

Paper code – BTX-CC-13

Your Roll No.....

Examination: _____

Semester: IV (2023)

Paper: Analytical Toxicology (Code: BTX-CC-13)

Time: 3:00 hr

MM: 75

This Q paper contains 5 questions, each of 15 marks.

Q1. Briefly answer all the questions. Each question carries 1 marks.

[1×10 = 15]

- i. Which of the following is a primary objective o
- ii. f sample handling in the analysis of pesticides in food and environmental samples?
 - a) Increase the concentration of pesticides in the sample
 - b) Reduce the presence of pesticides in the sample
 - c) Ensure proper preservation and preparation of the sample
 - d) Identify the source of pesticide contamination
- iii. Which extraction technique involves the partitioning of pesticides between two immiscible liquid phases?
 - a) Solid-phase microextraction (SPME)
 - b) QuEChERS extraction
 - c) Liquid-liquid extraction (LLE)
 - d) Microwave-assisted extraction (MAE)
- iv. What is the primary advantage of AAS in heavy metal analysis?
 - a) High sensitivity
 - b) High resolution
 - c) High selectivity
 - d) High speed of analysis
- v. Which instrumental technique is commonly used for the determination of heavy metals in food and environmental samples?
 - a) Atomic absorption spectroscopy (AAS)
 - b) High-performance liquid chromatography (HPLC)
 - c) Gas chromatography (GC)
 - d) Mass spectrometry (MS)
- vi. Which heavy metals are of particular concern in petroleum products due to their toxicity and environmental impact?
 - a) Copper and zinc
 - b) Iron and magnesium
 - c) Cadmium and lead
 - d) Nickel and chromium
- vii. Which biological specimen is considered the gold standard for drug testing due to its direct correlation with recent drug use?
 - a) Blood
 - b) Urine
 - c) Oral fluid
 - d) Hair
- viii. Which biological specimen is commonly used for the determination of drug use during the prenatal period?
 - a) Blood
 - b) Urine
 - c) Oral fluid
 - d) Meconium
- ix. How are DNA profiles visualized and compared in DNA fingerprinting?
 - a) By observing the color changes of DNA samples
 - b) By analyzing the DNA sequence directly
 - c) By examining the banding pattern on a gel after gel electrophoresis
 - d) By measuring the length of DNA fragments using a spectrophotometer

- x. In which type of immunoassay, the binding of target analytes to specific antibodies is visualized through a color change?
 - a) Enzyme Immunoassay (EIA)
 - b) Radio Immunoassay (RIA)
 - c) Chemiluminescent immunoassay (CLIA)
 - d) Colorimetric immunoassay (CIA)
- xi. What is the major application of Enzyme Immunoassay (EIA) in forensic toxicology?
 - a) Detection of drugs of abuse in biological samples
 - b) Identification of blood group antigens in crime scene samples
 - c) Analysis of heavy metals in environmental samples
 - d) Quantification of pesticides in food samples
- xii. _____ extraction is a technique commonly employed for the extraction of volatile and semi-volatile compounds.
- xiii. Solid-phase extraction (SPE) utilizes a _____ to selectively retain and elute target analytes.
- xiv. AAS is particularly useful for the analysis of _____ metals, such as lead, cadmium, and mercury.
- xv. Urine analysis is commonly used for _____ drug screening due to its ease of collection and longer detection window.
- xvi. Immunoassays in forensic toxicology and the food industry offer _____ and specific detection of target analytes, minimizing false positives and negatives.

Q2. Answer any five questions. Each question carries 3 marks.

[3×5 = 15]

- i. What is liquid-liquid extraction and how does it work?
- ii. How does gas chromatography (GC) facilitate the analysis of pesticides in complex matrices?
- iii. How are sample extraction and preparation carried out for pesticide analysis in food and environmental samples?
- iv. Which analytical techniques are commonly used for the determination of heavy metals in food and environmental samples?
- v. Which stimulant drugs are frequently abused?
- vi. What are the main steps involved in the process of DNA fingerprinting?

Q3. Answer any 3 questions. Each question carries 5 marks.

[5×3 = 15]

- i. What are the commonly abused depressant drugs, and how do they affect the central nervous system?
- ii. How is sample preparation carried out for the determination of heavy metals in food and environmental samples?
- iii. How are sample extraction and preparation carried out for pesticide analysis in food and environmental samples?
- iv. Describe the principles and applications of solid-phase extraction (SPE) in analytical chemistry.
- v. What is the principle behind Enzyme Immunoassay (EIA) and what are its applications in medical diagnostics?

Q4. Write a short note on 5 the following. Each carries 3 marks.

[3×5 = 15]

- i. Difference between RFLP and STR
- ii. Solid liquid extraction
- iii. RIA
- iv. Metabolism of cocaine
- v. Classes of pesticides
- vi. Toxic heavy metals

Q5. Compare and contrast the analysis of organochlorine pesticides and pyrethroids by Gas Chromatography. Discuss the specific sample preparation techniques, chromatographic conditions, and detection methods utilized for each class of pesticides. [15]

OR

Describe the principles and instrumentation involved in atomic absorption spectroscopy (AAS) for the analysis of heavy metals. Discuss the advantages and limitations of AAS and provide examples of heavy metals commonly analyzed using this technique.