

Bhakta Kavi Narsinh Mehta University, Junagadh



**Syllabus on the bases of Choice Based Credit System (CBCS)
For**

Semester 1 & 2

FORENSIC SCIENCE

Paper No. B – 201: FORENSICS, CRIME AND INVESTIGATIVE TECHNIQUES – 2

On Effective From – 2016

FS-101:FORENSICS,CRIME AND INVESTIGATIVE TECHNIQUES

Unit – I Forensic Science:

- I.1 Fundamental of Forensic Science
- I.2 Basic Principles and significance of Forensic Science
- I.3 Organizational Structure of Forensic Science Laboratories-I

I.3.1 Physics division:

Physical evidences, soil analysis, tool marks, cut marks, electrocution, physical comparison, physical quantities, itching, fake currency analysis, physical microscopy, speech and voice identification and authentication

I.3.2 Ballistics:

Fire arms and fire arm comparison, motion and direction of projectiles, impact analysis fire arms range and distance

I.3.3 Digital forensic science:

Cyber crime investigation, data recovery, SIM card analysis, computer forensic science, data retrieve from any storage device, detection of network crime, authentication of digital data

I.3.4 Photography:

Forensic photographic evidences, super imposition technique

I.3.5 Documents Division:

Examination of questioned documents such as handwritings, signature, stamp, erased writing alteration, addition, typewriting, etc.

I.3.6 Finger print division:

Detection of latent fingerprints and its comparison with database

Unit – II Organizational Structure of Forensic Science Laboratories-II

II.4 Prohibition and possession division:

Examination of alcohol in foreign liquor, country made liquor, illicit alcohol

II.5 Explosives:

Examination of explosive materials

II.6 Narcotics division:

Examination and detection of narcotic and psychotropic drugs

Unit – III Organizational Structure of Forensic Science Laboratories-III

III.1 Biology division:

Examination of blood, saliva, semen, urine, teeth, bone, hair, tissues and vegetative materials, food poisoning, and analysis of any biological materials. Analysis of sample in wildlife crime

III.2 Serology division:

Determination of origin and grouping of blood, saliva, semen, samples and iso-enzyme typing

III.3 DNA Division:

DNA profiling of any body fluids, tissues, hair, etc for personal identification, gang rape, and disputed paternity cases

III.4 Forensic psychology:

Lie detection, polygraph analysis, brain finger printing,

Forensic view in homeland security and antiterrorism, analysis work occur in Homeland Security and antiterrorism lab

III.6 other divisions

Forensic anthropology, Forensic entomology, Forensic medicine

Unit – IV Crime:

IV.1 Definition & causation, crime scene, types of crime scene, protection and recording of crime scene

IV.2 Search of physical clues, preservation, packing and forwarding of physical clues

IV.3 Processing of crime scene, Blood spattering / Pattern analysis

Analysis of unknown chemicals, petroleum products, arson cases, duplicates ghee and food additives

II.2 Toxicology:

Analysis and detection of toxic substances or its intermediate metabolites in viscera, blood, urine, vomits samples

II.3 Blood alcohol:

Detection and determination of percentage of alcohol in blood samples

Unit – V Basic principles of forensic biology:

V.1 Microscopy

Basic principles, Simple and Compound microscope, Comparison microscope, Phase contrast Microscope, Stereoscopic microscope, Polarizing microscope, Fluorescent Microscopy, Infra red Microscopy, Scanning Electron Microscope & Transmission Electron Microscope.

V.2 Cell, cell structure, cell organelles, their structure and functions

Suggested Experiments

1. To study tool mark identification.
2. To know the physical comparison of objects.
3. To analyze different soil of your region (physical and chemical).
4. To study Forensic photography.
5. To know the document examination.
6. To take rolled and plain fingerprints impression of individual and recognize the fingerprint patterns.
7. To analyze the blood group of given blood sample.
8. To determine the difference between human and animal blood.
9. To compare the hair.
10. Amino acid separation by ascending / circular paper chromatography.
11. To study different types of cells (Bacterial, Yeast, Plants and Animal).
12. To study the Mitochondria and Endoplasmic Reticulum organelles.
13. To study the principle and functional parts of light microscope.
14. To study the different types of microscope.

FS-201: FORENSICS, CRIME AND INVESTIGATIVE TECHNIQUES**Unit – I Basic Concepts - Atomic & Molecular Spectroscopy-I**

- I.1** What is spectroscopy, electromagnetic spectrum?
- I.2** Interaction of radiation with matter: reflection, absorption, transmission, fluorescence, phosphorescence and their forensic applications, radiation filters
- I.3** Atomic spectra, energy levels, quantum numbers and designation of states, selection rules, qualitative discussions of atomic spectra

Unit – II Elements of X- ray spectrometry

Sources for shorter wavelength radiations (X-ray tubes) radioactivity, x -rays ,Elements of X-ray spectrometry- fluorescence, energy Dispersive X-ray analysis (EDX), wavelength Dispersive X-ray analysis (WDX), X-ray diffraction, Augur effect

Unit – III Sources and detectors of radiation and LASER

- III.1** Sources of radiation; their utility and limitations- conventional sources for UV, visible and infrared rays, Detection of radiations; photographic detectors, thermal detectors, photoelectric detectors etc
- III.2** Laser (He, Ne, Argon ion, dye lasers, semi conductor lasers)

Unit-IV General Principles of Biological/ Bio-chemical Analysis

- IV.1** **pH and buffers, Physiological solution**
- IV.2** **Centrifugation Techniques**
Basic principles of sedimentation, various types of centrifuges, Density gradient centrifugation, Preparative centrifugation, Analysis of sub-cellular fractions, Ultra-centrifuge- Refrigerated Centrifuges

Unit-V Macromolecules

- V.1** Carbohydrates: Classification, Types, Properties, Significance
- V.2** Proteins: Classification, Structures, Properties, Significance
- V.3** Lipid: Classification, Types, Properties, Significance
- V.4** Nucleic Acid: Classification, Types, Properties, Significance, Structures

F.Y.B.Sc. Forensic Science Semester - II
Paper - II Suggested Experiments

- 1.** To prepare the phosphate buffer of different pH and measure the pH of given solution with pH meter.
- 2.** Separate the different compound from given biological mixtures.
- 3.** Qualitative test for (a) Carbohydrates (b) Proteins (c) Lipids
- 4.** Estimation of DNA and RNA.
- 5.** Estimation of amino-acid by ninhydrine methods.
- 6.** Verification of Beer's and Lambert's Law.
- 7.** To determine the uv-maxima for different compounds.
- 8.** To study the properties of
light - (a) Reflection,
(b) Absorption,
(c) ransmission,
(d) luorescence
- 9.** To study Photographic detector
- 10.** To study Photoelectric detector

PAPER STYLE

INSTRUCTIONS :

1. All the units carry equal weightage (14 Marks each)
2. There must be one question from each unit.
3. Each subtopic must be given due weightage in question paper
4. 70 Marks for Semester Examination & 30 marks for Internal Examinations.
5. Time duration: 2 $\frac{1}{2}$ Hours

Question 1: Answer the following (UNIT-I)

- a. Four objective questions each of one
- b. Answer any one out two each of two
- c. Answer any one out two each of three
- d. Answer any one out two each of five

Mark : $1 \times 4 = 4$
Marks : $1 \times 2 = 2$
Marks : $1 \times 3 = 3$
Marks : $1 \times 5 = 5$

Total Marks: 14

Question 2: Answer the following (UNIT-II)

- a. Four objective questions each of one
- b. Answer any one out two each of two
- c. Answer any one out two each of three
- d. Answer any one out two each of five

Mark : $1 \times 4 = 4$
Marks : $1 \times 2 = 2$
Marks : $1 \times 3 = 3$
Marks : $1 \times 5 = 5$

Total Marks: 14

Question 3: Answer the following (UNIT-II!)

- a. Four objective questions each of one
- b. Answer any one out two each of two
- c. Answer any one out two each of three
- d. Answer any one out two each of five

Mark : $1 \times 4 = 4$
Marks : $1 \times 2 = 2$
Marks : $1 \times 3 = 3$
Marks : $1 \times 5 = 5$

Total Marks: 14

Question 4: Answer the following (UNIT-IV)

- a. Four objective questions each of one
- b. Answer any one out two each of two
- c. Answer any one out two each of three
- d. Answer any one out two each of five

Mark : $1 \times 4 = 4$
Marks : $1 \times 2 = 2$
Marks : $1 \times 3 = 3$
Marks : $1 \times 5 = 5$

Total Marks: 14

Question 5: Answer the following (UNIT-V)

- a. Four objective questions each of one
- b. Answer any one out two each of two
- c. Answer any one out two each of three
- d. Answer any one out two each of five

Mark : $1 \times 4 = 4$
Marks : $1 \times 2 = 2$
Marks : $1 \times 3 = 3$
Marks : $1 \times 5 = 5$

Total Marks: 14