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 an 'A++' Grade by NAAC CGPA 3.65/4, Category I by UGC
Coimbatore - 641 043, Tamil Nadu, India

Continuous Internal Assessment Test II – October 2025

SemesterV

Class :III UG **Time: 2 hours**
Major: Biochemistry and Biotechnology **Max.marks: 60**

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- Answer all questions (6X1 = 6 Marks)

1. RAPD is best described as **CO3K1**
   a. A blotting technique to detect RNA
   b. A method for detecting protein-protein interactions
   c. A sequencing method using chain termination
   d. A PCR-based method for detecting DNA polymorphism
2. What is the main purpose of CRISPR-Cas9 technology in genome editing? **CO3K2**
   a. To amplify DNA fragments b.To cut DNA at specific target sites
   c.To separate DNA based on size d. To detect RNA molecules
3. An example of the bottom-up approach in nanomaterial synthesis is **CO4K2**
   a. Mechanical milling b. Chemical vapor deposition (CVD)
   c. Lithography d. Etching
4. A researcher wants to know the average crystallite size of nanoparticles. The best technique would be **CO4K3**
   a. DLS, because it measures Brownian motion b. UV-Visible spectroscopy
   c. XRD, using Scherrer's equation d. Transmission Electron Microscope
5. Nano drugs are preferred in treatment because they **CO5K2**
   a. Decrease drug bioavailability b.Increase drug toxicity
   c. Enhance solubility and stability of drugsd. Prevent drugs from reaching target sites
6 In nano drug delivery, targeted release helps to **CO5K3**
   a. Reduce side effects on healthy tissues b. Increase random distribution of drugs
   c. Decrease therapeutic efficiency d. Block the absorption of drugs

Part B 3 x 6 = 18

Answer the following

Answers should not exceed 200 words or one page

7. a. Explain the applications of recombinant DNA technology in medicine and agriculture with suitable examples **CO3K2**

(Or)

7. b. Discuss the importance of biosafety and bioethics in recombinant DNA technology **CO3K2**
8. a. Classify nanomaterials based on their dimensionality and discuss their properties **CO4K3**

(Or)

8. b. Review the working principle of UV–Visible Spectroscopy with examples of its applications **CO4K2**
9. a.Illustrate the concept of nano drugs with examples and explain their significance in medicine **CO5K2**

(Or)

9. b. Analyze the concept of bioformulation and explain how its components and preparation methods influence applications in medicine **CO5K3**

Part C **3 x 12 = 36**

Answer the following not exceeding 700 words or four pages

10. a. Compare the molecular techniques RFLP and RAPD used for detecting DNA polymorphisms, highlighting their principles, procedures, and applications. **CO3K3**

(Or)

10. b.ElucidateCRISPR technology and its application in genome editing. Include its mechanism, types, tools involved, advantages, and potential applications **CO3K3**

11. a. Illustrate the working principle of SEM and TEM and its application **CO4K2**

(Or)

11. b. Summarize the role of DLS and XRD techniques in nanotechnology research **CO4K2**

12. a. Elaborate any two nano analytical tools used for nanomaterial detection, highlighting their principle, working mechanism, and applications **CO5K2**

(Or)

12. b.Explain the principle and working mechanism of enzyme-based biosensors with suitable examples **CO5K2**

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