BSBE/02.26.2024/09.00-11.00

Indian Institute of Technology Guwahati

Mid Semester Examination

BT 207: Genetic Engineering

Time: 2 hours Total Marks: 50

Questions (Q) 1 – 7: 1 x 7 = 7 Marks

Q1. What is the size of human genome (haploid) in Mb?

Q2.. .....technique can reveal "satellite" DNA bands present in the human genome (fill in the blank).

Q3. TRIzol is used for.....isolation (fill in the blank).

Q4.....PCR technique can be used to amplify unknown DNA sequences located near a known sequence (fill in the blank).

Q5. What is the major difference between dNTPs and ddNTPs?

Q6. What is the basis of protein separation by the isoelectric focusing (IEF) technique?

Q7. Why GFP can be used for reporter assay?

Questions (Q) 8 – 13: 2 x 6 = 12 Marks

Q8. What are the phosphates labelled for i) labelling an entire DNA fragment and ii) end labelling of a given DNA fragment?

Q9. What are the names of the core histone proteins present in a nucleosome?

Q10. Write a major difference between **minisatellite** and **microsatellite** clusters in a genome. Why no two individuals have the same genetic profiles?

Q11. How many copies of the original double-stranded DNA target will be formed after 5 cycles of a PCR reaction?

Q12. Sequence of a given DNA fragment is 5'-TTGTCGAAGTCAG-3'; if the sequencing is done using the complementary strand, then what will be the order of the nucleotide in a capillary gel electrophoresis from TOP to BOTTOM direction?

Q13. Draw the steps for site-directed mutagenesis with an example.

Questions (Q) 14 – 18: 3 x 5 = 15 Marks

Q14. Write one-line definition for (i) genome, (ii) transcriptome, and (iii) proteome.

Q15. Draw a graph and describe how Real-time PCR is different from traditional PCR.

Q16. What are CHIP and EMSA, and what are the applications of these techniques?

Q17. Write a typical PCR program and show the cycling steps using arrows.

Q18. Describe briefly the microarray technique.

Questions (Q) 19 – 22: 4 x 4 = 16 Marks

Q19. Draw two labelled figures for i) nested PCR, and ii) RAPD technique.

Q20. What were the major steps for human genome project? Write two major applications of the human genome sequence project. Write name of any two database resources.

Q21. What is the basic principle of SYBR green dye and TaqMan probe used in the Real-time PCR?

Q22. Design PCR primers of 18 nucleotides and write their sequences in the 5'→3' direction to amplify any fragment of 10 bp in size for the given DNA sequence.

5'-GCTCGCTAGGCTAGGCTCTGAAAGGGCCCTATATATATATATGCTAGCTAA-3'

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