

Topic :- MOLECULAR BASIS OF INHERITANCE

- (B)

UGU	→	Cistine
UAC	→	Tyrosine
UCG	→	Serine
UUU	→	Phenylalanine
UAG, UGA, UAA	→	Stop codons
UAG	→	Start codon
- (A) During the process of translation an initial complex is formed between mRNA, 30S ribosomal sub-unit and methionyl tRNA. This complex is formed due to the association of IF₁, IF₂, IF₃ initiation factors and GTP molecule.
- (B) It has been seen variously that one tRNA molecule codes for more than one amino acid molecules. This is possible due to the improper pairing of third codon with the first anticodon of tRNA.
- (C) UAA is the 'stop' codon hence, polypeptide chain will not grow after 24th amino acid. In the absence of new initiating codon rest of codons will not be able to translate.
- (A) Out of 64 codons three (UAA, UAG, UGA) are chain terminating codons the translating mechanism is not able to read these codons and 61 codons are used to code all the 20 essential amino acids.
- (C) Bacterial chromosomes are circular DNA molecules.
- (C) Promoter is the nucleotide sequence to which RNA polymerase binds and initiates transcription. Formation of a single stranded linear chain of complementary RNA (mRNA) on the template strand of DNA in nucleus (eukaryotes) or in cytoplasm (prokaryotes) is known as transcription.
- (C) Lac operon refers to the DNA sequence in the genome of the bacterium E. coli encoding enzymes involved in lactose uptake and metabolism.
- (A) DNA fingerprinting refers to molecular analysis of DNA samples. Alec Jeffreys (1985-86) discovered this technique for the first time.
- (C) If DNA has ATACG nucleotide sequence then the mRNA would contain UAUGC sequence. The formation of mRNA from DNA is termed as transcription. This process takes place in the nucleus (eukaryotes) or in the cytoplasm (prokaryotes).
The base sequence of mRNA is complementary copy of the template DNA strand.

11. (C) The base ratio $A + T / G + C$ may vary from one species to another, but is constant for a given species. It is rarely equal to one and varies between 0.4 and 1.9.
12. (D) Telomeres have been shown to have unique structures that include short nucleotide sequences present as tandemly repeated units. In eukaryotes the telomeres terminate with a single-stranded DNA (12-16 nucleotides long) rich in guanine.
13. (A) Normally, genetic information flows from DNA \longrightarrow mRNA \longrightarrow protein. Hence, any change in nucleotides due to the mutation, would result in change in the structure of protein/enzyme which might result in some change in the organism.
14. (A) The events for initiation of DNA replication in prokaryotes may be classified into (a) pre-priming (occurring only at the origin) ; (b) priming (recurring with the initiation of each Okazaki fragment during elongation phase. Unwinding of DNA is followed by the synthesis of RNA primers by RNA primase.
15. (D) Ends of an eukaryotic chromosome are known as telomeres.
Telomerase, which is a special ribonucleoprotein molecule (enzymatic in nature) is responsible for the synthesis of these telomeres.
16. (D) TATA box is present in eukaryotic promoter region. It has a resemblance with Pribnow box of prokaryotes. TATA box was identified by Dr. Hogness and so, it is also called as Hogness box. It is a 7 bp long region located 20 bp upstream to the start point.
During the process of transcription the RNA polymerase (a holoenzyme which has a core unit and a sigma factor for proper initiation of transcription) binds to TATA box due to which DNA assumes a saddle like structure at this place.
17. (C) Endonuclease hydrolyses internal phosphodiester bonds in a polynucleotide chain.
18. (A) In 1970 H Temin and D Baltimore independently discovered the enzyme reverse transcriptase. This enzyme uses RNA as template for the synthesis of cDNA (complementary DNA).
19. (B) In the process of protein synthesis, the messenger RNA (mRNA) is responsible for carrying the genetic code transcribed from DNA to specialised sites within the cell (called ribosomes) where the information is translated into protein. The sequence of amino acids in a particular protein is determined by the sequence of nucleotides in mRNA. Sequence of tRNA, cDNA or rRNA do not decide the amino acid sequence in protein synthesis.
20. (D) 'One gene-one enzyme' hypothesis was given by Beadle and Tatum (1948) which states that particular gene controls the synthesis of specific enzyme. Later, it was modified to 'one-gene-one-enzyme'. Later, it was modified to 'one gene-one polypeptide hypothesis' by Yanofsky, et. al, (1965)

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	B	A	B	C	A	C	C	C	A	C
Q.	11	12	13	14	15	16	17	18	19	20
A.	C	D	A	A	D	D	C	A	B	D

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