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000125

Booklet Serial No.

Test Booklet Series

TEST BOOKLET - 2022
FORENSIC CHEMISTRY AND
TOXICOLOGY
(02)

A

Time Allowed: Two Hours

Maximum Marks: 120

INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES **NOT** HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. Please note that it is the candidate's responsibility to encode and fill in the Roll Number and Test Booklet Series Code A, B, C or D carefully and without any omission or discrepancy at the appropriate places in the OMR Response Sheet. Any omission/discrepancy will render the Response Sheet liable for rejection.
3. You have to enter your Roll Number on the Test Booklet in the Box provided alongside. **DO NOT** write anything else on the Test Booklet.
4. This Test booklet contains 120 items (questions). Each item comprises of four responses (answers). You will select the response which you want to mark on the Response sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose **ONLY ONE** response for each item.
5. You have to mark all your responses **ONLY** on the separate Response Sheet provided. See directions in the Response Sheet.
6. All items carry equal marks.
7. Before you proceed to mark in the Response sheet the response to various items in the Test Booklet you have to fill in some particulars in the Response Sheet as per instructions sent to you with your Admission Certificate.
8. After you have completed filling in all your responses on the Response Sheet and the examination has concluded, you should hand over to the Invigilator **only the Response Sheet**. You are permitted to take away with you the Test Booklet and Candidate's Copy of the Response Sheet.
9. Sheets for rough work are appended in the Test Booklet at the end.
10. **Penalty for wrong answers:**
THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY THE CANDIDATE.
 - (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, 0.25 of the marks assigned to that question will be deducted as penalty.
 - (ii) If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above for that question.
 - (iii) If a question is left blank, i.e., no answer is given by the candidate, there will be no **penalty** for that question.

SEAL

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1. All of the following are broad range of applications of Modern Forensic Science EXCEPT:
 - A) Used in Civil Cases
 - B) Used in Nuclear Non - Proliferation Treaty
 - C) Used to investigate Criminal Cases
 - D) To determine whether automobile emissions are within permissible level

2. Application of principle and knowledge of medical sciences to legal purposes and legal proceedings so as to aid in the administration of justice is :
 - A) Forensic Psychiatry
 - B) Forensic Entomology
 - C) Forensic Serology
 - D) Forensic Medicine

3. The 'Eureka' legend of Archimedes, Archimedes was able to prove that a crown was not made of gold by its :
 - A) Hypo density and buoyancy
 - B) Density and occupancy
 - C) Density and Hypersensitivity
 - D) Density and buoyancy

4. Comparative studies of various impressions and marks of tools used in commission of crime is examined by :
 - A) Forensic Physicist
 - B) Forensic Biologist
 - C) Forensic Chemist
 - D) Medical Technicians

5. Locard's exchange principle can be applied to all the following except
 - A) Tool marks from a screw driver formed on a metallic surface.
 - B) Fibers can be transferred from cloth to a person
 - C) Soil samples carried from perpetrator into victim's home
 - D) Blood spatter can be used to identify direction of force.

6. Medical examination of the body of the deceased is called as :
 - A) Post mortem
 - B) Age estimation
 - C) Ante mortem
 - D) Exhumation

7. All of the following are the Basic Principles of Light Microscopy EXCEPT :
- A) Light passes through the condenser
 - B) Objective lens minimizes the image of the specimen
 - C) Slide is held on the stage at 90° to the path of light
 - D) Light travels through the barrel of microscope
8. What does the Michelson interferometer do?
- A) Split a polychromatic beam of radiation into its component wavelengths
 - B) Produce a beam of radiation as source
 - C) Selectively filter certain wavelengths from a beam of I.R. radiation
 - D) Modulate the I.R. signal at a lower frequency, so that it can be observed by a detector
9. _____ supports a likely sequence of events by observing and evaluating physical evidence and statements made by witnesses and those involved with the incident.
- A) Investigation
 - B) Judgement
 - C) Reconstruction
 - D) Conviction
10. All of the following are the common precautions to be taken care of to avoid destruction of evidences at the scene of crime EXCEPT :
- A) Use clean latex gloves for collecting each items of evidence
 - B) Each items of evidence must be packed separately
 - C) Semen stains must not be thoroughly air dried prior to sealing and packing
 - D) Collect materials in sterilized bags/containers
11. Correct collection of evidence does not require which of the following?
- A) Documenting the location where the evidence was found
 - B) Maintaining proper chain of custody
 - C) Correct packaging of evidence
 - D) Analysis report

12. The simplest measurement of central tendency is
- A) Mean B) Median
C) Mode D) Standard Deviation
13. _____ is defined as the difference between the value of the extreme items of a series
- A) Deviation B) Average
C) Range D) Error
14. Which of the following may result in inadmissibility of evidence in court?
- A) Destruction of the sample with records which permit transparency of the testing process
B) Scientific evidence intended to be present in court by prosecution must generally be disclosed to the accused or their representative
C) An expert fails to prove his/her expertise in the area for which court has asked his/her opinion
D) Chain of custody during investigation is properly maintained.
15. Report given by Serologist may be considered to be an evidence in court under
- A) Section 291A Cr.P.C.
B) Section 293(2) Cr.P.C.
C) Section 292 Cr.P.C.
D) Section 45 in the Indian Evidence Act
16. As per section 45 of IEA, an expert may give his opinion
1. Upon facts which are either admitted, or proved by himself or other witnesses at the trial.
2. On hypothetical questions (based on stated assumptions) based thereon.
- A) Only 1 is true
B) Only 2 is true
C) Both 1 and 2 are true
D) Both 1 and 2 are false

17. When did the Narcotic Drugs and Psychotropic Substances Act 1985, come into force?
- A) 23 April 1985
 - B) 01 March 1986
 - C) 14 November 1985
 - D) 01 April 1986
18. The coca paste made from coca plant leaves are known as
- A) Antipsychotic substance
 - B) Cardiovascular Drugs
 - C) Depressant poison
 - D) Synthetic Drug
19. "magic remedy" includes
- A) Talisman
 - B) Mantra
 - C) Kavacha
 - D) All A, B and C
20. Any article, other than food, intended to affect or influence in any way the structure or any organic function of the body of human beings or animals is termed as
- A) Medicine
 - B) Drug
 - C) Poison
 - D) All A, B and C
21. _____ of NDPS Act, empowers the DLEO to search, seize and arrest in an enclosed place like a private house, godown, office or a garage.
- A) Section 42
 - B) Section 50(1)
 - C) Section 43
 - D) Section 50(2)
22. _____ empowers him to search, seize and arrest in a public place like a railway station, bus terminus, airport, highway
- A) Section 42
 - B) Section 50 (1)
 - C) Section 43
 - D) Section 50 (2)
23. Which drug does not fit in the category of narcotic drug
- A) Morphine
 - B) Aspirin
 - C) Heroin
 - D) Codein

24. A condition that occurs when the body gets used to a medicine so that either more medicine is needed or different medicine is needed is known as :
- A) Tolerance B) Addiction
C) Dependence D) Idiosyncrasy
25. Explosive compounds can be considered to be composed of three components namely
- A) Fuel B) Oxidizer
C) Sensitizer D) All A, B and C.
26. Lead Azide is an example of
- A) Primary High Explosive B) Pyrotechnics
C) Secondary High Explosive D) Propellants
27. _____ is one of the most commonly used High explosive in military weapons and in civilian mining
- A) DDNP B) Tetryl
C) TNT D) PETN
28. _____ is universally accepted broad - spectrum solvent for majority of organic explosives such as RDX, HMX, TNT, PETN etc.
- A) Benzene B) Ether
C) Chloroform D) Acetone
29. Which is not a preliminary test for identification of Explosives
- A) Friction Test B) Flame Test
C) Impact Test D) Benzidine Test
30. UV - VIS spectrophotometry is governed by _____ law.
- A) Hooke's law B) Lambert Beer's law
C) Ohm's law D) None of the above

31. Capillary columns for GC are made up of
- A) Copper
 - B) Fused silica
 - C) Brass
 - D) Bronze
32. Which of the following is not an evidence for the point of origin of fire?
- A) Beginning of the fire trails
 - B) Presence of accelerants
 - C) Burned clothes
 - D) Most intense burning
33. Which of the following is not an example of improvised explosive device
- A) Fuse bomb
 - B) Percussion cup bomb
 - C) Molotov cocktail
 - D) Grenade
34. Explosives is described in
- A) Explosive Substance Act 1908
 - B) Explosive Substance Act 1928
 - C) Explosive Substance Act 1918
 - D) Explosive Substance Act 1980
35. Portable drug detection kit for cannabis is generally based on Dequenois - Levine test. Which of the following is not a part of Dequenois - Levine reagent?
- A) Acetaldehyde
 - B) Ethanol
 - C) Vanillin
 - D) Hydrochloric acid
36. The person is incapable of knowing the nature of the act and the person does not know that the act which he is doing is wrong or contrary to Law is defined under :
- A) Section 184 IPC
 - B) Section 291 CrPC
 - C) Section 173 CrPC
 - D) Section 84 IPC

37. Two common constituents of homemade explosives are :
- A) Potassium nitrate
 - B) Potassium chlorate
 - C) Both A and B
 - D) None from A and B
38. Oxidizing agent in black powder (low explosive) is
- A) Potassium nitrate
 - B) Charcoal
 - C) Sulfur
 - D) All A, B and C
39. Nitroglycerin, a major constituent of dynamite combined oxygen and fuel components within
- A) One molecule
 - B) Two molecule
 - C) Three molecule
 - D) Four molecule
40. The speed at which low explosives decompose is known as
- A) Speed of deflagration
 - B) Speed of detonation
 - C) Both A and B
 - D) None from A and B
41. Screening objects for the presence of explosive residues in the field or the laboratory is the ion mobility spectrometer (IMS).
- A) Screening Purpose
 - B) Detection Purpose
 - C) Both A and B
 - D) None from A and B
42. For microscopic examination of high explosives, the recovered debris is thoroughly rinsed with
- A) Acetone
 - B) Hexane
 - C) Chloroform
 - D) Benzene

43. To demonstrate the presence of Trichloro compounds such as Chloral Hydrate which test is performed :
- | | |
|------------------|-----------------|
| A) Forrest test | B) Meixner test |
| C) Fujiwara test | D) Reinsh test |
44. In Marquis Test : add a mixture of 3 ml concentrated sulfuric acid and 3 drops of formalin to the gastric fluid, A purple colour which gradually turns Blue indicate the presence of?
- | | |
|-------------|------------|
| A) Ethanol | B) Glucose |
| C) Methanol | D) Opium |
45. All of the following are the Natural Opium derivatives EXCEPT :
- | | |
|---------------|-------------|
| A) Opium | B) Codiene |
| C) Loperamide | D) Morphine |
46. The petrol, kerosene, diesel and their residues can be identified and differentiated using
- | | |
|-----------------------|-----------------------------|
| A) Gas Chromatography | B) Liquid Chromatography |
| C) FT IR Spectroscopy | D) X Ray Diffraction Method |
47. Mostly used GC column(s) for petroleum product analysis is/are
- | | |
|---------|-------------------|
| A) OVI | B) ApiezonL |
| C) SE30 | D) All A, B and C |
48. Best GC detector(s) for petroleum product analysis is/are
- | | |
|--------|-------------------|
| A) FID | B) ECD |
| C) NPD | D) All A, B and C |
49. Most arsons are started with petroleum - based _____ such as gasoline or kerosene
- | | |
|----------------|-------------------|
| A) Accelerants | B) Fuel |
| C) Propellant | D) All A, B and C |

50. The first priority in search of the fire scene must be to detect
- A) Fire's origin
 - B) Accelerants
 - C) Fuel
 - D) Propellant
51. Telltale signs occur in
- A) Poisoning case
 - B) Explosion
 - C) Arson Case
 - D) Hit and run case
52. Most suitable technique for determining thermal processing history, especially when colour changes occur in uranium compounds of various oxidation states is :
- A) Lower energy near - edge (XANES)
 - B) Objective colour analysis
 - C) Alpha - particle spectroscopy
 - D) Counting Techniques
53. Chemical separation technique frequently utilized in nuclear forensics is
- A) Gas Chromatography
 - B) Liquid Chromatography
 - C) UV Visible spectroscopy
 - D) X ray Absorption Spectroscopy
54. The irritation in the mucous membranes to produce congestion, coughing, sneezing, and eventually nausea is caused by :
- A) Adamsite
 - B) Benzyl chloride
 - C) Bromoacetone
 - D) Benzyl bromide
55. The primary mechanism of toxicity of nerve agents is the
- A) Inhibition of acetylcholinesterase (AChE)
 - B) Over expression of acetylcholinesterase (AChE)
 - C) Both A and B
 - D) None of A and B

56. Flames consist primarily of _____
- A) Carbon dioxide
 - B) Oxygen and nitrogen
 - C) Water vapor
 - D) All A, B and C.
57. The main technique used to analyse samples suspected of containing liquid fire accelerants is :
- A) Gas Chromatography
 - B) Liquid Chromatography
 - C) UV Visible spectroscopy
 - D) X ray Diffraction method
58. Under most circumstances, the most efficient mechanism for the transfer of heat from burning fuel to fuel that is yet to ignite is :
- A) Conduction
 - B) Convection
 - C) Radiation
 - D) None of A, B and C
59. Which of the followig involves carrying genetic information from DNA for protein synthesis?
- A) mRNA
 - B) rRNA
 - C) snRNA
 - D) tRNA
60. Which of the following is the study of energy relationships and conversions in biological systems?
- A) Biochemistry
 - B) Biotechnology
 - C) Biophysics
 - D) Bioenergetics

61. Find the ion exchange phase used in SPE Cartridges
- A) Quaternary amine B) Octadecyl
C) Amino D) Silica
62. Stass - Otto Method is used for the isolation of _____.
- A) Toxic Cations B) Toxic Anions
C) Non Volatile Poison D) Volatile Poison
63. Remote - Local Action is developed by _____.
- A) Chloroform B) Phenol
C) Ether D) Acetone
64. _____ is nearly always the chosen gas for Super Critical Fluid Extraction
- A) Helium B) Carbondioxide
C) Argon D) Zero air
65. In which route of administration 100% bioavailability is there?
- A) Intra - Thecal B) Intra - Venous
C) Intra - Nasal D) Intra - Cranial
66. What do you mean by Phagocytosis?
- A) Tissue breaking process while poisoning
B) Phasing out cytokines in the system
C) Absorption phenomenon
D) Cell culture process
67. In case of emergency use, Antidote for Morphine or Opioid overdose?
- A) Naloxone B) Niamic acid
C) Naltrexone D) Nolodaine

68. Universal antidote is Activated Charcoal : Milk of Magnesia : Tannic Acid in the Ratio of?
- A) 1:1:1
B) 2:1:1
C) 1:2:3
D) 4:1:2
69. In Qualitative desferrioxamine colour test (QDCT) if an orange or red colour develops, it indicates the presence of toxic level of?
- A) Mercury
B) Silver
C) Gold
D) Iron
70. Infant Botulism most probably is caused by Contaminated :
- A) Milk
B) Water
C) Honey
D) Tea
71. Activated charcoal will bind all of the following EXCEPT :
- A) Theophylline
B) Paracetamol
C) Carbamazepine
D) Potassium
72. An FT - IR instrument record a signal in the
- A) Time domain
B) Frequency domain
C) Both A and B are true
D) Both A and B are false
73. The most useful bedside test to suggest snake bit envenomation is
- A) Prothrombin time
B) 20 min whole blood clotting time
C) International normalized ratio
D) Platelet count
74. _____ is combined effect of two chemicals is greater than sum of effects of each.
- A) Addition
B) Synergism
C) Potentiation
D) Antagonism

75. Apoplexy is the term used for
- A) Cerebral concussion B) Cerebral congestion
C) Cerebral anoxia D) None of the above
76. Which of the following poisons can be detected in the viscera in a decomposed body
- A) Acetic acid B) Organophosphorous
C) Chloroform D) Phosphorous
77. N - acetyl penicillamine is used in the treatment of poisoning by
- A) Mercury B) Arsenic
C) Lead D) Cadmium
78. The half - life of cocaine is approximately :
- A) 1 h B) 2 h
C) 3 h D) 4 h
79. Minute traces of Atropine in blood can be detected by Gas chromatography - Mass spectrometry as low as :
- A) 1 ng/ml B) 5 ng/ml
C) 10 ng/ml D) 15 ng/ml
80. All of the following are the physical and chemical properties of Hydrogen sulphide EXCEPT:
- A) Highly Toxic B) Heavier than air
C) Colourless Gas D) Odour of Garlic

81. Inebriant Poison includes

- A) Acetic acid
- B) Ethanol
- C) Chloroform
- D) Phosphorous

82. Which types of poison are having good protein binding and can be obtained from hair?

- A) Acidic poisons
- B) Vegetable poison
- C) Volatile poison
- D) Metallic poison

83. Common spraying reagent for alkaloids or primary or secondary or tertiary amine is?

- A) Iodoplatinate solution
- B) Copper sulphate
- C) Dragendorff's reagent
- D) Mercurous nitrate

84. Example of irritant poisons

- A) Metallic salts
- B) Dhatura
- C) Glass Powder
- D) All A, B and C

85. Alcohol and barbiturates simultaneously administered in body will lead to which type of reaction?

- A) Agonistic
- B) Potentiation
- C) Antagonistic
- D) Synergistic

86. Ophotoxemia refers to

- A) Heavy metal poisoning
- B) Dhatura Poisoning
- C) Snake venom poisoning
- D) Organophosphorous poisoning

87. Smell of bitter almonds is seen in poisoning with

- A) Phosphorous
- B) Hydrocyanic acid
- C) Oxalic acid
- D) Nitric acid

88. Carbon monoxide

- A) Has a half life bound to haemoglobin in the order of days
- B) Has ten times the affinity of oxygen for haemoglobin
- C) Forms met haemoglobin rendering haemoglobin unable to carry oxygen
- D) Moves the haemoglobin/oxygen dissociation curve to the left

89. With regard to carbon monoxide which is false?

- A) Its half life with 100% O₂ is 90 mins
- B) CO moves the O₂ dissociation curve to the left
- C) The fetus is relatively protected from the effects of CO
- D) CO is a direct myocardial suppressant

90. The term 'controlled drug' is applied to :

- A) Any drug that is available only on prescription
- B) Any drug that is subject to the Intoxicating Substance (Supply) Act 1985.
- C) Any prescription drug that is diverted to the black market for illegal usage.
- D) Any drug that is subject to the Misuse of Drugs Act 1971.

91. In Liver Methanol is metabolized to formaldehyde by :
- A) Alcohol dehydrogenase B) Acetylcholinesterase
C) Aldehyde dehydrogenase D) All A, B and C.
92. In which poisoning Garlic Like smell is detected :
- A) Aluminum phosphide B) Alcohol
C) Hydrogen Sulphide D) Methanol
93. No preservative need to be added to any of the specimens collected for chemical analysis that can be dispatched to the laboratory immediately and analysis can be done within _____
- A) 24 hours B) 72 hours
C) 48 hours D) 96 hours
94. Which of the following substances is not easily adsorbed by activated charcoal.
- A) Iron B) Methanol
C) Ethanol D) All A, B and C
95. One of the differences between morphine and pethidine relates to :
- A) Analgesic efficacy B) Histamine release effects
C) Ability to suppress cough D) Abuse potential
96. Among following which is not a part of L - ADME?
- A) Transformation B) Elimination
C) Liberty D) Disposition

97. The most important factor that determines whether a substance will be well absorbed within the stomach is the :

- A) Physical form as a solid or liquid
- B) Molecular size
- C) pH
- D) Solubilisation factor

98. The "first pass" phenomenon pertains to :

- A) The situation where xenobiotics that are absorbed from the GI tract first enter the circulating blood before going to the liver
- B) A condition where the liver first biotransforms a xenobiotic by Phase II reaction before it is biotransformed by a Phase I reaction
- C) An anatomical arrangement in which xenobiotics absorbed from the intestine go to the liver first rather than into the systemic circulation
- D) None of the above

99. The organ that has greatest ability to bio transform the Xenobiotic is?

- A) Pancreas
- B) Muscles
- C) Skin
- D) Liver

100. Phase I reactions are correct : Except

- A) Oxidation and Conjugation
- B) Reduction and Hydrolysis
- C) Dehydrogenation and Hydrolysis
- D) Mon oxygenation and Oxidation

101. Which one is the most acidic among these?

- A) MgO
- B) Al_2O_3
- C) CaO
- D) Na_2O

102. Which one will have the highest 2nd ionisation energy?

- A) $1s^22s^22p^6$ B) $1s^22s^22p^63s^1$
C) $1s^22s^22p^63s^2$ D) $1s^22s^22p^4$

103. Gastric juice contains HCl which is one example of

- A) Strong inorganic acid B) Soft organic acid
C) Inorganic acid D) Organic acid

104. _____ is inorganic non aqueous solvent

- A) Benzene B) Liquid ammonia
C) Acetone D) Ether

105. Solvent extraction is a _____ analytical technique

- A) Separation B) Qualitative
C) Quantitative D) All A, B and C

106. Reversed phase SPE separates analytes based on their

- A) Ions B) Molecular Mass
C) Polarity D) Chemical combination

107. _____ technique involves the use of fiber coated with an extracting phase, that can be a liquid (polymer) or a solid (sorbent)

- A) Solid phase extraction B) Solid phase micro extraction
C) QuEChERS D) Accelerated Solvent extraction

108. Accelerated Solvent extraction is useful for EXCEPT

- A) Metals B) Plasticizers
C) Pesticides D) Biodiesel

109. _____ is based on the working principle of acoustic cavitation

- A) Ultrasonic extraction
- B) Thermal Extraction
- C) Heat reflux extraction
- D) Liquid extraction

110. Example for Zwitterions is

- A) Ammonia
- B) Triphenylamine
- C) Glycine
- D) Phosphoric acid

111. The metal - carbon bond in organometallic compounds is generally highly

- A) Ionic bonding
- B) Dipolar bond
- C) Metallic bond
- D) Covalent Bond

112. Example of transition metal alkene complex

- A) Zeise's salt
- B) Ferrocene
- C) Adenosylcobalamin
- D) Cobaltocene

113. Calibration Curve is required in :

- A) Separation Analysis
- B) Qualitative Analysis
- C) Purification Analysis
- D) Quantitative Analysis

114. Following techniques can do Quantitative Analysis EXCEPT :

- A) Gas Chromatography
- B) Liquid Chromatography
- C) UV Visible spectroscopy
- D) QuEChERS

115. Electronic noses, nanotube and nanomechanical devices are used detect

- A) Poison
- B) Body Fluids
- C) Explosives
- D) Finger prints

116. In questioned document examination, _____ analyse at nanolevel provides three - dimensional (3D) surface morphology, which useful for the identification of ink crossing and pen strokes on paper.
- A) Mass Spectroscopy
 - B) X ray Diffraction method
 - C) Atomic force microscopy (AFM)
 - D) All A, B and C.
117. _____ is the most commonly used carrier gas in GC - MS
- A) Nitrogen
 - B) Argon
 - C) Hydrogen
 - D) Helium
118. In chromatography, the stationary phase can be supported on a solid surface
- A) Solid only
 - B) Solid or liquid
 - C) Liquid or gas
 - D) Liquid only
119. In context of Gas chromatography, derivatization is done to
- A) Increase volatility
 - B) Increase thermal stability
 - C) Both A and B
 - D) None from A and B
120. is generally used as stationary phase in TLC
- A) Silica gel - G
 - B) Ammonium sulphate
 - C) C8
 - D) C18

ROUGH WORK

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SEAL