

# BITS Pilani – Dubai Campus

1<sup>st</sup> Semester 2010 – 2011

Third Year Biotechnology

Date: 27/12/2010

Cell Physiology (BIOT C331) Comprehensive Examination

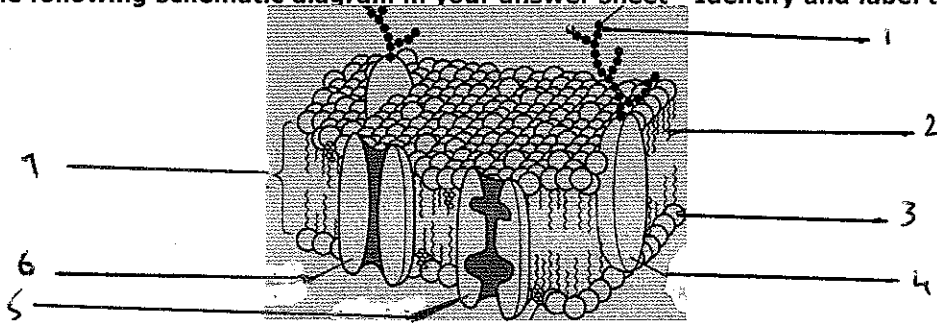
Weightage: 40% (Max Marks 80)

Duration: 3.00 hrs

**Instructions:** \* Answer to the point  
\* Draw the diagrams where ever necessary  
\* All parts of the questions have to answered together

1) What type of genes do Prokaryotes & Eukaryotes have? (2)

2) Draw the following schematic diagram in your answer sheet - Identify and label the parts (4)



3) What is Extra-Cellular Matrix? Give an example and mention its Components. (5)

4) Explain the two types of pathways exhibited in EPR (4)

5) Elucidate briefly the methods of lipochondria formation (5)

6) Write the differences between (5x2=10)

- Euchromatin & Heterochromatin
- Centromere and Telomere
- pinocytosis and phagocytosis
- Nuclear Lamina 1 & Nuclear Lamina 2
- Free and membrane bound ribosomes

7) Mention the features of various types of Electron Transport Complexes (5)

8) In what way the cell wall of a plant helps in the process of signaling? (5)

9) Write short notes on the following: (5x3=15)

- Role of Peroxisomes in plant cells
- Six known classes of enzyme-linked receptors
- types of meiosis
- Lignin
- Caspases

10) Explain the process of Calvin Cycle (5)

11) Following are the stages of meiosis jumbled up. Write them in proper sequence (5)

Pachytene,	Anaphase II	Prophase II	<i>Synaptonemal complex</i>	Interkinesis
Meiosis II	<i>Diplotene</i>	Telophase I	Synapsis	<i>Zygotene</i>
<i>Chiasmata</i>	S phase	Prophase I	<i>Leptotene,</i>	Bivalent / tetrad
Metaphase I	Metaphase II	Crossing over occurs		Diakinesis

12) Write a note on various categories of histones. (5)

13) Explain the process of Cytokinesis in Plant Cells stepwise (5)

14) What does it mean, Crosstalk with reference to cell physiology? (5)

“ALL THE BEST”

**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI – DUBAI CAMPUS**

**1<sup>st</sup> Semester 2010 – 2010**

**Cell Physiology (BIOT C331)**

**Test- 2 (Open Book)**

Date: 28/11/2010

Duration: 50 minutes

Weightage: 20(Max Marks 40)

**Instructions:** Only prescribed text book and hand written notes are permitted.  
Answer to the point, all parts of the questions have to answered together and draw diagrams wherever necessary.

1. Briefly mention some of the obvious structural and functional similarities and contrasting features of chloroplasts and mitochondria. (8)
2. How do C3 and C4 plants differ? (6)
3. Out of two photo-systems PS - I and PS - II, the later works as a light trapping complex. Connote the above fact. (6)
4. How the chlorophyll and haemoglobin is diverse in their chemical nature? (4)
5. Mention the role of Transport receptors of nuclear envelop. (5)
6. What are the different forms of chromatin exhibited during cell cycle? (5)
7. What do you mean by epigenetic modification? Illustrate with an example. (6)

**"ALL THE BEST"**

**BITS, Pilani – Dubai**  
**1<sup>st</sup> Semester 2010 – 2011**

**Third Year Biotechnology**

**Cell Physiology (BIOT C331)**

**Test – 1 (Close book)**

Date: 17/10/10 (Su/2)

Duration: 50 minutes

Weightage: 25 (Max Marks 50)

Instructions: Answer to the point  
All parts of the questions have to answered together  
Draw diagrams wherever required

- 1) Mention the features which held in common in both prokaryotic and eukaryotic cells. (6)
  
- 2) Write a short note on membrane proteins. (4)
  
- 3) Lipid bilayer is highly impermeable to charged substances but still there is a rapid conductance across the membrane. How does it take place? (3)
  
- 4) In a morphometric study, if eukaryotic mitochondria were 3.5micro meter in width, how many angstroms would it be? How many nano meters? And how many mille meters? (3)
  
- 5) Write briefly on the following: (4 x 3 = 12)
  - a) Desmosomes
  - b) Plasmodesmata
  - c) Translocon
  
- 6) Explain the mode of movements of materials through golgi complex – two controversial views (VSM , CMM) (6)
  
- 7) Describe the structure and functional differences between RER and SER (8)
  
- 8) Explain the mechanism of secretory and integral membrane protein synthesis. (8)

*"All the Best"*

**BITS, Pilani – Dubai**

1<sup>st</sup> Semester 2010 – 2011

Cell Physiology (BIOT C331)

Date: 10/11/2010

**version - A**

Duration: 20 minutes

Quiz -1 (Close book)

Weightage: 8 (Max Marks 24)

Name: \_\_\_\_\_

ID No: \_\_\_\_\_

**Instructions:**

- Underline the right choice.
- Marking more than one option (when not required) for MCQ will not be evaluated
- Write precise answers

(20 x ½ = 10 marks)

**1. The tricarboxylic acid cycle uses \_\_\_\_\_ to generate reducing equivalents.**

- a) NADH      b) Acetyl CoA      c) Oxygen      d) The proton motive force

**2. Which of the following is NOT produced by the electron transport system?**

- a) Oxygen      b) proton gradient      c) heat      d) reactive oxygen species

**3. The functional linkage between oxidation and phosphorylation depends on**

- a) How many reducing equivalents are generated.      b) The magnitude of the proton motive force.  
c) The integrity of the inner mitochondrial membrane.      d) The integrity of the outer mitochondrial membrane.

**4. Glycolysis is important to a cell for many reasons. Which of the following is NOT one of these?**

- a) Unlike oxidative metabolism, glycolysis can proceed in the absence of oxygen.  
b) Only glycolysis can produce ATP at a rate great enough to meet the energy demands of some tissues, such as the muscles used to sprint.  
c) Glycolytic intermediates are used as important substrates in pathways that lead to the synthesis of other molecules, including carbohydrates, nucleic acids, amino acids, and fatty acids.  
d) Glycolysis is a major source of heat production in cells

**5. Cells can convert \_\_\_\_\_ to \_\_\_\_\_ and \_\_\_\_\_ using the enzymes of gluconeogenesis.**

- a) Glucose; pyruvate; glucagon      b) pyruvate; glucose; glycogen  
c) Glycogen; glucose; pyruvate      d) pyruvate; NADH; acetyl CoA

**6. Fatty acids are broken down to acetyl CoA by**

- a)  $\beta$ -oxidation.      b) Lipogenesis.      c) Lipolysis.      d) Pyruvate dehydrogenase.

**7. The ratio of CO<sub>2</sub> produced to O<sub>2</sub> consumed is known as the**

- a) Reducing equivalent      b) Reciprocal regulation      c) Fluid mosaic model      d) Respiratory quotient (RQ).

**8. What is the "mitochondrial reticulum"?**

- a) A network of interconnected mitochondria.      b) The outer mitochondrial membrane.  
c) Another name for the electron transport system.      d) The very centre of the mitochondrial matrix.

**9. Proteins are carried between cellular compartments in small membrane-bound organelles called**

- a) mitochondria.      b) endoplasmic reticulum.      c) vesicles.      d) dyneins.

**10. RNA polymerases synthesize mRNA from a DNA template during \_\_\_\_\_, and protein is produced from a mRNA template during \_\_\_\_\_.**

- a) translation; transcription      b) transcription; translation  
c) replication; translation      d) transcription; alternative splicing

**11. How can cells regulate the rate of mRNA synthesis?**

- a) By altering the conformation of the gene & changing the ability of the transcriptional machinery to assemble.  
b) By changing the activity of DNA polymerase.  
c) By altering the activity of ribosomes and amino acyl tRNAs.  
d) By activating the proteasome.

**12. RNA is degraded by nucleases called**

- a) Ubiquitin.      b) RNAases.      c) Amino acyl tRNAs.      d) Mobile elements.

**13. The function of the mitochondria is to**

- a) Create ribosomes      b) Direct the cell's activities  
c) Release energy into the cell      d) Aid in the "digestion" of the cell

PTO

14. Mitochondria have their own \_\_\_\_\_, which are used to synthesize proteins from amino acids.  
a) enzymes                      b) DNA                      c) ribosomes                      d) RNA

15. Cells cannot store glucose; the glucose must be converted to \_\_\_\_\_ in order to be stored.  
a) Acetyl CoA                      b) Fructose                      c) Pyruates                      d) Lactose

16. The outer membrane of the mitochondria protects the organelle, and contains specialized transport proteins such as \_\_\_\_\_.

17. The inner mitochondrial membrane makes it very hard for small ions to get through due to having a very high content of \_\_\_\_\_.

18. In which aspect mitochondria is homologous to proxisomes

19. Mitochondrial DNA replication & division occurs during \_\_\_\_\_.

20. Lysosome is a \_\_\_\_\_ surrounds enzyme-rich matrix  
a) single biomembrane                      b) non-membranous                      c) double membranous                      d) tripartite

21. Mention any three major functions of proxisomes in human liver (1.5)

i

ii

iii

22. Mention the role of Peroxisomes in plant cells. (1)

a

b

23. Mention six functional aspects of lysosome (3)

1

2

3

4

5

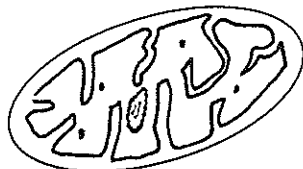
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24. Since the lysosome is full of digestive enzymes that can digest essentially all cellular components, Why doesn't the lysosome digest itself? (1.5)

25. Write briefly on  
a) Tay-sachs (4)

b) Cardiolipin

27. Label and mark the three stages of cellular respiration in the given diagram (3)



Cytosol