

VI SEMESTER B.TECH. (BIOTECHNOLOGY) END SEMESTER EXAMINATIONS, APRIL 2018 SUBJECT: GENOMICS AND PROTEOMICS (BIO 4005) REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

5

3

2

Instructions to Candidates:

Answer **ALL** the questions.

Missing data may be suitable assumed.

The future of genomics rests on the foundation of the Human Genome Project. Assign the following: Genomics to Health, Genomics to Society, Education, Ethical Legal & Social Implications (ELSI), Technology Development, Resources, Training, Genomics to Biology and Computational Biology as a building blocks in the below given image.

1A.

1B.



In a pyrosequencing of a short DNA molecule, the reaction started with the addition of dATP (see the left end of the below figure) and then dTTP, dCTP, dGTP, so forth were added sequentially as indicated by the letters A, T, C, G, respectively. The curve shows the changes of luminescence in the reaction mixture. Which of the following statements are true for peak A of the curve?

(A): Its appearance was caused by the presence of three adjacent thymines in 2
 the template. (B): Three molecules of dATP per template/primer complexes were consumed at this point of the

reaction. (C):Three molecules of pyrophosphate per template/primer complexes were released at this point of the reaction. (D): B and C. (E): A, B and C.

CGA

1C	What is the "ENCODE Project	" and why its goals are important?	
----	-----------------------------	------------------------------------	--

CGA

B

CGA

- 2A
 What is the difference between forward and reverse genetics? Explain one of the approaches in reverse genetics.
 4
- **2B** List the genome content of eukaryotes?

GA

G

Fill the table based on your knowledge on Genome Editing tools: Property CRISPR TALEN ZFN Recognition 2C 4 Methylation Sensitivity Construct Mechanism of action Before the genome project, it was assumed that all normal human individuals possessed identical nucleotide sequences in their chromosomes. It was also considered that those who suffered from a disease, differed from the normal individuals only in the DNA sequence of the 3A aene(s) involved in causing the disease. However, once the entire genome sequences of 3 many normal individuals were deciphered, it became obvious that they differed in their nucleotide sequences in one or more places. What such difference in the nucleotide sequences has revolutionized genomics perspective? Comment on it. An arduous investigation on lifespan of proteins by Varshith, concluded that C-terminal rule or C-end 3B rule applies to all prokaryotic and eukaryotic organisms. He also proposed that the only role of 4 ubiquitination is to ear mark the protein for proteolytic degradation. What are the flaws in this study? Proteomics of body fluids is important because it flows through the body and comes in contact with several tissues of different organs in the body; thus, it is possible to pick up proteins that may prove to 3C 3 be an ideal biomarker of disease and may provide clues for drug development. List the body fluids and the technical challenge involved for this type of study. A single phosphate group has been added through phosphorylation, an important post translation **4**A 4 modification (PTM). How we can measure the subtle changes in the protein? Explain. 4B Beyond protein identification, detail the technical scope and future developments of proteomics? 3 The yeast two-hybrid (Y2H) system determines the interaction of a number of proteins to a known protein. The principle of this technique is based on the fact that both the DNA binding domain (BD) 4C 3 and the activation domain (AD) are required for the transcription of a gene. Alternatively, how proteinprotein interaction can be studied in vitro? Detail the working principle as well. Novartis conducted a comparative study between two individuals (healthy & diseased) to develop new drug targets for killing the skin cancer melanoma. Their subsequent study attributed to avoid drugs 5A 5 with side effects. How proteomics can help in understanding drug development and drug side-effects? Explain through a flow chart. How metagenomics and metaproteomics approaches assist our comprehension towards 5B 3 microorganisms and human body? 2D gel technology has emerged as an important technology to analyze proteomes. Examples include descriptions of hundreds of proteins in human and rat brain, characterizing traits of beer, studying 5C 2 vaginal, nasal, or other secretions, or during the cell cycle of bacteria. What are the shortcomings of this approach?