# BUDDHA SERIES

## (Unit Wise Solved Question & Answers)

**Course – B.Sc. Botany 3rd year (5th semester)**

**College – Buddha Degree College**

**(DDU Code-859)**

**Department**: Science

**Subject**: Molecular Biology & Bioinformatics

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# Unit 1

1□□ Who first isolated nuclein (now known as DNA) from pus cells?

- a) Watson
- b) Crick
- c) Miescher □
- d) Griffith

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2□□ Which scientist discovered the "transforming principle" in bacteria?

- a) Hershey
- b) Avery
- c) Griffith □
- d) Chargaff

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3□□ Avery, MacLeod, and McCarty demonstrated that the transforming principle is:

- a) Protein
- b) DNA □
- c) RNA
- d) Lipid

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4□□ The Hershey-Chase experiment used which organism to prove DNA is genetic material?

- a) E. coli bacterium infected by T2 phage □
- b) Streptococcus pneumoniae
- c) Drosophila
- d) Yeast

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5□□ In the Hershey-Chase experiment, phosphorus-32 labeled:

- a) Protein coat
- b) DNA □
- c) RNA
- d) Carbohydrates

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6□□ The classic double helix model of DNA was proposed by:

- a) Griffith and Avery
- b) Hershey and Chase
- c) Watson and Crick □
- d) Meselson and Stahl

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**DNA Structure & Types**

7□□ Which of the following is true about B-DNA?

- a) Left-handed helix
- b) 10 base pairs per turn □
- c) 20 Å diameter
- d) Contains uracil

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8□□ Z-DNA is characterized by:

- a) Right-handed helix
- b) Left-handed helix □

- c) Single-stranded structure
- d) Presence of thymine dimers

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9□□ A-form DNA is most common under:

- a) High humidity
- b) Dehydrated conditions □
- c) Neutral pH
- d) High salt

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The diameter of B-DNA helix is:

- a) 10 Å
- b) 20 Å □
- c) 30 Å
- d) 40 Å

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1□□1□□ Which base pairing is correct in DNA?

- a) A–C
- b) G–A
- c) A–T □
- d) G–U

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**Types of Genetic Material**

1□□2□□ RNA can act as genetic material in:

- a) All bacteria
- b) Retroviruses □
- c) All plants
- d) All fungi

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1□□3□□ Which of the following is not a type of DNA?

- a) B-DNA
- b) Z-DNA
- c) D-DNA □
- d) A-DNA

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1□□4□□ In eukaryotes, the main genetic material is found in:

- a) Cytoplasm
- b) Mitochondria only
- c) Nucleus □
- d) Ribosomes

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1□□5□□ In prokaryotes, DNA is:

- a) Linear and present in nucleus
- b) Circular and without histones □
- c) Double stranded and in membrane-bound nucleus
- d) RNA-based

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**DNA Replication: General & Prokaryotes**

1□□6□□ DNA replication is called semi-conservative because:

- a) Both strands are new

- b) One strand is old and one is new ✅
- c) It uses RNA primer only
- d) It needs no enzymes

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1️⃣7️⃣ Meselson and Stahl proved the semi-conservative nature of DNA using:

- a) 15N and 14N labeling ✅
- b) Radioactive sulfur
- c) X-ray diffraction
- d) Autoradiography

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1️⃣8️⃣ In prokaryotes, replication begins at:

- a) Multiple origins
- b) One origin ✅
- c) Telomeres
- d) Any random point

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1️⃣9️⃣ Which enzyme synthesizes RNA primers?

- a) DNA polymerase I
- b) DNA polymerase III
- c) Primase ✅
- d) Ligase

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2️⃣0️⃣ In bacteria, the shape of replicating DNA resembles:

- a) ϕ (theta) ✅
- b) 8
- c) Y
- d) Linear ladder

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**DNA Replication: Eukaryotes & Advanced Concepts**

2️⃣1️⃣ In eukaryotes, replication is:

- a) Unidirectional
- b) Bidirectional ✅
- c) Conservative
- d) Starts at one origin

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2️⃣2️⃣ The lagging strand is synthesized in:

- a) Continuous manner
- b) Discontinuous manner ✅
- c) Without RNA primer
- d) From 5' to 5'

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2️⃣3️⃣ Short DNA fragments on lagging strand are called:

- a) Franklin fragments
- b) Okazaki fragments ✅
- c) Hershey fragments
- d) Z-DNA pieces

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2️⃣4️⃣ DNA polymerase needs a:

- a) Free 3' OH group ✅
- b) Free 5' phosphate

- c) Free amino group
- d) Free methyl group

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2□□5□□ Which enzyme removes RNA primers in prokaryotes?

- a) DNA ligase
- b) DNA polymerase I □
- c) DNA polymerase III
- d) Helicase

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2□□6□□ DNA ligase function is to:

- a) Unwind DNA
- b) Join Okazaki fragments □
- c) Add RNA primers
- d) Synthesize leading strand

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2□□7□□ In eukaryotes, replication of the linear chromosome's 5' end is solved by:

- a) Enhancers
- b) Telomerase □
- c) Topoisomerase
- d) Ligase

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2□□8□□ The function of single-stranded binding proteins (SSB) is:

- a) Remove supercoils
- b) Stabilize unwound DNA □
- c) Remove primers
- d) Join fragments

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2□□9□□ DNA replication in eukaryotes involves:

- a) One DNA polymerase only
- b) Many DNA polymerases □
- c) No proofreading
- d) No helicase

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3□□0□□ Which of the following is a correct feature of DNA replication?

- a) RNA primer not required
- b) Continuous synthesis on both strands
- c) Semi-discontinuous synthesis □
- d) 3' → 5' synthesis

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**□ Answers Summary**

| No. | Answer |
|---|---|
| 1 | c |
| 2 | c |
| 3 | b |
| 4 | a |
| 5 | b |
| 6 | c |
| 7 | b |
| 8 | b |

| No. | Answer | No. | Answer |
|---|---|---|---|
| 9 | b | 20 | a |
| 10 | b | 21 | b |
| 11 | c | 22 | b |
| 12 | b | 23 | b |
| 13 | c | 24 | a |
| 14 | c | 25 | b |
| 15 | b | 26 | b |
| 16 | b | 27 | b |
| 17 | a | 28 | b |
| 18 | b | 29 | b |
| 19 | c | 30 | c |

# Unit 2

1□□ Which of the following serves as a template during transcription?

- a) Coding strand
- b) Non-coding strand □
- c) Both strands
- d) mRNA

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2□□ In prokaryotes, transcription occurs in:

- a) Nucleus
- b) Cytoplasm □
- c) Mitochondria
- d) Ribosomes

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3□□ RNA polymerase in prokaryotes consists of how many subunits in the core enzyme?

- a) Two
- b) Three
- c) Four □
- d) Five

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4□□ The sigma (σ) factor in prokaryotic RNA polymerase is important for:

- a) Chain elongation
- b) Termination
- c) Promoter recognition □
- d) Proofreading

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5□□ In eukaryotes, RNA polymerase II transcribes:

- a) rRNA
- b) tRNA
- c) mRNA □
- d) 5S rRNA

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6□□ Which RNA has a cloverleaf structure?

- a) mRNA
- b) tRNA □
- c) rRNA
- d) snRNA

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7□□ The 5' cap of mRNA in eukaryotes is:

- a) Poly-A tail
- b) Methyl guanosine triphosphate □
- c) Acetyl group
- d) Thymidine

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8□□ Which of the following RNAs has an anticodon loop?

- a) mRNA
- b) tRNA □
- c) rRNA

- d) snRNA

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9□□ Ribosomal RNA (rRNA) is mainly involved in:

- a) Coding information
- b) Catalytic role in ribosome □
- c) Carrying amino acids
- d) Splicing

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Prokaryotic mRNA is usually:

- a) Monocistronic
- b) Polycistronic □
- c) Always capped
- d) Always spliced

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1□□1□□ The start codon for translation in most organisms is:

- a) UGA
- b) UAA
- c) AUG □
- d) UAG

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1□□2□□ A set of three nucleotides on mRNA is called:

- a) Anticodon
- b) Codon □
- c) Exon
- d) Intron

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1□□3□□ Which of the following is true about the genetic code?

- a) Overlapping
- b) Ambiguous
- c) Universal □
- d) Non-degenerate

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1□□4□□ In prokaryotes, the first amino acid incorporated is:

- a) Methionine
- b) Formylmethionine □
- c) Glycine
- d) Alanine

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1□□5□□ Peptidyl transferase activity is present in:

- a) tRNA
- b) mRNA
- c) rRNA □
- d) DNA

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1□□6□□ In eukaryotes, translation starts in the:

- a) Nucleus
- b) Cytoplasm □
- c) Mitochondria only
- d) Golgi apparatus

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1□□7□□ The sequence upstream of the start codon in prokaryotes that helps ribosome binding is:

- a) Kozak sequence
- b) Shine-Dalgarno sequence □
- c) Pribnow box
- d) TATA box

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1□□8□□ Number of possible codons in the genetic code:

- a) 16
- b) 32
- c) 64 □
- d) 128

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1□□9□□ Which of the following is a stop codon?

- a) AUG
- b) UUU
- c) UAG □
- d) GUG

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2□□0□□ The process of removal of introns from mRNA is called:

- a) Capping
- b) Polyadenylation
- c) Splicing □
- d) Editing

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2□□1□□ The regulatory gene in lac operon is:

- a) lacZ
- b) lacY
- c) lacA
- d) lacI □

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2□□2□□ In absence of lactose, lac operon is:

- a) On
- b) Off □
- c) Continuously active
- d) Overexpressed

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2□□3□□ The inducer molecule in lac operon is:

- a) Allolactose □
- b) Glucose
- c) Fructose
- d) Lactose directly

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2□□4□□ The operator region of lac operon is the binding site for:

- a) RNA polymerase
- b) Repressor □
- c) Activator
- d) Inducer

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2□□5□□ CAP-cAMP complex helps lac operon activation when:

- a) Glucose is high
- b) Glucose is low □
- c) Lactose is absent
- d) Lactose is high and glucose is high

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2□□6□□ Eukaryotic gene regulation mainly involves:

- a) Operons
- b) Chromatin remodeling □
- c) Sigma factors
- d) Polycistronic mRNA

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2□□7□□ DNA methylation generally causes:

- a) Activation of gene expression
- b) Repression of gene expression □
- c) Increased mRNA stability
- d) Enhanced translation

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2□□8□□ Histone acetylation leads to:

- a) Gene silencing
- b) Gene activation □
- c) DNA methylation
- d) RNA interference

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2□□9□□ Enhancers in eukaryotes are:

- a) Promoter regions
- b) Silencer elements
- c) Distal regulatory elements that increase transcription □
- d) Non-coding introns

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3□□0□□ Alternative splicing in eukaryotes leads to:

- a) One protein from one gene only
- b) Multiple proteins from the same gene □
- c) Stop of transcription
- d) Increased mRNA degradation

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**□ Answers Summary**

1 b 2 b 3 c 4 c

5 c 6 b 7 b 8 b

9 b 10 b 11 c 12 b

13 c 14 b 15 c 16 b

17 b 18 c 19 c 20 c

21 d 22 b 23 a 24 b

25 b 26 b 27 b 28 b

29 c 30 b