NIPER JEE 2025 Question Paper with Solutions - Memory Based

Time Allowed :2 hours	**Maximum Marks :**150	**Total Questions :**150

General Instructions for NIPER JEE 2025

Read the following instructions carefully and follow them strictly:

1. The question paper consists of multiple-choice questions (MCQs) based on various topics from Pharmaceutical Sciences, Chemistry, and Biology.
2. The question paper is divided into four sections:
   - Section A: Pharmaceutical Sciences
   - Section B: Chemistry
   - Section C: Biology
   - Section D: General Knowledge and Current Affairs
3. There are a total of 150 questions in the paper.
4. Each question carries 1 mark. There is no negative marking for wrong answers.
5. All questions are compulsory.
6. Each question has four options, labeled (A), (B), (C), and (D). Choose the correct option.
7. Answer all the questions on the OMR sheet provided. Mark only one option for each question.
8. Write your Roll Number, Name, and Signature on the OMR sheet in the space provided.
9. The time allotted for this paper is 2 hours.
10. No extra time will be granted for filling personal details on the OMR sheet.

1. Which of the following antipsychotic drugs works by blocking post-synaptic dopamine D2 receptors, particularly in the mesolimbic-mesocortical pathway?

(a) Haloperidol

(b) Clozapine

(c) Olanzapine

(d) Risperidone

Correct Answer: (a) Haloperidol

Solution:

Haloperidol is a typical antipsychotic drug that works by blocking the D2 dopamine receptors in the brain, especially in the mesolimbic-mesocortical pathways. This is essential in the management of schizophrenia and other psychotic disorders.

Clozapine, Olanzapine, and Risperidone are atypical antipsychotics that have a different mechanism, as they affect multiple neurotransmitter systems, including serotonin and dopamine.

Thus, the correct answer is (a) Haloperidol.

Quick Tip

Haloperidol is a typical antipsychotic, while others like Clozapine and Risperidone are atypical antipsychotics.

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2. Neutropenia is an adverse effect of all of the following drugs EXCEPT:

(a) Clozapine

(b) Carbamazepine

(c) Phenytoin

(d) Lithium

Correct Answer: (d) Lithium

Solution:

Neutropenia is a serious adverse effect seen in some drugs. Clozapine and Carbamazepine are known for causing neutropenia in some patients, which can be life-threatening if not monitored.

Phenytoin can cause neutropenia, especially in prolonged usage.

However, Lithium does not typically cause neutropenia. It may cause other adverse effects, like renal issues, but neutropenia is not common.

Thus, the correct answer is (d) Lithium.

Quick Tip

Monitor blood counts in patients on Clozapine and Carbamazepine due to the risk of neutropenia.

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3. The mode of action of nerve gas is:

(a) Inhibition of acetylcholinesterase

(b) Blockade of sodium channels

(c) Inhibition of gamma-aminobutyric acid (GABA)

(d) Activation of muscarinic receptors

Correct Answer: (a) Inhibition of acetylcholinesterase

Solution:

Nerve gases, such as Sarin and VX, inhibit acetylcholinesterase, the enzyme responsible for breaking down acetylcholine in synaptic clefts. This results in continuous stimulation of muscles and glands, leading to overstimulation and paralysis.

The other options are incorrect because nerve gases specifically inhibit acetylcholinesterase, not sodium channels, GABA, or muscarinic receptors.

Thus, the correct answer is (a) Inhibition of acetylcholinesterase.

Quick Tip

Nerve gases inhibit acetylcholinesterase, causing continuous neurotransmission and overstimulation.

4. Friedel-Crafts reaction is observed in:

(a) Aromatic compounds

(b) Aliphatic compounds

(c) Alcohols

(d) Aldehydes

Correct Answer: (a) Aromatic compounds

Solution:

The Friedel-Crafts reaction involves the substitution of a hydrogen atom on an aromatic compound with an alkyl or acyl group, catalyzed by a Lewis acid like $AlCl_3$. This reaction is typically seen with aromatic compounds.

The other options (aliphatic compounds, alcohols, and aldehydes) do not undergo Friedel-Crafts reactions.

Thus, the correct answer is (a) Aromatic compounds.

Quick Tip

Friedel-Crafts reactions occur primarily with aromatic compounds, not aliphatic compounds.

5. Which of the following peptides is cyclic in nature?

(a) Oxytocin

(b) Insulin

(c) Glucagon

(d) Vasopressin

Correct Answer: (a) Oxytocin

Solution:

Oxytocin is a cyclic peptide consisting of nine amino acids. It forms a cyclic structure through a disulfide bond between cysteine residues, which is crucial for its biological activity. Insulin, glucagon, and vasopressin are not cyclic peptides. Insulin consists of two chains linked by disulfide bonds but does not form a cyclic structure.
Thus, the correct answer is (a) Oxytocin.

Quick Tip

Oxytocin is cyclic, whereas insulin and other peptides are linear or have chain connections.

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6. The time taken for 5 percent of a drug to decompose by first-order kinetics is:

(a) Half-life
(b) Mean residence time
(c) Shelf-life
(d) None of the above

Correct Answer: (c) Shelf-life

Solution:
In first-order kinetics, the decomposition of a drug follows an exponential decay. The time it takes for 50 percent of the drug to decompose is called the half-life. However, the time it takes for 5 percent of a drug to decompose is typically referred to as its ”shelf-life,” as it is the time after which the drug may no longer be effective.
Thus, the correct answer is (c) Shelf-life.

Quick Tip

Shelf-life refers to the time it takes for a drug to degrade by a certain amount, like 5

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7. Which are the host cell membrane receptors that the outer coat protein gp-120 of HIV binds to?

(a) CD4 and CCR5

(b) CD8 and CXCR4

(c) CD4 and CXCR4

(d) CD8 and CCR5

Correct Answer: (c) CD4 and CXCR4

Solution:

HIV binds to the host cell via two primary receptors: CD4 and CXCR4. The gp-120 protein of HIV initially binds to CD4, and then the virus undergoes a conformational change to bind to CXCR4 or CCR5, depending on the type of HIV strain.

Thus, the correct answer is (c) CD4 and CXCR4.

Quick Tip

HIV targets CD4 and CXCR4 or CCR5 for cell entry.

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8. A partial theoretical support for the idea that more stable carbocations would be formed faster than less stable ones comes during regioselective addition of HCl to propene, provided by:

(a) Markovnikov's Rule

(b) Le Chatelier's Principle

(c) Hess's Law

(d) None of the above

Correct Answer: (a) Markovnikov's Rule

Solution:

Markovnikov's Rule states that when HX is added to an alkene, the proton (H) will add to the carbon atom of the double bond that has the greater number of hydrogen atoms (the more substituted carbon), and the halide (X) will add to the carbon with fewer hydrogen atoms. This rule explains the regioselectivity of the reaction, as the more stable carbocation intermediate is formed faster, leading to the observed product distribution.

Thus, the correct answer is (a) Markovnikov's Rule.

Quick Tip

Markovnikov's Rule helps in predicting the product of an electrophilic addition reaction based on carbocation stability.

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9. Which form of electrochemical measurement does NOT involve electrolysis?

(a) Potentiometry

(b) Voltammetry

(c) Coulometry

(d) Amperometry

Correct Answer: (a) Potentiometry

Solution:

Potentiometry measures the potential (voltage) difference between two electrodes, without passing a current through the solution. It does not involve electrolysis, unlike voltammetry, coulometry, and amperometry, which all require current flow and involve electrolysis reactions.

Thus, the correct answer is (a) Potentiometry.

Quick Tip

Potentiometry measures voltage without electrolysis, while other techniques involve current and electrolysis.

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10. In LC-MS (Liquid Chromatography-Mass Spectrometry) instrument, the interface is applied between:

(a) Liquid chromatography and UV detector

(b) Liquid chromatography and mass spectrometer

(c) UV detector and mass spectrometer

(d) None of the above

Correct Answer: (b) Liquid chromatography and mass spectrometer

Solution:

In LC-MS, the interface connects the liquid chromatography (LC) system with the mass spectrometer (MS). The liquid chromatography separates the sample components, and the mass spectrometer detects them based on their mass-to-charge ratio. The interface between LC and MS is crucial for transferring the eluted compounds from the chromatographic column to the mass spectrometer for analysis.

Thus, the correct answer is (b) Liquid chromatography and mass spectrometer.

Quick Tip

In LC-MS, the interface links the liquid chromatography system and mass spectrometer for component analysis.
