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SARDAR PATEL UNIVERSITY
M.Sc. (II SEMESTER) EXAMINATIONS
9th April, 2018 (Monday)
2.00 P.M to 5.00 P.M
Paper: PS02CBIC21 – Molecular Biology

TOTAL MARKS: 70

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1. Choose the most appropriate answer: (8)

a) Which one of the following repeat sequence motif at Ori C forms ssDNA during initiation of replication in prokaryotes
   a) 9-mer motif repeated 5 times
   b) 13-mer motif repeated 3 times
   c) Both 9-mer and 13-mer motifs repeated at least 3 times
   d) none of the above

b) Which of the following proteins binds to GATC sequence in Ori C and prevents binding of Dna A with Ori C
   a) Dna b b) Dna C c) Seq A d) topoisomerase II

c) Generally acetylated histones are conducive to a
   a) decreased chromatin condensation c) increased chromatin pacakaging
   b) inhibit gene expression d) none of the above

d) How many replication forks form after the dsDNA is opened at the origin,
   a) one b) two c) three d) depends on DNA sequence

e) The *E.coli* RNA polymerase holoenzyme differs from the core enzyme in having
   a) Sigma factor b) β subunit c) α subunit d) δ subunit

f) The – 35 promoters of bacteria control
   a) Formation of closed complex c) formation of open complex
   b) Conversion of closed to open complex d) none of these

g) In *trp* operon the attenuation of tryptophan biosynthesis is achieved by the presence of
   a) Leader sequence c) structural genes
   b) Propmoter sequence d) all of these

h) During mismatch repair, the DNA strand to be repaired is identified by the
   a) DNA sequence c) presence of methyl group
   b) Absence of methyl group d) presence of acetyl group

(P.T.O.)

2. Answer <u>any seven</u> in brief: (14)

a) Explain – the variation in size of eukaryotic genomes is not related to complexity of the species.
b) If *E. coli* has 4.6 Mb of genome with 44,000 genes, what is its gene density?
c) Distinguish between *E.coli* initiator protein, Dna A and eukaryotic initiator protein complex ORC.
d) Although high telomerase activity can effectively immortalize cells, why activating telomerase is not considered a wise method to seek immortality?
e) Why Pre RCs form only during G1 phase of the cell cycle and not at any other time?
f) Role of Sigma factor in initiation of transcription.
g) Secondary and tertiary structure of tRNA.
h) Degeneracy in genetic code.
i) Significance of formylation of Methionine in initiation of protein synthesis.

Q.3 (a) Explain packaging and organization of DNA into nucleosomes. What is the role of histone amino-terminal tails in nucleosome structure? (6)

(b) Discuss the general properties of linker as well as core histones. (6)

OR

(b) Explain alteration of the chromatin function due to enzymatic modification of histone tails. (6)

Q.4 (a) Explain initiation of replication of DNA in prokaryotes. (6)
(b) What is the role of following proteins in eukaryotic DNA replication? (6)
i) ORC ii) MCM complex iii) Cdc 6
iv) DNA Pol ε v) Topoisomerase I and II

OR

(b) What are the steps in the formation of the pre-replicative complex? How Pre-RCs are activated? (6)

Q.5 (a) What are the major differences between prokaryotic and eukaryotic transcription? Explain how regulatory proteins bind to DNA specifically? (6)
(b) Write short notes on: (6)
(i) Role of TBP in eukaryotic transcription (ii) mRNA editing

OR

(b) Describe amino acylation of tRNA in detail. Explain how the correct amino acid is acylated to its cognate tRNA? (6)

Q.6 (a) Explain "trp"operon in detail. How does this differ from "lac"operon? (6)
(b) Write notes on: (6)
(i) Catabolite repression ii) Control of galactose metabolism in yeast

OR

(b) Outline the role of various genes in Drosophila development. (6)