gene
- D. Structural gene

Answer: A



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45. This is not produced by E.coli in the lactose medium :

A. β -galactosidase

B. lactose permease

C. lactose dehydrogenase

D. thiogalactoside transacetylase

Answer: C



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46. In E.coli during lactose metabolism, repressor binds to :

- A. operator gene
- B. promoter gene
- C. regulator gene
- D. structural gene

Answer: A



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47. In case of lac operon when disaccharide enters the cell :

A. it binds to the bound repressor to the operator and the structural genes are transcribed because the RNA polymerase can recognise and bind the transcription initiation site

B. it binds to the repressor and structural genes are transcribed because the

repressor has an altered conformation, is inactivated and does not bind the operator

C. the membrane protein interacts with the operator and the RNA polymerase can recognise the transcription initiation site

D. the membrane protein has an altered conformation and does not interact with the operator, thus leading to the transcription of the structural genes.

Answer: B



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48. What does "lac" refer to in what we call the lac operon ?

- A. catabolic induction allosteric inhibition
- B. Lactose
- C. Lactase
- D. Lac insect

Answer: A



49. Lactose operon is considered to be glucose sensitive due to

- A. catabolic induction
- B. allosteric inhibition
- C. anabolic inhibition
- D. none of these

Answer: A



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50. In regulation of gene expression in prokaryotes :

A. Lactose acts as an the suppressor for gene expression

B. Tryptophan acts as the inducer for gene expression

C. Regulator gene is the one that produces the repressor molecule

A. A alone correct

B. B alone correct

C. C alone correct

D. B and A are correct

Answer: C



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51. Match the components of 'Lac Operon' of *E. coli* given under column I with their function listed in column II. Choose the answer with correct combination of alphabets of the two

columns.

Column I (Components of 'Lac Operon')	Column II (Function)
A Structural gene	p Binding site for repressor protein
B Operator gene	q Codes for repressor protein
C Promoter gene	r Induces lactose transport from the medium
D Regulator gene	s Codes for enzyme proteins
	t Binding site for RNA polymerase

A. $A=q, B = t, C=p, D=r$

B. $A = r, B = s, C = t, D = p$

C. $A = s, B = p, C = t, D = q$

D. $A = t, B = s, C = q, D = p$

Answer: C



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52. When tryptophan is present :

- A. transcription of structural genes occurs
- B. the repressor is able to bind to the operator
- C. the repressor is unable to bind to the operator
- D. both (b) and (c) are correct

Answer: B



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53. "Gene-Battery model" of the gene expression in eukaryotes is proposed by :

- A. Jacob and Monod
- B. Beadle and Tatum
- C. Britten and Davidson
- D. Kornberg and Ochoa

Answer: C



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54. The concept of split gene is that the :

A. DNA in a gene can be split by deoxyribonuclease

B. Adjacent genes are separated from each other by spacers

C. Secondary constrictions on the chromosomes give a split appearance to genes

D. Coding sequence in many eukaryotic genes are often separated by noncoding sequence

Answer: D



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55. Noncoding introns and coding part of exons composed gene called is :

- A. oncogene
- B. split gene
- C. pseudogene
- D. gene splicing

Answer: B



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56. Split genes are made of :

- A. exons and introns
- B. exons and cistrons
- C. cistrons and introns
- D. recons and mutons

Answer: A



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57. In split genes, the coding sequences are called

A. exons

B. introns

C. cistrons

D. operons

Answer: A



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58. RNA processing is :

- A. an event that occurs after RNA is transcribed
- B. the rejection of old wornout RNA
- C. the same as transcription
- D. both (b) and (c) are correct

Answer: A



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59. Which is the initial step in m-RNA maturation process

A. Splicing

B. 5' capping

C. Polyadenylation

D. Sealing by ligase

Answer: B



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60. Primary RNA products transcribed by eukaryotic gene contain regions complementary to:

A. exons

B. introns

C. both (a) and (b)

D. none of these

Answer: C



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61. The immediate product of transcription in eukaryotes will be :

A. hn-RNA

B. m-RNA

C. c-DNA

D. sn-RNA

Answer: A



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62. The intervening sequences of 'gene' are known as :

A. exons

B. introns

C. codons

D. cistrons

Answer: B



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63. Introns are :

A. coding part of m-RNA

B. gene present on DNA

C. noncoding part of m-RNA

D. sequence of essential amino acids required
for protein synthesis

Answer: C



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64. Protein of gene which is transcribed but not translated is

A. exon

B. intron

C. cistron

D. codon

Answer: B



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65. The part of m-RNA which removed after transcription by RNA splicing is :

A. exons

B. hexane

C. introns

D. none of these

Answer: C



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66. At the time of organogenesis, genes regulate the process at different levels and at different time due to :

A. exon

B. intron

C. promoter

D. regulator

Answer: A



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67. Post transcriptional modification in Eukaryotes is referred as

- A. splicing
- B. restriction
- C. translation
- D. sequencing

Answer: A



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68. Which of the following reunites the exon segments after RNA splicing ?

- A. RNA primase
- B. RNA ligase
- C. RNA protease
- D. RNA polymerase

Answer: B



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69. Which enzyme is used to remove the introns ?

A. Ligase

B. Ribozyme

C. Zymozyme

D. Carbinozyme

Answer: B



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70. Exon part of m- RNA code for

A. lipid

B. protein

C. carbohydrate

D. phospholipid

Answer: B



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71. All eukaryotic genes contain two kinds of base sequences. Which of these plays an important role in protein synthesis?

A. Exons

B. Introns

C. Both (a) and (b)

D. None of these

Answer: A



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72. Which of the followings has been investigated as a working model for the study of developmental mutants?

A. Xenopus

B. Drosophila

C. Neurospora

D. Coenorhabditis

Answer: B



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73. Homeotic mutants are mutants in which :

A. one structure is replaced by another

B. one structure is formed in multiple copies

C. the embryo dies during early development

D. a developing organism resembles to its
mother

Answer: A



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74. In *Drosophila*, during organ differentiation, one organ can be replaced by another like wings by legs. Genes responsible for it are :

A. plastid genes

B. homeotic genes

C. complementary genes

D. supplementary genes

Answer: B



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75. The most of the homeotic genes of *Drosophila* are located on the chromosome number:

A. one

B. two

C. three

D. four

Answer: C



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76. Which of the following is the protein-coding gene found in the bithorax complex of *Drosophila* ?

A. Ultrabithorax

B. Abdominal A

C. Abdominal B

D. All of these

Answer: D



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77. Which of the following classes of genes undergoes mutation frequently in cancer ?

A. Tumour suppressor genes

B. Mutator genes

C. Oncogenes

D. All of the above

Answer: D



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78. Molecular basis of organ differentiation depends on the modulation in transcription by

A. Ribosome

B. Anticodon

C. RNA polymerase

D. Transcription factor

Answer: D



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79. Human genome project was discovered by

A. Francis Collins and Roderick

B. Paul Berg and Wollman

C. Watson and Crick

D. Beadle and Tatum

Answer: A



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80. The total number of nitrogenous bases in human genome is estimated to be about

- A. 35 million
- B. 3.1 million
- C. 3.5 million
- D. 35 thousand

Answer: B



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81. DNA finger printing technique was first developed by

- A. Boysen and Jensen
- B. Edward and Steptoe
- C. Schleiden and Schwann
- D. Jeffreys, Wilson and Thien

Answer: D



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82. The technique of DNA fingerprinting was pioneered and perfected by :

A. Garrod

B. Alec Jeffreys

C. Francois Jacob

D. Jacques Monod

Answer: B



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83. DNA fingerprinting refers to

A. Molecular analysis of profiles of DNA samples

B. Analysis of DNA samples using imprinting devices

C. Techniques used for identification of fingerprints of individuals

D. Techniques used for molecular analysis of different specimens of DNA

Answer: A



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84. An analytical technique that is used in solving paternity dispute based on DNA polymorphism is called :

- A. Cloning
- B. Cell culture
- C. DNA sequencing
- D. DNA fingerprinting

Answer: D





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85. A technology which has found immense use in solving cases of disputed parentage is :

- A. DNA fingerprinting
- B. Polymerase chain reaction
- C. Recombinant DNA technology
- D. Monoclonal antibody production

Answer: A



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86. Which of the following is the best way to determine paternity ?

- A. Gene counting
- B. Protein analysis
- C. DNA fingerprinting
- D. Chromosome counting

Answer: C



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87. Which of the following techniques is useful in forensic science ?

- A. Genetic imprinting
- B. DNA footprinting
- C. DNA fingerprinting
- D. All of these

Answer: C



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88. Matching sequence of DNA between two evidences, one of the criminal with the suspect is known as :

- A. Gene mapping
- B. DNA resolution
- C. DNA amplification
- D. DNA fingerprinting

Answer: D



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89. Variable Number of Tandem Repeats (VNTRs)

in the DNA molecules are highly useful in :

A. Stem cell culture

B. DNA fingerprinting

C. Recombinant DNA technology

D. Monoclonal antibody production

Answer: B



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90. In DNA fingerprinting which of the following is true ?

- A. House keeping to luxury genes are uses as probes
- B. Specific metabolic genes are used as probes
- C. VNTR is used as probes
- D. All of the above

Answer: C



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91. VNTR is used in :

- A. DNA fingerprinting
- B. Protoplasmic culture
- C. Regulation of plant growth hormones
- D. Increasing the rate of photosynthesis in plant of desert zones

Answer: A



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92. Probes used in DNA finger-printing initially

A. 19 base long oligonucleotide

B. single stranded RNA

C. minisatellite

D. all of the above

Answer: A



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93. DNA fingerprinting has proved useful in forensic science. It involves use of :

A. c-DNA

B. minisatellite

C. bacterial DNA

D. ribosomal DNA

Answer: B



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94. The basis of DNA fingerprinting is :

A. availability of cloned DNA

B. knowledge of human karyotype

C. phenotypic difference between individuals

D. occurrence of RFLP (restriction fragment length polymorphism)

Answer: D



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95. RFLPs distributed throughout human genome are useful for :

- A. Gene mapping
- B. DNA fingerprints
- C. Both (a) and (b)
- D. None of these

Answer: B



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96. How are RFLPs detected ?

A. By amplifying the DNA using PCR

B. By doing standard Mendelian cross

C. By observing DNA of different lengths on a
gel

D. By looking at the chromosome in the
microscope

Answer: C



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97. DNA fingerprints are actually :

A. RNA

B. Genes

C. c-DNA

D. Restriction fragments

Answer: D



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98. DNA fragments result when.....cut DNA molecules at specific sites.

A. RFLPs

B. DNA probes

C. DNA polymerase

D. Restriction enzymes

Answer: D



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99. When DNA fragments are subjected to an electrical current on a gel, the.....fragments move to the farthest.

A. t-RNA

B. Largest

C. Smallest

D. DNA library

Answer: C



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100. Which one of the following pairs of terms/names mean one and the same thing

- A. Codon - Gene
- B. Cistron - Triplet
- C. Gene pool - Genome
- D. DNA - DNA profiling

Answer: D



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101. DNA fingerprinting method is very useful for

A. DNA tests for identity and relationships

B. Forensic studies

C. Polymorphism

D. All of the above

Answer: D



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102. DNA fingerprint cannot be prepared from :

A. WBC

B. RBC

C. Sperm

D. Inner lining of cheek

Answer: B



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103. DNA fingerprints were used to determine whether Ram could be the father of Sita's baby. Which o the following would show that Ram is not the father? If genetic fingerprint showed some bands not in genetic fingerprint.

A. Ram's - the baby's

B. Sita's - the baby's

C. The baby's - Ram's

D. The baby's - Ram's and Sita's

Answer: D



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104. DNA fingerprints used as evidence in a murder trial look something like supermarket bar

codes. The pattern of bars in a DNA fingerprint shows :

- A. the order of bases in a particular gene
- B. the order of genes along particular gene
- C. the exact location of a specific gene in a genomic library
- D. the presence of various-sized fragments from chopped-up DNA

Answer: D



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105. One of the most useful methods for indentifying a specific gene is the:

- A. Southern blot
- B. Western blot
- C. Northern blot
- D. None of these

Answer: A



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106. Which of the following techniques is used for separating DNA fragments and identification of cloned genes ?

- A. Western blotting
- B. Southern blotting
- C. Northern blotting
- D. None of these

Answer: B



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107. RFLPs are distinguished using which technique ?

- A. Cloning
- B. Colony blot
- C. Southern blot
- D. Sequencing

Answer: C



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108. Southern blot technique is related to :

A. Blood test

B. Widal test

C. ELISA test

D. DNA profiling

Answer: D



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109. Southern blotting is used to identify :

A. DNA in a cell

B. RNA in a cell

C. A protein in a cell

D. Antibiotic resistance in a cell

Answer: A



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110. What is the first step in the Southern Blot technique

A. Isolation of DNA from a nucleated cell such as the one from the scene of crime

- B. Denaturation of DNA on the gel for hybridization with specific probe
- C. Production of group of genetically identical cells
- D. Digestion of DNA by restriction enzyme

Answer: D



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111. Southern blots, but not colony blots, require which of the following ?

- A. Autoradiography
- B. Membrane filter
- C. DNA hybridization
- D. Gel electrophoresis

Answer: D



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112. Which of the following techniques is employed in nucleic acid blotting ?

- A. Chromatography

B. Gel electrophoresis

C. Spectrophotometry

D. Ultracentrifugation

Answer: B



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113. Gel electrophoresis is used for the :

A. construction of recombinant DNA by joining
with cloning vectors

B. culturing the host cells in a medium at a large scale

C. separation and isolation of DNA fragments

D. replication of DNA for many times

Answer: C



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114. By gel electrophoresis, fragments of a gene library can be separated according to :

A. shape

B. length

C. colour

D. species

Answer: b



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115. Assume you isolate, digest and electrophoresis plasmids from two bacteria. If the resulting DNA fingerprints are identical, this proves the bacteria:

A. are related

B. can hydrolyse x-gel

C. contain same plasmid

D. are resistant to antibodies

Answer: C



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116. A coordinated unit which controls the genetic expression is known is :

A. cistron

B. recon

C. muton

D. operon

Answer: D



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117. Intron transcripts in heterogenous nuclear RNA (hn-RNA) are removed and exon transcripts are joined together under the direction of protein complexes. These complexes are :

- A. Polysomes
- B. Cdk complex
- C. Spliceosomes
- D. Endopeptidases

Answer: C



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118. The genome of *Coenorhabditis elegans* consists of :

- A. 3 million base pairs and 30,000 genes

B. 12 million base pairs and 6,000 genes

C. 4.7 million base pairs and 4,000 genes

D. 97 million base pairs and 18,000 genes

Answer: D



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119. According to the lac operon concept, which functional unit of the bacterial genetic material is responsible for suppressing the activity of the operator gene in the absence of lactose ?

- A. Promoter gene
- B. Regulator gene
- C. Structural gene
- D. Repressor protein

Answer: B



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120. The basis of DNA fingerprinting is :

- A. DNA coiling
- B. Errors in base sequence

C. DNA replication

D. Polymorphism in sequence

Answer: D



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121. Removal of introns and joining of exons in a defined order during transcription is called :

A. slicing

B. looping

C. splicing

D. inducing

Answer: C



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122. DNA sequences that code for protein are known as :

A. introns

B. exons

C. control regions

D. intervening sequences

Answer: B



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123. The largest gene in man is :

A. oncogene

B. dystrophin

C. insulin gene

D. tumor suppressor gene

Answer: B



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124. The lac operon consists of :

A. four regulatory genes only

B. one regulatory gene and three structural genes

C. two regulatory gene and two structural genes

D. three regulatory gene and three structural genes

Answer: D



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125. Select the two correct statements out of the four (1-4) given below about lac operon.

1. Glucose or galactose may bind with the repressor and inactivate it
2. In the absence of lactose the repressor binds with the operator region
3. The z-gene codes for permease
4. This was elucidated Francois Jacob and Jacques

Monod

The correct statements are :

A. 2 and 4

B. 1 and 2

C. 2 and 3

D. 1 and 3

Answer: A



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126. The process of removal of introns and joining of exons is called :

A. tailing

B. splicing

C. capping

D. initiation

Answer: B



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127. The main aim of the human genome project is.....

- A. introduce new genes into humans
- B. remove disease causing genes from human
- C. identify sequence of all genes present in human DNA
- D. develop better techniques for comparing two different human DNA samples

Answer: C



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128. Match the enzyme in column I with its function in column II and select the correct option

:

Column I		Column II	
A	β -galactosidase	1	Joining DNA fragments
B	permease	2	Peptide bond formation
C	ligase	3	Hydrolysis of lactose
D	ribozyme	4	Increase permeability to β -galactosidase

A. A=2, B = 1, C = 4, D = 3

B. A = 3, B = 4, C = 1, D = 2

C. A = 1, B = 4, C = 1, D = 3

D. A = 3, B = 1, C = 4, D = 2

Answer: B



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129. The inducer for switching 'on' the lac operon in bacteria is :

- A. presence of lactose
- B. number of bacteria
- C. presence of sucrose
- D. presence of RNA polymerase

Answer: A



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130. Some genes in bacteria and virus may code for more than one polypeptide, they are called in

A. overlapping genes

B. jumping genes

C. split genes

D. none of these

Answer: A



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131. Agarose extracted from sea weeds finds use in

A. PCR

B. Tissue culture

C. Spectrophotometry

D. Gel electrophoresis

Answer: D



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132. Alec Jeffreys developed the DNA fingerprinting technique. The probe he used was :

A. SNP

B. VNTR

C. r-DNA

D. Ribozyme

Answer: B



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133. The method of DNA fingerprinting involves the use of :

- A. restriction enzymes
- B. taq polymerase
- C. oligonucleotide primers
- D. all of these

Answer: A



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134. Which one of the following is not an application of DNA fingerprinting ?

- A. Therapy for curing SCID
- B. Solving paternity cases
- C. Identifying gene mutation
- D. Solving immigration cases

Answer: A



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135. Human Genome Project was officially started
in :

A. 1989

B. 1990

C. 1985

D. 1993

Answer: B



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136. PCR and restriction Fragements length Polymorphism are the methods for

- A. study of enzymes
- B. genetic transformation
- C. DNA sequencing
- D. genetic fingerprinting

Answer: D



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137. Choose the wrong statement :

- A. VNTR belong to a class of mini-satellite DNA
- B. Satellite DNA normally do not code for proteins
- C. DNA sequencing work on the principle developed by Frederick Sanger
- D. DNA fingerprinting involves identifying similarities in repetitive DNA

Answer: D



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138. In lac operon, the genes a,i,y and z code respectively for :

A. repressor protein, permease, β -galactosidase, transacetylase

B. transacetylase, permease, β -galactosidase, repressor protein

C. permease, transacetylase, repressor protein, β -galactosidase

D. tranacetylase, repressor protein, permease,

β -galactosidase

Answer: D



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139. 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 grooves of the fingerprints
- D. Satellite DNA occurring as highly repeated short DNA segments

Answer: D



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140. The pioneer contributor towards the use of human DNA fingerprinting in forensic science in India is

A. J.C. Bose

B. Lalji Singh

C. H.Khorana

D. Swaminathan

Answer: B



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141. Which of the following is useful in solving cases of parental disputes ?

A. ELISA

B. Western blotting

C. DNA fingerprinting

D. Hybridoma technology

Answer: C



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142. The lac operon is turned on when allolactose molecules bind to

- A. m-RNA
- B. operator site
- C. promoter site
- D. repressor protein

Answer: D



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143. The colonies of recombinant bacteria appear white in contrast to blue colonies of non-recombinant bacteria because of

A. Insertional inactivation of alpha-galactosidase in non-recombinant bacteria

B. Insertional inactivation of alpha-galactosidase in recombinant bacteria

C. Inactivation of glycosidase enzyme in recombinant bacteria

D. Non-recombinant bacteria containing beta-galactosidase

Answer: B



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144. Which enzyme/s will be produced in a cell in which there is a nonsense mutation in the lac Y gene

A. Transacetylase

B. β -galactosidase

C. Lactose permease

D. Lactose permease and transacetylase

Answer: B



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145. Which of the following takes place in DNA fingerprinting ?

A. A positive identification can be made

B. Multiple restriction enzyme digests

generate unique fragments

C. The polymerase chain reaction amplifies fewer DNA

D. The variability of repeated sequences between two restriction sites is evaluated

Answer: D



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146. 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 - Using information in m-RNA to make protein

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

Answer: B



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147. Match column I with column II and choose the correct option.

Column I (Scientist)	Column II (Concept)
A Taylor and colleagues	1 <i>Lac</i> operon
B Hershey and Chase	2 DNA replicates semiconservatively
C Griffith	3 Transforming principle
D Jacob and Monod	4 DNA is the genetic material
	5 Transcription

A. A-2, B-5, C-1, D-3

B. A-3, B-4, C-2, D-1

C. A-2, B-4, C-3, D-1

D. A-1, B-5, C-4, D-2

Answer: C



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148. Aminoacylation of t-RNA is essential for :

- A. splicing
- B. termination
- C. replication of RNA
- D. formation of peptide bond

Answer: D



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149. In eukaryotic genes, coding sequences are called :

A. exons

B. introns

C. histones

D. repetitive DNA

Answer: A



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150. Find the wrongly matched pair:

- A. Har Gobind Khorana - Synthesised RNA molecules chemically
- B. George Gamow - Codon is triplet
- C. Meselson and Stahl - Regulation of gene expression
- D. Alec Jeffreys - DNA fingerprinting

Answer: C



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151. Which of the following events would occur in 'Lac' operon' of E. coli when the growth medium has high concentration of lactose ?

A. The structural genes fail to produce polycistronic m-RNA.

B. The inducer molecule binds to repressor protein and RNA polymerase binds to promoter sequence.

C. The repressor protein binds to RNA polymerase and prevents translation.

D. The repressor protein attaches to the promoter sequence and derepresses the operator.

Answer: B



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152. Statement A : The primary transcript produced in eukaryotic is translated without undergoing any modification or processing.

Statement B: The hn-RNA in humans has exons and introns.

A. Statement B is correct and statement A is wrong.

B. Statement A is correct and statement B is wrong.

C. Both the statements A and B are correct.

D. Both the statements A and B are wrong.

Answer: A



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153. Some of the steps of DNA fingerprinting are given below. Identify the correct sequence from the option given:

A. Electrophoresis of DNA fragments

B. Hybridisation with DNA probe

C. Digestion of DNA by RENS

D. Autoradiography

E. Blotting of DNA fragments to nitrocellulose membrane

A. C-A-B-E-D

B. C-A-E-B-D

C. A-E-C-B-D

D. A-C-E-D-B

Answer: B



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154. In DNA fingerprinting technique, _____ probe is used for hybridization of DNA fragments.

- A. double stranded RNA
- B. single stranded radioactive RNA
- C. single stranded radioactive DNA
- D. double stranded non-radioactive DNA

Answer: C



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155. Of the total number of genes estimated in human genome, nearly 10 per cent are contained in :

- A. Chromosome 11
- B. Chromosome 21
- C. Y Chromosome
- D. Chromosome 1

Answer: D



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156. The technique of DNA fingerprinting relies on
:

- A. repetitive DNA
- B. mini satellite DNA
- C. both (a) and (b)
- D. none of these

Answer: C



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157. In DNA fingerprinting the process of DNA hybridization with the help of specific DNA probe is described as:

- A. Western blotting
- B. Northern blotting
- C. Southern blotting
- D. All these methods

Answer: C



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158. Gene regulation governing lactose operon of

E. coli that involves the lac I gene product is

A. Positive and inducible because it can be induced by lactose

B. Negative and repressible because repressor protein prevents transcription

C. Feedback inhibition because excess of β -galactosidase can switch off transcription

D. Negative and inducible because repressor protein prevents transcription

Answer: D



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159. Select the correct combination of statements for DNA fingerprinting

It is an ELISA based technique

It is a PCR based technique

It is used by forensic scientists

It is based on the fingerprint of an individual

It is test for paternity

A. i, ii, iii

B. ii, iii, v

C. i, iv, v

D. i, iii, iv

Answer: B



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160. Microsatellites are :

A. ESTs

B. YAC

C. BAC

D. Repetitive DNA sequences

Answer: D



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161. 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-c-GMP complex

Answer: C



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162. Match the following

A. VNTR	P. Target gene
B. Introns and Exons	Q. DNA fingerprinting
C. Dystrophin	R. Bulk DNA
D. Satellite DNA	S. Splicing

A. A-q, B-s, C-p, D-r

B. A-r, B-s, C-p, D-q

C. A-q, B-p, C-s, D-r

D. A-s, B-p, C-q, D-r

Answer: A



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163. If an inheritable mutation is observed in a population at high frequency it is referred to as

A. Linkage

B. DNA polymorphism

C. Sequence annotation

D. Expressed sequence tag

Answer: B



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164. A desirable change in genotype of an organism is obtained by

A. DNA replication

B. protein synthesis

C. r-RNA technology

D. m-RNA formation

Answer: C



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165. Satellite DNA is important because it

A. codes for proteins needed in cell cycle

B. codes for enzymes needed for DNA replication.

C. does not code for proteins and is same in all members of the population.

D. shows high degree of polymorphism in population and also the same degree of polymorphism in an individual which is heritable from parents to children.

Answer: D



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166. Which of the following is required as inducer(s) for the expression of Lac operon ?

A. Lactose

B. Glucose

C. Galactose

D. Lactose and galactose

Answer: A



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167. Which of the following is not required for any of the techniques of DNA fingerprinting available at present

A. Restriction enzymes

B. zinc finger analysis

C. DNA-DNA hybridization

D. Polymerase chain reaction

Answer: B



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Ncert Corner Exemplar Problems

1. In a DNA strand the nucleotides are linked together by

A. peptide bonds

B. hydrogens bonds

C. glycosidic

D. phosphodiester bonds

Answer: D



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2. A nucleoside differs from a nucleotide. It lacks the

A. base

B. sugar

C. phosphate group

D. hydroxyl group

Answer: C



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3. Both deoxyribose and ribose belong to a class of sugars called

A. trioses

B. pentoses

C. hexoses

D. polysaccharides

Answer: B



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4. the fact that a purine base always pairs through hydrogen bonds with a pyrimidine base in the DNA double helix leads to

A. the antiparallel nature

B. uniform length in all DNA

C. the semiconservative nature

D. uniform width throughout DNA

Answer: D



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5. The net electric charge on DNA and histones is

A. zero

B. both positive

C. both negative

D. negative and positive, respectively

Answer: D



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6. 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: B



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7. Which of the following statements is the most appropriate for sickle cell anaemia

- A. It cannot be treated with iron supplements.
- B. It confers resistance to acquiring malaria.
- C. It is a molecular disease
- D. All of the above

Answer: D



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8. 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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9. The first genetic material could be

A. DNA

B. RNA

C. Protein

D. Carbohydrates

Answer: B



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10. With regard to mature mRNA in eukaryotes

- A. Exons and introns do not appear in the mature RNA.
- B. Both exons and introns appear in the mature RNA.
- C. Exons appear but introns do not appear in the mature RNA.
- D. Introns appear but exons do not appear in the mature RNA.

Answer: C



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

- A. Chromosome 1 and Y
- B. Chromosome X and Y
- C. Chromosome 21 and Y
- D. Chromosome 1 and X

Answer: A



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12. Who amongst the following scientists had no contribution in the development of the double helix model for the structure of DNA ?

- A. Erwin Chargaff
- B. Maurice Wilkins
- C. Rosalind
- D. Meselson and Stahl

Answer: D





13. 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 deoxy
ribose

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

D. Both 'B' and 'C'

Answer: B



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

A. DNA dependent DNA polymerase catalyses polymerisation only in one direction (5'-3').

B. DNA molecule being synthesised is very long.

C. It is a more efficient process.

D. DNA ligase has to have a role.

Answer: A



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15. 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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16. Control of gene expression takes place at the level of

A. Translation

B. Transcription

C. DNA-replication

D. None of these

Answer: B



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

A. They only increase expression.

B. They only decrease expression.

C. They can act both as activators and as repressors.

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

Answer: C



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18. Which was the last human chromosome to be completely sequenced ?

- A. Chromosome 1
- B. Chromosome 11
- C. Chromosome 21
- D. Chromosome X

Answer: A



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19. 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 is a constituent component of ribosomes.

C. It carries amino acids to ribosomes.

D. All of the above

Answer: D



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20. 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 Chargaff's rule it can be concluded that

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

Answer: C



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

A. c-DNA

B. r-DNA

C. A-DNA

D. B-DNA

Answer: A



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

A. 0 : 1 : 3

B. 0 : 1 : 7

C. 1 : 1 : 0

D. 1 : 4 : 0

Answer: B



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23. If the sequence of nitrogen bases of the coding strand of DNA in a transcription unit is $5' - ATGAATG - 3'$, the sequence of bases in its RNA transcript would be

A. $5' - UACUUAC - 3'$

B. $5' - CAUUCAU - 3'$

C. $5' - GUAAGUA - 3'$

D. $5' - AUGAUG - 3'$

Answer: D



24. The RNA polymerase holoenzyme transcribes

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

Answer: B





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

A. $5' - AUG - 3'$

B. $5' - GUA - 3'$

C. $5' - CAU - 3'$

D. $5' - UAC - 3'$

Answer: C



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26. The amino acid attaches to the tRNA at its

A. 5'-end

B. 3'-end

C. DHU loop

D. Anticodon site

Answer: B



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27. To initiate translation, the mRNA first binds to

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

Answer: A



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

A. repressor binds to operator

B. RNA polymerase binds to the operator

C. lactose is present and it binds to the repressor

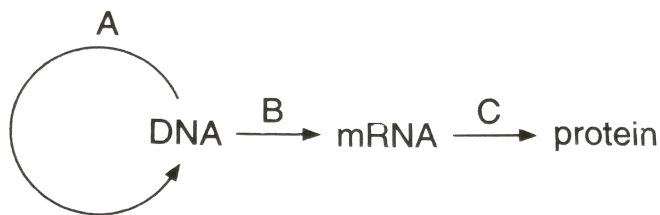
D. lactose is present and it binds to RNA polymerase

Answer: C



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29. A diagrammatic representation of the central dogma in molecular biology is given below. Identify A, B and C by selecting the correct option :



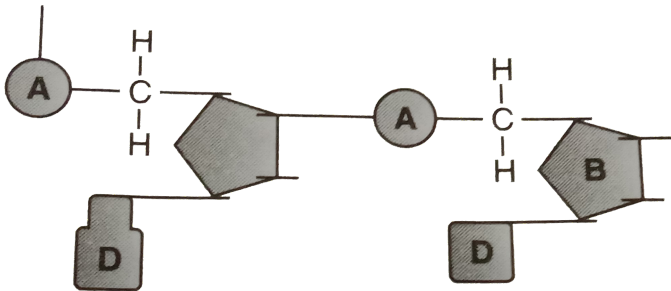
- A. *A* *B* *C*
Transcription Replication Translation
- B. *A* *B* *C*
Replication Transcription Translation
- C. *A* *B* *C*
Replication Translation Transcription
- D. *A* *B* *C*
Translation Replication Transcription

Answer: B



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30. Diagrammatic view of a dinucleotide is given below. Identify A,B and D by selecting the correct option :



A.

A

B

D

Nitrogenous base

Pentose sugar

Phosphate

B.

<i>A</i>	<i>B</i>	<i>D</i>
Phosphate	Nitrogenous base	Pentose sugar

C.

<i>A</i>	<i>B</i>	<i>D</i>
Pentose sugar	Phosphate	Nitrogenous base

D.

<i>A</i>	<i>B</i>	<i>D</i>
Phosphate	Pentose sugar	Nitrogenous base

Answer: D



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31. Read the following five statements (A to E) about nucleic acids and select the option with all correct statements:

(A) DNA is a long polymer of deoxyribonucleotides.

(B) The two chains of DNA have anti-parallel polarity.

(C) The backbone in a polynucleotide chain is formed due to nitrogenous bases and phosphates.

(D) DNA acts as the genetic material in most of the organisms.

(E) Uracil is present in RNA at the place of cytosine.

A. (A), (D) and (E)

B. (B), (C) and (E)

C. (A), (C) and (D)

D. (A), (B) and (D)

Answer: D

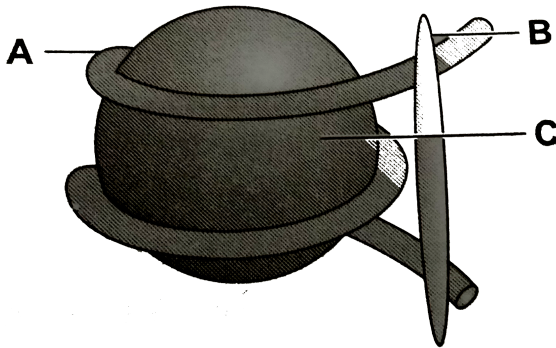


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32. Diagram of a nucleosome is given below.

Identify A, B and C by selecting the correct option

:



- A. *A* *B* *D*
 Hl Histone *DNA* Histone octamer
- B. *A* *B* *D*
DNA Histone octamer Hl Histone
- C. *A* *B* *D*
DNA Hl Histone Histone octamer
- D. *A* *B* *D*
 Histone octamer Hl Histone *DNA*

Answer: C



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33. Which one of the following statements is wrong ?

A. RNA was the first genetic material.

B. Nucleosomes constitute the repeating unit of a structure in the nucleus called chromatin.

C. A typical nucleosome contains 250 bp of DNA helix.

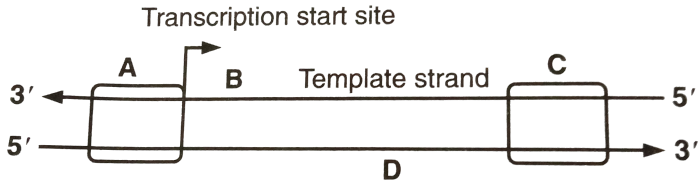
D. Watson and Crick proposed double helix model for the structure of DNA in 1953.

Answer: C



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34. Schematic structure of a transcription unit is given below. Select the correct option :



A. A - Promoter, B - Structural gene, C - Terminator, D - Coding strand

B. A - Terminator, B - Structural gene, C - Promoter, D - Coding strand

C. A -Structural gene, B - Promoter, C - Terminator, D - Coding strand

D. A -Promoter, B - Structural gene, C - Coding strand, D - Terminator

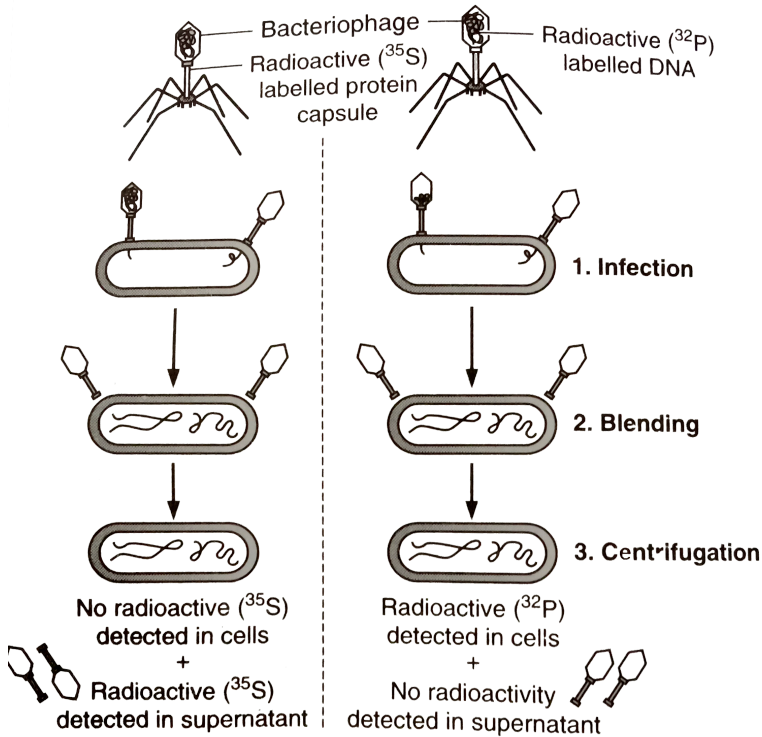
Answer: A



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35. A diagrammatic view the Hershey-Chase experiment is given below. Identify the steps A to

C and select the correct option :



A. *A* *B* *C*
 Blending Infection Centrifugation

B. *A* *B* *C*
 Infection Blending Centrifugation

C. *A* *B* *C*
 Infection Centrifugation Blending

D. *A* *B* *C*
 Centrifugation Infection Blending

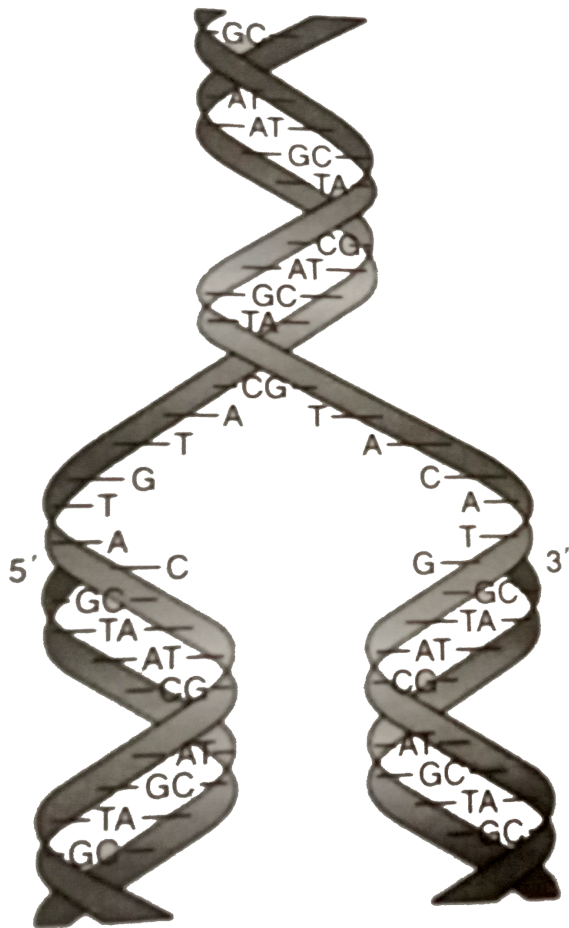
Answer: B



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36. Watson-Crick model for DNA replication is given below. Identify the mode of replication by

selecting the option:



A. Conservative

B. Semiconservative

C. Dispersive

D. None of the above

Answer: A



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37. Consider the following statements :

A. RNA has evolved from DNA with chemical modification that make it more unstable.

B. Central dogma in molecular biology states that the genetic information flows from DNA \rightarrow RNA \rightarrow Protein.

C. In some viruses like tobacco mosaic viruses, QB bacteriophage, DNA is the genetic material.

D. Euchromatin is said to be transcriptionally active chromatin, whereas heterochromatin is inactive.

Of the above statements :

A. B and C are correct

B. B and D are correct

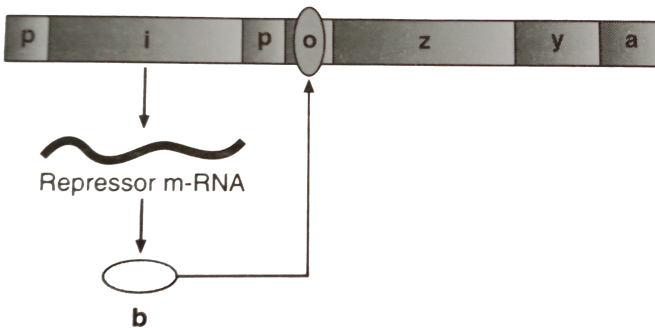
C. A and B correct

D. A and D are correct

Answer: B



38. The following diagram shows the lac Operon in the absence of inducer: Identify P, I, o, b and zya by selecting the option :



A. P. Producer, i. inductor, o. operator, b.

Repressor, zya, structural genes

B. P. Promoter, i. inducer, o. operator, b.

Repressor, zya structural genes

C. P. Promoter, i. inducer, o. operator, b.

Repressor, zya structural genes

D. P. Promoter, i. inducer, o. open gene, b.

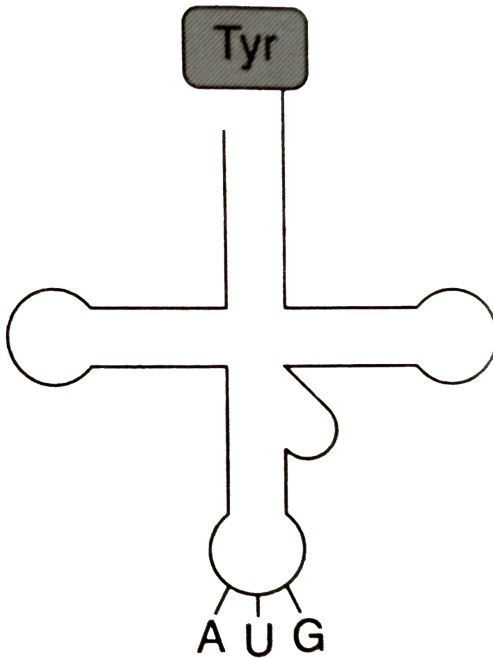
Repressor, zya, structural genes

Answer: C



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39. Identify the molecule shown below :



A. m-RNA

B. t-RNA

C. r-RNA

D. hn-RNA

Answer: B



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40. Consider the following statements with respect to translation.

A. Translation refers to the process of polymerisation of ribonucleotides.

B. The site of translation (protein synthesis) is ribosomes.

(D) An m-RNA also has untranslated regions (UTR)

that are not translated.

Of the above statements :

A. B and D are correct

B. A and B are correct

C. A and C are correct

D. A and D are correct

Answer: A



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41. Which one of the following statements is incorrect?

A. DNA chemically is less reactive and structurally more stable when compared to RNA.

B. A nitrogenous base is linked to the pentose sugar through a phosphodiester linkage to form a nucleoside.

C. The presence of thymine at the place of uracil confers additional stability to DNA.

D. Meselson and Stahl provided experimental evidence for semiconservative DNA replication.

Answer: B



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42. Initiation step during the process of transcription in bacteria is shown below. Identify

A, B, C and D by selecting the option :



A. A-RNA, polymerase, B - Promoter, C-Sigma factor, D-DNA helix

B. A-Promoter, B - Sigma factor, C- RNA polymerase, D-DNA helix

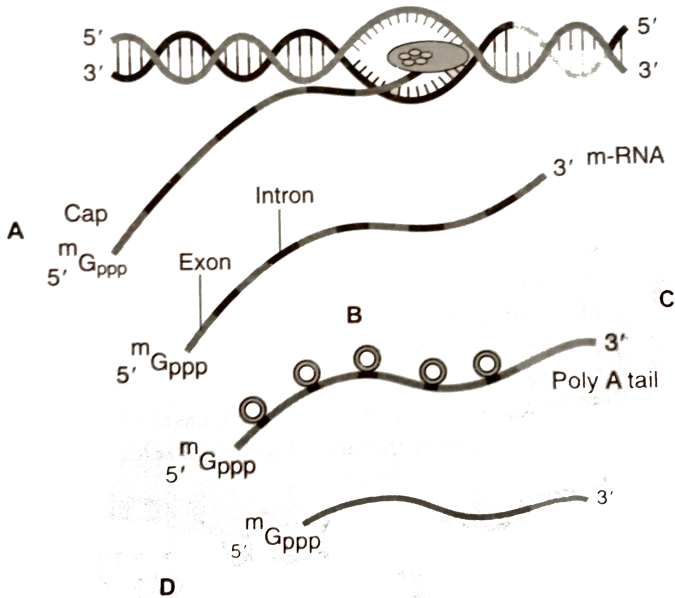
C. A - Promoter, B - RNA polymerase, C - DNA helix, D-Sigma factor

D. A - Promoter, B - RNA polymerase, C - Sigma factor, D-DNA helix

Answer: D

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43. Process of transcription in eukaryotes is given below. Identify A,B,C and D select the correct option:



A. A - Capping, B - RNA splicing, C - Polyadenylation, D - Messenger RNA

B. A - RNA splicing, B - Capping, C - Polyadenylation, D-Messenger RNA

C. A- Capping, B-RNA splicing, C-Messenger RNA, D-Polyadenylation

D. A-Capping, B-Messenger RNA, C-Polyadenylation, D-RNA splicing

Answer: A



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44. Which of the following statement/s regarding nucleic acids is/are wrong?

I. Haploid content of human DNA is $3.3 \times 10^9 bp$.

II. RNA is the genetic material for the majority of organisms.

III. Both RNA and DNA can function as genetic material.

IV. The bases in two strands of DNA are paired through disulphide bonds forming base pairs (bp).

(V) In RNA, every nucleotide residue has an additional -OH group present at 2'-position in the ribose.

A. II only

B. II and IV only

C. III and V only

D. I, II and IV only

Answer: B



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45. Select the correct option :

(a) Meselson - Stahl	<i>Streptococcus</i>
(b) Taylor <i>et al.</i>	Bacteriophage
(c) Hershey - Chase	<i>Escherichia coli</i>
(d) Griffith	<i>Vicia faba</i>

- A. (a) (b) (c) (d)
(ii) (i) (iv) (iii)
- B. (a) (b) (c) (d)
(i) (iv) (iii) (ii)
- C. (a) (b) (c) (d)
(iii) (iv) (ii) (i)
- D. (a) (b) (c) (d)
(iii) (iv) (i) (ii)

Answer: C



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46. Which of the following statements about the t-RNA is not true?

- A. The secondary structure of t-RNA looks like a clover-leaf.
- B. The t-RNA has an anticodon loop that has bases complementary to the codon.
- C. The t-RNAs are specific for each amino acid.
- D. There are three t-RNAs for stop codons.

Answer: D





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