BITS Pilani, Dubai Campus

2nd Semester 2013- 2014

General Biology BIO F111

Comprehensive Examination (Closed book)

Date: 29/05/14 (Th/AN) Duration: 3 Hours Weightage: 40% (Max Marks 80)

Instructions: Part A, Part B and Part C have to be answered in separate Answer sheets.
Marks are indicated against each question

Part A

Q 1 a. Define Competitive inhibition, [2]

b. What is negative feedback inhibition? [2]

c. Photosynthesis is a biochemical pathway that involves three kinds of activities. Name these and explain how they are related to each other. [3]

d. Explain the events that take place in the mitochondria during respiration [3]

Q2 a. Differentiate between lactic acid and alcoholic fermentation [1]

b. Explain the role of the following [2]
i. promoter sequences ii. DNA ligase iii. Ribosome iv. Polymerase

c. Explain the steps involved in protein translation. [3]

d. Differentiate between point mutations and chromosomal aberrations. [1]

e. Mention the mechanism of transport across the membrane for the following molecules in tabular form only. [3]
Water, Glucose, Sodium and potassium ions, mucus, Bacteria, Vitamin A &D

Q3 a. Name any 3 membranous organelles and mention each organelle's major function. [Tabular form] [3]

b. Justify how polar bears and whales sustain at extremely low temperatures. [1]

c. Classify proteins according to their functions. Give one example of each. [3]

Part B

1. About 70% of Americans perceive a bitter taste from the chemical phenylthiocarbamide (PTC). The ability to taste this chemical result from a dominant allele (T) and not being able to taste PTC is the result of having two recessive alleles (t). Albinism is also a single locus trait with normal pigment being dominant (A) and the lack of pigment being recessive (a). A normally pigmented woman who cannot taste PTC has a father who is an albino taster. She marries a homozygous, normally pigmented man who is a taster but who has a mother that does not taste PTC. Show all the steps completely and answer the following:
   a) What are the genotypes of the possible children? (5)
   b) What percentage of the children will be albinos? (1)
   c) What percentage of the children will be non-tasters of PTC? (1)

2. In a hypothetical scenario you wake up one morning to your roommate exclaiming about her sudden hair growth. She has been supplementing her diet with a strange new fungus purchased at the local farmer's market. You take samples of the fungus to your lab and you find that this fungus does indeed make a protein (the harE protein) that stimulates hair growth. You construct a fungal genomic DNA library in *E. coli* with the hope of cloning the harE gene. If you succeed you will be a billionaire!
   a) What features must be present on your plasmid that will allow you to use this as a cloning vector to make fungal genomic DNA library. (2)
   b) List out the steps in generating/making /preparing a plasmid based genomic library (2)
   c) How do you distinguish bacterial cells that carry a vector from those that do not and bacterial cells with a vector that contains gene of interest? (4)

PTO

3. (a) Middle East Respiratory Syndrome (MERS), the **viral** respiratory illness caused by a corona virus called MERS-CoV. The patients are presented with fever, cough, and shortness of breath. Explain, in brief, how the immune system provides the protection for the same. (3)

(b) List out two differences each between (i) Active and Passive Immunity, (ii) B lymphocyte and T lymphocyte. (3)

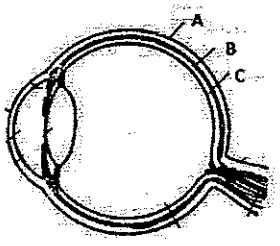
4. Identify the characteristic processes associated with the following events. (3)
   a) Microorganisms and plants absorbing raw materials into their cells to maintain their lives.
   b) Budding observed in *Saccharomyces cerevisiae.*
   c) Olfactory fatigue or odor fatigue after prolonged exposure to a particular airborne compound.
   d) Enzymatic action of glycogen synthetase on glucose to form glycogen to help in glucose storage in body.
   e) Maintenance of a constant internal environment.
   f) Extinction of mammoths and mastodons.

Part C

1. Write the different key events (contrasts and similarities) that occur during **Prophase I** & **Prophase II** in non-somatic cell division. (3)
2. List out the major sources of variation in the process of meiosis. (2)
3. Rearrange the following terms of human classification in the given Table as 'Taxonomic category / Taxonomic Name' (4)
   Hominedae, Domain, Phylum, Order, Mammalia, Family, Genus, Eucarya, Chordate, Animalia, Homo, Species, Primates, Kingdom, *Homo sapiens*, Class

'Taxonomic category	'Taxonomic Name'

4. Briefly explain the diastolic and systolic blood pressure. What the normal recording of BP in human and name the Instrument by which it is measured. (4)
5. Describe the muscles involved in breathing and explain how they cause air flow in to and out of lungs. (3)
6. Pulmonary artery and pulmonary vein are "exceptional" Justify the statement. (2)
7. Mention the three major functions of hepatic tissues (1.5)
8. Name the external coverings of brain, heart and lungs. (1.5)
9. Write the role of ADH in excretion (2)
10. Identify the structure and comment on it (mention its functions and tissues type) (3)



11. Define the following: (3)
    i. Lacteal
    ii. Ureter
    iii. Nephron

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BITS Pilani, Dubai Campus

Second Semester 2013-2014

Test II (Open Book)

Course No / Title: BIO F111 / General Biology

Maximum Marks: 40 [Weightage: 20%] Date: 13.04.14 Su7; Duration: 50 Minutes.

Instructions: Only Prescribed text book and hand written notes are permitted.
Write all the sub questions together; Marks are indicated against the question.

Q1. a) Justify the statement, 'Glyceraldehy-3-phosphate is the only product of photosynthesis'. How does the cell form other macromolecules from this key product of photosynthesis? [3]

b) Anabolic processes in plants can be beneficial as well as harmful to heterotrophs. Justify with an example. [2]

Q2. a) Alcohol dehydrogenase was used in an enzymatic reaction to estimate alcohol in a test tube. The reaction failed for several reasons. Can you suggest the probable reasons for the failure of the reaction? [4]

b) Justify, "a same enzyme cannot react with multiple substrates, but a single substrate can react with multiple enzymes." [3]

Q3. a) Why doesn't the enzymatic competition affect the normal functioning of the cell? [3]

b) Justify, "ATP production, electron transport and proton pump are all interrelated". [3]

Q4. a) Can there be DNA replication without cell division? Justify your answer. [1½]

b) Colchicine is a poison that binds to tubulin and prevents its assembly into microtubules; Cytochalasins are compounds that bind to the ends of actin filaments and prevent their elongation. What effects do you think that these two substances would have on cell division in animal cells? [3]

c) The Difference between Mitosis & Meiosis (fill the following Table) [2½]

Events	Mitotic Cell Division	Meiotic Cell Division
Cell type of parent (diploid / haploid)	?	?
Cell type of daughter cell(s) (diploid / haploid)	?	?
Number of daughter cells produced	?	?
Genetic relationship of daughter cells to parent cells & to each other (unique /identical)	?	?
Number of cell division	?	?

d) If two chromosomes of a species are the same length and have similar centromere placements yet are not homologous, what is different about them? [2]

e) It is a situation wherein a single celled organism is about to divide. You observe under the microscope that the homologous chromosomes are not paired, and that it doesn't look like any recombination has occurred. Is the organism dividing by mitosis or meiosis? Explain. [2]

Q5. (a) A strange woman has a bizarre condition known as "Cyclops" syndrome, where she has a single eye in the middle of her forehead. The allele for the normal condition is recessive. Her father is a Cyclops, as well as her mother. Her father's mother was normal. What is the genotype of the strange woman's father? Justify your answer. [5]

(b) A common form of red-green colour blindness in humans is caused by the presence of an X-linked recessive allele. Given simply that, please answer the following: [6]

(i) Can two colour-blind parents give birth to a normal son or daughter?

(ii) Can two normal parents produce a colour-blind daughter?

(iii) Can two normal parents produce a colour-blind son?

Justify your answers.

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BITS PILANI, DUBAI CAMPUS

SECOND SEMESTER 2013-2014

Test – 1 (Closed Book)

BIO F111: GENERAL BIOLOGY

Date: 23.02.14(Su7) **Time 50 minutes** **Max Marks: 50**(Weightage 25%)

Answer all the questions. Marks are mentioned against each question.

1) Identify the process / characteristic of life that the given examples signifies: **(4marks)**
   a) Eating a chocolate
   b) Multiplication of bacterial cells
   c) Maintenance of blood sugar level
   d) Training of athletes at higher altitude

2) List out the two areas which prove the impact of biology in our lives. Justify with an example of each. **(4Marks)**

3) Although science of biology has made major advances, there are several consequences of misunderstanding the biological principles. Explain the statement with two examples. **(4marks)**

4) Compare and contrast the following: **(6marks)**
   (i) Myoglobin and Hemoglobin
   (ii) Starch and Glycogen
   (iii) True fats and phospholipids

5) Justify – Cholesterol plays a positive as well as negative role. **(4marks)**

6) What are the different forms of RNA? Mention their functions. **(3marks)**

7) What are lecithins? Mention their importance. **(3marks)**

8) What is a gene? The information for synthesis of a particular protein is stored in the gene. Justify. **(3marks)**

9) Apart from serving as a major source of energy, what are the other roles that carbohydrates play? **(2marks)**

10) What is the role of chaperons? **(2marks)**

11) There is a limit to cell size with some exceptions. Justify with example. **(4marks)**

12) List the functions of proteins in cell membrane **(3marks)**

13) Given are the examples of biomolecules. Classify them into proper category and mention their functions in the tabular column as mentioned below. **(6marks)**
(i) dextrose, (ii) maltose, (iii) myoglobin, (iv) linoleic acid, (v) testosterone, (vi) glucagon

Biomolecule	Category	Function

14) How prokaryotes differ from eukaryotes. **(2marks)**

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BITS PILANI, DUBAI CAMPUS

A

DUBAI INTERNATIONAL ACDEMIC CITY

SECOND SEMESTER 2013-2014

QUIZ-2 (CLOSED BOOK)

Course No. BIO F111
Course Name: GENERAL BIOLOGY

04.05.2014 (Weightage 7%) Max Marks: 14
Duration: 20 Mins

Id No: _____ **Name:** _____ **Sec:** _____

Q1. List out the components of innate and acquired immune response. (1)

Q2. List out the sequence of events that happen during inflammatory immune response. (2)

Q3. List out the steps in phagocytosis. (1)

Q4. How is an antigen recognized by our body? (1)

Q5. Differentiate between B and T lymphocytes. (1)

Q6. Differentiate between active and passive immunity. (1)

Q7. Name the enzyme(s) involved in [2]
a. DNA replication _____
b. making a DNA from a RNA molecule _____

Q8. Name the protein that helps RNA polymerase to locate the promoter sequences. [0.5]

PTO

Q9. What is the significance of the terminator sequences? [1]

Q10.The _____ strand of the DNA acts as a template for RNA synthesis. [1]

Q11. _____ is a stop codon in protein translation. [0.5]

Q12. What are nucleosomes? [1]

Q13. The sequences that do not code for proteins are called _____. [0.5]

Q14. Sickle cell anemia is an example of _____mutation. [0.5]

"All the best"

BITS PILANI, DUBAI CAMPUS

B

DUBAI INTERNATIONAL ACDEMIC CITY

SECOND SEMESTER 2013-2014

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Course No. BIO F111 **04.05.2014 (Weightage 7%) Max Marks: 14**

Course Name: GENERAL BIOLOGY **Duration: 20 Mins**

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PTO

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Q14. What are nucleosomes? [1]

"All the best"

BITS Pilani – Dubai Campus

B

2nd Semester 2013- 2014

First Year | **General Biology (BIO F111)** | **Quiz – 1 (Close book)**

Date: 16/03/14 (M7) | Duration: 20 minutes | Weightage: 8% (Max Marks 16)

Id No: _____ **Name:** -_____ **Sec:** ____

Fill in the blanks: (5x½=2½ marks)

1. Cell wall of eubacteria contains a complex organic molecule called ..... and composed of 2 kinds of sugars linked to amino acids. One of these is .....

2. Cell membranes of archea have unique chemical structures which do not contain fatty acids but instead branched molecules called .....

3. Most fungi have a rigid, thin cell wall mostly made up of complex carbohydrate & nitrogen material called .....

4. Plant cell wall contains .....

Under line the correct answer(s) from the options given : (5x½=2½ =marks)

5. Which organelle(s) are associated with cell division?
   A. centrioles
   B. nucleus
   C. DNA
   D. ribosomes
   E. endoplasmic reticulum
   F. lysosomes

6. Identify the organelle(s) connected with the conversion of H_2O_2 to water?
   A. lysosomes
   B. vacuoles
   C. peroxisomes
   D. phagosomes
   E. centrosome

7. What is the function and location of centrioles?
   A. close to cell membrane, ingest and digest
   B. in the cytoplasm, produces ATP
   C. inside the Nucleolus, cell division.
   D. close to the nucleus, cell division
   E. on the Endoplasmic reticulum, protein synthesis

8. What is the function and location of the ribosome?
   A. modify package and export, in the cytoplasm
   B. makes protein, and located in the RER
   C. protein synthesis, throughout the cell
   D. cell division, inside mitochondria

9. Which one is not the organelle?
   A. Lysosome
   B. Phagosome
   C. Centrosome
   D. Ribosome
   E. Peroxisome

PTO

10. Pick the taxonomical names and place them in proper hierarchical order in the given table (2 marks)
Mammalia; *Homo sapiens;* Eucarya; Hominidae; Chordate; Homo; Animalia; Primates

Taxonomical category	Taxonomical name
Domain	
Kingdom	
Phylum	
Class	
Order	
Family	
Genus	
Species	

11. List out the evidences used to establish phylogenetic relationships (1 marks)

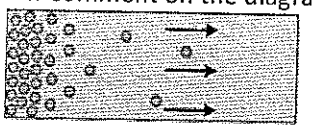
- .....
- .....
- .....
- .....

12. List out few diseases caused by prions (1 marks)

- .....
- .....
- .....
- .....

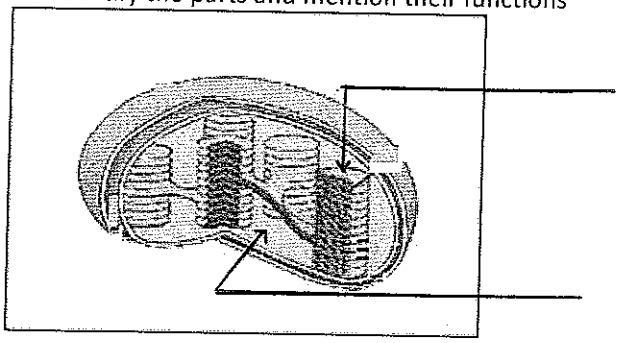
13. How centrioles are different from flagella / cilia in its construction? (2 marks)

14. Comment on the diagram related to cell transportation with illustrations (2 marks)



15. Write in one sentence the difference between virus and viroid? (1 mark)

16. Identify the parts and mention their functions (2 marks)



BITS Pilani – Dubai Campus

A

2nd Semester 2013- 2014

First Year
Date: 16/03/14 (M7)

General Biology (BIO F111)
Duration: 20 minutes

Quiz – 1 (Close book)
Weightage: 8% (Max Marks 16)

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Fill in the blanks: (5x½=2½ marks)

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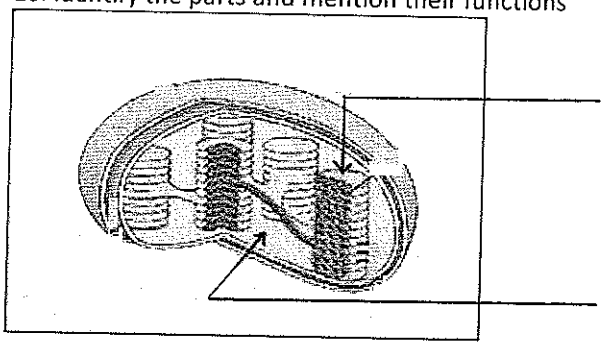

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