

- Q.1.** Choose correct statement from the following
- Griffith's experiment with *Streptococcus pneumoniae* showed transformation.
 - Heat-killed S strain + live R strain killed mice.
 - Avery, MacLeod, McCarty proved protein was transforming principle.
 - DNAse destroyed transformation ability.
 - Griffith directly proved DNA is genetic material.
- A, B, C, D are true
 - A, B, C, E are true
 - B, C, D, E are true
 - A, B, D are true
- Q.2.** Choose correct statement wrt Hershey & Chase Experiment
- Bacteriophages labeled with ^{32}P showed DNA enters bacteria.
 - ^{35}S label bacteriophages were found in supernatant.
 - They proved protein is genetic material.
 - They unequivocally prove that DNA is the hereditary material.
 - Their experiment involved T_2 phage and *E. coli*.
- A, B, C, D are true only
 - A, B, D, E are true only
 - B, C, D, E are true only
 - A, B, D are true only
- Q.3.** Choose correct statements for DNA Structure proposed by Watson & Crick
- DNA is a right-handed double helix.
 - Two strands run antiparallel.
 - Base pairing: A–T (2 H-bonds), G–C (3 H-bonds).
 - Major & minor grooves present.
 - Backbone made of proteins and sugar.
- A, B, C, D are true only
 - A, B, D, E are true only
 - B, C, D, E are true only
 - A, B, D are true only
- Q.4.** Choose correct statement wrt Chargaff's rule
- In DNA, $[A] = [T]$, $[G] = [C]$.
 - $(A+T) \neq (G+C)$ across species.
 - Base ratio varies among organisms.
 - Chargaff explained double helix structure.
 - Applicable to ds DNA
- A, B, C, D are true
 - A, B, C, E are true
 - B, C, D, E are true
 - A, B, D are true
- Q.5.** Select correct statement from the following for DNA
- DNA present in nucleus was first identified by F. Meischer in 1969.
 - Watson and Crick proposed the double helical structure of DNA
 - DNA is genetic material in all organisms
 - The plane of one base pair stacks over other in the double helix also gives stability to helical structure of DNA
- A, B, C, D are true only
 - A, B, D, E are true only
 - B, C, D are true only
 - A, B, D are true only
- Q.6.** Choose correct statement regarding semi-conservative of DNA Replication
- Meselson & Stahl used ^{15}N labeling.
 - After one generation in ^{14}N , DNA was hybrid.
 - After two generations, half DNA hybrid, half light.
 - DNA replication occurs during S phase in all type of cells.
 - Replication is conservative in higher organisms.
- B and C are true only
 - A and D are true only
 - B, C, D, E are true only
 - A, B, C are true only

- Q.7.** Choose correct statement wrt Enzymes used in DNA Replication
- Helicase unwinds DNA.
 - DNA dependent DNA polymerase synthesizes new strand 5'→3'.
 - Primase synthesizes RNA primers.
 - Ligase joins Okazaki fragments.
 - DNA polymerase initiates new strand de novo.
- A, and C are true only
 - A, B, C, D are true only
 - B and D are true only
 - A, B and D are true only
- Q.8.** Choose correct statement regarding Central Dogma
- Central dogma: DNA → RNA → Protein.
 - Reverse transcription occurs in retroviruses.
 - RNA → DNA → Protein is common in all cells.
 - It was proposed by Crick
 - Central dogma exceptions prove RNA world hypothesis.
- A, and C are true only
 - A, B, C, D are true only
 - B and D are true only
 - A, B, D, E are true only
- Q.9.** Following statements are given wrt Transcription in Prokaryotes. Choose correct one
- Sigma factor helps RNA polymerase bind promoter.
 - Transcription starts at promoter and ends at terminator.
 - mRNA is polycistronic in prokaryotes.
 - Splicing is required in bacterial mRNA.
 - Rho factor use to terminate transcription.
- A, and C are true only
 - A, B, C, E are true only
 - B and D are true only
 - A, B and D are true only
- Q.10.** Select correct statement regarding Genetic Code
- Code is triplet.
 - It is degenerate.
 - It is overlapping.
 - It is nearly universal.
 - AUG codes for methionine and serves as start codon.
- A, and C are true only
 - A, B, C, D are true only
 - B and D are true only
 - A, B, D, E are true only
- Q.11.** Choose correct one wrt to Lac Operon (Inducible System)
- Lac operon is active in presence of lactose.
 - Lac I produces repressor protein.
 - In absence of lactose, repressor binds operator.
 - Allolactose inactivates repressor.
 - Lac operon is constitutively expressed.
- A, and C are true only
 - A, B, C, D are true only
 - B and D are true only
 - A, B, D, E are true only
- Q.12.** Which criteria is/are required for molecule to become genetic material. Choose from the following
- Scope of slow change
 - Chemically stable and structurally unstable
 - Express in form of Mendelian character
 - Ability to undergo transcription
 - Power of replication
- A, and B are true only
 - A, B, C, D are true only
 - C and D are true only
 - A, C and E are true only
- Q.13.** Choose correct statement wrt to Regulation of Gene Expression in prokaryote
- Predominantly occur at transcriptional level
 - Regulatory protein can act both positively and negatively
 - In most cases the sequences of operator binds with repressor protein
 - Each operon has its specific operator but not specific promoter
 - The operator region is adjacent to the promoter elements in most operators
- A, B, C, E are true only
 - A, B, C, D are true only
 - C and D are true only
 - A, C and E are true only

- Q.14.** Select correct statement wrt Human Genome Project
- Completed in 2003.
 - Chromosomes one has most genes
 - Vast majority of DNA codes proteins.
 - Identified repeats and junk DNA.
 - Data helped in bioinformatics, medicine.
- A, B, C, E are true only
 - A, B, D, E are true only
 - C and D are true only
 - A, C and E are true only
- Q.15.** True statements about DNA Fingerprinting are
- Based on repetitive DNA (VNTRs).
 - Developed by Alec Jeffreys.
 - Restriction enzymes and Southern blotting used.
 - Every individual has unique DNA profile except identical twins.
 - Uses rRNA sequences for identification.
- A, B, C, E are true only
 - A, B, C, D are true only
 - C and D are true only
 - A, C and E are true only
- Q.16.** Select correct statements regarding RNA World Hypothesis
- RNA can act as genetic material and catalyst.
 - Ribozymes are catalytic RNAs.
 - Essential life processes like metabolism, translation, splicing evolved around RNA
 - Viruses like HIV support RNA world by reverse transcription.
 - RNA cannot store genetic information.
- A, B, C, E are true only
 - A, B, C, D are true only
 - C and D are true only
 - A, C and E are true only
- Q.17.** Which of the following is/are part of mRNA processing in Eukaryotes
- Exons are joined in defined order by splicing
 - Polyadenylation at 3' end.
 - Introns removed by splicing.
 - Capping at 5' end with usual nucleotide methyl guanosine triphosphate.
 - Alternative splicing generates multiple mRNAs.
- A, B, C, E are true only
 - A, B, C, D are true only
 - C and D are true only
 - A, C and E are true only
- Q.18.** Choose the option that correctly identifies which statements are true:
- The genetic code is unambiguous: one codon never codes for more than one amino acid.
 - The genetic code is degenerate (redundant): most amino acids have more than one codon.
 - "Wobble" at the third base allows a tRNA to recognize more than one codon.
 - Wobble hypothesis was proposed to explain degeneracy at the first base of the codon.
- (A) and (B) only
 - (A), (B) and (C) only
 - (A) and (D) only
 - All four statements
- Q.19.** Which statements are correct?
- The reading frame is set by the initiation codon and determines triplet grouping.
 - Insertion or deletion of three nucleotides (in-frame indel) may insert/delete one amino acid without frameshift.
 - A silent (synonymous) mutation changes the amino acid coded.
 - Missense mutation changes one amino acid to another.
- A, B, C are true only
 - A, B, D are true only
 - C and D are true only
 - A and C are true only

Q.20. In an experiment, different mutant strains of *E. coli* were tested for lac operon expression:

Strain A: lacI (repressor gene) is deleted.

Strain B: Operator (O) sequence is deleted.

Strain C: Promoter (P) region is deleted.

Consider the following statements:

- (A) In Strain A, lac operon will be expressed constitutively, even without lactose.
- (B) In Strain B, repressor cannot bind, so the operon is also constitutively expressed.
- (C) In Strain C, lac operon will never be expressed, even if lactose is present.
- (D) In wild type *E. coli*, lac operon is expressed only when lactose is present (inducer inactivates the repressor).

Which statements are correct?

- (1) (A) and (B) only
- (2) (A), (B) and (C) only
- (3) (B), (C) and (D) only
- (4) All four statements are correct

Q.21. A scientist isolates DNA samples from two organisms:

Sample X: Contains **60% GC content**

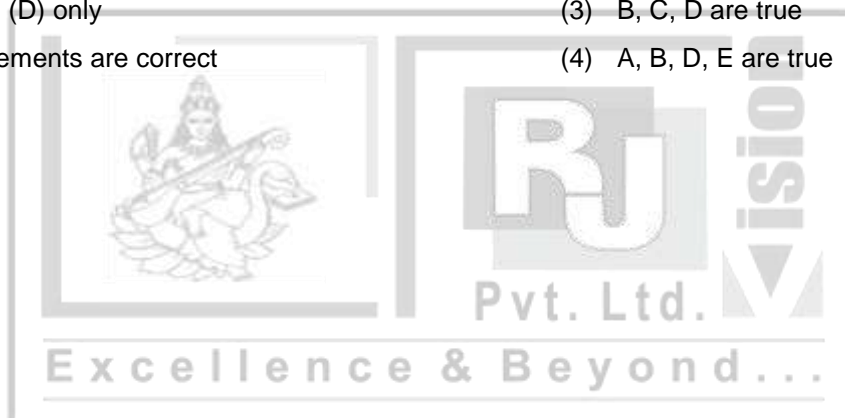
Sample Y: Contains **40% GC content**

He subjects both DNA samples to gradual heating to study DNA melting (denaturation).

Statements:

- A. DNA with higher GC content will have a higher melting temperature.
- B. In Sample X, the AT content is 40%.
- C. The stability of DNA depends on hydrogen bonding as well as base stacking interactions.
- D. Sample Y will denature at a lower temperature compared to Sample X.
- E. Hydrogen bonds in GC base pairs are fewer than those in AT base pairs.

- (1) A, B, C, D are true
- (2) A, C, D, E are true
- (3) B, C, D are true
- (4) A, B, D, E are true



ANSWERS - KEY

Q	1	2	3	4	5	6	7	8	9	10
Ans.	(4)	(2)	(1)	(2)	(3)	(4)	(2)	(4)	(2)	(4)
Q	11	12	13	14	15	16	17	18	19	20
Ans.	(2)	(4)	(1)	(2)	(2)	(2)	(1)	(2)	(2)	(4)
Q	21									
Ans.	(1)									