

BITS, PILANI- DUBAI
DUBAI INTERNATIONAL ACADEMIC CITY
FIRST SEMESTER 2009-2010
COMPREHENSIVE EXAMINATION

COURSE NO.: BIO C111

23.12.09

MAXIMUM MARKS: 120

COURSE TITLE: GENERAL BIOLOGY

DURATION: 3 HOURS

- Attempt part A and Part B in separate answer sheets
- Answer to the point
- Answer all questions in the given sequence only

PART - A

- Q1. (a) What is negative feedback mechanism? Using a flow diagram show a negative feedback control that takes place between Thyroid gland and Pituitary gland. [3]
(b) List out 3 hormones released by Anterior and Posterior Pituitary glands. [3]
(c) Give an example that shows interaction between Endocrine and Nervous system. [3]
(d) Photosynthesis is a biochemical pathway that involves three kinds of activities. Name these and explain how they are related to each other. [5]
(e) Explain the concept of generation of ATP with the Electron transport and proton gradient. [4]
- Q2. (a) Why is sexual reproduction important to the process of Natural selection? [2]
(b) The smaller the population, the more likely it is that random changes will influence gene frequencies? Why is this true, explain with an example [2]
(c) List out 3 factors that can lead to changed gene frequencies from one generation to other. [3]
(d) What is the difference between frame shift mutation and missense mutation? [3]
(e) What is the difference between gene/point mutation and chromosomal mutation? [2]
- Q3. (a) What are the major points of difference between prokaryotic and eukaryotic Transcription. [3]
(b) What are the requirements for translation process to begin? [3]
(c) List out the important features of a plasmid that make it to be used as Vector? [3]
(d) List out the major differences between Plasmid and phages [3]
(e) Why do bacterial colonies cultured on a medium containing X-gal turn white and some remain blue? [3]
(f) List out the requirements of a Genetic Engineering experiment or R-DNA technique and for what purpose each of these is used? [3]
- Q4. (a) What makes a secondary immune response faster than primary immune response? [2]
(b) Classify each of the following components of Immune system belonging to either Specific or Non specific defense. [3]
(i) Natural killer cells
(ii) Complement proteins
(iii) B cells
(iv) Inflammation
(v) Interferon
(vi) Cytotoxic T cells
(c) List out different types of Antibodies and their main function. [4]
(d) Give schematic presentation of the steps how B cells and T cells defend the body against viral infection? [3]

PART -B

- Q5. (a) What is Apoptosis? Do genes play a role in apoptosis, Justify? [2]
(b) Differentiate between meiosis and mitosis. [3]
(c) Define: (i) Homeostasis (ii) Population (iii) Individual Adaptation (iv) Tissue [4]
(d) Classify proteins according to their function, giving one example. [3]
(e) Tabulate the major differences between monosaccharides and polysaccharides. [3]
(f) Define diffusion and active transport and list out two differences between them. [3]
6. Write one major function of the following: [1X6]
(i) Smooth endoplasmic reticulum
(ii) Mitochondria
(iii) Peroxisomes
(iv) Kinesin
(v) Nuclear membrane
(vi) Ligands
7. (a) Assume that the dimple is inherited as a dominant gene. A dimpled man whose mother has no dimple marries a woman with no dimple. What is the probability that they will have a child with a dimple? [5]
(b). List out the 4 major lines of evidence used by phylogenatists to reconstruct evolutionary history [2]
(c) What are contractile vacuoles? What is their major function? [2]
(d) What is competitive inhibition? Explain briefly [3]
8. (a) The following are examples of a particular mechanism / concept. Name the mechanism / concept. [Answer in one sentence / few words] [2X3]
- (i) A child is diagnosed with cystic fibrosis [Cystic fibrosis is a recessive disease], even though both his parents are normal and do not have cystic fibrosis.
- (ii) Molecular size is one of the factors that affect membrane permeability. Yet glucose moves across membranes of certain cells.
- (iii) A child shows a mixture of family characteristics.
- (b) In cats, white color (W) dominates black color (w). Short hair (S) dominates long hair (s). A cross is made between a cat homozygous for both white color and long hair and a cat Homozygous for both black color and short hair. List the probable genotype & phenotype of offspring resulting from the cross. [6]
9. (a) Differentiate between pulmonary and systemic circulation. [2]
(b) Name the activities performed by the digestive system. [2]
(c) List out the distinct parts of the nephron with their major function. [4]
(d) Explain diagrammatically how crossing-over affects a single gene on a pair of homologous chromosomes. [Assume any trait] [2]
(e) What are embryonic stem cells? Name two major sources of embryonic stem cells. [2]

— x —

BITS, PILANI- DUBAI
DUBAI INTERNATIONAL ACADEMIC CITY
FIRST SEMESTER 2009-2010
TEST – I (CLOSED BOOK)

COURSE NO.: BIO C111

04.10.09

MAXIMUM MARKS: 75

COURSE TITLE: GENERAL BIOLOGY

DURATION: 50 Minutes

- **Answer to the point**
 - **Answer all questions in the given sequence**
-

- Q1. (a) List two ways by which polysaccharides differ from polypeptide. [4]
- (b) Animals store triglycerides as an energy reserve. Explain the advantages of storing triglycerides as an energy reserve than carbohydrates. [4]
- (c) Find out which of the following is not composed of Proteins: Hair, Muscle, cellulose, enzymes, and immunoglobulin and explain its significance for your health. [4]
- (d) List out two similarities and two differences between DNA and RNA. [4]
- (e) Name the different types of Endoplasmic Reticulum. List out their functions. [4]
- Q2. (a) Why does a denatured protein no longer function? Explain with an example. [4]
- (b) From the knowledge gained from cell structure and function, explain how the invading bacteria are destroyed in your body? [5]
- (c) What are lysosomes? List out any 3 major functions. [6]
- (d) Explain the significance of protein folding with an example? [4]
- (e) Define essential amino acids? Give two example of the same. [3]
- Q3. (a) Name the different types of RNA and list out their functions. [6]
- (b) List out any three major functions of proteins present in the plasma membrane. [6]
- (c) Fresh water animals are hypotonic or hypertonic to their external environment? How fresh water animals are able to maintain the balance of water in their body? [4]
- (d) Explain the method by which Glucose and sodium / potassium ions are transported across the membrane. [8]
- Q4. (a) What is metabolism? Name the three essential aspects of metabolism. [5]
- (b) Define homeostasis. Illustrate with an example. [4]

-----GOOD LUCK-----

BITS, PILANI –DUBAI
DUBAI INTERNATIONAL ACADEMIC CITY
FIRST SEMESTER 2009-2010
QUIZ-2 [14.12.09] B

COURSE NO.: BIO C111
TITLE: GENERAL BIOLOGY

MAXIMUM MARKS: 21
DURATION: 25 min.

Name:

ID NO.

Section:
.....

1. Which one of the following statements is true for the action potential of a neuron?
 - (a) It is initiated by efflux of Sodium ions
 - (b) It is terminated by efflux of Potassium ions
 - (c) Its amplitude declines as it moves along the axon
 - (a) It is due to the movement of calcium ions across the membrane.
2. The largest and most sophisticated portion of your brain is -----, its surface called -----accounts for most of your brain mass and is responsible for higher reasoning ability.
3. Gastric juice contains enzymes and _____
4. Blood flows from the atria to the ventricles through the _____; blood flows from the right ventricle to the lungs through the _____
5. Bile is stored in the _____ prior to release into the duodenum.
6. On setting an impulse, which one of the following sequences is correct?
 - (a) Resting Membrane-Depolarization-Action Potential – Repolarization
 - (b) Depolarization - Action Potential – Repolarization - Resting Membrane
 - (c) Depolarization - Action Potential – Resting membrane – Repolarization
 - (d) Repolarization – Depolarization – Action Potential- Resting membrane
7. Edema is associated with _____ disorders.
8. Name the two structures that make up central Nervous system

9. Give two examples of neurotransmitters:

10. All the symptoms listed below are indicative of Emphysema except:
 - a. Rapid breathing
 - b. Lower respiratory area
 - c. Increase in connective tissue
 - d. Increased stretching of the lungs
 - e. Difficulty in getting adequate oxygen

11. -----receives neurotransmitters from another neuron in order to continue the impulse.

12. The following enzymes are all involved in digestion, except for:
- f. Trypsin
 - g. Nuclease
 - h. Dipeptidase
 - i. Gastric lipase
 - j. All the enzymes above are digestive enzymes
 - k. None of the enzymes listed are digestive enzymes
13. The efficiency of the gas exchange process in the lungs is greatly enhanced by the _____ provided by the _____.
14. The 3 tiny bones attached to the tympanum are known as _____, _____ and _____
15. Central Nervous system is protected by _____, a liquid that cushion it and supplies with nutrients and layers of protective tissue called _____
16. _____ regulates the flow of blood to specific parts of the body.
17. Exercising increases the pH of the blood.
- a. True
 - b. False
18. A set of fluid filled tubes connected with cochlea are known as _____
19. Rods are located over most of the retinal surface except for the area of most acute vision known as _____
20. _____ assists in converting carbon dioxide to bicarbonate ions in RBCs.
21. Name the major function of the loop of Henle:

BITS, PILANI -DUBAI
DUBAI INTERNATIONAL ACADEMIC CITY
FIRST SEMESTER 2009-2010
QUIZ-1 [22.10.09]

COURSE NO.: BIO C111
TITLE: GENERAL BIOLOGY

MAXIMUM MARKS: 24
DURATION: 25 min.

Name: ID NO. Section:
.....

Q1. List out the three distinct pathways involved in Aerobic cellular Respiration and the site/ place where these pathways take place. [3]

Q2. What is the composition of cell wall in the following: / Cell wall is made up of -----
- in

- Plant cell
 - Bacterial cell
 - Fungal cell / Fungi
- [3]

Q3. In the binomial nomenclature, which one of the following is correct scientific name of an organism?

- (a) panthera tigris
 - (b) Panthera tigris
 - (c) Panthera tigris
 - (d) Panthera tigris
- [1]

Q4. Viruses responsible for measles and mumps attaches respectively to
and that of HIV to [1]

Q5. List out the 2 major points of differences that proves Mitochondria and chloroplast are different from other membranous structures [2]

Q6. Name the organelle composed of membranes but incapable of interconversion [1]

Q7. Trypsin works best at _____ pH, while _____ works well at an acidic pH. [1]

Q8. Name the electron carriers involved in the process of Cellular respiration and Photosynthesis. [1]

Q9. The receptor site for a virus is usually a _____ on the _____ [1]

Q10. Organisms found in Sewage and swamps are known asand belong to Domain

Q11. Chemosynthetic autotrophs use _____ as a source of energy and Photosynthetic autotrophs use as a source of energy.

[1]

Q12. Give one application of Enzymatic inhibition.

[1]

Q13. Organisms belonging to Domain Eubacteria reproduces by ----- [1]

Q14. What is the arrangement of microtubules in the organelle like Centrioles and cilia flagella? [2]

Q15. Name the term which refers to the classification of organism on the basis of evolutionary relatedness? [1]

Q16. Ribosomes are composed of _____ and _____ proteins. [1]

Q17. In aerobic cellular respiration, the final resting place for the electrons removed from glucose is _____ [1]

Q18. Glycolysis is an anaerobic / aerobic process [1]

BITS, PILANI- DUBAI
DUBAI INTERNATIONAL ACADEMIC CITY
FIRST SEMESTER 2009-2010
TEST – 2 (OPEN BOOK)

COURSE NO.: BIO C111

22.11.09

MAXIMUM MARKS: 60

COURSE TITLE: GENERAL BIOLOGY

DURATION: 50 Minutes

- Answer to the point
- Answer all questions in the given sequence

Q1. (a) In snapdragon flowers, a cross between a white colored flowering plant and a red colored flowering plant produces a pink colored flower and tall plants are dominant over short plants. What would you expect to get from a genetic cross of a homozygous tall red snapdragon with a short pink plant? [7]

(b) (i) Name a gas released as by-product of the light dependent reactions of Photosynthesis. (ii) Name the molecule that is the source of this gas. [4]

(c) The reactions of Calvin cycle (Light independent reactions) are not directly dependent on light and yet they usually do not occur at night, why? [4]

(d) Explain the following observation. A rule of thumb is that a chemical reaction will go twice as fast for every 10 degree rise in temperature. This is true for enzymes up to a certain temperature & there is a point at which no reaction occurs. [4]

(e) There are only 20 amino acids but the codons available in the genetic code are much more than this, suggest how these spare triplets are used? [3]

(f) Given is a double stranded DNA sequence, write the m-RNA sequence and the amino acids formed after translation.

Coding – CATATAATGACGGATGAGGGGAGTTAGACGGAT-

Non Coding - GTATATTAC TGCCTAC TC CCCTCAATCTGCCTA-

At 18th position if G is changed to A, what will be the effect of this change on the protein formed? [8]

Q2. (a) DNA replication process is highly accurate and considered to be essentially error free How this is made possible? Justify / explain [5]

(b) If your skin cells, bone cell and muscle cell have exactly the same genes, how can they be so different? Justify. [6]

(c) What is the difference between prophase of mitosis and prophase -1 of meiosis? [4]

(d) Heather was surprised to discover that she suffered from red green color blindness.

She told her biology professor, who said, your father is color blind too, right? How did her Professor know this? Why did her professor not say the same thing to the color blind males in the class? [7]

(e) How much ATP is released during anaerobic respiration? Anaerobic mechanisms yields much less energy than aerobic respiration, then why such inefficient process takes place in the body? [4]

(f) How can a mutation in tumor suppressor gene contribute to the development of Cancer ? [4]

-----X-----