Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **B.Tech.**
PBT4I101

4th Semester Regular / Back Examination 2017-18
MOLECULAR BIOLOGY
BRANCH : BIOTECH
Time : 3 Hours
Max Marks : 100
Q.CODE : C1003

Answer Part-A which is compulsory and any four from Part-B.
The figures in the right hand margin indicate marks.
Answer all parts of a question at a place.

Part – A (Answer all the questions)

Q1 **Answer the following questions: *multiple type or dash fill up type:*** **(2 x 10)**

a) Replication in prokaryotes differs from replication in eukaryotes for which of the following reasons?
(i) The rate of elongation during DNA replication is slower in prokaryotes than in eukaryotes.
(ii) Prokaryotic chromosomes have a two origins of replication, whereas eukaryotic chromosomes have 100s.
(iii) Prokaryotes produce Okazaki fragments during DNA replication, but eukaryotes do not.
(iv) Prokaryotic chromosomes have histones, whereas eukaryotic chromosomes do not.

b) What is meant by the description "antiparallel" regarding the strands that make up DNA?
(i) The twisting nature of DNA creates nonparallel strands.
(ii) Base pairings create unequal spacing between the two DNA strands.
(iii) One strand contains only purines and the other contains only pyrimidines.
(iv) The 5' to 3' direction of one strand runs counter to the 3’ to 5’ direction of the other strand.

c) The leading and the lagging strands differ in that _____.
(i) the lagging strand is synthesized continuously, whereas the leading strand is synthesized in short fragments that are ultimately stitched together
(ii) the leading strand is synthesized in the same direction as the movement of the replication fork, and the lagging strand is synthesized in the opposite direction
(iii) the leading strand is synthesized at twice the rate of the lagging strand
(iv) the leading strand is synthesized by adding nucleotides to the 3’ end of the growing strand, and the lagging strand is synthesized by adding nucleotides to the 5’ end

d) A new DNA strand elongates only in the 5’ to 3’ direction because ___.
(i) replication must progress toward the replication fork
(ii) DNA polymerase begins adding nucleotides at the 5’ end of the template
(iii) can add nucleotides only to the free 3’ end
(iv) the polarity of the DNA molecule prevents addition of nucleotides at the 3’ end

e) A particular triplet of bases in the template strand of DNA is 5' AGT 3'. The corresponding codon for the mRNA transcribed is _____.
(i) 3’ UGA 5’ (ii) 5’ TCA 3’
(iii) 3’ ACU 5’ (iv) 3’ UCA 5’

f) In the process of transcription, _____.
(i) proteins are synthesized (ii) mRNA attaches to ribosomes
(iii) RNA is synthesized (iv) DNA is replicated

g) Codons are part of the molecular structure of _____.
(i) mRNA (ii) tRNA
(iii) rRNA (iv) a protein

h) A particular triplet of bases in the coding sequence of DNA is AAA. The anticodon on the tRNA that binds the mRNA codon is _____.
(i) UUA (ii) AAA
(iii) UUU (iv) TTT

i) How does termination of translation take place?
(i) The 5' cap is reached.
(ii) end of the mRNA molecule is reached.
(iii) A stop codon is reached.
(iv) The poly-A tail is reached.

j) A single base substitution mutation is least likely to be deleterious when the base change results in_____.
(i) an amino acid substitution that alters the tertiary structure of the protein
(ii) stop codon
(iii) n amino acid substitution at the active site of an enzyme
(iv) codon that specifies the same amino acid as the original codon

Q2 **Answer the following questions: *Short answer type:*** **(2 x 10)**

a) What is Central Dogma?
b) What is Lampbrush chromosome?
c) How Okazaki segments are formed?
d) What is Selfish DNA?
e) Write the different enzymes involved in post translational modification of protein.
f) What are the different proteins involved in Trp-operon?
g) What is Gene silencing?
h) What is mutagenesis?
i) Differentiate between eukaryotic and prokaryotic transcription process.
j) What do you understand by overlapping genes?

Part – B (Answer any four questions)

Q3 **a)** Discuss the various experiments suggesting that 'DNA as the genetic material'. **(10)**
b) Explain split genes and its significance. **(5)**

Q4 **a)** Discuss the Genome complexity. Write the significance of C- value Paradox. **(10)**
b) Write a note on Cot curve analysis. **(5)**

Q5 **a)** Explain the Gene structure in prokaryotes and Eukaryotes with suitable schematic diagram. **(10)**
b) Discuss briefly the Translation process. **(5)**

Q6 **a)** Briefly, discuss the different Models of DNA replication. **(10)**
b) Write the different enzymes involved in DNA replication and their role. **(5)**

Q7 **a)** Discuss in detail the process of DNA replication. **(10)**
b) Write a note on DNA repair. **(5)**

Q8 **a)** Discuss in details the process of Transcription in eukaryotes. **(10)**
b) Discuss the mRNA editing. **(5)**

Q9 **a)** Discuss the Lac-operon model. **(10)**
b) Briefly discuss the DNA methylation. **(5)**