REV-01
BMB/01/05

2024/07

**SET A**

# B.Sc. MICROBIOLOGY
## FOURTH SEMESTER [SPECIAL REPEAT]
## 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. The molecular tools are.....
   a. RE, ligase and modifying enzymes
   b. RE
   c. Ligase and RE
   d. Ligase

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

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

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

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

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

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

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

9. 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

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

11. 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

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

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

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

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

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

17. 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

18. 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

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

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

-- --- --

## Descriptive

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

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

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

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. 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

= = *** = =