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**M.Sc.(Second Semester)  
EXAMINATION, May-June, 2022**

**BIOTECHNOLOGY**

**Paper Sixth**

**(Molecular Biology)**

*Time : Three Hours]*

*[Maximum Marks: 80*

**Note: Attempt all sections as directed. 15 minutes extra to read through the question paper.**

**Section - A**

**(Objective/Multiple Type Questions)**

**(1 mark each)**

**Note: Attempt all questions. Choose the correct/most appropriate answer and write it in your answer book.**

1. Which is a correct statement for DNA polymerase sub-unit for E. coli?
  - (A) Poly I-1
  - (B) Poly II-7
  - (C) Both (A) & (B)
  - (D) None of these
2. Okazaki fragments synthesized as a
  - (A) Leading strand
  - (B) Lagging strand
  - (C) Template strand
  - (D) None of these
3. Which following proteins are involved in DNA mismatch repair system?
  - (A) Mut H, Mut I
  - (B) Mut S, Mut T
  - (C) Mut L, Mut G
  - (D) None of these above
4. Which is a function of Spo11 protein in eukaryotic genome?
  - (A) To develop Holiday Model
  - (B) Introduction of double strand break
  - (C) Unknown
  - (D) None of these

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5. Which is/are correct statement for Chi structure?
- (A) Chi is short sequence of DNA
  - (B) Involved in homologous pair of DNA
  - (C) Provide a site for RecBCD
  - (D) All of the above
6. In prokaryotic genome transcription holoenzyme is involved. Its consist of following subunit:
- (A)  $\alpha 5 \beta 4 \beta 5' \omega 3 \sigma 8$
  - (B)  $\alpha 1 \alpha 2 \beta \omega \sigma$
  - (C)  $\alpha 2 \beta 3 \omega \sigma$
  - (D) None of these above
7. What is a function of  $\alpha$  (alpha) subunit of RNA polymerase in Prokaryotic transcription?
- (A) Provide a ribonucleoside triphosphate binding
  - (B) Initiation of transcription site
  - (C) Assembly of the tetrameric core
  - (D) None of these
8. After development of transcription bubble, hybrid duplex is
- (A) RNA-DNA
  - (B) DNA-DNA
  - (C) RNA-RNA
  - (D) None of these

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9. Which RNA polymerase is synthesized to mRNA?
- (A) RNA poly I
  - (B) RNA poly II
  - (C) RNA poly III
  - (D) RNA poly IV
10. Eukaryotic gene transcript usually undergoes three major modification. These are.....
- (A) Add 7methyl G caps at 5'
  - (B) Addition of poly (A) at tails 3'
  - (C) RNA edition
  - (D) All of the above
11. The splicing mechanism is done by under the following process:
- (A) Group I intron
  - (B) Group II intron
  - (C) Group III intron
  - (D) All of the above
12. Which following translation initiation factor involved in Prokaryotic system?
- (A) eIF1
  - (B) eIF2
  - (C) IF3
  - (D) None of these

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13. What is a function of EF-G elongation factor in prokaryotic translation?

- (A) tRNA delivery to Ribosome
- (B) Translocation
- (C) Both (A) & (B)
- (D) None of these

14. Which is/are eukaryotic translation elongation factor?

- (A) EF-14
- (B) IF-3
- (C) Both (A) & (B)
- (D) None of these

15. Which property of p53 enables it to prevent the development of cancer?

- (A) p53 prevents cells from triggering apoptosis
- (B) p53 prevents the replication of cells with damaged DNA
- (C) p53 stimulates synthesis of DNA repair enzymes that replace telomere sequence lost during cell division
- (D) p53 is a transcription factor that causes production of proteins that stimulate the cell cycle.

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16. With regards to siRNA, the most efficient siRNA duplexes will contain which of the following features?

- (A) Will be 21-23 nucleotides in length
- (B) Generalized process
- (C) Comprise a sense strand and an antisense strand, where the antisense strand harbours 100% complementarity to the mRNA target sequence
- (D) All of the above

17. Fluorescence in situ hybridization (FISH) for the visualization of specific DNA sequence in....

- (A) Entire chromosome
- (B) Metaphase chromosomes
- (C) Heterochromatin
- (D) All of these

18. Map based cloning belongs to

- (A) Chromosomal walking
- (B) Positional cloning
- (C) Both (A) & (B)
- (D) None of these

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19. p21, the protein activated by p53 on DNA damage is a

- (A) Cyclin inhibitor
- (B) Cdk inhibitor
- (C) Proapoptotic protein
- (D) None of these

20. Micro cloning techniques used for genome mapping, but have some limitation is/are:

- (A) Depurination leads, due to acid treatment
- (B) Easy handling process
- (C) Non Contamination process
- (D) None of these

**Section - B**

**(Very Short Answer Type Questions)**

**(2 marks each)**

**Note: -Attempt all question. Answer using 2-3 sentences only.**

1. What is DNA replication?
2. Define Splicing

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3. What is UAG?

4. What is the endocytosis process?

5. Write the role of tumor suppressor gene.

6. Define Antisense.

7. What is a DNA marker.

8. Define FISH?

**Section - C**

**(Short Answer Type Questions)**

**(3 marks each)**

**Note : Attempt all questions. Answer precisely using 75 words.**

1. Explain the DNA replication mechanism in Prokaryotes.

**OR**

Describe the process of homologous recombination.

2. Explain the DNA repair mechanism.

**OR**

Describe the process of gene targeting in detail.

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3. Describe the process of transcription in Eukaryotes.

**OR**

Describe the process of transcription termination in Prokaryotes.

4. Explain transcription regulation in Prokaryotes.

**OR**

Describe the process of transcription post modification in mRNA in detail.

5. Explain translation regulation in prokaryotes in detail

**OR**

Describe the process of co-and post- translational modification in detail.

6. Write a note on synthesis of secretory and membrane proteins.

**OR**

Explain mechanism of targeted protein import into the nucleus.

7. Describe the structure and function of pRB.

**OR**

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Explain mechanism of RNase P ribozyme in gene silencing process.

8. Explain 'Map-based cloning' procedure in detail.

**OR**

Describe the genetic mapping through the 'RFLP' method.

**Section - D**

**(Long Answer Type Questions)**

**(5 marks each)**

**Note- Attempt all questions. Answer precisely using 150 words.**

1. Give a detailed account of DNA replication process.

**OR**

Write a detailed note on the DNA recombination in detail.

2. Give a detailed account of prokaryotic transcription.

**OR**

Write a comprehensive note on eukaryotic transcription.

3. Give a detailed account of eukaryotic translation.

**OR**

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Write a detailed note on the mechanism of Protein localization through receptor mediated endocytosis.

4. Write an elaborative note on antisense technology.

**OR**

Write an elaborative note on mapping of genome.