Quiz Test: BT 101: Modern Biology; February 14, 2017

Maximum Time allowed: 40 minutes

Name:………………………………………..Roll No……………..…

PART A

1. Match the entries given in Group A with **MOST SUITABLE** entry in Group B

Group A

- **A.** Ribosome
- **B.** Plasma membrane
- **C.** Nucleus
- **D.** Smooth Endoplasmic Reticulum
- **E.** Rough Endoplasmic Reticulum
- **F.** Cilia

Group B

- **i.** Control center
- **ii.** Consist of rRNAs and proteins
- **iii.** 9+2 arrangement of microtubules
- **iv.** Fluid Mosaic Model
- **v.** Synthesis of lipids
- **vi.** Protein synthesis
- **vii.** Transport and storage

Group A	Group B (NO overwriting)
A	II or VI
B	iv
C	i
D	v
E	vi
F	iii

2. The endosymbiotic hypothesis is related to following two cell organelles

    i. Chloroplast
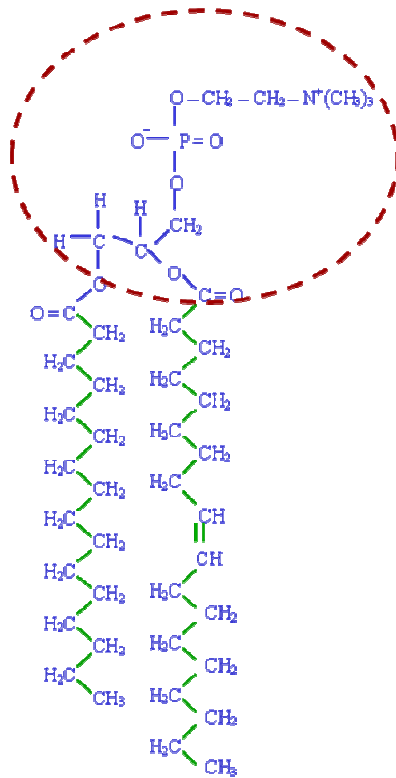   ii. Mitochondria

3. Glucose is transported through the plasma membrane by facilitated diffusion which proceeds spontaneously with the release of free energy due to concentration gradient. If concentration of glucose **inside** the cell of 0.5 millimolar (mM) and a concentration of glucose **outside** the cell of 5 millimolar (mM). At body temperature of (37°C), how much energy is relased per mole of glucose transport. (Value of Gas constant, R, = 2 cal K−1 mol−1)

Key answer
- a concentration of glucose **inside** the cell of **0.5** millimolar (**mM**) and a
- concentration of glucose **outside** the cell of **5** millimolar (**mM**)
- a body temperature of 37°**C**, so an absolute temperature of 37 + 273 = **310°K**, and
- the plasma membrane is permeable to glucose.

ΔG = **(2)(273+37)** x **ln (0.5/5)**
= **(2)(310)** x **ln (0.1)**
= **(620)(−2.3)** = **−1426 cal/mole**
= **−1.4 kcal/mole**

4. Draw structure of Phosphoglycerides and show amphipathic nature

$O-CH_2-CH_2-N^+(CH_3)_3$

$O^- - P=O$

O

$H \quad H$

$H-C \quad C \quad CH_2$

$O \quad O$

$O=C \quad C=O$

$CH_2 \quad H_2C \quad CH_2$

$H_2C \quad CH_2 \quad H_2C \quad CH_2$

$H_2C \quad CH_2 \quad H_2C \quad CH_2$

$H_2C \quad CH_2 \quad H_2C \quad CH_2$

$H_2C \quad CH_2 \quad H_2C \quad CH$

$H_2C \quad CH_2 \quad CH$

$H_2C \quad CH_2 \quad H_2C \quad CH_2$

$H_2C \quad CH_2 \quad H_2C \quad CH_2$

$H_2C \quad CH_3 \quad H_2C \quad CH_2$

$H_2C \quad CH_3$

PART B
Each question carries 1 mark, write only the correct choice in the given box.

Q1: The direction of the nerve impulse is
    (A) cell body to the axon terminal
    (B) axon terminal to the cell body
    (C) cell body to the dendrite terminal
    (D) cell body to the nucleus

Key answer: A

Q2: If the membrane of a neuron is more negative than resting potential, it is called
(A) depolarization
(B) action potential
(C) hyperpolarization
(D) neutralization

Key answer: C

Q3: While passing through the synapses of neurons, an action potentials or nerve impulses may be
    (A) blocked only
    (B) changed into repetitive impulse only
    (C) integrated with impulses from other neurons only
    (D) All of the above

Key answer: D

Q4: Electrical synapses are (a) **direct open** channels that conduct

(b) **electricity** from one cell to the next (fill in the blanks). ½+½ = 1 Mark

Q5: For a typical neuronal cell the concentrations of the Na^+ (outside) is 142 mEq/L, Na^+ (inside) is 14 mEq/L, K^+ (outside) is 4 mEq/L, and K^+ (inside) is 140 mEq/L. Calculate the Nernst potential for K^+ and Na^+ ions.   ½+½ = 1 Mark

Key answer

EMF (millivolts) = ± 61 log (Conc. Inside/Conc. Outside), Potential is +ve for negative ion and

-ve for positive ion.

K^+ (outside): 4 mEq/L

K$^+$ (inside): 140 mEq/L

K$^+_{inside}$/K$^+_{outside}$ =35.0

Therefore, Nernst potential for K$^+$ ion = -94 millivolts

Na$^+$ (outside): 142 mEq/L

Na$^+$ (inside): 14 mEq/L

Na$^+_{inside}$/Na$^+_{outside}$ =0.1

Therefore, Nernst potential for Na$^+$ ion = 61 millivolts