

Forensic Chemical Sciences

Answer Key

(Correct Answers are marked in bold letters)

Section - A

Forensic Aptitude

- Which country won the 2019 Ice Hockey World Championship?
 - Russia
 - Finland**
 - Canada
 - Czech Republic
- Which Indian state shares the longest land border with Bhutan?
 - Assam**
 - Sikkim
 - Arunachal Pradesh
 - West Bengal
- Which of the following is the longest train route in the world?
 - Moscow to Vladivostok**
 - Toronto to Vancouver
 - Shanghai to Lhasa
 - Sydney to Perth
- Identify the southernmost located country amongst these
 - Madagascar
 - Sri Lanka
 - New Zealand**
 - Fiji
- India shares its land borders with how many countries.
 - 5
 - 7**
 - 9
 - 4
- I will write a letter to you tentatively _____ the dates of the program.
 - involving
 - urging
 - guiding
 - indicating**
- 2 16 112 672 3360 13440 ?

- a) 3430
b) 3340
c) **40320**
d) 43240
8. 40% of 210 is same as one third of?
a) 840
b) 280
c) **252**
d) 84
9. QPO, NML, KJI, _____, EDC
a) **HGF**
b) CAB
c) JKM
d) GHD
10. Samantha is your father's mother's grandson's daughter. Therefore, Samantha is your
a) **niece**
b) sister
c) uncle
d) brother
11. The microscope which cannot be used for studying living cells is
a) Compound microscope
b) **Electron microscope**
c) Fluorescence microscope
d) Light microscope
12. What is the primary purpose of accrediting forensic labs?
a) Financial gain
b) Legal compliance
c) **Quality assurance**
d) Employee satisfaction
13. In which country did Sir William Herschel pioneer the use of fingerprints for identification in the 19th century?
a) United States
b) United Kingdom
c) **India**
d) France
14. The development of the Automated Fingerprint Identification System (AFIS) has greatly enhanced:
a) Bloodstain pattern analysis

- b) **Fingerprints**
 - c) DNA profiling
 - d) Toxicological analysis
15. The concept of "Every contact leaves a trace" is associated with the work of:
- a) Calvin Goddard
 - b) **Edmond Locard**
 - c) Alphonse Bertillon
 - d) Sir William Locard
16. Who is "Father of Forensic Entomology"?
- a) Dr. William Bass
 - b) Dr. Clyde Snow
 - c) Dr. Michael Baden
 - d) **Dr. Bernard Green Berg**
17. Next number in the series 3,6,8,16,18,.....is
- a) 28
 - b) **36**
 - c) 54
 - d) 34
18. If today is Wednesday, what would be the day after 121 days
- a) Wednesday
 - b) Saturday
 - c) Sunday
 - d) **Friday**
19. Which is the correct spelt word
- a) **Capricious**
 - b) Cappricious
 - c) Caprisious
 - d) Caprisuos
20. During electrophoresis speed of migration of ions depends on:
- a) Shape and size of molecule
 - b) Magnitude of charge and shape of molecule
 - c) **Magnitude of charge, shape and mass of molecule**
 - d) Magnitude of charge and mass of molecule
21. A bullet from scene of crime is collected by means of
- a) Forceps
 - b) Tongs
 - c) **Gloved hands**
 - d) Spatula

22. Chelioscopy is study of
- Foot
 - Fingers
 - Palate
 - Lips**
23. The electromagnetic spectrum's Visible region stretches from:
- 380-760 nm**
 - 500-1mm
 - 165-525 nm
 - 760-1 mm
24. Which of the following Microscope uses light as a source of illumination
- SEM
 - TEM
 - Stereo microscope**
 - Scanning probe microscope
25. What type of evidence includes tangible items such as weapons, clothing, or documents that are directly related to a crime?
- Circumstantial evidence
 - Physical evidence**
 - Testimonial evidence
 - Documentary evidence
26. A witness testifying about what they personally observed or experienced is providing:
- Circumstantial evidence
 - Hearsay evidence
 - Testimonial evidence**
 - Documentary evidence
27. Which technique involves casting three-dimensional replicas of footwear impressions found at a crime scene?
- Shoeprint analysis
 - Casting**
 - Electrostatic dust print lifting
 - Bloodstain pattern analysis
28. What is the primary purpose of creating a crime scene sketch?
- To replace photographs

- b) **To provide a visual overview of the crime scene**
c) To identify suspects
d) To collect physical evidence
29. The immediate surroundings of an area where a crime has been committed is referred to as:
a) A secondary crime scene
b) **A primary crime scene**
c) An auxiliary crime scene
d) A contained crime scene
30. What is the primary purpose of Crime Scene Photography?
a) To document the Investigator's presence
b) To create artistic representations of the crime scene
c) **To provide a visual record of the entire crime scene**
d) To capture only close-up shots of evidence
31. In crime scene reconstruction, what does the term "modus operandi" refer to?
a) The suspect's motive
b) **The method of operation used by the suspect**
c) The victim's actions at the crime scene
d) The legal procedures followed during the investigation
32. What does the term "Integrity of the Chain of Custody" refer to?
a) **Keeping the evidence in pristine condition**
b) Ensuring a swift transfer of evidence
c) Allowing multiple agencies to handle the evidence
d) Sharing evidence with the media
33. Which organization is responsible for accrediting forensic laboratories in India according to ISO/IEC 17025 standards?
a) FSSAI
b) NABH
c) **NABL**
d) BIS
34. To identify the shape of univariate data, what type of graph would be the most useful?
a) **Histogram**
b) Scatter plot
c) Bar chart
d) Pie chart
35. What is the purpose of staining in gel electrophoresis?
a) To regulate temperature

- b) To enhance electrical conductivity
 - c) To visualize separated molecules**
 - d) To control pH
36. Sum of deviations will be zero if it is taken from
- a) Mean**
 - b) Mode
 - c) Medium
 - d) Standard Deviation
37. Find the median of the given data set: 5, 8, 12, 17, 2, 14, 6, 8, 13 and 7
- a) 5
 - b) 2
 - c) 8**
 - d) 17
38. The reducing action of developing agents for Black & White film –
- a) Potassium Sulphite
 - b) Potassium Bromide
 - c) Sodium Carbonate
 - d) Sodium Thiosulphate**
39. The Exposure Triangle refer to the three major setting that effect Exposure -
- a) ISO, Aperture, Shutter Speed**
 - b) Aperture, Shutter Speed, Focal Length
 - c) Quality of Camera, Aperture, Shutter Speed
 - d) Film, Lens & Colour
40. As per Section 8 of the Indian Evidence Act, 1872 which of the following is a relevant fact:
- a) Motive
 - b) Preparation
 - c) Subsequent Conduct
 - d) All of the above**
41. Under the PFA Act, when is the food said to be adulterated
- a) if any ingredient is injurious to health
 - b) if it is obtained from a diseased animal
 - c) if spices are sold without their essence
 - d) all of these**
42. Coca, hemp and opium are defined under:
- a) The Narcotic Drugs and Psychotropic Substances Act**
 - b) The Pharmacy Act

- c) The Drugs and Cosmetics Act
 - d) The Poisons Act
43. Which of the following methods is non-destructive technique for ink identification
- a) Solubility test
 - b) Thin layer chromatography
 - c) UV-Vis spectrophotometer
 - d) Videospectral analysis**
44. Milk is deficient of which mineral?
- a) Phosphorus
 - b) Sodium
 - c) Iron**
 - d) Potassium
45. Preservation of footprint on snow can be done by
- a) Plaster of Paris Cast
 - b) Sulphur casting**
 - c) Tracing
 - d) Wax Casting
46. Ridge characteristics can be found in:
- a) Footprint
 - b) Fingerprints
 - c) Palm prints
 - d) All**
47. In which section of the CrPC provision for free legal aid is given:
- a) 314
 - b) 381
 - c) 304**
 - d) 334
48. The image seen through a compound microscope is-
- a) Virtual**
 - b) Real
 - c) False
 - d) Imaginary
49. Which of the following is a non-volatile memory?
- a) RAM
 - b) Hard Disk**
 - c) Cache
 - d) ROM**

50. What is the full form of ALU?
- a) Arithmetic Logical Unit
 - b) Arithmetic Local Unit
 - c) Arithmetic Logic Unit**
 - d) Arithmetic Logic Unity

Section-B
Forensic Chemical Sciences

51. Which of the following is NOT a Xenobiotic
- a) Chlorpyrifos
 - b) Strychnine
 - c) Lorazepam
 - d) Amino acid**
52. For oral poisoning, which of the following is best suitable specimen:
- a) Brain
 - b) Stomach and its contents**
 - c) Vitreous humor
 - d) Lung
53. Oxalic acid is classified as:
- a) Irritant
 - b) Neurotic
 - c) Corrosive**
 - d) Cardiac
54. For extraction of drugs; protein precipitation is NOT required for which of the following:
- a) Plasma
 - b) Blood
 - c) Serum
 - d) Urine**
55. If a drug is having pKa value of 9; what should be the ideal pH for its extraction:
- a) 7
 - b) 5
 - c) 11**
 - d) 9
56. If a drug is having pKa value of 5; what should be the ideal pH for its extraction:
- a) 3**
 - b) 5
 - c) 7
 - d) 9

57. Which of the following does NOT affect the extraction recovery in Liquid-liquid extraction (LLE):
- Solubility of drug in organic solvent
 - pH of the sample
 - Evaporation of the extract**
 - Amount of salt
58. Which of the following is a technique of choice for multi-elemental analysis:
- AAS
 - ICP-MS**
 - AES
 - NMR
59. Paraquat can be extracted from biological samples by:
- Liquid-liquid extraction**
 - Solid-phase extraction**
 - Solid-phase microextraction**
 - Ion-pair extraction**
60. Toxicity of Aluminium Phosphide is due to:
- Aluminium
 - Phosphide
 - Phosphine**
 - All of the above.
61. Which of the following is NOT a spray reagent in TLC for analysis of organophosphorous pesticides:
- Palladium chloride
 - Ferric chloride**
 - Silver nitrate
 - Rhodamine B
62. Ammonium molybdate test is used for the detection of
- Organochlorine pesticides
 - Pyrethroids
 - Carbamates
 - Organophosphorous pesticides**
63. Which of the following color test is NOT used to detect volatile poisons:
- Vitali's test**
 - Iodoform test
 - Chromotropic acid test
 - Potassium dichromate test

64. The amount of Blood Alcohol Concentration (BAC) at the stage of euphoria would be:
- 10-50 mg%
 - 30-120 mg%**
 - 180-300 mg%
 - 300-400 mg%
65. Which of the following is an antidote of cyanide poisoning:
- Hydroxocobolamin**
 - Atropine
 - Methanol
 - None of the above.
66. Which of the following is used as dehydrating agent in liquid-liquid extraction
- Ammonium chloride
 - Anhydrous sodium sulfate**
 - Sodium chloride
 - Ferric chloride
67. Dry ash method is used for the extraction of:
- Ethyl alcohol
 - Chlorpyrifos
 - Snake venom
 - Lead**
68. In SPE; analytes are _____ on the sorbent:
- Absorbed
 - Adsorbed**
 - Partitioned
 - Adhered
69. Following is NOT a step involved in SPE
- Washing
 - Conditioning
 - Evaporation**
 - Elution
70. In the extraction of poisons; the correct sequence of steps is:
- Extraction, group test, tissue homogenization, instrumentation
 - Tissue homogenization, extraction, group test, instrumentation**
 - Group test, extraction, tissue homogenization, instrumentation.
 - Instrumentation, group test, extraction, tissue homogenization
71. Which one is NOT a factor required to be considered in interpretation of toxicological results:

- a) Time of death after consumption of drug/poison.
 - b) If other substances are present, how do they interact with each other?
 - c) Age of the patient**
 - d) Postmortem redistribution.
72. In cases of putrefied bodies; which one of the following is suitable for measurement of alcohol concentration:
- a) Blood
 - b) Urine
 - c) Gastric lavage
 - d) Vitreous humor**
73. Following is NOT a procedure in Hair Analysis:
- a) Decontamination
 - b) Derivatization
 - c) Homogenization
 - d) Sterilization**
74. Which of the following is NOT a common drug that can be detected in hair samples?
- a) Penicillin**
 - b) Cocaine
 - c) Marijuana
 - d) Methamphetamine
75. Which of the following is last stage of pharmacokinetics:
- a) Distribution
 - b) Absorption
 - c) Elimination**
 - d) Metabolism
76. Which route of drug administration provides the fastest absorption?
- a) Oral
 - b) Intramuscular
 - c) Subcutaneous
 - d) Intravenous**
77. Which factor does not influence drug absorption?
- a) pH of the stomach
 - b) Drug metabolism in the liver**
 - c) Presence of food in the stomach
 - d) Blood flow to the site of administration
78. Which of the following has lowest fatal oral dose:
- a) Paracetamol
 - b) Amphetamine

- c) Ricin
d) **Botulinum toxin**
79. If you suspect a plant poison in a sample; what color test would you first apply?
a) Potassium dichromate
b) Dille Koppanyi test
c) **Dragendorff's reagent test**
d) Sodium nitroprusside test
80. Which one of the following is NOT an ingredient of Duquenois reagent:
a) **Dichloromethane**
b) Chloroform
c) Acetaldehyde
d) Vanillin
81. ECD detector in Gas Chromatography is most suitable for the detection of
a) Metallic poison
b) **Organochlorine insecticide**
c) Organophosphorous insecticide
d) Volatile poisons
82. Which of the following will have a shattering effect due to explosion:
a) Smokeless powder
b) Black powder
c) Chlorate mixture
d) **RDX**
83. Low and high explosives are classified on the basis of:
a) Number of nitro groups
b) Their chromatographic properties
c) **Speed at which they detonate**
d) None of the above
84. The composition of black powder is:
a) Potassium nitrate : carbon : sulfur (65:15:20)
b) **Potassium nitrate : carbon : sulfur (75:15:10)**
c) Potassium nitrate : carbon : sulfur (85:10:5)
d) Potassium nitrate : carbon : sulfur (70:20:10)
85. Nitroglycerine gives which color with diphenylamine:
a) Pink
b) Yellow
c) Green
d) **Blue**

86. PETN gives which color with Griess reagent.
- Green
 - Pink
 - Blue
 - Red**
87. The decomposition of solid organic matter by heat is known as:
- Pyrolysis**
 - Oxidation
 - Smouldering
 - Combustion
88. A typical 'V' pattern in a scene of Arson indicates:
- Downward movement of fire
 - Upward movement of fire**
 - Lateral movement of fire
 - None of the above.
89. Which of the following is an example of Pyrethroids:
- DDT
 - Malathion
 - Carabaryl
 - Cypermethrin**
90. For GC-FID analysis of pesticides, which of the following gas is NOT required:
- Hydrogen
 - Methane**
 - Air
 - All of the above
91. Rf value in thin layer chromatography is calculated by:
- Distance traveled by the solvent front / Distance traveled by the sample
 - Distance traveled by the sample / Distance traveled by the solvent front**
 - Distance traveled by the solvent front \times Distance traveled by the sample
 - None of the above
92. The development of spots on a TLC plate during analysis is influenced by:
- Sample concentration
 - TLC plate thickness
 - Mobile phase viscosity
 - All of the above**
93. One of the primary advantages of Gas Chromatography (GC) over Thin Layer Chromatography (TLC) is:
- Simplicity of operation

- b) **High resolution**
 - c) Low cost of equipment
 - d) Visual detection of compounds
94. The "origin" of a fire refers to:
- a) **The point of ignition**
 - b) The location of the fire department
 - c) The primary accelerant used
 - d) The time the fire started
95. In a clandestine drug laboratory, investigators discover an unknown substance suspected to be LSD. Which color test can be used for preliminary identification?
- a) Marquis test
 - b) Scott test
 - c) **Van Urk test**
 - d) Fujiwara test
96. 'Ecstasy' tablets contains
- a) Amphetamine
 - b) **Methylenedioxymethamphetamine**
 - c) Methamphetamine
 - d) Methylenedioxyamphetamine
97. What are the active compounds responsible for the stimulant effects of Khat?
- a) Cannabinoids
 - b) Psilocybin
 - c) **Cathinone and cathine**
 - d) Cocaine alkaloids
98. What is the common term for the experience induced by consuming Psilocybe mushrooms?
- a) Euphoria
 - b) Psychedelic trip
 - c) Hypnosis
 - d) **Hallucinogenesis**
99. Which of the following is a characteristic feature of designer drugs?
- a) Well-regulated production
 - b) Limited potential for abuse
 - c) **Frequent alteration of chemical structure to evade legal restrictions**
 - d) Constant chemical structure
100. The term "legal highs" is often associated with designer drugs. What does this term imply?
- a) Drugs with no psychoactive effects

- b) **Substances not covered by existing drug laws**
 - c) Pharmaceuticals prescribed by doctors
 - d) Over-the-counter medications
101. In addition to its medical uses, ketamine is also classified as a:
- a) **Hallucinogen**
 - b) Stimulant
 - c) Depressant
 - d) Opioid
102. 'Z' drugs are:
- a) Depressants
 - b) **Hypnotics**
 - c) Stimulants
 - d) Hallucinogens
103. After metabolism, morphine is further conjugated with which molecule before excretion?
- a) Sulfate
 - b) Phosphate
 - c) **Glucuronic acid**
 - d) Acetic acid
104. The presence of 6-acetyl morphine in blood is conclusive evidence of:
- a) Morphine consumption
 - b) Codeine consumption
 - c) Fentanyl consumption
 - d) **Heroin consumption**
105. What is the common name for the drug flunitrazepam, which is often associated with drug-facilitated sexual assault?
- a) GHB (Gamma-Hydroxybutyrate)
 - b) Ketamine
 - c) **Rohypnol**
 - d) Ecstasy
106. What is the street name for gamma-hydroxybutyrate (GHB), a central nervous system depressant commonly associated with drug-facilitated sexual assault?
- a) **Liquid X**
 - b) Special K
 - c) **Liquid Ecstasy**
 - d) Roofies
107. The detection window of gamma-hydroxybutyrate (GHB) in blood is:
- a) 2-4 hours

- b) 4-6 hours
 - c) **6-8 hours**
 - d) 8-10 hours
108. What does VBIED stand for?
- a) Very Big Improvised Explosive Device
 - b) **Vehicle-Borne Improvised Explosive Device**
 - c) Volatile Bomb Initiation and Explosive Detonation
 - d) Visual Bomb Identification and Explosive Disposal
109. What is the primary function of the initiator in an IED?
- a) To provide illumination during detonation
 - b) To contain the explosive material
 - c) **To transfer energy from the power source to the main charge**
 - d) To trigger the detonation
110. What is the purpose of using selective ion monitoring (SIM) in GC-MS analysis?
- a) To acquire full-scan data for general unknown screening
 - b) To generate additional fragmentation data from ions of interest
 - c) To promote a softer fragmentation than with electron ionization
 - d) **To monitor only the m/z of specific analytes of interest**
111. What is the purpose of using chemical ionization (CI) in GC-MS analysis?
- a) To acquire full-scan data for general unknown screening
 - b) **To promote a softer fragmentation than with electron ionization**
 - c) To monitor only the m/z of specific analytes of interest
 - d) To generate additional fragmentation data from ions of interest
112. What is the purpose of using a split injection in GC-MS analysis?
- a) **To reduce the amount of sample reaching the column**
 - b) To introduce the entire sample into the column
 - c) To increase the sensitivity of the mass spectrometer
 - d) To improve the resolution of the chromatographic peaks
113. What is the fundamental principle behind Atomic Absorption Spectrophotometry?
- a) Emission of light by excited atoms
 - b) Transmission of light through a sample
 - c) **Absorption of light by atoms in the gas phase**
 - d) Reflection of light by solid surfaces
114. What is the function of the nebulizer in AAS?
- a) To heat the sample to high temperatures
 - b) To produce a stable flame for atomization
 - c) To ionize the atoms in the sample
 - d) **To generate a fine aerosol from the sample solution**

115. Stretching vibration results in:
- Change in bond angle
 - Change in bond length**
 - Change in Atomic number
 - Change in bond strength
116. In a typical FTIR spectrum, which region provides the most information about the specific functional groups present in the sample?
- 400-1800 cm⁻¹**
 - 200-3000 cm⁻¹
 - 3000-4000 cm⁻¹
 - All of the above.
117. Stokes lines in Raman spectroscopy result from:
- Absorption of photons
 - Elastic scattering of light
 - Inelastic scattering with lower energy**
 - Inelastic scattering with higher energy
118. What distinguishes Raman scattering from Rayleigh scattering?
- Raman scattering involves absorption of photons
 - Rayleigh scattering is inelastic, while Raman is elastic
 - Rayleigh scattering is only applicable to gases
 - Raman scattering results in a frequency shift**
119. What is Rayleigh scattering in the context of spectroscopy?
- Absorption of photons by molecules
 - Elastic scattering of light**
 - Inelastic scattering of light
 - Fluorescence emission by molecules
120. Which of the following is NOT a type of mass analyzer
- Quadrupole
 - Time of flight
 - Electrospray**
 - Ion trap