

THIRD SEMESTER P.G. DEGREE EXAMINATION, NOVEMBER 2020

(CCSS)

M.Sc. Forensic Science

FSC 3E 22—FORENSIC SEROLOGY AND DNA PROFILING

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

I. Write an essay on any *two* of the following. Each question carries 15 marks :

- 1 Describe and explain the types of immunity possessed by humans.
- 2 Enumerate and briefly describe the various types of serum proteins? Describe the structure, site of production, functions and forensic significance of any one in detail.
- 3 Describe the procedure , of collection of DNA samples from a crime scene. Explain the precautions to be adopted by the crime scene technician and all the other officers in the crime scene giving reasons. How are the samples preserved and transported to the DNA lab ?
- 4 Describe and explain the procedure for determining the quality and quantity of DNA and RNA in a forensic sample.

(2 × 15 = 30 marks)

II. Write short essays on any *three* of the following. Each question carries 10 marks :

- 5 Describe and explain the procedure for quantification of DNA by Slot-blot assay.
- 6 Describe the various uni-parentally inherited genetic markers. Explain how they can be used for detection of ethnic and geographical origin in a person.
- 7 Describe the various drug- DNA interactions currently known.
- 8 Explain the limitations of DNA profiling.
- 9 Describe and explain the various factors which complicate the interpretation of DNA typing results.

(3 × 10 = 30 marks)

Turn over

III. Write short notes on any *five* of the following. Each question carries 4 marks :

10 RFLP.

11 Admissibility standards / Frye test..

12 Forensic significance of lectins.

13 Bombay blood group.

14 Pitfalls in Red Cell typing.

15 Determination of human origin of a tissue.

16 DNA fingerprinting of degraded samples.

17 Solid phase extraction of DNA from forensic samples.

(5 × 4 = 20 marks)

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THIRD SEMESTER P.G. DEGREE EXAMINATION, NOVEMBER 2020

(CCSS)

M.Sc. Forensic Science

FSC 3E 21—FORENSIC BIOLOGY

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

I. Write an essay on any *two* of the following :

- 1 Describe the modern concept of the fine structure of the gene and its working.
- 2 Explain the concept of the “Hardy weinberg equilibrium” and describe and explain the conditions leading to deviation from the Hardy Weinberg equilibrium.
- 3 How are epithelial cells classified ? Describe the function of each epithelial cell and places where each such epithelial cell is found.
- 4 Describe how allele frequency is determined for a particular population and explain its importance.
- 5 Describe the confirmatory tests for seminal stains.

(2 × 15 = 30 marks)

II. Write short essays on any *three* of the following :

- 6 Explain the differences between human hair and animal hair.
- 7 Explain how man made fibres are distinguished from natural fibres.
- 8 Explain why mutations happen and describe the types of mutations.
- 9 Describe the method of replication of DNA in Eukaryotes.
- 10 Describe the gross and microscopic structure of Human bone tissue.

(3 × 10 = 30 marks)

III. Write short notes on any *five* of the following :

- 11 Mitochondrial DNA.
- 12 Basic molecular cloning procedures.
- 13 Oligonucleotide probes.
- 14 Kastle Meyer test.
- 15 Identification of menstrual blood stains.
- 16 Acid phosphatase test.
- 17 Y-STR for genealogical testing.

(5 × 4 = 20 marks)

THIRD SEMESTER P.G. DEGREE EXAMINATION, NOVEMBER 2020

(CCSS)

M.Sc. Forensic Science

FSC 3E 20—FORENSIC MEDICINE AND TOXICOLOGY

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

I. Write an essays on any *two* of the following :

- 1 What is meant by rigor mortis ? Explain the molecular mechanism of production of rigor mortis. Explain how this phenomenon can be used to estimate the post mortem interval.
- 2 What are abrasions and contusions ? How can the age of an abrasion and contusion be determined ?
- 3 Define rape. What are the material objects to be collected from the victim's body if she reports to a doctor within 1 hour of its occurrence ? How should they be preserved and transmitted to the forensic lab maintaining the chain of custody ?
- 4 What is meant by "sudden death" ? How does death occur in "myocardial infarction" ? How can it be demonstrated at post mortem examination ?

(2 × 15 = 30 marks)

II. Write short essays on any *three* of the following :

- 5 What are stab wounds ? How can the doctor who did surgery or post mortem on a victim of a stab wound help in identifying the weapon that had been used to stab a victim ?
- 6 What are deceleration injuries ? What are the protective devices in a modern automobile which help prevent these deceleration injuries ? Explain how these work.
- 7 Explain, how death occurs due to injuries ?
- 8 What is an antidote ? How are they classified ?
- 9 What are the various methods of extraction of poison from body fluids and visceral organs ? Explain solvent extraction in detail.

(3 × 10 = 30 marks)

Turn over

III. Write short notes on any *five* of the following :

- 10 Somatic death.
- 11 Cadaveric spasm.
- 12 Adipocere formation.
- 13 Forensic entomology.
- 14 Unnatural sexual offences.
- 15 Injuries in bomb blasts.
- 16 Analysis of volatile poisons.
- 17 Analysis of viscera of snake bite victims.

(5 × 4 = 20 marks)

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THIRD SEMESTER P.G. DEGREE EXAMINATION, NOVEMBER 2020

(CCSS)

M.Sc. Forensic Science

FSC 3E 19—FORENSIC CHEMISTRY

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

I. Write an essay on any *two* of the following. Each question carries 15 marks :

- 1 Describe the classification of proteins drawing their structures.
- 2 How are different types of fertilizers classified ? What are standard fertilizers ? Describe how fertilizers are adulterated.
- 3 Describe the sites of absorption of alcohol in the human body, the metabolism / detoxification of alcohol and sites of excretion of alcohol from the human body.
- 4 Describe the elements of the life cycle of fire and the various types of fire. Explain how fire extinguishers can be used to put out various types of fires.

(2 × 15 = 30 marks)

II. Write short essays on any three of the following. Each question carries 10 marks :

- 5 Explain, how amino acids are degraded ?
- 6 Describe, how adulterants are detected in petrol ?
- 7 Describe the method of analysis of suspected arson.
- 8 Describe the classification of psychotropic substances. Explain the effect on the body of Amphetamines.
- 9 Describe the chemical methods of analysis of dyes.

(3 × 10 = 30 marks)

Turn over

III. Write short notes on any *five* of the following. Each question carries 4 marks :

- 10 Zwitterions.
- 11 Isoelectric point.
- 12 Analysis of residues of petroleum products in forensic exhibits.
- 13 Illicit liquor.
- 14 Incendiary devices.
- 15 Explain, how alcohol consumption can affect driving.
- 16 Proof spirit.
- 17 Estimation of heroin in smack.

(5 × 4 = 20 marks)

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THIRD SEMESTER P.G. DEGREE EXAMINATION, NOVEMBER 2020

(CCSS)

M.Sc. Forensic Science

FSC 3E 18—FORENSIC BALLISTICS

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

I. Write an essay on any *two* of the following :

- 1 Describe the classification and characteristics of firearms.
- 2 Describe the various types of primers and propellants and their components. Explain the role of each component.
- 3 Explain the various factors which affect the “external ballistics” of a firearm projectile.
- 4 Explain how the range of fire can be roughly assessed from the “terminal ballistics” in a smooth bore firearm injury. Use diagrams to explain the concepts. Explain how the range of fire is confirmed.

(2 × 15 = 30 marks)

II. Write short essays on any *three* of the following :

- 5 What is a Primer ? Describe the components of primers and explain the function of each component.
- 6 Describe and explain the concept of ballistics coefficient and limiting velocity.
- 7 Explain how the wound of entry of a projectile would be different from the wound of exit.
- 8 Explain the working of stereo and comparison microscopes.
- 9 Explain the method by which a shooter can be identified.
- 10 Explain the theory of recoil. Describe the methods for measurement of recoil.

(3 × 10 = 30 marks)

III. Write short notes on any *five* of the following :

- 11 Wad.
- 12 Effect of air resistance on the trajectory of a bullet.
- 13 Various types of bullets and their composition.
- 14 Identification of country-made firearms.
- 15 Equation of motion of projectile.
- 16 Cavitation effect in gunshot wounds.
- 17 Tumbling of bullet.

(5 × 4 = 20 marks)

THIRD SEMESTER P.G. DEGREE EXAMINATION, NOVEMBER 2020

(CCSS)

M.Sc. Forensic Science

FSC 3E 17—FORENSIC PHYSICS

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

I. Write an essay on any *two* of the following :

- 1 Describe the types and composition of soil.
- 2 Describe the various types of cements and their composition.
- 3 Describe the various types of fibres and explain the concept and importance of dye analysis.
- 4 Describe and explain the various types of tool marks.

(2 × 15 = 30 marks)

II. Write short essays on any *three* of the following :

- 5 Explain the concept of Density gradient analysis in soil testing.
- 6 Describe, how the compressive strength of cement is determined and explain its forensic significance ?
- 7 Explain the physical principles involved in IR Spectroscopy and discuss its application in forensic fibre analysis.
- 8 Explain, how matching and comparison of glass evidence is performed ?
- 9 Describe the various types of brakes and brake systems. How is a failure of brake system assessed ?

(3 × 10 = 30 marks)

III. Write short notes on any *five* of the following :

- 10 Types of motorcycles(classification).
- 11 Photogrammetry software and application in accident reconstruction.
- 12 Skid mark analysis.
- 13 Vehicular fire analysis.
- 14 Restoration of obliterated / erased marks.
- 15 Safety glass.
- 16 Pyrolysis gas chromatography.
- 17 Photographic examination of tool marks.

(5 × 4 = 20 marks)

THIRD SEMESTER P.G. DEGREE EXAMINATION, NOVEMBER 2020

(CCSS)

M.Sc. Forensic Science

FSC 3E 16—FORENSIC DERMATOGLYPHICS

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

I. Write an essay on any *two* of the following. Each question carries 15 marks :

- 1 How are fingerprints classified based on their patterns ? Describe each pattern drawing diagrams.
- 2 Describe the various forms of footwear impressions. Explain how these impressions can be enhanced.
- 3 In a tire impression, describe the tread nomenclature. Explain what is the information carried on the sidewall of a tire.
- 4 Describe the morphology of the human ear using diagrams. Explain which are the features which show variability and how they can be used for an identification.

(2 × 15 = 30 marks)

II. Write short essays on any *three* of the following. Each question carries 10 marks :

- 5 Explain the principles involved in the preservation and photography of fingerprints on various surfaces.
- 6 Explain what are the various informations that can be gleaned from careful study of a footwear impression.
- 7 Explain the various characteristics produced by retreaded tires and how they can be used for identification.
- 8 Explain the application of lip prints in crime detection.
- 9 Explain the principles of minutiae identification and matching using fingerprints.

(3 × 10 = 30 marks)

Turn over

THIRD SEMESTER P.G. DEGREE EXAMINATION, NOVEMBER 2020

(CCSS)

M.Sc. Forensic Science

FSC 3E 15—QUESTIONED DOCUMENTS

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

I. Write an essay on any *two* of the following :

- 1 Describe the observations tests carried out on Questioned documents. Enumerate their applications in various scenarios.
- 2 Describe how dating of ballpoint ink and non-ballpoint ink.
- 3 Describe the stabilization and examination of burnt/charred documents.
- 4 Enumerate and describe the major NABL guidelines for accreditation of document analysis labs.

(2 × 15 = 30 marks)

II. Write short essays on any *three* of the following :

- 5 Describe how individual characteristics of handwriting are used to analyze a particular person's handwriting in the context of a questioned document analysis.
- 6 Explain how a person's mother tongue can affect how a person uses a foreign language.
- 7 Explain the concept of "latent print processing".
- 8 Explain how the sequence of intersecting strokes is analysed and point out how it is useful in handwriting analysis.
- 9 Discuss the limitations of a forensic documents expert.

(3 × 10 = 30 marks)

III. Write short notes on any *five* of the following :

- 10 Simon new comb theory of probability.
- 11 Discuss the classification of documents for the purpose of Questioned document analysis.
- 12 Working and handling of video spectral comparator.
- 13 Laser induced fluorescence.
- 14 Electrostatic detection apparatus.
- 15 Microscopic specular reflectance.
- 16 Effect of emotions on handwriting.
- 17 Infrared luminescence.

(5 × 4 = 20 marks)

THIRD SEMESTER P.G. DEGREE EXAMINATION, NOVEMBER 2020**(CCSS)****M.Sc. Forensic Science****FSC 3C 14—CRIME SCENE INVESTIGATION, MANAGEMENT AND RECONSTRUCTION****(2019 Admissions)****Time : Three Hours****Maximum : 80 Marks****I. Write an essays on any *two* of the following :**

- 1 What is meant by a “crime scene” ? Explain how you will secure the crime scene of a homicide in an open place and how you will ensure that there is no further disturbance / contamination of the crime scene by the Police and other crime scene technicians / public? Describe How will you search and collect trace evidence from such a scene.
- 2 Explain how a “scene survey” is carried out. Add a note on “contamination control”.
- 3 Explain giving examples how crime scene analysis is correlated with “behavioral analysis”.
- 4 Briefly describe the physical and biological properties of blood needed for blood spatter analysis. Also briefly describe the “droplet dynamics” of blood, both in-flight and also on-impact with a surface.

(2 × 15 = 30 marks)**II. Write short essays on any *three* of the following :**

- 5 Describe the procedure by which evidence is adduced from a witness in a court of law.
- 6 Explain the concept of “chain of custody”. Briefly describe its legal significance.
- 7 Briefly describe the various digital aids available for crime scene reconstruction.
- 8 Briefly describe the concept of a “common witness” and an “expert witness”. Explain the difference in nature of the testimony provided by them in a court of law.
- 9 Describe the universal precautions to be taken by a forensic scientist while working a crime scene. Add a note on the precautions to be taken while handling and transporting hazardous materials.

(3 × 10 = 30 marks)**Turn over**

III. Write short notes on any *five* of the following :

- 10 Crime scene sketching.
- 11 Personal protective equipment.
- 12 Evidence recovery log.
- 13 Reconstruction report.
- 14 Altered blood-stain patterns.
- 15 Admissibility of “expert evidence” in a court of law.
- 16 Risks associated with blood borne pathogens.
- 17 Co-ordination of interstate investigation agencies.

(5 × 4 = 20 marks)

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THIRD SEMESTER P.G. DEGREE EXAMINATION, NOVEMBER 2020

(CCSS)

M.Sc. Forensic Science

FSC 3C 13—FORENSIC PHOTOGRAPHY

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

I. Write an essay on any *two* of the following. Each question carries 15 marks :

- 1 What are the various file formats for digital photographs ? Explain in detail the advantages and disadvantages of each file format.
- 2 What is meant by aperture and focus adjustment ? Explain how to use the aperture and focus adjustments in various practical scenarios and explain their practical significance in photography.
- 3 What is meant by surveillance photography ? Explain in detail its methods, techniques and tactics.
- 4 What is meant by “Geo-mapping” and “remote-sensing” ? Explain how these are performed.

(2 × 15 = 30 marks)

II. Write short essays on any *three* of the following. Each question carries 10 marks :

- 5 What are the various classes of photographic instruments available? Explain the functioning of each and indicate which equipment is most suitable in various practical forensic photography scenarios.
- 6 Explain the basic principles to be followed in indoor and outdoor crime scene photography. Also, draw a table and indicate the salient differences.
- 7 Explain the techniques and principles of “aerial photography”.
- 8 Explain the probative value, admissibility and legal aspects of crime scene photography / videos in a court of law.
- 9 Explain the working of a digital camera and the basics of digital imaging.

(3 × 10 = 30 marks)

Turn over

III. Write short notes on any *five* of the following. Each question carries 4 marks :

- 10 Optical filters.
- 11 IR photography.
- 12 Photomicrography.
- 13 Digital watermarking.
- 14 Photography in the identification of hostile human subjects.
- 15 3-D photography.
- 16 High speed videography.
- 17 Morphing of images.

(5 × 4 = 20 marks)

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