COURSE CODE (CREDITS): 14M11BT213 (3)   MAX. MARKS: 35

COURSE NAME: FUNCTIONAL GENOMICS

COURSE INSTRUCTOR: DR JATA SHANKAR   MAX. TIME: 2 Hours

Note: (a) *All questions are compulsory.*

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

Q. No.	Question	Marks
Q1	Explain the underlying principle and procedural steps involved in Serial Analysis of Gene Expression (SAGE). How does this technique facilitate the comparison of gene expression profiles between two distinct cell types?	5
Q2	Explain how genetic variations in patients influence the therapeutic efficacy and safety of the anticoagulant drug Warfarin. Discuss the key pharmacokinetic and pharmacodynamic factors involved in its metabolism and action.	5
Q3	What is RNA interference (RNAi) technology? Provide an overview of gene silencing mechanisms, including the role of microRNAs (miRNAs). Why is RNAi considered a valuable tool in functional genomics research? Illustrate its relevance with an example of miRNA function in a model organism.	5
Q4	Describe DNA microarray and its workflow. Explain the importance of normalisation in correcting systematic variations and biases. Differentiate between pre-normalized and post-normalised data, highlighting how normalisation helps in accurately identifying true biological differences in gene expression.	5
Q5	Discuss the concept of gene density and compare the genomic organisation of *E. Coli* with that to *Saccharomyces cerevisiae* (yeast) and the human genome. How do differences in gene density reflect the complexity and regulation of gene expression in these organisms?	5
Q6	Illustrate, with a suitable example, how the identification and characterisation of single-nucleotide polymorphisms (SNPs) contributed to the development of genetic markers for distinguishing between healthy and diseased individuals, with specific reference to the TP53 oncogene.	5
Q7	What is quantitative real-time PCR? Differentiate between qualitative and quantitative assessment of biomarkers? How does it help to identify the pathogen or an unhealthy condition, describe keeping viral infection as an example in cancer patients?	5