UPES
End Semester Examination, May 2024
Course: Advanced Instrumentation Techniques   Semester : 2nd
Program: MSc Nutrition & Dietetics
Duration : 3 Hours
Course Code: HSND 7015_2   Max. Marks: 100

Instructions: Attempt all the questions

S. No.	Section A Short answer questions/ MCQ/T&F (20Qx1.5M= 30 Marks)	Marks	COs
Q1	DSC measures the mass variation of a sample with change in heat flow. Is this statement true or false?	1.5	CO3
Q2	A combination electrode-type pH meter uses two electrodes in a single sealed tube. Is this statement true or false?	1.5	CO1
Q3	The dispersion type of FTIR is more preferrable than the interferometric type. Is this statement true or false?	1.5	CO2
Q4	What are the colors present in a Lovibond scale?	1.5	CO1
Q5	The amount of light scattering from a food sample is directly related to the size of food particles. Is this statement true or false?	1.5	CO1
Q6	Which of the following is true for UV-VIS spectroscopy? a. thermocouples are used as detectors b. it involves rotational transitions of electrons c. photomultiplier tubes are used as detectors d. solid samples can be analyzed	1.5	CO2
Q7	What is the light source used in a tintometer?	1.5	CO1
Q8	A spectrophotometric detector can be used in a HPLC system. Is this statement true or false?	1.5	CO4

Q9	The working of a turbidity meter is based on: a. photoelectric effect b. Tyndall effect c. thermionic emission d. none of the above	1.5	CO1
Q10	HPLC is a destructive analysis technique. Is this statement true or false?	1.5	CO4
Q11	The wavenumber scanning range in a FTIR spectrophotometer is: a. 400 μm – 4000 μm b. 100 μm – 800 μm c. 100 μm – 200 μm d. 100 nm – 400 nm	1.5	CO2
Q12	Which of the following best describes Bragg's law of diffraction: (a) $\lambda = d\ sin\theta$ (b) $\lambda = d\ cos\theta$ (c) $n\lambda = d\ sin\theta$ (d) $n\lambda = 2d\ sin\theta$	1.5	CO3
Q13	What is the standard reduction potential of $Zn^{2+}_{(aq)}/Zn_{(s)}$ if its standard oxidation potential is 0.76 V? a. 0 V b. − 0.76 V c. 0.76 V d. None of the above	1.5	CO1
Q14	Hypochromic effect is described by an increase in absorbance intensity. Is this statement true or false?	1.5	CO2
Q15	What is the unit used for measuring turbidity?	1.5	CO1
Q16	The flow range in a HPLC pump is 0.01 – 10 mL/min. Is this statement true or false?	1.5	CO4
Q17	In a DSC graph, the upward peak describes an endothermic process. Is this statement true or false?	1.5	CO3
Q18	Refractometry is based upon which law? a. Planck's law	1.5	CO1

	b. Law of reflection c. Snell's law d. none of the above		
Q19	Mention radiation sources which are used in UV-Vis spectroscopy.	1.5	CO2
Q20	A forced draft oven is more reliable for moisture analysis than a convection oven. Is this statement true or false?	1.5	CO1

Section B
(4Qx5M=20 Marks)

Q 1	What is the pH of a food sample which has $[H^+] = 10^{-3}$ M? What is the nature of this food sample? Give an example of such a food.	5	CO1
Q2	What is the Lovibond color scale? Mention its importance by giving suitable examples.	5	CO1
Q3	Describe the phenomenon of light refraction with the help of a suitable diagram.	5	CO2
Q4	Explain the various types of HPLC separation methods.	5	CO4

Section C
(2Qx15M=30 Marks)

Q 1	What is the governing principle behind the phenomenon of X-ray diffraction? Explain the working of the XRD instrument.	15	CO2
Q2	Discuss the difference in the instrument design of a dispersive type and interferometric type FTIR setup.	15	CO2

Section D
(2Qx10M=20 Marks)

Q 1	Describe the working of the nephelometric-based turbidity measurement.	10	CO1
Q2	Explain the various phenomena that can be analyzed from the DSC plot of polyethylene terephthalate.	10	CO3