**SET B**

# B.Sc. MICROBIOLOGY
## FOURTH SEMESTER
## GENETIC ENGINEERING
## BMB-404

[USE OMR SHEET FOR OBJECTIVE PART]

**Duration: 3 hrs.** **Full Marks: 70**

**Objective**

**Time: 30 mins.** **Marks: 20**

***Choose the correct answer from the following:*** ***1×20=20***

1. PCR can amplify..... DNA.
   a. Only gene
   b. Mili gram
   c. Coding region
   d. Micro gram

2. Hybridization is possible between.....
   a. RNA-dsDNA-ssDNA
   b. ds DNA-RNA
   c. RNA-DNA-RNA
   d. RNA-ssDNA

3. Choose the correct information for RFLP.
   a. Enzyme based
   b. Probe and PCR based
   c. PCR based
   d. All are correct

4. The GC content for proper amplification is.....
   a. 40-50%
   b. 40-60%
   c. 30-60%
   d. 40-80%

5. In ....., PCR quantification of DNA can be done.
   a. Real time
   b. Asymmetric
   c. Anchored
   d. Nested

6. A vector that can clone only a small DNA fragment is:
   a. Cosmid
   b. Plasmid
   c. YAC
   d. BAC

7. This is not a cloning factor.
   a. EST
   b. SV40
   c. pUC19
   d. M13

8. Which of the following bacterium is considered as natural genetic engineer?
   a. Pseudomonas putida
   b. Agrobacterium rhodobacter
   c. Thermos aquaticus
   d. Agrobacterium tumifaciens

9. The process by which a probe is used to screen a library is known as.....
   a. Northern hybridization
   b. Colony hybridization
   c. Southern blotting
   d. Western blotting

10. A single-stranded, radiolabelled molecule of nucleic acids is called:
    a. Plasmid
    b. Vector
    c. Probe
    d. Selectable marker

11. The molecular tools are.....
    a. RE, ligase and modifying enzymes
    b. RE
    c. Ligase and RE
    d. Ligase

12. GMO example is.....
    a. Bt Banana
    b. Bt Rice
    c. Bt Cotton and Bt Brinjal
    d. Bt Cotton

13. For detection of mutation at a point..... can be used.
    a. Molecular marker
    b. SNP
    c. Both are correct
    d. Optional

14. VNTR is the base of.....
    a. Microarray
    b. AFLP
    c. DNA fingerprinting
    d. RFPL

15. PCR+RFLP=AFLP. In the reaction..... is radioisotope based.
    a. RFLP and RAPD
    b. PCR and AFLP
    c. PCR, RFLP and AFLP
    d. RFLP and AFLP

16. Which one of the following is CORRECT for the plasmid pBR322 of *E.coli*?
    a. $amp^R$ and $tet^R$ – antibiotic resistance genes
    b. Hind III and EcoRI – selectable markers
    c. rop – reduced osmotic pressure
    d. ori – original restriction enzyme

17. How many bases does the sequence which identifies the type II restriction enzymes contain?
    a. 1
    b. 4
    c. 6
    d. 12

18. Introduction of DNA into cells by exposing to high voltage electric pulses is:
    a. Electrofision
    b. Electrofusion
    c. Electroporation
    d. All of the above

19. Which type of blotting technique is used to detect specific Amino Acid sequences?
    a. Southern Blotting
    b. Northern Blotting
    c. Western Blotting
    d. All of the above

20. Why is a probe labeled?
    a. Improve visibility
    b. Improve stability
    c. Improve location identification
    d. Improve binding capability

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## Descriptive

**Time : 2 hr. 30 mins.** **Marks : 50**

[ Answer question no.1 & any four (4) from the rest ]

1. What are nuclease enzymes? What is the importance of restriction enzymes for manipulation of genes? Explain in your own words. Mention the different types of restriction enzymes with examples. What are cohesive and blunt ends? Which one of the ends is more labour intensive to work with and why? 1+2+3+2+2 =10

2. Can we use the wild type plasmids in the field of genetic engineering? Give reasons for your answer. What are the essential elements you need to put in a vector to clone and express genes? What are the different strategies used to turn blunt ends to cohesive ends? Explain the mechanisms. Are the functions of polymerase and ligase enzymes same? Justify your answer with suitable examples. 2+2+4+2=10

3. Explain the microarray technique. Mentions the conditions for which the technique can be employed. 7+3=10

4. Illustrate the technique and importance of RFLP in phylogenetic study. 8+2=10

5. In vitro amplification is preferable. Write the reason and explain the PCR cycles. 2+8=10

6. Explain the mechanism of construction of cDNA libraries and genomic libraries. According to you which one is better for insertion of gene in to vectors? Give your reasons. Differentiate between Insertion and integrated vectors. Explain the advantages of each. What do you mean by hybridization? 4+2+3+1=10

7. How can you differentiate between cloning and expression vectors? If your objective is expression of genes, what type of sample DNA will you chose and why? What are the importance of cosmids and phagemids? Why BAC and YAC were used for decoding human genome? Explain the properties and organization of YAC. How will you select recombinant phage vectors? 1+2+2+1+3+1 =10

8. Differentiate between the mechanism of Southern and Northern Blotting. Explain the importance of each step in Southern Blotting. What is the meaning of vectorless mediated gene transfer? What is the advantage over using plasmids? Explain biolistic mode of gene transfer. 5+2+1+2=10

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