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SARDAR PATEL UNIVERSITY
M.Sc.(Integrated) Biotechnology
5th Semester Examination
Saturday, 1st December, 2012
10:30a.m. to 1:30p.m.
PS05CIGB02: Recombinant DNA Technology

Total Marks: 70

Note (i) Figures to right indicate marks.
(ii) All questions are compulsory.

Q.1 **Choose the most appropriate alternative for the following: (All are compulsory)** [8]

1. A recombinant DNA molecule is produced by joining together
   a. One mRNA with a DNA segment
   b. One mRNA with a tRNA segment
   c. Two mRNA molecules
   d. Two DNA segments
2. Calculate melting temperature for given primers and suggest annealing temperature for PCR reaction:
   R:AGGAACTGCCAGTGCGA and F: CTAGGGCGCAGCACTAG
   a. 50°C b. 54°C c. 60°C d. 62°C
3. After how many cycles PCR starts to give correct size product?
   a. After 1st cycle both long and correct products start forming
   b. After 2nd cycle with long products correct product also start to form
   c. Only after 3rd cycle correct products will be form
   d. After 4th cycle will be no long products and only correct products will form
4. Which DNA fingerprinting technique involves both restriction digestion and PCR?
   a. RFLP b. RAPD c. AFLP d. SCAR
5. ddNTP is modified at which part of nucleotide?
   a. Nitrogen base
   b. 2' carbon of pentose sugar
   c. Phosphate back bone
   d. 3' carbon of pentose sugar
6. Which technique is faster for DNA sequencing?
   a. Maxam-Gilbert
   b. Sanger sequencing
   c. Automated sequencing
   d. Pyrosequencing
7. Glyphosate is herbicide which inhibits which metabolism of plants?
   a. Fat metabolism
   b. Aromatic amino acid formation
   c. Electron Transport System
   d. Krebs cycle
8. Humulin, a genetically engineered insulin was produced for the first time by
   a. Biocon India Limited b. Glaxo c. Genentech d. Cipla

Q.2 **Attempt <u>any seven</u> of the following:** [14]

1. Write function and application of Alkaline phosphatase in biotechnology.
2. Give the criteria of nomenclature of restriction enzymes.
3. List out the chemicals required for DNA isolation along with their function differentiating between bacterial and plant cells.

4. Apply the formula of Clarke & Carbon to find out how many independent recombinants (N) are required for 20Kb sized fragments of $2.8x10^6$ Kb sized haploid human genome to get 95% (P=0.95) probability?
5. Write the factors affecting PCR.
6. Write the criteria of primer designing for PCR.
7. Give difference between dominant and co-dominant marker systems. Classify different DNA fingerprinting techniques into dominate and co-dominate markers.
8. Separate a sequence 5'-*AGACTTCAAGT-3' on gel based on the principle of Maxam-Gilbert method. Assumed that radiolabeling is at 5' end. Indicate the no of bases and sequence of resolved band in any one side of the gel diagram.
9. Explain metabolic engineering with suitable examples.

Q.3 A. As per the name "restriction enzymes", what they restrict in nature? How bacteria protect its own DNA from restriction digestion. Explain mechanism of Type-II restriction enzymes. [6]

B. Discuss the mechanism of cDNA cloning strategy along with the disadvantages? [6]

OR

B. Discuss in detail the steps involved in rDNA technology. [6]

Q.4 A. Explain the PCR technique applied for (i) Allele-specific amplification, and (ii) used to join two large units of DNA from two different sources. [6]

B. Explain the different types of DNA polymerases used in PCR. [6]

OR

B. Give the method and application of inverse PCR and nested PCR. [6]

Q.5 A. Explain PCR based DNA fingerprinting technique applied as dominant marker. [6]

B. Write the method and principle of Sanger sequencing. [6]

OR

B. Explain the principle and application of SSR and DGGE. [6]

Q.6 A. Explain the production of insulin, hirudin and phytase through recombinant DNA technique. [6]

B. Give a note on edible vaccines and plantibodies. [6]

OR

B. Gene Therapy [6]

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