Graphic Era HILL UNIVERSITY
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Sessional II (Even) Semester Examination May 2025

Roll no.....

Name of the Course: B. Pharma
Semester: VIII
Name of the Paper: Advanced Instrumentation Techniques
Paper Code: BP811ET

Time: 1.5 hours. **Maximum Marks: 30**

Note:
(i) This question paper contains three sections
(ii) All the sections are compulsory

Section-A

Multiple Choice Questions – Attempt all questions **(10 X 1 = 10 Marks)**

1.According to ICH guidelines, which of the following parameters is not typically evaluated during validation of an analytical method? A. Specificity B. Linearity C. Robustness D. Solubility **2.Which instrument is commonly used for the quantitative analysis of trace metal ions by emission of light at specific wavelengths?** A. UV-Visible Spectrophotometer B. Infrared Spectrophotometer C. Flame Photometer D. Fluorimeter **3.Which of the following analytical instruments operates based on the Beer-Lambert law?** A. UV-Visible Spectrophotometer B. Gas Chromatograph C. IR Spectrophotometer D. Flame Photometer **4.Which instrument uses a detector such as a flame ionization detector (FID) or thermal conductivity detector (TCD)?** A. UV-Visible Spectrophotometer B. High Performance Liquid Chromatography (HPLC) C. Gas Chromatography (GC) D. Infrared Spectrophotomete **5.As per USFDA guidance, calibration of an electronic balance should typically be performed:** A. Once a year B. Once in two years C. Daily before use D. Only when an error is suspected	CO3

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6. Which of the following is a major advantage of Radioimmunoassay (RIA)? A. Non-specific detection B. High sensitivity at nanogram levels C. No need for labeled antigens D. It uses visible light as detection system **7. Which of the following is not a component of a typical Radioimmunoassay (RIA)?** A. Radiolabeled antigen B. Antibody C. Substrate for enzyme reaction D. Sample containing unlabeled antigen **8. What is the basic principle behind Radioimmunoassay?** A. Competition between labeled and unlabeled antigen for antibody binding sites B. Enzymatic cleavage of radiolabeled compounds C. Precipitation of antigen-antibody complex D. Absorbance measurement of antigen **9. Which solvent system is most commonly used in liquid-liquid extraction for weakly acidic drugs?** A. Water-chloroform B. Water-butanol C. Water-ethyl acetate D. Water-acetone **10. In solid phase extraction, which of the following is the correct order of steps?** A. Load → Wash → Condition → Elute B. Condition → Load → Wash → Elute C. Elute → Load → Wash → Condition D. Wash → Elute → Load → Condition	**CO4**

Section B

Short Questions: Attempt any two questions **(2X 5 = 10 Marks)**

1. You are assigned to calibrate a UV-Visible spectrophotometer. Describe the steps you would follow using potassium dichromate as a standard, including any specific wavelengths and absorbance values involved. (CO3)

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2. A laboratory uses a flame photometer to determine sodium levels in a formulation. Outline the procedure to calibrate the instrument using standard sodium solutions. (CO3)
3. Differentiate between solid-phase extraction (SPE) and liquid-liquid extraction (LLE) based on principles, procedure steps, efficiency, and environmental safety. Analyze which method is more suitable for extracting polar drugs from plasma. (CO4)

Section C

Long questions: Attempt any one question **(1X10 = 10 Marks)**

1. You are working in a pharmaceutical quality control lab that recently installed a new HPLC system. Draft a standard operating procedure (SOP) for its calibration, including system suitability tests, mobile phase preparation, column performance checks, and documentation as per USFDA guidelines. (CO3)
2. Explain the principle of Radioimmunoassay (RIA) and describe the role of each of its components. Also, summarize its advantages, limitations, and at least three important applications in pharmaceutical or clinical analysis. (CO4)