FM 40   **Time 2 Hr**

1.a) Who demonstrated that DNA synthesis takes place discontinuously? Describe the salient steps of his experiments. He used alkaline sucrose gradient centrifugation to separate DNA fragments. What would have happened if he used neutral sucrose gradient?   4.0

b) Your nonbiologist friend collected some data given below about *E. coli* DNA polymerase I and III from somewhere and wanted to know if these data make sense.

Polymerization rate and processivity of PolI are 10-20 nucleotides/sec and. 500, 000 respectively. Corresponding values for polIII are 250-500 nucleotides/sec and 100-200.

As a molecular biologist, looking at the data and based on the knowledge about the functions of these two enzymes in replication, would you feel that there must have been some mix up of the data? If so, why? If not, why not? (the values are correct)   3.0

2. What happens to the local environment of chromatin when it undergoes i) replication and ii) transcription?   4.0

3. Which of the following methods will be best to map *E. coli* chromosome more exhaustively?
   a) Conjugation, b) Generalized transduction, c) Combination of both. Give reasons for your answer.   4.0

4. How do attenuators and terminators affect transcription?   4.0

5. How does glucose indirectly inhibit the lactose pennease and reduce the concentration of cAMP within the cell?   4.0

6. Describe the stages in the elongation of translation in bacteria   4.0

7. Prokaryotes mostly have polycistronic mRNA to code for various proteins per mRNA. How is the requirement of large variety of proteins compensated for in eukaryotes?   3.0

8. Write in short about any five of the following   5X2=10
   a) Kick start in transcription
   b) Self splicing of mRNA
   c) Rho independent termination
   d) Types of RNA polymerase in eukaryotes
   e) Initiator tRNA
   f) Regulation of ARA operon (Only diagram and few important comments). Please do not write long and descriptive answer.