KATHMANDU UNIVERSITY
End Semester Examination [C]
January, 2019

Marks scored:

Level : B. Tech.
Year : II

Course : BIOT 206
Semester: II

Exam Roll No.:

Time: 30 mins.

F.M. : 20

Registration No.:

Date : JAN 0 4 2019

SECTION "A"
[20 Q. × 1 = 20 marks]

I. Tick [√] the correct answer

1. What percentage of the total cellular RNA is ribosomal RNA:
   a. 5% b. 10% c. 50% d. 85%

2. What is the frequency of mutations in an organism?
   a. Large and infinite
   b. Small but infinite
   c. large but finite
   d. small but finite

3. How much energy does van der Waal's bond have?
   a. 0.6 kcal/mol
   b. 1 to 2 kcal/mol
   c. 3 to 7 kcal/mol
   d. 15 kcal/mol

4. Which is NOT one of the methods to predict the structure of RNA?
   a. Nuclear magnetic resonance spectroscopy
   b. X ray crystallography
   c. SELEX
   d. Mutate and map strategy

5. Pulsed field electrophoresis is used to separate
   a. Entire bacterial chromosome
   b. 10 kb DNA
   c. 1 kb DNA
   d. less than 1 kb DNA

6. What is 454 life science technology carry out?
   a. Sanger sequencing
   b. Next generation sequencing
   c. Single molecule sequencing
   d. RNA sequencing

7. To identify protein with phosphorylation resins are used that include immobilized
   a. Fe3+ b. Fe2+ c. Mg2+ d. Zn2+

8. The average number of introns per gene in humans is
   a. 0 b. 0.04 c. 6 d. 16

9. 20 percent of histone is composed of:
   a. lysine and histidine
   b. lysine and arginine
   c. histidine and arginine
   d. arginine and aspartate

10. Heterochromatin is characterized by:
    a. Poor staining with dyes, relatively open structure and high level of gene expression
    b. Dense staining with dyes, relatively open structure and high level of gene expression
    c. Poor staining with dyes, relative closed structure and low level of gene expression
    d. Dense staining with dyes, relatively closed structure and low level of gene expression

11. DOT1 is a type of
    a. HAT b. HDAC c. HMT d. HDM

12. Two geometric components of linking number are
    a. interwound and plectonemic
    b. twist and writhe
    c. toroidal or spiral
    d. spiral and interwound

13. Which of the following domains of polymerase binds to the incoming dNTP?
    a. thumb b. ring c. finger d. wrist

14. The driving force for polymerization of dNMPs in the polymerization of DNA is provided by
    a. Highly negative delta G value of the polymerization reaction
    b. Exonuclease activity
    c. Endonuclease activity
    d. Highly negative delta G value of pyrophosphate hydrolysis

15. Polκ is involved in
    a. Primer synthesis during DNA replication
    b. Base excision repair
    c. Mitochondrial DNA replication and repair
    d. Translesion synthesis

16. Combination of all the proteins associated with replication is most accurately called
    a. Trombone complex
    b. Replication complex
    c. Replisome complex
    d. Holoenzyme complex

17. Eukaryotic DNA replication is challenging because
    a. There are few origins of replication
    b. It works by activating few origins of replication at a time
    c. If there are too many replicators activated, regions of chromosomes will escape replication
    d. Replicators must be inactivated until next replication

18. Deamination of adenine gives
    a. hypoxanthine b. cytosine c. uracil d. inosine

19. What is the function of the enzyme DNA glycosylase?
    a. It hydrolyzes phosphodiester bond
    b. It hydrolyzes glycosidic bond
    c. It carries out glycosylation reaction
    d. It hydrolyzes phosphoester bond

20. What is the proteolytically autocleaved protein during SOS response
    a. RecA b. LexA c. DinB d. DinA

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Time : 2 hrs. 30 mins.

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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.

II. Answer ***ANY*** **FIVE** of the following questions:

1. How was the genetic code established? [3]

2. 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]

3. How are probes labeled? [3]

4. What is paired end sequencing? What problem does it solve? [3]

5. What is the role of histone H1 in nucleosome structure? [3]

6. What kind of damage does UV cause? How does it cause error during DNA replication? [3]

7. What is the role of SeqA protein in bacterial DNA replication? [3]

SECTION "C"
[5Q.×5=25 marks]

III. Answer ***ANY*** **FIVE** of the following questions

8. Draw the amino and imino forms of cytosine and ketone and enol form of guanine. What is the implication of bases in tautomeric forms? [5]

9. What is the mechanism employed by hammerhead ribozyme? What is a domain of a protein? [3+2]

10. How does Sanger sequencing work? [5]

11. How are histones assembled when DNA is replicated? [5]

12. What are the roles of SSB and topoisomerases in DNA replication? Explain [5]

13. How can it be shown that certain sequences are replicators in the native chromosomal location? [5]

14. What are the different ways to quantitate DNA damage? [5]

SECTION "D"

[2Q.×7.5=15 marks]

IV. Answer ***ANY TWO*** of the following questions:

15. Describe approaches to analyzing DNA protein interaction in vitro.

16. Describe organization and content of the human genome.

17. Describe mismatch repair machinery in prokaryotes and eukaryotes.