Molecular Basis of Inheritance

Question1

In a chromosome, there is a specific DNA sequence, responsible for initiating replication. It is called as:

[NEET 2024 Re]

Options:

A.

Recognition sequence

B.

Cloning site

C.

Restriction site

D.

ori site

Answer: D

Solution:

Option (4) is the correct answer because origin of replication (ori) is a sequence from where replication starts and any piece of DNA when linked to this sequence can be made to replicate, within the host cells.

Option (1) is incorrect because recognition sequence is a specific palindromic nucleotide sequence in DNA recognised by restriction endonuclease.

Options (2) and (3) are not the answers because cloning site/restriction site is the site on the vector for the use of restriction enzyme and it is similar to recognition site.

Question2

Given below are two statements regarding RNA polymerase in prokaryotes.

Statement I : In prokaryotes, RNA polymerase is capable of catalysing the process of elongation during transcription.

Statement II : RNA polymerase associate transiently with 'Rho' factor to initiate transcription.

In the light of the above statements, choose the correct answer from the options given below :

[NEET 2024 Re]

Options:

A.

Statement I is true but Statement II is false

B.

Statement I is false but Statement II is true

C.

Both Statement I and Statement II are true

D.

Both Statement I and Statement II are false

Answer: A

Solution:

The RNA polymerase is only capable of catalysing the process of elongation, thus, statement I is correct.

RNA polymerase associates transiently with initiation-factor (σ) and termination-factor (ρ) to initiate and terminate the transcription. Thus, statement II is incorrect.

Question3

Given below are two statements:

Statement I: In eukaryotes there are three RNA polymerases in the nucleus in addition to the RNA polymerase found in the organelles.

Statement II: All the three RNA polymerases in eukaryotic nucleus have different roles.

In the light of the above statements, choose the correct answer from the options given below:

[NEET 2024 Re]

Options:

A.

Statement I is correct but Statement II is incorrect

B.

Statement I is incorrect but Statement II is correct

C.

Both Statement I and Statement II are correct

D.

Both Statement I and Statement II are incorrect

Answer: C

Solution:

In eukaryotes, there are at least three RNA polymerase in the nucleus (in addition to the RNA polymerase found in the organelles). There is clear cut division of labour. RNA polymerase I transcribes rRNAs (28S, 18S, and 5.8 S), whereas the RNA polymerase III is responsible for transcription of tRNA, 5 SrRNA and SnRNAs. The RNA polymerase II transcribes precursor of mRNA.

Hence statement I and statement II, both are correct.

Question4

Given below are two statements :

Statement I : RNA interference takes place in all Eukaryotic organisms as method of cellular defense.

Statement II : RNAi involves the silencing of a specific mRNA due to a complementary single-stranded RNA molecule that binds and prevents translation of mRNA

In the light of the above statements, choose the correct answer from the options given below.

[NEET 2024 Re]

Options:

A.

Statement I is true but Statement II is false.

B.

Statement I is false but Statement II is true.

C.

Both Statement I and Statement II are true.

D.

Both Statement I and Statement II are false.

Answer: A

Solution:

The correct answer is option (1) because Statement I is correct which states that RNA interference takes place in all eukaryotic organisms as method of cellular defense and Statement II is incorrect which states that RNAi involved the silencing of a specific mRNA due to a complementary ssRNA molecule that binds and prevents translation of mRNA.

In statement II, it should be complementary dsRNA molecule that is involved in silencing of a specific mRNA.

Options (2), (3) and (4) are incorrect as they represent wrong answer.

Question5

The lactose present in the growth medium of bacteria is transported to the cell by the action of

[NEET 2024]

Options:

A.

Beta-galactosidase

B.

Acetylase

C.

Permease

D.

Polymerase

Answer: C

Solution:

The y gene lac operon codes for permease enzyme, which increase the permeability of cell to β-galactosides.

So, the lactose present in the growth medium of bacteria is transported into the cell by the action of permease.

Question6

A transcription unit in DNA is defined primarily by the three regions in DNA and these are with respect to upstream and down stream end;

[NEET 2024]

Options:

A.

Repressor, Operator gene, Structural gene

B.

Structural gene, Transposons, Operator gene

C.

Inducer, Repressor, Structural gene

D.

Promotor, Structural gene, Terminator

Answer: D

Solution:

A transcription unit of DNA is defined primarily by the three regions in the DNA:
(i) A promoter
(ii) The structural gene
(iii) A terminator

The promoter is said to be located towards 5'-end (upstream) of the structural gene (the reference is made with respect to the polarity of coding strand)

The terminator is located towards 3'-end (downstream) of the coding strand.

Question7

Which of the following statement is correct regarding the process of replication in E.coli?

[NEET 2024]

Options:

A.

The DNA dependent DNA polymerase catalyses polymerization in one direction that is 3′ ⟶ 5'

B.

The DNA dependent RNA polymerase catalyses polymerization in one direction, that is 5′ ⟶ 3′

C.

The DNA dependent DNA polymerase catalyses polymerization in 5′ ⟶ 3′ as well as 3′ ⟶ 5′ direction

D.

The DNA dependent DNA polymerase catalyses polymerization in 5′ ⟶ 3′ direction

Answer: D

Solution:

In Prokaryotes, like E.coli during replication, the DNA dependent DNA polymerase catalyse polymerization only in one direction, that is 5′ ⟶ 3′

Question8

Match List I with List II

	List-I		List-II
A.	Frederick Griffith	I.	Genetic code
B.	Francois Jacob & Jacque Monod	II.	Semi-conservative mode of DNA replication
C.	Har Gobind Khorana	III.	Transformation
D.	Meselson & Stahl	IV.	. Lac operon

Choose the correct answer from the options given below:

[NEET 2024]

Options:

A.

A-III, B-II, C-I, D-IV

B.

A-III, B-IV, C-I, D-II

C.

A-II, B-III, C-IV, D-I

D.

A-IV, B-I, C-II, D-III

Answer: B

Solution:

Frederick Griffith series of experiment witness miraculous transformation in the bacteria.

The elucidation of Lac operon was a result of a close association between geneticist, Francois Jacob and a biochemist, Jacques Monod.

Meselson and Stahl gave semi-conservative mode of DNA replication.

Har Gobind Khorana developed chemical method to define combination of bases in genetic code.

Question9

Match List I with List II :

	List-I		List-II
A.	Down’s syndrome	I.	11th chromosome
B.	α-Thalassemia	II.	‘X’ chromosome
C.	β-Thalassemia	III.	21st chromosome
D.	Klinefelter’s syndrome I	IV.	16th chromosome

Choose the correct answer from the options given below :

[NEET 2024]

Options:

A.

A-I, B-II, C-III, D-IV

B.

A-II, B-III, C-IV, D-I

C.

A-III, B-IV, C-I, D-II

D.

A-IV, B-I, C-II, D-III

Answer: D

Solution:

Down’s syndrome is due to presence of an additional copy of chromosome number 21. Klinefelter’s syndrome is caused due to presence of an additional copy of X-chromosome. α-Thalassemia is controlled by two closely linked genes on chromosome 16 of each parent. β-Thalassemia is controlled by a single gene HBB on chromosome 11 of each parent.

Question10

Which one is the correct product of DNA dependent RNA polymerase to the given template?

3’TACATGGCAAATATCCATTCA5’

[NEET 2024]

Options:

A.

5’AUGUACCGUUUAUAGGUAAGU3’

B.

5’AUGUAAAGUUUAUAGGUAAGU3’

C.

5’AUGUACCGUUUAUAGGGAAGU3’

D.

5’ATGTACCGTTTATAGGTAAGT3’

Answer: A

Solution:

Template DNA is :

3’TACATGGCAAATATCCATTCA5’

5’AUGUACCGUUUAUAGGUAAGU3’ m-RNA

Question11

Match List I with List II:

	List-I		List-II
A.	RNA polymerase III	I.	snRNPs
B.	Termination of transcription	II.	Promotor
C.	Splicing of Exons	III.	Rho factor
D.	TATA box	IV.	SnRNAs, tRNA

Choose the correct answer from the options given below :

[NEET 2024]

Options:

A.

A-II, B-IV, C-I, D-III

B.

A-III, B-II, C-IV, D-I

C.

A-III, B-IV, C-I, D-II

D.

A-IV, B-III, C-I, D-II

Answer: D

Solution:

• In eukaryotes, RNA polymerase III codes for snRNAs, tRNA and 5s rRNA.

• Splicing of exons is performed by snRNPs.

• TATA box is present in promoter region of transcription unit.

• Rho factor is responsible for termination of transcription.

Question12

The last chromosome sequenced in Human Genome Project was : [NEET 2023 mpr]

Options:

A.

Chromosome 6

B.

Chromosome 1

C.

Chromosome 22

D.

Chromosome 14

Answer: B

Solution:

Solution:

While the Human Genome Project, which aimed to sequence all the genes in the human genome, was officially completed in 2003, the sequencing and refinement of some parts of the genome continued past that date. Chromosome 1, the largest human chromosome, was the last to be fully sequenced, with this task not being completed until May 2006. This marked a significant milestone in human genetics.

Question13

Name the component that binds to the operator region of an operon and prevents RNA polymerase from transcribing the operon. [NEET 2023 mpr]

Options:

A.

Promotor

B.

Regulator protein

C.

Repressor protein

D.

Inducer

Answer: C

Solution:

The component that binds to the operator region of an operon and prevents RNA polymerase from transcribing the operon is the Repressor protein. Repressor proteins are produced by a regulator gene and can bind to an operator site to block transcription of downstream structural genes.

Question14

Given below are two statements :
Statement I :
The process of copying genetic information from one strand of the DNA into RNA is termed as transcription.
Statement II :
A transcription unit in DNA is defined primarily by the three regions in the DNA i.e., a promotor, the structural gene and a terminator.

In the light of the above statements, choose the correct answer from the options given below :
[NEET 2023 mpr]

Options:

A.

Statement I is true but Statement II is false

B.

Statement I is false but Statement II is true

C.

Both Statement I and Statement II are true

D.

Both Statement I and Statement II are false

Answer: C

Solution:

Solution:

Statement I is correct. Transcription is the process of copying genetic information from one strand of the DNA into RNA. The resulting RNA molecule is complementary to the DNA strand from which it was transcribed.
Statement II is also correct. A transcription unit in DNA is indeed defined by three main regions: the promoter, the structural gene, and a terminator.
1. The promoter is a DNA sequence that defines where transcription of a gene by RNA polymerase begins.
2. The structural gene contains the actual genetic information that is being transcribed.
3. The terminator is a sequence of nucleotides that signals the end of transcription.

Question15

Which scientist conducted an experiment with 32P and 35S labelled phages for demonstrating that DNA is the genetic material?

[NEET 2023 mpr]

Options:

A.

james D. Watson and F.H. C. Crick

B.

A. D Hershey and M.J. Chase

C.

F. Griffith

D.

O.T. Avery, C.M. MacLeod and M. McCarty

Answer: B

Solution:

Solution:

The experiment with ^{32}P and ^{35}S labelled phages for demonstrating that DNA is the genetic material was conducted by A. D. Hershey and M. J. Chase. So the correct answer is Option B.

Question16

Given below are two statements :
Statement I :
RNA being unstable, mutate at a faster rate.
Statement II :
RNA can directly code for synthesis of proteins hence can easily express the characters.

In the light of the above statements, choose the correct answer from the options given below :
[NEET 2023 mpr]

Options:

A.

Statement I is correct but Statement II is false

B.

Statement I is incorrect but Statement II is true

C.

Both Statement I and Statement II are true

D.

Both Statement I and Statement II are false

Answer: C

Solution:

Solution:

Statement I : RNA is indeed generally less stable than DNA and mutates at a faster rate. This is due to the presence of a hydroxyl group on the 2 ' carbon of RNA, which makes it more susceptible to hydrolysis and other chemical reactions. This increased rate of mutation can be beneficial for RNA viruses, for example, as it allows them to rapidly adapt to new environments or hosts.

Statement II : RNA, particularly mRNA (messenger RNA), can directly code for the synthesis of proteins. In the process of gene expression, DNA is first transcribed into RNA, which is then translated into protein. Hence, changes in the RNA sequence can directly affect the resultant protein and thus easily express different characters.

Question17

Select the correct statements about sickle cell anaemia.
(A) There is a change in gene for beta globin.
(B) In the beta globin, there is valine in the place of Lysine.
(C) It is an example of point mutation.
(D) In the normal gene U is replaced by A.

Choose the correct answer from the options given below :
[NEET 2023 mpr]

Options:

A.

(B), (C) and (D) only

B.

(B) and (D) only

C.

(A), (B) and (D) only

D.

(A) and (C) only

Answer: D

Solution:

Solution:

Sickle cell anemia is caused by a single point mutation in the gene for the beta globin chain of hemoglobin.
(A) is correct because the mutation occurs in the gene for beta globin.
(B) is incorrect because, in sickle cell anemia, there is a change in the beta globin chain where valine is substituted for glutamic acid, not lysine.
(C) is correct because sickle cell anemia is caused by a single point mutation, which is a change in a single nucleotide in the DNA.
(D) is incorrect because the statement does not accurately describe the genetic mutation. In the normal gene, the DNA code is GAG, which codes for glutamic acid, but in sickle cell anemia, this is changed to GTG, which codes for valine. This does not involve replacing uracil (U) with adenine (A) as the statement suggests.

Question18

Which one of the following acts as an inducer for lac operon? [NEET 2023 mpr]

Options:

A.

Sucrose

B.

Lactose

C.

Glucose

D.

Galactose

Answer: B

Solution:

Solution:

In bacterial genetics, the lac operon is an operon (a functioning unit of genomic DNA containing a cluster of genes under the control of a single regulatory signal or promoter) required for the transport and metabolism of lactose in E. coli and some other enteric bacteria.

When lactose is present, it acts as an inducer for the lac operon. This means that lactose, when present, triggers the activation of the lac operon, allowing the bacteria to produce the necessary enzymes (beta-galactosidase, lactose permease, and thiogalactoside transacetylase) to metabolize lactose. The lac operon is a classic example of a gene system subject to both positive and negative control.

Question19

With reference to Hershey and Chase experiments. Select the correct statements.
(A) Viruses grown in the presence of radioactive phosphorus contained radioactive DNA.
(B) Viruses grown on radioactive sulphur contained radioactive proteins.
(C) Viruses grown on radioactive phosphorus contained radioactive protein.
(D) Viruses grown on radioactive sulphur contained radioactive DNA.
(E) Viruses grown on radioactive protein contained radioactive DNA.

Choose the most appropriate answer from the options given below : [NEET 2023 mpr]

Options:

A.

(D) and (E) only

B.

(A) and (B) only

C.

(A) and (C) only

D.

(B) and (D) only

Answer: A

Solution:

Solution:

Explanation : In the Hershey and Chase experiments, they used bacteriophages (viruses that infect bacteria) and grew one batch in the presence of radioactive phosphorus (P32) and another batch in the presence of radioactive sulfur (S35).

Phosphorus is a component of DNA but not of protein. Therefore, any virus particles grown in the presence of radioactive phosphorus would have radioactive DNA, which is statement (A).
Sulfur is found in proteins (in the amino acids methionine and cysteine) but not in DNA. Therefore, any virus particles grown in the presence of radioactive sulfur would have radioactive protein, which is statement (B).

Statements (C), (D), and (E) are incorrect because they do not align with the components of DNA and proteins, and where sulfur and phosphorus are found in these molecules.
The Hershey and Chase experiments were key in establishing that DNA, not protein, is the genetic material. When these radioactive viruses infected bacteria, they found that the radioactive DNA (from phosphorus) was transferred to the bacteria, not the radioactive protein (from sulfur).

Question20

The salient features of genetic code are :
(A) The code is palindromic
(B) UGA act as initiator codon
(C) The code is unambiguous and specific
(D) The code is nearly universal

Choose the most appropriate answer from the options given below : [NEET 2023 mpr]

Options:

A.

(A) and (D) only

B.

(B) and (C) only

C.

(A) and (B) only

D.

(C) and (D) only

Answer: D

Solution:

Solution:

The genetic code is unambiguous and specific, meaning each codon specifies only one amino acid. Also, the genetic code is nearly universal as the same codons specify the same amino acids in all organisms with a few minor exceptions. The code is not palindromic, and UGA does not act as an initiator codon; it is a stop codon in most organisms.

Question21

The phenomenon of pleiotropism refers to [NEET 2023]

Options:

A. Presence of two alleles, each of the two genes controlling a single trait

B. A single gene affecting multiple phenotypic expression

C. More than two genes affecting a single character

D. Presence of several alleles of a single gene controlling a single crossover

Answer: B

Solution:

Solution:

When a single gene affects multiple phenotypic expression, the gene is called pleiotropic gene and the phenomenon is called pleiotropism.

Question22

Expressed Sequence Tags (ESTs) refers to [NEET 2023]

Options:

A. All genes that are expressed as proteins.

B. All genes whether expressed or unexpressed.

C. Certain important expressed genes.

D. All genes that are expressed as RNA.

Answer: D

Solution:

Solution:

All the genes that are expressed as RNA are referred to as Expressed Sequence Tags (ESTs).

Question23

Unequivocal proof that DNA is the genetic material was first proposed by
[NEET 2023]

Options:

A. Alfred Hershey and Martha Chase

B. Avery, Macleoid and McCarthy

C. Wilkins and Franklin

D. Frederick Griffith

Answer: A

Solution:

Solution:

The unequivocal proof that DNA is the genetic material came from the experiment of Alfred Hershey and Martha Chase.

Avery, Macleoid and McCarty gave the biochemical characterisation of Transforming Principle.

The transformation experiments by using Pneumococcus was conducted by Frederick Griffith.

Wilkins and Franklin produced X-ray diffraction data of DNA.

Question24

What is the role of RNA polymerase III in the process of transcription in Eukaryotes?
[NEET 2023]

Options:

A. Transcription of tRNA, 5S rRNA and snRNA

B. Transcription of precursor of mRNA

C. Transcription of only snRNAs

D. Transcription of rRNAs (28S, 18S and 5.8S)

Answer: A

Solution:

In eukaryotes there are three major types of RNA polymerases.

RNA polymerase I transcribes : 5.8S, 18S, 28S rRNAs

RNA polymerase II transcribes : hnRNAs (precurssor of mRNA)

RNA polymerase III transcribes : tRNAs, ScRNA, 5 S rRNA and snRNA

Question25

Given below are two statements:
Statement I: RNA mutates at a faster rate.
Statement II: Viruses having RNA genome and shorter life span mutate and evolve faster.

In the light of the above statements, choose the correct answer from the options given below:
[NEET 2023]

Options:

A. Both Statement I and Statement II are false.

B. Statement I is true but Statement II is false.

C. Statement I is false but Statement II is true.

D. Both Statement I and Statement II are true.

Answer: D

Solution:

Solution:

RNA being unstable, mutate at a faster rate. Consequently, viruses having RNA genome and having shorter life span mutate and evolve faster.

Question26

Given below are two statements:
Statement I: In prokaryotes, the positively charged DNA is held with some negatively charged proteins in a region called nucleoid.
Statement II: In eukaryotes, the negatively charged DNA is wrapped around the positively charged histone octamer to form nucleosome.

In the light of the above statements, choose the correct answer from the options given below:
[NEET 2023]

Options:

A. Both Statement I and Statement II are false.

B. Statement I is correct but Statement II is false.

C. Statement I is incorrect but Statement II is true.

D. Both Statement I and Statement II are true.

Answer: C

Solution:

Solution:

In prokaryotes, the negatively charged DNA is held with some positively charged proteins in a region termed as nucleoid.

In eukaryotes, the negatively charged DNA is wrapped around the positively charged histone octamer to form a structure called nucleosome

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Question27

Choose the correct answer from the options given below:
Match List I with List II.

List I	List II
A. Gene 'a'	I. β-galactosidase
B. Gene 'y'	II. Transacetylase
C. Gene 'i'	III. Permease
D. Gene 'z'	IV. Repressor protein

[NEET 2023]

Options:

A. A-II, B-III, C-IV, D-I

B. A-III, B-IV, C-I, D-II

C. A-III, B-I, C-IV, D-II

D. A-II, B-I, C-IV, D-III

Answer: A

Solution:

Solution:

In a lac operon,

Gene a codes for enzyme transacetylase.

Gene y codes for enzyme permease.

Gene i codes for repressor protein

Gene z codes for enzyme β-galactosidase.

Question28

Which one of the following is the sequence on corresponding coding strand, if the sequence on mRNA formed is as follows 5'AUCGAUCGAUCGAUCGAUCGAUCG AUCG 3'? [NEET 2023]

Options:

A. 3' UAGCUAGCUAGCUAGCUAGCUAGCUAGC 5'

B. 5' ATCGATCGATCGATCGATCGATCGATCG 3'

C. 3' ATCGATCGATCGATCGATCGATCGATCG 5'

D. 5' UAGCUAGCUAGCUAGCUAGCUAGCUAGC 3'

Answer: B

Solution:

Solution:

The sequence of coding strand is same as RNA except thymine at the place of uracil. Template strand → 3'-TAGCTAGCTAGCTAGCTAGCTAGCTAGC-5'

Coding strand → 5'-ATCGATCGATCG ATCGATCGATCGATCG-3'

↓ Transcription

mRNA → 5' AUCGAUCGAUCGAUCGAUCGAUCG AUCG 3'

Question29

In lac operon, z gene codes for: [NEET Re-2022]

Options:

A. Transacetylase

B. β-galactosidase

C. Permease

D. Repressor

Answer: B

Solution:

Solution:

z-gene codes for Beta galactosidase enzyme, y-gene code for permease enzyme and a gene code for transacetylase.

Question30

Given below are two statements.
Statement I:
DNA polymerases catalyses polymerisation only in one direction, that is $5' \rightarrow 3'$
Statement II :
During replication of DNA, on one strand the replication is continuous while on the other strand it is discontinuous.

In the light of the above statements, choose the correct answer from the options given below
[NEET Re-2022]

Options:

A. Statement I is incorrect but Statement II is correct

B. Both Statement I and Statement II are correct

C. Both Statement and Statement II are incorrect

D. Statement I is correct but Statement II is incorrect

Answer: B

Solution:

Solution:

The main enzyme for DNA replication is DNA Dependent DNA polymerase. It catalyses polymerisation only in one direction, that is 5′ →3′

During DNA replication, replication on one strand is continuous with polarity 3′→5′ while other strand is discontinuous with polarity 5′→ 3′.

Question31

List - I	List - II
(a) In lac operon i gene	(i) transacetylase codes for
(b) In lac operon z gene	(ii) permease codes for
(c) In lac operon y gene	(iii) β-galactosidase codes for
(d) In lac operon a gene	(iv) Repressor codes for

Choose the correct answer from the options given below.
[NEET Re-2022]

Options:

A. (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

B. (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)

C. (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)

D. (a)-(i), (b)-(i), (c)-(iii), (d)-(ii)

Answer: C

Solution:

Solution:

Lac operon genes-

(1) There are 3 structural genes

(a) Lac z→ Codes for β-galactosidase

(b) Lac y → Codes for permease

(c) Lac a→ codes for transacetylase

(2) Operator gene

(3) Promoter gene

(4) Regulator gene: It codes for a protein known as repressor protein

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Question32

List-I	List-II
(a) Bacteriophage $\varphi \times 174$	(i) 48502 base pairs
(b) Bacteriophage Lambda	(ii) 5386 nucleotides
(c) Escherichia coli	(iii) 3.3×10^9 Base pairs
(d) Haploid content Of human DNA	(iv) 4.6×10^6 base pairs

Choose the correct answer from the options given below : [NEET Re-2022]

Options:

A. (a)-(i), (b)-(ii), (c)-(iv), (d)-(iii)

B. (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)

C. (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)

D. (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

Answer: D

Solution:

Solution:

Length of DNA is defined as number of nucleotides or as base pairs.
It is a characteristic feature of an organism φ × 174 − ssDNA-5386 nucleotides.
Bacteriophage Lambda and Linear DNA 48502bp
E coli and circular DNA -4.6×10^6 bp
Haploid content of human DNA - 1 complete set of chromosomes -3.3×10^9 bp

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Question33

If DNA contained sulfur instead of phosphorus and proteins contained phosphorus instead of sulfur, what would have been the outcome of Hershey and Chase experiment?
[NEET Re-2022]

Options:

A. Radioactive phosphorus in bacterial cells

B. No radioactive sulfur in bacterial cells

C. Both radioactive sulfur and phosphorus in bacterial cells

D. Radioactive sulfur in bacterial cells

Answer: D

Solution:

Solution:

If DNA contains sulphur Protein contains Phosphorous

Then, Radioactive sulphur will be found in bacterial cells.

Question34

Against the codon 5′ UAC 3′, what would be the sequence of anticodon on tRNA?
[NEET Re-2022]

Options:

A. 5' GUA 3'

B. 5' AUG 3'

C. 5′ ATG 3′

D. 5' GTA 3'

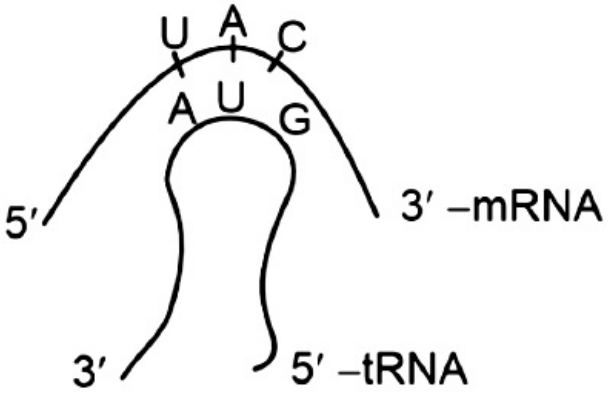
Answer: A

Solution:

mRNA codon : 5' UAC 3'

tRNA Anticodon : 3' AUG 5'

The sequence of anticodon on tRNA would be 5′ GUA 3'



Question35

If A and C make 30% and 20% of DNA, respectively, what will be the percentage composition of T . and G ?
[NEET Re-2022]

Options:

A. T : 20%, G : 20%

B. T : 20%, G : 30%

C. T : 30%, G : 20%

D. T : 30%, G : 30%

Answer: C

Solution:

Solution:

According to the Chargaff's rule, the DNA should have an equal ratio of Purine (Adenine & Guanine) and Pyrimidine (Thymine & Cytosine).

It means the number of Adenine is equal to Thymine and the number of Guanine is equal to Cytosine molecules.

Question36

The process of translation of mRNA to proteins begins as soon as : [NEET-2022]

Options:

A. The small subunit of ribosome encounters mRNA

B. The larger subunit of ribosome encounters mRNA

C. Both the subunits join together to bind with mRNA

D. The tRNA is activated and the larger subunit of ribosome encounters mRNA

Answer: A

Solution:

Solution:

When the small subunit of ribosome encounters an mRNA, the process of translation of the mRNA to protein begins. This process is followed by the binding of bigger/larger subunit.

t-RNA is activated by the addition of amino acid prior to the attachment of ribosome, in the first phase.

Question37

DNA polymorphism forms the basis of : [NEET-2022]

Options:

A. Genetic mapping

B. DNA finger printing

C. Both genetic mapping and DNA finger printing

D. Translation

Answer: C

Solution:

Solution:

Polymorphism in DNA sequence is the basis of genetic mapping of human genome as well as of DNAfingerprinting.

Question38

Read the following statements and choose the set of correct statements :
(a) Euchromatin is loosely packed chromatin
(b) Heterochromatin is transcriptionally active
(c) Histone octomer is wrapped by negatively charged DNA in nucleosome
(d) Histones are rich in lysine and arginine
(e) A typical nucleosome contains 400 bp of DNA helix

Choose the correct answer from the options given below :

[NEET-2022]

Options:

A. (b), (d), (e) Only

B. (a), (c), (d) Only

C. (b), (e) Only

D. (a), (c), (e) Only

Answer: B

Solution:

Solution:

Heterochromatin is transcriptionally inactive. A typical nucleosome contains 200 bp of DNA helix.

Euchromatin is the loosely packed chromatin region.

The negatively charged DNA is wrapped around the positively charged histone octamer to form a structure called nucleosome. Histones are rich in basic amino acid residues lysine and arginine.

Question39

If a geneticist uses the blind approach for sequencing the whole genome of an organism, followed by assignment of function to different segments, the methodology adopted by him is called as : [NEET-2022]

Options:

A. Sequence annotation

B. Gene mapping

C. Expressed sequence tags

D. Bioinformatics

Answer: A

Solution:

Solution:

Sequencing the whole set of genome that contained all the coding and non-coding sequences and later assigning different regions in the sequence with fuctions is called sequence annotation

---

Question40

If the length of a DNA molecule is 1.1 metres, what will be the approximate number of base pairs?

[NEET-2022]

Options:

A. 3. 3× bp 10^9

B. 6. ×610bp^9

C. 3.3× bp 10^6

D. 6.6 × bp10^6

Answer: A

Solution:

Solution:

Number of base pairs × distance between 2 consecutive base pairs = Length of DNA molecule

$$x \cdot 0.34 \times 10^{-9} m = 1.1 m$$

$$x = \frac{1.1}{0.3 \times 10^{-9}}$$

$$= 3.6 \times 10^9$$

$$\simeq 3.3 \times 10^9 bp$$

Question41

In an E. Coli strain i gene gets mutated and its product can not bind the inducer molecule. If growth medium is provided with lactose, what will be the outcome? [NEET-2022]

Options:

A. Onlyzgene will get transcribed

B. z, y, a genes will be transcribed

C. z ,y ,a genes will not be translated

D. RNA polymerase will bind the promoter region

Answer: C

Solution:

Solution:

As the product of ‘i’ gene binds with the operator region and blocks the transcription and translation of z, y and a genes.

It’s product is prevented from binding to the operator by attaching it with the inducer. As the inducer can now no more capable of binding with the repressor, thus, in all the cases, operator always gets attached with the repressor thereby preventing the transcription and transmission of z, y and a.

Even in the presence of lactose, transcription and translation of z, y and a would not occur.

Question42

Ten E.coli cells with ^{15}N - dsDNA are incubated in medium containing ^{14}N nucleotide. After 60 minutes, how many E.coli cells will have DNA totally free from ^{15}N ?
[NEET-2022]

Options:

A. 20 cells

B. 40 cells

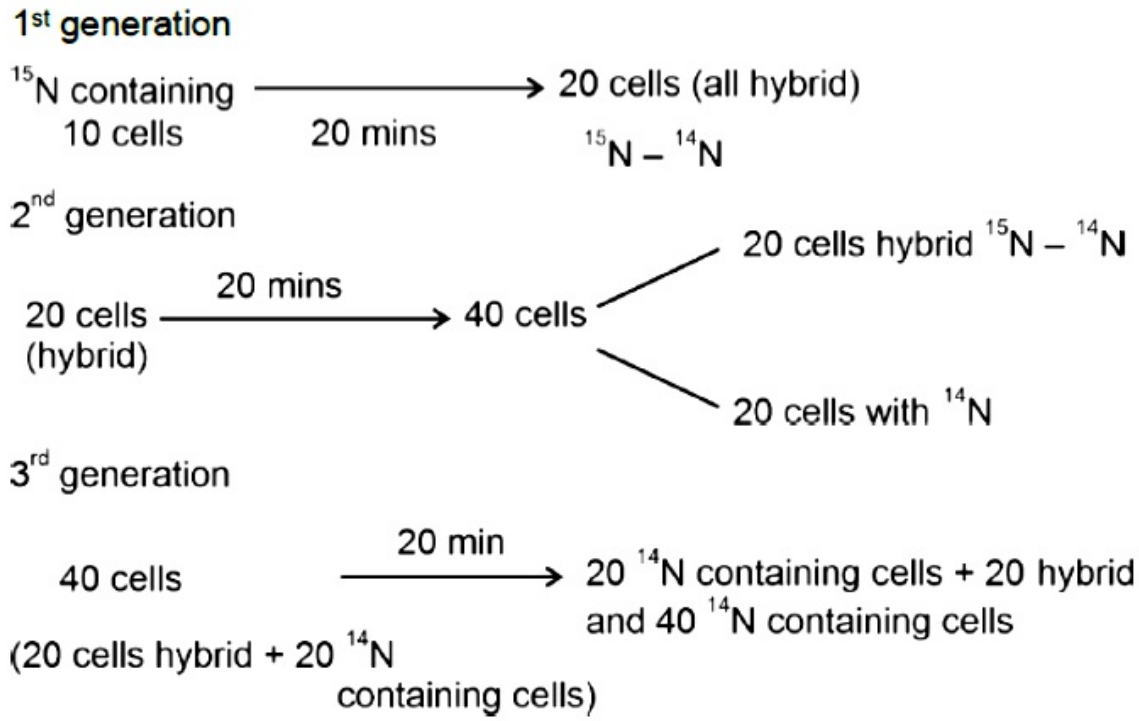
C. 60 cells

D. 80 cells

Answer: C

Solution:

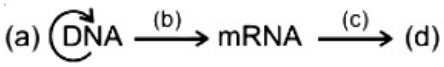
Solution:



Therefore, after 60 minutes, 60 E.coli cells will have DNA totally free from ^{15}N.

Question43

Complete the flow chart on central dogma.



[NEET 2021]

Options:

A. (a)-Replication; (b)-Transcription; (c)-Transduction; (d)-Protein

B. (a)-Translation; (b)-Replication; (c)-Transcription;(d)-Transduction

C. (a)-Replication; (b)-Transcription; (c)-Translation; (d)-Protein

D. (a)-Transduction; (b)-Translation; (c)-Replication; (d)-Protein

Answer: C

Solution:

Solution:

• Formation of DNA from DNA is replication.

• Formation of mRNA from DNA is called Transcription.

• Formation of protein from mRNA is called Translation.

• So, (a) is Replication

(b) is Transcription

(c) is Translation

(d) is Protein

• Transduction is transfer of genetic material from one bacterium to another with the help of virus or a bacteriophage.

Question44

DNA strands on a gel stained with ethidium bromide when viewed under UV radiation, appear as
[NEET 2021]

Options:

A. Yellow bands

B. Bright orange bands

C. Dark red bands

D. Bright blue bands

Answer: B

Solution:

Solution:

After the bands are stained, they are viewed in UV light. The bands appear bright orange in colour.

Ethidium bromide is the intercalating agent that stacks in between the nitrogenous bases.

Question45

Identify the correct statement.
[NEET 2021]

Options:

A. In capping, methyl guanosine triphosphate is added to the 3 ' end of hnRNA

B. RNA polymerase binds with Rho factor to terminate the process of transcription in bacteria

C. The coding strand in a transcription unit is copied to an mRNA

D. Split gene arrangement is characteristic of prokaryotes

Answer: B

Solution:

Solution:
• Split gene arrangement is characterstic of eukaryotes.
• In capping 5-methyl guanosine triphosphate is added at 5′ end of hnRNA.
• At 3′ end poly-A tail is added.
• The non coding or template strand is copied to an mRNA. RNA polymerase accociate with ρ factor (Rho factor) and it alters the specificity of the RNA polymerase to terminate the processes.

Question46

What is the role of RNA polymerase III in the process of transcription in eukaryotes?
[NEET 2021]

Options:

A. Transcribes rRNAs (28S, 18S and 5.8S)

B. Transcribes tRNA, 5s rRNA and snRNA

C. Transcribes precursor of mRNA

D. Transcribes only snRNAs

Answer: B

Solution:

• RNA polymerase III transcribes tRNA, ScRNA, 5S rRNA and SnRNA.
• RNA polymerase I transcribes 5.8S, 18S and 28S rRNA.

• RNA polymerase II transcribes hnRNA which is precursor of mRNA

Question47

DNA fingerprinting involves identifying differences in some specific regions in DNA sequence, called as
[NEET 2021]

Options:

A. Satellite DNA

B. Repetitive DNA

C. Single nucleotides

D. Polymorphic DNA

Answer: B

Solution:

Solution:

• DNA fingerprinting involves identifying differences in some specific regions in DNA sequence called as repetitive DNA.

• The basis of DNA fingerprinting is VNTR (a satellite DNA as probe that show very high degree of polymorphism)

• Polymorphism is the variation at genetic level.

Allelic sequence variation has traditionally been described as a DNA polymorphism.

Question48

Which is the "Only enzyme" that has "Capability" to catalyse Initiation, Elongation and Termination in the process of transcription in prokaryotes?
[NEET 2021]

Options:

A. DNA dependent DNA polymerase

B. DNA dependent RNA polymerase

C. DNA Ligase

D. DNase

Answer: B

Solution:

In prokaryotes, the DNA dependent RNA polymerase is a holoenzyme that is made of polypeptides (α2ββ′ω)σ. It is responsible for initiation, elongation and termination during transcription.

DNase degrades DNA.

DNA dependent DNA polymerase is involved in replication of DNA.

DNA ligase joins the discontinuously sysnthesised fragments of DNA.

Question49

Which of the following RNAs is not required for the synthesis of protein?
[NEET 2021]

Options:

A. mRNA

B. tRNA

C. rRNA

D. siRNA

Answer: D

Solution:

Solution:

siRNA are small interfering RNA also called silencing RNA. It is a class of double-stranded RNA, non-coding RNA molecules.

mRNA is messenger RNA that carries genetic information provided by DNA.

tRNA carries amino acids to the mRNA during translation.

rRNA is structural RNA that forms ribosomes which are involved in translation.

Question50

If Adenine makes 30% of the DNA molecule, what will be the percentage of Thymine, Guanine and Cytosine in it?
[NEET 2021]

Options:

A. T : 20 ; G : 30 ; C : 20

B. T : 20 ; G : 20 ; C : 30

C. T : 30 ; G : 20 ; C : 20

D. T : 20 ; G : 25 ; C : 25

Answer: C

Solution:

According to Chargaff's rule, for a double stranded DNA,

$[A] = [T]$

$\because [A] = 30\%, \Rightarrow [T] = 30\%$

Since $[C] = [G]$

$\therefore 100 - [A + T]$

$= 100 - [30 + 30]$

$= 100 - 60 = 40\%$

and $C = G = 20\%$ each

$\therefore [A] = 30\%$

$[T] = 30\%$

$[G] = 20\%$

$[C] = 20\%$

Question51

Statement I: The codon 'AUG' codes for methionine and phenylalanine.
Statement II: 'AAA' and 'AAG' both codons code for the amino acid lysine.

In the light of the above statements, choose the correct answer from the options given below.
[NEET 2021]

Options:

A. Both Statement I and Statement II are true

B. Both Statement I and Statement II are false

C. Statement I is correct but Statement II is false

D. Statement I is incorrect but Statement II is true

Answer: D

Solution:

Solution:

● AUG has dual functions, it codes for methionine. It also acts as initiator codon.

● AUG does not code for phenylalanine.

● Statement II is true.

Question52

Which one of the following statements about Histones is wrong? [NEET 2021]

Options:

A. Histones are organized to form a unit of 8 molecules

B. The pH of histones is slightly acidic

C. Histones are rich in amino acids - Lysine and Arginine

D. Histones carry positive charge in the side chain

Answer: B

Solution:

Solution:

● Histones are rich in basic amino acids residue lysine and arginine with charged side chain.
● There are five types of histone proteins i.e., H_1, H_2A,H_2B,H_3 and H_4 . Four of them occur in pairs to produce a unit of 8 molecules (histone octamer)
● The pH of histones is basic.

Question53

If the distance between two consecutive base pairs is 0.34 nm and the total number of base pairs of a DNA double helix in a typical mammalian cell is 6.6×10^9 bp, then the length of the DNA is approximately
[NEET-2020]

Options:

A. 2.5 meters

B. 2.2 meters

C. 2.7 meters

D. 2.0 meters

Answer: B

Solution:

Length of DNA
$= [0.34 \times 10^{-9}]m \times 6.6 \times 10^9 bp = 2.2m$

Distance between 2 base pair in DNA helix $= 0.34nm = 0.34 \times 10^{-9}m$

Total number of base pair $= 6.6 \times 10^9 bp$

Question54

Which of the following statements is correct?
[NEET-2020]

Options:

A. Adenine pairs with thymine through one H-bond

B. Adenine pairs with thymine through one H-bond

C. Adenine does not pair with thymine

D. Adenine pairs with thymine through two H-bonds

Answer: D

Solution:

Solution:

Adenine pairs with thymine through two H-bonds i.e., A == T

Question55

The first phase of translation is
[NEET-2020]

Options:

A. Recognition of DNA molecule

B. Aminoacylation of tRNA

C. Recognition of an anti-codon

D. Binding of mRNA to ribosome

Answer: B

Solution:

Solution:

The first phase of translation involves activation of amino acid in the presence of ATP and linked to their cognate tRNA - a process commonly called as charging of tRNA or aminoacylation of tRNA.

Question56

Which scientist experimentally proved that DNA is the sole genetic material in bacteriophage?
[NEET OD 2019]

Options:

A. Beadle and Tautum

B. Messelson and Stahl

C. Hershey and Chase

D. Jacob and Monod

Answer: C

Question57

From the following, identify the correct combination of salient features of Genetic Code :-
[NEET OD 2019]

Options:

A. Universal, Non-ambiguous, Overlapping

B. Degenerate, Overlapping, Commaless

C. Universal, Ambiguous, Degenerate

D. Degenerate, Non-overlapping, Non-ambiguous

Answer: D

Question58

In the process of transcription in Eukaryotes, the RNA polymerase I transcribes :-
[NEET OD 2019]

Options:

A. mRNA with additional processing, capping and tailing

B. tRNA, 5 SrRNA and snRNAs

C. rRNAs-28 S, 18S and 5.8S

D. Precursor of mRNA, hnRNA

Answer: C

Question59

What initiation and termination factors are involved in transcription in

Eukaryotes?
[NEET OD 2019]

Options:

A. σ and ρ, respectively

B. α and β, respectively

C. β and γ, respectively

D. α and σ, respectively

Answer: A

Question60

Match the following RNA polymerase with their transcribed products :

(a) RNA polymerase I	(i) tRNA
(b) RNA polymerase II	(ii) rRNA
(c) RNA polymerase III	(iii) hnRNA

[NEET OD 2019]

Options:

A. a-i, b-iii, c-ii

B. a-i, b-ii, c-iii

C. a-ii, b-iii, c-i

D. a-iii, b-ii, c-i

Answer: C

Question61

What will be the sequence of mRNA produced by the following stretch of DNA?
3'ATGCATGCATGCATG5' TEMPLATE STRAND
5' TACGTACGTACGTAC3' CODING STRAND
[NEET OD 2019]

Options:

A. 3'AUGCAUGCAUGCAUG5'

B. 5'UACGUACGUACGUAC 3'

C. 3' UACGUACGUACGUAC 5'

D. 5' AUGCAUGCAUGCAUG 3'

Answer: B

Question62

Non-membranous nucleoplasmic structures in nucleus are the site for active synthesis of [NEET OD 2019]

Options:

A. Protein synthesis

B. mRNA

C. rRNA

D. tRNA

Answer: C

Question63

Under which of the following conditions will there be no change in the reading frame of following mRNA? 5'AACAGCGGUGCUAUU3' [NEET 2019]

Options:

A. Deletion of G from 5^{th} position

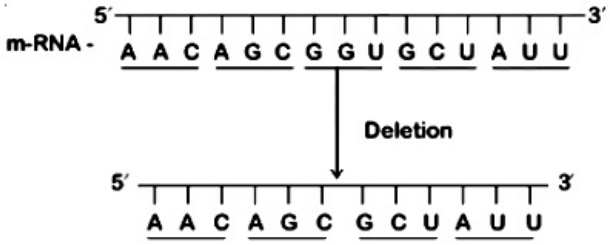
B. Insertion of A and G at 4^{th} and 5^{th} positions respectively

C. Deletion of GGU from 7^{th}, 8^{th} and 9^{th} positions

D. Insertion of G at 5^{th} position

Answer: C

Solution:



No change in reading frame of m-RNA.

Question64

Expressed Sequence Tags (ESTs) refers to : [NEET 2019]

Options:

A. Polypeptide expression

B. DNA polymorphism

C. Novel DNA sequences

D. Genes expressed as RNA

Answer: D

Solution:

Solution:

Expressed Sequence Tags (ESTs) are DNA sequences (genes) that are expressed as mRNA for protein synthesis. These are used in human Genome Project.

Question65

Match the following genes of the Lac operon with their respective products :

(a) i gene	(i) β-galactosidase
(b) z gene	(ii) Permease
(c) a gene	(iii) Repressor
(d) y gene	(iv) Transacetylase

Select the correct option.
(a) (b) (c) (d)
[NEET 2019]

Options:

A. (iii) (i) (ii) (iv)

B. (iii) (i) (iv) (ii)

C. (iii) (iv) (i) (ii)

D. (i) (iii) (ii) (iv)

Answer: B

Solution:

Solution:

In lac operon

i gene ––– Repressor

z gene ––– β-galactosidase

y gene ––– Permease

a gene ––– Transacetylase

Question66

AGGTATCGCAT is a sequence from the coding strand of a gene. What will be the corresponding sequence of the transcribed mRNA? [NEET 2018]

Options:

A. AGGUAUCGCAU

B. UGGTUTCGCAT

C. UCCAUAGCGUA

D. ACCUAUGCGAU

Answer: A

Solution:

Solution:

Coding strand and mRNA has same nucleotide sequence except, 'T' – Thymine is replaced by'U'–Uracil in mRNA.

Question67

Select the correct match [NEET 2018]

Options:

A. Alec Jeffreys – Streptococcus pneumoniae

B. Alfred Hershey and –TMV Martha Chase

C. Francois Jacob and –Lac operon Jacques Monod

D. Matthew Meselson –Pisum sativum and F.Stahl

Answer: C

Solution:

Solution:

Francois Jacob and Jacque Monod proposed model of gene regulation known as operon model/lac operon.

– Alec Jeffreys – DNA fingerprinting technique.

– Matthew Meselson and F. Stahl – Semiconservative DNA replication in E. coli.

– Alfred Hershey and Martha Chase – Proved DNA as genetic material notprotein

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Question68

The experimental proof for semiconservative replication of DNA was first shown in a
[NEET 2018]

Options:

A. Fungus

B. Bacterium

C. Virus

D. Plant

Answer: B

Solution:

Solution:

Semi-conservative DNA replication was first shown in Bacterium Escherichia coli by Matthew Meselson and Franklin Stahl.

Question69

All of the following are part of an operon except
[NEET 2018]

Options:

A. an operator

B. structural genes

C. a promoter

D. an enhancer

Answer: D

Solution:

Solution:

Enhancer sequences are present in eukaryotes.

Operon concept is for prokaryotes

Question70

The final proof for DNA as the genetic material came from the experiments of :
[NEET 2017]

Options:

A. Hershey and Chase

B. Avery, Mcleod and McCarty

C. Hargobind Khoran

D. Griffith

Answer: A

Question71

If there are 999 bases in an RNA that codes for a protein with 333 amino acids, and the base at position 901 is deleted such that the length of the RNA becomes 998 bases, how many codons will be altered ?
[NEET 2017]

Options:

A. 11

B. 33

C. 333

D. 1

Answer: B

Question72

During DNA replication, Okazaki fragments are used to elongate:

[NEET 2017]

Options:

A. The lagging strand towards replication fork

B. The leading strand away from replication fork.

C. The lagging strand away from the replication fork

D. The leading strand towards replication fork

Answer: C

Question73

Which of the following RNAs should be most abundant in animal cell ? [NEET 2017]

Options:

A. t-RNA

B. m-RNA

C. mi-RNA

D. r-RNA

Answer: D

Question74

Spliceosomes are not found in cells of; [NEET 2017]

Options:

A. Fungi

B. Animals

C. Bacteria

D. Plants

Answer: C

Question75

The association of histone H1 with a nucleosome indicates:
[NEET 2017]

Options:

A. DNA replication is occurring.

B. The DNA is condensed into a Chromatin Fibre

C. The DNA double helix is exposed

D. Transcription is occurring

Answer: B

Question76

Taylor conducted the experiments to prove semiconservative mode of chromosome replication on
[NEET 2016 P2]

Options:

A. E. coli

B. Vinca rosea

C. Vida faba

D. Drosophila melanogaster

Answer: C

Question77

The equivalent of a structural gene is A true breeding plant is
[NEET 2016 P2]

Options:

A. recon

B. muton

C. cistron

D. operon

Answer: C

Question78

Which of the following rRNAs acts as structural RNA as well as ribozyme in bacterial
[NEET 2016 P2]

Options:

A. 5·8s rRNA

B. 5S rRNA

C. 18 S rRNA

D. 23S rRNA

Answer: D

Question79

A molecule that can act as a genetic material must fulfill the traits given, except
[NEET 2016 P2]

Options:

A. it should provide the scope for slow changes that are required for evolution

B. it should be able to express itself in the form of 'Mendelian characters'

C. it should be able to generate its replica

D. it should be unstable structurally and chemicpally

Answer: D

Solution:

Solution:

Genetic material should be stable (chemically) otherwise its expression will change leading to loss in several metabolic functions or inconsistency in expression.

Question80

DNA- dependent RNA polymerase catalyzes transcription on the strand of the DNA which is called the
[NEET 2016 P2]

Options:

A. antistrand

B. template strand

C. coding strand

D. alpha strand

Answer: B

Solution:

Solution:

The template DNA strand serve in RNA synthesis during transcription is called anti coding or antisense strand while the other strand is called coding or sense strand as its base sequence is same as that of newly synthesized mRNA.

Question81

Which one of the following is the starter codon? [NEET 2016 P1]

Options:

A. UAG

B. AUG

C. UGA

D. UAA

Answer: B

Question82

Which of the following is required as inducer(s) for the expression of Lac operon? [NEET 2016 P1]

Options:

A. lactose and galactose

B. glucose

C. galactose

D. lactose

Answer: D

Solution:

Lactose acts as an inducer in lac operon. It binds with the repressor protein and thereby making the promoter site accessible to the RNA polymerase to initiate transcription of the lac operon.

Lac operon is an inducible operon. Lactose is the substrate for the enzyme β− galactosidase and it also regulates switching on and off of the operon. Hence, it is termed as inducer.

Question83

A complex of ribosomes attached to a single strand of RNA is known as : [NEET 2016 P1]

Options:

A. Okazaki fragment

B. Polysome

C. Polymer

D. Polypeptide

Answer: B

Question84

Which one of the following is not applicable to RNA? [NEET 2015]

Options:

A. Complementary base pairing

B. 5' phosphoryl and 3' hydroxyl ends

C. Heterocyclic nitrogenous bases

D. Chargaff's rule

Answer: D

Solution:

Solution:
Chargaff's rules are applicable only for double stranded DNA molecule. These are not applicable for single stranded DNA or RNA molecules. Chargaff's rules state that DNA helices contain equal molar ratios of A and T, G and C. This is because in a ds DNA molecule, complementary base pairing occurs between A and T , and C and G base pairs. This complementary base pairing is not possible in case of single stranded RNA molecule. Thus, Chargaff's rules are not applicable to RNA.

Question85

Balbiani rings are sites of :
[NEET 2015]

Options:

A. Polysaccharide synthesis

B. Lipid synthesis

C. RNA and protein synthesis

D. Nucleotide synthesis

Answer: C

Solution:

Solution:
RNA and protein synthesis occur in Balbiani rings.

Question86

Identify the correct order of organisation of genetic material from largest to smallest :
[NEET 2015]

Options:

A. Chromosome, genome, nucleotide, gene

B. Genome, chromosome, nucleotide, gene

C. Genome, chromosome, gene, nucleotide

D. Chromosome, gene, genome, nucleotide

Answer: C

Solution:

The correct order of organization of genetic material from largest to smallest is:
Genome > Chromosome > Gene > Nucleotide
Genome: It is the complete set of genetic material or DNA present in a cell or an organism, including all the genes, regulatory sequences, and non-coding DNA.
Chromosome: It is a thread-like structure made up of DNA and protein that carries genetic information in the form of genes. In eukaryotic cells, chromosomes are found in the nucleus, while in prokaryotic cells, they are present in the cytoplasm.
Gene: It is a unit of heredity that carries information for the synthesis of a particular protein or RNA molecule. A gene is a sequence of DNA that is transcribed into RNA and then translated into a protein.
Nucleotide: It is the basic building block of DNA and RNA, consisting of a nitrogenous base, a sugar molecule, and a phosphate group. The sequence of nucleotides in DNA determines the genetic information and the traits of an organism.
Therefore, the correct order of organization of genetic material from largest to smallest is genome > chromosome > gene > nucleotide, where genome is the largest and nucleotide is the smallest unit.

Question87

Satellite DNA is important because it :
[NEET 2015]

Options:

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

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

C. codes for proteins needed in cell cycle.

D. codes for proteins needed in cell cycle.

Answer: A

Solution:

Solution:
Satellite DNA displays high degree of polymorphism in population and also the same degree of polymorphism in an individual, which is inherited from parents to children (offsprings).

Question88

Gen regulation governing lactose operon of E.coli that involves the lac I gene product is :
[NEET 2015 C]

Options:

A. Negative and inducible because repressorprotein prevents transcription

B. Negative and repressible because repressorprotein prevents transcription

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

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

Answer: A

Question89

In sea urchin DNA,Which is double stranded,17 % of the bases were shown to be cytosine.The percentage of the other three bases excepted to be present in this DNA are :-
[NEET 2015 C]

Options:

A. G 17%,A 16.5%,T 32.5%

B. G 17%,A 33%,T 33%

C. G 8.5%,A 50%,T 24.5%

D. G 34%,A 24.5%,T 24.5%

Answer: B

Question90

Which one of the following is wrongly matched?
[NEET 2014]

Options:

A. Transcription- Writing information from DNA to- RNA

B. Translation- Using information in m- RNA to make protein

C. Repressor protein - Binds to a operatore to stop enzyme synthes

D. Operon- Structural genes, operator and promoter.

Answer: A

Solution:

Solution:
Transcription is the process of copying genetic information from one strand of the DNA into RNA.
Wherein the principle of complementarity guesses the process of transcription.
Transcription is writing information from DNA to mRNA not DNA to t-RNA.

Question91

Transformation was discovered by:
[NEET 2014]

Options:

A. Meseson and stahl

B. Hershey and chase

C. Griffith

D. Waston and crick

Answer: C

Solution:

Solution:
Transformation is one of the processes of transferring genetic material through the cell membrane in the form of naked deoxyribonucleic acid (DNA) between microbial cells resulting in genetic alteration.
Transformation can also be defined as insertion of new genetic material into bacterial cells. The uptake of DNA occurs in different types of cells like bacterial, yeast or plant cells. Common method for transformation of a DNA construct into a host cell is chemical transformation, electroporation or particle bombardment.

Transformation was first performed by British bacteriologist Frederick Griffith in 1928. He discovered transformation of the pneumococcal cells (Streptococcus pneumoniae) cells. In the experiment, Griffith cultured Streptococcus pneumoniae bacteria and bacteria showed two patterns of growth after the growth. One culture plate, smooth shiny colonies (S) were observed while in the other rough colonies (R) were seen. This difference was due to the presence of mucous coat in S strain bacteria.

Further, he injected both S and R strains to mice. The one which was infected with the S strain developed pneumonia and died while that infected with the R strain stayed alive.In the next stage, the heat-killed the S strain was injected into mice, but the mice stayed alive. Then, he mixed the heat-killed S and live R strains. The mixture was injected into mice and he found mice died. He also found living S strain bacteria in the dead mice.

After the observation, Griffith concluded that R strain bacteria had been transformed by S strain bacteria and the R strain became virulent. He also concludes that the transformation was inheritable. And he assumed this transforming principle as genetic material i.e., DNA.

Question92

Select the correct option:

	Directionof RNA synthesis	Direction of reading of the template DNA strand
(1)	5'-3'	3'-5'
(2)	3'-5'	5'-3'
(3)	5'-3'	5'-3'
(4)	3'-5'	3'-5'

[NEET 2014]

Options:

A. (1)

B. (2)

C. (3)

D. (4)

Answer: A

Solution:

Solution:
RNA Polymers catalyse polymerisation only in one direction, that is 5′ → 3′ and the strand that has the polarity 3′ → 5′ act as a template

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Question93

Which of the following statements is not true of two genes that show 50% recombination frequency?
(NEET 2013)

Options:

A. The gene show independent assortment.

B. If the genes are present on the same chromosome, they undergo more than one crossovers in every meiosis.

C. The genes may be on different chromosomes.

D. The genes are tightly linked.

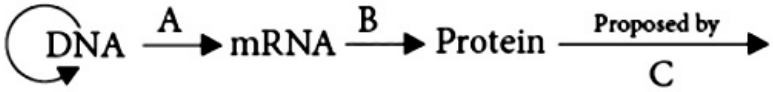
Answer: D

Solution:

Solution:
The genes that are located close to each other on a chromosome are called linked genes. The tendency of the linked genes to be inherited together is called genetic linkage. The genes that are close to each other have a tendency to be more linked than those that are farther. The more the linkage lesser will be the recombination frequency and vice a versa. Hence linkage decreases the frequency of the hybrid. A recombinant frequency of 50 percent means that the genes are present on the same chromosome but are widely separated hence they may have undergone more than one crossovers in every meiosis. They may also be unlinked due to their presence on separate chromosomes. These genes show independent assortment.

Question94

The diagram shows an important concept in the genetic implication of DNA. Fill in the blanks A to C.



(NEET 2013)

Options:

A. A-transcription B - translation C-Francis Crick

B. A-translation B - extension C-Rosalind Franklin

C. A-transcription B - replication C-James Watson

D. A-translation B - transciption C-Erwin Chargaff

Answer: A

Solution:

Solution:
The expression of the genetic material occurs normally through the production of proteins. This involves two consecutive steps. These are transcription and translation. The DNA codes for the production of messenger RNA (m RNA) during transcription. Messenger RNA carries coded information to ribosomes. The ribosomes read this information and use it for protein synthesis. This process is called translation. F.H.C. Crick described this undirectional flow of information in 1958 as the'central dogma of molecular biology'.

Question95

Which enzymes will be produced in a cell in which there is a nonsense mutation in the lacY gene?
(NEET 2013)

Options:

A. Transacetylase

B. Lactose permease and transcetylase

C. β- galactosidase

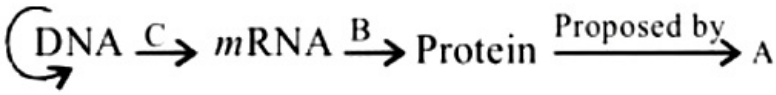
D. Lactose permease

Answer: C

Solution:

Solution:
A nonsense mutation is the one which stops polypeptide synthesis due to the formation of termination or non-sense codon. In lac operon, sequence of structural genes is Z , Y , and A, which respectively code for β -galactosidase, lactose permease and transacetylase. If the gene Y has nonsense mutation, gene expression will stop at it, resulting in non-expression of both gene Y and successive gene A. Thus, only β-galactosidase enzyme will be produced.

Question96



The figure gives an important concept in the genetic implication of DNA. Fill the blanks A, B and C.
(KN NEET 2013)

Options:

A. A-Maurice Wilkins, B-Transcription, C-Translation

B. A-James Watson, B-Replication, C- Extension

C. A-Erwin Chargaff, B-Translation, C-Replication

D. A- Francis Crick, B-Translation, C-Transcription

Answer: D

Question97

Satellite RNAs are present in some
(KN NEET 2013)

Options:

A. viroids

B. prions

C. bacteriophages

D. plant viruses

Answer: D

Solution:

Solution:
Plant viruses often contain parasites of their own, referred to as satellites. Satellite RNAs are highly dependent on their helper virus for both replication and encapsidation. Their size vary from 194 to 1500 nucleotides (approx.) The larger satellites contain open reading frame and express proteins, whereas smaller satellites do not produce functional proteins.

Question98

Which of the following is not a property of the genetic code?
(KN NEET 2013)

Options:

A. Non-overlapping

B. Ambíguous

C. Degeneracy

D. Universal

Answer: B

Solution:

Solution:
Genetic code is non-ambiguous. Nonambiguous code means that there is no ambiguity about a particular code. One codon specifies only one amino acid and not any other. There are 64 codons. Out of 64,3 are stop codons or nonsense codons, i. e, these do not code for any amino acid and rest 61 code for one of the 20 amino acids. Neither of them code for more than one amino acids except GUG which normally code for valine but in certain conditions it also codes for N - formyl methionine as initiation codon.

Question99

Genes of interest can be selected from a genomic library by using (KN NEET 2013)

Options:

A. cloning vectors

B. DNA probes

C. gene targets

D. restriction enzymes

Answer: B

Solution:

Solution:
Gene bank or genomic library is a complete collection of cloned DNA fragments which comprises the entire genome of an organism. Molecular probes are small DNA segments that are used to detect the presence of complementary sequences in nucleic acid samples in genomic library. These are usually formed of $200-500$ nucleotide sequences. These segments or probes are labelled either with radioactive or with nonradioactive compound. Probes with DNA sequence complementary to the gene to be isolated are used. They bind with the desired gene, making it visible and help in isolating it from the library.

Question100

In an inducible operon, the genes are (KN NEET 2013)

Options:

A. usually not expressed unless a signal turns them"on"

B. usually expressed unless a signal turns them "off".

C. never expressed

D. always expresser

Answer: A

Solution:

Solution:
Inducible operon is an operon which remains switched off normally but becomes operational in the presence of an inducer (lactose in case of lac operon). The inducible operon generally functions in catabolic pathways. In the presence of an inducer, i.e,, lactose (actually allolactose or metabolite of lactose), the repressor has a higher affinity for the inducer than for the operator gene. When lactose is added, a few lactose molecules are carried into the cell by the enzyme lactose permease as small amount of this enzyme is present in the cell even when the operon is not working. These few lactose molecules are converted into allolactose molecules which act as an inducer and bind to the repressor (a product of regulator gene). The repressor-inducer complex fails to join with the operator gene, thus it is turned on.

Question101

One of the most frequently used techniques in DNA fingerprinting is (KN NEET 2013)

Options:

A. VNTR

B. SSCP

C. SCAR

D. AFLP

Answer: A

Question102

Removal of introns and joining of exons in a defined order during transcription is called (2012)

Options:

A. looping

B. inducing

C. slicing

D. splicing

Answer: D

Solution:

Solution:
Introns, which occur principally in eukaryotes, are transcribed into messenger RNA (m RNA) but are subsequently removed from the transcription before translation. In certain cases, removal of the introns is an autocatalytic process (selfsplicing) whereby the RNA itself has the properties of an enzyme.

Question103

If one strand of DNA has the nitrogenous base sequence as ATCTG, what would be the complementary RNA strand sequence?
(2012)

Options:

A. TTAGU

B. UAGAC

C. AACTG

D. ATCGU

Answer: B

Solution:

Solution:
In RNA, thymine is substituted with uracil thus, the RNA strand complementary to DNA strand ATCTG will be UAGAC.

Question104

Ribosomal RNA is actively synthesized in
(2012)

Options:

A. lysosomes

B. nucleolus

C. nucleoplasm

D. ribosomes

Answer: B

Solution:

Solution:
Nucleolus is the centre for synthesis of ribosomal RNA (rRNA) that form ribosomal subunits. Ribosomal proteins migrate to the nucleolus from their assembly sites in the cytoplasm and are packaged into ribonucleoproteins. These return to the cytoplasm where they become mature ribosome particles.

Question105

Which one of the following is not a part of a transcription unit in DNA? (2012)

Options:

A. The inducer

B. A terminator

C. A promoter

D. The structural gene

Answer: A

Solution:

Solution:
A transcription unit is a part of DNA that is able to transcribe a complete RNA. It consists of a promoter region (where RNA polymerase binds to start transcription), the structural gene (coding region) and the terminator region (that signals release of RNA polymerase and newly formed RNA strand).

Question106

Removal of RNA polymerase III from nucleoplasm will affect the synthesis of
(2012)

Options:

A. t RNA

B. hnRNA

C. mRN A

D. r RNA.

Answer: A

Solution:

Solution:
In eukaryotes, RNA polymerase enzymes (Type I, II, III) catalyze the synthesis of RNA using as a template either an existing DNA strand or an RNA strand. Type I is responsible for synthesis of r RNA, type II for mRN A and type III for t RNA synthesis.

Question107

What are the structures called that give an appearance as 'beads-on-string' in the chromosomes when viewed under electron microscope? (2011)

Options:

A. Genes

B. Nucleotides

C. Nucleosomes

D. Base pairs

Answer: C

Solution:

Solution:
Nucleosomes appear as 'beads-on-string' in the chromosome when viewed under electron microscope. The beads in 'beads-on-string" arrangement are complexes of histones and DNA. The bead plus the connecting DNA that leads to the next bead from the nucleosome. Nucleosome is the fundamental unit of organization on which the higherorder packaging of chromatin is built. The bead of each nucleosome contains eight histone molecules in which two copies each of H_2A, H_2B, H_3 and H_4 are found.

Question108

The unequivocal proof of DNA as the genetic material came from the studies on a

(Mains 2011)

Options:

A. bacterium

B. fungus

C. viroid

D. bacterial virus.

Answer: D

Solution:

Solution:
The unequivocal proof that DNA is the genetic material came from the experiments of Alfred Hershey and Martha Chase (1952). They worked with viruses that infect bacteria called bacteriophages.

Question109

Which one of the following does not follow the central dogma of molecular biology?
(2010)

Options:

A. Pea

B. Mucor

C. Chlamydomonas

D. HIV

Answer: D

Solution:

$$\text{DNA} \xrightarrow{\text{Transcription}} \text{mRNA} \xrightarrow{\text{Translation}} \text{Protein}$$

This one-way flow of information from DNA to mRNA and then to protein is called the central dogma of molecular biology by F.H.C. Crick (1958). But later on two American workers H. Temin and D. Baltimore reported that DNA is also formed from RNA in retroviruses, e . g., HIV. This is called reverse transcription or Teminism, i.e.,

$$\text{DNA} \underset{\text{Reverse Transcription}}{\overset{\text{Transcription}}{\rightleftharpoons}} \text{mRNA} \xrightarrow{\text{Translation}} \text{Protein}$$

This reverse transcription occurs under the influence of reverse transcriptase enzyme. So, HIV viruses does not follow central dogma.

Question110

Which one of the following palindromic base sequences in DNA can be easily cut at about the middle by some particular restriction enzyme? (2010)

Options:

A. 5'———CGTTCG———3'
3'———ATGGTA———5'

B. 5'———GATATG———3'
3'———CTACTA———5'

C. 5'———GAATTC———3'
3'———CTTAAG———5'

D. 5'———CACGTA———3'
3'———CTCAGT———5'

Answer: C

Solution:

Solution:
Palindromic nucleotide sequences in the DNA molecule are groups of bases that form the same sequence when read in both forward and backward direction. In the given question, only option (c) represents a palindromic sequence, that can be easily cut at about the middle by some particular restriction enzyme.

Question111

The one aspect which is not a silent feature of genetic code, is its being (2010)

Options:

A. degenerate

B. ambiguous

C. universal

D. specific

Answer: B

Solution:

Genetic code is non-ambiguous. Non- ambiguous code means that there is no ambiguity about a particular code. One codon specifies only one amino acid and not any other. There are 64 codons. Out of 64, 3 are stop codons or nonsense codons, i.e., these do not code for any amino acid and rest 61 code for one of the 20 amino acids. Neither of them code for more than one amino acids except GUG which normally code for valine but in certain conditions it also codes for N-formyl methionine as initiation codon.

Question112

Select the two correct statements out of the four (i -iv) statements given below about lac operon.
(i) Glucose or galactose may bind with the repressor and inactivate it.
(ii) In the absence of lactose the repressor binds with the operator region.
(iii) The z -gene codes for permease.
(iv) This was elucidated by Francois Jacob and Jacques Monod. The correct statements are
(2010)

Options:

A. (ii) and (iii)

B. (i) and (iii)

C. (ii) and (iv)

D. (i) and (ii).

Answer: C

Solution:

Solution:
The two French scientists, Jacob and Monod proposed the lac operon of E . coli.
The lac operon (an inducible operon) contains a promoter, an operator, a regulator gene and three structural genes z, y, and a, coding for the enzyme square -galactosidase, β-galactoside permease, and β-galactoside transacetylase, respectively. β -galactoside permease "pumps" lactose into the cell, where β-galactosidase cleaves it into glucose and galactose.
The function of the transacetylase is still not clear. The lac regulator gene, designated the i gene, codes for a repressor. In the absence of the inducer (i.e., lactose, actually allolactose), the repressor binds to the lac operator sequence, preventing RNA polymerase from binding to the promoter and transcribing the structural genes. The inducer of the operon, allolactose, is derived from lactose in a reaction that is catalyzed by β-galactosidase. Once formed, allolactose binds to the repressor, causing it to be released from the operator; in doing so, it induces transcription of the z, y and a structural genes. CAP is activator called catabolic activator protein. It exerts a positive control in lac operon because in its absence RNA polymerase is unable to recognise promotor gene.
CAP activates lac genes only when glucose is absent. Such enzymes whose synthesis can be induced by adding the substrate are known as inducible enzymes and the genetic systems responsile for the synthesis of such an enzyme are known as inducible operons.

Question113

The 3'-5' Dphosphodiester linkages inside a polynucleotide chain serve to join

(Mains 2010)

Options:

A. one DNA strand with the other DNA strand

B. one nucleoside with another nucleoside

C. one nucleotide with another nucleotide

D. one nitrogenous base with pentose sugar

Answer: C

Solution:

Solution:
The phosphodiester bonds is formed between the phosphate group, which is connected to carbon 5' of the sugar residue of one nucleotide, and carbon 3' of the sugar residue of the next nucleotide.

Question114

The lac operon consists of (Mains 2010)

Options:

A. four regulatory genes only

B. one regulatory gene and three structural genes

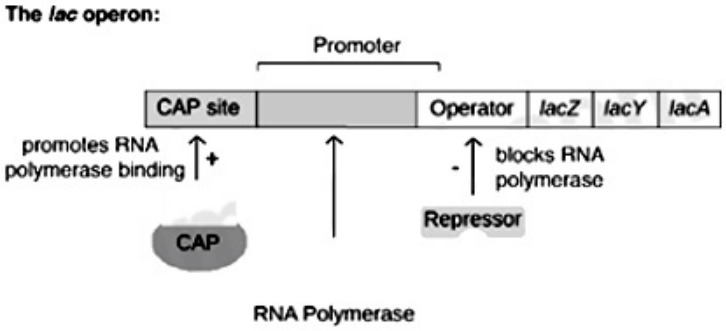
C. two regulatory genes and two structural genes

D. three regulatory genes and three structural genes

Answer: B

Solution:

Lac operon is made up of one regulator, one operator and three structural genes. The three structural genes are LacZ, LacY and LacA. LacZ encodes β-galactosidase (LacZ), an intracellular enzyme that cleaves the disaccharide lactose into glucose and galactose. LacY encodes beta permease which pumps the lactose inside the cell. Lac A encodes beta transacetylase which removes toxic substances from the cell.The regulator gene produces m-RNA which translates into the repressor. The repressor attaches to the operator and blocks the expression of the structural gene in absence of inducer. In presence of inducer, the repressor attaches to the inducer and operator is not blocked so it allows the expression of the structural gene. Operator genes are a region of DNA sequence which attaches to the repressor molecule and stops the expression of the structural gene. So, the correct answer is option C.



Question115

In eukaryotic cell transcription, RNA splicing and RNA capping take place inside the (Mains 2010)

Options:

A. ribosomes

B. nucleus

C. dictyosomes

D. ER

Answer: B

Solution:

Solution:
Unlike in prokaryotes where transcription and translation take place in the same compartment, in eukaryotes primary transcript is first processed in the nucleus and then transported outside of the nucleus. since the primary transcripts of the eukaryotes contains both the expressing genes (exons) and non expressing genes (introns), it undergoes splicing of introns and later capping and tailing at 5' end and 3' end respectively.

Question116

Which one of the following statements about the particular entity is true? (Mains 2010)

Options:

A. Centromere is found in animal cells, which produces aster during cell division.

B. The gene for producing insulin is present in every body cell.

C. Nucleosome is formed of nucleotides.

D. DNA consists of core of eight histones

Answer: B

Solution:

Solution:
Insulin gene is found in every body cell but is not expressed in all cells. It is nucleosome which consists of a core of eight histones. DNA is composed of nucleotides. Centriole is found in animal cells, which produces aster during cell division.

Question117

Whose experiments cracked the DNA and discovered unequivocally that a genetic code is a "triplet"?
(2009)

Options:

A. Hershey and Chase

B. Morgan and Sturtevant

C. Beadle and Tatum

D. Nirenberg and Mathaei

Answer: D

Solution:

Solution:
Genetic code was deciphered in 1960's by Crick, Ochoa, Nirenberg, Mathaei and Khorana.

Question118

Semi-conservative replication of DNA was first demonstrated in
(2009)

Options:

A. Escherichia coli

B. Streptococcus pneumoniae

C. Salmonella typhimurium

D. Drosophila melanogaster

Answer: A

Solution:

Mathew Meselson and Franklin Stahl (1958) conducted various experiments using isotopically labelled DNA of Escherichia coli to provide evidence in favour of semi-conservative mode of DNAreplication.

Question119

Removal of introns and joining the exons in a defined order in a transcription unit is called
(2009)

Options:

A. tailing

B. transformation

C. capping

D. splicing

Answer: D

Solution:

Solution:
m RNA is not made directly in a eukaryotic cell. It is transcribed as heterogeneous nuclear RNA (hnRNA) in the nucleus. hnRNA contains introns and exons. The introns are removed by RNA splicing leaving behind the exons,which contain the information. The exonic regions of RNA are joined together to produce a single chain RNA required for functioning as translational template.

Question120

What is not true for genetic code?
(2009)

Options:

A. It is nearly universal.

B. It is degenerate.

C. It is unambiguous.

D. A codon in m RNA is read in a noncontiguous fashion.

Answer: D

Solution:

The relationship between the sequence of amino acids in a polypeptide and nucleotide sequence of DNA or m RNA is called genetic code. The genetic code is continuous and does not possess pause after the triplets. So a codon in m RNA is a non-contiguous fashion. If a nucleotide is deleted or added, the whole genetic code will read differently.

Question121

In the DNA molecule,
(2008)

Options:

A. the proportion of adenine in relation to thymine varies with the organism

B. there are two strands which run antiparallelone in 5'-3' direction and other in 3'-5'

C. the total amount of purine nucleotides and pyrimidine nucleotides is not always equal

D. there are two strands which run parallel in the 5'-3' direction.

Answer: B

Solution:

Solution:
A DNA molecule has two unbranched complementary strands which are spirally coiled. The two chains are antiparallel i.e. they run parallel but in opposite direction. One chain has the polarity 5' → 3' whereas, other has 3' → 5'. Both are held together by hydrogen bonds between their bases i.e., A = T and G = C and the amount of adenine is equal to thymine and guanine equals to cytosine. The base ratio A + T / G + C may vary from one species to another but is constant for a given species. The purine and pyrimidines are always in equal amount (A + G = T + C) but A + T is not necessarily equal to G + C.

Question122

Which one of the following pairs of nitrogenous bases of nucleic acids, is wrongly matched with the category mentioned against it?
(2008)

Options:

A. Guanine, Adenine - Purines

B. Adenine, Thymine - Purines

C. Thymine, Uracil - Pyrimdines

D. Uracil, Cytosine - Pyrimidines

Answer: B

Solution:

The two DNA chains are held together by hydrogen bonds between their nitrogenous bases. Adenine (A), a purine of one chain lies exactly opposite thymine (T), a pyrimidine of the other chain. Similarly, cytosine (C), a pyrimidine lies opposite guanine (G), a purine.
Three hydrogen bonds occur between cytosine and guanine (C - G) at positions $1'$ $2'$ and $6'$ and two hydrogen bonds between adenine and thymine $\mathrm{A-T}$ at positions $1'$ and $6'$

Question123

Polysome is formed by
(2008)

Options:

A. a ribosome with several subunits

B. ribosomes attached to each other in a linear arrangement

C. several ribosomes attached to a single mRN A

D. many ribosomes attached to a strand of endoplasmic reticulum.

Answer: C

Solution:

Solution:
Ribosomes may occur in rosettes or helical groups called polyribosomes or polysomes (Gk. Poly many, soma - body). The different ribosomes of a polyribosome are connected with a $10-20\text{Å}$ thick strand of messenger or m RNA and its maintenance requires energy. Polyribosomes are formed during periods of active protein synthesis when a number of copies of the same polypeptide are required.

Question124

Which one of the following pairs of codons is correctly matched with their function or the signal for the particular amino acid?
(2008)

Options:

A. AUG, ACG - Start/methionine

B. UUA, UCA - Leucine

C. GUU, GCU - Alanine

D. UAG, UGA - Stop

Answer: D

Solution:

AUG codes for methionine and is initiation or start codon which starts the synthesis of polypeptide. UAA (ochre), UAG (amber) and UGA (opal) do not specify any amino acid so they are called termination codons. CUU, CUC, CUA and CUG codes for leucine whereas GCU , GCC, GCA and GCG codes for alanine.

Question125

One turn of the helix in a B-form DNA is approximately (2006)

Options:

A. 2nm

B. 20nm

C. 0.34nm

D. 3.4nm

Answer: D

Solution:

Solution:
DNA or deoxyribose nucleic acid is the largest macromolecule made of the helically twisted two antiparallel polydeoxyribonucleotide strands held together by hydrogen bonds. The two strands of DNA are together called DNA duplex. It has a diameter of 20Å. One turn spiral has a distance of 34Å. It contains 10 deoxyribonucleotides in each strand so that the distance between two adjacent nucleotides is 3.4Å.

Question126

One gene-one enzyme hypothesis was postulated by (2006)

Options:

A. Beadle and Tatum

B. R. Franklin

C. Hershey and Chase

D. A. Garrod

Answer: A

Solution:

In 1948, Beadle and Tatum proposed onegene one-enzyme hypothesis which states that a gene controls metabolic

machinery of the organism through synthesis of an enzyme. This laid the foundation of biochemical genetics. Beadle and Tatum were awarded Nobel Prize in 1958. This one gene one enzyme theory has been changed to one gene one polypeptide hypothesis proposed by Yanofsky. i.e., one gene synthesizes one polypeptide and many polypeptides form one enzyme.

Question127

Antiparallel strands of a DNA molecule means that (2006)

Options:

A. one strand turns clockwise

B. one strand turns anti-clockwise

C. the phosphate groups of two DNA strands, at their ends, share the same position

D. the phosphate groups at the start of two DNA strands are in opposite position (pole).

Answer: D

Solution:

Solution:
DNA is a type of nucleic acid that forms genetic material in many organisms. It consists of a long polymer of nucleotides which transcribes the coded information in the form of a triplet code of nucleotides in $\mathrm{mRN\,A}$. It is a double helical molecule. The two strands of DNA run in opposite directions to one another with the hydrogen bonds between them. One strand of DNA has $5' - 3'$ direction and the other strand has $3' - 5'$ direction. So they are antiparallel. This direction is determined by the presence of a free phosphate or OH group at the end of the strand. If the strand has phosphate group at the the $5'-$ end and with a free OH group at the $3'-$ end.

Question128

Which antibiotic inhibits interaction between tRNA and m RNA during bacterial protein synthesis? (2006)

Options:

A. Tetracycline

B. Erythromycin

C. Neomycin

D. Streptomycin

Answer: C

Solution:

Neomycin is a broad spectrum antibiotic which was first isolated from a strain of Streptomyces feadiae. It is effective against Gram positive as well as Gram negative bacteria. Its mechanism of action is by selective inhibition of protein synthesis on the 70S (prokaryotic) ribosome by inhibiting the interaction of mRN A and tRNA during translation process.

Question129

Amino acid sequence, in protein synthesis is decided by the sequence of (2006)

Options:

A. r RNA

B. t RNA

C. mRN A

D. c DNA

Answer: C

Solution:

Solution:
Messenger RNA or m RNA has been named so because it carries the coded information from DNA for the synthesis of proteins. It carries the coded information in a number of base triplets called codons. It is transcribed on DNA by the enzyme RNA polymerase. Hence, its base sequence is complementary to DNA on which it has been synthesized. In eukaryotes each gene transcribes its own mRN A, therefore the number of mRN As corresponds to the number of genes. r RNA is a type of RNA that forms structural and functional components of ribosomes. t RNA is a class of RNA having structures with triplet nucleotide sequences that are complementary to the triplet nucleotide coding sequences of m mathrm RN A. It binds with amino acids and transfers them to ribosomes.

Question130

E.coli cells with a mustard z gene of the lac operon cannot grow in medium containing only lactose as the source of energy because (2005)

Options:

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

Solution:

The lac operon is an operon responsible for transport and metabolism of lactose in Escherichia coli and other bacteria. It has three structural genes. The lac Z gene codes for β-galactosidase which converts lactose into glucose and galactose. Thus, 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 they cannot synthesize functional β-galactosidase. The lac Y gene that codes for β-galactoside permease which transports lactose into the cell; bacteria with mutated lac Y gene cannot transport lactose from the medium into the cell. The lac A gene codes for β-galactoside transacetylase. A constitutive mutant produces the gene product continually and lacks the control over its expression. In these mutants, the structural genes produced enzymes all the time in comparison to the wild type where the enzymes were synthesized only in the presence of lactose. Hence, they should have the mutation in a gene other than those responsible for the structural genes. E. coli cells prefer glucose over any other carbon source; in the presence of glucose, lac operon is switched off by catabolite repression which is not governed by lac Z gene. Thus, there is no effect of mutated lac Z gene on the choice of not using lactose in the presence of glucose. Option B is the correct answer.

Question131

Telomerase is an enzyme which is a
(2005)

Options:

A. simple protein

B. RNA

C. ribonucleoprotein

D. repetitive DNA

Answer: C

Solution:

Telomerase is a ribonucleoprotein molecule that is enzymatic in nature. It uses a special mechanism for the synthesis of DNA at telomeric ends. The DNA repeat sequence of telomere has one G rich strand and other C rich strand. The Grich strand has a single stranded overhand. This overhand works as a primer and for its elongation uses as template the RNA component of telomerase enzyme. Thus telomerase synthesizes only the G rich strand of telomeres.

Question132

Using imprints from a plate with complete medium and carrying bacterial colonies, you can select streptomycin resistant mutants and prove that such mutations do not originate as adaptation. These imprints need to be used
(2005)

Options:

A. on plates with and without streptomycin

B. on plates with minimal medium

C. only on plates with streptomycin

D. only on plates without streptomycin

Answer: C

Solution:

Streptomycin is broad spectrum (active against both Gram-posjtive and Gram-negative bacteria) and was the first really effective drug against tuberculosis, but its use is limited by the development of resistant strains and by toxic side-effects. The bactericidal action of streptomycin, as with other aminoglycoside antibiotics (e . g., neomycin) is through selective inhibition of protein synthesis on 70S ribosomes.
To check resistance of mutants against streptomycin they must be grown on plates with streptomycin. Only those bacterial colonies will propagate from the master that are resistant to the antibiotic.

Question133

Protein synthesis in an animal cell occurs (2005)

Options:

A. only on the ribosómes present in cytosol

B. only on ribosome attached to the nuclear envelope and endoplasmic reticulum

C. on fibosome present in the nucleolus as well as in cytoplasm

D. on ribosomes present in cytoplasm as well as in mitochondria

Answer: D

Solution:

Solution:
The mitochondria contains its own set of ribosomes which synthesize proteins, so protein synthesis occurs both in mitochondria and cytoplasm.

Question134

Which one of the following makes use of RNA template to synthesize DNA? (2005)

Options:

A. DNA polymerase

B. RNA polymerase

C. Reverse transcriptase

D. DNA dependant RNA polymerase

Answer: C

Solution:

Solution:
DNA polymerase carries out the process of copying of parental DNA to form daughter DNA molecules with identical nucleotide sequences, called as replication. RNA polymerase is the enzyme of transcription which is process by which parts of the genetic information encoded in DNA are copied precisely into RNA. The RNA polymerase that synthesizes RNA using DNA strand as the template is called DNA-dependent RNA polymerase, it is the enzyme that catalyzes the transcription process. On the other hand, the enzyme which synthesizes DNA using RNA template is called reverse transcriptase because the process goes in just opposite direction to normal transcription. Reverse transcription is carried out by RNA viruses. The correct answer is C.

Question135

Which one of the following hydrolyses internal phosphodiester bonds in a polynucleotide chain?
(2005)

Options:

A. Lipase

B. Protease

C. Endonuclease

D. Exonuclease

Answer: C

Solution:

Endonucleases hydrolyse the internal phosphodiester bond. Exonucleases cleave the terminal nucleotides. Lipase digest fats and proteases break down proteins.

Question136

During transcription holoenzyme RNA polymerase binds to a DNA sequence and the DNA assumes a saddle like structure at that point. What is that sequence called?
(2005)

Options:

A. AAAT box

B. TATA box

C. GGTT box

D. CAAT box

Answer: B

Solution:

Solution:
After 25 bases from start of transcription point are TATA boxes. After 40 bases from TATA boxes appears CAAT boxes. Both of these sequences serve as recognitions sites in eukaryotic promoters. Transcription in eukaryotic genes is a far more complicated process than in prokaryotes.

Question137

After a mutation at a genetic locus the character of an organism changes due to change in (2004)

Options:

A. protein structure

B. DNA replication

C. protein synthesis pattern

D. RNA transcription pattern

Answer: A

Solution:

Solution:
A mutation involves a change in the sequence of nucleotides in a nucleic acid molecule. This change will express itself in the form of a change in the sequence of aminoacids in the protein molecule synthesized through the information, encoded in nucleic acid segment. Therefore mutations at molecule level can be studied both by the study of the sequence of amino acids in a protein and also by the study of sequence of nucleotides in a segment of nucleic acid.

Question138

Which form of RNA has a structure resembling clover leaf? (2004)

Options:

A. r RNA

B. hnRNA

C. mRN A

D. t RNA

Answer: D

Solution:

Solution:
Transfer RNA (tRNA) are species of RNA responsible for the transfer of specific amino acids to the growing end of a polypeptide chain during translation.
R.Holly in 1965 gave clover leaf model of tRNA for yeast alanyl tRNA.
It has four major sites - AAbinding site, anticodon site, TUC loop and DHU loop. The chain is having unpaired base sequence CCA at 3'-end and G at 5'-end.

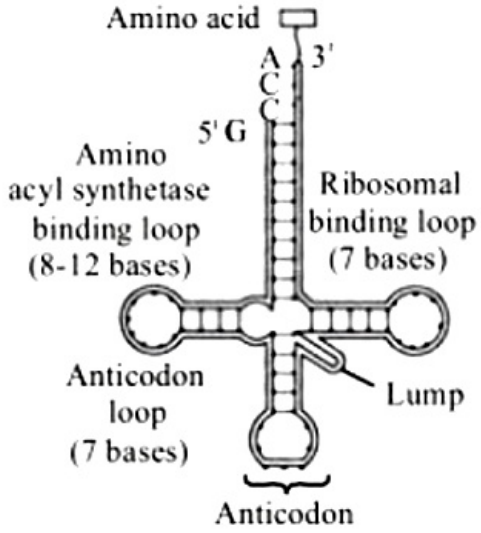


Fig. : Clover leaf model of *t*RNA structure

Question139

During transcription, if the nucleotide sequence of the DNA strand that is being coded is ATACG then the nucleotide sequence in the mRN A would be
(2004)

Options:

A. TATGC

B. TCTGG

C. UAUGC

D. UATGC

Answer: C

Solution:

During transcription RNA synthesis from a DNA template takes place. It involves rewriting of the code without a change in its language. In $\mathrm{mRN\,A}$ adenine pairs with uracil because thymine is not present $\mathrm{mRN\,A}$. So the nucleotide sequence in $\mathrm{mRN\,A}$ would be-

DNA template	A	T	A	C	G
	‖	‖	‖	‖	‖
mRNA	U	A	U	G	C

Question140

In mutational event, when adenine is replaced by guanine, it is a case of (2004)

Options:

A. frame shift mutation

B. transcription

C. transition

D. transversion

Answer: C

Solution:

Solution:
Transition mutant is one in which a purine is substituted by a different purine, or a pyrimidine by a different pyrimidine. Such a change involves a base pair change between a $\mathrm{G-C}$ pair and an $\mathrm{A-T}$ pair in the DNA whereas transversion results when one nitrogen base is replaced by another different type $\mathrm{e.g.}$ C-G and A-T. Transcription is the formation of m RNA

Question141

The following ratio is generally constant for a given species: (2004)

Options:

A. $\mathrm{A}+\frac{\mathrm{G}}{\mathrm{C}}+\mathrm{T}$

B. T + C / G + A

C. G + C / A + T

D. $A + \frac{C}{T} + G$

Answer: C

Solution:

Solution:
Nucleic acids are essential biomacromolecules of the living cells. They are polymer of nucleotides. Nucleotides comprises of three basic units nitrogenous base, pentose sugar and phosphate. There are two types of nitrogenous bases purines and pyrimidines. Adenine (A) and Guanine (G) are purines whereas Cytosine (C), Uracil (U) and Thymine (T) are pyrimidines. Erwin Chargaff proposed two rules which are termed as Chargaff's rules. These are applicable for double helix DNA/RNA structure. First rule, in any double stranded DNA the number of guanine units equals the number of cytosine units and the number of adenine units equals the number of thymine units.
Second rule, the composition of DNA varies from one species to another. Thus, in dsDNA/ dsRNA:
1. The molar ratio of A to T equals to 1. Similarly the molar ratio of G to c equals to 1
2. The sum of purines (A and G) equals that of pyrimidines (C and T)
3.The percentage of C+G does not necessary equal the percentage of A+T
4. The ratio of G+C and A+T is constant for any species
Therefore the ratio that is generally constant for a given species is G+C/A+T as explained by Chargaff's laws and the correct option is C

Question142

What would happen if in a gene encoding a polypeptide of 50 amino acids, 25^{th} codon (UAU) is mutated to UAA? (2003)

Options:

A. A polypeptide of 24 amino acids will be formed.

B. Two polypeptides of 24 and 25 amino acids will be formed.

C. A polypeptide of 49 amino acids will be formed.

D. A polypeptide of 25 amino acids will be formed.

Answer: A

Solution:

Solution:
UGA, UAG and UAA are three non sense (or termination) codon which do not code for any amino acid. If in a gene encoding a polypeptide of 50 amino acid, 25^{th} codon is mutated to UAA or any of the termination codon, then the chain will be terminated at that place because it will become difficult for t RNA to bring amino acid from amino acid pool. So in that case a polypeptide of 24 amino acid will be formed.

Question143

What does "lac" refer to in what we call the lac operon? (2003)

Options:

A. Lactose

B. Lactase

C. Lac insect

D. The number 1,00,000

Answer: A

Solution:

Solution:
The lac operon is an operon responsible for transport and metabolism of lactose in Escherichia coli and other bacteria and carries the genes that codes for enzymes involved in lactose metabolism only. This makes option D correct; "lac" refers to "lactose". The lac operon has three structural genes. The lac Z gene codes for β-galactosidase which converts lactose into glucose and galactose. The lac Y gene that codes for β-galactoside permease which transports lactose into the cell. The lac A gene codes for β-galactoside transacetylase. It does not carries the gene for lactase, an enzyme that digest milk sugar.

Question144

During translation initiation in prokaryotes, a GTP molecule is needed in
(2003)

Options:

A. formation of formyl-met-tRNA

B. binding of 30S subunit of ribosome with mRNA

C. association of 30S mRNA with formyl-met-tRNA

D. association of 50S subunit of ribosome with initiation complex.

Answer: C

Solution:

Solution:
Formyl-met-tRNA is formed by addition of methionine to tRNA fMet (formyl-methionine specific-tRNA) by the fMet-tRNA synthetase to produce methioninetRNA and then transfer of formyl group from N^{10} formyltetrahydrofolate to the amino group of the Met residue to produce N-formyl methionine tRNA. Binding of 30 S ribosomal subunit to two initiation factors, IF-1 and IF-3 initiates translation. Factor IF-3 prevents the 30 s and 50 S subunits from combining prematurely and mediated binding of mRNA to 30 S subunit. This is followed by binding of complex consisting of the 30 s ribosomal subunit, IF-3, and mRNA with the initiating formyl met tRNA in presence of GTP-bound IF-2. The pairing of anticodon of tRNA with the mRNAs initiation codon induces binding of 50 S ribosomal subunit. Thus, association of 30 S mRNA with formylmet-tRNA required GTP.

Question145

Which one of the following triplet codes, is correctly matched with its specificity for an amino acid in protein synthesis or as 'start' or 'stop' codon?
(2003)

Options:

A. UCG - start

B. UUU - stop

C. UGU - leucine

D. UAC - tyrosine

Answer: D

Solution:

Solution:
Codon UAC is correctly matched as it codes for amino acid tyrosine. UCG codes for serine, UUU codes for phenylalanine and UGU codes for cysteine. Start codon is AUG and stop codons are UAA, UAG and UGA.

Question146

During transcription, the DNA site at which RNA polymerase binds is called
(2003)

Options:

A. promoter

B. regulator

C. receptor

D. enhancer.

Answer: A

Solution:

Solution:
Promoter is region on a DNA molecule upstream from the coding sequence, area to which RNA polymerase initially binds prior to the initiation of transcription. The promoter,or at least part of it, determines the nature of the polymerase that associates with it. Certain consensus sequences within the promoter region seem to be particularly important in the binding of RNA polymerase, and these are known as CAAT and TATA boxes. The promoter region extends from some 40 nucleotides to about five nucleotides upstream from the start of the genecoding region, the CAAT and TATA boxes being located within the promoter region as short six or seven nucleotide sequence.

Question147

Degeneration of a genetic code is attributed to the (2003)

Options:

A. first member of a codon

B. second member of codon

C. entire codon

D. thitd member of a codon

Answer: D

Solution:

Solution:
In a triplet for a particular amino acid more than one word (synonyms) can be used. This phenomenon is described by saying that the code is degenerate. A degenerate code would be one where there is one to one relation between aminoacids and the codons that 44 codons out of 64 will be useless or nonsense codons. A code is degenerate because of the third base of the codon. It has been shown that the same t RNA can recognize more than one codons differing only at the third position. For example GCU, GCC and GCA all code for alanine amino acids.

Question148

In the genetic code dictionary, how many codons are used to code for all the 20 essential aminoacids? (2003)

Options:

A. 20

B. 64

C. 61

D. 60

Answer: C

Solution:

The genetic codon is triplet and at each position of the triplet there are four possibilities due to presence of four nucleotides in nucleic acids, thereby meaning there are (4x4x4) or 64 possible codons. Out of these 64 possible codons, three codons UAA, UAG, UGA are termination codons. They do not code for any amino acids but result in termination of

protein chain. Thus, 61 codons code for 20 essential amino acids.

Question149

In a DNA percentage of thymine is 20% then what will be percentage of guanine?
(2002)

Options:

A. 20%

B. 40%

C. 30%

D. 60%

Answer: C

Solution:

Solution:
In a DNA, the percentage of thymine is 20%. So, as it pairs with adenine, it is also 20%. So the guanine and cytosine together forms 60% of DNA and hence, guanine is 30%.

Question150

Transformation experiment was first performed on which bacteria?
(2002)

Options:

A. E . coli

B. Diplococcus pneumoniae

C. Salmonella

D. Pasteurella pestis

Answer: B

Solution:

Solution:
Transformation involves transfer of genetic material of one bacterial cell into another bacterial cell by some unknown mechanism and it converts one type of bacterium into another type. This was first studied by Griffith (1928) in Diplococcus pneumoniae and hence is known as Griffith effect.

Question151

Jacob and Monod studied lactose metabolism in E . coli and proposed operon concept. Operon concept is applicable for:
(2002)

Options:

A. all prokaryotes

B. all prokaryotes and some eukaryotes

C. all prokaryotes and all eukaryotes

D. all prokaryotes and some protozoans

Answer: C

Solution:

Solution:
Operon model was given by Jacob and Monod (1961) for regulation of protein synthesis in prokaryotes. In bacteria, the genes that contain the information for assembling the enzymes for a metabolic pathway are usually clustered together on the chromosome in a functional complex called an operon. Regulation of protein synthesis in eukaryotes is explained by gene battery model given by Britten and Davidson.

Question152

In E . coli, during lactose metabolism repressor binds to:
(2002)

Options:

A. regulator gene

B. operator gene

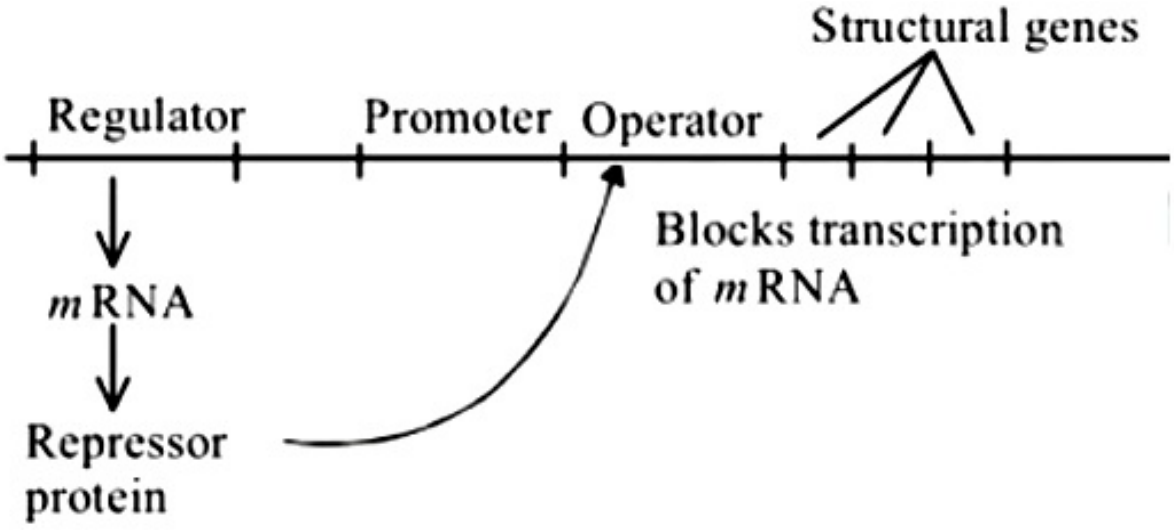
C. structural gene

D. promoter gene

Answer: B

Solution:

Solution:
In the lac operon of E.coli due to the activity of regulator gene synthesis of repressor molecules occurs. These repressor molecules get attached to the operator gene and thus check mRN A synthesis and because of this no protein synthesis occurs.



Question153

Out of 64 codons, 61 codons code for 20 types of amino acid. It is called (2002)

Options:

A. degeneracy of genetic code

B. overlapping of gene

C. wobbling of codon

D. universility of codons

Answer: A

Solution:

Solution:
The genetic code is universal which means that a particular codon specifies a particular amino acid in all the organisms. The mRNA codon "ACU" codes for threonine, irrespective of its source. It does not explain the presence of 61 codons for 20 amino acids. The genetic code is nonoverlapping means a base in mRNA is not shared by two different codons; if it was the case, six bases could code for four amino acids which are not true. Wobble pairing refers to loose base pairing between first base of the anticodon (5'-3'direction) and the third base of the codon on mRNA. The presence of wobble bases (inosine, I) at the first (wobble) nucleotide of an anticodon allows three different codons to be recognized by a tRNA. This is because it contains the uncommon base hypoxanthine and can pair with three different nucleotides (U, C, and A). Wobble base allows rapid dissociation of from mRNA but does not explain 61 codons for 20 amino acids. Genetic code show degeneracy which means that multiple codons specify particular amino acid; asparagine is encoded by "GAU and GAC". Degeneracy allows one amino acid to be encoded by multiple codons; thus 61 codons for 20 amino acids. The correct option is A.

Question154

Which of the following reunites the exon segments after RNA splicing? (2002)

Options:

A. RNA polymerase

B. RNA primase

C. RNA ligase

D. RNA proteoses

Answer: C

Solution:

Solution:
RNA polymerase enzyme catalyses the synthesis of RNA. It is single in prokaryotes.
There are three types of RNA polymerases in eukaryotes-
I for 28S, 18S and 5.8S RNA,
II for mRNA and snRNA and
III for tRNA, 5SRNA and scRNA.
Primase is an RNA polymerase that is used to initiate DNA synthesis: RNA ligase reunites the exon segment after RNA splicing.

Question155

Which of the following enzymes are used to join bits of DNA? (2002)

Options:

A. Ligase

B. Primase

C. DNA polymerase

D. Endonuclease

Answer: A

Solution:

Solution:
Ligases are used to join bits of DNA. Primase is an RNA polymerase, used to initiate DNA synthesis. DNA polymerase enzyme catalyses the synthesis of DNA. Endonuclease, causes the splicing of the intron carrying the coding sequence of the same endonuclease.

Question156

Exon part of m RNAs have code for (2002)

Options:

A. protein

B. lipid

C. carbohydrate

D. phospholipid

Answer: A

Solution:

Solution:
DNA transcribes to form m RNA. Its function is to carry coded information from DNA for the synthesis of proteins. The RNA consists of a coding region called exon and non-coding region called introns. The exons are thus the functional part that have code for proteins.

Question157

Change in sequence of nucleotide in DNA is called as (2002)

Options:

A. mutagen

B. mutation

C. recombination

D. translation

Answer: B

Solution:

Solution:
Mutation is alteration of nucleotide sequence of genome of an organism. It refers to the changes that occurs in DNA sequence due to mistakes durig replication of DNA or due to any other mutagen present in environment.

Question158

mRNA is synthesised on DNA template in which direction (2001)

Options:

A. 5'→ 3'

B. 3'→ 5'

C. both (a) and (b)

D. any

Answer: A

Solution:

Solution:
mRN A is synthesized on DNA template in $5' - 3'$ direction. Synthesis of mRNA exhibits several features that are synonymous with DNA replication. RNA synthesis requires accurate and efficient initiation, elongation proceeds in the $5' - 3'$ direction (i.e., the polymerase oves along the template strand of DNA in the $5' - 3'$ direction), and RNA synthesis requires distinct and accurate termination. Transcription exhibits several features that are distinct from replication.

Question159

In negative operon, (2001)

Options:

A. co-repressor binds with repressor

B. co-repressor does not bind with repressor

C. co-repressor binds with inducer

D. camp have negative effect on lac operon

Answer: A

Solution:

Solution:
The tryptophan operon (trp operon) in bacteria is a repressible operon. Here, repressor is inactive and it becomes active as DNA binding protein only when complexed with a co-repressor (tryptophan). In absence of tryptophan, the operator site is open to binding by RNA polymerase, which transcribes the structural genes of tryptophan operon, leading to production of enzymes that synthesize tryptophan. When tryptophan becomes available, the enzymes of tryptophan synthetic pathway are no longer needed and tryptophan (co-repressor)-repressor complex blocks transcription. The regulation of this operon is also a negative control.

Question160

Gene and cistron words are sometimes used synonymously because

(2001)

Options:

A. one cistron contains many genes

B. one gene contains many cistrons

C. one gene contains one cistron

D. one gene contains no cistron

Answer: C

Solution:

Solution:
A gene is a hereditary unit consisting of a sequence of DNA and occupying a specific position or locus within the genome. Gene activity ultimately affects the phenotype of the organism possessing the gene. Thus gene is a physical and functional unit of genetic information. A cistron is a unit of genetic function. In prokaryotes there is one gene one enzyme correspondence. It means that in these organisms genes and cistrons are equivalent.

Question161

Types of RNA polymerase required in nucleus of eukaryotes for RNA synthesis
(2001)

Options:

A. 1

B. 2

C. 3

D. 4

Answer: C

Solution:

Solution:
Eukaryotes have three RNA polymerases which are structurally distinct complexes, though share certain subunits in common, and have a specific function and specific promoter sequence. RNA polymerase I synthesize preribosomal RNA (pre-rRNA), which contains the precursor for the 18S, 5.8S, and 28S rRNAs. RNA polymerase II is synthesized mRNAs and some specialized RNAs. RNA polymerase III makes tRNAs, the 5S rRNA, and some other small specialized RNAs.

Question162

Method of DNA replication in which two strands of DNA separate and synthesize new strands
(2000)

Options:

A. dispersive

B. conservative

C. semi-conservative

D. non conservative.

Answer: C

Solution:

Solution:
The method of DNA replication is semiconservative. According to the semi-conservative model proposed by Watson and Crick, each strand of the two double helices formed would have one old and one new strand. So, the parental identity is conserved upto half extent and hence DNA replication is semi-conservative.

Question163

Which of the following is initiation codon?
(2000)

Options:

A. UAG

B. AUC

C. AUG

D. CCU

Answer: C

Solution:

Solution:
AUG is the initiation codon. Translation starts with a chain initiation codon or start codon and terminates with a stop codon. The start codon is the first codon of a messenger RNA (mRNA) transcript translated by a ribosome. The start codon always codes for methionine in eukaryotes and a modified Met (fMet) in prokaryotes. The most common start codon is AUG.

Question164

Anticodon occurs in (2000)

Options:

A. t RNA

B. mRN A

C. rRNA

D. DNA

Answer: A

Solution:

Solution:
A codon or triplet of bases specifies a given amino acid. Most amino acids are specified by more than one codon. The conversion of codon information into proteins is conducted by transfer RNA. Each transfer RNA (tRNA) has an anticodon which can base pair with a codon. Some anti-codons have modified bases that can pair with more than one codon, specifying the same amino acid.

Question165

Length of one loop of B-DNA (2000)

Options:

A. 3.4nm

B. 0.34nm

C. 20nm

D. 10 nm

Answer: A

Solution:

Solution:
B-DNA is an antiparallel double helix. The double strand or duplex is coiled plectonemically in right handed fashion around a common axis like a rope stair case twisted in a spiral. The coiling produces alternate major and minor grooves. One turn of spiral has a distance between two adjacent nucleotides is 3.4Å

Question166

In three dimensional view the molecule of t RNA is

(2000)

Options:

A. L-shaped

B. S-shaped

C. Y-shaped

D. E-shaped

Answer: A

Solution:

Solution:
3 -D model of t RNA looks like flattened L-shaped molecule. tRNA acts as adoptor molecule which carries amino acids to the site of protein synthesis (i.e., ribosomes). Most accepted model for t RNA structure is 'clover leaf model.

Question167

Similarity in DNA and RNA is that
(2000)

Options:

A. both are polymer of nucleotides

B. both have similar pyrimidine

C. both have similar sugar

D. both are genetic material

Answer: A

Solution:

Solution:
Deoxyribonucleic acid and ribonucleic acid as the name suggests are made up of several nucleotide monomers. Each nucleotide consists of pentose sugar, phosphate group and nitrogenous bases. DNA has deoxyribose sugar whereas RNA has ribose sugar. The bases in DNA molecule are A, T , G and C whereas in RNA, thymine is absent and instead uracil is found.

Question168

The Pneumococcus experiment proves that
(1999)

Options:

A. bacteria do not reproduce sexually

B. RNA sometime controls the production of DNA and proteins

C. DNA is the genetic material

D. bacteria undergo binary fission

Answer: C

Solution:

Solution:
Transformation was first discovered by Griffith (1928), in Pneumococcus (Streptococcus pneumoniae), that causes pneumonia.
Griffith injected a group of mice with nonencapsulated, rough (R), pneumococci; a second group with heat-killed encapsulated pneumococci cells, and a third group a mixture consisting of a few living nonencapsulated, rough pneumococci derived from a type S culture, and heat-killed encapsulated cells (S type). Griffith observed that the mice in the first two groups were not infected, and the mice in the third group died within a few days. The mice of the third group should have survived as the organisms which could kill them had been killed, and the cell of R type were incapable of causing disease. However, the mice died, and living virulent encapsulated cells of the type S were recovered from their dead bodies. It was observed by Griffith, that killed encapsulated pneumococci had liberated some substance which favoured non-capsulated cells (R type) to produce a capsular substance.
This substance in later experiments was proved to be DNA. These experiments showed that DNA is the genetic material.

Question169

In operon concept, regulator gene functions as (1999)

Options:

A. inhibitor

B. repressor

C. regulator

D. all of these

Answer: B

Solution:

Solution:
Regulator gene is a gene whose function is to control the transcriptional activity of other genes, either adjacent or distant in the genome. In the case of the lac operon of E .coli the regulator gene lac i produces a protein product that represses the operator gene of the operon. In bacteria the same regulator gene may affect a series of non-adjacent operons.

Question170

Initiation codon in eukaryotes is (1999,1994)

Options:

A. GAU

B. AGU

C. AUG

D. UAG

Answer: C

Solution:

Solution:
AUG is the initiation codon. Translation starts with a chain initiation codon or start codon and terminates with a stop codon. The start codon is the first codon of a messenger RNA (mRNA) transcript translated by a ribosome. The start codon always codes for methionine in eukaryotes and a modified Met (fMet) in prokaryotes. The most common start codon is AUG.

Question171

DNA is mainly found in (1999)

Options:

A. nucleolus

B. nucleus only

C. cytoplasm only

D. none of these

Answer: B

Solution:

Solution:
DNA is mainly found in nucleus. It is associated with RNA and proteins to form compact chromosomes. But some amount of DNA is also found in chloroplasts and mitochondria. This DNA is called extra-chromosomal DNA.

Question172

In prokaryotes, the genetic material is (1999)

Options:

A. linear DNA without histones

B. circular DNA without histones

C. linear DNA with histones

D. circular DNA with histones

Answer: B

Solution:

Solution:
The genetic material of prokaryotes is circular and single stranded DNA. It has no association of histones. The eukaryotic genetic material is linear and double stranded DNA. It is associated with histone proteins to form nucleosome unit.

Question173

In DNA, when AGCT occurs, their association is as per which of the following pair?
(1999)

Options:

A. AT-GC

B. AG-CT

C. AC-GT

D. All of these

Answer: A

Solution:

Solution:
DNA molecule has four bases - adenine, guanine, cytosine and thymine. Adenine always pairs with thymine and guanine pairs with cytosine. Their association is $A-T$ and $G-C$.

Question174

The eukaryotic genome differs from the prokaryotic genome because
(1999)

Options:

A. the DNA is complexed with histone in prokaryotes

B. the DNA is circular and single stranded in prokaryotes

C. repetitive sequences are present in eukaryotes

D. genes in the former case are organized into operons.

Answer: B

Solution:

Solution:
Genome refers to the total sets of chromosomes carried by each cell of the organism. In prokaryotes the genetic material is circular and single stranded DNA. It has no association of histones. The eukaryotic genetic material is linear and double stranded DNA. It is associated with bistone proteins to form nucleosome unit.

Question175

What base is responsible for hot spots for spontaneous point mutations? (1998)

Options:

A. 5 -bromouracil

B. 5 -methylcytosine

C. Guanine

D. Adenine

Answer: C

Solution:

Solution:
Mutations are rare events in nature and are then described as spontaneous mutations. Some of these mutations originate from mistakes in normal duplication of DNA. Transitions may be produced by tautomeric shift or ionization of bases which leads to mistaken, $A-C$ base pairing and more frequently mistaken $G-T$ base pairing. Guanine pairs with the rare enol form of thymine and is thus considered as hot spot for spontaneous point mutations.

Question176

Genes that are involved in turning on or off the transcription of a set of structural genes are called (1998)

Options:

A. redundant genes

B. regulatory genes

C. polymorphic genes

D. operator genes

Answer: D

Solution:

Solution:
Operator genes are a region of DNA sequence capable of interacting with a specific repressor molecule and in doing so it affects the activity of other genes downstream from it.

Question177

DNA elements, which can switch their position, are called (1998)

Options:

A. cistrons

B. transposons

C. exons

D. introns

Answer: B

Solution:

Solution:
Transposons are portable genetic elements which can insert themselves at random into a plasmid or any chromosome independently of the host cell recombination system. It was discovered by Barbara Mc Clintock (1940) in maize and termed as jumping genes. Later Headges and Jacob termed them as transposons.
Introns are nontranslated sequences within the coding sequence of a gene. Such sequences are transcribed into hnRNA but are then spliced out and are not represented in the message.
The non-intron sequences of the gene are referred to as exons. Cistron sequence of nucleotides in a DNA molecule code for one particular polypeptide chain.

Question178

The codons causing chain termination are (1997)

Options:

A. AGT, TAG, UGA

B. UAG, UGA, UAA

C. TAG, TAA, TGA

D. GAT, AAT, AGT

Answer: B

Solution:

Solution:
Non-sense codons are the codons which does not code for any amino acid. These are found important in terminating translation. For example, UAA, UAG and UGA.

Question179

DNA synthesis can be specifically measured by estimating the incorporation of radio-labelled
(1997)

Options:

A. thymidine

B. deoxyribose sugar

C. uracil

D. adenine

Answer: A

Solution:

Solution:
Autoradiography is the study of labelled precursors like ^{3}H by knowing the movement of radioactivity with the help of photographic films and emulsions at short intervals.
Radioactive material like tritiated thymidine which is formed by replacing normal hydrogen of thymidine with H^{3} (heavy isotope of hydrogen). Thymidine only is used for this purpose because RNA will not be labelled by this.

Question180

The RNA that pick up specific amino acid from amino acid pool in the cytoplasm to ribosome during protein synthesis is called
(1997)

Options:

A. rRNA

B. RNA

C. mRN A

D. t RNA

Answer: D

Solution:

Solution:
Transfer RNA or t RNA help in transfer of amino acids to ribosomes m RNA complex to form the polypeptide chain. It has four key regions a carrier and recognition end, enzyme site and ribosome site. This recognition end has three anticodons with the help of which amino acids are identified. rRNA forms 67% of 70S ribosomes and 50% of 80S ribosomes. mRNA carries the coded information from DNA for the synthesis of proteins.

Question181

Which of the following step of translation does not consume a high energy phosphate bond?
(1997)

Options:

A. Peptidyl transferase reaction

B. Aminoacyl t RNA binding to A-site

C. Translocation

D. Amino acid activation

Answer: A

Solution:

Solution:
Protein synthesis or translation consists of ribosomes, a mino acids, m RNA, t RNAs and aminoacyl tRNA synthetases. The ribosomes have two binding sites namely aminoacyl site or A-site and peptide site or P -site. The starting amino acid methionine lies at the P-site of the ribosome. The next incoming tRNA is called amino acyl tRNA, it is bound to A-site. A peptide bond is formed between $COOH$ group of the tRNA at P-site and NH_2 group of aminoacyl tRNA. This is facilitated by the enzyme peptidyl transferase and does not require high energy phosphate bonds.

Question182

Which of the following serves as a terminal codon?
(1996)

Options:

A. UAG

B. AGA

C. AUG

D. GCG

Answer: A

Solution:

Solution:
UAA (ochre), UAG (amber) and UGA (opal) do not specify any amino acid so they are called termination codons.

Question183

The maximum formation of m RNA occurs in (1996)

Options:

A. ribosome

B. nucleoplasm

C. cytoplasm

D. nucleolus

Answer: D

Solution:

Solution:
Nucleolus is a plasmosome body that is formed around the nucleolus organizer and is located in the secondary constriction on that chromosome. It is made up of RNA and proteins. The associated nucleolar chromatin contains DNA. It forms mRNA that has low molecular weight. Ribosomes are mainly concerned with proteins synthesis. They are sites for synthesis of rRNA and tRNA is synthesized in the cytoplasm.

Question184

Radio-tracer technique shows that DNA is in (1996)

Options:

A. multi-helix stage

B. single-helix stage

C. double-helix stage

D. none of these

Answer: C

Solution:

Solution:
^{14}C and ^{3}H are incorporated in bases like thymidine, uridine and amino acids to study the structure of DNA and proteins. Radio tracer technique shows that DNA is in double helical form.

Question185

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?
(1995)

Options:

A. The lac operon is induced.

B. E.coli cells stop dividing.

C. The lac operon is repressed.

D. All operons are induced

Answer: A

Solution:

Solution:
(a) : When E.coli bacteria are transfered to medium containing lactose, then the lac opeon is indueed. The lac opeaon consists of 3 structural gene (lac Z, lac Y and lac A). It involves the synthesis of β-galactosidase enzyme in E.coli, which hydrolyses lactose into glucose and galactose.

Question186

The lac operon is an example of
(1995)

Options:

A. repressible operon

B. overlapping genes

C. arabinose operon

D. inducible operon

Answer: D

Solution:

Solution:
The two French scientists, Jacob and Monod proposed the lac operon of E . coli.
The lac operon (an inducible operon) contains a promoter, an operator, a regulator gene and three structural genes z, y, and a, coding for the enzyme β -galactosidase, β-galactoside permease, and β -galactoside transacetylase, respectively. β -galactoside permease "pumps" lactose into the cell, where β-galactosidase cleaves it into glucose and galactose.

Question187

An environmental agent, which triggers transcription from an operon, is a
(1995)

Options:

A. depressor

B. controlling element

C. regulator

D. inducer

Answer: D

Solution:

Solution:
Inducer is a metabolite (or analogue of similar chemical structure), usually of low molecular weight, which promotes the production of an enzyme. Inducers are often substrates for the enzymes they induce, e . g. lactose in case of the synthesis of β- galoctosidase in lac operon.

Question188

If the sequence of bases in DNA is ATTCGATG then the sequence of bases in its transcript will be
(1995)

Options:

A. GUAGCUUA

B. AUUCGAUG

C. CAUCGAAU

D. UAAGCUAC

Answer: D

Solution:

Solution:
In transcription, m RNA is formed from DNA template and thymine of DNA is replaced by uracil of RNA. Uracil pairs with adenine.

DNA	A	T	T	C	G	A	T	G
mRNA	U	A	A	G	C	U	A	C

Question189

If the DNA codons are ATG ATG ATG and a cytosine base is inserted at the beginning, then which of the following will result?
(1995)

Options:

A. CAT GAT GATG

B. A non-sense mutation

C. C ATG ATG ATG

D. CA TGA TGA TG

Answer: A

Solution:

Solution:
Nonsense mutation is a mutation which interconverts a nonsense to or from a sense-coding triplet, resulting in an abnormally foreshortened or elongated polypeptide chain. But in this example cytosine is added at the beginning so CAT GAT GATG will result.

Question190

In split genes, the coding sequences are called
(1995)

Options:

A. exons

B. cistrons

C. introns

D. operons

Answer: A

Solution:

Solution:
Split gene are those genes that consist of continuous sequence of nucleotide (coding sequence) interrupted by intervening sequences. Most eukaryotic genes are split as are genes of some animal viruses. The continuous coding sequences are called exons and the intervening non-coding sequence are called introns. These introns are not represented in m RNA transcribed from the gene and are not utilized for the synthesis of proteins.

Question191

Anticodon is an unpaired triplet of bases in an exposed position of (1995)

Options:

A. t RNA

B. mRN A

C. r RNA

D. both (b) and (c)

Answer: A

Solution:

Solution:
Anticodon is the sequence of three nucleotides in a transfer RNA molecule that pairs with a complementary sequence of three nucleotides (codon) on a molecule of messenger RNA. t RNA has clove like shape or L shape (three dimensional). It has G at 5'-end CCA at 3'-end. CCA at 3'-end is meant for attaching to a specific amino acid (AA-binding site). On the opposite side lies an anticodon that is complementary to a specific codon of mRN A. The two are called recognition sites.

Question192

'Lac operon' in E . coli, is induced by (1994)

Options:

A. 'I' gene

B. promoter gene

C. β -galactosidase

D. lactose

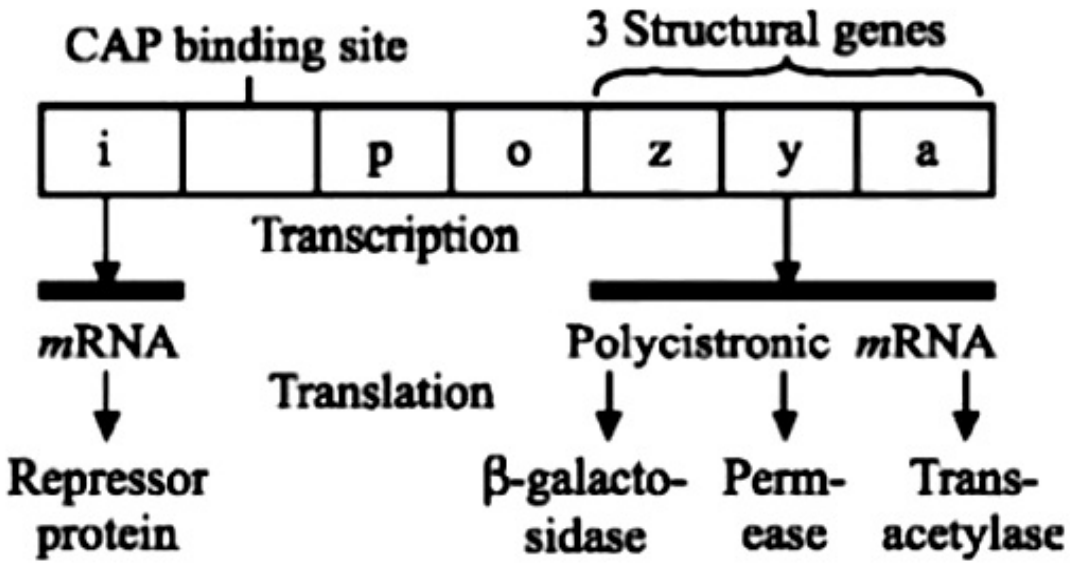
Answer: D

Solution:

Lac operon in E . coli is **induced** by β-galactosidase an enzyme meant for hydrolysis of lactose in glucose and galactose.

$$\text{Lactose} \xrightarrow{\beta-\text{galactosidase}} \text{Glucose + Galactose}$$

These enzymes are called as inducible enzymes, because the synthesis of such enzymes are **induced** by adding substrate such as lactose by 10,000 times.



Question193

Initiation codon in eukaryotes is (1994)

Options:

A. GAU

B. AGU

C. AUG

D. UAG

Answer: C

Solution:

AUG codes for methionine and is initiation or start codon which starts the synthesis of polypeptide. UAA (ochre), UAG (amber) and UGA (opal) do not specify any amino acid so they are called termination codons. CUU, CUC, CUA and CUG codes for leucine whereas GCU , GCC, GCA and GCG codes for alanine.

Question194

There are special proteins that help to open up DNA double helix in front of the replication fork. These proteins are (1994)

Options:

A. DNA ligase

B. DNA topoisomerase I

C. DNA gyrase

D. DNA polymerase I

Answer: B

Solution:

Solution:
DNA is a double helical molecule and it opens to form a replication fork for its replication. The two strands of DNA are joined with the help of H-bonds between the strands. Topoisomerases are specialized to cause nicks or breaks in the double helix and helps separate the DNA stands. Helicase unwinds the DNA helix from that nick caused by the topoisomerase and this seperates the two strands. DNA gyrase introduces negative supercoils in DNA strands of prokayotes. DNA polymerase adds nucleotides units to the $3'-$end of a DNA chain. DNA ligase joins the ends of DNA.

Question195

In protein synthesis, the polymerization of amino acids involves three steps. Which one of the following is not involved in the polymerisation of protein ? (1994)

Options:

A. Termination

B. Initiation

C. Elongation

D. Transcription

Answer: D

Solution:

Solution:
Transcription is the mechanism of copying the message of DNA on RNA with the help of enzyme RNA polymerase. It is meant for taking the coded information from DNA to the site where it is required for protein synthesis. Translation or protein synthesis is a complicated process involving several steps such as - activation of amino acid, transfer of amino acid to t RNA, initiation of polypeptide synthesis, elongation of polypeptide chain and, termination of polypeptide chain.

Question196

Nucleosome core is made of (1993)

Options:

A. H_1, H_2A, H_2B and H_3

B. H_1, H_2A, H_2B, H_4

C. H_1, H_2A, H_2B, H_3 and H_4

D. H_2A, H_2B, H_3 and H_4

Answer: D

Solution:

Solution:
Nucleosome core is made up of H_2A, H_2B, H_3 and H_4. It is about $7-10\text{nm}$ in diameter, consisting of histones around which a DNA strand, about 120 base pair long is wrapped in chromosomes.

Question197

Initiation codon of protein synthesis (in eukaryotes) is (1993)

Options:

A. GUA

B. GCA

C. CCA

D. AUG

Answer: D

Solution:

Solution:
AUG codes for methionine and is initiation or start codon which starts the synthesis of polypeptide. UAA (ochre), UAG (amber) and UGA (opal) do not specify any amino acid so they are called termination codons. CUU, CUC, CUA and CUG codes for leucine whereas GCU,GCC,GCA and GCG codes for alanine.

Question198

The transforming principle of Pneumococcus as found out by Avery, MacLeod and McCarty was
(1993)

Options:

A. m RNA

B. DNA

C. protein

D. polysaccharide

Answer: B

Solution:

Solution:
The transforming principle of Pneumococcus as found out by Avery, MacLeod and McCarty was DNA.
In 1944, Avery, MacLeod and McCarty repeated Griffith's experiment successfully.
They separated the proteins, carbohydrates and DNA of S III strains and separately mixed them in the pure cultures of R II.
Only DNA could bring about transformation of R II type into S III and not the proteins or the carbohydrates.

Question199

Who proved that DNA is basic genetic material?
(1993)

Options:

A. Griffith

B. Watson

C. Boveri and Sutton

D. Hershey and Chase

Answer: D

Solution:

Solution:
Hershey and Chase proved that DNA is a basic genetic material. Hershey and Chase, 1952, by using P^{32} and S^{35} with a $T - 2$ type phage concluded that DNA is the genetic material.

Question200

Because most of the amino acids are represented by more than one codon, the genetic code is
(1993)

Options:

A. overlapping

B. wobbling

C. degenerate

D. generate

Answer: C

Solution:

Solution:
Certain amino acids are identified by more than one codons. This phenomenon is called as degeneracy e.g., only AUG codes for methionine and UGG tryptophan.

Question201

During DNA replication, the strands separate by
(1993)

Options:

A. DNA polymerase

B. topoisomerase

C. unwindase/helicase

D. gyrase

Answer: C

Solution:

During DNA replication, the strands separate by unwindase/helicase. The molecule is unwound by DNA unwinding proteins called helicases. The helicases II and III get attached to logging strand and protein to the leading strand. The formation of bands is avoided by single stranded DNA binding proteins (SSB).

Question202

The process of translation is (1993)

Options:

A. ribosome synthesis

B. protein synthesis

C. DNA synthesis

D. RNA synthesis

Answer: B

Solution:

Solution:
The process of translation is protein synthesis. Emil Fischer, a German chemist established that the proteins are polymers of amino acids. There are some twenty amino acids involved in protein synthesis. In translation, the message coded by DNA on mRN A is translated into a specific protein.

Question203

A DNA with unequal nitrogen bases would most probably be (1993)

Options:

A. single stranded

B. double stranded

C. triple stranded

D. four stranded

Answer: A

Solution:

A DNA with unequal nitrogen bases would most probably be single stranded. Nitrogenous bases are unequal in number in single stranded DNA, because they do not possess complementary base pairs.

Question204

Nucleotide arrangement in DNA can be seen by (1993)

Options:

A. X-ray crystallography

B. electron microscope

C. ultracentrifuge

D. light microscope

Answer: A

Solution:

Solution:
Nucleotide arrangement in DNA can be seen by X-ray crystallography. Watson and Crick, 1953 proposed the double helical model for DNA. They were awarded Nobel prize in 1962. This model was developed by them on the basis of several previous observations including the d -helix of Pauling, 1951 and X -ray reflection studies of Franklin and Gosling, 1953.

Question205

Experimental material in the study of DNA replication has been (1992)

Options:

A. Escherichia coli

B. Neurospora crassa

C. Pneumococcus

D. Drosophila melanogaster

Answer: A

Solution:

Solution:
Experimental material in the study of DNA replication has been Escherichia coli. E. coli fully labelled with ^{15}N is allowed

to grow in ^{14}N medium. The two strands of DNA molecule of the first generation bacteria have different density and do not resemble parent DNA. Meselson and Stahl, 1958 by using ^{14}N and ^{15}N confirmed that the replication of DNA in E . coli is semi-conservative in nature.

Question206

Khorana first deciphered the triplet codons of
(1992)

Options:

A. serine and isoleucine

B. cysteine and valine

C. tyrosine and tryptophan

D. phenylalanine and methinonine

Answer: B

Solution:

Solution:
Khorana synthesised a chain of alternate nucleotide GUGUGUGUGU. He found that it stimulated synthesis of a peptide having alternate valine-cysteine-valine-cysteine.

Question207

Escherichia coli fully labelled with ^{15}N is allowed to grow in ^{14}N medium. The two strands of DNA molecule of the first generation bacteria have
(1992)

Options:

A. different density and do not resemble parent DNA

B. different density but resemble parent DNA

C. same density and resemble parent DNA

D. same density but do not resemble parent DNA

Answer: A

Solution:

When E. coil fully labelled with N^{15} is allowed to grow in N^{14} medium, then after first generation of replication one of the two strands would have N^{15} and the other strand would have N^{14}. The resulting molecule would have a density which is intermediate between N^{15} DNA and N^{14} DNA.
These two molecules of DNA will be similar but not same in density.

Question208

The process of transfer of genetic information from DNA to RNA/formation of RNA fromDNA (1991)

Options:

A. transversion

B. transcription

C. translation

D. translocation

Answer: B

Solution:

Solution:
The process in living cells in which the genetic information of DNA is transferred to a molecule of mesenger RNA (m RNA) is the first step in protein synthesis. Transcription takes place in the cell nucleus or nuclear region and is regulated by transcription factors.

Question209

An octamer of 4 histones complexed with DNA forms (1990)

Options:

A. endosome

B. nucleosome

C. mesosome

D. centromere

Answer: B

Solution:

An octamer of 4 histones complexed with DNA forms nucleosome. The association of histones with DNA is very characteristic. It involves the formation of linear array of spherial structures called nucleosomes. These structures contains four pairs of histones (H_2A, H_2B, H_3 and H_4) in a ball; around which is wrapped a stretch of about 150 base pairs of DNA.

Question210

In the genetic dictionary, there are 64 codons as (1990)

Options:

A. 64 amino acids are to be coded

B. 64 types of t RNAs are present

C. there are 44 nonsense codons and 20 sense codons

D. genetic code is triplet

Answer: D

Solution:

Solution:
There are 64 colons as genetic code is triplet. Three adjacent bases, termed a codon specify one amino acid. This can only account for the 20 amino acids. Thus in a triplet codon, the four bases would specify a total of 64 amino acids.

Question211

DNA replication is (1989)

Options:

A. conservative and discontinuous

B. semi-conservative and semi-discontinuous

C. semi-conservative and discontinuous

D. conservative

Answer: B

Solution:

Solution:
The method of DNA replication is semiconservative. According to the semi-conservative model proposed by Watson and Crick, each strand of the two double helices formed would have one old and one new strand. So, the parental identity is

conserved upto half extent and hence DNA replication is semi-conservative.

Question212

Genetic code consists of (1988)

Options:

A. adenine and guanine

B. cytosine and uracil

C. cytosine and guanine

D. all the above

Answer: D

Solution:

The genetic information is transferred from DNA to m RNA to protein. The proteins are made up of some 20 amino acids whose sequence is hidden in the sequence of nucleotides of $\mathrm{mRN A}$. Hence, genetic code consists of all 20 amino acids. Thus genetic code is the relationship of amino acids sequence in a polypetide and nucleotide\/base sequence in $\mathrm{mRN A}$ antisense strand and DNA.
