Study Circle Career Development Institute

Assistant Director, Forensic Science Lab Exam.

Model Paper for Screening Test based on PYQs

महाराष्ट्र शासन
महाराष्ट्र लोकसेवा आयोग
मुख्य कार्यालय : ५, ७, ८ वा मजला, कुपरेज टेलिफोन निगम इमारत, महर्षि कर्वे मार्ग, कुपरेज, मुंबई - ४०००२१ २२७९५९००
फोर्ट कार्यालय : बँक ऑफ इंडिया इमारत, ३ रा मजला, फोर्ट, मुंबई-४०००० २२१०२२२२
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क्रमांक: डीआरए-०५२२/प्र.क्र.८०/२०२२/जाहिरात जाहिरात क्रमांक : ०३४/२०२२

महाराष्ट्र शासनाच्या गृह विभागांतर्गत न्यायसहायक वैज्ञानिक संचालनालयाच्या आस्थापनेवरील **सहायक संचालक, न्यायसहायक वैज्ञानिक प्रयोगशाळा, सामान्य राज्य सेवा, गट-अ** या संवर्गातील पद भरती करीता विहित ऑनलाईन पध्दतीने अर्ज मागविण्यात येत आहेत.

२. उपलब्ध पदसंख्या:- १७

३. भरावयाच्या पदांचा सामाजिक/समांतर आरक्षणाबाबतचा तपशील खालीलप्रमाणे आहे:-

प्रवर्ग	अ.जा.	अ.ज.	वि.जा. (अ)	भ. ज. (ब)	भ. ज. (क)	भ.ज. (ड)	वि.मा.प्र.	आ.दु.घ.	इ.मा.व.	एकूण आरक्षित	अराखीव (खुला)	एकूण पदे
एकुण पदे	०१	--	०१	--	०१	--	--	०२	०४	०९	०८	१७
सर्वसाधारण	०१	--	०१	--	०१	--	--	०१	०३	०७	०६	१३
महिला	--	--	--	--	--	--	--	०१	०१	०२	०२	०४
खेळाडू	--	--	--	--	--	--	--	--	--	--	--	--
अनाथ	--											
दिव्यांग	एकूण १७ पदांपैकी ०१ पद - अस्थीव्यंगता / मेंदुचा पक्षघात (Cerebral Palsy) / कुष्ठरोग मुक्त (Leprosy Cured) / शारीरिक वाढ खुंटणे (Dwarfism) / आम्ल हल्लाग्रस्त (Acid Attack Victims) / स्नायु विकृती (Muscular Dystrophy) साठी आरक्षित											

८. शैक्षणिक अर्हता आणि अनुभव:-

८.१ शैक्षणिक अर्हता:- Possess Post Graduate Degree at least in second class, in any branch of Chemistry or Bio-chemistry or an equivalent qualification thereto;

८.२ अनुभव:- (१) Have acquired training and analytical or research experience in a recognized laboratories for a period of not less than Seven years after acquiring the essential qualifications.

(२) शासन पत्र, गृह विभाग, क्रमांक एफएसएल-०४२१/प्र.क्र.२२९/पोल-४, दिनांक ३१ जानेवारी, २०२२ अन्वये प्राप्त अभिप्रायानुसार ज्या प्रयोगशाळा/संस्था केंद्र/राज्य शासन मान्यताप्राप्त किंवा केंद्र/राज्य शासन नोंदणीकृत आहेत अशा प्रयोगशाळा/संस्था (Institute) मान्यताप्राप्त म्हणून ग्राह्य धरण्यात येतील. (उदा. हाफकिन संस्था, अन्न व औषध प्रयोगशाळा, प्रदुषण नियंत्रण प्रयोगशाळा, National Chemical Laboratory, Public Health Laboraoty, केंद्रीय न्यायसहायक वैज्ञानिक प्रयोगशाळा, नवी दिल्ली, चंदिगड इत्यादी)

८.३ प्राधान्यशील अर्हता:- Preference may be given to candidates who possess research or analytical experience relevant to the post for which solution is to be made. [e.g. Bio Chemistry Immunological work as applied to Characterization of biological materials including is ozyme immune-blood typing/Analytical Toxicology/Drug Analysis/Analysis of standared and illicit liquors, spirituous medicinal preparations/blood alcohol/narcotics durgs/drugs/general or industrial chemical analysis and in gas/liquid chromatography UV/R Physico-chemical instrumental methods/analysis including spectro chemicals/ballistic work.]

८.४ Notwithstanding anything contained in clause 8.2 above, if at any state of selection, the Commission is of the opinion that sufficient number of candidates possessing the requisite experienceare not available to fill up the vacancies reserved for candidates belonging to Schedule Caste, Schedule Caste converts to Buddhism, Schedule Tribes, Denotified Tribes or Nomadic Tribes then the Commission may in the matter of such selection, relax the requirement in the respect of period of experience set out therein, and select suitable candidate belonging to such Caste or Tribes.

सहायक संचालक, न्यायसहायक वैज्ञानिक प्रयोगशाळा, सामान्य राज्य सेवा, गट-अ
Assistant Director, Forensic Science Laboratories, General State Services, Group-A

परीक्षेचे टप्पे :- लेखी परीक्षा - २०० गुण **मुलाखत** - ५० गुण

-: परीक्षा योजना :-

विषय व सांकेतांक	प्रश्नसंख्या	गुण	कालावधी	दर्जा	माध्यम	प्रश्नपत्रिकेचे स्वरुप
विषयाशी संबंधीत घटक (सांकेतांक-१८६)	१००	२००	एक तास	पदव्युत्तर पदवी	इंग्रजी	वस्तुनिष्ठ बहुपर्यायी

अ) नकारात्मक गुणदान -

१) प्रत्येक चुकीच्या उत्तराकरीता २५% किंवा १/४ एवढे गुण एकूण गुणांमधून वजा/ कमी करण्यात येतील.
२) एखाद्या प्रश्नाची एकापेक्षा अधिक उत्तरे दिली असल्यास अथवा ज्या उमेदवाराने उत्तरपत्रिकेत पूर्ण वर्तुळ चिन्हांकित केले नसेल अशा प्रश्नाचे उत्तर चुकीचे समजण्यात येऊन त्या प्रश्नाच्या उत्तराकरीता २५% किंवा १/४ एवढे गुण एकूण गुणांमधून वजा/कमी करण्यात येतील.
३) वरीलप्रमाणे कार्यपध्दतीचा अवलंब करताना एकूण अंतिम गुणांची बेरीज अपूर्णांकात आली तरीही ती अपूर्णांकातच राहील व पुढील कार्यवाही त्याच्या आधारे करण्यात येईल.
४) एखाद्या प्रश्नाचे उत्तर अनुत्तरित असेल तर, अशा प्रकरणी नकारात्मक गुणांची पध्दत लागू असणार नाही.

ब) अंतिम गुणवत्ता यादी ही वस्तुनिष्ठ परीक्षेतील व मुलाखतीतील एकत्रित गुणांवर आधारीत राहील.

-: अभ्यासक्रम :-

अ.क्र.	घटक व उपघटक
1	**Rules** 1. The Indian Evidence Act - related to Forensic Science 2. Right to information act 2005 3. Maharashtra Right to Public Service Act 2015 4. Laboratory Accreditation
2	**Theory of Crime scene investigation, guidelines of collection of evidence and physical evidence.**
3	**Forensic Chemistry and Toxicology** 1. Narcotic drugs and Psychotropic substances, Explosives, petroleum product, Gold examination, Alkali and acids, Fire and arson, Examination of liquor/ alcoholic drinks and alcohols and other adulterants. 2. Isolation and purification of poisons, gaseous and volatile poisons, analysis of inorganic poisons, analysis of basic drugs / poisons, analysis of acidic drugs and poisons. 3. **Method of Analysis** a) Basic concept - Preparation of solution, Concentration units, mole, molarity, molality, equivalent weight, normality, ppm, mill equivalents and other related units, Precision, deviation, mean deviation, standard deviation, accuracy, absolute error, types of errors, Students 't' test, Confidence limit, uncertainty. b) Titrations: - Acid-base, redox, precipitation, complexometric, Indicators, theory of indicators, Metal-ion indicators, non-aqueous titrations.

	c) Gravimetric analysis: - Preparation of sample solution, precipitation, types of precipitates. Role of organic precipitants in gravimetric analysis. Some important organic precipitants. d) Sampling, extraction, purification and identification of substances, SAP value, iodine value. e) Spectroscopy like UV (Ultra Violet) visible, mass spectroscopy, RAMAN spectroscopy, FTIR spectroscopy (Fourier Transformer Infra Red spectroscopy), Fluorescence spectroscopy. f) Application in chemical analysis of Crystallization, distillation, Fractional Distillation, Separation techniques like TLC (Thin Layer Chromatography), HPTLC (High Performance Thin Layer Chromatography), HPLC (High Performance Liquid Chromatography), GC (Gas Chromatography), and Head space GC. g) Combine techniques like GC-MS (Gas Chromatography –Mass spectroscopy) and LC-MS (Liquid Chromatography –Mass spectroscopy).
4	**Forensic Biology, serology, Human DNA and Wild life DNA** 1. Examination of Blood and blood stains, Examination of other body fluids and their stains, Examination of semen and seminal fluids, Examination of vaginal fluid and stains of vaginal secretions, examination of Saliva, saliva stains, vomit, urine stains, Faecal matter and its stains, hair examination. 2. Method of Analysis- Presumptive and confirmatory test, Estimation of Protein, Nucleic acids, Lipids, Carbohydrates, Enzymes, Isoenzyme, blood group identification, Biological buffers, High voltage electrophoresis, SDS-PAGE (Sodium Dodecysil Sulfate-Polyacrylamide Gel Electrophoresis), Agarose electrophoresis, capillary electrophoresis, COE (Cross Over Electrophoresis). 3. DNA sample collection and extraction - Presumptive and confirmatory tests, DNA extraction, Bone processing and DNA isolation from tooth and bone, automated DNA extraction, Quantification of DNA, Amplification (PCR), Detection of PCR product using genetic analyzer, STR data analysis, data analysis and interpretation of PCR 4. Method of Analysis- DNA finger printing RFLP (Restriction Fragment Length Polymorphism), SNP (Single Nucleotide Polymorphism), PCR (Polymerase Chain Reaction), RT-PCR (Reverse Transcriptase Polymerase Chain Reaction), RIA (Radio Immuno Assay)…etc
5	**Forensic Physics and Ballistics** 1. Barrel washing examination, Identification and Examination of Firearms, Identification and Examination of ammunition, Identification of shots, pellets, wads, propellant charge,…etc., Ballistics related examination. 2. Examination of Foot / Footwear/ Tyre impression, tool marks, tampered electrical energy meters, paints, identification mark, glass fragments, broken objects paper, forensic documents, fiber, restoration of number, soil analysis. 3. Method of analysis Microscopic analysis, XRD (X-Ray Diffraction), STA (Simultaneous Thermal analysis), DSC (Differential Scanning Calorimetry), Tensile strength, Atomic emission spectroscopy, Flame emission spectroscopy, AAS(Atomic Absorption Spectroscopy), SEM(Scanning Electron Microscopy), Energy Dispersive X-ray Spectrophotometry, Video Spectral Comparator.

अवर सचिव
महाराष्ट्र लोकसेवा आयोग

दिनांक : ३०/०५/२०२३

MPSC

Syllabus for Assistant Director, Forensic Science Lab Exam.

* **Paper wrt Forensic Science**
* **Number of Qs : 100 MCQs**
* **Marks : 200**
* **Time : 1 hour**
* **Medium : English**
* **Satndard of Qs : upto Post Graduation**

Topics for Assistant Director, Forensic Lab Exam.

1) Rules (10)

1) The Indian Evidence Act - related to Forensic Science / 3
2) Right to information act 2005 / 2
3) Maharashtra Right to Public Service Act 2015 /2
4) Laboratory Accreditation / 3

2) Theory and Guidelines (10)

1) Theory of Crime scene investigation /5
2) Guidelines of collection of evidence and physical evidence /5

3) Forensic Chemistry and Toxicology (40)

1) Forensic Chemistry / 10
2) Toxicology / 10
3) Method of Analysis / 20

a) Basic concepts
b) Titrations
c) Gravimetric analysis
d) Sampling, extraction, purification and identification
e) Spectroscopy
f) Application in chemical analysis
g) Combine techniques

4) Forensic Biology, serology, Human DNA and Wild life DNA (20)

1) Examinations /5
2) Method of Analysis /5
3) DNA sample collection and extraction /5
4) Method of Analysis /5

5) Forensic Physics and Ballistics (20)

1) Ballistics related examination / 6
2) Examination of physical objects, proof / 7
3) Method of analysis / 7

Assistant Director, Forensic Science Lab Exam.

Topics & Subtopics of the Syllabus

Preparation & Guidance

100 Points for Assistant Director, Forensic Lab Exam.

1) The Indian Evidence Act - related to Forensic Science / 3
2) Right to information act 2005 / 2
3) Maharashtra Right to Public Service Act 2015 /2
4) Laboratory Accreditation / 3
5) Theory of Crime scene investigation /5
6) Guidelines of collection of evidence and physical evidence /5
7) Forensic Chemistry / 10
8) Toxicology / 10
9) Method of Analysis in Forensic Chemistry & Toxicology - Basic concepts /3
10) Titrations /3
11) Gravimetric analysis /3
12) Sampling, extraction, purification and identification /3
13) Spectroscopy /3
14) Application in chemical analysis /3
15) Combine techniques /2
16) Forensic Biology & Serology Examinations /5
17) Method of Analysis for biochemical substances /5
18) DNA sample collection and extraction /5
19) Method of Analysis for Human DNA and Wild life DNA /5
20) Ballistics related examination & Forensic Physics / 6
21) Examination of physical objects, proof / 7
22) Method of analysis in Forensic Physics & Ballistics / 7

(1) Rules /10

1) The Indian Evidence Act - related to Forensic Science

1) The Indian Evidence Act - Background, Scope & Salient Features
2) The Indian Evidence Act - Powers & Functions of Authorities & Bodies, Judgment - Sentences
3) The Indian Evidence Act - wrt Forensic Science, Evidence & Provisions wrt Enquiries And Trials

2) Right to information act 2005

4) Right to information act 2005 - Background, Scope & Salient Features, Authorities & Bodies
5) Right to information act 2005 - Proceedings, Appeals, Transfers, Revision & Miscellaneous

3) Maharashtra Right to Public Service Act 2015

6) Maharashtra Right to Public Service Act 2015 - Background, Scope & Salient Features, Authorities & Bodies
7) Maharashtra Right to Public Service Act 2015 - Proceedings, Appeals, Transfers, Revision & Miscellaneous

4) Laboratory Accreditation

8) Laboratory Accreditation - Scope, Quality, Organization and Management
9) Guidelines for Lab. Assessment - Training and Developmen, Evidence Management, Methods and Procedures
10) Checklist for Lab. Assessment - Lab. Management and Operation, Evidence Control Standards and Criteria, Personnel Qualifications, Physical Plant

(2) Theory and Guidelines /10

1) Theory of Crime scene investigation

11) Crime scene investigation - Theory, Practice, Technique, and Law
12) Legal aspects wrt crime investigation
13) Steps & Methods for searching crime scenes -Line of approach, Point of entry, Actual scene, Point of exit and Line of retreat, Contamination control.
14) Death, Injury and Crime Investigation
15) Recording of the Crime Scene - Documents, Sketching, Photography

2) Guidelines of collection of evidence and physical evidence

16) Procedures for securing, identifying and analyzing crime scene evidence
17) Methods of collecting evidence
18) Preservation, packaging and forwarding of biological evidences
19) Use of Forensic Scince lab facilities
20) Technology used in Crime scene investigation

(3) Forensic Chemistry and Toxicology /40

1) Forensic Chemistry (10)

21) Narcotic drugs
22) Psychotropic substances
23) Explosives
24) Petroleum product
25) Gold examination, Alkali and acids
26) Plant toxins
26) Alkali and acids
27) Fire and arson
28) Examination of liquor/ alcoholic drinks
29) Examination of additives/preservatives
30) Examination of animal toxins, venoms

2) Toxicology /10

31) Concept of Forensic Toxicology and its significance, History and Classification
32) Isolation and purification of poisons - gaseous poisons, volatile poisons
33) Analysis of inorganic poisons, organic poisons
34) Analysis of acidic drugs, basic drugs, Forensic drug testing
35) Analysis of acidic poisons, basic poisons
36) Medical, Clinical Toxicology
37) Food, Environmental, Occupational Toxicology
38) Human performance toxicology
39) Postmortem forensic toxicology
40) Development and Advances of Forensic Toxicology

3) Method of Analysis in Forensic Chemistry & Toxicology / 10

a) Basic concepts (3)

41) Preparation of solution, Concentration units - mole, molarity, molality, equivalent weight, normality, ppm, mill equivalents and other related units
42) Precision, deviation, mean deviation, standard deviation, accuracy, absolute error, types of errors
43) Students 't' test, Confidence limit, uncertainty

b) Titrations (3)

44) Acid-base, redox, precipitation, complexometric
45) Indicators, theory of indicators, Metal-ion indicators
46) Non-aqueous titrations.

c) Gravimetric analysis (3)

47) Preparation of sample solution, precipitation, types of precipitates.
48) Role of organic precipitants in gravimetric analysis.
49) Some important organic precipitants.

d) Sampling, extraction, purification and identification (3)

50) Sampling, extraction of substances
51) Purification of substances, Identification of substances
52) SAP value, Iodine value

e) Spectroscopy (3)

53) UV (Ultra Violet), Visible mass spectroscopy
54) RAMAN spectroscopy
55) FTIR spectroscopy (Fourier Transformer Infra Red spectroscopy)
Fluorescence spectroscopy

f) Application in chemical analysis (3)

56) Crystallization, Distillation, Fractional Distillation,
57) Separation techniques like TLC (Thin Layer Chromatography)
HPTLC (High Performance Thin Layer Chromatography)

58) HPLC (High Performance Liquid Chromatography)
GC (Gas Chromatography) and Head space GC.

g) Combine techniques (2)

59) GC-MS (Gas Chromatography –Mass spectroscopy)
60) LC-MS (Liquid Chromatography –Mass spectroscopy)

(4) Forensic Biology, serology, Human DNA and Wild life DNA (20)

1) Examinations in Forensic Biology & Serology / 5

61) Examination Blood and blood stains, other body fluids and their stains
62) Examination of semen and seminal fluids, vaginal fluid and stains of vaginal secretions,
63) Examination of Saliva, saliva stains, vomit
64) Examination of urine stains, Faecal matter and its stains
65) Hair examination.

2) Method of Analysis for biochemical substances / 5

66) Presumptive and confirmatory test
67) Estimation of Protein, Nucleic acids, Lipids, Carbohydrates, Enzymes, Isoenzyme, blood group identification, Biological buffers.
68) High voltage electrophoresis
69) SDS-PAGE (Sodium Dodecyl Sulfate- Polyacrylamide Gel Electrophoresis)
70) Agarose electrophoresis & Capillary electrophoresis
COE (Cross Over Electrophoresis)

3) DNA sample collection and extraction / 5

71) Presumptive and confirmatory tests - DNA extraction
72) Bone processing and DNA isolation from tooth and bone, automated DNA extraction
73) Quantification of DNA, Amplification (PCR)
74) Detection of PCR product using genetic analyzer
75) STR data analysis, data analysis and interpretation of PCR

4) Method of Analysis for Human DNA and Wild life DNA / 5

76) DNA finger printing
77) RFLP (Restriction Fragment Length Polymorphism)
SNP (Single Nucleotide Polymorphism)
78) PCR (Polymerase Chain Reaction)
79) RT-PCR (Reverse Transcriptase Polymerase Chain Reaction
80) RIA (Radio Immuno Assay)

(5) Forensic Physics and Ballistics (20)

1) Ballistics related examination & Forensic Physics / 6

81) Barrel washing examination, Examination of Inanimate object(s) affected by shooting
82) Identification and Examination of Firearms, ammunition, Manufacturing tools
83) Identification (SEM) of shots, pellets, wads, propellant charge, partially burnt powder charge.
84) Examination of Swabbing or lifting from body parts of suspects shooter/victim, Victim's/accused's apparel, Inanimate object(s) affected by shooting
85) Examination of Parts of skin, bones, hair and other body parts affected by shooting
86) Post-mortem/injury reports and related X-ray plates.

2) Examination of physical objects, proof / 7

87) Foot / Footwear/ Tyre impression
88) Identification mark, tool marks
89) Tampered electrical energy meters
90) Glass fragments, broken objects, paper, paints
91) Forensic documents, fiber
92) Restoration of number
93) Soil analysis

3) Method of analysis in Forensic Physics & Ballistics / 7

94) Microscopic analysis
95) XRD (X-Ray Diffraction)
96) STA (Simultaneous Thermal analysis)
DSC (Differential Scanning Calorimetry)
97) Tensile strength, Atomic emission spectroscopy
Flame emission spectroscopy
98) AAS (Atomic Absorption Spectroscopy)
99) SEM (Scanning Electron Microscopy)
Energy Dispersive X-ray Spectrophotometry
100) Video Spectral Comparator

Assistant Director, Forensic Science Lab Exam.

Topics & Subtopics of the Syllabus

Model Paper for Screening Test

(1) Rules /10

(1) The Indian Evidence Act - related to Forensic Science

1) The Indian Evidence Act - Background, Scope & Salient Features
2) The Indian Evidence Act - Powers & Functions of Authorities & Bodies
3) The Indian Evidence Act - Evidence & Provisions wrt Enquiries And Trials

1) The Indian Evidence Act - Background, Scope & Salient Features

1) Which provision of Indian Evidence Act states that, confession caused by inducement, threat or promise, is irrelevant in Criminal proceedings ?
1) Section 24 2) Section 25 3) Section 26 4) None of the above

2) The Indian Evidence Act - Powers & Functions of Authorities & Bodies

2) When does a Memorandum Panchnama done under section 27 of Indian Evidence Act ?
1) When accused is in police custody 2) When accused in magisterial custody
3) When accused is on bail 4) With the permission of the court

3) The Indian Evidence Act - Evidence & Provisions wrt Enquiries And Trials

2) In order to establish the offence in the case of defloration or violation of virgin after puberty, there must be following evidence as per Indian Evidence Act.
1) That previous connection with other person could not have taken place.
2) That the alleged intercourse took place at the time of alleged.
3) That it was by force and against the will of women.
4) All the above.

(2) Right to information act 2005

4) Right to information act 2005 - Background, Scope & Salient Features, Authorities
5) Right to information act 2005 - Proceedings, Appeals, Transfers, Miscellaneous

4) Right to information act 2005 - Background, Scope & Salient Features

4) Match the following regarding the Right to Information Act, 2005.

Section	Provision
a. 6	i. Appropriate government to prepare programmes
b. 12	ii. Protection of action taken in good faith

c. 21 iii. Request to obtain information
d. 26 iv. Constitution of Central Information Commission

Answer Options :

	(a)	(b)	(c)	(d)
1)	iii	iv	ii	i
2)	iv	iii	ii	i
3)	ii	i	iii	iv
4)	i	ii	iii	iv

5) Right to information act 2005 - Proceedings, Appeals, Transfers, Revision

5) As per section ..... of the Right to Information Act, 2005 if information sought which is concern with life and liberty of any person, the same shall be provided within ..... hours of the receipt of such request.

1) 5(1), 72 2) 6(1), 60 3) 7(1), 48 4) 8(1), 84

(3) Maharashtra Right to Public Service Act 2015

6) Maharashtra Right to Public Service Act 2015 - Scope & Salient Features, Authorities
7) Maharashtra Right to Public Service Act 2015 - Proceedings, Appeals,

6) Maharashtra Right to Public Service Act 2015 - Authorities & Bodies

6) While deciding an appeal under the Maharashtra Right to Public Service Act, 2015, the Chief Commissioner or Commissioner can .....

a. impose penalty on Designated officer or First Appellate Authority.
b. change the penalty imposed on them.
c. can revoke the penalty imposed on them.

Answer Options :

1) Only a and b are true 2) Only a and c are true
3) Only b and c are true 4) All a, b, c are true

7) Maharashtra Right to Public Service Act 2015 - Proceedings, Appeals

7) Match the following regarding the Maharashtra Right to Public Services Act, 2015.

Section	**Provision**
a. 6	i. Appeal
b. 7	ii. Appointment of appellate authorities
c. 8	iii. Use of information technology for delivery of public service
d. 9	iv. Monitoring status of application

Answer Options :

1)	a-i	b-ii	c-iii	d-iv
2)	a-ii	b-i	c-iv	d-iii
3)	a-iv	b-iii	c-ii	d-i
4)	a-iv	b-i	c-iii	d-ii

(4) Laboratory Accreditation

8) Laboratory Accreditation - Scope, Quality, Organization and Management
9) Guidelines for Lab. Assessment - Training and Developmen, Evidence Management
10) Checklist for Lab. Assessment - Standards and Criteria

8) Laboratory Accreditation - Scope, Quality, Organization and Management

8) The main regulatory authorities which issue guidelines that are globally accepted and followed by Pharma Industries are :
a) USFDA (United States Food and Drug Administration)
b) UKMCA (The Medicine Control Agency)
c) ICH (International Conference on Harmonizations)
d) WHO (World Health Organizations)
Answer options :
1) (a) and (b) only 2) (c) and (d) only 3) All of the above 4) None of the above

9) Guidelines for Lab. Assessment - Evidence Management, Methods

9) The functions of the central Drug Laboratory in respect of the classes of the drugs are enlisted below :
a) Laboratory in respect of blood grouping and diagnostic kits for Hepatitis B, C virus National institute of Bioligicals, Noida
b) Laboratory with respect to VDRL Antigen = Pasteur Institute, Connoor.
c) Indian Veterinary Research Institute - Haffkine, Parel.
d) Laboratory for Homeopathic medicines - Ghazibad
Which of the above pairs are true?
1) (a) and (b) only 2) (a) and (c) only 3) (a) and (d) only 4) (b) and (c) only

10) Checklist for Lab. Assessment - Lab. Management and Operation,

10) Food Authority may notify food laboratories and research institutions accredited by NABL or any such accreditation agencies, wherein NABL stands for .....
1. National Accreditation Board for Laboratories
2. National Accreditation Board for Testing Laboratories
3. National Accreditation Board for Calibration Laboratories
4. National Accreditation Board for Testing and Calibration Laboratories

(2) Theory and Guidelines /10

(1) Theory of Crime scene investigation

11) Crime scene investigation - Theory, Practice, Technique, and Law
12) Legal aspects wrt crime investigation
13) Steps & Methods for searching crime scenes -Line of approach, Point of entry, Actual scene, Point of exit and Line of retreat, Contamination control.
14) Death, Injury and Crime Investigation
15) Recording of the Crime Scene - Documents, Sketching, Photography

11) Crime scene investigation - Theory, Practice, Technique and Law

11) In which of the following cases FSL report was useful for conviction ?
a) Nooriya Havelivala hit and run case
b) German Bakery blast case
c) Shaktimill rape case
d) Pramod Mahajan murder case
Anwer Options:
1) a, b, c 2) a, b, d 3) b, c, d 2) all the above

12) Legal aspects wrt crime investigation

12) The evidence of Expert in the Court of Law is recorded in the following order:
1) Examination in chief, Cross examination, Oath, Questions by Judges.
2) Oath, Examination chief, Cross examination, Questions by Judges
3) Questions by Judges, Oath, Cross examination, Examination in Chief
4) Oath, Questions by Judges, Examination in chief, Cross examination

13) Steps & Methods of crime investigation

13) Arrange the following steps of crime investigation in proper sequence:
(i) Collection and despatch of evidence to Forensic Science Laboratory.
(ii) First Information Report.
(iii) Photography of scene of crime.
(iv) Protection of scene of crime.
Answer Options :
1) ii, iv, iii, i 2) i, iv, ii, iii 3) ii, iv, i, iii 4) iii, i, ii, iv

14) Death, Injury and Crime Investigation

14) Consider the following statements regarding Exhumation :
a) Exhumation means digging of dead body from ground.
b) Authorization is required from Executive Magistrate.
c) In India, there is 10 years of limit for Exhumation.
Which of the statements given above is/are correct ?
1) Only a 2) Only a and c 3) Only a and b 4) Only c

15) Recording of the Crime Scene - Documents, Sketching, Photography

15) These are sketching methods in crime scene, except .....
(A) Rectangular co-ordinate method
(B) Spiral method
(C) Triangular co-ordinate method
(D) Polar co-ordinate method
Anwer Options:
1) A, B 2) only B 3) B, C, D 2) A and D

(2) Guidelines of collection of evidence and physical evidence

16) Procedures for securing, identifying and analyzing crime scene evidence
17) Methods of collecting evidence
18) Preservation, packaging and forwarding of biological evidences
19) Use of Forensic Scince lab facilities
20) Technology used in Crime scene investigation

16) Procedures, Tests used for securing, identifying and analyzing evidence

16) If CPU cabinet/s and/or laptop/s are seized from the crime scene, then .....
a) remove the hard disk/s (CD/DVD if any) from them and submit ONLY hard disk/s (CD/DVD if any) to cyber division at DFSL Mumbai
b) don't remove the the hard disk/s (CD/DVD if any) from them and submit all the seized articles to cyber division at RFSL Nagpur, and RFSL Pune.
c) remove the hard disk/s (CD/DVD if any) from them and submit ONLY hard disk/s (CD/DVD if any) to cyber division at RFSL Nagpur, and RFSL Pune.
d) don't remove the the hard disk/s (CD/DVD if any) from them and submit all the seized articles to cyber division at DFSL Mumbai.
Anwer Options:
1) a and b 2) c and d 3) only d 2) a and c

17) Methods of collecting evidence

17) **Assertion (A):** Detailed note should be recorded regarding the amount of blood found/splattered at the scene of occurrence.
Reason (R): It would help to evaluate about the length of survival of the victim after assault.
Answer Options :
1) Both (A) and (R) are correct. 2) (A) is correct but (R) is incorrect.
3) (A) is incorrect but (R) is correct. 4) Both (A) and (R) are incorrect.

18) Preservation, packaging and forwarding of biological evidences

18) Which of the following material should be used for packaging the evidance seized at suspected cybercrime location ?
a) Metal or wooden Boxes b) Plastic Bubble-Wraps
c) Small Polythene Bags d) Thick Cardboard Boxes
Anwer Options:
1) a, b, c 2) a, b, d 3) b, c, d 2) none of the above

19) Use of Forensic Scince lab facilities

19) Select the incorrect statement :
a) DNA facility is available at RFSLs Aurangabad, Nashik, and Amravati
b) Cyber Forensic facility is available at DFSL Mumbai
c) Narco Analysis facility is available at RFSLs Nagpur
d) Brain mapping facilty is available at RFSL Pune.
Anwer Options:
1) b, c, d 2) b, d 3) c, d 2) only d

20) Technology used in Crime scene investigation

20) Instrumental analytical methods have become an important tool for analyzing minor and trace constituents of alcoholic beverages. The most widely used methods are .....
a) ultraviolet (UV) visible spectrophotometry
b) gas chromatography (GC)
c) Atomic Absorption Spectroscopy (AAS)
d) mass spectrometry (MS)
Anwer Options:
1) a, b, c 2) a, b, d 3) b, c, d 2) all the above

(3) Forensic Chemistry and Toxicology /40

(1) Forensic Chemistry (10)

21) Narcotic drugs
22) Psychotropic substances
23) Explosives
24) Petroleum product
25) Gold examination, Alkali and acids
26) Plant toxins
26) Alkali and acids
27) Fire and arson
28) Examination of liquor / alcoholic drinks
29) Examination of additives/preservatives
30) Examination of animal toxins, venoms

21) Narcotic drugs

21) Arrange in the ascendi ng order of presence of THC in the following:
(i) Charas (ii) Bhang (iii) Ganja (iv) Charas oil
Anwer Options:
1) (iv), (i), (iii), (ii) 2) (ii), (iii), (i), (iv) 3) (iv), (ii), (i), (iii) 4) (ii), (iv), (i), (iii)

22) Psychotropic substances

22) Match the following:

List – I	**List – II**
a. Cardiac	i. Brucine
b. Deleriant	ii. Calotropin
c. Spiral	iii. Aconitine
d. Irritant	iv. Cannabinoid

Codes:

	a	**b**	**c**	**d**
1)	ii	iii	iv	i
2)	iii	iv	i	ii
3)	iv	i	iii	ii
4)	i	ii	iii	iv

23) Explosives

23) Molotov cocktail is:
1) A special cocktail of strong alcohols which perpetrators take to increase their courage before using explosives
2) A petrol bomb
3) A recently discovered special decoction used for treatment in victims of explosions
4) A special and highly destructive bomb used in Brazil by a gang known as Molotov

24) Petroleum product

24) Blue colour of PDS kerosene is due to the presence of which dye?
(A) Phenyl azo-naphthol (B) Dialkyl amino anthraquinone
(C) Anthraquinone (D) Anthracene
Anwer Options:
1) A, B 2) only B 3) B, C, D 2) A and D

25) Gold examination, Alkali and acids

25) The exhibit solution is placed on a filter paper and added 1-2 drops of Benzidine reagent solution on it. If ..... appears on the filter paper, it indicates the presence of gold.
1) red colour 2) orange colour 3) blue colour 4) yellow colour

26) Plant toxins

26) Which of the following substances is classified as deliriant poison?
1) Nicotine 2) Caffeine 3) Hyoscyamine 4) Loganin

27) Fire and arson

27) Substance ..... is used on the side of safety match box.
1) Potassium chlorate 2) Antimony suiphide 3) Red phosphorus 4) Yellow phosphorus

28) Examination of liquor/ alcoholic drinks

28) What is the golden rule as a forensic chemist?
1) Go slowly, take all the time necessary to make the case complete.
2) Rationality has more value than intution, no matter how pressing others may be for the result;
3) Finish the task in given time, no matter how urgent it may appear.
4) Good work cannot be hurried, adjourn a case if work cannot be finish in time.

29) Examination of additives/preservatives

29) Match the following items in **Group I** and **Group II** in relation to permitted food additives/ preservatives in India :

Group I	**Group II**
P) Jelly	a) Calcium propionate
Q) Edible oil	b) Monosodium glutamate
R) Meat flavour enhancer	c) Sodium benzoate
S) Bread	d) Butylated hydroxylated anisole
	e) Tricalcium silicate

Answer Options :

	(P)	**(Q)**	**(R)**	**(S)**
1)	(c)	(d)	(b)	(a)
2)	(e)	(c)	(b)	(d)
3)	(a)	(c)	(d)	(e)
4)	(b)	(c)	(a)	(e)

30) Examination of animal toxins, venoms

30) For elapids venom, the drug effectively used is __
1) neostigmine 2) methyl dopa 3) domperidone 4) caffeine

(2) Toxicology /10

31) Concept of Forensic Toxicology and its significance, History and Classification
32) Isolation and purification of poisons - gaseous poisons, volatile poisons, Insecticides
33) Analysis of inorganic poisons, organic poisons
34) Analysis of acidic drugs, basic drugs, Forensic drug testing
35) Analysis of acidic poisons, basic poisons
36) Medical, Clinical Toxicology
37) Food, Environmental Toxicology, biological hazards
38) Occupational, Human performance toxicology
39) Postmortem forensic toxicology
40) Development and Advances of Forensic Toxicology

31) Concept of Forensic Toxicology and its significance, History and Classification

31) Rectified spirit as preservative is contra-indicated in cases of poisoning by :
1) Alcohol 2) Phosphorus 3) Acetic acid 4) All of above

32) Isolation and purification of poisons - gaseous poisons, volatile poisons

32) **Assertion (A):** The colour of lividity in carbon-mono oxide poisoning is cherry red.
Reason (R): Because of the binding of carbon to hemoglobin.
Answer Options :
1) (A) is correct, but (R) is incorrect. 2) Both (A) and (R) are correct.
3) (A) is incorrect, but (R) is correct. 4) Both (A) and (R) are incorrect.

33) Analysis of inorganic poisons, organic poisons

33) 'Smoky Stool Syndrome', may be seen in acute poisoning with :
(A) Tetracycline (B) Yellow phosphorus(C) Paracetamol (D) None of the above

34) Analysis of acidic drugs, basic drugs, Forensic drug testing

34) The synonym 'Angel Dust' is referred by addicts for ..... drug.
1) Phencyclidine 2) Dimethyltryptamine 3) Mescaline 4) Tacrine

35) Analysis of acidic poisons, basic poisons

35) The colour of the vomitus in Oxalic acid poisoning is .....
(A) Blue (B) Green (C) Coffee (D) Yellow
Anwer Options:
1) A, B 2) only B and C 3) B, C, D 2) only C

36) Medical, Clinical Toxicology

36) Consider the following statements :
a) Chronic toxicity may not be of importance in antidote use.
b) An antidote which is non-toxic may be used even if its efficacy is uncertain.
c) A toxic antidote may be used even if the diagnosis of the cause is uncertain
d) An antidote may mobilize the toxic substance from tissue stores.
Which of the above statements are true ?
1) (a) and (b) only 2) (a) and (c) only 3) (a), (b) and (c) 4) (a), (b) and (d)

37) Food, Environmental, Occupational Toxicology

37) Match the toxicants of plant foods in **Group I** with their main plant source given in **Group II** :

Group I	**Group II**
P) Gossypol	a) Khesari Dahl (Lathyrus sativus)
Q) Vicine	b) Cotton seeds
R) Glucosinolates	c) Fava beans
S) BOAA (Beta-N-Oxalyl Amino L-Alanine)	d) Rapeseeds

Answer Options :

	(P)	**(Q)**	**(R)**	**(S)**
1)	(b)	(c)	(d)	(a)
2)	(b)	(d)	(c)	(a)
3)	(c)	(a)	(b)	(d)
4)	(d)	(c)	(a)	(b)

38) Human performance toxicology

38) Adverse side effects of Selective Serotonin Reuptake Inhibitors like insomnia, increased anxiety, irritability, and decreased libido are due to :

1) excessive stimulation of brain 5HT 1B receptors
2) excessive stimulation of brain 5HT2 receptors
3) excessive stimulation of brain 5HT 3 receptors
4) excessive stimulation of brain 5HT4 receptors

39) Postmortem forensic toxicology

39) 'Milk spots' on liver is a typical post mortem finding of

1) Ascaris suum infestation
2) Taenia Solium infestation
3) Fasciola hepatica infestation
4) Stilesia hepatica infestation

40) Development and Advances of Forensic Toxicology

40) Food may contain naturally occurring toxic agents or toxic substances formed in cooking that, are more harmful than the small amounts of pesticides that linger in the food we eat. Can you identify the food that contains nitrosoamines formed by the reaction of nitrates and nitrites with amino acids ?

1) Cooked preserved meats
2) Bananas artificially ripened in an atmosphere of ethylene
3) Mushrooms cooked in aluminium pots
4) Cheese aged over 6 months

(3) Method of Analysis in Forensic Chemistry & Toxicology / 10

(a) Basic concepts (3)

41) Preparation of solution, Concentration units - mole, molarity, molality, equivalent weight, normality, ppm, mill equivalents and other related units

42) Precision, deviation, mean deviation, standard deviation, accuracy, types of errors

43) Students 't' test, Confidence limit, uncertainty

41) Preparation of solution, Concentration units - mole, molarity, molality

41) Which of the following statements is correct with respect to molarity and molality?
1. Molarity has kilograms of solvent and molality depends on temperature of solution
2. Molarity depends on temperature of solution and molality depends on volume of solution
3. Molarity depends on volume of solution and molality depends on atmospheric pressure
4. Molarity depends on temperature of solution and molality has kilograms of solvent.

42) Precision, deviation, mean deviation, standard deviation, accuracy, errors

42) If 16.18 is the actual value of a quantity and 19.53 is the experimentally measured value, then the absolute error will be: (in percentage)
1. 35.71 2. 3.35 3. 19.53 4. 10.18

43) Students 't' test, Confidence limit, uncertainty

43) "Figures of merit" used to evaluate the performance characteristics if an analytical technique include :
a) Lineearity range
b) Coefficient of selectivity
c) Coefficient of variation
d) Systematic error
Answer Options :
1) (a), (b) and (c) only
2) (a), (c) and (d) only
3) (b), (c) and (d) only
4) (a), (b), (c) and (d)

(b) Titrations (3)

44) Acid-base, redox, precipitation, complexometric
45) Indicators, theory of indicators, Metal-ion indicators
46) Non-aqueous titrations.

44) Acid-base, redox, precipitation, complexometric

44) Which of the following are the weak acid cation exchanger, and strong base anion exchanger, respectively?
1. Sulphuric acid and amine
2. Carboxylic acid and amine
3. Carboxylic acid and quaternary amine
4. Sulphuric acid and quaternary amine

45) Indicators, theory of indicators, Metal-ion indicators

45) What are the colours of Phenol red indicator in acidic medium and basic medium, respectively?
1. Colourless and blue 2. Yellow and blue 3. Colourless and red 4. Yellow and red

46) Non-aqueous titrations

46) Which of the following nonaqueous solvents is an example of Protophilic solvents?
1. Ketone 2. Formic acid 3. Chloroform 4. Acetonitrile

(c) Gravimetric analysis (3)

47) Preparation of sample solution, precipitation, types of precipitates.
48) Role of organic precipitants in gravimetric analysis.
49) Some important organic precipitants.

47) Preparation of sample solution, precipitation, types of precipitates

47) Which of the following processes is the most widely used chemical precipitation process?
1. Carbonate precipitation
2. Nitrates precipitation
3. Hydride precipitation
4. Hydroxide precipitation

48) Role of organic precipitants in gravimetric analysis

48) Which of the following statements is INCORRECT with respect to gravimetric analysis?
1. Gravimetric analysis is potentially less accurate than volumetric analysis.
2. Gravimetric analysis avoids problems with temperature fluctuation, with volumetric analysis.
3. Gravimetric analysis is used for determination of purity, and thermal stability of both primary and second standard.
4. Gravimetric analysis is used for determination of composition of complex mixtures.

49) Some important organic precipitants

49) Which of the following organic reagents is used for the reduction and determination of gold?
1. Pinene
2. Hydroquinone
3. Cumene
4. Styrene

(d) Sampling, extraction, purification and identification (3)

50) Sampling, extraction of substances
51) Purification of substances, Identification of substances
52) SAP value, Iodine value

50) Sampling, extraction of substances

50) Which of the following methods is NOT suitable for extraction techniques?
1. Enzyme assisted extraction
2. Ultrasound assisted extraction
3. X-ray diffraction assisted extraction
4. Solvent extraction

51) Purification of substances, Identification of substances

51) Acetylcholine esterase is purified by using :
1. affinity chromatography 2. cation exchanger 3. anion exchanger 4. gel filtration

52) SAP value, Iodine value

52) The degree of unsaturation in a lipid is measured by
1) Saponification number
2) Iodine number
3) Acid number
4) Reichert-Meissl number

(e) Spectroscopy (3)

53) UV (Ultra Violet) Visible mass spectroscopy
54) RAMAN spectroscopy
55) FTIR spectroscopy (Fourier Transformer Infra Red spectroscopy)
Fluorescence spectroscopy

53) UV (Ultra Violet) Visible mass spectroscopy

53) In uv-visible spectroscopy, for optimum dispersion, the slits should be put .....
1) as far as possible
2) as near as possible
3) anywhere near each other
4) None of the above

54) RAMAN spectroscopy

54) State **True** or **False** regarding lossless image compression techniques :
a) Raman Spectroscopy is a non-destructive chemical analysis technique which provides detailed information about chemical structure, phase and polymorphy, crystallinity and molecular interactions.
b) NMR spectroscopy is an analytical technique where scattered light is used to measure the vibrational energy modes of a sample.
Answer Options :
1) (a) True, (b) True 2) (a) True, (b) False 3) (a) False, (b) True 4) (a) False, (b) False

55) FTIR spectroscopy (Fourier Transformer Infra Red spectroscopy)

55) Fourier transform infrared spectroscopy is the most common form of infrared spectroscopy. It act on the principle that when infrared (IR) radiation .....
1) that passes through a sample, but not absorbed, gets recorded
2) that doesnot pass through the sample, but gets reflected fully, is recorded.
3) that doesnot pass through a sample, if not absorbed, gets recorded.
4) that passes through the sample is recorded.

(f) Application in chemical analysis (3)

56) Crystallization, Distillation, Fractional Distillation,
57) Separation techniques like TLC (Thin Layer Chromatography)
HPTLC (High Performance Thin Layer Chromatography)
58) HPLC (High Performance Liquid Chromatography)
GC (Gas Chromatography) and Head space GC.

56) Crystallization, Distillation, Fractional Distillation

56) Which ofthe following statements is correct with respect to crystallisation and evaporation?
1. Crystallisation converts a liquid into its gaseous phase at a specific high temperature.
2. Crystallisation is less efficient because some solids decompose on heating.
3. Evaporation is used in separating pure solid from liquid with high efficiency.
4. Crystallisation is the formation of solid crystals from a liquid.

57) Separation techniques like TLC (Thin Layer Chromatography), HPTLC

57) Which of the following statements give the advantages of HPTLC over TLC ?
a) Sample volumns are in the lower nanolitre range
b) Solvent migration is faster
c) Efficiency for dilute samples after extraction
d) HPTLC layers are of finer particle size
Answer options :
1) Only (a) and (b) are correct
2) (a) and (c) are incorrect
3) (b) and (c) are incorrect
4) (d) is correct but (a) and (b) are incorrect

58) HPLC, GC (Gas Chromatography) and Head space GC

58) Gas chromatography was developed by .....
1) G.D. Kohler and K. Thide
2) Henry and Pascal
3) Piobert and Pascal
4) Leduce and K. Thide

(g) Combine techniques (2)

59) GC-MS (Gas Chromatography –Mass spectroscopy)
60) LC-MS (Liquid Chromatography –Mass spectroscopy)

59) GC-MS (Gas Chromatography –Mass spectroscopy)

59) A Mass Spectrometer is linked to a LC so that :
1) exact mass of the mixture can be determined by Mass Spectrometry before it is passed through LC
2) liquid used as mobile phase in LC is first purified by Mass Spectrometer.
3) substances can be separated in LC and then passed through Mass Spectrometer.
4) substances can be separated by Mass Spectrometer and then passed through LC.

60) LC-MS (Liquid Chromatography –Mass spectroscopy)

60) A jet separator in LC-MS, works on the principle of.....
1) Venturi action
2) Solubility of a separated fraction in an elastomer
3) Solubility of the mobile phase in an elastomer
4) Permeability of a separated fraction through an elastomer

(4) Forensic Biology, serology, Human DNA and Wild life DNA (20)

(1) Examinations in Forensic Biology & Serology / 5

61) Examination Blood and blood stains, other body fluids and their stains
62) Examination of semen and seminal fluids, vaginal fluid and stains of vaginal secretions,
63) Examination of Saliva, saliva stains, vomit
64) Examination of urine stains, Faecal matter and its stains
65) Hair examination

61) Examination Blood and blood stains, other body fluids and their stains

61) **Assertion (A):** In disputed paternity and maternity cases, it is not possible to determine the blood group of the child.
Reason (R): The blood groups are not inherited as per Mendelian law of inheritance.
Answer Options :
1) Both (A) and (R) are correct.
2) (A) is incorrect, but (R) is correct.
3) Both (A) and (R) are incorrect.
4) (R) is incorrect and (A) is correct.

62) Exam. of semen, seminal fluids, vaginal fluid and stains of vaginal secretions

62) The characterization of semen is done by following presumptive test .....
(A) Acid Phosphatase test (B) Special Antigen test
(C) Microscopic observation (D) Precipitation test
Anwer Options:
1) A, B 2) only A 3) B, C, D 2) A and D

63) Examination of Saliva, saliva stains, vomit

63) Confirmatory test for identification of human saliva are .....
(i) lateral immunochromatographic strip test (ii) Rapid Stain Identification Kit (RSID)
(iii) Phadebas test (iv) UV examination
Answer Options :
1) (i) and (ii) are correct. 2) (i) and (iii) are correct.
3) (ii) and (iii) are correct. 4) (ii), and (iv) are correct.

64) Examination of urine stains, Faecal matter and its stains

64) The term 'liquid gold' refers to :
1) Urine of a jaundiced patient
2) Inhalational hydrocarbons which can only be bought by addicts at very high cost in the black market
3) Urine of a person who has ingested yellow sulfide or arsenic
4) Urine of amphetamine abuser

65) Hair examination

65) Indiviuals with red hair express an increase in .....
(A) Eumelanin (B) Pheomelanin (C) Gamma melanin (D) Acromelanin
Anwer Options:
1) B and C 2) A and B 3) B, C, D 2) only D

(2) Method of Analysis for biochemical substances / 5

66) Presumptive and confirmatory test
67) Estimation of Protein, Nucleic acids, Lipids, Carbohydrates, Enzymes, Isoenzyme, blood group identification, Biological buffers.
68) High voltage electrophoresis
69) SDS-PAGE (Sodium Dodecyl Sulfate- Polyacrylamide Gel Electrophoresis)
70) Agarose electrophoresis & Capillary electrophoresis
COE (Cross Over Electrophoresis)

66) Presumptive and confirmatory test

66) Keeping biological determinants in perspective, consider the following statements:
A. Presence of a normal karyotype is the first requisite for human health
B. Genetic screening can play an important role in prevention of wide spectrum of diseases
C. If an individual is allowed to live in healthy relationship with the environment, the person's genetic potentialities can transform into phenotypic realities
Which of the above statements is/are correct?
1) A, B and C 2) only A 3) B, C, D 2) A and D

67) Estimation of Protein,, Lipids, Carbohydrates, Enzymes, Isoenzyme, buffers

67) The most suitable traditional method of quantitative assay for pure protein is based on reaction of aromatic amino acids with phospho-tungstic acid is
1) Micro-Kjeldahl method
2) Nephalometric method
3) Folin-Ciocalteu (Lowry) method
4) Folin-Wu method

68) High voltage electrophoresis

68) Electrophoretic mobility is the ratio of:
1. it's intensity, and the velocity of the biomolecule in the electric field
2. the velocity of the biomolecule in the electric field, and it's intensity
3. the distance of the biomolecule in the electric field, and it's intensity
4. the velocity of the biomolecule in the electric field, and it's intra molecular distance

69) SDS-PAGE (Sodium Dodecyl Sulfate- Polyacrylamide Gel Electrophoresis)

69) What is the role of sodium dodecyl sulphate (SDS) in SDS-PAGE ?
1) Protein unfolding
2) Imparting net positive charge to the protein
3) Imparting equal mass to all proteins
4) Protein denaturing and imparting net negative charge to the protein

70) Agarose electrophoresis & Capillary electrophoresis

70) What is the difference between agarose gel electrophoresis and capillary electrophoresis?
1) gel electrophoresis is performed in a in a capillary tube using a polymer gel of standard pore size whereas capillary electrophoresis is performed in vertical or horizontal plan with a polymer liquid or a gel.
2) gel electrophoresis is performed in a vertical plane using a polymer gel of any pore size whereas capillary electrophoresis is performed in a capillary tube with a gel.
3) gel electrophoresis is performed in a vertical or horizontal plane using a polymer gel of standard pore size whereas capillary electrophoresis is performed in a capillary tube with a polymer liquid or a gel.
4) gel electrophoresis is performed in a in a capillary tube using a polymer gel of any pore size whereas capillary electrophoresis is performed in horizontal plane with a polymer liquid.

(3) DNA sample collection and extraction / 5

71) Presumptive and confirmatory tests - DNA extraction
72) Bone processing and DNA isolation from tooth and bone
73) Automated DNA extraction, Quantification of DNA, Amplification (PCR)
74) Detection of PCR product using genetic analyzer
75) STR data analysis, data analysis and interpretation of PCR

71) Presumptive and confirmatory tests - DNA extraction

71) Which of the following, externally visible characteristic, be predicted and used in crime detection, based on DNA evidence .....
(A) Black hair colour (B) Red hair colour (C) Blue iris colour (D) Black skin colour
Anwer Options:
1) A, B
2) only A
3) B and C
2) A and D

72) Bone processing and DNA isolation from tooth and bone

72) Nuclear DNA from bones at different states of degradation can be isolated using these methods:
a) Classical, organic phenol–chloroform extraction
b) DNA extraction from crystal aggregates
c) DNA extraction by total demineralisation
Answer Options :
1) (a) and (b) only 2) (a), (b) and (c) 3) (a) and (c) only 4) (b) and (c) only

73) Automated DNA extraction, Quantification of DNA, Amplification (PCR)

73) A growing research area, in DNA analysis using epigenetic alterations, focus on .....
1) Differentially modified regions 2) Differentially methylated regions
3) Differentially methylated RNAs 4) Differentially modified RNAs

74) Detection of PCR product using genetic analyzer

74) Which key feature of Taq polymerase allows PCR to be conveniently performed ?
1) Taq polymerase does not require primers.
2) Taq polymerase does not require templates.
3) Taq polymerase is heat stable.
4) Taq polymerase can work at very low temperatures.

75) STR data analysis, data analysis and interpretation of PCR

75) What are the three different temperatures reached during the polymerase chain reaction to facilitate the denaturation and hybridisation of the DNA strands?
1. Starting temperature is elevated to 72°C, then lowered to 60°C and again increased to 62°C.
2. Starting temperature is elevated to 90°C, then lowered to 60°C and again increased to 78°C.
3. Starting temperature is elevated to 95°C, then lowered to 60°C and again increased to 72°C.
4. Starting temperature is elevated to 85°C, then lowered to 60°C and again increased to 75°C.

(4) Method of Analysis for Human DNA and Wild life DNA / 5

76) DNA finger printing
77) RFLP (Restriction Fragment Length Polymorphism)
SNP (Single Nucleotide Polymorphism)
78) PCR (Polymerase Chain Reaction)
79) RT-PCR (Reverse Transcriptase Polymerase Chain Reaction
80) RIA (Radio Immuno Assay)

76) DNA finger printing

76) To identify an individual on the basis of DNA analysis of the blood, investigators look for DNA fingerprinting based on .....
1) Non-repetitive sequence 2) Sequence polymorphism
3) Constant tandem repeats 4) Variable number tandem repeats

77) RFLP (Restriction Fragment Length Polymorphism)

77) Which of the following techniques is used for the detection of Restriction Fragment Length Polymorphism (RFLPs) ?
1) Northern blotting 2) Southern blotting 3) Western blotting 4) Eastern blotting

78) PCR (Polymerase Chain Reaction)

78) Polymerase Chain Reaction is a revolutionary method developed by __ .
1. Paul Flory 2. Peter Debye 3. Kary Mullis 4. Francis Mark

79) RT-PCR (Reverse Transcriptase Polymerase Chain Reaction)

79) In reverse transcriptase PCR method (RT-PCR), the DNA polymerase that has both polymerase and reverse transcriptase activities at high temperature, is obtained from.
1) Escherichia coli (Korenberg's enzyme) 2) Thermus aquaticus
3) Thermus termophilus 4) Haemophilus influenzae (Rd)

80) RIA (Radio Immuno Assay)

80) Who among the following developed the radioimmunoassay technique for measuring concentration of insulin in blood?
1. Carl Linnaeus 2. Louis-Charles (jointly)
3. Berson-Yalow (jointly) 4. Francis Crick

(5) Forensic Physics and Ballistics (20)

1) Ballistics related examination & Forensic Physics / 6

81) Barrel washing examination, Examination of Inanimate object(s) affected by shooting
82) Identification and Examination of Firearms, ammunition, Manufacturing tools
83) Identification (SEM) of shots, pellets, wads, propellant charge, partially burnt powder charge.
84) Examination of Swabbing or lifting from body parts of suspects shooter/victim, Victim's/ accused's apparel, Inanimate object(s) affected by shooting
85) Examination of Parts of skin, bones, hair and other body parts affected by shooting
86) Post-mortem/injury reports and related X-ray plates.

81) Barrel washing examination, Examination of object(s) affected by shooting

81) **Assertion (A):** The penetration power of shot gun is more than service rifle.
Reason (R): Rifle produces more energy inside the barrel as compared to shot gun.
Answer Options :
1) (A) is correct, but (R) is incorrect. 2) Both (A) and (R) are correct.
3) (A) is incorrect, but (R) is correct. 4) Both (A) and (R) are incorrect.

82) Identification and Examination of Firearms, ammunition, Manufacturing tools

82) Every fired firearm has Ballistic Signature. Choose the correct sentences.
a) The barrel, firing pin, firing chamber, ejector and other parts of the gun in contact with the bullet and cartridge leaves these marks.
b) These marks are unique in nature.

c) These are reproduciable marks on each bullet and case when it fires.

d) Integrated Ballistic Identification System is specialised computer hardware-software combination designed to compare these Ballistic Signature.

Answer Options :

1) Only a, b and c 2) Only b, c and d 3) Only a,c and d 4) All of the above

83) Identification (SEM) of shots, pellets, wads, propellant charge, powder charge

83) Match the following:

List – I	**List – II**
a. Fulminate of mercury	i. Nitroglycerin
b. Gelatinesticks	ii. Dart
c. Ballistite	iii. Primer
d. Air gun	iv. Double base smokeless powder

Answer Options :

	a	**b**	**c**	**d**
1)	i	iii	iv	ii
2)	iv	iii	ii	i
3)	iii	i	iv	ii
4)	iii	ii	i	iv

84) Examination of Swabbing or lifting from body parts of suspects shooter

84) For wound ballistics study in human beings, the following is used in experiments :

1) 10% gelatin gel block 2) 20% gilatin gel block

3) 10% agar gel block 4) 20% starch gel block

85) Examination of Parts of skin, bones, hair, body parts affected by shooting

85) If a shotgun is fired from distance of 60 to 90 cm, the entry wound will show presence of .....

1) Only burning 2) Only blackening 3) Only tattooing 4) All of the above

86) Post-mortem/injury reports and related X-ray plates

86) In the medicolegal setting, postmortem radiographs are useful for .....

a) examining bones for signs of recent and old trauma

b) localizing bullets or other metallic foreign objects

c) confirming suspected air embolism

d) documenting pneumothorax, pneumomediastinum, and pneumoperitoneum

Anwer Options:

1) a, b, c 2) a, b, c, d 3) b, c, d 2) a, c, d

(2) Examination of physical objects, proof / 7

87) Foot / Footwear/ Tyre impression

88) Identification mark, tool marks

89) Tampered electrical energy meters

90) Glass fragments, broken objects, paper, paints

91) Forensic documents, fiber

92) Restoration of number

93) Soil analysis

87) Foot / Footwear/ Tyre impression

87) The foot prints found at the scene of crime, indicates which of the following?
(A) Number of persons involved
(B) Height of the persons involved
(C) Entrance or exit of the persons involved
Which of the above statements is/are correct?
1) A, B and C 2) only A and C 3) only B and C 2) only A and B

88) Identification mark, tool marks

88) The following is a suitable material for casting of tool marks:
(a) Wax (b) Plasticine (c) Woodsmetal (d) Faxfilm
Answer Options :
1) (a) and (b) are correct. 2) (b) and (c) are correct.
3) (c) and (d) are correct. 4) (a) and (d) are correct.

89) Tampered electrical energy meters

89) What is electric meter tampering?
a) Meter tampering means doing anything that causes the meter to run slower or not at all.
b) Meter tampering includes anything that is used to divert electricity around the electric meter.
c) Meter tampering is theft of electricity from the power company.
Answer options :
1) Only a and c 2) a, b and c 3) only a 4) Only b and c

90) Glass fragments, broken objects, paper, paints , inks

90) **Assertion (A):** A translucent design impressed into paper during manufacture is called as water mark.
Reason (R): They help in providing information about the origin of paper.
Answer Options :
1) (A) is correct, but (R) is incorrect. **2) Both (A) and (R) are correct.**
3) (A) is incorrect, but (R) is correct. 4) Both (A) and (R) are incorrect.

91) Forensic documents, fiber

91) Match the following:

List – I	**List – II**
a. Vegetable fibre	i. Asbestos
b. Animal fibre	ii. Cotton
c. Mineral fibre	iii. Acrylic
d. Synthetic fibre	iv. Angora

Answer Options :

	a	**b**	**c**	**d**
1)	iv	ii	i	iii
2)	i	iv	iii	ii
3)	ii	iv	iii	i
4)	ii	iv	i	iii

92) Secret writings, Restoration of number

92) Match the following in case of deciphering of secret writings:

List – I	**List – II**
a. Soap	i. heat
b. Milk	ii. Ferric compounds
c. Sodium Chloride	iii.water
d. Potassium thiocyanate	iv.silver nitrate

Answer Options :

	a	b	c	d
1)	iii	i	iv	ii
2)	iv	iii	i	ii
3)	ii	i	iv	iii
4)	iv	iii	ii	i

93) Soil Analysis

93) **Assertion (A):** Organic contents of the soil help in ascertaining the source of the soil.
Reason (R): The organic components of soil from different sources are different in nature.
Answer Options :
1) (A) is correct, but (R) is incorrect.
2) Both (A) and (R) are correct.
3) (A) is incorrect, but (R) is correct.
4) Both (A) and (R) are incorrect.

(3) Method of analysis in Forensic Physics & Ballistics / 7

94) Microscopic analysis
95) XRD (X-Ray Diffraction)
96) STA (Simultaneous Thermal analysis)
DSC (Differential Scanning Calorimetry)
97) Tensile strength, Atomic emission spectroscopy
Flame emission spectroscopy
98) AAS (Atomic Absorption Spectroscopy)
99) SEM (Scanning Electron Microscopy)
Energy Dispersive X-ray Spectrophotometry
100) Video Spectral Comparator

94) Microscopic analysis

94) The comparison microscope has two microscopes placed next to each other and the optical paths of each microscope are connected together by the optical bridge whish consists of .....
1) a series of lenses that brings the two images back together at the single eyepiece.
2) a series of mirrors that brings the series of images back together at the single eyepiece.
3) a series of lenses and a mirror that brings the series of images back together at the single eyepiece.
4) a series of lenses and a mirror that brings the two images back together at the single eyepiece.

95) XRD (X-Ray Diffraction)

95) Which of the following X-ray diffraction methods is generally NOT useful for investigating the internal structures?

1. Powder method
2. Magnetic method
3. Rotating crystal method
4. Laue photographic method

96) STA, DSC (Differential Scanning Calorimetry)

96) Choose the incorrect statement :

1) DSC (Differential Scanning Calorimetry) is more usefeul in forensics than STA (Simultane ous Thermal analysis)
2) DSC thermal characterization information complements IR microscopy and is widely used for forensic applications.
3) The infrared microscope has become essential in the forensic community for identification of trace materials.
4)STA (Simultaneous Thermal analysis) can be used as a method of testing the thermal sensitivity of energetic materials.

97) Tensile strength, Flame emission spectroscopy

97) The units used to measure tensile strength are .....

a) Kilogram per square centimeter (kpsc)
b) Pascals, Megapascals, Gigapascals
c) Pounds-force per square inch (psi)
d) Kilo-pounds per square inch (kpsi)

Anwer Options:

1) a, b, c 2) only b 3) b, c, d 2) a, c, d

98) AAS (Atomic Absorption Spectroscopy)

98) Match the instrument with the detector.

List – I	**List – II**
i. Atomic Absorption Spectrometer	a. Thermal conductivity
ii. Infra Red Spectrometer	b. Hypersensitive Photoplate
iii. Emission Spectrograph	c. Golay
iv. Gas liquid Chromatography	d. Photomultiplier Tube

Answer Options :

	a	**b**	**c**	**d**
1)	iv	iii	ii	i
2)	i	iv	iii	ii
3)	i	iii	iv	ii
4)	iii	iv	iii	i

99) SEM (Scanning Electron Microscopy)

99) In scanning electron microscopy the electrons in the beam interact with the sample and give information about the surface ..... and .....

1) topography, morphology
2) topography, monography
3) polarography, sampling
4) None of these

100) Video Spectral Comparator

100) Video Spectral Comparator is an imaging device that allows an examiner to .....

a) analyze inks
b) visualize hidden security features
c) reveal alterations on a document
d) analyze the cause of death

Anwer Options:

1) a, b, c 2) only b 3) b, c, d 2) a, c, d