

BITS PILANI DUBAI CAMPUS

SECOND SEMESTER 2006-07

COMPREHENSIVE EXAMINATION

COURSE NO: BIO UC 111

COURSE NAME: GENERAL BIOLOGY

DATE: 28.5.2007

DURATION: 3 Hrs.

MAX MARKS: 120

Answer all parts of a question in a sequence.

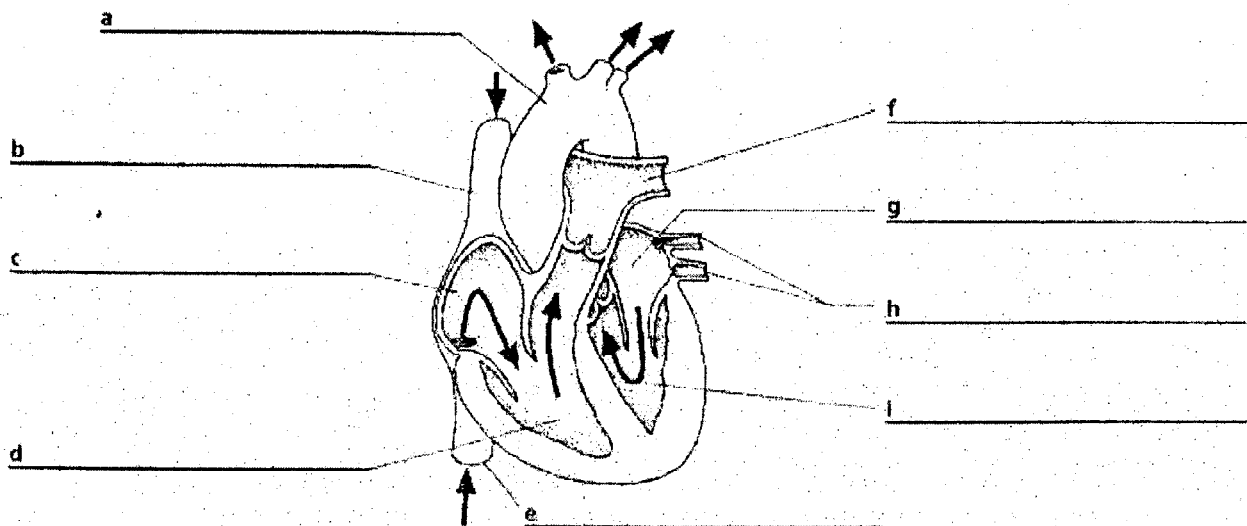
Q1. Give one term for each of the following description

(1x20)

- a. Organelle generally found in animals but absent in plants
- b. Part of brain that controls , balance, posture and coordination
- c. Neurons that carry impulses from brain and spinal cord to muscle and glands
- d. Phenomenon wherein a single gene can show multiple effects on a phenotype
- e. Kingdom of life that lacks photosynthetic mode of nutrition
- f. Technique that separates molecules according to their molecular size on electric field
- g. Period between 2 mitotic divisions
- h. Pair of alleles for same gene, interacting in heterozygous condition to produce a phenotype different from those of the Homozygote
- i. Condition where cells of malignant tumor move from original site to other site
- j. Cellular death which has genetic basis and is not the result of injury
- k. Strand of DNA that serve as a template for Transcription
- l. 3 nucleotide combination required in the process of Translation
- m. Specific sequence of DNA located a number of nucleotides upstream of region of DNA that codes for protein to which RNA polymerase binds during transcription
- n. Major change in DNA that can be observed at level of chromosomes
- o. Process of forming specialized cells within a multicellular organism
- p. A process when the chromosome fail to segregate properly and both the chromosome of pair end up in same gamete
- q. Portion of Nephron where maximum reabsorbtion of nutrients takes place
- r. Organ which store fluids that emulsifies fat
- s. Cells that target and kill body cells infected with virus
- t. Molecules that alarm signals to activate body's system by stimulating T_H

Q2. Identify the labeled structures of the diagram below and write in the answer sheet.

(8)



Q3. Classify each of the following actions/ processes into one of the 4 categories of characteristic of life (0.5x4)

- (i) Touch me not plant (*Mimosa pudica*) shrinking its leaves when you touch it
- (ii) Muscle activities of legs are coordinated when an insect walk
- (iii) Increase in size of a baby
- (iv) Processing of nutrients

Q4. (a) Give suitable explanation for the following: (2x5)

- (i) Potted plants can not grow when watered with sea water
- (ii) RBC relies on lactic acid fermentation for energy.
- (iii) Elevated levels of LDL are risk factors for Coronary heart diseases.
- (iv) Increase in permeability of capillaries is essential to inflammatory Immune response.
- (v) Hardy Weinberg conditions rarely exist.

(b) Name 2 organelles of each category and list one major function of each (2x3)

- (i) Double membrane bound
- (ii) Single membrane bound
- (iii) Non Membranous organelle

Q5. (a) Compare mitosis and meiosis as per the format given below (5)

Feature of comparison	Mitosis	Meiosis
1. type of cells in which it occurs		
2. number of daughter cells formed		
3. number of times DNA replication occurs		
4. crossing over		
5. Importance		

(b) Differentiate (2x2)

- (i) Lytic and Lysogenic cycle
- (ii) Lactic acid fermentation and Ethanol fermentation

Q6. (i) Write down the similarities and differences between Photosynthesis and respiration.

(ii) If the electron transport was absent, what is the net ATP yield from the oxidation of glucose to carbon dioxide and water, Justify?

(iii) Elucidate the effects of pH and temperature on enzyme activity.

(iv) What are gene regulator proteins? How are these involved in acetyl metabolism?

(v) How does primary, secondary, tertiary and quaternary structure of protein differ?

(vi) Mechanism of DNA replication, explain? (Write in steps)

(5+3+4+3+4+4)

Q7. (a) In a recombinant DNA experiment many human genes were cloned to produce a clonal library. Keeping in mind all resultant clones may not contain gene of interest, what steps would you like to proceed with to find particular clone of human interleukin-2 (one of the target gene).

(5)

(b) List out the different stages of a genetic engineering experiment.

(2)

© In humans the gene for normal color vision is dominant and the gene for color deficiency is recessive. Both genes are X-linked. A male who has normal vision mates with a female who is

heterozygous for normal color vision. What type of children can they have in terms of these traits and what is the probability for each type. (8)

Q8 (a) When children have chicken pox they run a fever and develop a rash that leaves them contagious for 5-7 days. In that time, the immune system mounts an attack resulting in the production of antibodies that help the cells of immune system fight the infection. If these children are exposed to chicken pox virus again, they do not develop the disease. Explain the mechanism that why the person doesn't develop chicken pox for the second time. (4)

(b) Mention the role of the following in 2 lines

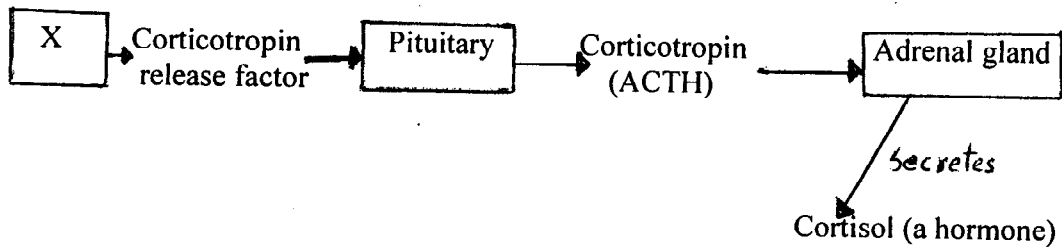
(i) Restriction enzyme

(ii) Lecithin

(iii) p53 gene

(2x3)

Q9. Study the following diagram and answer the questions that follow



(i) Name the tissue / organ/ gland denoted by X.

(ii) How does Cortisol concentration affect the secretion of corticotropin?

(1+4)

Q10. (a) What is Hardy Weinberg concept? What is its significance?

(4)

(b) How does Cell mediated immune response protect the body against invading pathogen and foreign cells.

(4)

Q11. This is a typical drawing made by a person who has severe damage in his brain. Identify the area of the brain and the hemisphere (left or right) that is damaged. Briefly explain your answer.

(4)



BITS PILANI DUBAI CAMPUS
SECOND SEMSTER 2006-07

A

QUIZ- 2

COURSE NO: BIO UC 111

COURSE NAME: GENERAL BIOLOGY

DATE: 1.05.2007

DURATION: 30 min

MAX MARKS: 30

All questions except Q No. 1, 4, 6, 21 and 23 carry one mark each

- Q1. _____ are bacterial proteins that have the ability to cut both strands of DNA molecule at a specific nucleotide sequence and the sequence is known as _____ (2)
- Q2. The small fingerlike projections in the small intestine are called _____
- Q3. Bile from the liver aids in the digestion of _____
- Q4. Complementary DNA is made *in vitro* (in the laboratory) by using _____ enzyme and _____ as usual template. (2)
- Q5. Bacteria protect their own genome from the degradation by Endonucleases by _____
- a) making double stranded cuts
 - b) cutting only phage or plasmid DNA
 - c) methylating their own DNA
 - d) phosphorylating their own DNA.
- Q6. A piece of DNA is introduced into ampicillin resistant gene of plasmid, which also has a tetracycline resistant gene. Bacteria transformed with this plasmid will be _____
- a) Sensitive to both antibiotics
 - b) Resistant to ampicillin only
 - c) Sensitive to tetracycline only
 - d) Resistant to both the antibiotics
 - e) Resistant to tetracycline only. (2)
- Q7. List 2 practical applications of Recombinant Technology to human health and agriculture.
- Q8. A network of vessels known as _____ collects the _____ and returns it to the circulatory system.
- Q9. The Vascular system that takes nutrients from the intestine to the liver includes the
- a) Glomerulus
 - b) Hepatic portal vein
 - c) Gastro-liver transport system
 - d) None of the above
- Q10. Four important things happen during inhalation are
- a)
 - b)
 - c)
 - d)
- Q11. The two most commonly used vectors are _____

Q12. The general purpose of all the valves in the circulatory system is to _____

Q13. Arterioles branch into network of very small blood vessels known as _____

Q14. The organ that removes water from indigestible material passing through it is the _____

Q15. A DNA molecule into which foreign DNA may be inserted and which can be returned to and replicated within a cell is known as _____

Q16. The stomach breaks down the food into a soft, partially digested mixture called _____

Q17. _____ seals a nick in a strand of DNA by creating a sugar phosphate bond between adjacent, disjointed nucleotides

Q18. As the blood leaves the heart on its systemic circuit, which is the correct pathway for a drop of blood.

- a) Artery, arteriole, capillary, venule, vein
- b) Artery, vein, arteriole, venule, capillary
- c) Vein, venule, capillary, arteriole, artery
- d) Vein, artery, venule, arteriole, capillary

Q19. When you are thirsty or dehydrated

- a) The hypothalamus produces more ADH and thus conserves the water in your system
- b) The hypothalamus produces less ADH and thus conserves the water in your system
- c) The kidney produces less ADH and thus conserves the water in your system
- d) The kidney produces more ADH and thus conserves the water in your system

Q20. Semilunar valve prevent the flow of blood into

- a) aorta
- b) Atria
- c) Ventricles
- d) Arteries

Q21. Presence of plasmid as well as inserted DNA in a bacterial colony can be confirmed by _____

(2)

Q22. In humans digestion occurs in all of the following except

- a) Duodenum
- b) Mouth
- c) Pancreas
- d) Small intestine
- e) Stomach

Q23. State TRUE or FALSE

- a) Fats are soluble in water that makes the action of Bile easier ()
- b) Walls of Trachea are supported by ring of cartilages to prevent collapsing ()
- c) Plasmids have a linear DNA and phage has a circular DNA ()
- d) Arteries contain valves that help in carrying blood to different parts of the body () (4)

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

BITS PILANI DUBAI CAMPUS

IInd SEMESTER 2006-07

TEST-2 (OPEN BOOK)

COURSE NO: BIO UC 111

COURSE NAME: GENERAL BIOLOGY

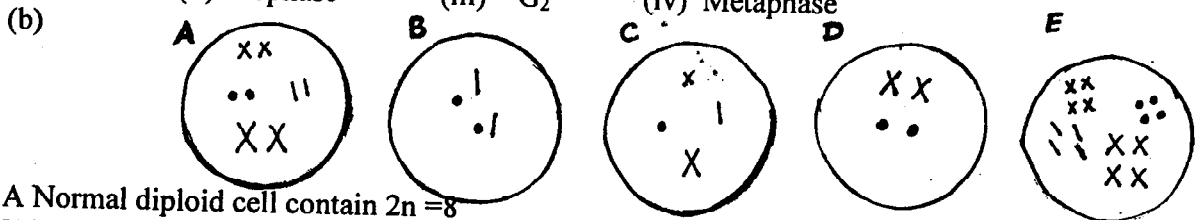
DATE: 15.04.2007

WEIGHTAGE: 20 % TIME: 50 min. MAX MARKS: 60

- Q1 (a) What is the unique about Prophase -1 of meiosis? (4)
 (b) How transcription differs in Prokaryotic and Eukaryotic organisms? (6)
 (c) How is it possible that a new born child is diabetic even though both the parents were normal for this trait, Explain? (4)

Q2. (a) Consider two alleles, A/a and B/b, each pair located on a different pair of chromosomes in the somatic cells of an organism. With regard to these alleles, what would you find in the cells that are in the following stages of cells / cell cycle. (6)

- (i) G₁ (ii) Prophase (iii) G₂ (iv) Metaphase



A Normal diploid cell contain $2n=8$

Which out of the above mentioned option A-E represents a Zygote and a gamete, Justify? (8)

- Q3 (a) Human body synthesizes many molecules at specific places /parts, how the synthesis of these molecules is controlled, explain with an example? (6)
 (b) Given below is a segment of coding region (Exon) of p⁵³ in Humans

- ATGACCGCTTATTCCGATT-

And it changes to - ATGGACCGCTTATTCCGATT-

- (i) Work out the m-RNA sequence after this change
 (ii) Give the biological term to explain this change
 (iii) Explain the impact of this event on the cell.

(12)

Q4. In fruitflies, dumpy wings are shorter and broader than normal wings. Allele for normal wings is dominant over dumpy wings. Two normal winged flies were mated and produced 300 normal winged and 100 dumpy winged flies. Work out what would be the probable genotypes of the parents. (6)

Q5. A light hair man has O blood type. Wife is heterozygous for dark hair and with AB blood group. (Dark color dominant over light)

- (i) What would be the probability of child with dark hair and A blood group? (8)
 (ii) Light hair and B blood group.

— GOOD LUCK —

BITS PILANI DUBAI CAMPUS
IInd SEMSTER 2006-07
QUIZ-1

COURSE NO: BIO UC 111
DATE: 27.3.2007

DURATION: 30 min

COURSE NAME: GENERAL BIOLOGY
MAX MARKS: 30

Name:	ID.No.	Sec.No:
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Q1. In alcohol metabolism -----acts as a coenzyme

Q2. Viruses are composed of

- A. Prokaryotic cells
- B. Eukaryotic cell
- C. Protein and Nucleic acid
- D. Membranous organelles

Q3. The two end products of light energy conversion stage needed for CO₂ conversion stage in photosynthesis are

Q4. The 5 carbon molecule needed for CO₂ conversion stage of photosynthesis is-----

Q5. In aerobic cellular respiration, the final electron acceptor is -----

Q6. Alternation of generation is a characteristic feature of

- A. bacteria
- B. Plants
- C. Viruses
- D. None of these

Q7. At its optimum temperature enzyme molecule

- A. Denatured rapidly
- B. Hydrolyzed slowly
- C. Form complex with substrate at a faster rate
- D. All of the above

Q8. Glycolysis and Krebs cycle convert the carbons of glucose in to, storing the energy as ATP, and

Q9. Chemical messengers that tell the cell to decrease the production of a certain protein are

- A) coenzymes.
- B) gene-repressor proteins.
- C) inhibitors.
- D) denatured enzymes.

Q10 Refrigerated food items stay fresh longer than otherwise because

- A. the enzymes of food are inactivated at low temperature
- B. micro organisms that cause food decay are rendered inactive, since these enzymes are inactivated at low temperature
- C. The protein that is present in food is inactivated at low temperature
- D. All of the above
- E. None of the above

Q11. Which of the following is proper sequence of taxa?

- A. Kingdom ,phylum, class, order , family
- B. phylum, Kingdom ,family, order, class
- C. Phylum, class ,order , family, species
- D. Kingdom ,phylum, family ,class, order

Q12. Which of the following is NOT true of photo system II?

- A. It is located in thylakoid membranes.
- B. It is involved in the oxidation of water.
- C. It has special oxidizable chlorophyll, P680.
- D. It has an associated antenna complex for light harvesting activity.
- E. It is required for cyclic photophosphorylation.

Q13. What three events occur during light reaction of photosynthesis

- A. Reduction of oxygen , oxidation of NADPH ,formation of ATP
- B. oxidation of water, reduction of NADP^+ , formation of ATP
- C. Fixation of CO_2 , Release of O_2 , synthesis of glucose
- D. Fixation of CO_2 , oxidation of water, reduction of NADP^+

Q14. .What is the purpose of the electron transport chain during the last stage of oxidative phosphorylation?

- (A)To create a proton motive force
- (B)To harness the power of the electron to phosphorylate ADP to ATP
- (C)To get rid of excess electrons
- (D)The function of this step is still not known

Q15. According to which of the patterns below are most enzymes named

- A) First the molecule involved; second the type of reaction; third the "-ase" ending.
- B) First the type of reaction; second the molecule involved; third the "-ase" ending.
- C) First the type of reaction; second some type of description; third the "-ase" ending.
- D) The molecule involved and the reaction type are interchangeable - followed by the "-ase" ending.

Q16. For attachment virus recognizes host cell's

(2)

- A. Nucleus
- B. DNA
- C. Membrane receptor
- D. Ribosomes

Q17 Fossil is -----evidence of prehistoric life

Q18. An organism that is multicellular, eukaryotic and heterotrophic is

- A. Plant
- B. animal
- C. protist
- D. Animal or fungus

Q19. Which of the following scientific names is written correctly?

- A. *Micropterus Salmoides*
- B. *Treponema pallidum*
- C. *Nymphaea odorata*
- D. *salmo Trutta*

Q20 Turnover number is the -----a single enzyme molecule in a given time

- A. Number of substrate molecules attached to
- B. Number of product molecules produced by
- C. Number of protein molecules required by
- D. Number of ATP generated by

Q21. At the end of glycolysis, each molecule of glucose has yielded 2 molecules of _____, 2 molecules of _____ and a net 2 molecules of _____.

(2)

Q22. During fat respiration, Glycerol molecule first converts to

Q23 To transfer the right amount of chemical bond energy from energy releasing to energy requiring reactions, cells use -----molecule

Q24. A rate of reaction from A to B (catalyzed by enzyme E) decreases significantly when compound C is added to the enzymatic reaction mixture. A high ratio of substrate A to compound C will minimize the effect of compound C, this is an example of

(2)

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

BITS PILANI DUBAI CAMPUS
SECOND SEMESTER 2006-07
TEST -1

COURSE NO: BIO UC 111
COURSE NAME: GENERAL BIOLOGY DATE: 04.03.2007

DURATION: 50 min
Maximum Marks: 60

- Q1. (a) List out various characteristics of life and briefly explain the control processes.
 (b) List out the various components of cell membrane.
 (c) List out the main /major functions of Cholesterol (3 points)

(5+2+3)

Q2. Complete the following table:

(10)

Biomolecules	Example	Monomeric unit	Function(1Major function)
Polysaccharide			
Disaccharide			
Protein			
Nucleic Acid			
True Fat			

- (b) Classify the proteins and write their functions giving example for each of these (9)

Type of Protein	Example	Function(1Major function)

- Q3 (a) Compare and contrast the mechanisms by which cells transport materials across the membrane and name what kind of molecules /ions are moved in each case (Give in tabular form only). (10)

- (b) Name the organelles which are known as ENERGY CONVERTERS, briefly describe the structure and function of anyone of these, how these organelles are different from other membrane bound organelle? (8)

- (c) The way a particular protein folds is important to its function, justify. (5)

Q4. Write down the differences between the following:

- (i) Lysosomes and peroxisomes (2 points)
 (ii) DNA and RNA (3 Points)
 (iii) Smooth and Rough Endoplasmic reticulum (2 points)
 (iv) Prokaryotic and Eukaryotic cell (3 Points) (8)

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