Name: **Enrolment No:**	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2023

Course: Advanced Instrumentation Techniques — **Semester: II**
Program: M.Sc.(N&D) — **Duration: 3 Hours**
Course Code: HSND 7015 — **Max. Marks: 100**
Instructions:

S. No.	Section A Short answer questions/ MCQ/T&F (20Qx1.5M= 30 Marks)	Marks	COs
Q1	Which of the following is not true about Fourier Transform Infrared (FTIR) spectrometer? a) It is of non-dispersive type b) It is useful where repetitive analysis is required c) Size has been reduced over the years d) Size has increased over the years	1.5	CO1
Q2	The number of soluble solids that are dissolved within a substance. It is determined using – a) Penetrometer b) Refractometer c) Thermometer d) pH meter	1.5	CO1
Q3	Which of the following is not the advantage of Fourier Transform Spectrometers? a) Signal to noise ratio is high b) Information could be obtained on all frequencies c) Retrieval of data is possible d) Easy to maintain	1.5	CO1
Q4	Computers accept analog signals directly. a) True b) False	1.5	CO1
Q5	Why is the computer necessary in Fourier Transform Spectrometer? a) To display the detector output b) To process the detector output c) To determine the amplitude d) To determine the frequency	1.5	CO1

Q6	Chromatography is a physical method that is used to separate and analyse _____ a) Simple mixtures b) Complex mixtures c) Viscous mixtures d) Metals	1.5	CO2
Q7	In chromatography, which of the following can the mobile phase be made of? a) Solid or liquid b) Liquid or gas c) Gas only d) Liquid only	1.5	CO2
Q8	Evaporation, desiccation and dehydration all mean the same thing. a) True b) False	1.5	CO2
Q9	Pure water is known to be which of the following? a) Weak electrolyte b) Strong electrolyte c) Neither weak nor strong d) Not an electrolyte	1.5	CO2
Q10	The wavelength of absorbed radiation is called as a) Phosphorescence b) Fluorescence c) Emission wavelength d) Excitation wavelength	1.5	CO2
Q11	_____ containing food supplies Nitrogen in our body. a) Vitamin-A b) Proteins c) Carbohydrates d) Fats	1.5	CO3
Q12	What type of method is the spectroscopic technique? a) Instrumental methods b) Radioactive methods c) Gravimetric method d) Titrimetric method	1.5	CO5
Q13	When do we use Buffer Solution? a) To make the solution basic b) To make the solution acidic c) To prevent solution's pH change d) None of the above	1.5	CO3

Q14	What does QA and QC stand for? a) Quality assurance and Queuing control b) Quality adjustment and Quality completion c) Quality assurance and Quality control d) Quality adjustment and Queuing control	1.5	CO3
Q15	Total ash content provides information on a) salt content b) mineral content c) siliceous matter d) all of the above	1.5	CO5
Q16	Which of the following options is CORRECT in terms of wavelength for the different types of IR spectrometer? a) Near IR: 0.8 – 2.5 µm b) Mid IR: 0.8 – 2.5 µm c) Far IR: 2.5 – 50 µm d) Mid IR: 50 – 100 µm	1.5	CO4
Q17	In Turbidimetry, the intensity of the transmitted light is usually measure at angle-------- a) 90° b) 45° c) 135° d) 180°	1.5	CO4
Q18	The principle involved in turbidimetry is the measurement of a) Absorbed light b) Scattered light c) Emitted light d) Transmitted light	1.5	CO3
Q19	What kind of vibrational changes occur at lower frequency in IR spectroscopy? a) Stretching vibration b) Bending or stretching depending on the media c) Bending Vibrations d) None of above	1.5	CO4
Q20	UV Spectroscopy is working on which principle. a) Partition b) Absorption c) Adsorption d) Emission	1.5	CO5
Section B **(4Qx5M=20 Marks)**			

Q 1	What are the different methods of turbidity analysis? Describe three in detail.	5	CO4
Q 2	Why chemical analysis is required? Describe its steps.	5	CO5
Q 3	Describe sampling process. What are the different sampling techniques. Describe briefly.	5	CO3
Q 4	What is the importance of color analysis? Describe different methods for this.	5	CO1
Section C (2Qx15M=30 Marks)			
Q 1	Ravi owns a food processing unit for multiple food products. a) Write down different physicochemical properties that can be analysed for a particular food product (Choose any of your choice). **(5 marks)** b) Describe the principle and working of five different instruments that can used for analysis of that food product. **(10 marks)**	15	CO5
Q 2	Sunil owns a fruit and vegetable processing unit. Answer the following questions: a) Describe all the proximate properties that can be analysed for a food product. **(5 marks)** b) Describe the principle and methods of analysis for all proximate components. **(10 marks)**	15	CO4
Section D (2Qx10M=20 Marks)			
Q 1	What is FTIR? Describe the components of FTIR equipment and its working.	10	CO2
Q 2	Describe the methods moisture content analysis with its principles.	10	CO3