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BP 605 T

2025

B.Pharm. 6th Semester (Regular) End-Term Examination

PHARMACEUTICAL BIOTECHNOLOGY

Full Marks – 75 Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer question No. 1 and any *four* from the rest.

1. Multiple choice questions (MCQ) (Answer ALL questions) : $20 \times 1 = 20$

(i) Which of the following is NOT a method of enzyme immobilization?
- (a) Adsorption
- (b) Covalent bonding
- (c) Lyophilization
- (d) Encapsulation

(ii) Biosensors mainly use which biomolecule for detecting target substances?
- (a) DNA
- (b) Lipids
- (c) Proteins
- (d) Enzymes

(iii) Which enzyme is used in the industrial production of glucose syrup from starch?
- (a) Protease
- (b) Amylase
- (c) Peroxidase
- (d) Catalase

(iv) Protein engineering is primarily used for:
- (a) DNA sequencing
- (b) Enhancing enzyme properties
- (c) Microbial fermentation
- (d) Vaccine production

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(v) Which of the following is NOT a feature of a cloning vector?

(a) Origin of replication

(b) Restriction sites

(c) Telomere sequences

(d) Selectable maker

(vi) Which enzyme is responsible for cutting DNA at specific sequences?

(a) DNA polymerase

(b) Restriction endonuclease

(c) Ligase

(d) RNA polymerase

(vii) Recombinant insulin is produced using which host organism?

(a) Saccharomyces cerevisiae

(b) Esoherichia coil

(c) Bacillus subtilis

(d) Streptomyces

(viii) PCR is used to;

(a) Amplify DNA

(b) Cut DNA

(c) Transfer genes

(d) Clone cells

(ix) Which immunoglobulin is the first to respond in an infection?

(a) IgA

(b) IgG

(c) IgE

(d) IgM

(x) Which type of hypersensitivity reaction is responsible for anaphylaxis?

(a) Type I

(b) Type II

(c) Type III

(d) Type IV

(xi) Monoclonal antibodies are produced using which technique?

(a) PCR

(b) Hybridoma technology

(c) DNA sequencing

(d) Immunoblotting

(xii) Which of the following is NOT a function of the Major Histocompatibility Complex (MHC)?

(a) Antigen presentation

(b) Immune suppression

(c) DNA replication

(d) Immune system regulation

(xiii) Which genetic process involves the uptake of free DNA by bacteria?

(a) Transformation

(b) Transduction

(c) Conjugation

(d) Mutation

(xiv) Plasmids are;

(a) Circular DNA molecules

(b) Viral proteins

(c) Linear DNA molecules

(d) Mitochondrial structures

(xv) Which blotting technique is used fur DNA analysis?

(a) Western blotting

(b) Northern blotting

(c) Southern blotting

(d) Eastern blotting

(xvi) A silent mutation is a mutation that:

(a) Changes the amino acid sequence

(b) Has no effect on the protein

(c) Causes a frame shift

(d) Introduces a premature stop codon

(xvii) Which of the following is NOT a requirement for industrial fermentation?

(a) Aeration

(b) Sterilization

(c) Cloning vectors

(d) Agitation

(xviii) What is the main purpose of a fermenter's aeration system?

(a) Maintain sterility

(b) Provide oxygen for microbial growth

(c) Control pH levels

(d) Remove toxins

(xix) Penicillin production requires fermentation using:

(a) *Escherchia coil*

(b) *Aspergillus niger*

(c) *Penicillium chrysogenum*

(d) *Streptomyces griseus*

(xx) Which vitamin is commonly produced through microbial fermentation?

(a) Vitamin D

(b) Vitamin D12

(c) Vitamin K

(d) Vitamin C

2. Short answers (Answer Seven) $7 \times 5 = 35$

(a) Explain the different methods of enzyme immobilization and their industrial applications.

(b) Describe the working principle of biosensors and their role in pharmaceutical industries.

(c) What are cloning vector? Discuss their essential features with examples.

(d) Explain the steps involved in Recombinant DNA (rDNA) technology with a suitable diagram.

(e) Differentiate between humoral and cellular immunity with suitable examples.

(f) Describe the production and applications of monoclonal antibodies using hybridoma technology.

(g) Explain microbial genetic recombination processes: transformation, transduction, and conjugation.

(h) Describe the working of a large-scale fermenter with a neat diagram.

(i) Discuss the industrial production of Penicillin, including the microorganism used, fermentation conditions, and recovery process.

3. Long answers (Answer any two) $2 \times 10 = 20$

(a) Discuss the structure and function of Major Histocompatibility Complex (MHC) in immunity.

(b) Describe the steps involved in Polymerase Chain Reaction (PCR) and its applications in biotechnology.

(c) What are blood products and plasma substitutes? Discuss their collection, processing, and storage.