KATHMANDU UNIVERSITY
End Semester Examination [C]
June, 2018

Marks scored:

Level : B.Tech.
Year : III

Course : BIOT 302
Semester: I

Exam Roll No.:

Time: 30 mins.

F.M. : 20

Registration No.:

Date JUN 10 2018

SECTION "A"

[20Q.×1=20 marks]

I. Tick [√] the correct answer

1. In the X-ray diffraction pattern of DNA, the heavy black regions at the top and bottom belong to:
   a. Hydrogen bonds
   b. Stacking of base
   c. Helical form of DNA
   d. Positively charged phosphates

2. Which of the following is the strongest bond?
   a. Hydrogen bond
   b. Ionic bond
   c. Covalent bond
   d. Hydrophobic interaction

3. In Ramachandran plot, what are the values of Φ and Ψ angles respectively where glycine is permitted?
   a. 0 to π and 0 to π
   b. 0 to -π and 0 to -π
   c. 0 to -π and 0 to π
   d. 0 to π and 0 to -π

4. In sequencing reaction what is the ratio of dNTP to ddNTP ?
   a. 100:1 b. 10:1 c. 1:10 d. 1:100

5. To figure out the interactome which of the following processes is not used ?
   a. Ion exchange column
   b. Digestion with trypsin
   c. Size exchange column
   d. Reverse phase column

6. How large is the genome of *Sacchromyces cerevisiae*?
   a. 4.5 Mb b. 6.7 Mb c. 12.1 Mb d. 97 Mb

7. H2A and H2B in solution form a
   a. Heterodimer
   b. Heterotetramer
   c. Heterooctamer
   d. Do not associate

8. In the Z type DNA, glycosyl bond conformation is
   a. All anti
   b. Anti at C, syn at G
   c. All syn
   d. Anti at G, syn at C

9. Which enzyme removes ribonucleotides added to the genome?
   a. RNAase A
   b. RNAase H
   c. Exonuclease of polymerase
   d. Reverse primase

10. Pol δ (delta) is used in
    a. Translesion synthesis
    b. Lagging strand synthesis
    c. Leading strand synthesis
    d. Somatic hypermutation

11. During SOS response, the transcriptional repressor that gets degraded is:
    a. RecA b. LexA c. DinB d. UmuD

12. What type of DNA damage creates oxoG?
    a. Alkylation b. UV radiation c. Oxidation d. X-ray

13. MRX complex is composed of
    a. Mre11, Rad50 and Xrs2
    b. Mre50, Rad11 and Xrs2
    c. Mre11 and Xrs2
    d. Mre2, Rad11, Xrs50

14. What happens around Chi site
    a. Recombination frequency in 1 direction increases by 10 fold
    b. Recombination frequency in 1 direction increases by 5 fold
    c. Recombination frequency in both directions increases by 10 fold
    d. Recombination frequency in both directions increases by 5 fold

15. In retrotransposons what does LTR stand for?
    a. Long Terminal Reverse
    b. Lengthy Terminal Repeat
    c. Lengthy Terminal Reverse Transcriptase
    d. Long Terminal Repeat

16. What does guanyltransferase intrinsically add to mRNA
    a. GDP b. ADP c. GMP d. AMP

17. Polypyrimidine tract lies:
    a. 5' direction of the 5'splice site
    b. between 5'splice site and the branch site
    c. between branch site and 3'splice site
    d. 3' direction of the 3' splice site

18. Which of the following is NOT a start codon in prokaryotes ?
    a. AUG b. CUG c. GUG d. UUG

19. Which of the following is NOT one of the mechanism used by ribosome to select against incorrect aminoacyl-tRNA ?
    a. Involvement of two adjacent adenine residues in the 16S rRNA
    b. Involvement of GTPase activity of EF-Tu
    c. Proofreading that occurs after EF-Tu release during accommodation
    d. Alteration of the ribozyme activity of ribosome

20. Overall molecular mass of ribosome is:
    a. >1.5MDa b. >2.5MDa c. >3.5MDa d. >4.5MDa

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F.M. : 55

SECTION "B"
[5Q.×3=15 marks]

Indicate by checking (√) of each question you have answered in the cover page of main answer book.

I. Answer any *FIVE* of the following questions:

1. Scientists studying life on Mars discovered archaea like organisms that they brought back to earth. In a laboratory they conducted mica experiment on the DNA from the organism. They ran a gel and found bands corresponding to 9, 10, 18, 19 and 20 bps. Band strength at 19 bps was especially strong. What is the periodicity of DNA discovered? Why? [3]

2. What is mutate and map strategy used for? In the graph plotted what is the x-axis and y-axes? How are boxes marked? [3]

3. What is the difference between nuclease protection footprinting and chemical protection footprinting? [3]

4. Describe the solenoid model in the formation of 30 nm nucleosome fiber. [3]

5. Describe the function of SSB protein. [3]

6. What is direct reversal of DNA damage? Give two examples. [3]

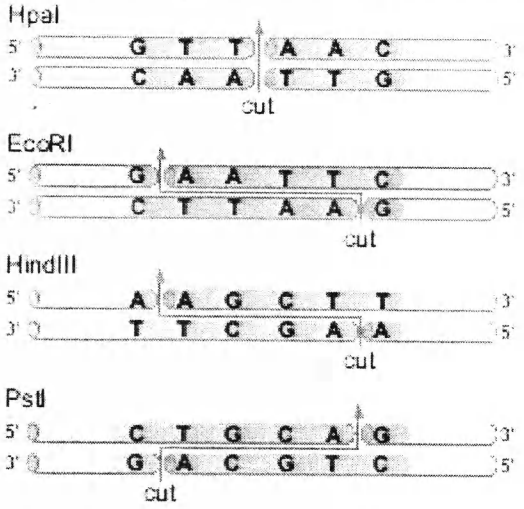
7. What is the role of TRCF in transcription coupled repair? [3]

SECTION "C"
[5Q.×5=25 marks]

II. Answer any *FIVE* of the following questions

8. How does Meselson and Stahl experiment prove that DNA replication occurs semiconservatively and not dispersively? [5]

9. While considering restriction enzymes, what are blunt ends and sticky ends? What are 5' and 3' overhangs? Which categories do HpaI, EcoRI, HindIII and PstI fall into? [5]



10. What kind of problem does paired-end strategy solve? Describe how it was used in *Haemophilus influenzae*? [5]

11. Describe how telomeres are replicated by telomerase. [5]

12. How does RuvC function? [5]

13. Describe a variant of the normal splicing reaction? [5]

14. How is wobble produced in the anticodon? [5]

SECTION "D"

[2Q.×7.5=15 marks]

III. Answer any *TWO* of the following questions:

15. Describe the organization and content of human genome.

16. How is the catalytic core of transposases and integrases conserved? Describe Poly-A retrotransposition and reverse splicing mechanism of poly-A retrotransposon.

17. Describe the secondary and tertiary structure of tRNA.