

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -2 EXAMINATION- 2025

MTech-I Semester (BT)

Course Code (Credits): 13M11BT114 (3)

Max. Marks: 25

Course Name: High Throughput Technologies (13M11BT114)

Course Instructors: Dr. Abhishek Chaudhary

Max. Time: 1.5 Hour

Note: (a) All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q.No	Question	Marks
Q-1	Fluorophores are used in multiple gene sequencing applications, most notably in next-generation sequencing (NGS) and Sanger sequencing. The technique involves tagging DNA with fluorescent molecules to enable high-throughput and accurate detection of the DNA sequence. If ethanol and cyclohexane are used as solvents for the fluorophore solution, what effect will you see on the emission behavior of the fluorophore and how will these different solvents impact gene sequencing?	5
Q-2	Pyro-sequencing is one of the most important method used in high-throughput screening, single nucleotide polymorphism (SNP) detection, and quantifying DNA methylation. It also enables high-throughput analysis for genetic mutations, insertions, and deletions in pathogens and other microbes. What does the term "pyrosequencing" mean to you? How might this be applied to the sequencing of genes? Describe the sequencing process's steps and underlying principles. Explains pyrosequencing's limitations as well.	1+1+2 +2+1
Q-3	The number of photon emitted or emission intensity by DAPI (chromophore) is 6.0×10^{18} but in the presence of quenching agent the number of emitted photon from the same compound is 1.5×10^{16} . What would be the concentration of quenching agent? Value of quenching constant is 8 LMol^{-1} . Also calculate the quantum yield of the same compound [5]	5
Q4	The advancement in high-throughput technology (HTT) has revolutionized the field of biology. This technology has become a crucial tool in many areas of research, allowing scientists to generate vast amounts of genetic data at a much faster pace than traditional methods. With this, researchers can now address critical questions and gain new insights into the inner workings of living organisms, as well as the underlying causes of various diseases. Detail out at least five important applications of HTT in modern science.	2

Q5

Consider the Jablonski diagram below, in which 06 processes are indicated: Identifying the listed processes from the Jablonski diagram and detail out each process. Also calculate the Stokes shift from the diagram.

6

