Minor Exam

BBL231 (Molecular Biology and Genetics)

MM 30 November 9th, 2020

Duration: 1 h

Q. 1 You are working on an enzyme, whose active site contains Arginine, Glycine and serine. You would like to enhance the substrate specificity of this enzyme. Describe the method you will use in this case. 3

Q. 2 Describe the technique that is used for studying the localization of chromosomal loci in the genome in eukaryotes in live cells. 5

Q. 3 What are the important features of proteins responsible for packaging DNA. Give examples of such proteins present in eukaryotes and in prokaryotes. Describe bead on a string model. If the length of one bp DNA is 0.3 nm, calculate the length of DNA packaged and the packing ratio (fold packaging) in an 11 nm fiber. 8

Q. 4 What are Cot values? What do they indicate? Discuss the significance of high and low Cot values. Draw the Cot curves for an organism which contains some moderately repetitive sequences which are scattered at several places in the genome and compare it with that of *E. coli*. 5

Q. 5 9

a) What are isocaudomers? Which of the following are isocaudomers?

5'-C/TCGAG-3'

3'-GAGCT/C-5'

5'-T/TGCAA-3'

3'-AACGT/T-5'

5'-T/CCGGA-3'

3'-AGGCC/T-5'

5'-TTG/CAA-3'

3'-AAC/GTT-5'

b) Calculate the number of fragments a given restriction enzyme would be expected to generate from a piece of DNA of given length but unknown sequence. Assume that each base — A, T,

G or C — occurs equally frequently in the DNA. Give your answer to the nearest whole number of fragments.

Recognition Sequence: TYRA

Circular DNA of length: 2 kb

c) Draw the restriction map of a circular plasmid

EcoRI 3000

BamHI 3000

SalI 1800 and 1200

EcoRI and BamHI 1450 and 1550

BamHI and SalI 1800, 650 and 550

EcoR1 and SalI 1200, 1000 and 800