

DIPLOMA IN FORENSIC BIOLOGY

(Non-Semester)

(With effect from the academic year 2013-14)

Eligibility for the Course

Candidates for admission to Diploma in Forensic Biology could possess a Bachelors degree in Zoology, Botany, Chemistry, Biochemistry, Microbiology, Biotechnology/Environmental/ Animal/plant Food sciences, Dietetics & Nutrition, Bioinformatics, BE in Chemical Engineering & Biotechnology; B.Tech in Biotechnology & Bioinformatics/Nanotechnology; BDS; MBBS; B.Sc in Agri/Agri Biotechnology; B.V.Sc., B.F.Sc., .Pharm and BPT.

Duration of the Course

One year Diploma in Forensic Biology course non-semester for One Year duration

Examination

All the theory papers are of 3 hours duration each for maximum of 100 marks with passing minimum of 35 marks. Practical examinations are also for 3 hours duration for a maximum of 100 marks and passing minimum of 35 marks.

Question Paper Pattern

Maximum marks: 100

Time: 3 hours

Part A (5 x 3 = 15)

Five short answer questions (One question from each unit)

Part B (5 x 8 = 40)

Paragraph questions (Total questions 8, out of which answers are to be given for any five questions;

Part C (3 x 15 = 45)

Total questions 5, out of which answers are to be given for any Three questions;

S.No	Theory & Practicals	Maximum Marks	Minimum Marks
1.	Forensic Biology	100	35
2.	Forensic DNA Analysis	100	35
3.	Human Genetics	100	35
P1	Practical- Forensic Biology	100	35

PAPER- I. FORENSIC BIOLOGY

UNIT-I: SCOPE OF FORENSICS

Definition – history- international and national fields- evidences and their classification- specific socio economic offences against human body, property, terrorism, pollution, adulteration- description of sham-crime scene- establishment of identity and importance of motivation.

UNIT-II: FINGER PRINTING

History, fundamental and principles- Henry system- primary classification and computerized prints- Types of injuries- wounds- signs and symptoms of death time- time of death and post mortem changes-Blood stains, grouping, and identification- disputed paternity and DNA tests- Physical evidences-Identification, comparison, collection methods and preservation of hair, fibre, paint, glass and soil- Fire arms, tool marks and impressions.

UNIT-III: FORENSIC ENTOMOLOGY & FORENSIC MEDICINE

Insects of forensic importance-Biology of insects of forensic importance-study of maggots-sarcophagy- venoms and poisons - methods employed for forensic analysis-Medico legal issues of organ transplantation-organ racketing-euthanasia- MTP -sexual offences-rape: semen analysis.

UNIT-IV: FOOD POISONS & NARCOANALYSIS

Classification and sources of drugs, narcotics, cosmetics and abortifacients- physiological and psychological effects- toxic nature of poisoning- sources of poisons-Toxicity testing- methods and instruments for toxicity analysis-Narco analysis.

UNIT-V: INFORMATION TECHNOLOGY AND LEGAL ASPECTS

Cyber crime – law of robotics- laws and data mining-super imposing techniques- e-com and intelligent systems- justice and law- sources, enactments, judiciary, legal aid- laws of copyrights and patents. Forensic sourcing: Enforcement agencies -public and private: police, CBI- National Institute of criminology and forensic science- Interpol, Prisons and rehabilitation.

References:

1. Forensic Medicine (1979), Simpson, K, ELBS (8th edition)
2. Criminalistics, an introduction to forensic sciences: (1978). Safertein, R. Frenice Hall of India, New Delhi.
3. An introduction to Forensic DNA Analysis (2002). Rudin, N and Crim, K.I.C CRC Press, New York.

PAPER-II : FORENSIC DNA ANALYSIS

UNIT- I: DNA BIOLOGY

Science and the law- Criminalities- biological specimen- types- DNA extraction from various sources- methods- scientific basis of DNA typing- Basis of heredity- genes, alleles, polymorphism, variations- Population genetics: introduction- molecular aspects of DNA.

UNIT- II: TOOLS IN DNA TYPING

Restriction enzymes- RFLP analysis- apoB VNTRs - universal primers and probes- PCR: Principles, types and applications- HLA- DQ typing- Genotyping of microsatellites- STRs- gender identification- Y- SRTRs- mitochondrial DNA- length polymorphism- methods & approaches.

UNIT- III: INTERPRETATION RESULTS

Complication factors- sexual assault evidence- Non-sexual assault mixtures- degradation-non-human DNA- Multibanded & single banded patterns- Strengths: continuous allele systems- discrete allele systems- relatives- issues.

UNIT- IV: DNA DATABANK

Premise of a databank- difference between databank and a database - Elements: legislation- collection of samples: offenders, choice of markers- case studies- data categories and indexes- searching profile- confirmation of match.

UNIT- V: DNA DATA AS EVIDENCE

Fyre, Daubert and the Federal rules of evidence- Past admissibility- Landmark cases: OJ. Simpsons' case- pedigree analysis based on DNA finger printing- Selected Indian cases.

REFERENCES:

1. Forensic Medicine (1979), Simpson, K, ELBS (8th edition)
2. Criminalistics, an introduction to forensic sciences: (1978). Safertein, R. Frentice Hall of India, New Delhi.
3. An introduction to Forensic DNA Analysis (2002). Rudin, N and Crim, K.I.C CRC Press, New York.

PAPER- III: HUMAN GENETICS

UNIT- I: BASICS OF HUMAN GENOME

History and development of human genetics; organization of the human genome- Genes and chromosome- structure, function and inheritance- Repetitive DNA in human genome & its significance - Alu and SINE repeats- rganization of centromeres and telomeres- telomers & aging-Microsatellites & VNTRs.

UNIT- II: MOLECULAR GENETICS OF DISEASES

Genetics of congenital abnormalities- disorders- Retinoblastoma- Phenylketoneuria haemoglobinopathies- Inherited human diseases-single gene diseases- Cystic fibrosis –DMD.

UNIT- III: CELL AND CHROMOSOMAL ANALYSIS

Methods for genetic studies –chromosomal analysis- biochemical analysis- Somatic cell genetics: somatic cell hybrids, radiation hybrids - FISH, fibre FISH, mFISH -Tissue culture techniques: long-term and shorts-term cultures- lymphoblastoid cell lines- T cell & cancer cell culture- applications.

UNIT- IV: HUMAN GENOMICS

Human genome mapping – genetic mapping, physical mapping-restriction fragment length polymorphism- pulse field gel electrophoresis- yeast artificial chromosomes- bacterial artificial chromosomes-expressed sequence tags- microsatellites and single nucleotide polymorphisms- HUGO & Human Genome Mapping- implications & applications.

UNIT- V: MOLECULAR METHODS

Identification and isolation of disease genes – positional cloning, functional cloning- DNA and cDNA microarrays- Cancer genomics- pre-natal diagnosis- chorionic villus sampling, amniocentesis - Pre-implantation diagnosis – Principles of Genetic counseling- Ethical aspects of gene testing.

REFERENCES:

1. Strachan, T. and A.P. Read. 2004. Human Molecular Genetics. 3rd Edition. Garland Science, UK.
2. Daniel, L. Hartl and Elizabeth. W. Jones. 2000. Genetics Analysis of Genes and Genomes, 5th Edition. , USA.

PAPER- IV: PRACTICAL FORENSIC BIOLOGY

1. DNA extraction from blood.
2. DNA extraction from clotted blood.
3. DNA extraction from hair, tissue and buccal swap.
4. Blood grouping from dried strains / dots.
5. Paternity testing using PCR methods- (Demo).
6. Molecular detection by PCR-RAPD- (Demo).
7. Pedigree Analysis-chart method.
8. Semen analysis (cattle sample from veterinary department).
9. Fingerprinting analysis & triradicus angles.
10. Reverse grouping.