BIOL*1090 MIDTERM EXAM Answer Key

Section A:

1.	b	16.	a
2.	c	17.	b
3.	a	18.	d
4.	b	19.	c
5.	b	20.	d
6.	d	21.	c
7.	b	22.	d
8.	a	23.	a
9.	b	24.	d
10.	c	25.	a
11.	c	26.	b
12.	d	27.	a
13.	a	28.	c
14.	d	29.	b
15.	b	30.	a

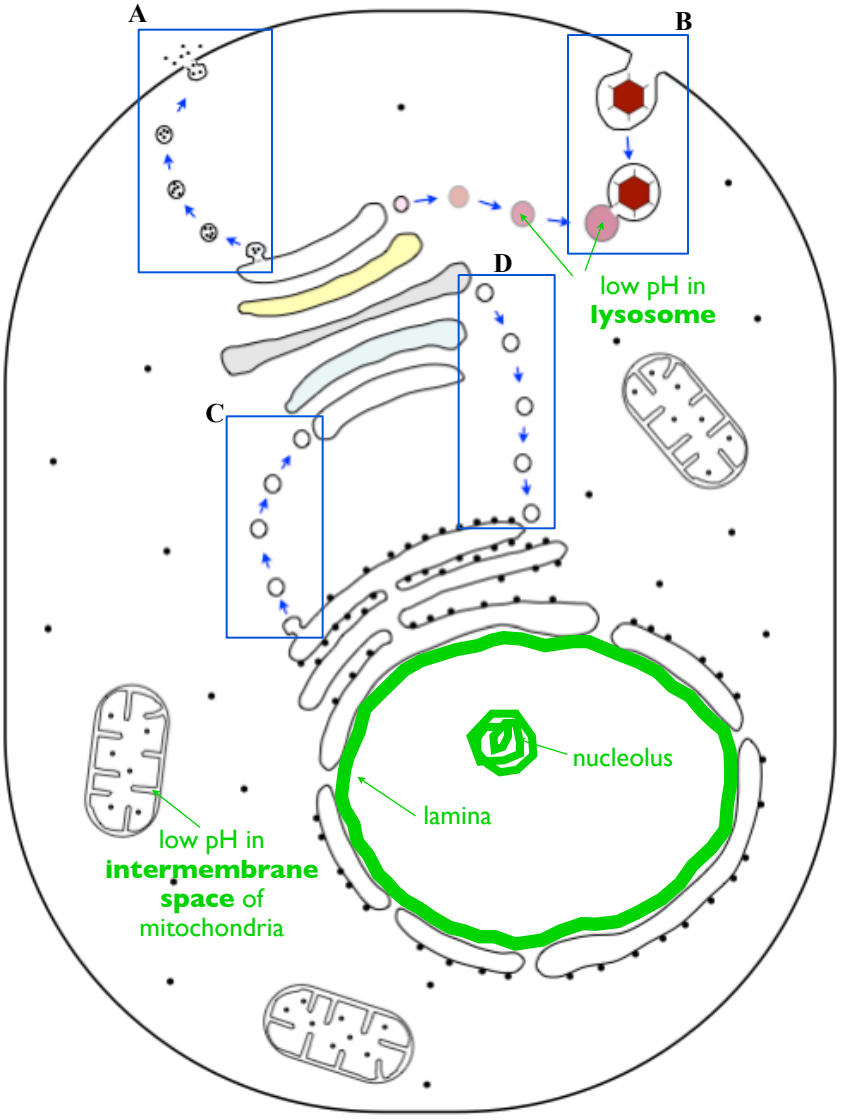
Section B

Refer to the figure below to answer the following questions. DO NOT USE ACRONYMS. Section B is worth a **total of 12 marks**.

1) **a)** Indicate what is going on in each boxed area (**A,B,C,D**). (**L** = lysosome) **[8]**

b) Draw and label the following components of the cell: **[2]**
i) **nucleolus**
ii) **nuclear lamina**

c) Indicate **two** (2) different compartments that have a relatively **low** pH. **[2]**



A = **exocytosis**, budding of vesicle from Golgi, movement to and **fusion with plasma membrane**
- **excretion** of substance into **extracellualar space**

B = **endocytosis**, engulfment of a virus by plasma membrane
- **fusion of membrane bound virus with lysosome**

(also, **phagocytosis** but not autophagy

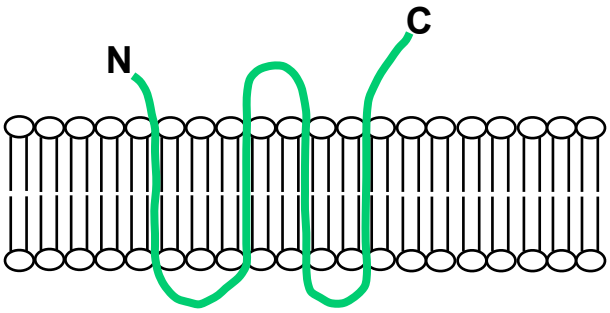
C = **budding of vesicle from RER** and **movement to cis Golgi network** by **anterograde** movement
- vesicle fuses with Golgi
- **COPII**-coated vesicle

D = **retrograde** movement of vesicle from a Golgi stack to the RER
- **COPI**-coated vesicle

Section C

Answer each question as indicated. Please record your answers in the space provided. **You may use point form.** Do not use acronyms. Section C is worth a **total of 8 marks**.

1) The $GABA_A$ receptor is composed of several subunits. Connect the amino (**N**) and carboxyl (**C**) ends of the single protein subunit below; i.e. draw a line between the N and C relative to the phospholipid bilayer. **[2]**



+ 1 mark for showing line going **into** and **out** of membrane to connect N and C (must go through **both** leaflets)
+ **1 mark** for showing **4** transmembrane domains
- 1 mark for overly complex diagrams and extraneous, incorrect lines

2) Describe, as concisely as possible, how the following are related:
1) lamellipodia, 2) cell movement, 3) actin filaments**.** **[2]**

- lamellipodia are **leading membrane edges** of **moving cells**
- force of movement is generated by **growth and branching of actin filaments** (F actin, microfilaments) "**pushing**" against the inside of the cell membrane to form the lamellipodium and cause movement

(mention of myosin and F-actin pulling the trailing edge is irrelevant)

3) Compare **microtubules** and **microfilaments**. List 2 ways they are similar and 2 ways they are different. **[4]**

Similar:
- both are cytoskeletal structural components
- polarized, have "+" and "-" ends
- form tracks for intracellular vesicle or organelle movement, ATP used for movement
- both are constantly created and degraded, i.e., dynamically unstable

Different:
- MT made up made of alpha and beta tubulin monomers; MF made of G-actin monomers
- MT interact with kinesin and dynein motor proteins; MF interact with myosin motor proteins
- MT are hollow and made up of 13 protofilaments, MF are not hollow
- MT nucleation occurs at MTOC (which has gamma tubulin in it); MF nucleation mediated by Arp2/3 complex
- MF can branch, MT do not