MSc MICROBIOLOGY
IBSBT, CSJM UNIVERISTY, KANPUR
MIC 405: MICROBIAL GENOMICS AND PROTEOMICS Question Bank

Unit 1.

1. Write short notes on Importance of Omics technology in biology
2. What do you understand by Structural genomics
3. Describe the significance of Functional Genomics
4. How can one use Comparative genomics for identification of unknown organisms and gene functions
5. Expand on the importance of SNP
6. Discuss the role of EST, GSS and STS in genomics
7. Write short note on Genomics impact in agriculture
8. Briefly explain Genomics impact in environment
9. What is the impact of genomics and proteomics in medicine
10. Write a short note on Pharmacogenomics
11. Write a short note on Clinical genomics
12. What is Metagenomics
13. What are the Recent developments in genomics
14. Differentiate between Physical mapping and genetic mapping
15. Differentiate between Structural genomics and Functional genomics
16. Differentiate between Genetics and Genomics
17. Describe in detail the current developments in microbial genomics and proteomics
18. Describe in details techniques used to determine differential gene expression using functional genomics
19. Differentiate between minisatellite and microsatellite
20. Describe in detail different gene markers used in physical mapping and their significance.
21. Describe in detail how polymorphism is used in the study of genomics
22. How does transcriptomics differ from genomics. Describe high throughput technologies for determining differences in gene regulation of cells under environmental stress.
23. What is pathogenomics. Describe how study of comparative genomics has helped in the understanding of virulence factors and antimicrobial resistance amongst pathogens
24. Describe how genomics has changed preconception about prokaryotic genomes and their functions
25. Describe briefly history of microbial genomics with suitable examples

Unit 2.

1. Why do we need to have different sequencing strategies depending on organism .
2. Write a short note on DNA barcoding in genome sequencing
3. Write short note on shotgun cloning

4. Write short note on large insert vectors
5. Write a short note on Pyrosequencing technology
6. Write a short note on Illumina Reverse terminator Sequencing technology
7. Write a short note on 3rd generation sequencing technologies and their applications
8. Differentiate between YAC, BAC and MAC vectors
9. Differentiate between dominant and codominant gene markers with help of examples and their use in genome mapping
10. Differentiate between genetic and physical mapping
11. Why is RFLP and SSR codominant while AFLP is dominant gene markers and how are they used in genome sequencing studies
12. Which genetic markers allow differentiation or provide information about coding sequences
13. Differentiate between SSR and RAPD as genetic markers
14. Differentiate between SSR polymorphism and SNP polymorphism
15. Describe the different types of vectors used for prokaryotic and eukaryotic genome sequencing
16. Differentiate between hierarchial, shotgun and clone contig clong approaches
17. What do you understand by Next Generation Sequencing.
18. Elucidate on the different sequencing by synthesis method.
19. Using suitable diagrams, describe the recent developments in Genome Sequencing technologies
20. What are the major advances in NGS over the traditional sequencing by cloning and sequencing methodologies
21. What are the different types of gene libraries. Describe in detail methods of preparaing genomics library
22. Describe with suitable flowchart, methodology of developing a cDNA library
23. Differentiate between applications of genomic, cDNA and amplicon library
24. How do sequencing strategies differ between prokaryotic and multicellular eukaryotic cells.
25. Describe the sequencing strategies used for the sequencing of E.coli genome.

UNIT 3.

1. Write a short note on Genome annotation
2. Write short note on UniProt
3. Write short note on PDB
4. Provide full form of the following acronyms : PDB, CATH, ExPASy
5. Write a short note on Protein Funtional Analysis Tools
6. Write a short note on BLAST and its applications
7. Write a short note on phylogenetic analysis
8. Write a short note on gene chips
9. Differentiate between Swissprot and Tremble
10. What are the different methods of protein structure prediction and modeling
11. Describe the importance of transcriptomics and proteomics
12. Write a short nore on PHI and PSI BLAST
13. Write a short note on Megablast
14. What are the applications of tBlastx
15. Describe in detail the various high throughput technologies used for the proteomic analysis

16. Describe in detail importance of 2D Gel electrophoresis and mass spectrometry in proteomics
17. How does peptide fingerprinting help in determining the proteome of a given sample
18. Describe the design of different types of DNA microarrays and their applications
19. What are the different types of protein microarrays and their specific applications
20. Differentiate between analytical, functional and reverse phase protein microarrays
21. Differentiate between Oligonucleotide and cDNA microarrays with their applications
22. Describe in detail the different steps in the design of microarray for determining differential gene expression between normal and cancer cell lines
23. Describe a high throughput technology for determining nucleic acid interacting protein partners.
24. Expand on the Microarray based approach to environmental metagenomic biodiversity studies
25. How are DNA microarrays used in the detection of SNPs

Unit 4.

1. Write a short note on NCBI
2. Write full forms of NCBI, EBI, DDBJ, GEO, KEGG, MEGA
3. Write the full forms of EMBL, EBI, DDBJ, SRA
4. What are genome browsers and their applications
5. Write a short note on patents and copyrights in genomics
6. Write a short note on LAN, WAN and WWW
7. Define the following: HTTP, URL, HTML, IP, MAC
8. What was the significance of the Budapest Treaty for the field of genomics
9. What is cloud computing and what are its applications in genomics
10. What is IoT and its applications in biological systems
11. Write a short note on primary nucleotide databases
12. What are the different types of databases in biological systems
13. What are the different genome submission portals in nucleotide dataases
14. Differentiate between pairwise and multiple sequence analysis and its use in phylogenetics
15. Write a short note on importance of BankIT
16. Differentiate between primary and derived biological databases
17. What are the importance of the following: ESTdB, DBA barcode database
18. Write a short note on phylogenetic analysis. What do you understand by rooted and unrooted trees.
19. What is FASTA sequence and what is its importance
20. What is the significance of networking and internet for the field of genomics
21. Describe in detail the role of routers and the layers associated with computer networking
22. What are the recent advances in networking technology that have also helped in the advancements in genomics
23. Describe the different ways in which prokaryotic and eukaryotic genome submissions can be made to public database such as NCBI
24. Comment on the importance of patenting of genes, gene locations and engineered DNA.

25. Describe the importance of freely accessible public databases in the field of genomics and proteomics.