

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -I EXAMINATIONS-2026

B. Tech V-Semester (BT)

COURSE CODE (CREDITS): 18B1WBT532 (3)

MAX. MARKS: 15

COURSE NAME: COMPARATIVE AND FUNCTIONAL GENOMICS

COURSE INSTRUCTOR: DR. JATA SHANKAR

MAX. TIME: 1 Hour

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

Q. No	Question	CO	Marks
Q1	What is the approximate genome size of the human genome, and how many protein-coding genes does its genome contain? Using these values, calculate the gene density of human genome. Also state the total number of chromosomes present in human genome.	CO I	2
Q2	Describe in detail the principle and mechanism of Sanger sequencing. Draw and label the structures of a deoxyribonucleotide (dNTP) and a dideoxynucleotide (ddNTP), highlighting the structural difference responsible for chain termination. Explain the significance and interpretation of the chromatogram generated during Sanger sequencing. Also, provide a brief historical account of the development of Sanger sequencing, including the major milestone year	CO I	4
Q3	Compare the genomic organization of <i>Escherichia coli</i> and humans with respect to protein-coding regions. State the approximate percentage of each genome that encodes proteins, and explain what contributes for the coding region differing substantially between these two distantly related organisms	CO II	3
Q4	Prior to Sanger sequencing, millions of copies of the target DNA template are generally required for generating a detectable signal. Describe the different strategies that can be employed to generate multiple copies of an unknown DNA template for Sanger sequencing, including the principles and key steps involved in each approach	CO I	3
Q5	In a human genome sequencing dataset, a nucleotide position has a Phred quality score (Q-score) of 40. What is the corresponding number of an incorrect base call, and approximately what percentage of base calls would be expected to contain errors at this quality score	CO II	3