

BMT-72106 Cellular Biophysics

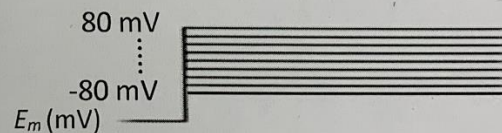
Exam 08.06.2022

Examiners: Soile Nymark and Teemu Ihalainen

Please answer the four (4) exam questions below.

1. Explain the following processes and phenomena:
 - A) Force generation by actin cytoskeleton (2p)
 - B) Mechanotransduction in focal adhesions (2p)
 - C) The effect of the force magnitude, directionality and loading rate on mechanotransduction response of a protein (2p)
2. Explain extracellular matrix: its structure, function, and cellular interactions (6p)
3.
 - A) Explain shortly two different ways an animal can tune their spectral sensitivity and give an example of situation where this tuning would be beneficial. (3p)
 - B) Explain how cellular membrane potential is generated and how it can be varied. Give equation for calculation of membrane potential. (3p)
4. The figure shows patch clamp recordings from a squid motor neuron where current responses to membrane potential (E_m) depolarizations in 20 mV intervals from -80 mV to 80 mV have been recorded. The first two responses have been indicated by arrows.

- A) Based on the recordings, draw a current-response curve (I-V curve) for the Na^+ currents.



- B) From the I-V curve, determine the half-maximal activation potential as well as the reversal potential for the Na^+ currents.

