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SARDAR PATEL UNIVERSITY  
M. Sc. Microbiology/Biotechnology I<sup>st</sup> Semester Examination  
PS01CMIC01/PS01CBIT01: Molecular Biology  
Friday, 01/04/2016

Time: 10:30 am to 1:30 pm

Max Marks: 70

Note: Figures on the right indicate marks

Q.1 Choose the most appropriate answer

(08)

- i The propeller twist in B-form of DNA is approximately  
a) 30°      b) -30°      c) 36°      d) -36°
- ii The processivity of DNA replicase increases upon its association with  
a) ds DNA    b) sliding clamps    c) primase    d) all of the above
- iii Which of the following enzymes can alter the linking number of covalently closed circular form of DNA?  
a) primase    b) DNA polymerase    c) gyrase    d) ligase
- iv Which of the following is gyrase inhibitor?  
a) mitomycin    b) 5-fluorodeoxyuridine    c) trimethoprim    d) novobiocin
- v Which of the following genes in the *lac*-operon codes for the repressor protein?  
a) *lac Z*      b) *lac Y*      c) *lac I*      d) *lac A*
- vi Alternate splicing means that  
a) the same gene can code for several different proteins  
b) several different genes can code for the same protein  
c) gene expression can be regulated at the level of transcription  
d) pieces of DNA can move around within genome
- vii The protein binding site on DNA can be identified by the following experiment.  
a) DNA footprinting      b) mobility shift assay  
c) Western blotting      d) All of the above
- viii Promoter elements in prokaryotes usually possess consensus sequences at  
a) -10 and -25    b) -25 and -60    c) -25 and -75    d) -10 and -35

Q.2 Attempt **any seven** of the following:

(14)

- a) Explain: Hoogsteen base pairing
- b) Define: Helical Pitch
- c) Write in brief on: leucine zipper motif
- d) Write in brief on any one inhibitor of DNA replication which acts by blocking precursor synthesis.
- e) Write in brief on DNA polymerase-I of *E. coli*
- f) Explain the term global regulatory response
- g) Explain the term spliceosome
- h) Explain cis-acting and trans-acting elements
- i) Explain the term stable ternary complex

- Q.3 a. Give a comparative account of helix parameters of A, B and Z forms of DNA. (06)  
 b. Write a note on: DNA supercoiling (06)  
 OR  
 b. Write a note on: Cot curves (06)
- Q.4 a. Write a note on: End replication problem of linear DNA molecules (06)  
 b. Describe the molecular mechanism of DNA polymerase catalyzed synthesis of DNA. (06)  
 OR  
 b. Write a note on: Structure of eukaryotic nucleosome (06)
- Q.5 a. Explain the statement: 'Gene transcription is more evolved in eukaryotes' (06)  
 b. Write a note on: Heat shock regulon (06)  
 OR  
 b. Explain *lac*-operon in detail (06)
- Q.6 a. Give general features of genetic code and point out exceptions wherever they exist. Describe the experiment used to decipher the genetic code. (06)  
 b. Give a brief account of various steps involved in translation of mRNA into polypeptide in prokaryotes. (06)  
 OR  
 b. Explain the mechanism of endoplasmic reticulum mediated transport of newly synthesized proteins. (06)

-X-X-X-X-X-