

**B.Sc. BIOTECHNOLOGY**  
**FIFTH SEMESTER (SPECIAL REPEAT)**  
**RECOMBINANT DNA TECHNOLOGY**  
**BBT-502**

(Use separate answer scripts for Objective & Descriptive)

Duration : 3 hrs.

Full Marks : 70

**[ PART-A : Objective ]**

Time : 20 min.

Marks : 20

*Choose the correct answer from the following:*

*1X20=20*

- Hairy root disease is caused by
  - Ti plasmid
  - Ri plasmid
  - Both 1 and 2
  - None
- Which of these is an activity of Reverse transcriptase?
  - RNA dependent DNA polymerase
  - RNA cleavage from hybrid
  - Polymerase activity on DNA template
  - All of the above
- PCR based method of random mutagenesis is error prone
  - True
  - False
  - Maybe
  - Can't say
- In vector recombinant vaccine, plasmid insertion vector incorporates its genes into \_ virus genome at a place that encodes for..... enzyme.
  - Baculovirus; HbSag
  - Vaccinia; HbS
  - Vaccinia; thymidine kinase
  - Baculovirus; TK
- Alkaline phosphatase is used to
  - Remove terminal phosphate from 5'end of cut DNA
  - Prevent recircularization of DNA
  - Remove phosphate groups
  - All of the above
- What should be the GC content of PCR primers?
  - 35%-45%
  - 55%
  - 50%
  - Poly G and Poly C
- Biolistics is also known as
  - Microparticle carrier
  - Gene gun
  - Particle bombardment
  - All of the above
- Recombinant Factor VIII protein is industrially produced in
  - E. coli cells
  - Hamster kidney cells
  - Embryonic stem cells
  - None
- Replacement vectors are preferred over Insertional vectors because
  - Large size of gene of interest
  - Presence of polylinkers
  - Both 1 and 2
  - None
- His-tag is used as a fusion partner with proteins in..... chromatography because it can bind to.....
  - Affinity; Ni-NTA beads
  - Affinity; Imidazole
  - Gel permeation; cations
  - Gel permeation; Imidazole

11. The unusual amino acid produced by *Agrobacterium* is
    - a. Opine
    - b. Nopaline
    - c. Octopine
    - d. All of the above
  12. Hepatitis vaccine, a .....vaccine, is produced by cloning .....gene in yeast cells.
    - a. Attenuated; HbS
    - b. Subunit; HbS
    - c. Subunit; HbSAg
    - d. Attenuated, HbSAg
  13. Genomic DNA library contains only the expressed genes of an organism.
    - a. True
    - b. False
    - c. Maybe
    - d. Can't say
  14. The function of ligase is
    - a. Seals nicks in DNA
    - b. Forms bonds between cut DNA bases
    - c. Join sugar-phosphate backbone of cut DNA
    - d. Both 1 and 3
  15. Which of these is solved by DNA fingerprinting?
    - a. Crime bases
    - b. Paternity disputes
    - c. Immigration issues
    - d. All
  16. Reverse transcription involves
    - a. Extension of DNA from 3' end
    - b. 2 jumps of U and R region
    - c. Removal of viral R and U5 regions
    - d. All of the above
  17. How many operons are present in the Vir region of Ti plasmid?
    - a. 8
    - b. 12
    - c. 9
    - d. 11
  18. ANDi is the name of
    - a. Smart mouse
    - b. Youth mouse
    - c. Glowing monkey
    - d. Super pig
  19. EcoPI is an example of
    - a. Type I RE
    - b. Type III RE
    - c. Type II RE
    - d. None
  20. In .....PCR, the annealing temperature in the early cycles is usually 3-5°C above the standard  $T_m$  of the primers used, while in the later cycles it is a similar amount below the  $T_m$ .
    - a. Touchdown
    - b. Hot-start
    - c. Real time
    - d. Anchored
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( PART-B : Descriptive )

Time : 2 hrs. 40 min.

Marks : 50

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

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|----|--|----------|
| 1. | a. What are plasmids? Write about the important features of plasmid. Briefly describe transformation.                                | 1+2+3=6  |
|    | b. Briefly explain about alkaline phosphatase and restriction endonuclease in molecular biology.                                     | 2+2=4    |
| 2. | a. What is PCR and what are its steps? Write about any 2 variations of PCR.  | 2+3=5    |
|    | b. Describe qPCR in detail with appropriate diagrams.  | 5        |
| 3. | a. What is Southern blotting? Explain the process in detail with suitable diagrams.  | 1+5+1=7  |
|    | b. How is northern blotting different from Southern blotting? List the disadvantages of Northern blotting.                           | 1+2=3    |
| 4. | a. What are the approaches of gene transfer in plants?   | 2        |
|    | b. Explain in brief the working of gene gun and electroporation.   | 4+4=8    |
| 5. | Explain with diagram the organization of Ti plasmid. Write a note on co-integrate vectors. Include a diagram.                        | 6+4=10   |
| 6. | a. What are 3 methods of introducing a transgene in animals? Explain the process of SCNT. Name a transgenic animal produced by SCNT. | 1++3+1=5 |
|    | b. Diagrammatically explain the production of cholera vaccine.   | 2+3=5    |
| 7. | Differentiate between:   | 5+5=10   |
|    | a. Conventional and recombinant vaccines   |          |
|    | b. Genomic and cDNA library  |          |
| 8. | Write short notes on:  | 5+5=10   |
|    | a. DNA fingerprinting  |          |
|    | b. Recombinant insulin   |          |

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