Time: 3 Hours **Marks: 75**

Q.1. Multiple Choice Questions (MCQs) **20**

1 Which technique is commonly used for identifying lead compounds?

A Northern blotting B. High-throughput screening

C. Protein Sequencing D. ELISA

2 What is a major contributor to the high cost of drug development?

A. Late-stage clinical trial failures B. Cheap preclinical models

C Over-the-counter sales D. Efficient regulatory approval

3 Which field integrates biological data using computational tools in drug discovery?

A. Pharmacology B. Bioinformatics

C. Toxicology D. Clinical medicine

4 Antisense oligonucleotides (ASOs) function by:

A. Activating transcription B. Enhancing protein folding

C. Editing DNA D. Binding to mRNA to block translation

5 One major advantage of siRNA technology in drug development is:

A High toxicity B. Increased protein translation

C. Specific and potent gene silencing D. Universal target for all diseases

6 Which of the following is a key feature of combinatorial chemistry?

A. Single compound synthesis B. High cost and low output

C. Generation of large compound libraries D. Manual compound screening

7 Structure-based drug design depends primarily on:

A. Chemical synthesis of compounds B. 3D structure of the target protein

C. Clinical trial results D. ADMET profiling

8 Cell-based assays are primarily used to:

A. Quantify solubility B. Test protein folding

C. Measure biological response of test compounds D. Identify DNA damage

9 Rational drug design involves

A Designing molecules based on knowledge of biological targets

B Random compound screening

C. Only natural compound testing

D. Trial and error approach

10 Molecular docking is used in rational drug design to:

A Analyze mRNA expression

B Visualize protein sequences

C. Predict binding affinity and orientation of ligands in the target site

D. Estimate drug solubility

11 Flexible docking allows:

A Ligand or both ligand and receptor to change conformation

B Only the receptor to be flexible

C. No movement during docking

D. Only protein side chains to move

12 The purpose of molecular docking is to:

A Determine clinical trial results

B Predict binding orientation and affinity of a ligand to its target

C. Analyze gene sequences

D. Isolate new microbes

13 De novo drug design refers to:

A Screening only FDA-approved drugs

B Manual trial-and-error drug design

C. Designing novel compounds from scratch using the active site of the target

D. Random compound testing

14 The main difference between SAR and QSAR is:

A SAR is computational, QSAR is manual

B QSAR is quantitative; SAR is qualitative

C. QSAR only applies to antibiotics

D. SAR uses statistical methods

15 What does the term 'Hansch analysis' refer to in QSAR studies?

A Genetic mutation profiling B. Docking protocol

C. De novo design method D. Linear regression-based modelling

16 Prodrugs are designed to improve patient acceptability by:

A Masking unpleasant taste or irritation B. Reducing dose frequency

C Increasing protein binding D. Preventing metabolism

17 A prodrug designed to be activated in the colon is intended for:

A Fast systemic action
B. Site-specific drug delivery
C Reduced half-life
D. Inhibition of absorption

18 Ideal characteristics of a prodrug include:

A Being highly toxic before activation
B. Releasing multiple active forms
C Predictable enzymatic conversion to active drug
D. Permanent activity without metabolism

19 _____ is an example of a prodrug?

A Paracetamol B. Ibuprofen C. Metformin D. Enalapril

20 The primary purpose of designing a prodrug is to:

A Improve drug delivery and pharmacokinetic properties
B Increase molecular weight
C. Eliminate side effects completely
D. Avoid oral administration

Q.2 Long Answers (Answer 2 out of 3) **20**

1 Describe the principle, methodology, and advantages of High Throughput Screening (HTS) in the identification of drug leads.
2 Elaborate on rational drug design. Discuss methods used in rational drug design.
3 Discuss in detail about De Novo drug design. Elaborate flexible docking methods with suitable examples.

Q.3 Short Answers (Answer 7 out of 9) **35**

1 Explain the role of nucleic acid microarrays in target discovery.
2 Write a note on antisense oligonucleotides and its application in target validation.
3 Describe the steps involved in homology modeling of a protein.
4 Define combinatorial Chemistry? Discuss solid phase synthesis.
5 Compare structure-based and pharmacophore-based drug design methods.
6 What are the different approaches for traditional drug design?
7 Enlist advantages and disadvantages of QSAR? Write a note on 3D QSAR
8 Explain the concept of rigid molecular docking. what are its advantages and limitations?
9 Describe with suitable examples how prodrugs are useful for improving pharmacokinetic properties of drugs.

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