Avinashilingam Institute for Home Science and Higher Education for Women

Deemed to be University Estd. u/s 3 of UGC Act 1956, Category A by MHRD (now MoE)
Re-accredited with A++ Grade by NAAC. CGPA 3.65/4, Category I by UGC
Coimbatore - 641 043, Tamil Nadu, India

Bachelor's Degree Examination – November 2025
V Semester

Class : III UG | **Time: 3 Hours**
Major : Biochemistry and Biotechnology | **Max. Marks: 100**

23BBTC05 Recombinant DNA Technology and Nanobiotechnology

Course Outcomes:

CO1: Understand the basic steps in a cloning experiment.
CO2: Acquire knowledge about how to isolate a DNA segment, clone it into a suitable vector, introduce into a host and identify the recombinant from non recombinants. The expression vectors and their importance in Biotechnology will be studied.
CO3: Know the theoretical basis for selection, screening, and construction of libraries and expression of genes. Production of insulin using recombinant DNA technology, transgenic crops – merits and demerits will be studied.
CO4: Learn the principles of various genetic engineering techniques as well as their applications.
CO5: Acquire a fundamental understanding of the basic principles of nanobiotechnology.

Part A — 10 x 1 = 10
Choose the Correct Answer

1. Selectable markers are the genes which code for resistance to _____ — CO1 K2
   a. disease b. phages
   c. antibiotics d. foreign entity

2. Identify the vector constructed by Bolivar and Rodriguez from the following — CO1 K3
   a.Yip7 b.R6-5
   c. pUC8 d. PBR322

3. What is the approximate size of fragments given off by EcoR1? — CO2 K2
   a. 1 kb b. 2 kb
   c. 3 kb d.4 kb

4. Chromosome walking is a — CO2 K2
   a. Hybridization technique b. Sequencing technique
   c. Genetic marker d. Chemical degradation technique

5. Which of the following is used as targets in the blotting techniques? — CO3 K3
   a. Amino acid b. Proteins
   c. Antigens d. Nucleic acids

6. CRISPR cas system in bacteria primarily functions as — CO3 K2
   a. DNA replication b. ATP Synthesis
   c. Protein synthesis d. Immune defense

7. Among the following which is the driving force in Bottom Up approach? — CO4 K3
   a. Increment in internal stress of material
   b. Reduction in Gibbs free energy
   c. Decrease in surface energy
   d. Increase in surface energy

8. What is the biggest problem with Top Down approach? — CO4 K2
   a. Increase surface area b. Increased internal stress
   c. Imperfection in surface structure d. Reduced Gibbs energy

9. Nanoparticles used in MRI technology to _____ — CO5 K2
   a. Detect metal implants in body b. Increase the image quality
   c. Decrease the acoustic reflectivity d. Develop allergen to the contrasting agent

10. Select the field that integrates nanotechnology with biology called? — CO5 K3
   a. Nanomaterials science b. Nanoengineering
   c. Nanomedicine d. Nanoelectronics

Part B — 5 x 6 = 30

Answer ALL questions

Each answer should not exceed 400 words or two pages

11.a. Explain the role of endonuclease briefly.	CO1 K2
(or)	
11.b. Write short note on viral vector SV40.	CO1 K2
12.a. Write short note on Ames test for mutagenic agents.	CO2 K3
(or)	
12.b. Explain Blue White colony screening briefly.	CO2 K3
13.a. Discuss the significance of NGS sequencing in medical sector.	CO3 K2
(or)	
13.b. Write short note on RFLP technique.	CO3 K3
14.a. Discuss the properties of nano-materials.	CO4 K2
(or)	
14.b. Write short note on XRD.	CO4 K3
15.a. Outline the construction and application of Nanosensors.	CO5 K2
(or)	
15.b. Summarize various applications of nanotechnology.	CO5 K2

Part C — 5 x 12 = 60

Answer ALL questions

Each answer should not exceed 800 words or four pages

16.a. Discuss cloning vectors in detail.	CO1 K2
(or)	
16.b. Compare and contrast BACs and YACs.	CO1 K2
17.a. Explain cDNA library construction in detail.	CO2 K2
(or)	
17.b. Discuss different gene transfer methods in detail.	CO2 K2
18.a. Compare RFLP and RAPD	CO3 K4
(or)	
18.b. Explain various applications of rDNA in medicine sector.	CO3 K2
19.a. Discuss the green synthesis of nanoparticles from plants in detail.	CO4 K2
(or)	
19.b. Discuss in detail about the characterization of nanoparticles.	CO4 K2
20.a. Outline drug delivery systems in nano-biotechnology.	CO5 K4
(or)	
20.b. Discuss nano-drugs with its significance.	CO5 K2

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