**TOPIC: MOLECULAR BASIS OF INHERITANCE**

**UNIT NO: B-14**

1. Following are some of the bonds are present polymers. Which of the following is not seen in m-RNA?

a. N-Glycosidic bond b. Phosphoester bond

c. Phosphodister bond d. Hydrogen bond

e. Phosphoanhydride bond f. Peptide bond

1. All except a, b, c, d 2. All except a and b

3. All except a, b, c 4. All expect c, d, e, f

1. Following molecule represents

1. Nucleoside of DNA 2. Nucleoside of RNA

3. Nucleotide of DNA 4. Nucleotide of RNA

1. Match the following with reference to bonds

|  |  |  |  |
| --- | --- | --- | --- |
|  | Column I |  | Column II |
| A | N-Glycosidic bond | P | Between two strands |
| B | Phosphoester bond | Q | Sugar and nitrogenous base (formation of nucleoside) |
| C | Phosphodiester bond | R | Amino acids |
| D | Hydrogen bond | S | Formation of a nucleotide (between Nucleoside and phosphate) |
| E | Peptide bond | T | Between nucleotides of a strand of DNA/RNA |

1. A=Q; B=S; C=T; D=P; E=R 2. A=S; B=Q; C=T; D=P; E=R

3. A=Q; B=S; C=T; D=R; E=P 4. A=Q; B=S; C=P; D=T; E=R

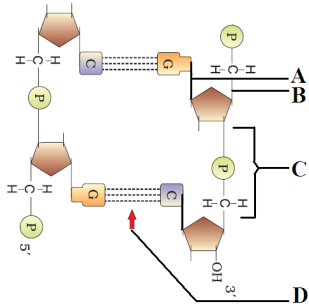
1. N-glycosidic linkage is present in between

1. Pentose sugar and phosphate 2. Pentose sugar and nitrogenous bases

3. Two pentose sugar molecules 4. Nitrogenous bases and Phosphate

1. Phosphate molecule attaches to deoxyribose sugar to form a nucleotide. To which carbon atom it is attached?

1. 3′ C and OH 2. 3′ C and P 3. 5′ C and OH 4. 5′ C and P

1. Identify the alphabets A, B, C and D in the labelled diagram representing different types of bonds formed.

1. A=N-glycosidic bond; B=Phosphoester bond;

C=Hydrogen bond; D= Phosphodiester bond

2. A=N-glycosidic bond; B=Phosphoester bond;

C=Phosphodiester bond; D=Hydrogen bond

3. A=Phosphoester bond; B=N-glycosidic bond;

C=Phosphodiester bond; D=Hydrogen bond

4. A=N-glycosidic bond; B=Phosphodiester bond;

C=Phosphoester bond; D=Hydrogen bond

1. Number of hydrogen bonds between A and T, C and G respectively are

1. 1 and 1 2. 2 and 3 3. 3 and 2 4.2 and 2

1. DNA identification for the first time done by

1. F. Crick 2. F. Meischer 3. Chargaff 4. M. Wilkins

1. Find the mismatch

1. Nuclein – F. Meischer 2. Chargaff – Base equivalence

3. Wilkins and Franklin – Density gradient separation

4. Watson and Crick – Double helix

1. While analyzing the DNA of an organism a total number of 10000 nucleotides were found out of which the proportion of different bases were: Adenine 35%, Guanine 35%, Cytosine 20% and Thymine 10%. Considering ‘Chargaff’ rule it can be concluded that

1. It is ds DNA 2. It is ss DNA 3. It is ds RNA 4. No conclusion drawn

1. If there are 120 Adenine molecules in B-DNA double helical structure showing 20 coils, what is the total number of hydrogen bonds formed between Guanine and Cytosine?

1. 80 2. 160 3. 240 4. 360

1. How many nucleotides present in DNA with 1000 turns?

1. 2000 2. 1000 3. 4000 4. 20,000

1. Which of the following represents double stranded DNA?

1. A-30%, C-30%, G-20%, T-20% 2. A-37%, C-13% ,G-13%, T-37%

3. A-10%, C-33%, G-33%,T-18% 4. A-18%,C-32%, G-18%, T-32%

1. How many of following statements about structure of DNA molecule is true?

A. DNA is double stranded structure which are parallel to each other

B. Two strands are made up of polymers of nucleotides

C. Backbone is made up of repeated sugar and phosphate molecules

D. Complementary base pairing occur between two strands, i.e., between A – T and G – C

E. Two hydrogen bonds between A and T while three hydrogen bonds between G and C

F. Pitch of the helix is 34 Å and between each base pair the distance is 3.4 nm

1. 5 2. 6 3. 3 4. 4

1. Identify mismatch with reference to number base pairs per turn

1. B- DNA – 10 bp 2. Z-DNA – 12 bp 3. A- DNA – 11 bp 4. D-DNA – 9 bp

1. Combination of purine with pyrimidine of two strands of DNA is called base pairing. This results in

1. Constant diameter of DNA helix 2. Specific combination of nucleotides of a strand

3. Constant distance between nucleotides of a strand 4. Antiparallel nature of DNA strands

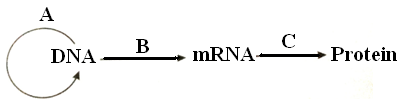
1. DNA strands are antiparallel because of the presence of

1. H-bonds 2. Peptide bonds 3. Disulphide bonds 4. Ester bonds

1. The Central dogma of molecular biology includes

1. Translation 2. Taminism 3. Transcription 4. Both 1 and 3

1. Identify the processes which are indicated as A, B and C in the central dogma

1. A=Replication; B=Taminism; C=Translation

2. A=Replication; B=Transcription; C=Translation

3. A=Transcription; B=Replication; C=Translation

4. A=Replication; B=Translation; C=Transcription

1. If the DNA of a Human cell contains 6.6 X 109 bp, the length of DNA would be

1. 6.6 m 2. 4.4 m 3. 2.2 m 4. 2.2 mm

1. DNA is acidic due to

1. Purine 2. Pyrimidine 3. Sugar 4. Phosphoric acid

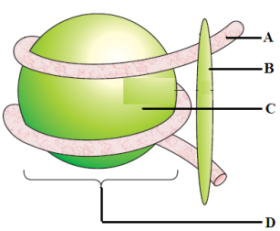
1. Electron microscopy of chromatin is shown as beads on string. A typical nucleosome formed of histone protein is wrapped by DNA molecule having

1. 175bp 2. 200bp 3. 75bp 4. 1000bp

1. Nucleosome is composed of :

1. DNA wrapped by histone 2. Histone wrapped by DNA

3. RNA wrapped in DNA 4. RNA wrapped in histone

1. Identify the labelled diagram of the following

1. A=DNA; B=H1 Protein; C=Histone octamer;

D=Core of histone molecules

2. A=DNA; B=H1 Protein; C=Core of histone molecules;

D=Histone octamer

3. A=H1 Protein; B=DNA; C=Histone octamer;

D=Core of histone molecules

4. A=DNA; B=Histone octamer; C=H1 Protein; D=Core of histone molecules

1. Packaging of DNA during cell division is associated with

1. Histone and NHC proteins 2. Histones only 3. NHC proteins only 4. DNA only

1. In eukaryotes, negatively charged DNA is associated with basic proteins called histones. Such histones are rich in

1. Tryptophan and Carbohydrates 2. Lysine and Leucine

3. Lysine and Arginine 4. Arginine and Leucine

1. Euchromatin differs from heterochromatin because euchromatin is

1. Loosely packed 2. Lightly stained 3. Genetically active 4. All these

1. Read the following statements carefully and mark the correct option given below:

a. ‘S’ strain of Streptococcus pneumoniae is non capsulated and causes pneumonia in mammals

b. When heat killed ‘S’ and live ‘R’ strains of S. pneumoniae injected into mice separately, the mice were healthy and alive

c. Heat killed ‘S’ and live ‘R’ strains of S. pneumoniae injected together, the mice were dead and R cells show the process of transformation

d. Transformation of ‘R’ cells is due to the genetic material of heat killed ‘S cells.

1. a, c and d are correct, b is incorrect 2. a, b and c are correct, d is incorrect

3. b, c and d are correct, a is incorrect 4. a, b and d are correct, c is incorrect

1. When a mixture of heat killed virulent and live avirulent bacteria were injected to mice by Griffith, then possible observation in the experiment is

1. Animals are alive without disease 2. Mice die because of disease

3. Live virulent strains in dead mice 4. Both 2 and 3

1. Avery, MacLeod and McCarty proved \_\_\_\_ as transforming principle

1. DNA 2. RNA 3. Both 1 and 2 4. Proteins

1. Enzymes used for isolation of individual biomolecules are given in combination. Identify the incorrect one.

1. RNase-Digest RNA 2. Protease-Digest protein

3. DNAs- Digest DNA 4. Lipase-Digest lipids

1. Hershey and Chase provided evidence for

1. Double stranded DNA structure 2. Helical coiling of DNA

3. DNA as the genetic material 4. Semiconservative DNA replication

1. Hershey and Chase in their experiments on bacteriophages proved DNA is the genetic material and their observation were

1. Bacteria which were infected with viruses that had radioactive DNA, were radioactive

2. Bacteria which were infected with viruses that had radioactive protein coats, were radioactive

3. Bacteria which were infected with viruses that had radioactive protein coats, were not radioactive

4. Both 1 and 3

1. Which of the following features is wrong with reference to properties of genetic material?

1. A genetic material should be chemically and structurally stable

2. Genetic material is capable of duplication i.e., copying itself

3. Genetic material should provide scope for fast mutation which is required for evolution

4. It should be capable of expression of Mendelian characters.

1. Which of the following statements are correct about stability of DNA molecule?

A. DNA is double stranded B. DNA do not contain –OH group at 2 C atom

C. DNA is unstable at high temperature D. Thymine is more stable than Uracil

E. DNA is non catalytic molecule and helps in peptide bond formation

1. All are correct except C 2. A, B and C are correct; D and E are wrong

3. A, B and D are correct; C and E are wrong 4. All are correct except E

1. RNA is unstable due to the presence of

1. 2′- OH 2. Single stranded 3. Catalytic molecule 4. All these

1. The first evolved genetic material could be

1. DNA 2. RNA 3. Protein 4. Carbohydrate

1. Essential life processes such as metabolism, transcription and splicing have evolved around

1. DNA 2. RNA 3. Carbohydrate 4. Protein

1. In Meselson and Stahl experiment when bacterial cells were shifted from heavy nitrogen to normal nitrogen containing medium. After 80 minutes what is the ratio of heavy: hybrid: normal DNA molecules?

1. 1 : 1 : 1 2. 0 : 1 : 7 3. 0 : 1 : 3 4. 0: 7 : 1

1. Using radioactive thymidine Taylor and his colleagues observed semiconservative replication in \_\_\_\_

1. *Catheranthus roseus* 2. *Mangifera indica* 3. *Arabidopsis thaliana* 4. *Vicia faba*

1. When DNA contains 5′AAAAAACCCTGCGAT3′ in its coding strand. What is base sequence of template strand, mRNA and anticodons?

1. Template strand: 5′UUUUUUGGGACGCUA3′; m-RNA: 5′UUUUUUGGGACGCUA3′; anticodons: 5′UUUUUUGGGACGCUA3′

2. Template strand: 3′TTTTTTGGGACGCTA5′; m-RNA: 5′AAAAAACCCUGCGAT3′; anticodons: 3′UUUUUUGGGACGCUA5′

3. Template strand: 5′TTTTTTGGGACGCTA3′; m-RNA: 5′AAAAAACCCUGCGAT3′; anticodons: 5′UUUUUUGGGACGCUA3′

4. Template strand: 5′AAAAAACCCTGCGAT3′; m-RNA: 5′UUUUUUGGGACGCUA3′; anticodons: 5′AAAAAACCCUGCGAU3′

1. The polarity of coding strand is

1. 5′-3′ 2. 3′- 5′ 3. Either 1 or 2 4. Both 1 and 2

1. Which of the features about hnRNA is correct?

1. Found only in the nucleus 2. It is the primary transcript

3. It is non functional RNA in eukaryotes 4. All these

1. Following are the statements regarding transcription

a. Structural gene is flanked by promoter and terminator sequences towards upstream and downstream in a transcriptional unit

b. RNA dependent RNA polymerase helps in polymerization of m-RNA

c. Initiation of transcription involves sigma factor and terminated by rho factor

d. Process of transcription occurs from 5′ to 3′ direction on template strand

e. In eukaryotes functional m-RNA is produced after process of splicing

1. a, c and d are correct; b and e are wrong 2. a, b and c are correct; d and e are wrong

3. a, c and e are correct; b and d are wrong 4. a, d and e are correct; b and c are wrong

1. The process of removal of introns and joining of exons is known as

1. Splicing 2.Tailing 3.Capping 4.Termination

1. What are introns?

1. Coding sequence 2. Non-coding sequences

3. Non functional genes 4. All these

1. Which of the components of gene responsible for replication?

1. Recon 2. Muton 3. Replicon 4. Exon

1. Which of the following features is wrong with reference to eukaryotes?

1. Capping at 5′ end, trailing with poly A tail at 3′ end

2. Coupling of transcription and translation

3. Functional m-RNA is produced after processing

4. Synthesized in nucleus, transported to cytoplasm

1. The set of three nucleotides present in arm of t-RNA is binds with codons of m-RNA is

1. Anticodon 2.Codon 3.Code 4. Muton

1. Which of the following characters is not applicable to t RNA?

1. It acts an adapter for amino acids 2. It has a clover leaf like structure

3. It bears NODOC 4. It is the largest RNA

1. Match the following

|  |  |
| --- | --- |
| Arm of t-RNA | Significance |
| i. Acceptor arm | a. Binding with codon of m-RNA |
| ii. TΨC arm | b. Amino acid binding arm |
| iii. Anticodon arm | c. Enzyme recognition site |
| iv. DHU arm | d. Attachment with ribosome |

1. i-b, ii-c, iii-a, iv-d

2. i.b, ii-d, iii-a, iv-c

3. i-d, ii-a, iii-c, iv-d

4. i-c, ii-b, iii-a, iv-d

1. The most abundant RNA of cell is

1. m-RNA 2. t-RNA 3. r-RNA 4. snRNA

1. Ribozyme of bacteria is

1. 28SrRNA 2.23SrRNA 3.5.8SrRNA 4.5SrRNA

1. RNA polymerase-I transcribes eukaryotic ribosome which does not consists of

1. 18S rRNA 2. 5.8S rRNA 3. 5SrRNA 4. 28S rRNA

1. Cistron refers to the unit of gene for

1. Coding a polypeptide

2. The process of recombination

3. The purpose of replication

4. The process of mutation

1. Which of the following is/are the characteristic features of Genetic code?

1. Triplet nature 2. Universality 3. Degeneracy 4. All these

1. Degeneracy of genetic code refers to

1. A single Nitrogenous base coding for an amino acid

2. A single amino acid coded by single codon

3. A single amino acid coded by more than one codon

4. Many amino acids coded by single codon

1. Initiator codon is

1. AUU 2. AUG 3. UUU 4. UUC

In the following questions a statement assertion (A) is followed by a statement reason (R). Mark the correct answer as follows:

1. Both assertion and reason are true and reason is the correct explanation of assertion.

2. Both assertion and reason are true and reason is not a correct explanation of the assertion.

3. Assertion is true but the reason is false 4. Both assertion and reason are false

1. Assertion: Replication in organisms is semiconservative and bidirectional

Reason: Replication occurs in cytoplasm of the cell

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | 2 | 3 | 4 |

1. Assertion: In eukaryotes there is splicing before m-RNA is sent to cytoplasm

Reason: Primary transcript in eukaryotes is non-functional hnRNA

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | 2 | 3 | 4 |

1. Which of the following mutations explains triplet nature of GC?

1. Frame shift mutation 2. Point mutation 3. Recombination 4. All there

1. When there is addition of one or more codons it is referred to as

1. Frame shift insertion mutation 2. Frame shift deletion mutation

3. Both 1 and 2 4. Point mutation

1. AUG is initiator codon. If it is not an initiator codon it codes for

1. Tryptophan 2. Methionine 3. Valine 4. Isoleucine

1. Universality of genetic code is exception to some

1. Protozoans 2. Mammals 3. Fungi 4. Bryophytes

1. Severo Ochoa enzyme is

1. Polynucleotide isomerase 2. Nucleotide transferase

3. Polynucleotide phosphorylase 4. t-RNA synthetase

1. Which of the following features is not a characteristic feature of genetic code?

1. Non specificity 2. Ambiguous 3. Uniqueness 4. All these

1. Codon AAA codes for amino acid Lysine in bacteria and human beings. This statement suggests that

1. Genetic code is non-specific in nature 2. Genetic code is universal in nature

3. Genetic code is degenerate 4. It consists of initiator codon

1. Select the incorrect statement(s)

1. Six codons do not code for any amino acid 2. Codons read on mRNA in a contiguous fashion

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

1. 1, 2 and 4 are incorrect 2. 1, 2 and 3 are incorrect

3. 2, 3 and 4 are incorrect 4. 1 alone is incorrect

1. Single amino acid is being coded by more than one codon and the phenomenon is called degeneracy of genetic code. Exception to this feature is associated with

1. Methionine 2. Tryptophan 3. Alanine 4. Both 1 and 2

1. Reading frame of mRNA consists of 600 nucleotides including initiator and terminator codons. Then total number of amino acids present in a polypeptide is

1. 200 2. 199 3. 198 4. 1200

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

1. A polypeptide of 24 amino acids will be formed

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

3. A polypeptide of 49 amino acids will be formed

4. A polypeptide of 25 amino acids will be formed

1. Aminoacylation of t-RNA refers to

1. Linking of t-RNA to m-RNA 2. Formation of initiation complex

3. Linking of amino acids to acceptor arm of t-RNA

4. Formation of mature proteins by combination of other molecules

1. Incorrect feature about the ribosome that associated with translation is

1. Consists of structural RNA and 80 different types proteins

2. Found dissociated at the time of non-protein synthesizing state

3. 23 S rRNA acts as catalyst called Ribozyme 4. None of these

1. The correct sequence of process of translation is

a. Elongation b. Termination c. Activation of amino acids

d. Charging of t-RNA e. Initiation f. Maturation

1. a, b, c, e, d, f 2. a, b, c, d, e, f 3. c, d, e, a, b, f 4. f, b, a, e, d, c

1. Which of the following amino acids coded by maximum number of codons?

1. Leucine 2. Serine 3. Arginine 4. All these

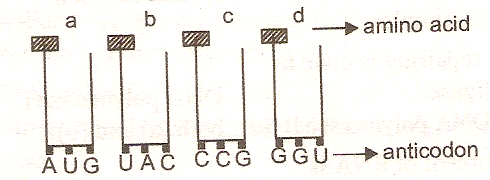
1. Which of the following features about termination is wrong?

1. Release factor binds to stop codons during termination

2. Protein chain comes out of ribosomes complex at the time of termination

3. Termination of translation requires ATP during the process

4. It ends the process of protein synthesis

1. Find the sequence of binding of the following amino acyl-t RNA complexes during translation of a mRNA transcribed by a DNA segment having the base sequence 3′TACATGGGTCCG5′. Choose the answer showing the correct order of alphabets.

1. a, b, d, c 2. b, a, d, c

3. a, b, c, d 4. b, a, c, d

1. Which of the following is incorrect regarding regulation of gene expression in eukaryotes?

1. Transcriptional level 2. Processing level 3. Translational level 4. All these

1. Lac Z gene produces \_\_\_\_\_ which is utilized in hydrolysis of \_\_\_\_\_\_

1. Lac permease and Lactose into glucose and galactose

2. β galactosidase and Sucrose into glucose and fructose

3. Transacetylase and Lactose into glucose

4. β galactosidase and Lactose into glucose and galactose

1. Match the components of ‘Lac operon’ of E. coli given under Column I with their function listed in Column II. Choose the answer with correct combination of alphabets of the two columns.

Column I Column II

(Components of Lac operon) (Function)

i. Structural gene p. Binding site for repressor protein

ii. Operator gene q. Codes for repressor protein

iii. Promoter gene r. Induces lactose transport from the medium

iv. Regulator gene s. Codes for enzyme proteins

t. Binding site for RNA polymerase

i ii iii iv

1. q t p r

2. r s t p

3. s p t q

4. t s q p

1. Operon refers to combination of

1. Operator and Promoter sequences

2. Structural genes with operators, regulators and promoters

3. Structural genes with promoter and terminators 4. Structural genes with operator and cistrons

1. DNA fingerprinting was developed by

1. Alec Jeffreys 2. Nierenberg 3. Khorana 4. Holley

1. Operators are generally bind with

1. Regulators proteins 2. Repressor proteins 3. Structural proteins 4. All these

1. VNTR probe refers to artificially synthesized

1. Single stranded radioactive DNA 2. Double stranded non-radioactive DNA

3. Single stranded non-radioactive DNA 4. Double stranded radioactive DNA

1. VNTRs are same in

1. Identical twins 2. Fraternal twins 3. Siblings 4. Parents

1. The technique of transferring DNA fragment separated on agarose gel to a synthetic membrane such as nitrocellulose is known as

1. Northern blotting 2. Southern blotting 3. Western blotting 4. All these

1. DNA fingerprinting has proved to be useful in forensic science. It involves the use of

1. Minisatellites 2. rRNA 3. Bacterial DNA 4. cDNA

1. Single polynucleotide polymorphism is represented as

1. snurps 2. snips 3. snops 4. Sips

1. In HGP, Expressed sequence tags includes the study of

1. Genes which express as RNAs 2. Genes that do not code for proteins

3. All coding and non coding parts of DNA 4. All these

1. Largest gene is

1. Dystrophin gene 2. Lac Z gene 3. Insulin gene 4. None

**TOPIC: MOLECULAR BASIS OF INHERITANCE**

**UNIT NO: B-14**

**ANSWER KEY**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Ans.** | **Q. No.** | **Ans.** | **Q. No.** | **Ans.** | **Q. No.** | **Ans.** | **Q. No.** | **Ans.** |
| 1 | **2** | 2 | **2** | 3 | **1** | 4 | **2 (cor)** | 5 | **3** |
| 6 | **2** | 7 | **2** | 8 | **2** | 9 | **3** | 10 | **2** |
| 11 | **3** | 12 | **4** | 13 | **2** | 14 | **4** | 15 | **4** |
| 16 | **1** | 17 | **1** | 18 | **4** | 19 | **2** | 20 | **3** |
| 21 | **4** | 22 | **2** | 23 | **2** | 24 | **1** | 25 | **1** |
| 26 | **3** | 27 | **4** | 28 | **3** | 29 | **4** | 30 | **1** |
| 31 | **3** | 32 | **3** | 33 | **4** | 34 | **3** | 35 | **3** |
| 36 | **4** | 37 | **2** | 38 | **2** | 39 | **2** | 40 | **4** |
| 41 | **2** | 42 | **1** | 43 | **4** | 44 | **3** | 45 | **1** |
| 46 | **2** | 47 | **3** | 48 | **2** | 49 | **1** | 50 | **4** |
| 51 | **2** | 52 | **3** | 53 | **2** | 54 | **3** | 55 | **1** |
| 56 | **4** | 57 | **3** | 58 | **2** | 59 | **3** | 60 | **1** |
| 61 | **1** | 62 | **1** | 63 | **2** | 64 | **1** | 65 | **3** |
| 66 | **4** | 67 | **2** | 68 | **4** | 69 | **4** | 70 | **2** |
| 71 | **1** | 72 | **3** | 73 | **4** | 74 | **3** | 75 | **4** |
| 76 | **3** | 77 | **2** | 78 | **4** | 79 | **4** | 80 | **3** |
| 81 | **2** | 82 | **1** | 83 | **2** | 84 | **1** | 85 | **1** |
| 86 | **2** | 87 | **1** | 88 | **2** | 89 | **1** | 90 | **1** |