

UNIVERSITY OF OSLO

Faculty of Mathematics and Natural Sciences

Exam in: **MBV2010 Molecular Biology**

Day of exam: **June 6, 2007**

Exam hours: **9:00-12:00 (3 hours)**

This examination paper consists of **2** pages.

Appendices: **None**

Permitted materials: **None**

Make sure that your copy of this examination paper is complete before answering.

Numbers in brackets indicate the maximum number of points for each question. The maximum number of points for the entire exam is 100.

1. In which molecular processes are the following proteins involved

DNA polymerase I
DNA polymerase V
RuvC
RecBCD
RNA polymerase III
Single strand binding protein (SSB)
DnaB
Janus kinases
Telomerase
Small nuclear ribonucleoproteins (snRNPs)
Guanylyl transferase
GreB
“Flap endonuclease” (FEN 1)
Cohesins
MutS

(15)

2. Are the following statements true or false?

- a) Telomerase is an RNA-dependent DNA polymerase.
- b) DNA polymerase δ is the main replication enzyme in the nucleus of eukaryotes.
- c) Activation of proteins in signal transduction occurs primarily by acetylation.
- d) The DnaA protein binds to the replication fork.
- e) Heat can lead to breaks in DNA.
- f) Steroid hormones (e.g. estrogen) bind to receptors on the surface of cells.

- g) Horizontal resolution of the chi form of a Holliday junction yields crossover products (reciprocal strand exchange).
- h) attP and attB sites are involved in site-specific recombination.
- i) Inteins occur in messenger RNA.
- j) Isoaccepting tRNAs can interact with more than one codon in mRNA.
- k) Histones are primarily acetylated at serine amino acids.
- l) Methylation of histones results always in silencing of a region of DNA.
- m) Bacterial RNA polymerases attach to promoter sequences.
- n) An enhancer is a protein that enhances transcription.
- o) DNA and proteins interact via hydrogen bonds. (15)

3. Point out the differences between prokaryotes and eukaryotes in
- a) initiation of transcription (15)
 - b) initiation of translation (15), and
 - c) initiation of replication. (15) (45)

4. a) What is the difference between homologous recombination and site-specific recombination? Name (don't describe) an example for each process. (10)
- b) Explain the RecBCD pathway in *E. coli*. (15) (25)