

BITS PILANI, DUBAI CAMPUS

DUBAI INTERNATIONAL ACADEMIC CITY

Second Semester 2010-2011

Comprehensive Examination (Closed Book)

Course No.: BIO C111

Thursday, 2.06.11 (8.30 – 11.30 am)

Maximum Marks: 80

Course Title: General Biology

Duration: 3 Hours

Answer to the point; Answer all parts of the questions together and in the given sequence.

PART A

Q1. (a) A man with a dimple and brown eyes [whose father has blue eyes but no dimples] marries a woman with a dimple and brown eyes [whose father has blue eyes but no dimples]. What is the probability that their first child will be blue-eyed and without a dimple? [Assume that dimple is dominant over smooth cheeks and brown eyes are dominant over blue] [6]

(b) Classify proteins structurally and provide one example for each classification. [3]

(c) Write the major function of the following: [2]

i) Phospholipids ii) NADP⁺ iii) DNA Polymerase iv) Termination Sequences

(d) What is a point mutation? Define three types of point mutations. [2]

(e) Write the reactions that summarize the light-dependent and light-independent stages of photosynthesis. [2]

Q2. (a) Give a schematic overview of Aerobic Cellular Respiration, clearly marking the stages involved, the reactants, products and the linkages between the stages.

[No theory required; only the schematic representation is needed] [4]

(b) Name the different types of RNA involved in translation and mention each type's major function [2]

(c) A study on blood types in a population found the following genotypic distribution among the people sampled: 1101 were AA, 1496 were Aa and 503 were aa. Calculate the allele frequencies of A and a. [4]

[Assume that the Hardy-Weinberg equilibrium holds true]

Also, list four conditions under which the Hardy-Weinberg concept holds true.

PART B

Q1. (a) Answer in a Tabular form the requirements of Gene technology experiment and what for these are needed. [3]

(b). List out the characteristic features of plasmid & the role assigned to each of these. [3]

(c). Explain the different ways by which you can check the presence of inserted DNA /Fragment of Interest (Answer in Points) [5]

Q2. (a) How Natural Killer cells & Complement proteins differ in the way they protect the cells of the body. (2 points) [4]

(b) State True or False [4]

(i) T lymphocytes can bind to both free and processed antigens, whereas B lymphocytes can not.

(ii) Macrophages that encounter antigens release a protein called Interleukin

(iii) Cytotoxic T cells destroy the infected cells that present the antigen along with MHCII protein while Helper T cells can interact only with the antigens presented to them with MHCI

(iv) MHC proteins on the tissue cells serve as self markers that enable immune system to distinguish between self and foreign cells

(v) B Cells originate in bone marrow travel to thymus and mature there.

(vi) The inflammatory response is a localized, nonspecific response to infection

(vii) Alpha & Beta interferon prevent the viral replication & protein assembly in neighboring cell

(viii) Sweat contains lysozymes for digesting the bacterial cell wall

(c). Explain the mechanism of cell mediated immunity in protecting the body from viral infection [2]
(Answer in points only)

PTO

- Q3. (a) What is non disjunction? What is the difference, if the non disjunction occurs after Meiosis-1 or Meiosis II? [3]
- (b) Explain case of Trisomy with an example studied by you & how does it happen? [3]
- (c) Cell division, if not regulated result into abnormal mass of cells .Explain the mechanism /factor that helps in keeping a check for regulating the cell division. [3]

PART - C

Q1.

- a) How energy converters are different from other membranous organelles? [2]
- b) What happens when the bacteria / erythrocytes are kept in the two different types of solutions? Answer in the following tabular form [2]

Tonicity	Bacteria / fungi	Erythrocytes
Hypotonic solution		
Hypertonic solution		

Q2.

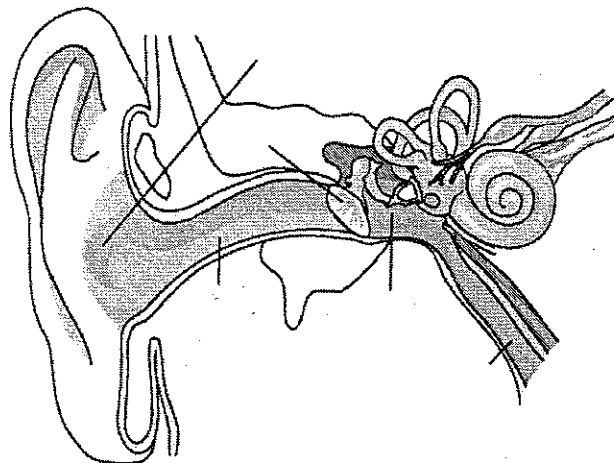
- a) why do the viruses often referred as "*obligate intra cellular parasite*" [2]
- b) list two ways that Eubacteria and Achaea differ from each other [2]
- c) What are the main characteristic features of primates? [1]

Q3.

- a) Mention the role of diaphragm and intercostal muscles in the breathing movements [2]
- b) Differentiate between systolic and diastolic pressure [2]
- c) Mention the primary functions of lymphatic system? [2]
- d) Write the role of ADH in the regulation of water loss in human being [2]

Q4.

- a) Briefly explain the stages of nerve impulse [3]
- b) Expand the following abbreviations:
MSH, FSH, ACTH, TSH, LTH [3]
- c) Identify the parts and mention their functions [2]



"All the best"

BITS, PILANI- DUBAI
DUBAI INTERNATIONAL ACADEMIC CITY
SECOND SEMESTER 2010-2011
TEST – II (OPEN BOOK)

COURSE NO.: BIO C111

17.04.11

MAXIMUM MARKS: 40

COURSE TITLE: GENERAL BIOLOGY

DURATION: 50 Minutes

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

Marks will be allotted for step-wise solution to problems

Q1. (a) A woman with type A blood group has parents who are both type AB and a husband who is a type B. What is the probability that their first child will have type O blood? [6]

(b) The inheritance of color blindness in humans is due to a recessive gene located on the X chromosome (X linked). If a color-blind boy is born to parents both of whom have normal vision, what are the genotypes of the three individuals? [6]

(c) Can diet influence the phenotype of an individual? Justify. [2]

Q2. DNA Coding Strand: 5'-CCTGATGGGGAATGCCTGACATTACAT-3' [14]

(a) Write the mRNA formed from transcription

(b) Write the polypeptide formed after translation of the mRNA.

(c) Write the possible tRNA anti-codons for the mRNA sequence.

(d) If the above sequence were to change to

CCTGATGGGGAATGTCTGACATTACAT, what is this mutation called?

(e) What is the advantage of having more than one codon coding for the same amino acid?

(f) Why is the error rate in DNA Replication so low?

(g) Can mutations be caused by viruses? Justify.

Q3. (a) Calculate the number of ATP molecules produced when 8 molecules of glucose are metabolized in prokaryotes. [5]

(b) Name two similarities and two differences between aerobic cellular respiration and photosynthesis. [2]

(c) Indicate whether the following statements are **True or False**:

(i) Light-independent reactions can occur in a plant that is in a dark room so long as the materials carbon dioxide, ATP, and NADP-H are present.

(ii) All electrons contain the same amount of energy. [2]

(d) Which contains more energy: one molecule of NADP or one molecule of NADP-H? Why? [2]

(e) Why is fat ideal as a long-term energy storage material? [1]

BITS PILANI , DUBAI CAMPUS
DUBAI INTERNATIONAL ACADEMIC CITY
SECOND SEMESTER 2010-2011
TEST – I (CLOSED BOOK)

COURSE NO.: BIO C111

27.02.11

MAXIMUM MARKS: 50

COURSE TITLE: General Biology

DURATION: 50 Minutes

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

Q1. (a) Write one characteristic structural feature and one function of the following: [4]

- i) Hemoglobin
- ii) Cellulose
- iii) Mitochondria
- iv) SER

(b) Answer the following in tabular form: [2]

Name two similarities and two differences between RNA and DNA

(c) What is the fluid-mosaic model? Name the major molecules found in cellular membranes and write their major function. [5]

(d) Introduction of foreign species of plants or animals harms the ecosystem. How? [3]

(e) What are control processes? [4]

Q2. (a) Why is it not advisable for marathon runners to take in large quantities of water immediately after a work-out? [3]

(b) Membranous organelles can be converted from one form to another. Name four such membranous organelles and also explain how these organelles are inter-convertible? [4]

(c) In the organelles known as energy converters,

(i) What type of energy conversion takes place?

(ii) Name the major reaction / process that occur in each of the organelles. [4]

(d) Explain the process by which sodium and potassium ions are transported across the membrane. [4]

Q3. (a) Explain signal transduction with two examples. [5]

(b) How are blood sugar levels controlled in the human body? [3]

(c) What are the major functions of cholesterol? Also, mention two other examples of steroids. [5]

(d) Structure and function of proteins are inter-related. Justify with two examples. [4]

Fill in the blank:

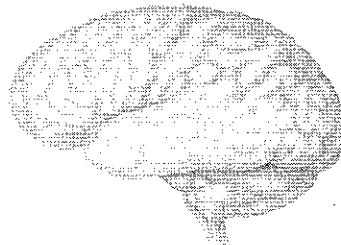
(4x ½ =2 Marks)

- 11. Language used in Binomial system of Nomenclature is -----
- 12. The hormones regulating blood calcium levels are ----- &-----
- 13. The other name of Vasopressin is -----
- 14. Example of obligatory intra cellular parasite is -----

13. Name the lobes of the human brain and Label it in the given diagram

(4x½=2 Marks)

- a. Which controls memory, reasoning and judgement _____
- b. Which is responsible for interpretation of sensory experiences, memory of visual and auditory patterns _____
- c. Which is responsible for combining of visual images, visual recognition of objects _____
- d. Which is responsible for understanding, speech, and soma-aesthetic functions _____.



14. Choose the correct options from the following and match them in their respective columns

Paramecium, Molds, Sponge, Methanogens, Amoeba, Mosses, Thermophilic, Puff balls, Mites, Ferns, Halobacteria Mushroom Dinoflagellates Corals, Conifers **(5 marks)**

Protista	Fungi	Plantae	Animalia	Extermophiles

15. Mention four evidences used to develop phylogenetic relationship and taxonomical categories.

(2 marks)

- a.
- b.
- c.
- d.

Name: Id No: Sec:

Identify the correct answer(s) and underline it.

(8x½=4 marks)

1) Our throat divides into two separate tubes: the windpipe and the gullet. What prevents food from entering the windpipe?

Uvula, tongue, trachea, epiglottis

2) Digestion takes place in long tube- alimentary canal. Food travels through these organs in the following order:

Mouth, gullet, stomach, small intestine, large intestine and rectum

Mouth, oesophagus, stomach, large intestine, small intestine and rectum

Mouth, stomach, oesophagus, small intestine, large intestine and rectum

Buccal cavity, stomach, gullet, small intestine, large intestine and rectum

3) Food passes through our digestive tracts even when lying down due to:

Epiglottis, Peristalsis, Absorption in intestine, Regurgitation

4) Bile is produced in the liver and stored in the gall bladder. What is its function?

Water absorption, breakdown of fats and oils, prevention of constipation, assimilation

5) Which of the following are likely to increase in number when the body is under bacterial attack?

Erythrocytes, leukocytes, Thrombocytes, Pinocytes

6) The liver's role is to:

Remove harmful substances from the blood,

Form the blood cells,

Digests the protein substances,

Facilitates the blood circulation

7) Which one is not associated with lymphatic system?

Spleen, Tonsils, Appendix, Thymus

8) The mineral deficiency which leads to one type of anaemia in humans is:

Iron,

Iodine,

Calcium,

Phosphorus

Write the differences between:

(3x2=6marks)

9) Nephron & Neuron

10) Ureter and uterus

11) Blind spot and yellow spot

Fill in the blank:

(7x1=7marks)

- 12) The primary hormone involved in regulating the water loss is
- 13) Typical blood pressure recorded in a large artery while the heart is contracting is about
- 14) Gastric juice comprises of a major enzyme and an acid,
- 15) Granular leucocytes are,,
- 16) Auditory capsule comprises of,, bones
- 17) Three Major functions of nephron are,,
- 18) Salivary glands Comprises of, and glands

Briefly make a note on:

(3x1½ =4½marks)

- 19) What is a common significant structural feature of Villi, cisternae, gyri and sulci,

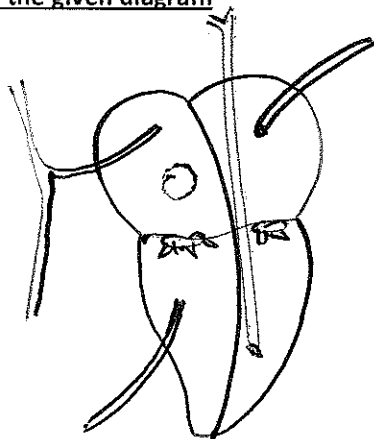
- 20) Mention three excretory organs of invertebrates

- 21) What is emulsification?

22) Identify the parts and Label it in the given diagram

(5x½=2½marks)

- Exceptional artery
- Exceptional vein
- Mitral valve
- Superior venacava
- Dorsal aorta



All the Best