Marks Scored:

KATHMANDU UNIVERSITY
End Semester Examination
February/March, 2019

Level : B. Tech.
Year : III

Course : BIOT 302
Semester: I

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date 17 FEB 2019

SECTION "A"
[20 Q.× 1= 20 marks]

Encircle the most appropriate answer.

1. What about Rad52 is true?
   a. It is a eukaryotic homolog of RecA protein
   b. It chews up double stranded DNA to produce 3' ended overhang
   c. It acts like RecBCD protein in loading Rad51 protein in eukaryotes
   d. It acts as Holliday junction resolvase in eukaryotes

2. HO endonuclease
   a. Remains covalently linked to the cut strands
   b. Is a non-sequence specific endonuclease
   c. Is always expressed in yeast cells
   d. Introduces staggered break in the chromosome

3. As defined by Barbara McClintock what do Ds and As stand for?
   a. Dissociators and Activators
   b. Differentiators and Associators
   c. Differentiators and Activators
   d. Dissociators and Associators

4. Integration of bacteriophage lamda genome into bacterial chromosome is an example of?
   a. Transposon insertion catalyzed by transposase
   b. Site specific recombination catalyzed by recombinase
   c. Transposon insertion catalyzed by integrase
   d. Site specific recombination catalyzed by resolvase

5. ORF2 in poly-A retrotransposons are:
   a. Reverse transcriptase and endonuclease
   b. RNA binding enzyme and endonuclease
   c. RNA binding enzyme and reverse transcriptase
   d. Reverse transcriptase and integrase

6. The order of transcription initiation are
   a. Promoter escape, closed complex formation, open complex formation
   b. Closed complex formation, open complex formation, promoter escape
   c. Open complex formation, closed complex formation, promoter escape
   d. Open complex formation, promoter escape, closed complex formation

7. Rho dependent terminators are composed of RNA sites called
   a. helicase sites
   b. polymerase sites
   c. hairpin sites
   d. rut sites

8. mRNA export from the nuclease requires energy which is supplied by the hydrolysis of
a. ATP b. ADP c. GTP d. CTP

9. Exon shuffling explains why
a. Introns exist in eukaryotes but not in prokaryotes
b. Exons exist in both prokaryotes and eukaryotes
c. Introns were lost from prokaryotes
d. Exons arose in eukaryotes

10. The channel in the ribosome that fits the polypeptide can accommodate which structure of protein
a. Alpha helix only
b. Beta sheet only
c. Alpha helix and beta sheet
d. Alpha helix, beta sheet and other tertiary structures

11. D loop is named after
a. dihydrocytosine
b. D-ribose
c. dihydrouridine
d. D-deoxyribose

12. Where is the decoding center found
a. large subunit of ribosome
b. small subunit of ribosome
c. tRNA
d. mRNA

13. According to wobble hypothesis how many tRNA exist for six serine codons (UCU, UCC, UCA, UCG, AGU, and AGC)?
a. At least 1
b. At least 2
c. 2
d. At least 3

14. Which of the following is NOT one of the ways of selecting correct aminoacylated tRNA
a. Correct codon anticodon base pairing induces GTPase activity of EFTu
b. Base pairing between 2 adjacent adenine residues in 16S rRNA to correct base pair formed between anticodon and first two bases of the codon in the A-site
c. Accomodation activity whereby aminoacylated tRNA moves by 70 degrees
d. Hydrolytic editing whereby incorrectly added amino acid is removed by hydrolysis

15. How does MerR activate MerT gene
a. By recruiting RNA polymerase to the promoter
b. By physically twisting promoter DNA
c. By bringing another operator in close proximity to the promoter
d. By releasing repressor from the promoter

16. Most repressors and activators act at the level of
a. Transcription initiation
b. Transcription elongation
c. Transcription termination
d. Translation initiation

17. What does maintenance methylase do
    a. It methylates DNA that is about to be replicated
    b. It methylates DNA that is about to be transcribed
    c. It methlates the new DNA strand that has been replicated
    d. It methylates the RNA that has been transcribed

18. What is an enhancer?
    a. It is the region found in the promoter that activates transcription
    b. It is the region found upstream of the promoter that activates transcription
    c. It is the region found in the 5'UTR of the mRNA that promotes translation
    d. It is the region found in the 3'UTR of the mRNA that promotes translation

19. Riboswitches respond to all the following EXCEPT:
    a. Uncharged tRNA
    b. Flavin Mono Nucleotide (FMN)
    c. Thiamine Pyro Phosphate (TPP)
    d. Adenosine Tri Phosphate (ATP)

20. Which of the following contains viral DNA sequence
    a. Repeat sequence
    b. Spacer sequence
    c. Leader sequence
    d. Cas9 sequence

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SECTION "B"
[5Q. × 3 = 15 marks]

Answer *ANY FIVE* of the following questions:

1. How does RuvC function?
2. What are the three families of transposons? Draw their organization.
3. What are the different bacterial promoter elements? What is their function?
4. What are the functions of IF1, IF2 and IF3 in translation?
5. "The genetic code is degenerate". Do you agree with this statement? Elaborate.
6. What do leucine zipper motif and homeodomain proteins look like?
7. Describe dosage compensation in mammals.

SECTION "C"
[5Q. × 5 = 25 marks]

Answer *ANY FIVE* of the following questions.

8. Describe the structure and enzymatic activities of RecBCD protein.
9. Describe the mechanism of VDJ recombination including the roles of Rag1, Rag2 and RSS.
10. How does the major splicing pathway work?
11. Describe the mechanism of attachment of amino acid to tRNA, with the help of figure.
12. Describe how ribosome acts as a ribozyme.
13. Describe the operator sites present in lamda and how the repressor and Cro bind to them.
14. How do transcriptional repressors work in eukaryotes?

SECTION "D"

[2Q. × 7.5 = 15 marks]

Answer *ANY TWO* of the following questions:

15. Describe the roles of Drosha, Dicer and RISC in miRNA processing.

16. In eukaryotic transcription, describe phosphorylation of polymerase tail, mediator complex, TBP-DNA interaction and TAF.

17. Describe the control of lac operon by arepressor.