





- iii) During DNA synthesis, the leading strand is synthesized ..... and the lagging strand is synthesized .....
- a) 3' to 5' ; 5' to 3'                      b) 3' to 5' ; 3' to 5'  
c) 5' to 3' ; 3' to 5'                      d) 5' to 3' ; 5' to 3'.
- iv) Which of the following sugars is found in RNA ?
- a) 2-deoxy Ribose                      b) 3-deoxy Ribose  
c) D-Ribose                                  d) D-Xylulose.
- v) All are nucleosides *except*
- a) Cytosine                                  b) Guanosine  
c) Inosine                                      d) Adenosine.
- vi) What is added to the 3'-end of many eukaryotic tRNAs after transcription ?
- a) Introns  
b) Cap of modified G nucleotide  
c) Poly A tail  
d) Trinucleotide CCA
- vii) HRE is a
- a) Piece of DNA                              b) Piece of mRNA  
c) Protein                                      d) Piece of rRNA.





**GROUP – B**

**( Short Answer Type Questions )**

Answer any *three* of the following.  $3 \times 5 = 15$

2. Write the functions of the following enzymes :  $5 \times 1$   
(i) Topoisomerase, (ii) DNA ligase, (iii)  $\beta$  sliding clamp,  
(iv) Helicase and (v) Primase.
3. What is genetic code ? What are the characteristics of genetic code ? Discuss the universality of genetic code.  $1 + 2 + 2$
4. What do you mean by telomere ? How is this synthesized ? Describe this process in short.  $1 + 1 + 3$
5. State briefly the steps through which a eukaryotic mRNA processed before maturation.
6. What is SOS repair ? Describe the process of SOS repairing in short.  $1 + 4$

**GROUP – C**

**( Long Answer Type Questions )**

Answer any *three* of the following.  $3 \times 15 = 45$

7. The *E. coli* chromosome contains  $4.64 \times 10^6$  bp.
  - a) How many turns of the double helix must be unwound during replication of the *E. coli* chromosome ?



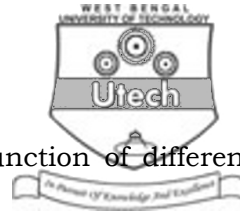
- b) From the given data, how long would it take to replicate the *E. coli* chromosome at 37°C, if two replication forks proceeded from the origin ? Assume replication occurs at a rate of 1,000 bp/s. Under some conditions *E. coli* cells can divide every 20 min. How might this be possible ?
- c) In the replication of the *E. coli* chromosome, about how many Okazaki fragments would be formed ? What factors guarantee that the numerous Okazaki fragments are assembled in the correct order in the new DNA ?
- d) Write all the steps of DNA replication of *E. coli* with labeled diagram.
8. a) A segment of DNA in *E. coli* has the following sequence of nucleotide pairs :

+ 1

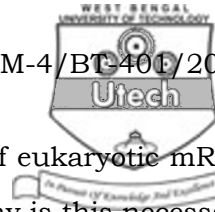
5' TATAATGACGTTACCCGACATAGCTACGATCACGATAAGCGACATAG 3'

3' ATATTACTGCAATGGGCTGT ATCGATGCTACTGC TATTCGCT GTATC 5'

- When this segment of DNA is transcribed by RNA polymerase, what will be the sequence of nucleotides in the RNA transcript ?
- b) What is meant by abortive initiation ? Why it happens in prokaryotes ?



- c) Give an account of structure and function of different subunits of *E. coli* RNA polymerase.
- d) What is the role of  $\sigma$  factor in prokaryotic transcription initiation ?
- e) Describe the two different modes of transcription termination in *E. coli*. 2 + 2 + 4 + 3 + 4
9. a) What is operon ? Name two inducers of lac operon. What are the full forms of “Z”, “Y” & “a” genes for lac-operon ?
- b) Discuss negative control of transcription with special reference to lactose operon. 7 + 8
10. Explain the mechanism of recycling of EF-Tu during bacterial protein synthesis ? Describe the structure of Nucleosome. What happens when nucleosome is treated with Micrococcal nuclease and the digest is run on agarose gel ? Describe the role of Rifampicin and Puromycin. 5 + 3 + 3 + 2 + 2
11. a) Describe the process of assembly of eukaryotic transcription initiation complex.
- b) What is the significance of CTD of RNA pol II in the transition of the enzyme from the initiation to elongation phase ?



- c) Describe the molecular mechanism of eukaryotic mRNA modification at the 5' and 3' ends. Why is this necessary in eukaryote but not in prokaryote ?
- d) Mention the mechanism of transcription inhibition by the following :

Rifampicin,  $\alpha$ -amanitin.

4 + 2 + (4 + 2) + 3

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