KATHMANDU UNIVERSITY
End Semester Examination
February/March, 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 MAR 13 2018

SECTION "A"

[20Q.×1=20 marks]

I. Tick [√] the correct answer

1. The experiment in which ^{35}S labeled coat protein and ^{32}P labeled DNA phage was used to infect *E. coli* was carried out by:
   a. Griffith
   b. Avery
   c. Hershey and Chase
   d. Kornberg

2. Given, A stands for hydrogen bond acceptor, D for hydrogen bond donor, M for methyl group and H for non polar hydrogen, detection of MADA in the major groove signifies presence of
   a. A:T base pair
   b. G:C base pair
   c. T:A base pair
   d. C:G base pair

3. Which of the following amino acids is commonly phosphorylated in prokaryotic cells but not in eukaryotic cells?
   a. Serine b. Threonine c. Tyrosine d. Histidine

4. Chemical synthesis of defined DNA sequences is carried out using precursors called
   a. Phosphoribosalamine
   b. Phosphoamidines
   c. Ribonucleotide
   d. Deoxyribonucleotide

5. Yeast two hybrid is used to detect
   a. RNA protein interaction
   b. Protein protein interaction
   c. DNA RNA interaction
   d. RNA RNA interaction

6. How many chromosomes does Drosophila have?
   a. 4 b. 6 c. 20 d. 23

7. Wrapping of DNA around the histone protein core stores
   a. Positive superhelicity
   b. Negative superhelicity
   c. Neither positive nor negative superhelicity
   d. Both positive and negative superhelicity

8. Which amino acid lies at the active site of topoisomerase?
   a. Proline b. Serine c. Tyrosine d. Threonine

9. In *E. coli* the primase prefers to initiate RNA synthesis using a ssDNA template containing the trimer:
   a. ATG b. GTA c. GTC d. ATC

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

11. Cis acting DNA sequence that is sufficient to direct the initiation of DNA replication is:
   a. Origin of replication
   b. Replicator
   c. Replicon
   d. Initiator

12. Mcm 2-7 helicase is phosphorylated by:
   a. DDK b. GINS c. Cdc45 d. Sld2

13. During NHEJ LigIV performs ligation in complex with
   a. DNA PKc b. XRCC4 c. Ku70 d. Ku80

14. RecA is found as a
   a. monomer b. dimer c. hexamer d. filament

15. Which of the following is NOT a mechanism of cleaving the nontransferred strand?
   a. Using an enzyme other than transposase
   b. Transposase forms a DNA hairpin on transferred strand
   c. Transposase forms a DNA hairpin on the nontransferred strand
   d. Transposase forms DNA hairpin on both transferred strand and nontransferred strand

16. Which of the following enzymes is not involved in RNA capping
   a. RNA triphosphatase
   b. RNA kinase
   c. Guanylyltransferase
   d. Methyltransferase

17. Tri-snRNA particle is made up of:
   a. U4, U5 and U6 particles
   b. U1, U4 and U6 particles
   c. U2, U5 and U6 particles
   d. U1, U2 and U4 particles

18. What percentage of the ribosomes would be engaged in protein synthesis if one mRNA could be translated by one ribosome at a time
   a. 5% b. 10% c. 15% d. 20%

19. It has been proposed that the 2'-OH of the P site tRNA may act as a
   a. Proton shuttle
   b. Neutron shuttle
   c. Electron shuttle
   d. Hydrogen shuttle

20. Inosine in the anticodon pairs with the following bases in the codon:
   a. Uracil or cytosine
   b. Adenine, guanine or cytosine
   c. Adenine or guanine
   d. Adenine, uracil or cytosine

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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. Why is the information available in the minor groove of the DNA not sufficient in distinguishing base pairs? [3]

2. Describe the biological reason for a lack of uracil in DNA. [3]

3. What is a 3C assay? [3]

4. What are the three types of changes promoted by nucleosome modeling complex? Describe. [3]

5. Describe the molecular set of events that trigger eukaryotic helicase loading. [3]

6. How is nucleotide excision repair in eukaryotes different from prokaryotes? [3]

7. What are the three models of termination caused by the rho factor? [3]

SECTION "C"
[5Q.×5=25 marks]

II. Answer any *FIVE* of the following questions

8. Describe how physical exchange between homologous chromosomes was demonstrated. [5]

9. The following times and temperatures are an example of the steps for PCR. [2+2+1]

94°C ⇒	94°C ⇒	55°C ⇒	72°C ⇒	72°C ⇒	4°C
10 min	30 sec	30 sec	1:30 sec	10 min	∞
	(× 25 cycles)				

a. Why is the first step carried out at 94 degree Celsius?
b. What happens when the temperature shifts to 55 degree Celsius?
c. What occurs when the temperature is at 72 degree Celsius?

10. Intergenic sequences make up to 60% of the human genome. Where do these intergenic sequences come from and what are their functions? [5]

11. How were replicators first identified? [5]

12. How does Spo11 function? [5]

13. Describe the sequences within the RNA that determine where splicing occurs. How is lariat formed? [2+3]

14. How is the genetic code designed so as to minimize the deleterious effects of mutations? [5]

SECTION "D"

[2Q.×7.5=15 marks]

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

15. Describe the structure and function of DNA helicase.

16. Describe transposition by cut and paste mechanism.

17. Describe the role of EF-G in translation elongation.