

NATIONAL INSTITUTE OF TECHNOLOGY, JAMSHEDPUR

Time: 2 Hours

Mid-Semester Examination

Full Marks: 30

Branch: ME, MME, PIE & ECM

Subject: Science of Living System (HS 1102)

Answer all Questions

1. How normal human beings breathe Oxygen from the atmosphere? Justify your answer with respect to the difference in partial pressure of Oxygen. [5]
2. What is Central Dogma? Considering an Eukaryotic cell, name the following:
 - a) Kitchen of the Cell
 - b) Protein factory of the Cell
 - c) Control room of the Cell [5]
3. How the process of Aerobic respiration takes place in various steps? Write down the key chemical reaction of Lactic acid and Ethanol Fermentation. [5]
4. a) There are 28 chromosomes in a sperm cell of a Sheep which is 20 pg in content. What would be the number of chromosomes and amount of DNA (content) in the 'Sperm Mother Cell' during G₁ and G₂ phases of cell cycle? [2.5]
b) Give the step by step reactions of Glycolysis. How many unit(s) of energy is produced during this cycle? [2.5]
5. With a labelled diagram, describe the process of Prophase-1? Taking 4 chromosomes in the nucleus, describe the different phases of Meiosis-1? [5]
6. Describe the following cycle:
 - a) Cell cycle [2.5]
 - b) C₄ cycle [2.5]

ALL THE BEST

NATIONAL INSTITUTE OF TECHNOLOGY, JAMSHEDPUR

Time: 3 Hours

End-Semester Examination-Dec,23

Full Marks: 50

Branch: MME, ME, PIE and ECM

Subject: Science of Living System (HS 1102)

Answer all Questions

1. a) In a double stranded DNA, Adenine is 21%. What would be the % of other nitrogenous bases in the DNA? [3]
- b) The length of *E.coli* DNA is 1.36 μm . What would be its length in base pair? [3]
- c) What are sugars? Classify its various types for ease in studies. [4]
2. A short piece of DNA, having 20 base pairs, was analyzed to find the number of nucleotide bases in each of the polynucleotide strands. Some of the results are shown in the table: [5]

	Number of Nucleotide bases			
	Adenine	Cytosine	Guanine	Thymine
Strand 1	4	4	A	B
Strand 2	C	5	D	E

Find the values of A, B, C, D and E.

- b) What is PCR? Discuss the various steps involved in PCR. Write the programming for a standard PCR. [5]
3. a) What is enzyme? What are the various factors that affect the enzyme activity in an isolated system? [5]
- b) What is Mitosis? Taking 4 chromosomes in a cell show the various steps. [5]
4. a) What is Protein? Show the formation of a peptide bond and the various charges present in the amino acids. [5]
- b) If the first three alphabets of a 6 bp long recognition sequence of a restriction endonuclease are 'AGT'. What would be the next 3 alphabets? [3]
- c) What is the length of human DNA/cell (in base pair) when it is said diploid. [2]
5. a) What is DNA? Give its composition and describe its chemical structure. [5]
- b) Write down the various upstream processes of r-DNA Technology. Explain the screening of transformants using blue-white colony based screening. [5]

ALL THE BEST