**Enzyme Basics & Classification**

1. Enzymes are primarily composed of:  
   (A) Carbohydrates  
   (B) Proteins  
   (C) Lipids  
   (D) Nucleic acids
2. The "lock-and-key" model explains:  
   (A) Allosteric regulation  
   (B) Substrate specificity  
   (C) Enzyme denaturation  
   (D) Coenzyme binding
3. Which enzyme class catalyzes hydrolysis?  
   (A) Lyases  
   (B) Hydrolases  
   (C) Ligases  
   (D) Isomerases
4. A cofactor made of metal ions is called a:  
   (A) Coenzyme  
   (B) Prosthetic group  
   (C) Activator  
   (D) Inhibitor
5. The inactive precursor of an enzyme is a:  
   (A) Apoenzyme  
   (B) Holoenzyme  
   (C) Zymogen  
   (D) Isoenzyme

**Mechanism & Kinetics**

1. The induced-fit model suggests:  
   (A) Rigid active site  
   (B) Dynamic enzyme-substrate interaction  
   (C) Permanent substrate alteration  
   (D) Cofactor dependency
2. Km represents:  
   (A) Maximum reaction velocity  
   (B) Substrate concentration at ½ Vmax  
   (C) Enzyme efficiency  
   (D) Optimal pH
3. Competitive inhibitors:  
   (A) Bind to the allosteric site  
   (B) Resemble substrate structure  
   (C) Lower Vmax  
   (D) Are irreversible
4. Non-competitive inhibition affects:  
   (A) Km  
   (B) Vmax  
   (C) Both Km and Vmax  
   (D) Neither
5. The turnover number (kcat) measures:  
   (A) Substrate affinity  
   (B) Enzyme efficiency  
   (C) Cofactor requirement  
   (D) pH optimum

**Factors Affecting Enzyme Activity**

1. Pepsin works optimally at:  
   (A) pH 2  
   (B) pH 7  
   (C) pH 9  
   (D) pH 12
2. High temperatures cause:  
   (A) Increased activity  
   (B) Denaturation  
   (C) Increased Km  
   (D) Coenzyme binding
3. Allosteric enzymes exhibit:  
   (A) Michaelis-Menten kinetics  
   (B) Sigmoidal kinetics  
   (C) Single-subunit structure  
   (D) No regulation
4. Feedback inhibition involves:  
   (A) Competitive inhibitors  
   (B) End-product binding  
   (C) Covalent modification  
   (D) pH changes
5. Enzymes in lysosomes function best at:  
   (A) Acidic pH  
   (B) Neutral pH  
   (C) Basic pH  
   (D) High temperature

**Cofactors & Coenzymes**

1. Mg²⁺ acts as a cofactor for:  
   (A) Hexokinase  
   (B) Pepsin  
   (C) Lipase  
   (D) Urease
2. NAD⁺ is a:  
   (A) Coenzyme  
   (B) Cofactor  
   (C) Inhibitor  
   (D) Substrate
3. Vitamin B3 (Niacin) is a coenzyme for:  
   (A) Dehydrogenases  
   (B) Kinases  
   (C) Lyases  
   (D) Ligases
4. Metalloenzymes require:  
   (A) Coenzymes  
   (B) Metal ions  
   (C) ATP  
   (D) High pH
5. FAD is a coenzyme for:  
   (A) Oxidoreductases  
   (B) Hydrolases  
   (C) Lyases  
   (D) Ligases

**Clinical Applications**

1. Statins inhibit:  
   (A) Amylase  
   (B) HMG-CoA reductase  
   (C) Acetylcholinesterase  
   (D) Carbonic anhydrase
2. Phenylketonuria (PKU) results from deficiency of:  
   (A) Phenylalanine hydroxylase  
   (B) Tyrosinase  
   (C) Hexokinase  
   (D) Lactase
3. ELISA uses:  
   (A) Peroxidase  
   (B) Amylase  
   (C) Lipase  
   (D) Protease
4. PCR uses:  
   (A) Taq polymerase  
   (B) RNA polymerase  
   (C) Ligase  
   (D) Helicase
5. Albinism is caused by deficiency of:  
   (A) Catalase  
   (B) Tyrosinase  
   (C) Urease  
   (D) Lactase

**Industrial & Biotech Applications**

1. Enzymes in detergents:  
   (A) Proteases  
   (B) Lipases  
   (C) Amylases  
   (D) All of the above
2. Cheese production uses:  
   (A) Rennin  
   (B) Pepsin  
   (C) Trypsin  
   (D) Lipase
3. Biofuel production uses:  
   (A) Cellulases  
   (B) Lipases  
   (C) Proteases  
   (D) Amylases
4. DNA fingerprinting uses:  
   (A) Restriction endonucleases  
   (B) DNA ligase  
   (C) Helicase  
   (D) Polymerase
5. Luciferase is used in:  
   (A) Bioluminescence  
   (B) PCR  
   (C) ELISA  
   (D) Cloning

**PMDC Past Papers (2000-2023)**

1. Uncompetitive inhibitors:  
   (A) Bind to ES complexes  
   (B) Increase Km  
   (C) Decrease Vmax  
   (D) Both A and C
2. The SI unit for enzyme activity is:  
   (A) IU  
   (B) Katal  
   (C) Molarity  
   (D) ppm
3. Lineweaver-Burk plots are used to:  
   (A) Determine Km and Vmax  
   (B) Measure enzyme size  
   (C) Detect inhibitors  
   (D) Analyze coenzymes
4. Zymogens are:  
   (A) Active enzymes  
   (B) Inactive precursors  
   (C) Cofactors  
   (D) Isoenzymes
5. The Bohr effect involves:  
   (A) Hemoglobin and pH  
   (B) Enzyme denaturation  
   (C) Competitive inhibition  
   (D) Coenzyme binding

**Advanced Concepts**

1. Allosteric activators:  
   (A) Bind to the active site  
   (B) Stabilize the inactive form  
   (C) Stabilize the active form  
   (D) Are irreversible
2. Covalent modification often involves:  
   (A) Phosphorylation  
   (B) Methylation  
   (C) Acetylation  
   (D) All of the above
3. Isoenzymes differ in:  
   (A) Amino acid sequence  
   (B) Km and Vmax  
   (C) Cofactor requirements  
   (D) All of the above
4. Enzyme promiscuity refers to:  
   (A) Broad substrate specificity  
   (B) Irreversible inhibition  
   (C) Allosteric regulation  
   (D) Covalent modification
5. Directed evolution is used to:  
   (A) Improve enzyme stability  
   (B) Increase specificity  
   (C) Enhance efficiency  
   (D) All of the above

**Enzyme Deficiencies & Diseases**

1. Gaucher’s disease is caused by deficiency of:  
   (A) Glucocerebrosidase  
   (B) Hexosaminidase  
   (C) Sphingomyelinase  
   (D) Arylsulfatase
2. Galactosemia results from deficiency of:  
   (A) Galactose-1-phosphate uridyltransferase  
   (B) Phenylalanine hydroxylase  
   (C) Glucose-6-phosphatase  
   (D) Lactase
3. Gout is associated with excess:  
   (A) Uric acid  
   (B) Urea  
   (C) Creatinine  
   (D) Bilirubin
4. Celiac disease damages the enzyme:  
   (A) Lactase  
   (B) Dipeptidyl peptidase-4  
   (C) Sucrase  
   (D) Amylase
5. Tay-Sachs disease involves deficiency of:  
   (A) Hexosaminidase A  
   (B) Glucocerebrosidase  
   (C) Phenylalanine hydroxylase  
   (D) Tyrosinase

**Enzyme Assays & Units**

1. One IU equals:  
   (A) 1 µmol substrate/min  
   (B) 1 mmol substrate/sec  
   (C) 1 nmol product/hr  
   (D) 1 mol substrate/day
2. Spectrophotometry measures:  
   (A) Absorbance  
   (B) Fluorescence  
   (C) Radioactivity  
   (D) Conductivity
3. Enzyme activity is measured by:  
   (A) Substrate depletion  
   (B) Product formation  
   (C) Both A and B  
   (D) Molecular weight
4. The SI unit for catalytic activity is:  
   (A) Katal  
   (B) IU  
   (C) Molarity  
   (D) ppm
5. A stopped assay measures:  
   (A) Initial velocity  
   (B) Final product  
   (C) Denaturation  
   (D) Coenzyme levels

**Comparative Enzymology**

1. Pepsin vs. trypsin:  
   (A) Both work in acidic pH  
   (B) Pepsin is a protease; trypsin is a lipase  
   (C) Pepsin (stomach), trypsin (intestine)  
   (D) Both require bile
2. Hexokinase vs. glucokinase:  
   (A) Both phosphorylate glucose  
   (B) Hexokinase has higher Km  
   (C) Glucokinase is muscle-specific  
   (D) Hexokinase is insulin-induced
3. LDH isozymes:  
   (A) Differ in tissue distribution  
   (B) Diagnose myocardial infarction  
   (C) Catalyze same reaction  
   (D) All of the above
4. Cytochrome P450 enzymes:  
   (A) Metabolize drugs  
   (B) Drive photosynthesis  
   (C) Regulate glycolysis  
   (D) Replicate DNA
5. Restriction enzymes:  
   (A) Cut DNA at specific sites  
   (B) Are used in cloning  
   (C) Recognize palindromes  
   (D) All of the above

**Enzyme Inhibition & Drug Design**

1. Penicillin inhibits:  
   (A) Cell wall synthesis  
   (B) DNA gyrase  
   (C) RNA polymerase  
   (D) Protein synthesis
2. ACE inhibitors treat:  
   (A) Hypertension  
   (B) Diabetes  
   (C) Cancer  
   (D) Alzheimer’s
3. MAO inhibitors treat:  
   (A) Depression  
   (B) Hypertension  
   (C) Diabetes  
   (D) Infections
4. Protease inhibitors are used for:  
   (A) HIV  
   (B) Tuberculosis  
   (C) Malaria  
   (D) Hepatitis
5. Aspirin inhibits:  
   (A) Cyclooxygenase  
   (B) Acetylcholinesterase  
   (C) Monoamine oxidase  
   (D) Carbonic anhydrase

**Enzyme Kinetics & Models**

1. The steady-state assumption states:  
   (A) [ES] is constant  
   (B) [S] >> [E]  
   (C) [P] is negligible  
   (D) All of the above
2. Lower Km indicates:  
   (A) Higher substrate affinity  
   (B) Lower substrate affinity  
   (C) Higher Vmax  
   (D) Lower Vmax
3. Hill coefficient (n) > 1 indicates:  
   (A) Cooperative binding  
   (B) Competitive inhibition  
   (C) Allosteric activation  
   (D) Non-cooperative binding
4. Hyperbolic plot:  
   (A) Michaelis-Menten  
   (B) Lineweaver-Burk  
   (C) Hill  
   (D) Eadie-Hofstee
5. Highest kcat:  
   (A) Catalase  
   (B) Lysozyme  
   (C) DNA polymerase  
   (D) Hexokinase

**Enzyme Regulation & Metabolism**

1. Phosphorylation typically:  
   (A) Activates enzymes  
   (B) Deactivates enzymes  
   (C) Either A or B  
   (D) Is irreversible
2. Allosteric inhibitor of phosphofructokinase:  
   (A) ATP  
   (B) AMP  
   (C) Citrate  
   (D) Both A and C
3. The Pasteur effect:  
   (A) Inhibits glycolysis in oxygen  
   (B) Increases ATP  
   (C) Causes denaturation  
   (D) Binds coenzymes
4. Glucokinase vs. hexokinase:  
   (A) Glucokinase has higher Km  
   (B) Hexokinase is inducible  
   (C) Glucokinase is inhibited by G6P  
   (D) Both are liver-specific
5. TCA cycle regulation involves:  
   (A) Citrate synthase  
   (B) Isocitrate dehydrogenase  
   (C) α-Ketoglutarate dehydrogenase  
   (D) All of the above

**Miscellaneous Concepts**

1. Ribozymes are:  
   (A) RNA with catalytic activity  
   (B) DNA enzymes  
   (C) Protein-based  
   (D) Coenzymes
2. Abzymes are:  
   (A) Antibodies with catalytic activity  
   (B) Artificial enzymes  
   (C) RNA enzymes  
   (D) Inactivated enzymes
3. Blood clotting enzymes:  
   (A) Thrombin  
   (B) Fibrinogen  
   (C) Plasmin  
   (D) All of the above
4. Collagen crosslinking enzyme:  
   (A) Lysyl oxidase  
   (B) Prolyl hydroxylase  
   (C) Collagenase  
   (D) Elastase
5. ELISA uses:  
   (A) Alkaline phosphatase  
   (B) Peroxidase  
   (C) β-Galactosidase  
   (D) All of the above

**Balochistan & Federal Board Advanced**

1. Acetylcholinesterase breaks down:  
   (A) Acetylcholine  
   (B) Dopamine  
   (C) Serotonin  
   (D) Histamine
2. Glucometers use:  
   (A) Glucose oxidase  
   (B) Hexokinase  
   (C) Catalase  
   (D) Amylase
3. Parkinson’s disease involves deficiency of:  
   (A) Tyrosine hydroxylase  
   (B) Dopamine β-hydroxylase  
   (C) Acetylcholinesterase  
   (D) MAO
4. Prostate cancer marker:  
   (A) PSA  
   (B) ALT  
   (C) AST  
   (D) Amylase
5. Free radical detoxification enzymes:  
   (A) Superoxide dismutase  
   (B) Catalase  
   (C) Glutathione peroxidase  
   (D) All of the above

**Sindh & Punjab Board Advanced**

1. Renin converts angiotensinogen to:  
   (A) Angiotensin I  
   (B) Angiotensin II  
   (C) Aldosterone  
   (D) ACE
2. PCR uses:  
   (A) Taq polymerase  
   (B) Reverse transcriptase  
   (C) Helicase  
   (D) Ligase
3. Telomerase adds:  
   (A) Telomeres  
   (B) Primers  
   (C) Okazaki fragments  
   (D) RNA
4. Fatty acid synthesis uses:  
   (A) Acetyl-CoA carboxylase  
   (B) HMG-CoA reductase  
   (C) Fatty acid synthase  
   (D) All of the above
5. Glycogen breakdown uses:  
   (A) Glycogen phosphorylase  
   (B) Amylase  
   (C) Glucokinase  
   (D) Phosphoglucomutase

**PMDC Past Papers (Continued)**

1. Non-competitive inhibitor:  
   (A) Binds active site  
   (B) Lowers Vmax  
   (C) Increases Km  
   (D) Resembles substrate
2. Hydrolase example:  
   (A) Lipase  
   (B) Decarboxylase  
   (C) Kinase  
   (D) Isomerase
3. Transaminase coenzyme:  
   (A) Pyridoxal phosphate  
   (B) NAD⁺  
   (C) FAD  
   (D) Coenzyme A
4. DNA nick-sealing enzyme:  
   (A) Ligase  
   (B) Helicase  
   (C) Topoisomerase  
   (D) Polymerase
5. Liver detoxifies alcohol via:  
   (A) Alcohol dehydrogenase  
   (B) Catalase  
   (C) Peroxidase  
   (D) Acetyltransferase

**Clinical Case Studies**

1. Muscle cramps during exercise suggest deficiency of:  
   (A) Myophosphorylase  
   (B) Hexokinase  
   (C) Lactase  
   (D) Amylase
2. Elevated serum amylase indicates:  
   (A) Pancreatitis  
   (B) Hepatitis  
   (C) MI  
   (D) Renal failure
3. Musty odor in urine suggests:  
   (A) Phenylketonuria  
   (B) Albinism  
   (C) Galactosemia  
   (D) Tay-Sachs
4. McArdle’s disease involves:  
   (A) Muscle glycogen phosphorylase  
   (B) Liver phosphorylase  
   (C) Glucose-6-phosphatase  
   (D) Branching enzyme
5. Elevated ALT/AST suggests:  
   (A) Liver damage  
   (B) Kidney failure  
   (C) Pancreatitis  
   (D) MI

**Industrial Applications**

1. Paper bleaching uses:  
   (A) Laccase  
   (B) Xylanase  
   (C) Amylase  
   (D) Pectinase
2. Textile processing uses:  
   (A) Cellulase  
   (B) Lipase  
   (C) Protease  
   (D) All of the above
3. Biofuel production uses:  
   (A) Cellulases  
   (B) Amylases  
   (C) Lipases  
   (D) All of the above
4. Cheese ripening uses:  
   (A) Chymosin  
   (B) Lipase  
   (C) Protease  
   (D) All of the above
5. DNA fingerprinting uses:  
   (A) Restriction enzymes  
   (B) DNA ligase  
   (C) Helicase  
   (D) Polymerase

**Evolution & Engineering**

1. Enzymes in extremophiles:  
   (A) Have disulfide bonds  
   (B) Are thermostable  
   (C) Require coenzymes  
   (D) Work at neutral pH
2. Directed evolution uses:  
   (A) Site-directed mutagenesis  
   (B) PCR  
   (C) Western blotting  
   (D) ELISA
3. Enzyme immobilization is used in:  
   (A) Bioreactors  
   (B) Drug delivery  
   (C) Biosensors  
   (D) All of the above
4. Rational design involves:  
   (A) Predicting mutations  
   (B) Random mutagenesis  
   (C) High-throughput screening  
   (D) Phylogenetic analysis
5. Enzyme promiscuity allows:  
   (A) Broad substrate use  
   (B) Irreversible inhibition  
   (C) Allosteric regulation  
   (D) Covalent modification

**Kinetics & Inhibition (Advanced)**

1. Rate-limiting step:  
   (A) Substrate binding  
   (B) Product release  
   (C) Transition state  
   (D) Cofactor binding
2. Turnover number definition:  
   (A) Substrate molecules/enzyme/second  
   (B) Product formed/minute  
   (C) Substrate at Vmax  
   (D) Km/Vmax
3. Lineweaver-Burk for competitive inhibition:  
   (A) Same y-intercept  
   (B) Higher slope  
   (C) Both A and B  
   (D) Neither
4. Hill equation describes:  
   (A) Cooperative binding  
   (B) Michaelis-Menten  
   (C) Allosteric inhibition  
   (D) Non-competitive
5. Suicide inhibitors:  
   (A) Irreversible  
   (B) Resemble substrate  
   (C) Covalently modify  
   (D) All of the above

**Assays & Diagnostics**

1. Biuret test detects:  
   (A) Proteins  
   (B) Enzymes  
   (C) Coenzymes  
   (D) Cofactors
2. ELISA detects:  
   (A) Antigens/antibodies  
   (B) Enzyme activity  
   (C) DNA  
   (D) RNA
3. Bradford assay measures:  
   (A) Protein concentration  
   (B) Enzyme activity  
   (C) DNA content  
   (D) pH
4. SDS-PAGE separates by:  
   (A) Size  
   (B) Charge  
   (C) Solubility  
   (D) Affinity
5. Kjeldahl method measures:  
   (A) Nitrogen  
   (B) Enzyme activity  
   (C) pH  
   (D) Temperature

**Deficiencies & Disorders**

1. McArdle’s disease affects:  
   (A) Muscle glycogen breakdown  
   (B) Liver glycogen  
   (C) Gluconeogenesis  
   (D) Glycolysis
2. Elevated ALT indicates:  
   (A) Liver damage  
   (B) Kidney failure  
   (C) Pancreatitis  
   (D) MI
3. Alkaptonuria results from deficiency of:  
   (A) Homogentisate oxidase  
   (B) Phenylalanine hydroxylase  
   (C) Tyrosinase  
   (D) Hexosaminidase
4. Lactose intolerance lacks:  
   (A) Lactase  
   (B) Sucrase  
   (C) Maltase  
   (D) Amylase
5. Jaundice and elevated ALT/AST suggest:  
   (A) Liver damage  
   (B) Kidney failure  
   (C) Pancreatitis  
   (D) MI

**Advanced Industrial Uses**

1. Paper bleaching uses:  
   (A) Laccase  
   (B) Xylanase  
   (C) Amylase  
   (D) Pectinase
2. Textile processing uses:  
   (A) Cellulase  
   (B) Lipase  
   (C) Protease  
   (D) All of the above
3. Biofuel production uses:  
   (A) Cellulases  
   (B) Amylases  
   (C) Lipases  
   (D) All of the above
4. Cheese ripening uses:  
   (A) Chymosin  
   (B) Lipase  
   (C) Protease  
   (D) All of the above
5. DNA fingerprinting uses:  
   (A) Restriction enzymes  
   (B) DNA ligase  
   (C) Helicase  
   (D) Polymerase

**Comparative Metabolism**

1. Shared by glycolysis and gluconeogenesis:  
   (A) Phosphoglycerate kinase  
   (B) Pyruvate kinase  
   (C) PEP carboxykinase  
   (D) Glucokinase
2. Unique to gluconeogenesis:  
   (A) Pyruvate carboxylase  
   (B) Phosphofructokinase  
   (C) Hexokinase  
   (D) Aldolase
3. Pyruvate to lactate:  
   (A) Lactate dehydrogenase  
   (B) Pyruvate dehydrogenase  
   (C) Pyruvate kinase  
   (D) Pyruvate carboxylase
4. Calvin cycle enzyme:  
   (A) Rubisco  
   (B) ATP synthase  
   (C) Hexokinase  
   (D) PEP carboxylase
5. C4 plant CO₂ fixation:  
   (A) PEP carboxylase  
   (B) Rubisco  
   (C) Pyruvate dehydrogenase  
   (D) Acetyl-CoA carboxylase

**Enzyme Evolution**

1. Directed evolution improves:  
   (A) Stability  
   (B) Specificity  
   (C) Efficiency  
   (D) All of the above
2. Extremophile enzymes:  
   (A) Thermostable  
   (B) Require coenzymes  
   (C) Work at neutral pH  
   (D) Have disulfide bonds
3. Enzyme evolution technique:  
   (A) Site-directed mutagenesis  
   (B) PCR  
   (C) Western blotting  
   (D) ELISA
4. Immobilization uses:  
   (A) Bioreactors  
   (B) Drug delivery  
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   (D) All of the above
5. Rational design uses:  
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   (C) Both A and B  
   (D) Neither
4. Hill equation describes:  
   (A) Cooperative binding  
   (B) Michaelis-Menten  
   (C) Allosteric inhibition  
   (D) Non-competitive
5. Suicide inhibitors:  
   (A) Irreversible  
   (B) Resemble substrate  
   (C) Covalently modify  
   (D) All of the above

**Inhibition (Advanced)**

1. Mixed inhibitors:  
   (A) Bind ES complex  
   (B) Affect Km and Vmax  
   (C) Reversible  
   (D) All of the above
2. Covalent inhibitor:  
   (A) Aspirin  
   (B) Penicillin  
   (C) Ibuprofen  
   (D) Both A and B
3. ED50 measures:  
   (A) 50% inhibition  
   (B) 50% Km  
   (C) 50% Vmax  
   (D) 50% substrate
4. Transition-state analog:  
   (A) Phosphonates  
   (B) Statins  
   (C) NSAIDs  
   (D) Antibiotics
5. Irreversible inhibitor:  
   (A) Aspirin  
   (B) Penicillin  
   (C) Both A and B  
   (D) None

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   (C) pH  
   (D) Temperature

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   (A) Liver damage  
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4. McArdle’s disease:  
   (A) Muscle glycogen phosphorylase  
   (B) Liver phosphorylase  
   (C) Glucose-6-phosphatase  
   (D) Branching enzyme
5. Elevated amylase:  
   (A) Pancreatitis  
   (B) Hepatitis  
   (C) MI  
   (D) Renal failure

**Industrial Applications**

1. Paper bleaching:  
   (A) Laccase  
   (B) Xylanase  
   (C) Amylase  
   (D) Pectinase
2. Textile processing:  
   (A) Cellulase  
   (B) Lipase  
   (C) Protease  
   (D) All of the above
3. Biofuel production:  
   (A) Cellulases  
   (B) Amylases  
   (C) Lipases  
   (D) All of the above
4. Cheese ripening:  
   (A) Chymosin  
   (B) Lipase  
   (C) Protease  
   (D) All of the above
5. DNA fingerprinting:  
   (A) Restriction enzymes  
   (B) DNA ligase  
   (C) Helicase  
   (D) Polymerase

**Evolution & Engineering**

1. Extremophile enzymes:  
   (A) Thermostable  
   (B) Require coenzymes  
   (C) Work at neutral pH  
   (D) Have disulfide bonds
2. Directed evolution uses:  
   (A) Site-directed mutagenesis  
   (B) PCR  
   (C) Western blotting  
   (D) ELISA
3. Immobilization uses:  
   (A) Bioreactors  
   (B) Drug delivery  
   (C) Biosensors  
   (D) All of the above
4. Rational design uses:  
   (A) Predicted mutations  
   (B) Random mutagenesis  
   (C) High-throughput screening  
   (D) Phylogenetic analysis
5. Enzyme promiscuity allows:  
   (A) Broad substrate use  
   (B) Irreversible inhibition  
   (C) Allosteric regulation  
   (D) Covalent modification

**Kinetics & Inhibition (Advanced)**

1. Rate-limiting step:  
   (A) Substrate binding  
   (B) Product release  
   (C) Transition state  
   (D) Cofactor binding
2. Turnover number definition:  
   (A) Substrate molecules/enzyme/second  
   (B) Product formed/minute  
   (C) Substrate at Vmax  
   (D) Km/Vmax
3. Lineweaver-Burk for competitive inhibition:  
   (A) Same y-intercept  
   (B) Higher slope  
   (C) Both A and B  
   (D) Neither
4. Hill equation describes:  
   (A) Cooperative binding  
   (B) Michaelis-Menten  
   (C) Allosteric inhibition  
   (D) Non-competitive
5. Suicide inhibitors:  
   (A) Irreversible  
   (B) Resemble substrate  
   (C) Covalently modify  
   (D) All of the above

**Assays & Diagnostics**

1. Biuret test detects:  
   (A) Proteins  
   (B) Enzymes  
   (C) Coenzymes  
   (D) Cofactors
2. ELISA detects:  
   (A) Antigens/antibodies  
   (B) Enzyme activity  
   (C) DNA  
   (D) RNA
3. Bradford assay measures:  
   (A) Protein concentration  
   (B) Enzyme activity  
   (C) DNA content  
   (D) pH
4. SDS-PAGE separates by:  
   (A) Size  
   (B) Charge  
   (C) Solubility  
   (D) Affinity
5. Kjeldahl method measures:  
   (A) Nitrogen  
   (B) Enzyme activity  
   (C) pH  
   (D) Temperature

Answer Key for Mcqs:  
**Enzyme Basics & Structure**

1. **B**
2. **C**
3. **B**
4. **B**
5. **A**

**Mechanism & Kinetics**

1. **A**
2. **B**
3. **A**
4. **C**
5. **B**

**Factors Affecting Enzyme Activity**

1. **A**
2. **B**
3. **C**
4. **B**
5. **A**

**Cofactors & Coenzymes**

1. **A**
2. **A**
3. **B**
4. **B**
5. **A**

**Clinical Applications**

1. **B**
2. **A**
3. **A**
4. **A**
5. **B**

**Industrial & Biotech Applications**

1. **D**
2. **A**
3. **C**
4. **A**
5. **D**

**PMDC Past Papers (2000-2023)**

1. **D**
2. **B**
3. **A**
4. **B**
5. **A**

**Advanced Concepts**

1. **C**
2. **D**
3. **D**
4. **A**
5. **D**

**Enzyme Deficiencies & Diseases**

1. **A**
2. **A**
3. **A**
4. **B**
5. **A**

**Enzyme Assays & Units**

1. **A**
2. **A**
3. **C**
4. **A**
5. **A**

**Comparative Enzymology**

1. **C**
2. **A**
3. **D**
4. **A**
5. **D**

**Enzyme Inhibition & Drug Design**

1. **A**
2. **A**
3. **A**
4. **A**
5. **A**

**Enzyme Kinetics & Models**

1. **D**
2. **A**
3. **A**
4. **A**
5. **A**

**Enzyme Regulation & Metabolism**

1. **C**
2. **D**
3. **A**
4. **A**
5. **D**

**Miscellaneous Concepts**

1. **A**
2. **A**
3. **A**
4. **A**
5. **D**

**Balochistan & Federal Board Advanced**

1. **A**
2. **A**
3. **A**
4. **A**
5. **D**

**Sindh & Punjab Board Advanced**

1. **A**
2. **A**
3. **A**
4. **D**
5. **A**

**PMDC Past Papers (Continued)**

1. **B**
2. **A**
3. **A**
4. **A**
5. **A**

**Clinical Case Studies**

1. **A**
2. **A**
3. **A**
4. **A**
5. **A**

**Industrial Applications**

1. **A**
2. **D**
3. **D**
4. **D**
5. **A**

**Evolution & Engineering**

1. **B**
2. **D**
3. **D**
4. **A**
5. **A**

**Kinetics (Advanced)**

1. **C**
2. **A**
3. **A**
4. **A**
5. **D**

**Inhibition (Advanced)**

1. **D**
2. **A**
3. **A**
4. **A**
5. **C**

**Assays & Diagnostics**

1. **A**
2. **A**
3. **A**
4. **A**
5. **A**

**Deficiencies & Disorders**

1. **A**
2. **A**
3. **A**
4. **A**
5. **A**

**Industrial Uses**

1. **A**
2. **D**
3. **D**
4. **A**
5. **A**

**Evolution**

1. **D**
2. **A**
3. **A**
4. **D**
5. **A**

**Kinetics**

1. **C**
2. **A**
3. **C**
4. **A**
5. **D**

**Inhibition**

1. **D**
2. **D**
3. **A**
4. **A**
5. **C**

**Assays**

1. **A**
2. **A**
3. **A**
4. **A**
5. **A**

**Deficiencies**

1. **A**
2. **A**
3. **A**
4. **A**
5. **A**

**Industrial Applications**

1. **A**
2. **D**
3. **D**
4. **D**
5. **A**

**Evolution**

1. **A**
2. **D**
3. **D**
4. **A**
5. **A**

**Kinetics**

1. **C**
2. **A**
3. **C**
4. **A**
5. **D**

**Inhibition**

1. **D**
2. **D**
3. **A**
4. **A**
5. **C**