	Utech
Name :	
Roll No.:	A Agency Of Exercising 2nd Explored
Invigilator's Signature :	

CS/M.Tech(BT)/SEM-1/MBT-102/2009-10 2009

GENETIC ENGINEERING

Time Allotted: 3 Hours Full Marks: 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP - A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following:

 $10 \times 1 = 10$

- i) Genetic engineering techniques that depend on the formation of RNA-DNA + hybrids is
 - a) DNA sequencing
- b) northern blotting
- c) western blotting
- d) none of these.
- ii) Which of the following components terminates the chain in sequencing reaction?
 - a) Klenow fragment
- b) Deoxy nucleotide
- c) DNA primer
- d) Dideoxy nucleotide.
- iii) A vector DNA sequence containing multiple unique restriction enzyme cut sites, convenient for inserting foreign DNA called
 - a) ribosome binding site b) multiple cloning site
 - c) promoter
- d) none of these.

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- Which of the following techniques would you allow a researcher to determine the genetic relatedness between two samples of DNA?
 - Inverse PCR
 - TA cloning b)
 - Reverse transcribed PCR c)
 - Randomly amplified polymorphic DNA.
- A nucleic acid segment used to identify specific DNA v) molecules bearing the complementary sequence, in recombinant DNA techniques is
 - probe a)

- repetitive DNA
- c) satellite DNA
- d) none of these.
- A section of DNA that has been inserted into vector molecules (e.g. plasmid or phase chromosome) and then replicated to form many copies, called
 - cosmid
- b) phagemid
- DNA clone c)
- d) none of these.
- Why are gene libraries constructed? vii)
 - To find a new gene
 - To sequence whole genome b)
 - To create a "bank" of all the genes in an c)
 - All of these.
- viii) A technique that only separates molecules according to their net charge in an electrical field, usually on solid or semi-solid support media such as paper or agarose
 - Electrophoresis a)
- Chromatography b)
- Southern blotting
- Northern blotting. d)
- Bacterial enzyme that break phosphodiester bonds in DNA at specific base sequence is
 - Restriction enzyme a)
- b) DNA ligase
- c) Agarase
- d) Pronase.
- In an Amplicon, foreign gene is incorporated in a vector X)
 - where all viral genes are removed
 - some viral genes are removed b)
 - only the packaging and replication genes are kept c)
 - none of these. d)



GROUP - B

(Short Answer Type Questions)

Answer any three of the following.

 $3 \times 5 = 15$

- 2. Write short note on any *one* of the following:
 - a) pBR322
 - b) pUC18
 - c) Cosmid
 - d) Directional cloning.
- 3. Write only the reaction and *one* use of the following enzymes in genetic engineering : 5×1
 - a) DNA polymerase-I
 - b) T_4 DNA ligase
 - c) Bacterial alkaline phosphates
 - d) Polynucleotide kinase
 - e) Terminal deoxynucleotide transferase.
- 4. What is blue-white screening? Describe with diagram.
- 5. The human genome contains about 3×10^9 bp of DNA. How many recombinant clone you have to screen, if would you want to clone 20 kb DNA fragment into BAC vector to get a genomic library to have 95% probability of including a particular sequence.
- 6. a) Name two common selectable markers used to select transformed animal cell lines.
 - b) Briefly describe three methods of gene transfer to anima cell. 2 + 3
- 7. Describe the features of a good vector and a good host in genetic engineering.

GROUP - C

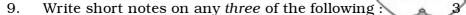
(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

- 8. a) Write the requirement of PCR.
 - b) Describe the detailed mechanism of PCR (draw a flow diagram).
 - c) How will you optimize the PCR reaction condition?
 - d) Write the applications of PCR in biology.
 - e) What is RT PCR? How will you synthesize *ds* cDNA?

2 + 3 + 3 + 3 + 4

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- a) RFLF
- b) Maxam Gilbert method of DNA sequencing
- c) Southern blotting
- d) Pyrosequencing
- e) Nested PCR.
- 10. a) Write in detail about the features of a general expression vector with a diagram.
 - b) Write the mechanism of the control of expression of a cloned gene in a pET vector system with diagram. 8 + 7
- 11. a) What is restriction enzyme (RE) ? Write the names of different types of RE.
 - b) Compare properties of the different types of restriction enzymes.
 - c) Which types of RE's are useful for genetic engineering and why?
 - d) The restriction eznyme HindIII recognize sequence "AAGCTT". If the genomic DNA of random sequence, size 50 kb is cleaved with HindIII, what will be the average size of a fragments and how many fragments will be there? 2+5+3+5
- 12. a) Describe transfection by liposomes and write the advantages of these method?
 - b) What is *T*-DNA? Describe the molecular mechanism of *T*-DNA transfer by *Agrobacterium tumefaciens*.
 - c) Describe the transfection method to ES cells.
 - d) What are the different biosafety levels assigned to the rDNAs? 3+6+4+2
- 13. Write about the application of genetic engineering in any three of the following: 3×5

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- a) Human gene therapy
- b) Fighting against AIDS
- c) DNA based diagnosis of genetic diseases
- d) Medicine and health care.

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