श्री चित्रा तिरुनाल आयुर्विज्ञान और प्रौघोगिकी संस्थान,तिरुवनन्दपुरम् - ६९५ ०११,केरल, भारत
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## WRITTEN TEST FOR THE POST OF SCIENTIFIC ASSISTANT (INSTRUMENTS)

Roll No. [ ]

Date: 30.12.2019
Time: 10.00 A.M

Duration: 60 Minutes
Total Marks: 50

## INSTRUCTIONS TO THE CANDIDATE

1. Write your Roll Number in the Question Booklet and in the answer sheet.
2. Write legibly the alphabet of the most appropriate answer in the separate answer sheet provided.
3. There will not be any Negative marking.
4. Over-writing is not permitted.
5. Candidate should sign in the question paper and answer sheet.
6. No clarifications will be given.
7. Candidate should hand over the answer sheet and question paper to the invigilator before leaving the examination hall.

Signature of the Candidate

Office Copy

**SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES & TECHNOLOGY**
**BIOMEDICAL TECHNOLOGY WING, POOJAPPURA, TRIVANDRUM –12**
*(An Institute of National Importance under Govt.of India)*

## Recruitment for the post of Scientific Assistant (Instruments)

### Question Paper

1. An instrument used for determining glass transition temperature of polymers

   a) Mass spectrometer
   b) High performance liquid chromatograph
   c) Infrared spectrometer
   d) Differential scanning calorimeter

2. Who is considered as the father of chromatography?

   a) Alfred Nobel
   b) Michael Tsvett
   c) A J Hume
   d) A Werner

3. The unit of tensile strength is:

   a) Newton/Sq. meter
   b) Newton / meter
   c) Newton . sq. meter
   d) Newton . meter

4. Tocopherol is the main constituent of:

   a) Vitamin K
   b) Vitamin E
   c) Vitamin D
   d) Vitamin B10

5. Hydrargerum is the old name which element?

   a) Bromine
   b) Antimony
   c) Mercury
   d) Selenium

6. The most common agent used for sterilizing polymeric medical devices:

   a) Ethylene glycol
   b) Methanol
   c) Ethylene oxide
   d) Autoclave

7. The materials that allow radiation to pass more freely are referred to as:

   a) Radioactive
   b) Radiopaque
   c) Radiolucent
   d) none of these

8. Energy is inversely proportional to:

   a) frequency
   b) velocity of light
   c) wavelength
   d) wave number

9. Who got Nobel Prize for developing first modern gas chromatography

a) Mikhail Tsvet b) Gregor Mendel c) A. J. Martin d) Jaroslav Heyrovski

10. Which of the following material is used for preparing pans for thermal analysis?

a) Aluminium b) Alumina c) Platinum d) All of these

11. Elution of traces of stationary phase is called column .....

a) Scotching b) Bleeding c) Discharging d) Erosion

12. Deuterated trigycine sulphate is a detector for:

a) UV spectroscopy instruments b) IR spectroscopy instruments
b) Nitro aromatics d) Sound

13. The year 2019 is celebrated as the 150$^{th}$ anniversary of :

a) Periodic table b) Atomic structure c) Chromatography d) electron

14. Who was the inorganic chemist to won Nobel prize in chemistry in 1913 when Tagore received literature Nobel?

a) J. H. Vant'Hoff b) A. Werner c) F. Haber d) A. Kekule

15. Kooichi Tanaka received Nobel Prize in chemistry in 2002 for the discovery of?

a) Electrospray ionization c) Matrix Assisted Laser Desorption/Ionization
b) Ion trap d) Fast atom bombardment ionization technique

16. In gas chromatography, FID is used as the common detector for analyzing mass flow of samples. What is FID?

a) Free Induction Decay c) Flow Induced Detector
b) Fourier Integrated Detector d) Flame Ionization Detector

17. Which standard describes the estimation of residual EtO from sterilized medical devices?

a) ISO 10993-14 b) ISO 10993-07 c) ISO 10993-04 d) ISO 10993-11

18. Which is the deadly secondary carcinogen formed when ethylene oxide residues interacted with free halide ions of PVC?

a) Ethylene cyanohydrin c) Cyanoethane

b) Ethylene chlorohydrin
d) Cyanogen oxide

19. Which solvent is commonly used as the packing solution for Styragel columns?

a) Tetrahydrofuran
b) Toluene
c) Dimethyl formamide
d) All of these

20. Molecular weights of polar macromolecules can be determined by the Size exclusion chromatography analysis of their aqueous solutions using:

a) Styragel column
b) Ultrahydrogel column
c) C-18 column
d) Silica column

21. In UV-Visible spectrophotometer the source used for providing electromagnetic radiations in the UV region (190-390 nm) is:

a) Halogen lamp
b) Tungsten lamp
c) Deuterium lamp
d) Quartz lamp

22. In some solid materials, excited electrons in the triplet energy state moves to lower singlet energy state with the emission of radiation. This phenomenon is called

a) Fluorescence
b) Illuminance
c) Phosphorescence
d) Chemiluminescence

23. Which region in an IR spectrum is known as finger print region?

a) 3500-2800 $cm^{-1}$
b) 2800-1500 $cm^{-1}$
c) 1800-1100 $cm^{-1}$
d) 1500-500 $cm^{-1}$

24. In the Thermogravimetric profile of Calcium Oxalate monohydrate, which compound remains after third decomposition?

a) Calcium Oxide
b) Calcium Carbide
c) Calcium sesquioxide
d) Calcium Superoxide

25. Sir C V Raman won Nobel Prize in Physics for the discovery of Raman effect in the year:

a) 1921
b) 1936
c) 1928
d) 1930

26. If the scattered and incident radiations have same energy such type of scattering is called:

a) Raman scattering
c) Rayleigh scattering

b) Stokes scattering d) Walden scattering

27. "For molecules with a center of symmetry, no IR active transitions are Raman active and vice versa." This principle is called:

a) Pauli's exclusion principle c) Symmetry exclusion principle
b) Mutual exclusion principle d) Raman exclusion principle.

28. Which of the following is the major advantage of IR analysis over Raman analysis

a) Water can be used as a solvent c) Independent of background fluorescence
b) All states can be analyzed d) None of these

29. CCD based detectors are mainly used in Raman analysis. What is CCD?

a) Cooled chemical detector c) Cooled charge device
b) Charge centered detector d) Charge coupled device

30. A Mass Spectrometer (LC-MS) measures.....

a) Mass b) charge c) Mass/charge d) molecular mass

31. Which of the following technique could be used for the determination of Curie point of a material?

a) HPLC b) FTIR c) TGA d) Raman analysis

32. Number of normal modes of vibration possible for a linear molecule with n atoms is.....

a) 3n-4 b) 3n-5 c) 3n-6 d) 3n-1

33. Thermodynamic parameters of a phase transition could be obtained from.....?

a) Gas chromatography c) UV-Vis absorption spectroscopy
b) Differential Scanning calorimetry d) NMR spectroscopy

34. Nernst glower is used as the source of .....radiations.

a) Radio b) Ultraviolet c) Infrared d) Raman

35. In the context of chromatography which of the following statements are correct? (i) The stationary phase is always a solid, (ii) Mobile phase is always liquid, (iii) Retention time depend on the relative interaction of analyte with stationary and mobile phases, (iv) Polar analytes requires polar stationary phase, (v) Polar analytes requires non-polar stationary phase.

a) iii and iv b) i, ii, iii and v c), iii and v d) none of these

36. Energy transitions of an electron in a system could be depicted by a ..... Diagram.

a) Heyrovski b) Jablonski c) Orpat d) Venn

37. In the Raman spectrometer, the laser source with wavelength 1064 nm is made of:

a) Ar ion b) Xe ion c) He-Ne d) Nd-YAG

38. The efficiency of a stationary phase used for HPLC is measured in terms of:

a) Resolving power b) Affinity factor c) Plate count d) Rf factor

39. Which of the following techniques can be used for the structural elucidation of an unknown compound? (i) UV-Vis spectroscopy, (ii) Thermogravimetry, (iii) Viscosity analyzer, (iv) FTIR spectroscopy, (v) Raman spectroscopy, (vi) Nuclear magnetic resonance spectroscopy, (vii) Liquid chromatography-Mass spectrometry, (viii) Elemental analysis, (ix) Differential scanning calorimetry and (x) Contact angle measurements.

a) i, iii, v, vii, ix, x
b) i, iv, v, vi, vii, viii
c) i, iii, iv, viii, ix, x
d) All the above

40. Beer Lambert's law gives the relation between:

a) Reflected radiation and concentration
b) Scattered radiation and concentration
c) Energy absorption and concentration
d) Energy absorption and reflected radiation

41. Which of the following is not a property or parameter of electromagnetic radiation

a) Wavelength
b) Voltage
c) Wave number
d) Amplitude

42. Which of the following is false about the wavelengths of electromagnetic radiation?

a) Radiation with short wavelengths have high energies
b) Energy does not depend on wavelength
c) Radiation with long wavelengths have low energies
d) Energy depends on wavelength

43. Which of the following is the wavelength of microwave radiation?

a) 10 – 780nm b) 0.78 – 30μm c) 0.6 – 10 m d) 0.75 – 3.75 mm

44. In which type of chromatography, the stationary phase held in a narrow tube and the mobile phase is forced through it under pressure?

a) Column chromatography
b) Liquid chromatography
c) Planar chromatography
d) Gas chromatography

45. Gas chromatography can be performed in which of the following ways?

a) Only in columns
b) Only on plane surfaces
c) Either in columns or on plane surfaces
d) Neither in columns nor on plane surfaces

46. Which of the following is not a type of detector used in gas chromatography?
a) Argon ionisation detector
b) Thermal conductivity detector
c) UV visible spectrometric detector
d) Electron capture detector

47. X-ray diffractometers are not used to identify the physical properties of:

a) Metals b) Liquids c) Polymeric materials d) Solids

48. NMR is the study of the absorption of _____ by nuclei in a magnetic field.
a) Radioactive radiation
b) Infrared radiation
c) Radio frequency radiation
d) Microwaves

49. NMR spectroscopy indicates the chemical nature of the ____and spatial positions of ____
a) Electrons, Protons
b) Neutrons, electrons
c) Nuclei, electrons
d) Nuclei, neighbouring nuclei

50. Area under the stress-strain curve is called:
a) Toughness b) Strain c) Modulus d) Brittleness

---------- End of Test ----------

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## Recruitment for the post of Scientific Assistant (Instruments)

## Answer Key

| | |
|---|---|
| 1 | d |
| 2 | b |
| 3 | a |
| 4 | b |
| 5 | c |
| 6 | c |
| 7 | c |
| 8 | c |
| 9 | c |
| 10 | d |
| 11 | b |
| 12 | b |
| 13 | a |
| 14 | b |
| 15 | c |
| 16 | d |
| 17 | b |

| | |
|---|---|
| 18 | b |
| 19 | d |
| 20 | b |
| 21 | c |
| 22 | c |
| 23 | d |
| 24 | a |
| 25 | d |
| 26 | c |
| 27 | b |
| 28 | c |
| 29 | d |
| 30 | c |
| 31 | c |
| 32 | b |
| 33 | d |
| 34 | c |

| | |
|---|---|
| 35 | c |
| 36 | b |
| 37 | d |
| 38 | c |
| 39 | b |
| 40 | c |
| 41 | b |
| 42 | b |
| 43 | d |
| 44 | a |
| 45 | a |
| 46 | c |
| 47 | b |
| 48 | c |
| 49 | d |
| 50 | a |
| | |