

# QB365 Question Bank Software Study Materials

## Zoology - Molecular Genetics Important 2 Marks Questions With Answers (Book Back and Creative)

12th Standard

Biology

Total Marks : 40

### 2 Marks

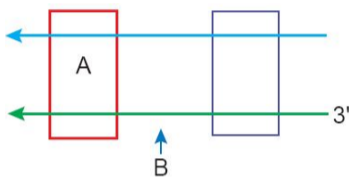
20 x 2 = 40

- 1) Give reasons: 'Genetic code is universal'.

**Answer :** 1. The genetic code is universal. It means that all known living systems use nucleic acids and the same three base codons (triplet codon) direct the synthesis of protein from amino acids. E.g, mRNA ,(UUU) codon codes for phenylalanine in all cells of all organisms.

2. Some exceptions are reported in prokaryotic, mitochondrial and chloroplast genomes. However similarities are more common than differences.

- 2) Name the parts marked 'A' and 'B' in the given transcription unit:



**Answer :** A - 5' → 3' is called a coding strand.

B - 3' → 5' is called a template strand.

- 3) Differentiate - Template strand and coding strand.

**Answer :**

TEMPLATE STRAND	CODING STRAND
It is that strand of transcription unit upon which RNA is transcribed in 5' → 3' direction.	It is that strand of transcription unit having the same base sequence as that of the transcription mRNA (transcript) from the template strain.
It has 3' → 5' polarity	It has 5' → 3' polarity

- 4) Mention any two ways in which single nucleotide polymorphism (SNPs) identified in human genome can bring revolutionary change in biological and medical science.

**Answer :** There are 1.4 million locations where single base DNA differences (Called SNPs - Single Nucleotide Polymorphism - pronounce as snips) occurs in human's genome.

(i) By tracing human history

(ii) By finding chromosomal locations for disease associated sequences

- 5) From their examination of the structure of DNA, What did Watson and Crick infer about the probable mechanism of DNA replication, coding capability and mutation?

**Answer :** They inferred each strand of the double strands helps was used as a template for the formation of a new, daughter strand having a complementary sequence of bases.

- 6) Why tRNA is called an adapter molecule?

**Answer :** tRNA on one hand binds to specific amino acids and on the other hand reads the codon of the amino acid bound to it through its anticodon, it is called as adapter molecule.

- 7) Name the anticodon required to recognize the following codons: AAU, CGA, UAU, and GCA.

**Answer :** (i) AAU - UUA

(ii) CGA - GCU

(iii) UAU - AUA

(iv) GCA - CGU

- 8) If the coding sequence in a transcription unit is written as follows:  
5' TGCATGCATGCATGCATGCATGC 3' Write down the sequence of mRNA?

**Answer :** 5, - UACGUACGUACGU, ACGUACGUACGUACG UACG - 3'

- 9) Name the chemical substance which is called by the name  
(a) Kornberg Enzyme  
(b) Ochoa's enzyme

**Answer :** DNA polymerase I is also known as Kornberg enzyme.  
Polynucleotide phosphorylase is also known as Ochoa's enzyme

- 10) What is the function of Deoxy nucleotide triphosphate in replication?

**Answer :** Deoxynucleotide triphosphate acts as a substrate and also provides energy for polymerization reaction.

- 11) Expand (a) ETS and (b) YAC.

**Answer :** ETS: Expressed Sequence Tags  
YAC: Yeast Artificial Chromosomes

- 12) Mention any four areas where DNA fingerprinting can be used.

**Answer :** (a) Forensic analysis  
(b) Pedigree analysis  
(c) Conservation of wildlife  
(d) Anthropological studies

- 13) 5'→3' direction of a nucleic acid. Write the meaning of 5' and 3' in the above statement.

**Answer :** (i) The polynucleotide chain has at the 5<sup>th</sup> position of the pentose sugar, a free phosphate moiety; this end is called 5' end.  
(ii) The 3<sup>rd</sup> position of the pentose sugar has a OH- group attached, this is called the 3' end.

- 14) Why is it that transcription and translation can be coupled in prokaryotic cells but not in eukaryotic cells?

**Answer :** (i) In prokaryotic, the mRNA does not require any processing to become active.  
(ii) Transcription and translation occur in the same compartment -cytosol as there is no well-defined nucleus.  
(iii) So, coupling of transcription and translation is possible.  
(iv) The mRNA has to be processed before becoming active.  
(v) Since, nucleus and cytoplasm are well separated, in eukaryotes the RNA has to be transported to the cytoplasm for translation.  
(vi) So, coupling of transcription and translation is not possible.

- 15) (a) Name of the scientist, who suggested the genetic code should be made of the combination of three nucleotides.  
(b) Explain the basis on which he arrived at this conclusion.

**Answer :** (a) George Gamor  
(b) There are only four bases and they have to code for 20 amino acids.  
(i) If the code will have combination of three nucleotides, a permutation combination of 4<sup>3</sup> (4 x 4 x 4), would generate 64 codons. i.e. many more codons than the required number for the 20 amino acids.

- 16) Why does peptide bond formation occurs in a bacterial ribosome and how?

**Answer :** (i) The ribosome exists as two subunits, a large subunit and small subunit.  
(ii) The large subunit has two sites. Where two amino acids coded by the two consecutive codons of mRNA bind to.  
(iii) Since, these two amino acids closer enough, peptide bond formation occurs between them.  
(iv) ATP helps in the activation of amino acids, during the charging of tRNA; since the amino acids are charged, peptide bond formation is favoured energetically.

- 17) What is a genophore?

**Answer :** In prokaryotes such as E. coli though they do not have defined nucleus, the DNA is not scattered throughout the cell. DNA (being negatively charged) is held with some proteins (that have positive charges) in a region called the nucleoid. The DNA as a nucleoid is organized into large loops held by protein. DNA of prokaryotes is almost circular and lacks chromatin organization, hence termed genophore.

18) Differentiate between Heterochromatin and Euchromatin.

**Answer :**

Heterochromatin	Euchromatin
Region of nucleus where the chromatin are loosely packed and stains light are called Heterochromatin.	Region of nucleus where the chromatin are tightly packed and stains dark are called Euchromatin.
Transcriptionally inactive	Transcriptionally active.

19) What is S - D sequence?

**Answer :** The 5' end of the mRNA of prokaryotes has a special sequence which precedes the initial AUG start codon of mRNA. This ribosome binding site is called the Shine Dalgarno sequence or S-D sequence. This sequence base-pairs with a region of the 16S rRNA of the small ribosomal subunit facilitating initiation.

20) What is Goldberg-Hogness box and Pribnow box.

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