Raksha Shakti University
Ahmedabad

सत्यमेव जयते
Directorate of Forensic Science Services,
MHA, Govt. of India, New Delhi

Gujarat University
Ahmedabad

24th All India Forensic Science Conference

10 11 12 February, 2018

Theme: Harnessing New Vistas in Academics & Forensic Science

Jointly organised by

Directorate of Forensic Science Services (MHA, GOI, New Delhi)

Gujarat University & Raksha Shakti University, Ahmedabad

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Venue: The Senate Hall, Gujarat University, Ahmedabad (Gujarat), INDIA

BOOK OF ABSTRACT

24th All India Forensic Science Conference

10, 11 & 12 February, 2018

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(Ministry of Home Affair, Government of India, New Delhi)

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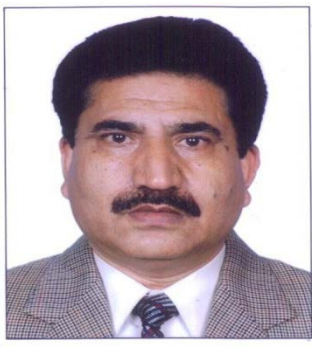
Vanue: The Senate Hall, Gujarat University, Ahmedabad (Gujarat), INDIA



FOREWARD

Shri. A. K. Ganjoo
Director cum Chief Forensic Scientist
DFSS, MHA, New Delhi

It gives me immense pleasure to release the Proceedings of 24th All India Forensic Science Conference. This grand auspicious presence of forensic Science Community is 24th All India Conference in a row under the ambit of Directorate of Forensic Science Services. This proceeding being released today consists of research papers, contributed by Forensic Scientists from all over the country, is of great intellectual and scientific value.

Directorate of Forensic Science Services (DFSS) under Ministry of Home Affairs is a nodal agency for promotion and propagation of Forensic Science in the country. This Organization at central level is playing a vital role in promoting best practices in forensic science by formulating plans, policies, and legislations to promote and regulate quality, capacity, and capability building for forensic science services in the country on one hand and forensic analysis of crime exhibits to generate the clues of evidentiary value through its seven out laying laboratories on the other. ***All India Forensic Science Conference*** is an annual mega event of DFSS on this noble scientific endeavour and I am happy to note that the intellectual deliberations and meaningful exchange of ideas along with panel discussion will encourage the participants to contribute towards the success of the Conference to build ours effective forensic preparedness for future. The essence of the theme of the Conference, "**Harnessing new vistas in Academics and Forensic Science**" will allow the participants to share their innovative ideas on various topics related to the contemporary trends in Forensic Science.

I should not lose this opportunity to express my gratitude to the co-organizers of 24th All India Forensic Science Conference i.e. ***Prof. Himanshu Pandya, Vice Chancellor, Gujarat University*** and ***Sh. Vikas Sahay IPS, Director General, Raksha Shakti Univeristy*** and the entire team of Gujarat University and Raksha Shakti University, Ahmedabad, for their continuous, strenuous and untiring support on all levels

Before I come to close, I share with you all the joy and pleasure of releasing the Conference Proceedings and also extend my gratitude to the entire team of DFSS and all delegates for providing continuous support and cooperation.

A K Ganjoo

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"CONVENTIONAL PAPER BASED FORENSIC DOCUMENTS AND DIGITAL DOCUMENTS"

EMERGING TRENDS AND CHANGING NOTIONS IN THEIR ORIGIN AND EXAMINATION

M C JOSHI*, K V RAVI KUMAR, A K GANJOO*****

INTRODUCTION

This is an age of documents-substrate/paper based or digital/electronic besides being an age of anxiety. Documents feature in our financial, legal, business, social and personal affairs. Hardly a day goes by without some documents playing a part in the life of every one of us. Due to their spreading use in almost all walks of life, spurious paper based or electronic/digital documents are produced for perpetrating crime of cheating, frauds, mis-appropriation, criminal misconduct, embezzlement, extortion, forgeries as also for defamatory, seditious or anonymous communications. They are the **true** and **mute** witnesses and many a times they become vital links in a chain of evidence in serious crimes like kidnapping, arson, murder etc. The conventional crimes have given a way to the sophisticated **white-collar crime** committed by professional criminals armed with latest advancements in Science & Technology. They are inextricably involved in the entire area of vigilance / crime investigation and form more than 70% of the **irrefutable physical evidence** in one or the other form.

It has been rightly pointed out by one of the eminent forensic scientist James V P Convey in the book 'Evidential Documents' that 'Society has evolved literally into a world of Documents'. Documents in any form are questioned or disputed because of their origin, contents or the circumstances regarding its usage/production, execution and location and which arouse serious suspicion regarding their authenticity. Like other profession, the science of questioned/forensic document examination has organisation, systems, faculties, problems and goals dedicated to its advancement & innovation with the growth of science and technology. The scientific examination of documents of any form and nature, being a scientific process basing its origin with in the legal system, rests upon the various principles, instruments, tools and software, chemicals, light arrangements and gadgets used by the forensic experts of the domain to search the truth of immense evidentiary value in the administration of criminal justice system.

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WHITE COLLAR CRIME

The term "white-collar crime" was first used by an American criminologist, Edward Sutherland, in 1940, in his classic paper entitled, "White Collar Criminality". According to him, there are important sociological differences between those who commit conventional crimes, such as murder or burglary, and those who are involved in white-collar crimes. He said that the persons of respectability and social status in the course of their occupation commit white-collar crime. In their book entitled "Crime at the Top", the Criminologists Johnson and Douglas defined it as, ***"White collar-crime is an illegal act or series of illegal acts committed by non-physical means and by concealment or guile, to obtain money or property, to avoid the payment or loss of money or property, or to obtain business or personal advantage". "White-collar crime is primarily a non-conventional offence committed by any person with a dishonest or fraudulent intention with the motive that he may wrongfully gain or wrongfully retain money or property. It is the violation of a position of trust by someone in a formal role relationship with another person for private profit or other personal advantages".*** White-collar crime is generally intended to reap monetary benefits from individuals, establishments or the State, by fraudulent means using the tools of crimes such as pen, paper, computer, mobile, etc. Its current usage includes a broad range of non-violent offenses, where cheating, dishonesty and corruption are the central elements. They are also referred to as **"commercial** crime", **"business** crime" or **"economic** offences".

*The society has now leaped into the **information age,** which has radically changed the way in which white-collar crimes are being committed in view of easy availability of digital tools and image processing gadgets and application software on one side and use of net-banking. Now the traces of evidences of the crime exist in both world- conventional paper based documents and in digital media. This has increased the intricacy of the white collar crimes manifold both for investigation and modalities of their scientific examination. This is a paradigm shift in the nature, pattern and basic definition of white collar crimes due to the conglomeration of conventional and digital world in the perpetration of white collar crimes. The sophisticated nature of such emerging white collar crime armed with digital tools & tricks and the fact that the offenders can usually afford best of the defence lawyers, demands a highly professional expertise, on the part of the police/Investigation and the forensic scientists.*

NEW PROBLEMS

Forensic Science in general and forensic Document examination and Computer/Cybercrime forensics in particular today are going to be the flagship towards the crime detection and investigation hence immensely assisting the administration of justice delivery system. *Law has influenced the science to its growth and effectiveness and forensic science has also influenced the law both substantially and procedurally*. In past, right from the admissibility of opinion of experts on typewriting in the courts of law as per the verdict of Hon'ble Supreme Court of India till today's IT act and enactment of various Cybercrime laws and now commencement of thinking on the ways and means of laws for the *Artificial Intelligence /Machine language* driven objects are excellent examples of progressive and vibrating democratic law abiding society. New concepts like digitally or computer generated documents, transposition forgery, cloud computing, digital cloning, information highways, network forensics, mobile forensics, SIM card forensics, etc. has emerged in today's hi-tech society for which modalities are available which were not known few years ago.Technological advances in the microchip technology, embedded technology,fuzzy logic,

artificial Intelligence/machine language, ever expanding mobile technology, cloud computing concept and robotics, etc. on one hand and criminalistics and engineering areas are overwhelming on the other and has revolutionised our work. Such developments have created new problems in terms of hi-tech crimes and pressing demands to address such problems for law enforcing agencies, forensic Scientists, legal profession and courts to understand,utilize and adopt these technological capabilities for the administration of justice both civil and criminal.

MACHINES & METHODS – FORENSIC DOCUMENTS

Forensic Document Examination has made tremendous objective progress by the development of new techniques and methods, some of which are invented by Document Examiners while other are adaptation of advances made in the field of science. In consonance with the scientific advancements available to everyone including the cheats, it becomes essential for the Document Experts to foresee and forecast innovative crime and to well equip themselves. Today, forensic documents specialists have an array of methods and instruments at their disposal to cope with the multiplicity of white collar crimes viz. Spectral Comparators, Hyper-spectral Imaging, Comparison Microscope, Electrostatic detection techniques for decipherment of indented and secret writings,digital reproduction unit with image authentication camera, UV / IR Microscopes, SEM, narrow band filters, high resolution & magnification Microscopes interfaced with software for dimensional measurements of graphic features, Twin Video Microscopes, IPI & ICPO decipherments, anti-stokes feature finders in security/travel documents,etc.

In recent years, many sophisticated methods and tools such as visible light spectroscopy, non-destructive spectrophotometry and fibre optics, Electrophoresis, HPLC, HPTLC, LASER, Holography, Scanning Electron Microscopy, Kromekote lifting, Phosphorescence Marking, FTIR, ATR-FTIR, DRIFTS, DAC-FTIR, Beta-Radiography, IR Microscopy, erasure reconstruction and dating, hyper-spectral Comparison of inks, side by side comparison by spectral Comparators, chromaticity based reflectance spectra studies of ink layers, Handwriting pressure meter, computer programs / software, neutron activation techniques, X-Ray diffraction techniques etc. for the examination of conventional forensic document related problems have been introduced. The examination of counterfeit/spurious credit cards or access products involves various techniques ranging from manufacturer of plastic (polyvinyl substrate is common) to the technology of embossing and imprinting of logo and other surface features over it. This would require IR Spectrometry, Pyrolysis GC, Thermal analytical technique, NMR technique, Mass Spectrometry and HPTLC during examination of its various constituents.

COMPUTER AS A TOOL IN HANDWRITING EXAMINATION

Computerisation as a complementary or supplementary aid to the conventional method has been tried in forensic science and some success have been achieved in the field of finger prints and other disciplines. Research is seriously being pursued for Computer based forensic examination of the handwriting. An eminent Scientist of Indian Origin Dr Sagur Srihari based at USA, working on Neural Network, Pattern recognition and image analysis /processing at***'centre of excellence for document Analysis and recognition (CEDAR)'*** has come up with a proto-type of the software (**Automatic Handwriting examination system - Cedar Fox)**for examination of Handwriting. The project was financed by US department of Justice and the trial of the software is done at FBI laboratory, Quantico, USA.Recently, we

have come across of a book mentioning the utility of the system, the book says:*" **One of the most convincing studies supporting the scientific nature of the forensic document examination is the work on handwriting identification at the State university of the New York's center of excellence for document Analysis and recognition (CEDAR).Funded by the national institute of Justice, the CEDAR computer software program is able to recognize certain feature of the handwriting and provide possible matches from the handwriting database. Similar to the automated Finger print identification system for latent finger prints identification, Cedar assist document examiners but does not replace them. The cedar program proved that there were unique identifiable features to handwriting that can be objectively demonstrated.The result of these empirical studies was the general acceptance of forensic document examination as a scientific discipline in most courts".*** This is very encouraging and thrilling development but the feedback of US based Document experts is that *'the prototype system is too slow and yet need perfection to reasonable limit of probability of certainty of decisions'.*

FAKE/COUNTERFEIT SECURITY DOCUMENTS AND BANK NOTES

Achievements and failures of past, effective solutions, appropriate technology use and new concepts are vital to meet the future challenges of faking & counterfeiting of various important documents such as-travel documents, identity documents, access products, security documents & bank notes and therefore, amalgamation these ingredients generate valuable synergies for secure, quality, printing and production of such secured documents in the new millennium. Achievements from effective implementation of tried and tested technology, learning from past failures, and new concepts are going to play a vital role in coping up with future challenges of counterfeiting/faking.

Counterfeiting of currency notes or legal tenders is prevalent ever since its inception by the civilized society.The volume of about 250-billions dollars business of counterfeiting globally inflicting governments loss of billion dollars which speaks the magnitude and gravity of the situation.Counterfeiting is an offence never committed by accident or by ignorance, or in the heat of passionnor in the extreme of poverty. Its crime expertly designed by one who possesses technical skill and lays out substantial sums for equipment.People take currency note on "face value" and because of this, many "unacceptable" notes come into public circulation affecting the psyche and confidence of the people about their own currency.

Counterfeit/fake Identity cards for press, students, airline crews, driving licenses, university degree and diplomas, etc.reasonably authentic in appearance, are sold openly in the markets of the n*eighboring countries especially in the close vicinity of tourist spots of South East Asian countries. The business of fakes is so open and brisk that it has taken a shape of cottage industry offering a huge variety of fake identity cards and other documents.* This situation appears alarming and a security risk to the nations, strategic installations and economic assets and trade especially in this region of the world which is hot bed of the terrorist organizations, drug lords and human trafficking. Street of Khao San Road in Bangkok, Thailand, etc. is an excellent example of this. The availability of a wide range of fakes at tourist places in this area include paper and plastic ID cards for press, students, cabin crews of major airlines, Interpol, the US Federal Bureau of Investigation and Drug Enforcement Administration, as well as citizenship and driving licenses.

COUNTERFEITING OF INDIAN BANK NOTES-PAST SCENARIO

In past, late eighties - early nineties, when counterfeiting of Indian currency notes, especially of Rs. 100 and 500 denomination took a dangerous proposition like undeclared and clandestine "economic war" from across the borders, serious attention was paid towards it,

leading to rapid changes in design as well as incorporation of new enhanced security features. The process of planning for further deterrent and cost-intensive changes in design with upgraded anti-counterfeit features is a continuous process adopted by RBI and Government. INTERPOL had recommended changes in the design and pattern of bank notes after every 5-10 years along with publicity in the society regarding anti-counterfeit measures.**Mr. Saddak Graidia, Interpol's Counterfeit expert says:** ***"I think, maybe we should give priority to getting information to the public..."*** Studies over the past years on counterfeit currency have revealed several key features attributed to the counterfeit industry.

- The organized activity of local criminal gangs infected youths, majority of them educated, with the "get rich quick syndrome". These groups print counterfeit notes using easily available digital image acquisition and reproduction technology such as computers, high resolution scanners and printers, color photocopier, digital cameras etc.
- Organized efforts of external agencies to pump in high quality counterfeit currency. High quality and incorporation of some key security features of genuine notes in counterfeit notes in past indicate that these fakes were products of a regular printing press process involving skilled and trained manpower outside the boundaries of country.

The motive of these externally sponsored outfits in printing and pumping counterfeit Indian bank notes were broadly:

- To wage an undeclared *"economic war"* against India and destabilize India's economy
    1. To weaken Indian currency in the international market and hence inflicting economic loss and adversely affecting balance of trade.
    2. To downgrade the credibility of Indian community and currency before the international community.
- To finance anti-social and anti-national groups busy in disturbing social, religious and economic peace thereby directly threatening internal security.
- To fund drug trafficking and smuggling.

Such motives of external outfits can never be taken casually at any period of time. As per CBI, a premier investigating agency of the country, the modus-operandi and media of such agencies for pumping in counterfeit currency (FICN) in to the country are-through terrorists organizations, smugglers and money launderers, couriers and agents / touts.

'When magnitude of this menace took monstrous shape and proportion as well as endangered our economy and socio –economic fabric, a historical, brave & bold step was taken by the Government of India on 8th November 2017 to demonetize the high value denomination bank notes of Rs. 500 and 1000 to break the back bone of the counterfeiters having collateral motives against the Nationon one hand and to curve black money racketeers on the other to achieve the noble target of bringing the 'informal economy'or 'grey economy' into main stream 'formal economy' and to curve the anti-national activities. Today, Series of new currency notes of different denominations with completely modified design, size, colour and tonal gradations and impregnable anti-security features are being issued for circulation in our Country'.

Therefore, as a proactive measure, it is also imperative that public / people should know the details of their instrument of payments, security documents and identity documents at least up to the minimum preventive level. This will make them somehow confident about

the technical know-how and expertise both in prevention and detection and in turn help in the stability of the larger economy by recruiting/involving the citizens in building this internal defense against malicious efforts. The motive should be – ***"Success lies in the details as magnification is basis of verification and verification is the basis of acceptance",*** therefore, share some details and let people know at least up to a detectable and preventive level for defeating the ill motives of the fraudster/counterfeiters.

To achieve this goal, a concentrated effort with the working theme of ***"prevention is better than cure"*** should be implemented. Constitution of a core group is imperative comprising of people from various sectors including forensic documents science, Computer forensics, etc. for planning and continued review of bank note security.Current series of Indian Bank Notes, especially of high denomination have state of the art security printing, but the security features, which are presumed effective today, may be obsolete tomorrow as ***'technology is evolutionary in nature but revolutionary in execution'.***

Technology is inevitable, hence, either go for it or perish. Innovation of effective technology for the security of money, merchant cards, access products, identity documents, travel and other security documents needs investment of huge magnitude. Even the high cost of new technology won't keep cheats away from printing fakes; even then we need to be always ahead of counterfeiters since currency and security documents of a country symbolizes nation's soul, pride and economic might of the country on one hand whereas the access products, identity documents, etc. are personnel & essential property of citizens on the other.

DIGITALLYMANIPULATED– COMPUTER/MACHINE GENERATED DOCUMENTS

'Unwanted Progenies of Modern Technology'

The mind set of deceit and tricks of conventional forgery coupled with the application of digital image acquisition, processing and reproduction technology in the perpetration of crimes has created a paradigm shift in the nature, intricacy and impact in the field of Forensic document Science resulting into various new challenges and dangers. Use of dry transfer lettering, scotch tape and gelatine transfer techniques have been reported in facilitating the transfer or transposition of the genuine signatures to another to create spurious documents. The popularity and easy availability of high quality plain paper copiers and digital technology have added new dimensions to the nature and quality of white collar crimes both in case of their perpetration and detection. With the advancements in digital image acquisition, processing and reproduction technologies, the fabrication of documents has become easier and closer to perfection. This has led to the uncovering of new dimensions and intricacies of white-collar crimes on the one hand and the facing of new challenges of their detection on the other.Extensive examination of such questioned document and its original source document in a forensically sound manner in light of the principle of comparison and individuality revealed that such type of digitally manipulated and machine generated questioned documents are spurious and generated/created with a motive of deceit and hence are**'unwanted progeny'**of Modern technology both in terms of their nature and origin.

COMPUTER/CYBER CRIMES - FRAUDS of 21ST CENTURY

Today, computers have proliferated and penetrated into everywhere- banks, industry, commerce, railways, police, military, scientific research, health and other governmental agencies in a big way. Any damage or intrusion with motive of deceit to any of the computerized or digital infrastructure of an organization or corporate establishment may lead to heavy losses in terms of information, finances and its reputation. *"Any illegal or*

unauthorized activity involving computers can be termed as computer crime, whether it is against an individual or an organization". It can even be against the nation, endangering or threatening to endanger its integrity and security. The Organisation of economic cooperation and development (OECD) has defined Computers crimes as "Computer abuse is considered any illegal, unethical or unauthorized behaviour relating to automatic processing and transmission of data''. The Computer Crimes can generally be classified as **physical** crime, **data related** crimeand **software related** crime.The increasing use of information technology and a very fast growth in digital applications/ programs being introduced in the industry, banking, apps driven mobile enabled applications and commerce have also resulted in its abuse by miscreants. This would shortly become a great threat to our economy as well as national security. Computer related crimes like unauthorized access, interception, alteration of computer data frauds, software piracy, internet crime etc. are some of the critical areas which are required to be detected and proactive techniques have to be developed for preventive actions.

The INTERPOL classifies digital crime as *computer crime; computer related crime and network crime*. The new types of white-collar digital crimes are either "computer-based" or "computer network based". In case of computer crime, the victim is a computer. Such crimes include piracy, data theft, data manipulation and even time thefts by way of computer break-ins. In computer related crime, the computer is a tool to perpetrate the crime, which mainly relates to bank frauds. In case of computer network crime, the computer is witness to the crime. Investigation and forensic analysis of such crimes is an extremely complicated affair, if the crime is committed by unauthorized access to the computer network, since the number of places where the evidence could be searched is unlimited. For example when a cheque is forged, that would be the only disputed instrument or crime exhibit. On the other hand, in computer related white-collar crimes, the evidence could be found in different formats.

In the information age, significant opportunities exist for those who are best at utilizing both, the **technology** and the **information.** Who will do a better job, the criminals or those seeking to detect or investigate the crime? This would be decided by the application of their relative ingenuity in this game of wits. The whole world has become the ***operational canvas*** for the cyber criminals, since they are not constrained by the national boundaries. In absence or feebleness of international cooperation to combat transnational crimes, there are many safe havens for the criminals to take shelter. It has become easy for the criminals to operate globally and go absolutely scot-free, while the law enforcement agencies grapple with the maze of procedural tangles involved in investigation and prosecution. The nature of evidence is such that it can be destroyed easily and to recover and prove the authenticity of the evidence is a difficult task. In the process of searching and seizing the evidence in digital format, considerable care should be taken to avoid contamination of its evidential value, for which the investigators need to be specially trained & integrity of the evidence needs to be proved through hash value. Different types of Cyber Crimes are-Hacking, Denial of service attack, Virus dissemination, Software Piracy, Pornography, IRC Crimes, Credit Card Fraud, NET Extortion, Phishing, Spoofing, Cyber Stalking, Cyber Defamation, Threatening, Salami attacks, etc.

Due to ever increasing power of information technology and computers, we are witnessing an unprecedented spurt in a wide variety of digital crimes, which are perpetrated through ingenious means. Different types of cybercrimes have emerged due to the explosive growth of the Internet, e-commerce, D-commerce and personal computing. Internet crime might be interpreted in a number of ways. One is to limit it to the new forms of crime that can be performed on the Internet. Another is to apply it not only to the new forms of crime, but

also to variants of existing crimes that are adapted into the Internet context. The emerging crime trends in the digital world are-Crime-as-a-Service, Ransomware, Criminal use of data, Payment fraud, Online child sexual abuse, Abuse of the Darknet, Social engineering, Virtual crypto currencies-bit coins, Steganography, etc. The ***Financial Crimes Enforcement Network*** *(FinCEN), a bureau of the US Treasury, defined virtual currency is a type of unregulated,* ***digital money****, which is issued and usually controlled by its developers, and used and accepted among the members of a specific* ***virtual community****. It is said that the virtual money is virtual future of money laundering and other hi-tech crimes.*

Detection of computer crime and there after examination of computer evidence was an emerging filed a few years back but now it has become a necessity and integral part of forensic labs today, for which skills need to be developed and upgraded in our laboratories. Such evidence is required in economic offences, espionage, sabotage, data communication network, terrorism, murder, drugs trafficking, cellular frauds, child pornography, crime against women, etc. to bring the perpetrator to book under the legal provisions of land. In every crime in general and cybercrimes in particular, the identification of the fact that the crime has been perpetrated is not difficult, but the challenge is to connect the crime with the criminal and produce sufficient evidence to convince the judiciary so that the laws are enforced to convict the guilty as the ***'laws are flaws, jurisdictions are fictions and reality is virtuality in cyber world of netizens***'.

COMPUTER/CYBER FORENSICS

It is the process of methodically examining the computer media for digital evidence, its recovery, reconstruction and presentation in the court of law while maintaining and establishing the Integrity and chain of Custody. Though it appears to be similar to software skills of data recovery and its presentation, it is a step complicated in terms of handling as the sensitiveness of integrity of data to be maintained and never it to be handled directly.

Computer Forensics/Cybercrime Forensics is the scientific collection, examination, analysis and presentation of information held on or retrieved from computer storage media in such a way that it can be used as potential legal evidence. The evidence sought might be from a wide range of computer crime or misuse, including violations of intellectual property rights and fraud. To discover data that resides in a computer system, or recover deleted, encrypted or damaged file information, the computer forensic scientist can draw on an array of methods. The information generated during the course of the examination would be of help in the investigation of crime and deposition in the courts of law.The expectations from computer forensics are divergent from the more traditional forensic science branches like forensic physics or forensic toxicology etc. Application of **computer forensics** becomes essential to provide scientific aids to cybercrime investigation, since the new age criminals are committing traditional crimes using non-traditional methods. The investigation of such crime needs the investigator to be equipped with the latest technical tools that are available with the computer security people and fine tune them to their needs.

The Computer/Cyber Forensics utilizes Hardware and Software tools including High-end Forensic Work Stations, Hardware based Forensic Imaging Devices, ample number of Integrated Forensic Analysis Kits, Various-Mail Database Analysis Facility, Vivid Mobile Phone Forensic tools to conduct Logical, File System, Physical Level Analysis, Password bypassing /cracking facility, Decryption of Encrypted data facility, RAM Analysis facility, Server Data Analysis facility, Malware Analysis facilities. Plenty of equipment /tools with generic names are available in the field of cyber forensic such as-X-Ways Forensics, SANS

Investigative Forensics Toolkit – SIFT, Volatility, Windows SCOPE, Oxygen Forensic Suite, XRY, Cellebrite UFED, EnCase/ FTK/Belkasoft Evidence Center, etc.

The field of Computer Forensics is also going under huge changes due to rapid technological innovations and advancements in its related areas therefore, various subsections of cyber forensics are emerging to cope with the emerging trends and changing notions of the cybercrime world –network forensics, mobile forensics, disc and storage media forensics, chip/SIM card forensics, cloud computing, software forensics,etc. to cope with the digital crime related with embedded system, open systems and communication systems.Forensic investigation of digital evidence can be divided into three main areas, which are embedded system, open systems and communication systems. Therefore, due to varied nature, mode and media of perpetration of digital crime, dimension and impact a well-equipped digital or cyber forensic laboratory may look for sub-divisions such as- Physical Media Examination unit, Storage Media Examination unit, Mobile device Forensics,Embedded Forensics unit, Malware Forensics unit, Source code Forensics unit, Crypto Analysis Unit, Information System Auditing Unit, Database Forensics Unit, Cloud Forensic Unit (Cloud Forensics, a new term, is cross-discipline between Cloud Computing and Digital Forensics. Cloud Forensics is actually an application within Digital Forensics which oversees the crime committed over the cloud and investigates on it), IoT (Internet of Things) Forensic Unit with in the lab for smooth and proper scientific examination of exhibits conforming to the SOP's of the laboratory.

CONCLUSION

The scope, limitations and uncertainties of the final product of various modes of trickery, forgery, reproduction and image acquisition technologies, digital manipulations through digital tools, software and digital processes have become professional hazards, thereby affecting the quality and nature of findings of forensic document/cyber experts. It is therefore imperative for forensic experts of the domain, who convert uncertainties into certainty, possibility into confirmation and subjective into objective, to address these new forms of evidence by updating their knowledge and skills as well as to keep abreast of the technology and scientific advancement in the field, otherwise society will be deprived of truth and facts of evidentiary value. Also, the professional acumen, experience and competence of the examiners have a vital role to play in bringing out the truth through innovative skills, continuous thought process and objective interpretation of data related with all those forensic problems (hard &soft) which area direct outgrowth of modern technological advancements and innovations.The serious threats of digitized document and digital document frauds,taking the journey of frauds from ***'cursive to cursor'*** are inevitable and are growing dueto advancement in the field of writing instruments, writing media, digital acquisition, reproduction and core digital technology, hence our forensic readiness and deterrent forensic preparedness is vital and crucial.

ABSTRACTS
ORAL PRESENTATION

BIOLOGICAL SCIENCE

BO-1

The limitation of conventional STRs in resolving paternity when both accused are closely related- A case study

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The conventional autosomal Short Tandem Repeats (STRs) have been successfully used in DNA profiling of trios in parentage disputes. These autosomal STRs have limited efficacy in deficiency parentage (duos) and complex kinship cases, and need additional markers (autosomal, Y, X, or mtDNA) to settle the issue. The fifteen autosomal STRs failed to resolve the paternity issue in a case where the two accused were closely related- father and son. Additional markers are required to examine such type of complex paternity cases while considering the presence of null alleles and mutations in tetranucleotide STRs.

BO-2

An Approach for Forensic Facial Approximation from Partly Pulverized Human Skull: A Case Study

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Forensic facial approximation is an attempt to depict the face of an individual from a skull. It is a powerful tool that can significantly enhance the chances of identification of the deceased when only the skull or some of the skeletal remains are left as evidence. The facial reconstruction or approximation becomes more challenging when the recovered skull is damaged. The damage may be due to trauma, burning or environmental or animal activities. The present study is an attempt for forensic facial approximation from a partly pulverized human skull. In this case, an unidentified and unclaimed charred dead body was recovered from a tempo traveler. The partly pulverized skull was sent to Central Forensic Science Laboratory, Chandigarh for facial approximation for the purpose of identification of the victim. 2-D drawing method of facial approximation was used to visualize the facial information imparted by the skull. The skull was photographed with all the relevant facial soft tissue thickness. A tracing paper was placed over the life size image of the skull and then the facial features were drawn on the tracing paper carefully following the tissue depth markers and contours of the skull. Several forensic scientists criticize forensic facial approximation for identifying skeletal remains, mentioning the lack of scientific reproduction of the final product and the low statistical success rates. However,currently the facial reconstruction/approximation is proving to be a vital breakthrough in cases where there are left no clues except the unidentified skeletal remains.

BO-3

Identification of Assailant in A Gang Rape Case and Comparative Study of Available Y-Str Multiplex Systems

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Y-STRs are a specialized class of STRs located on the Y chromosome and are passed unchanged (barring a mutation) from one generation to the next. With the advancement in the technology in last more than one decade since the availability of Y-STR multiplex systems, the number of markers has been increased along with manifold increase in the sensitivity of STR multiplex systems. We present here a comparative account of available Y-STR multiplex systems by presenting a case study of a gang rape involving five suspects though unrelated but having the close similarity in their Y-STRs DNA profile. A single male Y-STR profile was observed from the source of the victim which finally resulted into inclusion of one suspect. In the present case the results obtained from 16 Y- STRs (Y-Filer), 23 Y STRs (Powerplex Y- 23) and Minimal Y STRs (yhrd.org) are compared and discussed.

BO-4

Technology in Forensic Science: A Tool for the Crime Analysis

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As Technology touches every aspect of our lives, it is no surprise that resolving crimes has become almost innovative in its advances. Throughout history, analytical technologies and the associated methodologies have evolved, and will continue to evolve, to fulfill unmet needs. Infra-red, UV-visible spectroscopy, Raman Scattering, Mass spectrometry, NMR spectroscopy, Chromatography, Electrophoresis, Immunoassay, LASER, DNA finger printing and other technologies and methods are refined and more widely applied to investigate various type of crimes. The technology associated with the human behavioral study i.e. Narco analysis, Brain mapping, Lie detector has also proven its importance in solving the critical cases. The advances and development in forensic technology inspire us to write a review on all the associated technology that is being utilized in forensic applications. The current review reports chronological technological development and its use in crime analysis.
Key Words: Forensic Technology, Analytical Technology, DNA Fingerprinting, Crime Analysis

BO-5

Gang-Rape & murder involving paternally related perpetrators solved by DNA profiling-A Case Study

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The discovery of DNA fingerprinting has greatly transformed the field of forensic investigations. Apart from conviction of criminals, forensic DNA analysis also plays an important role toexonerate the wrongly accused as well as to identify the victims of a crime. The present case involves the gang-rape and murder of a tribal women of Madhya Pradesh region leading to the arrest of six persons, during investigation. Among the suspects, three persons were paternally related while remaining three were unrelated.DNA Y-Chromosome STR studies conducted on the exhibits of the victim pointed towards the involvement of paternally related suspect persons. Further studies on autosomal STRs led to the connection of two of the suspects with the crime. Also the presence of a rare microvariant allele at one of the autosomal STR markers helped in discrimination among the suspects.

Keywords: DNA fingerprinting,Y-chromosome,Autosomal,STR, Microvariant allele.

BO-6

Multifaceted STR Analyses of Father-Daughter Incest, Paternity Probability and Inheritance Pattern of Alleles

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Two father-daughter incest cases have been addressed in this study, a rare report inIndian population.Biparental autosomal STR analysis as well as uniparental X and Y chromosome analysis confirmed the aborted fetus to be the product of incestuous father-daughter relationship in both the cases. The probability of paternity as well as maternity was found to be 99.9999% in both the cases. The power of exclusion of paternity and maternity were calculated in the magnitude of $10^{8}$to 10^{10}. Similarly, the CRMNE was found to be in the range of 10^{-9} to 10^{-11}.Generation of the fetus due to father-daughter incest has a tremendous effect on the genome as the unrelated alleles decrease dramatically in the STR loci tested, between the father/mother [33.33% (*Case 1*), 35% (*Case 2*)], father/child [16.66% (*Case 1*), 20% (*Case 2*)] and mother/child [26.66% (*Case 1*), 21.66% (*Case 2*)]. Presence of 53.33% homozygous alleles in the fetus suggested the high genome sharing due to the father-daughter incest.

Key word: DNA Fingerprinting, Father-daughter incest, STRs, Paternity Index (PI), Power of Exclusion (PE), Combined Random Men Not Excluded (CRMNE).

BO-7

Validation of a Real time PCR based kit for differentiating cow and Buffalo samples

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In India, cow and buffalo are the two livestock species mainly reared as dairy animals. Since, due to religious/ethical reasons cow slaughter is banned in most parts of India, it is important to identify species origin of meat being consumed or exported. Efforts have been made to differentiate cow and buffalo tissue samples as well as milk by using various molecular and chemical techniques. However, these methods are less sensitive, cumbersome and requiring post PCR processing of samples like RFLP. A real time PCR based kit available for the purpose is validated in recommended full and also

in half reaction volume for cow and buffalo differentiation. The kit was tested on 30 samples each along with human, dog, cat and microbial DNA as well to see its specificity. The kit Mylab Lifesolutions VetScreen^{R} tested on Real time PCR (ABI 7500), has the ability to differentiate cow and buffalo samples with 100 % specificity and sensitivity.

BO-8

Performance Comparison Of Two New Generation Autosomal STRMultiplex Systems For Forensic Purpose

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The study presents comparison and internal validation of two new generation STR multiplex systems incorporating the new CODIS loci. These new generation kits offer a number of advantages including reduction in PCR time, an increased number of loci and improved sensitivity over previously available kits. Two kits assessed were the Applied Biosystems Globalfiler® and Promega PowerPlex® Fusion 6C. The results were compared on the basis of lowest amplifiable DNA limit, amplification of mixture and concordance of results. The data obtained was compared and analysed on the basis of total peak height, intra and inter locus peak height balance and overall DNA profile quality index. The study also presents first validation of both the systems with 10µL reaction volume with no increase in stutter proportions or heterozygote imbalance. Both the kits were found to be effective up to 31.25 pg of single source DNA and also with different ratio of male female mixture in 10µL reaction volume.

BO-9

Direct Sample to Genotyping Protocol for Whole Blood Samples Using Non-Direct PCRAmplification Kits for Forensic Applications

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A novel amplification protocol for generating DNA profile directly from whole blood is validated and proposed. The manuscript describes two rapid and direct strategies/protocols, direct amplification conditions, the reproducibility and concordance of DNA profiles generated with the standard procedures. The protocol is validated with more than 200 samples using ABI 3500XL and ABI 3100 genetic analyzers and with the most commonly used new generation six different **non-direct** autosomal and/or Y-STR multiplex kits viz. Global Filler, Powerplex Fusion 6 C, Y Filler Plus, Powerplex 21 and Powerplex Y23 system which are helpful in amplifying 16-27 STR loci. Peak height ratio, interlocus peak variation and quality index of DNA profiles were calculated and were found to be optimal in generated electropherograms. This protocol is both time- and cost-effective in producing quality STRDNA profiles with high performance that are ready for use in forensic DNA fingerprinting as well as other databases , anthropological or medical diagnostic applications.

BO-10

Importance Of DNA In Identification Of Mutilated Dead Bodies In Bomb Blast Of Pulgaon Ammunition Depot

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In forensic case work we frequently encounter cases were burnt bones and tissues are submitted for identification of unknown bodies. Burnt bones and tissues are significantly altered both in physical and chemical properties and which could be a challenge in DNA profiling. DNA is an essential method of identification in high profile cases or when identity is to be proved, beyond doubt in the court of law. In the said case, 19 army personnel died following a blast in ammunition depot at army camp in Pulgaon, Maharashtra. All the bodies were burnt and mutilated and some body parts were found on the scene. Out of the 19 bodies, 5 bodies remained unidentified. Burnt tissue, blood and bone samples were submitted to RFSL Nagpur for DNA profiling, along with reference blood samples of relatives. A total of 7 individual DNA profiles were obtained. 6 of the individual DNA profiles were found to match with the reference samples of their relatives, by using reverse paternity. 1 individual DNA profile remained unidentified, due to lack of reference blood samples of relatives. DNA fingerprinting helped confirm the identity of the blast victims and made it feasible for the authorities to hand over their remains to relatives for cremation, within 48 hours of the receipt of samples. Thus, DNA identification proved to be fast and accurate technique for identification of dead bodies in blast scene.

Keywords: Bomb blast, DNA fingerprinting, burnt bones, cremation

BO-11

The Case of Peafowl and Porcupine Killing: Molecular Perception of A Heinous Wildlife Crime

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We address a recent case where the forest officials found suspected flesh of nearly 10 peafowls and quills, bones with tissue remains of porcupine. Apart from quills, flesh and tissue bone mixture could not be differentiated on the basis of physical parameters. Cytochrome oxidase I gene of the mitochondrial DNA was used for the identification of species. Sequence analysis revealed that the DNA obtained from flesh was of Indian peafowl which is included under Schedule I of The Indian Wildlife Protection Act, 1972 and DNA obtained from bones with tissue was of Indian crested porcupine which is also protected under The Indian Wildlife Protection Act, 1972 amended up to 2002.

Keywords: PCR amplification, cytochrome oxidase I gene, *Pavo cristatus*, *Hystrix indica*, wildlife crime, The Indian Wildlife Protection Act, 1972.

BO-12

DNA Based Identification of Victims of Bus Mishap from Completely Burnt Bones: A Case Study

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The head-on collision of two passenger buses resulted in the loss of eight lives. The mishap took place at Baljori village on Chaibasa-Noamundi State Highway No 75, about eightkms away from Haat Gamharia police station and 35 kms from Chaibasa. On collision the bus catches fire and eight persons died because of complete burning. Out of eight, five dead bodies were beyond recognition and can only be handed over to the claimant relatives if identified and relation with the claimant is established. The completely charred bone pieces of victims and the dried blood samples of claimant relative on gauze were sent to State Forensic Science Laboratory, Jharkhand for DNA profiling and establishing the exact identity and biological relation with the claimant relatives. This analysis permitted the identification and establishment of biological relation of the completely burnt bone pieces of victims with the claimant relatives. This is itself a challenging work to extract DNA and generate DNA profiles from completely charred bones. Autosomal STR, Y-STR and X-STR were conducted to establish the identity. We were able to establish the identities of all the body remains of the victims whose charred bones were provided for identification and establishment of relation with the reference blood samples. The present result indicates the importance and effectiveness of DNA isolation of charred bones and to generate DNA profiles using various DNA typing techniques for establishing the original identification and biological relation of the victims with their claimant relatives in such type of disaster where burnt bones are only available as biological sample.
Key words: Disaster management, Forensic science, DNA profiling, Autosomal STRs, Y-STR, X-STR, Victim identification

BO-13

Next Generation DNA Identification from Biological Samples in Sexual Assault Cases found New Repeats of True Alleles

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Sexual assault sample has multiple challenges including small quantity of male DNA relatively high quantity of female DNA. The study will focus on DNA mixtures involving three or more people. More problems come when sexual assault occurs and there is no ejaculation, means penetration without ejaculation or digital penetration. With the advent of more sensitive typing methodologies, in which DNA analysis from biological samples in sexual assault cases found new repetitions of Trueallele no. The goal of the study is to measure the allelic frequency of new genotyping no. when used with different types of DNA evidence such as four-person mixtures and penile swabs for vaginal epithelial cell in limited periods of time (perhaps 36 hours or less) were generated for all 16 Y-STR and STR loci using Ampf*l*STR Y-filer and Identifiler Plus kit.

Keywords: Forensic Science, Y-STR analysis, DNA, Sexual assault.

BO-14

Criminal Mutilation of Human Body and Their Identification in Tripura

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The mutilation-murders are rare in Tripura a north eastern state of India. Only two cases criminal mutilation/ dismemberment of the human body were registered during 2003- 2015. One at 17. 08. 2003 and another at 02. 09. 2015. Both the deceased were male and age in one case was 25 years and another was 35 years in Tripura. All perpetrators were males. One was deceased co-worker age 23 years and another was deceased younger brother (18 years). In both the case no persons were involved to assist the crime. In first case the perpetrator's occupation was associated with application of anatomical knowledge *e.g* butcher and in second case the perpetrator's has criminal history and in the year 2013 he involved in robbery and murder of a Auto rickshaw driver. In both the cases both the accused has been convicted where forensic evidence played vital role.
Key Words: Mutilation, Homicide, Corpus delicti, Medico-legal, Crime

BO-15

Environmental Forensic Science: Biological and Physico-Chemical Analysis of Waters of Fateh Sagar Pond in Rajasthan : For A Social Cause

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Fateh Sagar, a heritage pond in the walled city of Jodhpur, Rajasthan was one of the drinking water source to the people of Jodhpur in past. It was developed to fulfill the demand of drinking water in the desert city. The pond was fed by rain water collected from surrounding hills through a feeder canal. But as the time passed and alternate source of drinking water made available to the city, the pond was neglected by the administrative authority so that the water became polluted and its quality deteriorated to such an extent that a Suo motto (D.B. Civil Writ petition (PIL) No. 752/2016 Suo Moto Vs State of Rajasthan) was taken up by The Hon'ble High Court, Rajasthan for its cleaning and regaining its heritage value. In this regard, first time in the history of Rajasthan Forensic Science, The Hon'ble High Court in an unprecedented move, ordered Forensic Science Laboratory, Rajasthan to analyse the water quality of pond and to give opinion regarding the presence of sewage contents in the pond water.

In compliance to the Hon'ble High Court orders, team of FSL scientists collected the water samples from five different locations of pond in the month of April, July and August 2016. The water samples were analysed for phyto-planktonic diversity, microbiological study and its physico-chemical parameters.The microbiological (bacteriological) analysis showed the presence of infinite number of Total Coliform and Faecal Coliform bacteria per 100 ml (CFU) by Membrane Filtration Technique which clearly indicated the presence of sewage contents in the water samples of the pond. The values of various physico-chemical parameters were also indicative of the high pollution load of the pond water.

Irrespective of criminality aspect, the present work is focussed on environmental and social needs to help the judiciary and local administration in maintaining and cleaning a water reservoir of historical importance. In this unique type of work, the forensic science which is usually meant for its crime solving contributions is used by the judiciary for a social cause of environmental importance and in turn, Forensic Science proved credibility of scientific analysis and uplifted the faith of judiciary in it.

Keywords: Phyto-planktons, diatoms, Coliforms, physico-chemical parameters, pollution

BO-16

Forensic Identification of some Endangered Snake Species usingMultiplex PCR

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The wildlife in India is being vehemently destroyed due to poaching, illegal trafficking and population pressure, in spite of having Wildlife Protection Act (1972) in place to protect them. It is very important to conserve endangered species and identify them on at least species level for implementation of law. Establishing identity of the animal species is absolute necessity for punishing the offender. Among different endangered animal species, snakes are being illegally trafficked and poached for their high medicinal values. Hence, identification of snake species at molecular level is very important step for booking of criminals. Here we have demonstrated a novel multiplexing technique, using 16S r RNA and C-mos gene for identification of four Indian snake species, namely *Ptyas mucosa, Daboia russellii, Naja naja and Xenochrophis piscator* listed in Appendix-II & III of CITES. The regions targeted within mitochondrial gene were 280 bp for *P. mucosa*, 135 bp for *D. russellii*, 130 bp for *N. naja* and for C-mos gene were 280 bp for *P.mucosa*, 240 bp for *D. russellii*, 260 bp for *X. Piscator*. As these newly constructed primers are showing species specific PCR amplification hence both the markers can help establishing species specific identity. It is considered necessary for Forensic Identification of morphologically altered exhibits from these Indian snake species and promising to be useful for their conservation.

Keywords: Wildlife conservation, CITES, 16S rRNA, C-mos, Multiplex PCR amplification, Forensic Identification.

BO-17

Mutation Or Exclusion : An Uncommon Paternity Case

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A paternitycase was received in this laboratory from Delhi Police for the purpose of paternity establishment based on DNA analysis. The blood samples in EDTA vials of the male child, his mother and the alleged father were deposited. These were subjected to phenol-chloroform DNA extraction. Isolated DNA samples were quantified by RT-PCR and were subjected to PCR amplification using the 15 Autosomal STR markers containing AmpFlSTR Identifiler PCR amplification kit. The DNA profiles generated from the samples of child and the alleged father showed an inconsistency at the locus D18S51 between them. This raised the question whether there was exclusion of the alleged father or the existence of a mutation. The mismatch was reproduced and confirmed using AmpFlSTR Y-filer PCR amplification kit which contains 16 Y-STR

markers. None of the Y-STR markers showed inconsistency between the alleged father and the child. Results were sufficient to conclude that the alleged father was the biological father of the child and the first generation mutation was detected in the child.

BO-18

Need of DNA Database in India

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Among all the forensic tools available to assist criminal investigations, DNA analysis is the only one that has reproduced consistent results. It played major roles not just in criminal cases but also in solving cases like paternity/maternity, wildlife species identification, immigration, organ transplantation, genetic diseases, victim identification in mass disasters and many more. No two individuals share the same DNA apart from monozygotic twins. Since the use of genetic fingerprinting in forensic purposes, there's has been a tremendous amount of research on DNA Profiling and one such initiative is DNA database.DNA database can be categorized into local level DNA Database, State level DNA Database and National DNA Database. DNA database holds great potential in providing invaluable information in various types of cases, especially in mass disasters, a large number of unidentified dead bodies (UIDs) are recovered which are fully charred, decomposed or beyond physical recognition, the UIDs shall be properly stored, which is quite impossible due to logistical constrains. However, a DNA Profiling database can act as a useful alternative to retain genetic information of the deceased victims which can be used in future for the identity of deceased person.India, being the 2nd most populated country in the world with considerable rate of crime, DNA Profile database will provide valuable information to various law enforcement agencies of the country to control different types of criminal activities and strengthen justice delivery system. Though the countries like Argentina, United States of America, Canada, China, United Kingdom, Scotland, Trinidad and Tobago have already developed their own DNA Profile databases, the Human DNA profiling bill in India is yet to be passed in Parliament.

Keywords: DNA database, Human DNA profiling, Victim identification, Mass disasters, DNA profiling bill.

BO-19

Serial Rape Suspect Preying On Minor Victims Linked By Dna Profiling - A Case Study

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DNA technology plays an important role in solving crimes involving serial rapist who forces a series of victims into unwanted sexual activity. One such case of a serial rape suspect is presented here who was involved in three different violent sexual attacks registered under different police stations across Bhopal district of Madhya Pradesh region. At the same time, the suspect had misguided the investigating agencies by changing his name continuously. A sample of the suspect's DNA was compared with the evidence samples from the victims of three cases. The results of comparison, finally linked the suspect to the crime and helped in convicting the serial rape suspect.

Key words: DNA, Y STR, Autosomal.

BO-20

Burn Death After Coitus Or Its Mere An Accident: A Perspective Study

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Forced sexual intercourse is extreme on negative side of a coin while its positive side is most pleasant, innocent, intense experiences provided by nature. Apart from pleasure; coitus is part of healthy living. Definition of "rape" as contained in under section (U/s) 375 IPC refers to "sexual intercourse" and the explanation appended to the section provides that penetration is sufficient to constitute the sexual intercourse necessary to the offence of rape. Intercourse means "sexual connection". In this study, deceased Ms.Phoolwanti alias Anju(Unmarried) got fire due to sudden emanating flames of the stove during food preparation. On the basis of information said above, hospital chowki, Balaghat register a Marg no. 0/15/161, P/s Kotwali, district Balaghat, U/s 174 CrPC and took this case under investigation. She brought to the government district hospital, Balaghat for the treatment. Deceased's exhibits were submitted in FSL for examination and analysisfor the presence of seminal stains and human spermatozoa.On FSL examination of vaginal slide of deceased, it is found positive i.e., human spermatozoa were found.

BO-21

Fruitful Modification at Routine DNA Fingerprinting Methodology: Successful Utilization in Challenging Forensic Paternity Case.

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DNA fingerprinting is the most widely used morden technique to perceive the diverse criminal happenings. The routine technique can also be manipulated to achieve successfulresults in case of trace and degraded samples.Present method describes the step wise modification of the key routine DNA fingerprinting procedure i.e. DNA isolation, multiplex PCR etc. to generate successful DNA profile. The amendment methodology solved the disputed forensic paternity case using only single left sample of deceased mother and her child viscera which was highly degraded as trace evidence. The modification of methodology not only yielded good DNA profile, but also established the identity of the deceased child as the biological offspring of the deceased mother and the alleged father.
Key words: Cell Separation, Multiplex PCR, Forensic paternity.

BO-22

Genetic similarity in central Indian populations based on Autosomal STR marker

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The analysis of 15 autosomal STRs is done on twelve different caste and tribal populations of central India. The autosomal STR profile reported is generated by using ABI Amp*fl*STRidentifiler, ABI Amp*fl*STRidentifilerplus, Promega Powerplex 16HS and Qiagen Investigator plus. The study revealed that the distribution of most common allele is uniform in all the studied populations. Even caste and tribal populations also showed significant similarity in most common allele. Structural differentiation is also lacking among the studied populations which is strongly indicative of genetic similarity among the studied central Indian population.

BO-23

DNA Profile on Product of Conception Received along with Uterus-Difficulty Encountered and Strategy to be Adopted

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Product of conception received for paternity testing along with uterus results in a mixture STR profile with minor and major component. This paper presents difficulties encountered, strategy to be adopted and methods for analyzing DNA mixtures in such type of cases.
Key Words: Product of conception, DNA profile, Uterus, Mixture Analysis, Minor and Major component

BO-24

A Microwave Technique: As a Forensic Tool to Identify Amount of Insulin in Biological Fluids.

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Even though drugs can cure disease and reduce pain, they can also be means of murder. Forensic Scientist can examine blood and tissue to uncover cases where death is not as natural as it may seem – from slow arsenic poisoning to quick cocaine overdose. Besides this, there are many cases associated with insulin overdose poisoning in suicidal and murder cases in all over the world. Insulin poisoning seems perfect weapon to criminals because according to them it cannot be detected after death. Moreover, Instrumental methods are the foundation of modern forensic physics and toxicology

investigation. In this paper we will discuss a new Microwave Technique and diagnostic methods of insulin, which can be applied in forensic science for detection and quantification of insulin as toxin in biological fluids. A short description on the theory and inherent potency and limitations of its methodology is incorporated. Goal of this paper is to promote novelty to develop our technological capabilities and use of new diagnostic techniques in forensic science.

BO-25

Suicide at a Tender Age: An Unusual Case Report

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According to the WHO report about 20 million people attempt suicide every year out of which one million end up in fatal events. Youth (18 and above-below 30 years) and middle aged people (30 and above- below 45 years) are the prime groups taking recourse to the path of suicide. We present an unusual case of suicide by a six year old girl who died as a result of asphyxia consequent upon suicidal hanging. The postmortem examination and investigation revealed that the girl was subjected to aggravated penetrative sexual assault. Subsequently, the accused was examined at our institute. The case was registered under section 376,377,305 of IPC and section 3(a)/4,17,18 of POCSO,2012.Suicide at such a tender age has been rarely mentioned in the forensic literature.

BO-26

Quadruple Drowning: A Rare Occurrence in Dyadic Death

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Dyadic death is not a common entity in medico legal work with significant global and regional variations. Dyadic deaths can be broadly described as homicide-suicide or suicide-suicide which can be with or without a pact. When the victims are children, it is labeled filicide. This is the rare case of QUADRUPLE DROWNING in which the mother is perpetrator, The dead bodies of three female children aged 6,4 and 2 years along with their mother aged 27 years were retrieved from the water reservoir at their home and brought to AIIMS Jodhpur for medico legal autopsies. The cause of death in these cases was opined as ante mortem drowning. During Investigation, It was established that mother had drowned her children in their sleep and committed suicide on that fateful night. On further probing it was revealed that she was depressed and frustrated for the want of male child and was often subjected to currently cruelty by husband and in laws. This case report highlights the dyadic death with quadruple drowning as the method perpetrated which is very rare occurrence and emphasises on identification of various predisposing factors which can save innocent lives.

BO-27

Sensitivity determination of dried blood stain of grouping technique at different time interval on soil surfaces

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The most important biological which crave identification and characterization of crime scene is **blood.** Presence is always link suspect and victim to one another. Examination of blood stain is often immense value in the reconstruction of crime scene. The serological methods are important in the process of investigation of crime. Blood is body fluid which is slightly alkaline and it is specialized connective tissue in humans and other animals that delivers necessary substances such as nutrients and oxygen to the cells and hauling metabolic waste product away from those sane cells, The molecular formula is $C_{2952}H_{4664}N_{812}O_{832}S_8Fe_4$. The hemoglobin component in blood can exist in oxygenated and deoxygenated form. The average density of blood is approximately 1060kg/m^3. The ABO blood group system was discovered in the year 1900 by **Karl Landsteiner. Jansky** is credited with the first classification of blood into four types (A,B,AB and O) in 1907, which remains in use today. The intent of this study is to describe the grouping can be drawn out from the dried blood stain samples and determine the sensitivity using extraction method for ABO (Absorption elution method and Mixed agglutination method) grouping from dried blood stain at different breach of time.

Keywords: Connective tissue, Serological, Oxygenated, Deoxygenated, Absorption Elution method, Mixed Agglutination method.

BO-28

Extraction, Identification and Grouping of blood from different objects

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Blood continues to play an important part in forensic investigations. The location, distribution, and pattern of blood and blood stains help the investigator to reconstruct the scene of crime. Establishing individuality is an imperative aspect in any investigating procedure. The use of blood for identification of an individual is a relatively recent development. Blood is forensically found in cases of murder, sexual assault, homicide etc. As we identify the blood then by performing grouping of blood sample we conclude that the blood related to a particular individual. In this study blood is extracted from the different surfaces with the help of different solvent systems like 3% aqueous solution of Sodium Carbonate, 5% aqueous solution of ammonia and 5% alcoholic solution of acetic acid respectively. The assay of blood is done by the methods benzidine test, teichman's test and mixed agglutination method. In this work we can identify the blood extracted from the different surfaces like, concrete and leather.

Keywords: . Benzidine test, Teichman's test, Mixed Agglutination method.

BO-29

Efficacy of Blood Stain Detection Tests After Repetitive Washing on Different Floor Surfaces

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Blood stains are one of the most commonly uncounted evidence in forensic science. Blood is generally found in the case of sexual assault homicidal etc. this body fluid helps to individualize the identity of the person and plays a vital role in solving a critical case of crime. It creates a key link between criminal identity and the case over the years criminals have tried many ingenious way to hide, clean up and remove blood evidence. Washing is one of the common way which is used by criminal to hide, clean up and remove blood evidence. Thus it is today's need to carry study on detection of blood from different surface after repetitive washing by criminals. Detection of blood stains is quite easy at a crime scene, especially when there was no attempt to wash it out. When the scene has been washed several times, there are still ways for forensic investigators to detect washed away blood, by using different physicochemical tests. This work focus on study of efficacy of blood detection tests after repetitive washing on different floor surface.
Keyword - Body fluid, physiochemical test blood detection.

BO-30

Differentiation of grass leaves using ATR FT-IR spectroscopy

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Botanical evidence often encountered at the crime scene, helps in defining the primary as well as secondary crime scenes. One of the most important botanical evidence are grasses. Due to the limited quantity and intricate nature of samples, there is a need of fast, sensitive and reliable technique for fruitful analysis of grass samples. In the present study, an attempt has been made to study the feasibility of ATR FT-IR spectroscopy in differentiating the selected grass species from Punjab region. ATR FT-IR spectroscopy is a non- destructive, rapid and reliable technique.
Keywords: Differentiation, Botanical evidence, grass, ATR FT-IR spectroscopy

BO-31

"Comet Assay" A New Molecular Method for the Age Estimation of Bloodstains

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The age estimation of bloodstains provides invaluable evidence for the chronological assessment of criminal events and their reconstruction. In bloodstains, biochemical reactions are ongoing process, even occur in the dried state. As in dried stain degradation to macromolecules such as DNA, RNA and protein occur prolonged with time. Therefore, in this study, an attempt was made to measure the kinetics of DNA degradation using new molecular method known as Comet assay. Our results revealed a significant induction of DNA degradation in aged bloodstains, which proof that DNA degradation could be used as a 'molecular clock' for age estimation of bloodstains.

BO-32

A preliminary study of sexual, bimanual, and topological variations in the Palm Print Ridge density.

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Palm print like fingerprints are often encountered on the scene of crime and are sometimes useful in establishing identity. It can even be valuable in identification during medico legal investigations in cases of mass disasters/mass homicides, etc. wherein body parts are severed/chopped off.The aim of this work was to evaluate the palm print ridge density in the random samples taken from a Muslim population of Maharashtra for the existence of any sexual, bimanual, and topological variations. The study was conducted on 100 subjects (50 males and 50 females) chosen randomly in the age group of 18-50 years. The variation in ridge density in different areas of the palm prints among men and women were studied. The five prominent areas analysed on the palm prints included central prominent part of the thenar eminence (TH), hypothenar region (HT) Middle portion of index finger and middle finger (T1), Middle portion of Middle finger and Ring finger (T2) and middle portion of ring finger and little finger (T3). In Females, the mean ridge density in all the areas of right and left were found to be 13.06 and 13.11 respectively. While in Males, the mean ridge density in all the areas of right and left hand were found to be 11.32 and 11.57 respectively. The results demonstrate the subsistence of topological differences in ridge thickness on the epidermal palm surface. The sample studied revealed that females present a significantly higher ridge density than men and, as such, have narrower ridges over the entire palmer surface. These findings could be applied in the field of forensic science in order to improve sex identification using palm prints.

Keywords: Sexual Differences Palmprint; Ridge Density; Male; Female; Epidermal ridges.

BO-33

Role of Dental DNA Fingerprinting in Identification of Severely Decomposed Human Remains: A Case Study

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The present study focuses on the importance of dental DNA evidence in identification of fully decomposed body and establishing the link between crime scene and victim. In Delhi, a missing person report was filed who was last seen in a car with two men. Meanwhile, the police of another state found an unidentified decomposed body in a well, which was found to be of missing man. Molars and premolars were preserved for DNA analysis. During investigation, the suspected car was also found. Delhi Forensic Science Laboratory (FSL) team collected all possible evidence for DNA analysis, that could link the car to the homicide.After DNA examination identity of the deceased and crime scene was established.

Key Words: Dental DNA fingerprinting, Forensic science, personal identification

BO-34

Sex Discrimination From Ct Scan Images (Craniofacial Parameters) In Gujarati Sub-Adult Population

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Sex estimation of the skeletal remains is of the utmost importance as it reduces the number of suspected victims directly into the half. The ability of different bones of sex discrimination varies. There has to be a database of the recent population for the purpose of creating standard formulae for sex discrimination, which is made possible by the use of radio imaging techniques like CT scan. The present study includes the use of CT scan images data for sex discrimination in sub adult population (n – 47, 10-18 years), of Gujarati origin. The statistical analysis shows that, out of 25 craniofacial parameters, only 7 parameters are dimorphic in nature when applied on subadults.

Keywords : Sex discrimination, CT scan, Sub adult population, Gujarati origin.

BO-35

Does secular changes really affect the sexing accuracy? A study on North Indian population using chord measurements

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Sex determination from fragmentary crania is a critical problem which is further enhanced by changing pattern of sexual dimorphism due to temporal/secular changes. The anthropometric studies on chord measurements are very few. So the present study aims to track temporal changes in seven chord measurements of 483 adult (20–65 years) crania from two temporally distinct North Indian populations. Analysis of data demonstrated significant sexual and population variations over time. Best single variable in both populations was glabella-bregma chord providing a sexing accuracy of 78.5% and 74.5% respectively. Causes of such temporal variations were also discussed.

Key Words: Sex classification, Fragmentary crania, Chord measurements, temporal changes

BO-36

Molecular characterization of Musk deer (*Moschus* spp) in India using mitochondrial genes: Wildlife forensic perspective for better law enforcement

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Musk deer are very timid, shy, solitary and hornless Ruminants belonging to infra order Pecora and classified under family *Moschidae*. Musk deer possesses some of the primitive characteristics of deer and is of high conservation priority. Musk deer are susceptible to poaching pressure mainly because of its priced possession "Musk Pod". Representation of musk deer status using molecular genetics is poorly documented in India and it is not confirmed as to how many species of musk deer are present. In the current study, we characterize for the first time, the genetic diversity of musk deer from Uttarakhand using mitochondrial genes viz. Cytochrome Oxidase sub-unit (COI) gene and compared with the data available for other four species across Asia. Results revealed the presence of six haplotypes in the Uttarakhand population amongst total 17 sequences. Of these, 12 sequences were found to share the single haplotype. The intra-species sequences divergence was from 0.003-0.017, whereas divergence with other species of musk deer was 0.071-0.081. Based on the Bayesian phylogenetic tree, samples from Uttarakhand formed a separate clade with respect to other species of musk deer whereas three species distributed in the China clustered in the same clade and showed low sequences divergence i.e. 0.002-0.061. Because of different ecomorph reported in the literature, we suggest using the mitochondrial genes especially barcoding based approach of COI gene for inter and intra-species distinction and delineating species boundaries across the range so as to plan effective conservation strategies. Besides, systematic classification of the species, DNA barcoding data would also enable to deal with the wildlife offence cases for disposal of the legal report in court. Though, musk deer has been placed in Schedule I of the Wildlife (Protection) Act, 1972 of India that accords highest protection status to the species, adequate vigilance and effective conservation measures both inside and outside protected areas is required to arrest the dwindling of musk deer populations in Himalaya.

Keywords: Genetic diversity, Indian musk deer, phylogenetics, sequence divergence, Wildlife forensics

BO-37

Fragmented Frustules of Diatoms Recovered From Biological Samples Act as Trace Evidences, To Ascertain Antemortem Death in Cases of Drowning

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During examination of biological samples for diatom test, many times fragmented/broken frustules were observed under microscope, which are deprived as not as a positive conclusion may be due to found difficulty for identification. As per, present study, it is proven that during the acid digetsion process of biological sample treatment for diatom examination, the frustules may break due to agitation or acid attack at the girdle bands. Diatom genera such as *Nitzschia, Synedra, Cymbella, Melosira* and *Cyclotella* were the most commonly distributed diatom genera of fresh water bodies and same may found in broken or fragmented form in biological samples. This research mainly highlights the role of identification of such fragmented pieces of diatom frustules from victim's visceral material and putative drowning medium act as corroboratory or conclusive evidence in antemortem drowning. Other role for identification of suspect's presence at site in case of postmortem drowning may be possible by performing diatom test on his/her clothes.

Keywords: Drowning, Forensic,Diatom Frustules and Fragmented

BO-38

Age Prediction for Forensic Investigation: A Multidisciplinary Approach

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Age prediction is a routine procedure that is commonly probed to establish the identity of an individual having profound legal implications across the globe. The current techniques rely solely on anthropological features which can be integrated with other molecular & biochemical techniques like DNA methylation rates, chromosome specific telomere attrition, quantification of T-cell specific DNA rearrangements, mRNA markers, hormones, protein profiles, SNP, mtDNA, DNA and RNA mutations that may provide greater accuracy to predict age in living or dead individuals. This paper provides an in-depth insight into the recent research trends towards analysis of biological evidences to create workable statistical models in age prediction for forensic purpose.

Keywords: Epigenetics, Age prediction, DNA methylation, Biomarkers, Aging

BO-39

Odontometrics in Permanent Dentition in Population of North India

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The slight differences in tooth dimensions within the population can be of great utility to both the anthropologist and forensic odontologists. These differences reflect the process of evolutionary changes in anthropological studies where as for the forensic odontologists help in attributing the sex to unidentified human remains. The sexual dimorphism in human canines is well documented. However, this study was conducted to measure the dimensions of the maxillary and mandibular first permanent molars to find out their dimorphic nature. There is lack of normative data on the tooth

dimensions especially the maxillary and mandibular first permanent molars of the North Indian population. In the present study, the mesiodistal and buccolingual dimensions of molars from 100 individuals were taken with vernier callipers with resolution of 0.02 mm. and subject to statistical analysis. The mean values and standard deviation of all recorded dimensions were larger in males than in females. This research shows that there is a statistically significant sexual dimorphism in the mesio-distal and the bucco-lingual crown dimensions of maxillary and mandibular first molar teeth in a permanent dentition.

Keywords – Odontometrics, dimorphism, permanent molars.

CHEMICAL SCIENCE

CO-01

Determination of Diazepam in Hair and Nail using Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS)

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Diazepam, (7-Chloro-1,3-dihydro-1-methyl-5-phenyl-3H-1,4-benzodiazepin-2-one), a benzodiazepine and a scheduled drug is one of the highly abused drugs in recent times and encountered most often in forensic cases. A sensitive analytical methodology using Liquid Chromatography tandem Mass Spectrometry (LC-MS/MS) was developed for the determination of diazepam in human hair and nail samples.The method involves the decontamination of hair and nail using 2ml each of 0.1% SDS (sodium dodecyl sulphate), water and methanol, dried followed by incubation in phosphate buffer (pH=8), extraction with diethyl ether : chloroform (70:30, v/v), separation and detection using liquid chromatography- tandem mass spectrometry which was carried out in the multiple reaction monitoring (MRM) mode. The molecular ion (parent ion) of Diazepam, 285 which is the $[M+H]^+$ ion is fragmented to form two major daughter ions: 193 and 154 which are monitored simultaneously in which 193 is taken as the quantifier ion. The method was totally validated with the limit of detection (LOD) of diazepam estimated as 0.50pg/mg and the limit of quantification (LOQ) as 1.5 pg/mg of hair and nail. Linearity was observed in the range: 1.5 pg/mg to 5000 pg/mg with $r^2 > 0.9990$. The extraction recoveries, intraday and interday precisions, accuracy and matrix effect were also studied for the developed method. The validated method was successfully applied to the real samples of hair and nail of reported drug users and the amount of diazepam detected in the respective samples were found to be in the range of 0.0637- 0.9384 ng/mg in hair and 0.0530 – 3.4680 ng/mg in nail. With a forensic perspective, the analytical methodology developed will be helpful for the forensic toxicologists as well as the various law enforcing agencies to a great extend in supporting the criminal justice system by adopting the same in the routine case work related to the same analyte. Hair and nail which are unusual biological specimens for analysis are proved to be useful tools to identify the suspected drugs of abuse which may aid the investigating agencies in solving the cases.

CO-02

Post Analysis of an Exploded IED

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The different Improvised Explosive Devices (IEDs) are designed with daily used tools like brief case, tiffin box, pressure cooker, scooter, cycle, bag, toy & vehicle to conceal the device to avoid suspicion when kept in the crowded public place. In addition to IED, use of grenade and fire-arms are also reported in many subversive activities to effect more causalities and sensitise the incident. But use of IED is very common since such device is easily prepared, planted within short notice and convenient to disguise inside commonly available tools. In one case, a milk-can was designed to work as an IED with the help of explosive substance, booster, power source and concealed inside a bag. The IED was tagged with programmed timer device and kept very close to shopping complex inside town area. It exploded in the late evening without any casualty. However, post blast materials collected from the blast site could help to identify the substance by chemical & FTIR (Fourier Transform Infrared) studies and reconstruct possible mechanism of power source to trigger the explosion. All the details have been discussed in this paper.
Key words: Milk-can IED, charge, power source, blast, low intensity, FTIR

CO-03

Barriers in the Identification and Characterization of New Psychotropic Substances (NPS) among Forensic and other Laboratories

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The challenge of New Psychoactive Substances (NPS) have become a global phenomenon and all regions of the world have been affected by it. NPS are not under international control.During a survey made by Central Revenues Control Laboratory, New Delhi during 2012, for the assessment of Capacity of existing Forensic Science, Revenue & Government Opinion and Alkaloid Works Laboratories for analysis of Narcotic Drugs & Psychotropic Substances (NDPS), it was observed that most of the laboratories did not have capacity to characterise NDPS as per the NDPS Act 1985. Whereas Government of India is in the process of inclusion of NPS in the existing list of NDPS, majority of laboratories shall face a technical barrier for the want of necessary instruments, methods, reference standards etc. so as to follow uniform methodology of analysis.

CO-04

Detection and Characterization of Phorateand Its Metabolites in Visceral Matrices by Mass Spectrometry

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Phorate is an Organophosphate insecticide and acaricide. Phorate is prone to undergo degradation in biological and environmental matrices. Consequently, screening and characterization of the phorate and its degradation products in visceral matrices is an important task in the area of forensic toxicology and will be an invaluable support to both during investigation and in conviction of criminal cases in courts of law. In a case study, Phorate and its metabolites Phoratesulfoxide, Phoratesulfone and Diethyl Dithiophosphoric acid were detected in the visceral matrices by Gas Chromatography-Mass Spectrometry. Here we report successful detection and characterization of the Phorate and it's metabolites under Electron Ionization (EI) mass spectrometry. The EI mass spectra of the target compounds showed an abundant molecular ion [$M^{+\bullet}$] in addition to the other diagnostic product ions that enable unambiguous identification of phorate and its metabolites. General fragmentation pattern of these compounds are discussed in detail. The Mclafferty rearrangement was also observed in target compounds.

CO-05

Comparative Study of Thinner and DecolourisedPDS Kerosine

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Public distribution system (PDS) kerosine is easily decolourised by treating with commonly available 'MultaniMitti' or fine powder of Calcium and Magnesium silicates. Then this decolourised PDS Kerosineand becomes apparently similar to thinner. Both PDS Kerosine and thinner are C11 - C18 hydrocarbons and are blends of paraffins, Naphthenes and aromatics. So it is very difficult to differentiate between them. Gas-Chromatographic analysis alone fails to distinguish between the two. However, methodology adopted in this laboratory exploiting inherent physical properties of PDS kerosine like higher aromacity, presence of Dialkyl amino anthroquinone(dye in PDS kerosine) it can be distinguished from Thinner. The methodology proposed is rapid, accurate and reliable.

Key words: PDS Kerosine, Thinner, Gas chromatography, calcium and magnesium

CO-06

Single-Drop Microextraction (SDME) Attenuated Total Reflectance-Fourier Transform Infrared (ATR-FTIR) Spectroscopic Determination Of Borate $(BO_3)^{3-}$ in Biological and Environmental Samples

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In this work, ion-pair single-drop microextraction (SDME) combined with attenuated total reflectance (ATR)-FTIR spectroscopy has been developed for the determination of borate in biological and environmental samples. Borate was extracted in a single drop of methyl isobutyl ketone as an ion pair with the cationic surfactant cetyltrimethylammonuim bromide under optimized conditions. The strongest IR peak at 1191.81 cm^{-1} was selected for the quantification of borate. Eight calibration curves for different concentration ranges of borate were prepared, and excellent linearity was observed for absorbance and peak area in the range of 2–100 ng/mL borate, with r values of 0.978 and 0.977, respectively. The RSDs (n = 8) for the borate concentration ranges of 2–100, 2–10 and 10–50 and 50-100 ng/mL were in the range of 1.9–2.7% for the above calibration curves. The LOD and

LOQ in the present work were 0.2 and 1 ng/mL, respectively. The extracted microdrop was analyzed directly by ATR-FTIR spectroscopy. The parameters affecting SDME, were optimized, and the role of foreign species was also investigated. F- and t-tests were performed to check the analytical QA of the method. A noteworthy feature of the reported method is the noninterference of any of the associated ions. The results were compared with those of the ion chromatography method, and a high degree of acceptability was found. The method was successfully applied for the determination of borate in bioenvironmental samples.

CO-07

A Forensic Case study of Fake toddy

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The toddy is known as palm wine is an alcoholic beverage created from sap of various species of palm trees such as Palmyra, date palms and coconut palms. Palm sap being fermenting immediately after collection, due to natural yeasts in the air. The fermentation yields toddy of up to 4% alcohol content. However in Maharashtra Degloortaluka in Nanded district is near to Telangana and most of the toddy illegally transports to Maharashtra.Now days the toddy is seized by state excise and police was found fake toddy after forensic examination. Earlier only chloral hydrate was found in synthetic toddy samples, after chemical analysis and instrumental analysis like GC-MS, Micro XRF, UV…etc, it was revealed that along with chloral hydrate, Titanium dioxide, Sulphur, Citric acid, Calcium chloride, Sugar and Constituents of sapidusmukorossi (Reetha) wear added.The chloral hydrate is a sedative drug. Hence to get hypnotic effect it was used, but plasma concentration of trichloro ethanol are likely to produce toxic effect. Oxide of titanium was used to get white colour to the liquor. Sugar was used to get sweetness. Citric acid was used for taste. Sapidusmukorossi (Reetha) were used to get soap. Reetha is generally used for an external application, oral usage is contra indicated during pregnancy as it is capable of inducing abortion. Oral intake of sulphur produces toxic effect. Hence Considering above facts it was concluded that consumption of fake toddy is hazardous to human health.

CO-08

DLLME Extraction of Amino Acids from Blood Samples, Litchi Fruit and Its Profiling With Special References to Essential and Non-Essential Amino Acid by High Performance Thin Layer Chromatography

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Amino acids are the organic compounds containing amine and carboxyl functional group along with a side chain (-R group) specific to each amino acids. .About five hundred amino acids are known, though only 20 appear in genetic code. There are 21 amino acids(proteinogenic) found which combine into peptide chain to form building blocks of vast array of proteins.20 of the proteinogenic amino

acids are encoded directly by triplet codons in the genetic code also known as standard amino acids. Out of 20 amino acids 11 are essential amino acids which are required to be provided through diet, and 9 are non-essential amino acids which are synthesized inside the body of an individual. Amino acids also serve as an energy source, especially in times of starvation. These compounds are essential for the biosynthesis of numerous endogenous nitrogenous compounds. The determination of amino acids from biological samples is very important because it highlights some anomalies correlated to various metabolic illnesses also (Journal of Liquid Chromatography LC).

A huge mass outbreak reported in several parts of Bihar, West Bengal and Orissa in rural areas of infant and child dies after consumption of litchi fruit in an empty stomach. Litchi is a fruit widely seen in spring to summer season and the pulp of the ripe fruit contain amino acids (Hypoglycin&α-(methylenecyclopropyl)glycine) which are responsible for initiating the lethal sequence of death.(Reported in Lancet Journal).

Various methods have been reported and several attempt have been made to identify the change in the metabolism of amino acids in the blood samples of poisoning cases. The profiling of amino acids in poisoned blood samples in comparison to the normal control blood samples were no poison found is studied. Because it is found that when poison enters a body of an individual, it denatures the proteins and by alters and halts the metabolism of many amino acids which are needs to be functionally active to form target protein and gene.

DLLME is a modified simple fast inexpensive solvent micro extraction technique with higher extraction efficiency it consume a low volume of organic solvent is used for extracting amino acids .HPTLC(camag) instrument is used for separation and Quantitative measurements.The mobile phase is optimized for better separation with 1 butanol: acetic acid: Water is used for the separation of amino acids.

The procedure can be employed for the routine analysis of amino acids in pharmaceutical formulations and in bulk drug preparations as well as for the quality assurance of related market samples. The present study discusses the amino acid extraction and separation from biological matrices and a new novel method was developed by using HPTLC with micro extraction techniques.

Key words: HPTLC,DLLME.

CO-09

Development and Validation of a GC-HS-FID Method for Separation and Quantification of 7 VOCs of Forensic Significance in Whole Blood

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Origin of blood alcohol in subjects with elevated levels at the time of death with no confirmed history consumption of alcohol, is a constant source of research and discussion. In such cases it is important to know for sure that the source of alcohol is antemortem consumption rather than a post-mortem artefact. One way of determining the origin of ethanol in dispute cases is to analyse biological samples and the alcohols identified in the same case. The paper covers a method using Gas Chromatography-Headspace sampler with Flame Ionisation Detector, capillary column (DB-624) and carrier gas Nitrogen, validated to analyse Ethanol, Methanol, Acetone, Acetaldehyde, N-propanol, I-propanol, and N-butanol in post-mortem Femoral blood; with Acetonitrile as an Internal Standard. The proposed methodology serves to be competent enough to analyse the compounds, quantitatively and qualitatively in research and clinical samples. Linearity was achieved across a concentration of

3.95mg to 316 mg/100 ml with a correlation coefficient of within the range of 0.988- 0.999 for all matrixes. LOQ and LOD were within the range of 0.5- 5mg%. Reproducibility of samples and standards resulted in precision and accuracy of more than 90%. The developed and validated method can be used for research and clinical cases.

Keywords: Postmortem, Alcohols; Gas Chromatography; Validation; Femoral Blood etc.

CO-10

Detection of 4-methoxy Benzylphenethylamine in LSD cases. "A case study."

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LSD (Lysergic Acid Diethyl amide) is one of the most potent hallucinogen. A very small fraction of the dose range between 30 and 150 µg of LSD per dose, although stronger doses of 150 to 400 µg of LSD per dose may produce profound hallucinogenic effect. Presently many cases are received from various Law enforcement agencies for the analysis of LSD. It is manufactured from lysergic acid, which is found in the ergot fungus that grows on rye and other grains. The analysis is mainly done by UV-Vis Spectrophotometry and in GC-MS methods. The disadvantage of GC-MS in these cases is that it is not possible to detect LSD without derivatisation as it is nonvolatile in nature. Recently in our case study, identification of totally a new drug named as 4-methoxy Benzylphenethylamine, mostly on the paper stripes similar to LSD strips was detected but in this case 4-methoxy Benzylphenethylamine is identified by UV-vis Spectrophotometry and GC-MS.This is a new trend followed by the drug peddlers/smugglers to deceive the law enforcement agencies. LSD is covered under NDPS Act but 4-methoxy Benzylphenethylamine which is not covered in NDPS Act. At the same time both the LSD and 4-methoxy Benzylphenethylamine are giving similar effect (Kick).

Keywords - LSD, Hallucinogen, GC-MS, NDPS.

CO-11

Identification and Analysis of Turpentine Oil in Arson Case by GC-MS Method

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Dowry system is one of the major social problems in India. It is mainly co-related to various types of serious crime such as Homicide or even suicide. Since the Ladies are normally engaged in cooking in India, the proximity of kerosene and LPG are made use by the perpetrator to commit crime, which looks like normal accidental burning. Various flammable liquids like petrol, diesel, kerosene and inflammable liquid like paint thinner (Turpentine) etc., are used in such types of criminal offences. Here we have considered Turpentine oil as a sample which involved in an Arson case. Turpentine ($C_{10}H_{16}$) has major constituent's viz- alpha-pinene and beta- pinene while minor constituents are Camphene, 3-Carene, Limonene etc. Turpentine oil is mainly obtained by Pines trees resins which have a peculiar smell and carcinogenic property. Turpentine is examined by using various scientific methods such as colour test and by chromatographic techniques i.e., Gas chromatography/mass spectrometry (GC/MS) has been widely used by forensic chemists in arson analysis. The authors present a comparatively rare case of study in arson in which turpentine oil is used. This report

highlights the immediate need to address such types of inflammable liquid in the relatively lesser educated societies of developing countries like India to prevent the loss of innocent lives.
Keywords- Dowry system, flammable liquids, Arson cases, Turpentine oil and GC-MS.

CO-12

Peroxides: Recent Explosives of Choice of Criminals and their Challenge in Forensic Analysis

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In recent years, peroxides have been most elusive used explosives in many deadly terrorist acts all around the world. Some acts of terrorism in recent years are carried out using some illegally obtained high explosives, the strict control over these substances have led terrorists to develop an ever growing methodology of improvised explosives. Most of the conventional high explosives contain nitro groups, but some improvised explosives contain no nitrogen at all; rather they are based on organic peroxides. Most common of these peroxide based explosive compounds are Triacetonetriperoxide (TATP), Tricyclic acetone peroxide(TCAP), diacetonediperoxide (DADP) and Hexamethylinetriperoxidediamine (HMTD). The tremendous devastating force of these peroxides, together with the relative ease of making them, as well as the difficulty in detecting them, made them as explosives of choice for terrorists.

Over the years, many methods and techniques for detecting these peroxide based explosives are being carried out because identifying the improvised explosives that do not contain nitrate and nitro elements is still a very difficult task because the analytical methods that are used to detect other explosives aren't much applicable for these organic peroxides. The analysis of peroxide based explosives is a challenge to forensic scientists as they seldom leave any residue. In the present paper, protocol for the forensic analysis of some of the peroxides in post blast explosives cases has been described elaborately. A scheme for the post blast recovery, purification and identification of various peroxide based explosives are described in significance of forensic investigation and will be useful for forensic science laboratories as these procedures are not mentioned in the current SOPs.

Keywords: Explosives, Organic peroxides, TATP, TCAP, DADP, HMTD, Forensic analysis.

CO-13

Identification of Principal Impurities Present in Amphetamine and Methamphetamine Tablets Manufactured in Clandestine Laboratories from the Seizures in North Eastern Part of India

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North eastern part of India has the notorious distinction of very high seizures of ATS and MTS type of drugs. Analysis of these drugs especially Amphetamine and Methamphetamine indicates that most of the seizures these types of tablets are of clandestine origin. Impurity profiling of these drugs reveals that most of the impurities are being synthetic impurities, intermediate impurities and some

characteristic adulterant type of impurities. This laboratory has been trying to interrelate source of ATS and MTS drugs from the impurity profiling by elaborate study of the synthetic path adopted in the clandestine laboratories. The study carried out using Gas chromatography, Gas chromatography with mass spectrometry among other analytical techniques.

Keywords: Amphetamine, Methamphetamine, synthetic impurities, clandestine laboratory, Gas chromatography, Gas chromatography with mass spectrometry

CO-14

Simultaneous determination ofImipramine and Caffeine in post-mortem samples by High Performance Thin Layer Chromatography and Gas-Chromatography Mass Spectrometry

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A novel method was developed for the simultaneous determination of Imipramine and Caffeine by High Performance Thin Layer Chromatography (HPTLC) and Gas-Chromatography Mass Spectrometry (GC-MS) in post mortem biological matrices. The two drugs were separated using HPTLC silica gel 60 F_{254} silica plates as stationary phase and two mobile phases, Chloroform:Methanol (9:1) &Ethylacetate:Methanol:Ammonia (8.5:1:0.5). The semi-quantitative analysis lead to linear regression curves with correlation coefficient over 0.998 & standard deviation variance (sdv) of 3.25% for Imipramine. The quantification value obtained was 5.2 µg/mL in post-mortem blood. The detection of both the drugs was authenticated by their characteristic mass ions.

Keywords: Imipramine, Caffeine, HPTLC, GC-MS.

CO-15

Forensic Analysis of Electronic Components/ Switch Circuits of IEDs

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The IED has increasingly become the weapon of choice for terrorists, insurgents and criminal organizations as IEDs are low cost, easy to construct, can be emplaced anywhere, and can be readily adapted to fit a wide variety of circumstances and targets. The proliferation of the Internet and exploitation of readily available off–the–shelf technologies, insurgents, terrorists, and criminals have the capability to develop and employ improvised weapon system with a relatively small investment. IEDs vary widely in shape, size and form: however, they usually share three common components: power sources, initiating/switch circuit system and detonator. A switch is a device for making, breaking, or changing an electrical or nonelectrical connection. Instruments and terrorists specifically employ switches to fire or arm an IED.

In this communication, components, circuits of various types of IEDs are described and a case study is also discussed, in which, the Law enforcement agency seized electronic circuits, electronic components resistors, capacitors, transistors, I.C.s, relay switches, digital wrist watches, powder, tools, literature related to electronic components from the suspects alleged related to the banned terrorists organisation. These seized items are forwarded to FSL for forensic examination. Forensic examination concludes that highly efficient electronic components, digital watches, electronic switch

circuits can be used as trigger of IED with suitable connection to the detonator. Seized literatures also contained the information about electronic switch circuits and basic of electronic components. FSL report elaborate the detailed description and utilisation of seized items which proved as an important clue about the conspiracy against the State.

CO-16

Levamisole: A Terrifying Cocaine Adulterant

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Levamisole showed anthelminthic and immunomudolary properties that was previously used in both animals and humans to treat various inflammatory conditions. But it has been identified as a cocaine adulterant in United State since 2003. Now it has increasing been discovered the presence in street cocaine samples seized in India. Recently it has been observed in many street cocaine samples seized by Delhi police Department. In chemical and analytical examination; TLC, FTIR, GC, GC/MS and HPTLC were used to find out the contents of Levamisole with other adulterants like caffeine and phenacetin in illicit cocaine sample. Levamisole is used to adulterate other illict substances like heroin. Aminorex is a potent toxic metabolite of levamisole, exerts amphetamine like actions. So present study highlighted the analytical instruments used in apparent appearance of these contaminants in the cocaine supply in India.

CO-17

Detection and Quantification of Mercury (II) Using Fluorescent Gold Atomic Clusters – A Forensic Perspective

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Several crime cases have been registered by the Kerala Police from the rural areas where Mercury (Hg) had been used to blight plants or vegetation. Forensic Science means the application of Science to criminal investigation, with a decisive role in the resolution of crimes and the promotion of human rights. Thus, the objective of this study is to detect and quantify Hg (II) in the samples collected and forwarded by the Police. For that we synthesized Photoluminescent gold atomic clusterspotentiodynamically and potentiostatically using pre-cleaned polycrystalline gold electrode in 50 mM cationic surfactant CTAB. The clusters formed by potentiodynamic method showed good photophysical properties and was further studied. The formed gold clusters were collected in 4 mL of different concentrations of CTAB viz 50, 25, 10 and water by sonication method. It has strong and broad blue emission in the range 360-450 nm. The morphological properties were also studied. It shows a quenching of fluorescence with increasing addition of Hg (II) and has a linear calibration range of 2.5 to 50nM. The developed optical sensor shows good reproducibility and repeatability for the quantitative determination of Hg (II) ions. The fluorescence spectra of potentiostatically formed gold clusters were also studied.

CO-18

Detection of Mosquito Repellent in Viscera- A Case Study

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Transfluthrin is being used as fast acting household insecticide and widely used as liquid mosquito repellent. The transfluthrin has been detected in the viscera of the 62 years male deceased. It has been found that the concentration of the active ingredient prevalent in the in tissues of liver and kidney, lowest levels are found in the brain. The detection of transfluthrin has been carried out using colour test, TLC methods, FTIR and GC-MS. The use of liquid -liquid extraction technique for the extraction of transfluthrin has been carried out and further subjected to different solvent systems and spraying reagent. In the case of detection of transfluthrin by using TLC methods was found cheap and time saving. The instrumental methods have been used for confirmation of the active ingredients.
Keyword: Transfluthrin ,Color Test, TLC, FTIR, GC-MS.

CO-19

Detection of Tramadol and Codeine in Biological Matrix by TLC and Instrumental Techniques– A Case Study of Poisoning

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Tramadol a narcotic analgesic, is primarily used to treat mild to severe pain, both acute and chronic. Codeineis anopiate which is used to treat pain, as a cough medicine and for diarrhoea. In the present case, a twenty five years old boy suddenly became unconscious at around 2.30 pm in the afternoon. He was taken to hospital and declared brought dead. The FIR of the case revealed that the boy was an employee in a medical shop as an assistant and was habitual of taking some drugs. (Marg No. 20/14, 174 CrPC, P.S: Shastrinagar, Jodhpur West). The preliminary identification of the extracted residue from cadaver tissues was done using TLC method with two solvent systems and Dragendroff's Reagent as chromogenic agent. UV-Visible spectrophotometry of the extracted sample showed three peaks at λ_{max} 273 nm , 279 nm and 285 nm in aqueous acidic medium (0.1 N H_2SO_4) which could not confirm presence of any specific drug. Hence, GC-MS analysis was carried out and the results of library search software in GC-Mass spectrometry confirmed the presence of Tramadol and Codeine in the biological matrix. Tramadol is a CNS acting analgesic and its depressent effects are noted to last much longer than that of opiates. Codeine, on the other hand is easily available in the market as cough syrup and in the pain relieving medicines. Hence, the combination of these two drugs easily substitute the need for opiates or any other sedative substances if taken in controlled doses. But the synergistic effect or overdoses proved to be fatal as it abnormally slows down the CNS activity leading to unconsciousness, coma and death which might have happened in the present case. The present study also indicated the recent drift in nature of sedatives used by the drug addictive population.
Keywords: Tramadol, Codeine, Narcotic, Chromogenic reagent, UV-Visible spectrophotometry, Gas chromatography – mass spectrometry.

CO-20

Detection of Copper Ions from Skin Piece in a Case of Electrocution – An Innovative Forensic Approach.

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Electrocution mark and joule burn are pathogonomic features of electric shock when low or medium voltage current is involved. Many times the electrocution marks are hard to identify and thus proof of an electrocution mark is obtained either by histological or histochemical examination or by electro-microscopic methods which are useful for a forensic pathologist to rule out the cause of death due to electrocution. The present paper deals with histochemical examination of suspected site of lesion to ascertain the electrocution at Forensic laboratory level. Thorough examination of skin piece using different techniques confirmed the presence of Copper Ions which established the wound of to be made by electrocution. The presence of Copper ions at the lesion site not only establish the wound to be due to electric current but also proved that wire was made of Copper metal which further corroborate the physical evidence of crime scene. In our study, it was found that histochemical examination could be an important aid in diagnosis, where the findings were suggestive of electrical injuries. The present study will be a new approach for establishing the suspected cases of electrocution.

Keywords: Electrocution, Copper Ions, Histochemical examination, Electrical injuries.

CO-21

A Case Study Related to use of Different Doping Agents in Drug Trafficking

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A new type of illicit doping agent or a new derivative of controlled narcotic drugs and psychotropic substances involved in drug trafficking were seized by the Police and submitted to the laboratory for the analysis.

The following case study summarizes the two samples among the seven samples received. One was three white coloured Sugar Cubes and another was 26 LSD Blotter Papers. These samples were analysed by using systematic chemical tests, UV-Spectrophotometry, FTIR, TLC, HPTLC and LC-MS.

This is for the first time ever we received sugar cubes said to containing some drugs. Up on detailed analysis we found that some illicit drug in it and it was 2,5-dimethoxyamphetamine (**2, 5-DMA**). These sugar cubes where doped with the 2,5-DMA. Hence doping of these and illicit drugs in Sugar Cubes became a good medium for illegal drug trafficking.

The normal content of blotter papers as in second samples is lysergic acid diethylamide (LSD) but Surprisingly, a new amphetamine derivative 2,5-dimethoxy-4-chloroamphetamine (DOC) was detected in blotter papers. LSD, 2,5-dimethoxy-4-methylamphetamine (DOM), 2,5-dimethoxy-4-bromoamphetamine (DOB) are controlled drugs under NDPS Act but 2,5-dimethoxy-4-chloroamphetamine (DOC) being a substituted amphetamine it is not comes under the act. This will make the drug trafficking people from being classified as illegal and/or avoid detection in

standard drug tests. DOC does not have the same established safety profile as LSD. It can be particularly unsafe for those suffering from hypertension, as amphetamine compounds are known to cause sharp increases in systolic blood pressure.

Drug addiction threatens to kill the whole generation. No individual, family or community is safe where illicit drugs take control. The control of these kinds of drugs is very much required and also it is a challenge for law enforcement and public health.

CO-22

Quantitative Estimation and Method Validation of Haloperidol and Olanzapine by RP-HPLC in Biological Samples

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Suicidal and accidental poisoning with drug overdose is one of the common cause of morbidity and mortality in India. Considering such fact, quantification of drugs is becomes imperative to distinguish narrow margin of therapeutic dose and toxic dose. Haloperidol and Olanzapine both drugs are come under the group of antipsychotic drugs. Haloperidol is a typical antipsychotic drug while olanzapine is atypical antipsychotic drug. Generally these drugs are usedin treatment of Schizophrenia and bipolar syndrome Therapeutic dose for haloperidol is 1 – 6 mg in patients of moderate symptoms while 6-15mg in severe cases. Overdose of Haloperidol causes CNS depression, respiratory depression, coma&cardiac dysrhythmia. It can be fatal in large dose (>300mg).In case of olanzapine cardiac toxicity occurs due to its overdose, leads to death. Therapeutic dose of olanzapine is 5 - 15mg/day. A quick, simple and precise method is developed for quantitative estimation of acetaminophen using RP-HPLC in biological samples viz. Blood, Vitreous Humor and CSF. The separation was done by using RPC-18 HPLC column and Acetonitrile: 50mm phosphate buffer as mobile phase. On the basis of ICH guidelines validation parameters such as Linearity, Reproducibility, Accuracy, Precision, Recovery, Limit of Quantitation and Limit of Detection were done.

Keywords: Haloperidol Olanzapine, Validation, RP-HPLC, Quantification.

CO-23

Microextractionin Packed Sorbent (MEPS) for Determination of Carbofuranin Sus Scrofa (Wild Boar) Meat Samples by Gas Chromatography Coupled to Mass Spectrometry (GC-MS).

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Carbofuran is a most toxic broad spectrum systemic insecticide, nematicide and acaricide commonly used for agriculture purposes. Wild life can ingest carbofuran directly when mixed with food and when drinking contaminated water source. Wild boars were exposed to carbofuran either by ingestion

of contaminated food or water. Initially, we performed solvent extraction on meat samples followed by optimisation by micro extraction in packed sorbent (MEPS). Later, Gas Chromatography coupled to mass spectrometry (GC-MS) was used to characterise the pesticide. Mass spectra evaluation revealed presence of carbofuran in tissues. This study suggests that MEPS and GC-MS approach is precise and sensitive to characterise carbamate pesticide and can be used as a promising tool for Forensic Toxicological analysis.

Keywords: Carbofuran, MEPS, GC-MS

CO-24

Detection of Snake Venom Using Polyvalent and Monovalent Anti Snake Venom Serum by Double Immunodiffusion Method: A Case Study

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Mortality due to poisonous snake bite is an emerging public health concern and has drawn global attention. Detection of snake venom is of immense forensic importance so as to determine the exact cause of death and prevent the false claims. Different methods have been developed for detection of snake venom such as enzyme linked immunosobent assay (ELISA) and optical immune assay (OIA). In the present case the presence of snake venom using polyvalent anti snake venom serum was detected using double immunodiffusion method and was confirmed by using monovalent anti snake venom serum of four poisonous snake found in Pune region.

Keywords: Snake venom, polyvalent anti snake venom serum, monovalent anti snake venom serum, Double immunodiffusion method.

CO-25

Use of Anti-Psychotropic Drug in a Sensational Cinematic Farari of a Gangster: Case Cracked by Forensic Detection and Quantitation of a Bizarre Drug: A New Phase of Analysis and Crime

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Drugs are becoming them most important sources behind many crime and misused by criminals to give incidents as view of an accident. A very important and highlighted case of Farari of A big tycoon of Ajmer took place in a Cinematic scenario where the gangster and allies use an unusual drug for success of this Farari. This case explains forensic aspect of identification of an antipsychotropic drug clozapine by use of most vaild techniques as GC-MS, HPTLC, UV-Visible Spectrophotometry. The detection of Clozapne by LC-MS-MS is done as needful and new to era. The identified drug is different from those large number of generally known drugs likes Alprazolam, Diazepam, Lorazepam of Benzodiazepines groups used for crimes makes the analysis a big success towards unknown detection. This case explains the various issues related to uses of drugs and also explain how the uses of sedative drugs can create a big loop hole in custody systems. The major question on which this case depends is whether the policemen were intoxicated or they interpreted to be under the influence of

unknown substance. After Forensic analysis of gastric lavages, blood samples, sweets and food articles the forensic report proved that some of the policemen were intoxicated with this drug. Clozapine also adds a new phase to crime scenario. This case study explains how a pre-planned master mind was working behind it. Forensic examination was not only concerned with the detection of drug but provides useful direction to trap the culprits and linking the evidence. The possibility of involvement of a person having medical background cannot be overruled. The suspicious and dull role of police persons proved significant indulgence a s they not only take the sweets but allowed the use of mobile to the gangster and taking selfies with the gangster. This case becomes the most important one to pen the eyes of our govt. and administrative system towards security and elaborates the issue to think of the poor facilities provided to police personnel's and their deteriorating moral values in greed towards several items. The need of present hour is to strengthen the police with latest video recording devices, cameras and proper salaries and food so that they should not get impressed of all such needs. Authorities and society should remain alert towards the changing scenario of crimes using drugs in high amount.

Keywords: LC-MS-MS, GC-MS, Anti-psychotropic, gangster.

CO-26

Elucidation of Different Layers Pattern of Samples Having Forensic Importance Using Confocal Laser Scanning Microscope

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Confocal Laser Scanning Microscopy is materializing as a scintillating imaging technique in the territories of biological sciences and the present study reveals that for the first time, Confocal laser Scanning Microscopy can be used in the field of forensic sciences in analysis to elucidate the layer patterns of the sample (in conjunction with solid state scanning system). Microscopy is ordinarily used a preliminary source of analysis which is infrequently enforced in judicial practice but this Confocal Microscopy engender a series of approach to retrieve and obtain micrographs where only specific diffraction defined spot is observed and illuminated at a time. Various multicoated samples with different origins and characteristics along with the different biological and rigid samples (for example emulsifiers, hair, pollen, blood and ink) had examined under Nikon A-1 CLSM associated with the Z-Stacks computer software. Samples had scrutinized under the parameters including L100 Light path, Fast Scan speed i.e. 1 frame/sec at 18^{o}C ambient operating temperature and 10x Nose piece. Z- Series view of optical micrographs which are also called 3D-Stacks/Z-Stacks are the brilliant sources for consecutive assimilation of depoth-coded maps. Image acquisition parameters engage these four distinct laser channels i.e. DAPI, ALX 594, Alexa 488 antibody and Alx 647 affiliated with the 405.0nm, 561.0nm 488.0nm and 640.0nm laser wavelength's respectively. The micrographs described in this study had collected employing only the auto fluorescence-based technique. The experiments were designed in such a way to elucidate layer patterns in various situations and thus the instrument possess the forensic application.

CO-27

Vitreous Humor as a Predictor of Ethanol and Methanol in Postmortem Whole Blood

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Alcohol is widely abused substance and is frequently encountered in forensic toxicological analysis. Though blood is one of the most commonsample for toxicological analysis it has several disadvantages. Depending on the state of decomposition of the body, blood could undergo several changes like microbial growth, contamination from body cavities and many more. In view to explore alternative sample, the present study has been conducted for the evaluation of vitreous humor as a biomatrix in the identification and quantification of ethanol and methanol. Postmortem samples (whole blood, plasma and vitreous humor) from the 120 real forensic cases were subjected for screening ofethanol and methanol using head-space gas chromatography. Although there is a difference in the vitreous penetration of ethanol and methanol, the analysis of ethanol and methanol indicate the possibility of using vitreous humor as a biomatrix to predict the concentration of ethanol and methanol in blood for the postmortem samples.

CO-28

Dried Blood Spot: A Novel Sampling Technique for Toxicological Analysis

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A conventional sampling method for toxicological analysis such as blood or plasma has several disadvantages. Disadvantages like degradation of drug by hydrolysis, relatively tedious sample collection, and propagation of infectious disease have forced toxicological analyst to have alternate sampling method. Dried blood spot (DBS) technology refers to a blood sampling technique where small volumes of blood are spotted on an appropriate filter paper, dried, and taken to the laboratory for analysis. DBS has several advantages over conventional methods. DBSs can be obtained with relatively little training, require minimal manipulation at the collection site, are generally considered non-hazardous, and can be transported from remote sites easily for analysis. Filter paper collection devices are low cost, stored and handled easily, offer a stable analyte matrix, and are easily used in resource-restricted settings. DBS samples have proven to be inexpensive and reliable for testing, particularly for large-scale testing in remote population. This study explores usage of DBS for toxicological analysis, its advantages over conventional methods, challenges and limitations through a comparative study. A comparative study was carried out between two matrices whole blood and dried blood spot wherein a validated method was designed and 25 samples of each matrix was analysed through HPLC.

Keywords: Dried blood spot, sampling technique, HPLC, toxicological analysis.

CO-29

Improved Isolation Method for Detection of Malathion Pesticide from Biological Fluids by GC/MS

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Pesticides are widely used, and as a result, they are involved in numerous acute and even fatal poisonings. The aim of this study was the development of improved isolation methodsfor the detection of malathion in urine and viscera. The selectivity of the method was adequate with minimal matrix effect in all blank samples. Percent recovery was assessed by running three replicates at

different concentration.The percent recovery was found to be higher than 70.0%. The limit of detection (LOD) and limit of quantification (LOQ) were determined as the lowest concentration yielding signal-to-noise ratios of at least 3:1 and 10:1 respectively. LODs and LOQs were found to be 0.25 and 0.75 µg/L, respectively. In the present study methodology has been improved. Requirement of amount of substance has become less due to increased sensitivity. The overall analytical protocol has become reliable, accurate, reproducible and user friendly application oriented in forensic and analytical toxicology cases.

Keywords: Forensic toxicology, Malathion, liquid–liquid extraction, gas chromatography-mass spectrometry

CO-30

Fire Debris Analysis by Chromatography

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Fire incidents are a major contributor to the number of deaths and property losses. Arsonists usually use as an accelerant in order to start or accelerate a fire. The most widely used analytical method to determine the presence of such accelerants consists of a pre-concentration step of the ignitable liquid residues followed by chromatographic analysis. Upon saturation of the surface area, hydrocarbons with weaker interactions with the activated carbon were displaced by more strongly interacting hydrocarbons thus resulting in distortion of the chromatographic profiles used in the interpretation of the GC/MS data. Fire debris analysis includes the preservation, extraction, detection and characterization of ignitable liquids from fire debris. The analysis of this fire debris plays a very significant role in forensic science.

Keywords: Forensic Science, accelerants, Debris, chromatography.

CO-31

Evaluation of Anti-Inflammatory Activity of Diclofenac Sodium Using Chitosan Succinate and Chitosan Phthalate Pellets as a Carrier For Drug Delivery

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Objective: This study aims to perform Gastro-intestinal compatibility and Pharmacodynamic efficacy of the Diclofenac sodium using Chitosan Succinate pellets and Chitosan Phthalate pellets as a drug delivery carrier. A pre-clinical study protocol was approved by Institutional Animal Ethics Committee (IAEC), on animal use.

Methods: Anti-inflammatory activity was evaluated using Carrageenan induced paw edema model in male Wister rats using Plethysmometer. Animals were divided into four groups of six animals each. The first group served as control (received 0.1 ml saline), second group was administered diclofenac sodium (10 mg/kg), third group given the chitosan succinate pellets and fourth group given the chitosan phthalate pellets. The paw volume was measured plethysmographically at various time intervals 0,1,2,3,6,12,18 and 24hr after the injection of carrageenan.

Results: Anti-inflammatory activity of pre-treatment with pure diclofenac sodium, chitosan succinate pellets and chitosan phthalate pellets showed reduction in carrageenan evoked hind paw edema and differed significant ($p<0.05$). The inhibition of paw edema, 64.2% at 6 hr of diclofenac sodium, 85.4% at 18 hr of chitosan succinate pellets and 78.1% at 18 hr of chitosan phthalate pellets at the dose of (10 mg/kg), respectively.
Conclusion: The percentageinhibition of paw volume was lesser when compared to the chitosan succinate at a initial hr. The results revealed that chitosan succinate pellets have higher gel forming capacity when compared to chitosan phthalate pellets.
Keywords: Anti-inflammatory, Diclofenac sodium, Chitosan succinate and phthalate pellets.

CO-32

An innovative method for detection of cannabis via green route

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Cannabis Sativa, is a major concern of law enforcement agencies as it is the most abused substance in NDPS Act. Reported methods of cannabis identification involve the use of techniques such as colorimetry, TLC, HPLC and GC to identify cannabinoids, in this paper, a sensing device for onsite detection of cannabis via green route is developed. The method is rapid, sensitive and spill proof, easy to perform and specifically selective to cannabinoids. The developed method will be helpful to law enforcement agencies dealing with cannabinoids drugs.
Keywords: Cannabis, active principles, toxicity, green route.

CO-33

Detection of mercury, lead, arsenic by lab in syringe via Nerium oleander extract

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Heavy metal toxicity has proven to be a major threat and there are several health risks associated with it. Their multiple industrial, domestic, agricultural, medical and technological applications have led to their wide distribution in the environment; raising concerns over their potential effects on human health and the environment. Here in this paper an attempt is made to develop colorimetric-based lab-in-a-syringe (LIS) for detection of mercury lead, arsenic. This simple diagnostic device features instant detection and does not suffer from any delay between sampling and detection. The reported methods for detection of heavy metals require expensive instrumentation and laborious operation, which can only be accomplished in centralized laboratories. The developed LIS can be used for complete on-site analysis, the detection device has been developed is simple, sensitive, selective and disposable alternatives to conventional ones for on-site detection of heavy metals.
Key words: Lab in syringe, Heavy metals, toxicity, Nerium oleander

CO-34

A Fluorescence based on spot detection of ANFO (low explosive) using Citrus aurantifolia extract

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Ammonium nitrate Fuel Oil(ANFO) is a major explosive substance being detected in serial bomb blast in India few decades. On spot detection method for ammonium nitrate has been reported by colorimetric, spectroscopic, nanoparticles method. Though these methods give results for identification of ANFO, but availability, cost of instrument, tedious process in nanoparticles preparation and stability are major issue. Hence, here an attempt is made to develop sensitive, selective and easy method for on spot detection of ANFO by Citrus aurantifolia extract. The results obtained from simulated samples, analysis gave a remarkable and selective identification, through fluorescence, giving more reliable results. The development can be very useful in onsite detection of ANFO.
Key words: ANFO, explosive, detection, Citrus aurantifolia

CO-35

Quantification of Ethanol in Alcoholic Beverages Using Gas Chromatography Headspace Flame Ionization Detector with N-Propanol as Internal Standard

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Ethanol is the most easily available substance of abuse. A simple and rapid method was developed to quantify ethanol content in alcoholic beverages. The method was set up for quantitative estimation by Gas Chromatography Headspace Flame Ionization Detector and DB-24; 30m*0.30mm, 3.0µ (Agilent Technologies) capillary column was used. The samples were alcoholic beverages such as Whisky, Beer, Wine, Vodka and Rum. This method provies determination of volatile compounds in alcoholic beverages expressed directly as mg/100ml. No sample pre-treatment was required except addition of internal standard (n-**Propanol**). Furthermore the method was validated in order to confirm its reliability and potentials to use as quality control tool in clinical laboratories and for research purpose. The present work can be used as a routing quality and safety standardization.
Keywords: Beverages, Alcohol, Gas Chromatography, Headspace, Flame Ionization detector etc.

CO-36

Exploring the Virtual World of Drugs

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Over the counter drugs to selling drugs online has become a regular practice with passing years in our daily lives. Internet has been impacting lives on all levels from making the access to drugs easier to forming opinions on the use of drugs. Substance of abuse which was earlier limited to the real world

has been availed just by a click away through dark web or online sources too. Apart from these the role of social media in exposing the youngsters, a vulnerable group which can easily adapting the habit of substance of abuse. Conventional methods of dealing with the menace of drug abuse do not suffice given the high pace and it is increasing with time. Therefore, to find innovative and improvised ways to deal with serious issues like drug trafficking and drugs of abuse on a whole need to be focused on. The present study is an attempt to analyze such content related to drugs including texts, images, videos etc. to understand the effect of the same and its level of acceptability among the general population. Our study will also explore the possibilities of using the internet platforms for the purpose of drug policing and the possible steps to have a check on them.

Key words: Drugs of abuse, Drug Trafficking, Social media, Dark web, Content Analysis.

CO-37

Portable Smartphone Enabled Microfluidic Paper-Based Analytical Devices (µPADs) for Time since Death Determination

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The study reports Microfluidic paper-based application for the determination of time since death (TSD) from vitreous humour (VH) protein for on-the-spot analysis using smart phone. We report a novel, simple, portable, disposable, rapid inexpensive microfluidic paper-based analytical device (µPAD) for TSD determination. The results showed that there is a linear correlation between the VH protein concentration, RGB values and TSD. The proposed method provides a smart, rapid and sensitive, cost effective as well as "mix-&-measure" detection platform using µPAD and smart phone which offer new alternative for on-site TSD determination especially in field situations in forensic cases via VH protein.

Keywords: Microfluidic paper-based analytical device (µPAD), nanoparticles, smart phone, portable, Alprazolam, Vitreous Humor, blood

CO-38

Smartphone based Portable Nanomaterials enabled Microfluidic Paper-based Analytical Devices (µPADs) for Explosive

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Since explosive detection have become an increasing concern for law enforcement officials who may encounter terrorist's activities. In these situations, fast and accurate identification of the explosive material is paramount. Hence, driven-by-need to detect Explosive, we report a novel, simple, portable, disposable, rapid inexpensive microfluidic paper-based analytical device (µPAD) for Explosive detection from soil sample .Study involves µPAD embedded with nanoparticles for colorimetric detection enhanced with portability and onsite rapid quantification using smart phone. Proposed method provides portable detection platform using µPAD and smart phone which offer new alternative for on-site detection especially in field situations in forensic cases.

Key Words: Microfluidic paper-based analytical device (µPAD), nanoparticles, smart phone, portable, Explosive

PHYSICAL SCIENCE

PO-01

Study on Discriminant Power of Dimensions Used forForensic Speaker Identification

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In speaker identification, most powerful dimensions are naturally those that show a small intra speaker and large inter speaker variations. So the way to select the potentially useful forensic speaker identification dimensions has been to inspect the ratio of between speakers to with-in speaker variation. The ratio is called F-ratio and the dimension which is having more resolving power is more useful. Here we have analysed the discriminant power of first three formant frequencies and analysed in three different conditions. The analysis of these parameters is very useful to determine the powerful parameter in forensic speaker identification.
Keywords: intra speaker and inter speaker variations, F-ratio, formant frequencies.

PO-02

Headless Body- A Challenging Case for Image Processing Forensic Science Expert

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A sensitive case was registered in the police station after the huge rights and large number causalities because of some anti-social elements publishing/widely create a nuisance by playing a video in the public place. The video recording contents chopping of cow, beaten of police official and very important drag the headless body in the public place with help of some antisocial element. The impact of above said video the general public annoyed and creates riots and during the riot some innocent public persons are got casualties and major injuries. The case was sent to laboratory for examination of authenticity of video CD, which was playing in the public place and responsible for riots and casualty. The expert applied the different techniques i.e. image processing technique, image morphing and image grafting technique for examination of case. The expert came to conclusion that the video recording was edited and not authentic.

PO-03

X-Ray Powder Diffraction of a Stone - A Forensic Determination

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An opaque, aggregate and lead to silver grey shiny and soft metallic matrix of cuboctahedral crystals with defined faces and edges in which the forms of the cube and the octahedron have an

equal size of a stone was suspected and considered as a part of examination for characterizing the components contained in the stone.

X-ray Powder Diffractometer, Philips, DY993, has been employed in this study to examine the physico-chemical make-up of unknown materials of crystalline substances having unique diffraction patterns, to distinguish between elements and their oxides, and to identify chemical compounds, polymorphic forms of mixed crystals. The physical and optical parameters, such as specific gravity, hardness, luster, transparency, cleavage, streak and other associated properties of a suspected stone have also been measured. The diffraction spectrum has been measured with the proportional counter in the 2θ range from 5 to 100º at 300K. X- Ray diffraction pattern of a substance collected on a Bragg-Brentano geometry with Cu Kα radiation and the diffraction pattern has been compared with JCPDS files. PowderX, Fullproof, Rietan and Espoir have been used for indexation and refining the diffraction pattern to obtain the indices, space group etc. of the stone. The aim of this study is: (i) to analyse the constituents in order to identify the nature of the stone; (ii) to quantify the constituents (iii) to determine the coordinates of the constituents of the stone and (iv) to analyse and evaluate the diffraction pattern of the stone and compare the same with the known diffraction pattern of the substances thus represented so that it can reveal the nature of the stone in aggregate for forensic identification of the stone. The study is also extended to carry out the Rietveld analysis of the constituents to get the data provided the atomic coordinates from its X-ray powder diffraction pattern and isotropic displacement parameters of the atoms leading to form a molecule which can strongly differentiate the stone from the Forensic point of view.

Keywords: Stone, X-ray diffraction, transparency, cleavage, streak, mineral deposition.

PO-04

Enhancement of Image Matching of Firearms Exhibits Using Mathematical Modal and Pattern Recognition Technique

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Fire cartridge cases and bullets are compared with question cartridge case and bullets using comparison microscope which is a part firearms identification. The present technology provide the firearms examiner with additional facility like Image analysis system to acquire ,store and analyze the image of comparison in the laboratory .while acquiring images, the microscopic feature of fired cartridge cases and bullets under comparison microscope is being illuminated by ordinary light source .but digital image are not ideal for any automated comparison with ballistics data base on feature of fired cartridge case and fired bullets for source identification like in the case of IBIS, DRUFIRE,etc . The lack of clarity of these digital image are due to the recoding of unwanted features due to difference light source, different in material of the bullet/cartridge case, manufacturing defects etc. the presence of these image matching and the subsequent source identification.

This paper reports on different method of feature selection for pattern recognition using mathematical algorithm for image matching. Feature selection was achieved by tracking method using KL transform. The mathematical algorithms developed was also used to enhance the quality of image with respect to firing pin impression ,breech face mark of fired cartridge cases received for examination in the laboratory .the details of the finding are also discussed in this paper.

Key words: KL Transform, image processing, pattern recognition, firing pin impression, breech face marks

PO-05

Anthropometrical Analysis of CCTV Blurred Images for Facial Identification

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The questioned facial images in video recordings, CCTV footage, passports, driving license and on the other related documents are invariably sent to the laboratory for comparison with the suspect's specimen photograph/Image as well as video recordings to prove the presence of the person(s). Various techniques i.e Morphological facial features, superimposition and Anthropometrical measurements are employed for forensic comparison of photographs. In the present study, some additional facial Indices and the anthropometrical angles between various landmarks have been used for comparison of photos/images received in various crime cases in the situation when the facial image is blurred and facial features are not clear. The findings of the study could be employed effectively for facial identification in case of CCTV blurred images.
Keywords: CCTV Images, Anthropometric measurement, Facial Indices.

PO-06

Identification of Accused Person from Negative Fingerprint"- A Case Study

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The fingerprint science is the most positive means of identifying individual. Fingerprint science provides positive identification and establish the identity of a criminal with the crime. The questioned fingerprint on OMR answers sheet is a vital evidence of impersonation cases of various competitive/ recruitment/ admission in higher education examination etc. In this case the questioned fingerprint recorded on the OMR answer sheet at the time of examination was not properly recorded intentionally and excess pressure was also applied at the time of putting the thumb impression, so as to conceal the identity of accused person/ solver /impersonator as well as to mislead the fingerprint expert also. This case is related to Vyapam scam cases Bhopal and thumb impression recorded on OMR answer sheet was found as negative fingerprint image and some ridge characteristics are not in relative position to establish the identity of accused person/ impersonator. The quality of questioned finger prints was enhanced by using different filters/ image processing technique and after that finger print on OMR answer sheet was found identical with suspected person/solver/ impersonator.
Keywords: Fingerprint, Identification, solver, impersonation, Investigation, image processing, hide and OMR answer sheet.

PO-07

Forensic Examination of Improvised Fire-Arms Which Give Impression Of Standard Fire Arm: A Case Study

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Fire-arm is a device consisting of a Cylindrical tube through which missile/Projectile/s can be projected in a particular direction by the force obtained from the burning of a quantity of propellant. In other words the fire-arm is a device in which the Potential Energy of gun powder converts into the kinetic energy of the bullet /Projectile.In today's scenario most of the persons wants to carry the Fire Arm as a symbol of prestige and might in his society. As a result, the demand of acquiring Fire Arms has increased many folds. These crazy people want to have a fire-arm either legally or illegally. To obtain a licensed fire-arm is difficult and also involve a lot of scrutiny by the licensing authority. But to obtain an illegal fire-arm is very easy in grey market. Due to this, illegal manufacturing of fire-arm has become a lucrative business now-a-days and many illegal fire-arm manufacturers are manufacturing fire-arm which looks like standard/genuine fire-arm and also improvising one calibre fire-arm to another calibre for getting more profit in the grey market.

Brief History of the case:

Recently police of a state has caught a group of criminals who were expert in manufacturing of fire arms. In this group, well trained engineers and machine operators were involved. They have developed expertise not only to change the calibre but also to improvise the Fire Arms which look like standard fire-arm as per demand in the market. In this crime the supplier/owner of the gun houses was also involved. For example they can change the calibre of .315" Rifle into .30-06" Rifle very smartly because of difference in price tag between these calibres.

Forensic Findings:

In the instant case, Ballistics Division of CFSL/CBI received large no. of fire arms for forensic examination. The IO of the case wants to examine the said fire arms in respect of their calibre and geniunity. Further IO also wants to know if, any tempering or improvising has been made in the firearms or otherwise. During the examination, the expert conducted the test firing & microscopic examination of the parts of the fire arm as well as manufacturer marks/proof mark available on these fire-arm. After meticulous microscopic examination of these fire arms it was concluded that these firearms are improvised firearms and calibre of all the fire arms has been altered by machining.

Keywords: Missile/Projectile, manufacturing, improvise, difference in price tag, tempering, improvised firearms

PO-08

Challenges Faced In Speaker Identification for the Speakers Having Similar Phonetic Feature

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Speaker identification often plays a vital role in crime investigations cases involving telephonic conversations. The prevailing technique employed for the purpose of speaker identification is based on critical listening subsequently followed by spectrographic and waveform analysis. However, problems are faced by an examiner in cases related to identification of two different speakers having similar phonetic features during critical listening. The various problems encountered during examination of such cases are availability of similarly spoken clue words, range of pitch level, annotation pattern, formants frequency formation, etc. This paper is an attempt to study the challenges faced during the examination of such cases and project the preventive measures that can be taken in such conditions.

Keywords: Speaker identification, Telephonic Conversation, Critical listening.

PO-09

The Future of Guns and Ammo: 3Dprinted Firearms and Challenges to Forensic Ballistics Expert

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Guns and ammunition manufacturing technology are now emerging in 3D printed form. Once may astonish to ask a question that how a gun can be printed? Due to the advancement in science& technology, things can be printed in3D physical object with computerized programs using 3D prints. Now –d- day technology is available t print a complete firearms capable of firing ammunition of f=different calibers in few hours of time. Spare parts require to operate a firearms such as barrel (including rifling), action mechanism. magazine, etc. can also be printed .bullets of various calibers such as 9mm, .357in., .22in. can also be printed .use of such 3D printed firearms either with factory manufactured ammunition and /or 3D printed bullets can revolutionize the science of firearms identification .Further, they may pose challenges to the law enforcement agencies, judicial offices forensic ballistics experts, etc. during identification collection, preservation, examination, and evaluation of physical evidence in criminal investifation&trials.This paper discuss 3D printed gun&ammunition and challenges which may emerge from the use of such firearms & ammo in criminal activities.

PO-10

Determination of Ballistic Coefficients Of Subsonic Handgun Bullets for Exterior Ballistic Work in Forensic Science

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The requirement of a suitable method and readily available ballistic coefficient data of subsonic handgun bullets of different make and caliber commonly encountered in crime for computation of important trajectory parameters in reconstruction of shooting incident work has since long been felt. This study involves determination of ballistic coefficients of a good number of subsonic handgun bullets using a suitable method and ballistic data available in literature. The drop parameters of the

bullets have been calculated using the theoretical ballistic coefficient values suitable equation of motion. The theoretical drop parameter values have been found in good agreement with the available experimental ballistic data. Interestingly, the same have been found quite in order even at the ranges where the trajectories are markedly curved and requirement of Siacci assumptions are not met. This study is useful in exterior ballistic work involving handgun bullets.

Keywords: Ballistic Coefficient, Trajectory parameters, Exterior ballistic, Subsonic bullet, Reconstruction.

Paper for presentation in 24th All India Forensic Science Conference:

PO-11

Variable Behavior of Improvised Pistols:Test Firings Results of Actual Case Studies

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In this submission, the results of test firings done in various laboratory cases are being reported, involving improvised, country made pistols of different types and calibers e.g. 12 bore, 0.315 caliber and 7.65mm caliber pistols of varying barrel lengths and muzzle diameters, which were test fired at different distances from target and consequent 'behavior' i.e. effects around the gunshot holes viz. blackening, gun powder marks etc. were observed. Apart from that, in cases involving 12 bore pistols, the profile of dispersion of pellets and deviation of wads were also observed.

The compilation of the results underlined the erratic behavior and interesting patterns on target which showed appreciable difference from those of standard, factory made firearms. The profile of dispersion of pellets fired from 12 bore improvised pistols was found to be too much deviated from standard counterparts. An attempt has been made to correlate the results with barrel length and muzzle diameter of the pistols. Moreover, test firings of 12 bore improvised pistols showed the unusual phenomena of the wads getting broken up into pieces and their irregular deviation.

Hence, the study underlines the fact that standard references and text book data would lead to an inaccurate opinion, when such firearms are involved and the interpretation must be based on the results of simulative test firings only.

Keywords: 12 bore, 0.315 caliber, 7.65mm caliber, improvised pistols, barrel length, muzzle diameter, simulative test firing, blackening, gun powder marks.

PO-12

Conclusive Linkage of Evidence Cartridges withCountry Made Pistols without Firing Pin: Two Case Studies

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Two case studies are being presented in which evidence cartridge shells, seized from the crime scene, were successfully linked with suspect country made pistols, providing useful, conclusive opinion.In

one case, the evidence cartridge shell was having firing pin impression but the country made pistol, fabricated to fire 7.65mm caliber cartridges, received for the examination was not having firing pin. Though, the action mechanism was in working order, the test firing wasn't possible. Using a firing pin of a standard 7.65mm caliber pistol was also not possible. Finally, a compatible firing pin was fabricated in the laboratory and the pistol was successfully test fired and evidence cartridge could be conclusively linked with the suspect pistol on the basis of microscopic matching of breech face and chamber marks.

In second case, the firing pin of the suspect country made pistol, received for the examination was tempered beyond comparison and its action mechanism was also not working properly. The breech face marks of the pistol were obtained with other means which were used for the conclusive microscopic matching with the evidence cartridge.

Keywords:7.65mm caliber, country made pistol, breech face marks, chamber marks, action mechanism, microscopic matching.

PO-13

Analysis of Imitated / Improvised Firearmsand the Cartridges and Bullets Fired Through Them(With Special Reference to 7.65mm Caliber Semi Automatic Pistols)

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Imitated / improvised firearms i.e. substandard copies of regular factory made firearms are having similar class characteristics in their design, loading and locking mechanism, cocking and firing arrangements which are replica of any standard firearm. Though their external appearance generally resembles the original ones, their dimensions are dissimilar compared to the specified dimension of their counterpart but at times it becomes somewhat difficult to distinguish them. Sufficient literature is not available on such type of firearms; hence it is necessary to make more study in this field.

In this paper, in addition to the general considerations of various improvised firearms, specifically, imitated versions of 7.65mm caliber semi-automatic pistol have been examined showing their action mechanism and other physical features along with the cartridge shells and bullets fired through them. The characteristic features of these firearms are so unique that the fired evidence bullets or cartridge shells can simply be matched with the test. Such information may be useful for firearm experts while case examination and accurate interpretation.

Keywords: Improvised firearms, semi-automatic Pistol, 7.65mm caliber.

PO-14

Country Made Pistol Capable of Firing Rimless Cartridges

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The 12 bore shotgun cartridges, .303 inch rifle cartridges and 8MM/.315 inch rifle cartridges are commonly used by criminal in locally fabricated (country made) pistols for committing crime. Rim of ammunition is accommodated in headspace rim (counter bore) present in the barrel of countrymade firearms that make these cartridges to sit firmly and fire. In absence of head space rim (counter bore), either the cartridge will not fit properly or it will fall in the barrel and hence cartridges will result in misfire or not fire.

A rimless cartridge cannot be fired through country made pistols without use of any adopter /necessary modifications. In present paper, an alternative method will be discussed to fire rimless cartridges through country made pistol without using any adopter.

Keywords: Country made pistol, 12 bore shotgun cartridges, .303 inch rifle cartridges, 8MM/.315 inch rifle cartridges, rimmed and rimless cartridges.

PO-15

Reliability of Formants F1 and F2 for Identification of Speakers in Cases of Mimicry

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The objective of this paper is to determine the effectiveness of first (F1) and second (F2) formant in identification of the speakers in cases of mimicry. It is believed that the values of F1 and F2 usually depend upon the style of vowel production. F1 depends upon the height of vowels and F2 relies on the degree of backness of tongue while pronouncing the particular vowel. Mimicry is an art of modulating your voice frequencies and pitch to imitate someone. In such cases the artist tries to imitate the speaker in every possible sense, including the style of speaking, speaking accent, pronunciation of particular words, constant use of particular phrase or slang to make it more closer to the original. Similarity in production of vowels may result in lowering the potential of F1 and F2 in speaker identification. This study will aid the examiner in deciding the efficiency of F1 and F2 in rendering definite opinion in cases of disguise by mimicry.

Keywords: Forensic, voice, mimicry, identification, formants, frequency

PO-16

Acoustic Analysis of Naturally Shuttered and Malingering Speech

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Voice has proved to be a vital evidence for identification of anonymous callers in crimes involving kidnapping, threatening, extortion and may more In forensic cases. Forensic Speaker Identification system deals with the identification and verification of speakers by comparing the acoustic parameters of their voice. Despite of such advantages, the science of speaker recognition comes in question if the experts have to deal with the cases involving disguised speech. Out of so many disguise techniques used by the criminals, stuttering is commonly practiced to manipulate the natural voice characteristics by the individuals. The aim of this paper is to study the amount of variations in the acoustic parameters between naturally stuttered speech and deliberately stuttered/malingering speech. This study will aid the expert in identifying the significant acoustic parameters useful in dealing with the problems related to disguise by stammering.

Keywords: Forensic, Voice, Shuttered, Malingering, Naturally, Speech

PO-17

Advent of Laser Technology in Forensic Science

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The advent of laser technology in the society has created a boon in the field of forensic science. Various laser sources have been used in the field of forensics to facilitate their use in solving crimes. Laser is a device that produces and amplifies a narrow beam of coherent light by making use of the processes that amplify blight signals which are being generated by some other means. The basic principle of laser amplification is stimulated emission and Brian. E. Dalrymple is known for introduction of laser for its utilization in the forensic field. The Laser was used for the first time as forensic light source for the identification of fingerprints and other evidence detection such as elemental analysis of glass and paints, characterization of gunshot residue, crime scene investigation, detection of biological evidences, traces of explosives, analysis of soils and sediments, stress and fatigue in metals. The article emphasis on the use of laser in the forensic field which will prove beneficial in accurate and speedy analysis of the cases.
Keywords: Laser, Monochromatic, Optical cavity, LA-ICPMS, fluorescamine, Ablation cell

PO-18

Individualization Assessment from Latent Palm Prints Present On Hieroglyphics Substantial

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Personal identification is the key of identity, reliability and security in the society. The reliability of personal identification relies upon the commonly used modalities i.e. fingerprints & Palm prints, facial recognition, DNA, retina, gait pattern etc. Palm prints recognition inherently implements many of the same matching characteristics as of fingerprints that have allowed it to be one of the valuable form of evidence. Being unique, perpetual, and ubiquitous by nature, Palm prints identification are based on the aggregate of information presented in a friction ridge impression, like fingerprints and identity can be established by the numerous continuous characteristics. Such prints can be encountered in diversified forms from the crime scene at distinct surfaces i.e. walls, glass, weapon of offence, hieroglyphics substantial's etc. This study was carried out for the assessment of individualization from the latent palm prints present on hieroglyphics substantials. For this study, 100 samples including male and female were collected from the local residents of Western population of Uttar Pradesh. After the intensification of palm prints and for the fixation of identity, 4 parameters followed by 12 sub-parameters were established which not only proved its significance level but also increase the evidential value of such prints. If the questioned documents examination process could be accompanied by such intensified prints, then it can be placed at par in court of law on the top of all other scientific evidences.
Keywords: Identification, Palm prints, latent, individualization, evidences, crime scene, etc.

PO-19

Pattern and GSR Analysis on Cloth Surface Fired From Fixed Distance of 9mm Improvised Firearm - A Case Study

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Armed violence is common in India and among the other top states, Delhi and its NCR region play a vital role when it comes to seizures of country made firearms. Among the major forms of seized firearms, 9mm has also been observed to be used.A case study has been done on 9mm Improvised seized firearm in FSL, Delhi. Gunshot pattern on a fixed distance (5cm & 10cm) cotton target has been studied using AAS elemental analysis for Sb, Ba, Cu, Pb and Ni. It will narrow down the findings for the Law Enforcement Agencies and the Forensic scientists.

PO-20

Occupational Alteration on Fingerprints

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Fingerprints are the well-known natural identity card for every human being as they are unique and permanent in nature. Over the past century, countless criminal cases have been solved solely by matching the fingerprints found at the crime scene with the fingerprints of a potential criminal. Even though fingerprints stay unique throughout a person's lifetime, but they too are prone to change due to a person's occupation. Fingerprints, especially of the thumb and the index finger, might get changed because of some specific type of occupation of a person such as construction work, Blacksmithing, Physical labor etc. In this paper, we conducted a detailed analysis of the changes which took place in the fingerprints during the normal course of work because of the person's occupation. We collected samples from the peoples in 3 different occupations specifically in Indore region and performed our analysis. Our study shows that a person's fingerprints might corrupt due to his occupation and this damage is more severe if the person is doing similar work for a very long period.
Keywords: fingerprints, occupational impact, investigation.

PO-21

A New Method for Development of Latent Finger prints on Various Surface Using Soil

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Different methods have been accounted for the visualization of latent fingerprint on various surfaces in the literature such as lead powder, titanium oxide, Rhodamine B dye etc. Are used to visualization of latent fingerprint. If some powders methods are exposed to human contact that leads to health problems and also these methods are expensive in nature. Current study established a new powders mathods, which is simple, nontoxic to human health and cheap in nature and cab be utilized to development of latent fingerprint on various surfaces. This method is simple and easily available that is soil has present in the earth and it has different color forms ,can be used to decipher the latent fingerprint which are present at crime scence.Current study we used different soil color for development latent fingerprint on various contrast surfaces such as plastic surface,aluminum suraces,motor bike painted area, car bonnet.CPU, hanke,glass,table(sunmica-glossy).CD, and transparency ,cotton ,skin. We successfully development latent fingerprint on all surface expect skin and cotton by using this method.

Keywords: forensic science, Dactaloscopy, Latent fingerprint, Soil, Powder method

PO-22

A comparative study on dialectal specific variations in Gujarati population

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The voice sample is generally encountered in forensic cases like kidnapping, anonymous calls, threatening calls, etc. where the dialect plays an important role in unknown speaker identification. Gujarat state has six to seven dialects which can be used to study dialectal specific variations from auditory and instrumental analysis. In this study the main parameter includes intra speaker and interspeaker variations, accent, quality of speech, articulation rate, degree of formation of consonants and vowels, length of vowels and consonants, pronunciations, phonetics, linguistics, tones and formant frequency.

Keywords: Forensic, phonetic, linguistic, formant frequency, dialect specific variation, intraspeaker, interspeaker, articulation rate.

DOCUMENT SCIENCE

DO-01

Evaluation of fabricated documents for commonness of origin using On-screen tools

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Conventionally, the fabricated documents with implanted elements such as signatures, seals, stamps etc., were evaluated for commonness of origin by superimposing through their transparencies. This traditional technique of superimposition of transparency, however, may not help the Scientists, if the

elements of the fabricated documents are digitally transformed and planted on such documents. On-screen tools are used to evaluate digitally transformed elements and the methodology to overcome such bottleneck in superimposition techniques, is described in this paper.

DO-02
Bio-Disorders and their effects on handwriting

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Age imposes a sure impact on the living beings. We gain experience and maturity with time which enrich and refined our personality. But biological disorders, which occur usually in advance age, cause numerous morphological, anatomical and physiological changes in our body. Morphological changes are generally perceptible and can be noticed. Contrary to these anatomical and physiological changes occur inside our body, cannot easily be recognized. Physiology of organ system is contributed much towards smooth and efficient functioning of various vital processes and activities in living beings. Handwriting is one of them.

Nervous, respiratory, blood vascular and bone-joint systems, despite their respective functions, play an important phenomenal role in normal and natural execution of writing of an individual.

Hand, as hardware, is directed and regulated by 'bio-software' i.e. neuro-muscular coordination. Functional equilibrium between these hardware and software ensures smooth and characteristic execution of writing. This precise equilibrium is often disturbed by physiological disorders of organ systems in our body and reflects many significant writing characteristics in an unusual manner. Problem becomes more complicated when these bio-disorders amalgamated with geriatric ailments which cause neuro-muscular, neuro-skeletal or cardio-vascular disorders. Writing derives at this juncture usually exhibits abnormal and strange features in resultant writing. Such writing is generally remained unexplained when compared with the normal standard writing of same individual.

DO-03
Application of ATR-FTIR Spectroscopy in Discrimination of Inks

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Forensic examination of ink is required in a number of criminal cases for the purpose of differentiation of two or more ink. Many of the criminal cases related to handwriting examination and signature forgeries where handwritten contents are manipulated by addition /alteration, the query regarding differentiation between two or more ink is often asked. Advancement in writing instrument has resulted in more complex problems in analysis of criminal cases where discriminate between two inks of similar color is required. Examination of the questioned document related with the ink differentiation has become challenging issue for question document expert to opine because of various types of make and mode of writing instrument. Keeping the view in mind, a study was carried out on various brand of similar color ink on paper surface and its differentiation on the basis of physical and optical examination methods as well as using ATR-FTIR method. In this paper the objective was to explore the ATR-FTIR spectroscopy method in examination of ink which physically appears similar but chemically differs in their composition. Examination result reveals that ATR-FTIR spectroscopy

is very useful non-destructive scientific method for forensic study of questioned document in order to discrimination of various inks. However the active research in this area and its examination is still going on.

Keywords: ATR-FTIR Spectroscopy, Forensic Examination etc.

DO-04

Limit of reliability on Latent Image as security feature in genuine bank notes

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Recently, counterfeit notes were found to successfully introduce latent image. Its presence can easily deceive layman. Only a careful examination can avoid such blunders. For this, it is necessary to understand the intricacies in the method of introduction of this feature in bank notes. This paper is to study if such feature is due to inability of the reflected light from the intaglio reaching to the eye of the observer at low angle. There are different latent images when viewed lengthwise and breadthwise directions. In cases, so far studied, latent images are still not distinct and clear as in genuine bank notes. However, it will be a real challenge in future to distinguish between counterfeit notes from genuine when such gap becomes too narrow.

Keywords: Counterfeit notes, Intaglio printing, Latent image, oblique light, length-wise, breadth-wise

DO-05

Forensic Analysis of Disputed Official Order: A Case Study

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The document is an integral part of our personal, academic and professional life. Genuineness of a document is required to be ascertained prior to rely upon. The advancement in printing, scanning and photocopying technology has offered new and quick methods to fabricate the documents. Though, the technology has offered a lot of advantages to human beings but at the same time also been responsible for its ill effects. In the present case, a person joined school lecturer in government education department on PTA basis in the year 2002. On joining of regular incumbent, the services were terminated. He felt aggrieved and filed writ petition in Hon'ble Administrative Tribunal. The court issued instructions to the department for deciding his case within four weeks. The department decided against him under intimation to the court. Later on, he joined school lecturer on contractual basis. Further, after about ten years, on the request of deptt., the investigating agency registered FIR against him and referred the entire record of his appointment/ service to regional forensic science laboratory. The forensic analysis unraveled conspiracy behind the appointment. The authors also established modus operandi of the preparatory and precursor document by using Forensic XP-4010D.

Key words: Technology, Fabrication, Manipulations, Forensic XP-4010D.

DO-06

Identification of Printing Technology for Detection of Counterfeiting of Security Documents Using Various Photographic & Primitive Image Processing Techniques-A Case Study

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Counterfeiting of Security Documents (SD) is increasing exponentially due to advancements in Information & Technology (ICT) and its ease of use. This is posing challenges to forensic document examiners. Further Printing Technology Identification (PTI) and associated problems in document forensics have also been projected as challenges in image processing applications. This paper is a real-life case study wherein the counterfeit documents have successfully been identified by use of various Photographic & Primitive Image Processing Techniques. This study shows more on use of Micro Photography coupled with basic image pressing tools for identification.
Keywords: Forensic Documents, Document Photography, Counterfeiting, Security Documents, Image Processing.

DO-07

Comparative Study of Original and Photocopied Document Handwriting Using a Stereo Microscope

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Currently, numerous tools are used to create forged documents and forgers are successfully making the fabricated documents with these tools. Photocopier is one of such tool often used to reproduce the original documents; therefore the document examiners must find some empirical method to prove the authenticity of the documents in the court. In this paper, a comparative study has been done to compare the original with photocopied colored and black and white handwritten documents for all possible striking features. Stereo microscope gives a 3-dimensional view of the strokes and in this paper an effort has been made to compare the handwriting present on the original document and photocopied document with the aid of stereo microscope to differentiate the document is original or photocopied.
Keyword: Photocopied Document, Colored Document, Stereo microscope

DO-08

Distinguish between Forged and Guided hand Signatures

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The paper outlines the features of stimulated signatures as well as the signatures which emerged from the joint effort of two hands, one being disable hand and the other a normal hand guiding the former. In imitation speed presents the greatest hurdle and if, however, the speed is maintained the minute features become divergent and the pictorial look of the forged signature become dis-similar. In the assisted signature, the helper puts the pen in the hand of the writer, places the hand at the right place on the paper and also makes the writing hand steady in case it becomes unbalanced during the progress of the signature. Some signs of spontaneity may, therefore, appear in such signature provided the latent fundamental pen-sweeps are stimulated during assistance and operation.It has been emphasized that two persons trying to write concurrently will certainly produce a writing which will be abnormal involving erratic pen strokes. Even if the guided hand is completely passive, natural writings will not be produced due to the abnormal state of affairs. The paper has quoted extensively from 'A. S. Osborn' for stressing that if two writers, having at their command different styles of writing, cooperate to produce a signature; there will be a conflict as regards to letter designs. But if the two writers usually write in similar style, the production of a signature as a cooperative venture may show less defects. The author has discussed and enumerated the signs and symptoms of different classes of guided hand signature.The scientist of questioned documents, in encountering a cases of this nature, will have to apply his mind mostly into the qualitative and quantitative differentiation as far and near variations from the norms which are received as standards for comparison.

Key Words : Forged Signatures, Simulation, Guided hand signature, hand writing characteristics, natural variation.

DO-09

Forensic Detection & Decipherment of Cheque

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Cheque fraud, one of the vital challenge, is faced by financial institutions and businesses etc. With the advancement of computer technology it becomes easy for criminals, either independently or in organized gangs, to manipulate cheques in such a way as to deceive innocent victims expecting value in exchange for their money. To prevent such types of fraud, a number of Security Features under Mandatory and Desirable Category have been proposed by CTS 2010 for the implementation and improvement of cheque. The current research work is focused to assist to the forensic scientists, bank officials and layman etc for the awareness of enhanced features of cheque and their use in the detection of cheque fraud. The decipherment between genuine vs fake cheque is just based on the forensic identification/examination of Security Features. In addition with that MICR and IFSC also play an important role for the forensic examination of cheque which can be performed either by physical comparison or by online verification.

Keywords:NIA, CTS, MICR, E13B, IFSC etc.

DO-10

Secret Writings and Evaluation of Common Methods used to reveal Secret Writings

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Secret writings are the art of hidden or invisible writings which do not appear unless exposed to any of the revealing process. This paper is intended as a technical introduction to Secret writings for those who are unfamiliar with the field. Secret writings are used to convey message to anyone in hidden form. This research paper comprise sample of invisible writings written by using organic Fluids and Sympathetic Inks. They were revealed by using physical method by heat treatment and by chemical methods.
Keywords: Secret writings, Invisible ink, revealing process

DO-11

Studies on Suicidal Notes- Some Case Studies

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The suicidal case in India is very alarming. As per the NCRB (National Crime Records Bureau), MHA, Govt. of India report, Sikkim and Tripura of North-eastern states show high percentage of suicide in the country. It is observed that in suicide cases sometimes the victim use to leave behind suicidal notes. The examinations of such notes help to establish the crime. The writing of suicidal note in disturbed mental condition affects the writings. Some real case studies on suicidal notes, seized during investigation have been examined /compared with admitted writings of the victims. The variation observed on writing features in such condition of mind bears significant character to establish the fact in all the cases under study.
Keywords: Suicidal notes, admitted writings, mental condition, variation.

DO-12

A Study to Identify Natural Tremors in Signatures of Genuine Persons and Their Comparison with the Tremors Made By the Forger While Doing Forgery and Its Significance

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Natural Tremor in the signatures of genuine person is an involuntary deviation in the desired path of a stroke while signing. These Natural Tremor may occur in the handwriting of genuine person when the writer is novice and unfamiliar with the script or semi-literate, having weak muscular coordination, due to illness or old age, having weak nervous system and sometimes the person is under intoxication or exerted. The Forged Tremor/hesitations may occur while forging the signatures of other persons. These are intentionally introduced while copying the signature of old aged persons having Natural Tremors, installed at wrong places and sometimes by using unaccustomed hand by the forger. In the present study an effort has been made to compare the Natural Tremors with the Forged Tremors from a sample of 200 Subjects. The subjects were in the age group of 55 to 82 years of both sex and are semi-literate, graduates and post graduates having tremors in their writing. All the Subjects were told to give ten specimen signatures and then told to copy the signatures of other persons. The result revealed that the Natural Tremors are difficult to imitate and there are significant differences in the Natural Tremors and Forged Tremors after comparing the natural variations in the signatures of genuine persons.
Keywords: Natural Tremors, Forged Tremors, Significant differences, Natural variations

DO-13

Case Study of Disguised Writings

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A large chunk of cases pertaining to Handwriting examinations include falsification of documents by self- disguise. It is therefore become necessary on the part of a Handwriting expert while examining the case exhibits to rule out the possibility of disguised nature of supplied specimens and their misinterpretation. Since the expert is not aware of the circumstances under which the comparable materials were procured by the concerned Investigating Agency and therefore when they encounter the case exhibits during examination process, an extra effort to observe through the whole exhibits to do justice with the case is required.
Keywords: Disguise, exhibits, specimen, experts, misinterpretation

DO-14

Decipherment of obliterated writing using Photo Scientific Aids- A case study

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Obliterated writings are not visible to the naked eye and can be deciphered through photographic techniques, Instruments and other modern sophisticated imaging devices. The case with obliterated writing on a document was received in the laboratory for decipherment of the original writing. The writing was obliterated with the help of thick layer of correcting fluid. Nondestructive techniques were used for their analysis. The document was also photographed using various photographic techniques i.e. ultraviolet light photography, infrared light photography, transmitted light photography etc. The images were processed with the help of software i.e. Adobe Photoshop. The original writing was successfully deciphered.
Keywords: Obliterated writings, Imaging Devices, Photography, Adobe Photoshop etc.

DO-15

Forensic Application of Scanning Electron Microscopy with EDX for the Characterization of Questioned Documents

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Document examination is an important forensic discipline and the legal system regularly needs the knowledge and skills of the scientific expert when questioned documents are involved in criminal or civil matters. Amongst the many aspects of the scientific examination of documents, elemental analysis can provide useful results. In this study, the evaluation of the analytical performance of a commercially available scanning electron microscopy with EDX (SEM EDX) instrument was

conducted on laser printer toners and printer toners. A total of 80 toner samples from various manufacturers were analysed and discriminated on the basis of different elements present in the respective toners. SEM EDX demonstrated detectable and significant differences between laser printer and photocopier toners as well as between different brands of toner samples. The present method in combination with chemometrics provided comparable discrimination powers for the selected sample sets. SEM EDX is a suitable technique for the determination of elemental composition as part of a protocol for the examination of questioned documents.

DO-16

Study of Insertion of Page in a Commercial Document: A Forensic Study

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Study of insertion of a forged page into a document particularly in Commercial Documents/Wills for wrongful gain and deceit have been a prominent practice in modern day white collar crimes This paper is an extensive study of such a document referred by Hon'ble High Court at Kolkata, in which a particular page has been suspected to be inserted subsequently after the finalization of an commercial agreement. The study was conducted in multiple stages viz:

(1) Study of the type-scripts.
(2) Study of the ink of the type-scripts through absorbance and reflectance spectra.
(3) Study of the watermark of the paper.
(4) Study of the ink of the signatures present in the documents.
(5) Study of the pin-holes/stapled marks present on all the pages of the documents.

This extensive study alongwith scientific analysis yielded interesting results, which have been discussed elaborately in this paper.

Keywords: Type-Scripts, fluorescence, Absorbance and Reflectance Spectra, Pin-Holes, Relative Age.

DO-17

Study on Role of Muscles in Identification of Handwriting

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This paper presents study on Role of Muscles in Identification of Handwriting. Biologically muscles are made up of fibers. Transformation of invisible writing signals originate from the brain into visible form in precise manner, by hand muscles is a highly individual mechanism of a writer. There is transmission of an impulse from the nerve to a skeleton muscle. As the myelinated nerve fiber approaches to a skeleton muscle fiber, it loses its medullary sheath and branches at its terminal end into terminal ramifications. At the tips of these terminals ramifications of nerve fiber are still other structure called as sole feet which makes an extensive contact with a specialized part of the muscles fiber membrane to form actual neuromuscular junction.

The number of muscle fibers is generally determined in an individual. Muscles get their functional efficiency and accuracy by regular use and practice. On receiving the writing signal through fine motor nerve, muscles starts working with hand, finger and thumb. Factors responsible for mental and neural disorder may damage characteristics movement of finger and thumb muscles.

The finger and thumb oriented writing characteristics and traits are muscular coordination of an individual. Action of muscles during the execution of writing with respect to pivot is known as movement, which includes direction, slant, rhythm, pressure, patterns, line quality and speed. It shows role of muscles in identification of handwriting.

DO-18

Unpredictable Alteration and Interpolation of Secured Printed Account Holder's Data: An Exceptional Case of Bank Cheque Forgery

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Apart from currency notes and credit/debit cards, still bank cheques plays very vital role in transaction of money for their ease and convenience. Due to this cheques are vulnerable to forgeries by anti-social elements.. Many cases of cheque forgery are related to the interpolation or alteration in amount, while in other similar cases it is observed that the forger scans the whole cheque leaf and by using advanced printers produce almost exact replica of the original cheque but in present case the forger altered the cheque number, IFSC detail, bank branch detail, account number and subsequently interpolated new detail, and used the same for duping the bank and for fraudulently transfer of money to his account. Extensive examination using VSC instrument regarding, printing, UV security features, paper examination etc successfully established the fraudulent nature of alterations made and modus operandi followed.

Keywords: Bank Cheques, Forgery,Security Features, UV Security feature, Fraudulent, Interpolation, Video Spectral Comparator.

DO-19

Manipulation of Documents Using Digital Printing Technologies

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Since Chester Carlson's discovery of xerography in 1938 and the subsequent introduction of the first commercial automated xerographic photocopier in 1960, there has been a phenomenal growth in the development of non-impact printing technologies. Today, it is possible to purchaseinexpensive colour ink jet and laser printers with amazingly high text and graphic print quality. Although of slightly lower resolution than impact printing technologies such as offset lithography, this gap is likely to narrow as relatively inexpensive higher quality products become increasingly available to the general public. Easy availability of these hardware gadgets like computer, printer, scanner, copier as well as image enhancement software such as Paint, Photoshop etc. have revolutionized the reproduction of documents with much improved print quality. Ready access to such technologies poses a serious challenge to many businesses and police forces because of the increasing likelihood of criminal actions such as removal of corporate intellectual property, fraud and counterfeiting. The characterization of digital printing technologies used in manipulation of documents is a challenging

task. The Forensic Document expert sees these devices as an opportunity and exploits their features to detect instances of fraud perpetrated by fraudsters.

Keywords: digital printing, xerography, inkjet, laser.

DO-20

Raman Spectroscopy in the discrimination and characterization of toners from laser printer and photocopiers: A newer approach to Questioned Document Analysis

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In the modern world of computers, scanners and printers, the number of handwritten documents has been drastically reduced. The use of printed and copied documents in order to store and exchange information has become the one of the very common practice in almost all sections of society. This has allowed the counterfeiters to generate fraud documents with the intent of causing harm or damage to property, person, nation or economy. Documents generated with the help of laser printers/ photocopiers have very minute inconspicuous differences, which are otherwise difficult to detect with naked eye. Document frauds like false contracts, fake cheques, medical reports, fake passports, counterfeit currency are constantly received in forensic science laboratories for the examination and authentication. These forgeries have further necessitated the use of sophisticated and better methods of analysis than are currently available. In the present research, Raman spectroscopy is used as a method of analysis for 48 toner samples from laser printer and photocopier machines from different manufacturers. The various components of toners mainly polymers, pigments, dyes, surfactants and other additives are discriminated with the help of raman spectroscopy. These different formulations tend to show different spectral features and thus, samples were grouped according to them. The printouts produced from various laser printers and photocopiers were thus discriminated and classified with the help of this technique. Raman spectroscopy is non invasive, fast, reliable, and produce repeatable results. Such techniques will further allow the forensic document examiners to cope with the increasing number of cases containing printed matter along with the high evidential material to be presented in the court of law. This technique can be further extended to analysis of exhibits in other disciplines of forensic science.

DO-21

Examination of Questioned Cheque with DOCUBOX HD: A Case Study

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Like Counterfeit currency, there is also very common crime of counterfeiting the important documents such as Cheque, Passport, PAN Card, AADHAR Card etc. One such case was received in Regional Forensic Science Laboratory, Chanakyapuri New Delhi in which all the watermarks, security marks, coding contents were visible, still it was a Counterfeit one. The examination of cheques was quite challenging due to the fibre destruction caused by physical abrasion and the reprinting of the contents was done above the abraised surfaces/areas. The same was examined and reported with the conclusion with the help of Docubox HD.

Keywords : Counterfeit, DocuboxHD, Cheque, Paperfibre

DO-22

Decipherment of Invisible Inks with the Help of Instruments: A Case Study

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Examination of invisible inks on surface of writings is one of the challenges encountered by document examiners. Inks in which dye disappears with span of time from the written surfaces are Invisible Inks that can be made visible by observing under different light sources of sophisticated instruments like Docubox HD. Present is the study of a case in which a cheque was written with so called a magic pen, wherein the ink of original writing disappeared after sometime and later on the same cheque was filled with different pen for the monetary benefit. Using various lighting conditions with multiple range of filters, we were able to decipher the original writings beneath the existing writings.
Keywords : DocuboxHD, Magic Pen, Decipherment

DO-23

Q.D. Report led to 20 years imprisonment- A case study

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In a case of bank-fraud, the police registered a case u/s- 409, 467, 471 I.P.C. against a Bank Manager, who obviously denied the charges. The documents related to loan sanction by the manager, were the prime evidence in the present case. The accused pertained to be an innocent as if he is not even aware of any such loan sanctions. He denied the authorship of signatures on all the “loan sanction” evidence documents. The Questioned documents along with the specimen as well as admitted signatures of accused were submitted to State Examiner of Questioned Document Laboratory, Madhya Pradesh, to establish the authorship of the signatures on the Questioned documents. The Questioned signatures, total 67 in numbers, were compared among themselves and then with the supplied standard for the characteristic features. Although the data available in any of individual questioned signatures, more specifically the simplified initial signatures, were too limited; though the collective data of all Questioned signatures were found sufficient for conclusive comparison with the standard. The meticulous examination at the laboratory resulted in fixing the authorship of the Questioned signatures by the accused. The report of the expert along with personal deposition before the honorable court was well received and played a key role in arriving at a conviction for the accused with an extraordinary punishment -imprisonment for total 20 years and a fine of 26 lacs.

DO-24

Identification of Printer by Printed Document Examination

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The use of laser printed documents is increasing day to day. The standard methods is not available to examine those documents. This problem is the motivation of writing this paper for classification, identification, detection and analysis of printed documents. A printed document is usually examined

to determine whether or not it is forged or to determine its source of origin etc. For this different methods are available but standard method is required for uniformity in forensic community. The main aspiration of this paper is to provide standard method, so that forensic community can implement in forensic laboratories. For this we considered same font and same text printed paper of same slot on same brand black and white company printers of different models with different OPC drum diameters. The printed papers were analysed for printing quality, printer traces and printing material. Printing quality was examined on the general basis examination of characteristics of morphological features of words/strokes, toner particle distribution. Printer trace was examined on the critical basis examination of characteristics of cyclic defects produced by the OPC drum and roller marks produced by the paper transport system. And printing material was examined on general basis of characteristics of toner composition. All the characteristic were examined by using naked eye, magnifying glass, Microscope, VSC6000, ESDA , FTIR and MS. On the basis of above finding characteristic, we were able to differentiate the printed papers. The method has been applied on different model printers and found encouraging results. Therefore, forensic community may like to adopt this method for linking of the printer with the printed papers.

Keywords: Printed Documents, Printing quality, printing traces, printing material.

DO-25

Effectiveness of VSC- 40 and Docucentre- NIRVIS in Determining Sequence of Strokes of Blue Pen Ink and Blue Seal- A Comparative Study

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Sequence of strokes is the study to determine the sequence in which writing strokes are made on the paper. Determining sequence of strokes is an important part of forensic document examination. In this paper, the chronological sequence of intersecting pen strokes with seal ink has been determined using VSC- 40 and Docucentre- Nirvis. The exemplars were prepared at different time intervals. The results were obtained by observing Continuity of ink, Relative gloss of the ball point ink, Spreading of ink, and Dragging of ink pigments. Intersections of blue seal impression with blue colour pen ink (fountain pen ink, ball pen ink and gel pen ink) were studied. Strokes were examined under both the instruments. The effectiveness of instrument for examination of sequence of stroke has been compared.

Keywords: Seal impression, Blue Pen inks, Intersections, VSC- 40, Docucentre- Nirvis, Blue seal

DO-26

Detection of Forgery in Suspected Documents– A Case Study

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In this paper an attempt has been made to describe the characteristics involved in examination of Handwriting and Signatures. In that aspect visible light and hand lens, software and some regular but substantial and authentic techniques were used to drag the truth from the piece of paper. In this paper genuine and forged signatures detected by instruments and software by their size, space, slant, characters etc. Alteration and addition in numbers and words detected by microscope and software for pen pressure, different ink, tremors etc. Each case studies shown different characteristics which was detected on the basis of case requirement.
Keywords: Handwriting, Signatures, Alteration, Case studies, Forensic Science.

DO-27

A New Approach for Forensic Accounting in Financial Fraud

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In recent years, accounting fraud has occurred widely throughout the globalized business sector. Why for – The main intent of Forensic Accounting is to help law enforcement agencies and regulatory bodies in curbing white collar crimes and scams. Forensic accounting is the application of accounting principles, theories and discipline to facts or hypothesis at issues in a legal dispute and encompasses every branch of accounting knowledge. The objective of this paper is to follow a new approach of Forensic Accounting in investigation of the financial evidence. Paper also focuses on the area of analysis and presentation of the financial evidence in a computerized form also finding the communication in the form of exports, exhibits and collection of document. Beside it, it also assist in legal proceedings, including testifying in court of law as an expert witness and preparing visual aids to support trial evidence.
Keywords: Forensic Accounting, Regulatory Bodies, Financial Evidence, Legal Proceedings

DO-28

Region Wise Differences in Stroke Formation for DevnagriScript: A Comparative Study

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Devnagri script is one of the oldest scripts of India which is used to write Sanskrit and Prakrit languages like Hindi and Marathi. This study aims to identify differences in sequence of formation of characters in Devnagri script by people from various regions of India. This difference may be attributed to the style of writing taught in the school of that particular region. A person who has completed his/her primary education from a specific region of India may have region specific way of writing for Devnagri script. The difference in the way of forming the characters can be a class characteristic to identify the region of the writer. For the present study, India is divided into four regions viz. North, South, East and West regions. Handwriting samples of people from various regions are collected. The format of handwriting sample includes three different given texts which are

to be copied by the individuals. Our study reveals that formation of strokes for making Devnagri letters are unique to specific region.

Keywords: Devnagri, stroke formation, class characteristics, region specific features.

DO-29

Forensic Characterization of Blue Ball Point Pen Inks Using High Performance Thin Layer Chromatography (HPTLC)

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Ink analysis plays a vital role in determining source, origin and authenticity of documents. Opinion based on handwriting features can be strengthening with additional information based on ink analysis. Present study involves characterization of 50 blue ball point pen inks on the basis of their dyestuffs using High performance thin layer chromatography (HPTLC). Primary classification has been done on the basis of major dyestuffs whereas subsequent differentiation has been achieved by analyzing additional spots at specific wavelengths using TLC scanner. Obtained results enabled differentiation within models of same make. The method showed high reproducibility (R.S.D <2%) and repeatability (R.S.D <2%). Concept of relative intensity of spots proved to be a negative approach to differentiate similar ink profiles.

DO-30

Use of Confocal Microscope in Sequence of Strokes

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Confocal microscope, apart from its uses in the biological sciences can also be used for the determination of the sequence of intersected lines placed on a questioned document as a non-destructive technique. In this study, oil based (ball point pen), liquid-based (fountain pen and gel pen) ink of black and blue color, and so forth. Homogenous intersections and effect of pen pressure was observed. In this study, Nikon Confocal A1 microscope was used and total 60 samples were examined. Results concluded that confocal microscope proved to be a reliable and precise method for the analysis of homogenous intersected lines and pen pressure. Pen pressure played an important role in determining the accuracy of the sequence irrespective of the ink color. The analysis was done on the basis of grooves created by the tip of the writing instrument i.e. pen. Over 80 percent of samples gave the positive result in terms of identifying the exact sequence beyond any error during interpretation. The intersections made by the same color of an ink were visually differentiated by three-dimensional images.

Keywords:sequence of intersected lines, homogenous ink, pen pressure, oil based ink and liquid based ink.

DO-31

A Writing Instrument Used to Committing Document Frauds

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In recent scenario, scientific examination of ink analysis is a biggest task. Literature and survey reveals that, some magic erasable ink pens were consistently used to commit financial frauds of documents. In this field, alteration, editions, substitutions and manipulations of the documents are biggest problems. These types of magic erasable ink pens are easily available in local market. Every day manufacturers of the writing instruments are introducing different types of pens with different technologies like gel pens, fountain pens, ball point pens, felt tip pens, oil based ink pens and high tech ink pens. Some manufacturers provide double-sided felt tip pens with fine fibre felt tip on one side which writes like normal ink pen and on the another side having thick fibre felt tip for erasing purpose. When the thick fibre tip is applied on the writings done with fibre tip on the other side of such pen, it is completely erased and not visible with naked eyes.Here, we deciphered this type of magic erasable ink on different papers and articles with the help of VSC-6000/HS. The main aim of this research work is to develop simple, rapid, sensitive, eco-friendly, economically viable, portable and non-destructive methods to retrieve original writings of rewrite-erasable ink. The research in such field will be directly beneficial to society as well as law enforcement agencies which give additional motivation to do research in the field of forensic questioned document frauds.

DO-32

Identification of Regional Belongingness of Writer through Examination of Dialectical Features in Gujarati Handwritten Documents

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In case of incognito letter where perpetrator, whose effort is to conceal his/her identity, forensic linguistics and dialectology can be of great value to the investigation and identification of writer. Although Gujarati is the mother-tongue across the length and breadth of Gujarat state, there are a variety of dialects within Gujarati language as we move from one geographical region to the other within the state. These dialectical variations can be applied in crime investigations to narrow down the search by Identification of Regional belongingness of writer. In the present study, samples were amassed from the different areas of Gujarat and were analyzed to optically discern people on the bases of their dialectical features. Significant variations could be observed to geographically categorize the dialects and authors.

Keywords: forensic, dialects, Gujarati, language, author, documents

DO-33

Hyper Spectral Imaging as a Tool for Discrimination amid Forensic Falsification in Documents

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Hyperspectral imaging (HSI) as a non-invasive technique, has evolved as a tool in forensic analysis especially in cases of forensic document examinations. In this paper this most useful tool has been explored for forensic document examination. In document examination frequently issues of forgery of printed document, seal impression and fingerprint are encountered. Normally these prints are often questioned on its authenticity. Many times in document that prints part on each other and form a smudged area on document. This smudge area is unable to observe clearly. This paper is focused on distinguishing printed text, stamp impression and fingerprint on document. Here using VSC-6000/HS with HSI range is used to distinguish and photographs were taken for record.

CRIME SCENE

CSO-01

Unnatural death of a minor boy: A drug overdose case

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Proper interpretation of evidences collected from the crime scene can solve the crime without dispute. In a case, dead body of a minor boy (12yrs) was found in a secluded place surrounded by bushes in a hillock. There were vines trapped in the toes and disturbances present on the ground. Dendrite tubes and lots of their torn pieces, polyethylene transparent packets and 'Korrect it' fluid bottles in the area, stained handkerchief from pocket, love letter from school bag were found. Chemical burnt like marks present in hand. Minor injuries were present on earlobe and toes. Bleeding from nostrils could be overserved. Stain on the handkerchief matched with dendrite. Deductions from all these findings lead towards overdose from strongly suspected case of murder. PM findings also supported our findings.
K**eywords:** Minor boy, Drugs, Overdose, Evidence.

CSO-02

Reconstruction of Typical Accident Case

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INTRODUCTION- In general, when a dead body is found at a public place, law & order situation is created mainly by persons related to dead person. In some cases relatives and other person make false allegations with few names because primafacy scene of crime and injury looks like homicidal in nature, especially in those cases where eye witness is not present. This case is also like that: a half naked body with cloths rounded over neck was found inside a farm house. His cloths, vehicle, sleeper, etc were missing.

OBSERVATION---ON BODY

1-Body had lacerated wound on hand, abrasion on leg.
2-Blood flow pattern on body down to earth.
3-blood sticking on both leg palm region.
4 No cloths below kamar region.
5-one old cloth (chunari) rounded neck loose without knot.

ON VECHICLE—

1-top gear, engine in on position (key), head light on, petro knob on.
2-damaged headlight, indicator, lever break dent in leg guard, tank.
3. Scratch marks in different places - front to back direction.
4. Blood spot on handle.
5. tiny leaves stuck on different parts of vehicle.

SCENE OF CRIME—

1-vehicle on khai where big stones were present.
2-elevated, curvy, sloppy road.
3-from road to vehicle track pattern on grass, tree etc, distance is 30 feet. Sloppy and 10 feet deep from road.
4-on track broken part present.
5- Tracks width was one foot where grass crushed in upward direction.
6- above60 feet from vehicle, plane ground was present where dhoti and gamcha of dead person was found. blood spot present in these cloths look like used for first aid.
7-from vehicle to dead body distance was 600 meter in L shape. Track was covered with blood drops of size one cm at different intervals. In some places, especially in starting and end point blood pools were present.

ANALYSIS OF OBSEEVATION

1-Road was curvy and upward where accidental possibility is max.
2-Injury on body like traffic injury.
3-vehicle having speed collision impact dent/damage.
4.-person move and try to take first aid.

CSO-03

Study of Gunshot on Aircraft- Triggered By Chhattisgarh Naxalites: A Crime Scene Investigation

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Aircrafts of Air Force/BSF are mainly used in naxal area like Chhattisgarh (Bastar Division) for transportation of Force, goods and pickup injured police/ BSF/ CRPF/ CAF/ paramilitary force persons etc. During the search operation by Air Force aircraft in dense forest area of Bastar, Chhattisgarh, Naxal Maoist targets the aircraft to perform maximum damage to force or civil persons.

When bullet strikes the aircraft, it makes holes/ perforation effect/ dent on the body and/or wings of aircraft. Such types of crime scene investigations have been done by Forensic Scientist of ballistic division of State Forensic Science Laboratory, Raipur, Chhattisgarh. The purpose of investigation is to determine the actual position of Naxalites, targeted helicopter/ aircraft, height of aircraft, distance and direction of firing. These values were evaluated mathematically by using geometrical/ trigonometry methods so that an alternative method may be adopted to avoid the bullet striking on the target and also to reduce the injury/casualty.

K**eywords:** Crime Scene Investigation, Naxal attack point, Distance and direction of firing, Geometrical/ Trigonometry method.

CSO-04

Importance of Reconstruction of Scene of Crime: A Case Study

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The examination of Scene of crime & reconstruction of the Scene of crime is one of the most important step for the investigation of the Special crime cases. During the examination of the scene of crime, with the help of Forensic Scientists, the Investigating Officer is able to collect the vital physical evidences from the scene of crime. With the help of these physical evidences the IO of the case can connect the culprit and can connect the chain of incident happened during the crime. With the help of reconstruction of the scene of crime in the presence of forensic scientists, the Investigating agency can correlate the three main steps: what was happened before the crime, during the crime and after the crime.

Brief history of the Case:

In a day light police encounter case at busy crossing near Ghaziabad a criminal was shoot dead in his car when he was travelling towards Ghaziabad from Delhi and during the encounter two police officials were also got injured and later on, one police official was died. The said encounter was transferred to the CBI for the investigation to ascertain whether the encounter is real or fake.

Forensic Findings in the Case:

The scene of crime was examined by the CFSL/CBI team and Reconstruction was done at the same spot where the incident was occurred. The reconstruction of the scene of crime at the original site is very important for fruitful result. During the Reconstruction of the scene of crime the following points were considered to arrive at correct line of investigation:

(i) Post Mortem report of the deceased
(ii) Post Mortem report of Police Official
(iii) MLC of police officials
(iv) Statement of the police party involve in the shootout.
(v) Forensic examination of the exhibits received in the CFSL for examination
(vi) Photographs of the deceased taken after the Shootout
(vii) Photographs of the vehicle driven by the deceased

After the examination & Reconstruction of the scene of crime by the CFSL team on the basis of the above points, it was concluded that the encounter was consistent with the police version. In this paper the author wants to discuss the importance of the Reconstruction of the scene of crime.

Keywords: Reconstruction, physical evidences, correlate, incident, Post Mortem, concluded, consistent, version

CSO-05

Forensic Reconstructive Analysis of an Alleged Murder in A Hit &Run Incidence: Accidental or Homicidal?

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This submission describes the reconstructive and simulative forensic analysis of a sensational case of death of a politically active youngster following a hit & run incidence on a bridge, in which allegation of murder i.e. a pre planed homicidal hit & run was made by a group. The incidence initiated a rivalry of various political groups, attracted large media attention, and police and administer had to tackle severe law & order situation. Finally, a team of forensic experts was constituted to scientifically analyze the incidence and to decide whether the incidence was of accidental or homicidal nature.
The incidence took place on the tapered portion of a bridge in a populated area of the city. To begin with, the overall damage profile of the affected vehicle i.e. a bike and the presence of the scratches, dents, bends and the transferred materials were observed and analyzed minutely which lead to an extrapolation of the size, shape and hitting portions of the questioned vehicle. Secondly, volume and pattern of the traffic on the sight of mishappening during specific hours was observed and recorded.
Finally, the incidence was reconstructed with the said position of the vehicle using repeated simulative exercises with similar vehicle with respect to the relevant marks and various other indicative features on the spot and the probabilities of a planned hit & run with homicidal intention vis a vis an accidental hit (due to the negligence) were scientifically examined and a useful opinion was provided with logical reasoning.
In addition to the above analysis, on the basis the extrapolated profile of the hitting vehicle, a number of suspect vehicles, seized by various police stations were observed and opinion regarding the probable hitting vehicle was also provided.
K**eywords:** reconstructive analysis, simulative exercises, homicidal, transferred material.

CSO-06

A Modified Scene of Explosion: Forensic Spot Investigation, Reconstruction and Chemical Analysis

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Fireworks industries are always prone to incidences of accidental explosions followed by fire and arson causing massive loss of human life and property. Indian fireworks industries, in particular, more

prone to such happenings, because of use of unauthorized manufacturing places, crude and unsafe raw materials and methodology.

In this submission, Spot investigation followed by laboratory analysis of case exhibits relating to a sensational case of explosion in the vicinity of a village residential area is discussed. There were contradictory versions regarding the possible cause of the incidence – a planed sabotage by anti social elements versus an accident due to negligence during crude manufacturing process.

After minute inspection of the scene, seat of explosion, the storage pattern of raw materials, finished fireworks products and the equipments used in manufacturing, the possibilities of sabotage and accidents were scientifically examined and the relevant exhibits were collected and seized, which were examined in the laboratory. Finally, the incidence was proved to be an accidental explosion, initiated by highly impact sensitive explosive admixture which was used to crudely fabricate the cartridges of a toy pistol, and a useful opinion regarding the possible sequence of happenings was given.

Keywords: Fireworks, Explosion, Spot investigation

CSO-07

Application of Forensic Photography in Resolving the Mystery of Triple Murder Case

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Crime scenes are dynamic, rapidly changing environments and the first officers to arrive on the scene must be concerned with countless details. The crime scene is the location from which the majority of the physical evidences associated with the crime are obtained. It provides investigators with a starting point for the inquiry to determine the identities of the suspect and victim and to compile together the circumstances of what happened during the crime. Physical evidences found at the scene can be the key to the solution of the crime. The first officer's most important task at the scene is to prevent the destruction or diminished value of potential evidences that may lead to the apprehension of the criminal and the ultimate resolution of the crime. Once the first officer at the crime scene has established that the victim is dead and has made a inspection of the crime scene, superiors must be notified regarding the nature of the case.

Keywords: Crime scene, suspicious death, suicide, homicide, circumstantial evidences

CSO-08

Crime scene examination of LPG EXPLOSION: A case study

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Liquefied petroleum gas as a fuel for cooking purpose is most commonly used in every houses. Although along its all efficient quality, this harmless looking cylinders can actually be dangerous .Accident prone to the leakage of it in confined area create a flammable atmosphere and give rise to an explosion, which are too common heard and seen in day to day news.observaton and study of pattern of damage in such accidantle cases can provide reference data to differentiate LPG explosion from other kind of explosion. This paper emphasis on the case study of LPG gas explosion tool place

in west Delhi, where five person including two children and a senior citizen were killed while eight were injured.

Key point: LPG, cylinder, explosion, damage, seat if explosion

CSO-09

How the Recovere Valuable Physical Evidence Refuted the Hypothesis Generated by the Party and Unfolded the Murder Mystery

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Forensic science starts with the crime scene that contains a treasure of information to solve the mystery. Crime scene investigators work directly at the scene of crime, analysing the situation and gathering valuable evidence to achieve the goal of crime detection to crime conviction. It is evident from several important case examples that every witness may turn hostile, but scientific evidence gathered from the scene of crime after appropriate analysis become solid evidence which does not change with time. Physical evidence cannot be intimidated. It does not forget. It sits there and waits to be detected, preserved, evaluated and explained.

From Sherlock Holmes to CSI, crime scene investigators have long relied on scientific methods to turn routine observations into case-cracking evidence, and it can be significant in supporting or refuting hypothesis generated by parties. Supreme court often emphasized that in a criminal case, the fate of the proceedings cannot always be left entirely in the hands of the parties. The endeavour has been made by the author, by exploring a case example, to emphasize on the importance of prompt, thorough and scientific processing of crime scene, for recovery of valuable physical evidence, resulting, a lead in right direction that ultimately end in conviction by refuting or ruling out all the hypothesis generated by family and general hostile attitude of witnesses. Recovery of partially burnt cartridge cases from earthen stove, same day on the spot, turned the simulated story in a murder case.

Keywords:crime scene management, physical evidence, hostile witness.

CSO-10

Important Elements to Analyze the Manner of Death obtained From the Crime Scene in Suicidal Hanging Cases Occurred in Bangalore City – A Retrospective Study

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Suicide or self-destruction occurs throughout the world, hanging has become one of the common method in committing suicide. Interpretation by a forensic crime scene expert provides a potential and vital information through reconstructing a undistorted crime scene to analyze and establish the manner of death. A retrospective study on 75 cases between January 2014 to June 2015 revealed Male preponderance (64%) and female (36%), Ratio of 16: 09. In the present study age group between 26 to 35 (34.67%), were observed in committing suicide. Saree was an optional and easily accessible ligature material found used by the victims (45.33%).Short suspension was found in (29.33%) cases followed by long suspension (18.67%) cases. Partial hanging was observed in (34%) of the victims

followed by complete hanging (13.33%). Death notes are very vital evidence and were available at the death scene (6.67%). This study has proven the hypothesis of observing the importance of the death scene to analyze the manner of death from the crime scene findings in hanging cases. Overall view of this study suggests for an appropriate orientation programme to improve the quality of the work are necessary to improve the crime scene investigation.

Keywords: Hanging, Suicide, Crime Scene, Suspension, Ligature material

CYBER/COMPUTER

CyO-1

Examination of tampered electronic document

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The world is moving towards paperless offices and therefore with implementation of office automation most of the important and confidential information is now stored and communicated in electronic forms as an image or text using various interacting Medias viz. emails, SMS, Whatsapp etc. The genuineness of the e-document received at the other end needs to be authenticated. It is observed that there is maximum possibility of tempering in e-documents. Hence a method is required to establish that the e-document so received at the other end is "as it is" without any tempering in it. A lot of research is going on regarding temper-proof e-documents. Digital Signature Certificate and Hashing are some of the method to check whether e-document is tempered or not. However, these methods do not pinpoint altered text in the tempered e-documents. This research for examination of electronic documents is very helpful in the field of investigation.A programme is designed using object oriented programming language of Computer to overcome above mentioned problems. Computer reads any e-document in binary language i.e 0 and 1. The programme so designed is named "KamalVidya". Using this programme, it is possible to examine tampered electronic documents and subsequently it will display the altered text in result. This programme can be used in investigation of tampered e-document as well as can be used as to establish a secure means of e-document communication. The programme so designed has in-built function to detect and decipher obliteration, addition or deletion in e-documents with capability to locate even a small "dot or space" added or deleted in the e-document. It also includes comparison of two e-documents and finding similarities and differences between content.

CyO-2

Dirty Secret-A Case Study

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The sexual related crime scenario in the country is very alarming. As per report of the NCRB(National Crime Record Bureau), MHA, Govt. of India, every 34 minutes, one rape case is reported in India. In-spite of stringent punishment under various sections of IPC(Indian Penal

Code)and other laws, the sex crime is in increasing order with electronic tools like smart phones, i-pod, tablet and laptop etc. These tools are easily misused to record/store obscene picture to stimulate the young girls for sex activities. Many such cases are reported against friend, teacher, relative and neighbor in the society. In one case, a 9-year old girl was admitted in an English medium school. Taking advantage of the age and social status of the girl, the principal often used to call the girl to his residential room inside the school campus and showing her obscene picture from electronic mobile (Tablet). The principal had also sex several times with the girl recording the obscene picture in the tablet. The girl being underage, had disturbed mind and insisted her parents not to study further in the same school. Knowing such reluctance, the parents insisted to know the reason and ultimately she narrated sexual assault on her, committed by the principal. Thereafter, parents lodged a complaint to the police. In the course of investigation medical examination of the victim girl and seizure of the tablet were made for Forensic examination. The details have been examined in the Cyber Forensic division for establishing the fact.

CyO-3

Authentication/Identification of IMEI Number of Smartphone - Forensic Significance

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The IMEI number of mobile phone is vital important parameter for identification of mobile via hardware and software techniques. The IMEI number contains very important information related to mobile brand, model and manufacturers information. The IMEI number is very important to identify the mobile in case of loss/theft. This laboratory has receiving many of cases regarding the fake IMEI number of smart phones for identification of authentic IMEI number. The Unique international mobile equipment identity (IMED number uniquely identifies each mobile anywhere as IMEI number was programmed uniquely to identify an individual mobile device. The hacker have designed various methods i.e. flashers equipments and software techniques to change the IMEI number of mobile devices so that lost or stolen mobile devices doesn't recognize by the investigating agencies. By the change of IMEI, hacker misuse the mobile as of threat call, bank account number, false email, false messages and use phone directories stored on mobile etc. The Forensic scientist facing a lot of problem to find out the authenticate IMEI number of mobile phones during examination. The author's research may be recognize the alteration of IMEI number and maintain the authenticity. To prevent such attempts some methods are presented in this paper. This paper also list out the various methods of changing the IMEI number, software tools are used for changing the IMEI number of various mobile brands. At the last this method is proposed which if implemented will help in prevention of Change of IMEI and locate the lost or stolen devices anywhere.

CyO-4

Study of Metadata and Display Properties of Image and Video Files for Source Identification in Mobile Forensic

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Embedded or captured data of image/video files in smart phones can be sent to another smart phones through various applications i.e. SMS,MMS, Bluetooth,Some Social networking applications such as

Whats-App, Facebook, Twitter, Wechat, Hike etc.and also exchanging the data by copying the information. The activities of exchange of data among smartphones is a paramount important for the forensic scientists in solving the crime cases when smart phones, in which the embedded and captured data, involved as a tool in criminal activities. To solve such incriminate activities, the metadata and the other display properties of image/video files information have been analyzed for identification of the origin of the source to help justice delivery system.

CyO-5

Analysis of Barcode Forgery using Cyber Forensic techniques -A Case Study

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Today, we are talking about digital India, smart cities and many more about cyber world. India is growing globally and digitally. But in this digital era cyber security and prevention against forgery is very challenging. Cybercrime is the latest and perhaps the most complicated problem in the cyber world. Any criminal activity that uses a computer either as an instrumentality, target or a means for perpetuating further crime comes within the ambit of cyber-crime. Digital evidence means information of probative value stored or transmitted in digital form. In digital world our entrepreneur, shopkeepers are using digital code, barcode labels for each and every product which make its very authentic and easy to locate the products.In this paper we are presenting a case study related to digital forgery of barcodes. This paper examines the making of manipulated barcode labels using electronic instruments and software and the use of these forged to different products in the market. As the encoded information is intended to be machine readable only, a human cannot distinguish between a valid and a maliciously manipulated barcodes.

CyO-6

Advancement in Cyber Crime

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In the current era of online processing maximum of the information is digitalized, data processing become complex & online, where advancement in Cybercrime behavior is becoming ever more serious. Beginning from the 2002 or beginning from IT act's Computer Crime Survey show an upward trend that demonstrates a need for a time to time opinion of existing approaches to fighting this advancement new phenomenon in the information age i.e. (Internet of Things), artificial intelligence, robotics. In this paper, we define different types of advance cybercrime and current status of fighting against advance cybercrime in INDIA along with other countries that depend on legal aspects, organizational (telecommunications, banking and finance, government operations, transportation, electrical energy, water supply, emergency services) and technological approaches. We focus on a case study of fighting cybercrime in INDIA and discuss problems faced. Finally, we propose several recommendations to advance the work of fighting cybercrime because cybercrime would be impossible without the Internet of things (IOT). Mostly businesses such as electronic

commerce (E-commerce) work on the Internet. Cybercrime falls into various categories: (1) A computer is the target and tool of criminal activity; (2) The electronic devices and communications devices (Mobile, Internet)Is only an Incidental aspect of the crime.

My paper gives detailed information regarding advanced cybercrime, its types, and modes of cybercrime and security measures including prevention to deal effectively with cybercrimes Internet of things (IOT), and future view of cybercrime also try to find upcoming type of Advance Cyber Crime is most practices or used in the world.

CyO-7

Detection of SMS Spoofing in mobile forensics – A case study

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Mobile crimes are not only being used for the purpose of perpetuating criminal activities but also the purposes of targeting mobile networks also. Mobile crime is becoming increasingly important challenge for law enforcement agencies across the world. A variety of mobile crimes are emerging on the horizon. Spoofing is a malicious practice in which communication is sent from an unknown source disguised as source known to the receiver. SMS spoofing is one kind of spoofing allows to change the name or number text messages appears to come from. In this paper we are presenting a case study related to SMS spoofing and this paper examines the person has spoofed with his own identity using third party applications.This is the challenging case study, which will be beneficial to the further spoofing related investigations.

CyO-8

Study of Electric Circuit-cum-Switch used in IED: A Case Study

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Now a day's crimes relating to terrorist and terrorism have dramatically increased in overall region in India. In Digital India, people are more familiar or increasing use of electronic technology and this electronic technology are very much improved and advanced which all peoples are using as application.Electronic technology forensic is an increasingly important field within digital forensic. This is because of increasing number of criminals and terrorism cases. In this case study electronic wireless technology one of the important device, like electrical switch cum circuit, remote controller, batteries, on-off switch, LED, connecting wire. This all materials and devices were used for creating bomb circuitry. Terrorism is a complex term, compromise of “Terror" and "ism" which may simply translate as the philosophy or creating terror or fear or destruction. The whole world is under the fear of this terrorism. This terrorism activity increasing day by day in India. In this article we are presenting a case study about Electric Circuit-cum-Switch used in Improvised explosive devices.

CyO-9

Recent Trends in "Smart Phone Forensics"

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A Mobile Phone is commonly found digital evidence at almost all the crimes scenes and all crimetypes. These devices can be valuable evidences as well as great clues and leads regarding the activities of the owner/user of that particular device and his associates. In the current digital age, devices have become too advanced with the advent of Mobile device operating systems like "Android", "iOS" and Windows. For This very reason these devices are often referred to as "Smart Phones". Thus, there is a need to address the issues of (A) Forensic Imaging and Acquisition of Device (B) Extraction/Recovery of relevant evidences from apps. In this paper, it is intended to provide a brief introduction to various stages in Smartphone forensic process with issues, challenges and possible solutions.

CyO-10

Methodology used for recovery of CCTV footages/videos from DVR/NVR Hard drives

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Nowadays complete surveillance is not possible through human eyes. So millions of CCTV cameras are installed in streets and business throughout the world with a goal to reduce crime and increase public safety. Closed Circuit Tele Vision CCTV represents the most common surveillance technology currently utilised in various places such as hospital, colleges, schools, railway station, malls, mini store and sensitive places. Introduced for crime control purposes, it has undergone immense function creep and is now focused on a multitude of behaviours and activities such as murder, rape, cheating, truancy, smoking, bullying, human performance naughtiness. Cyber expert faces many problems to recover video files such CCTV DVR/NVR Hard drive. This paper provides method to recover CCTV footage video files form DVR/NVR Hard drive which will be useful in investigation purpose.

CyO-11

Diving Deep in the Ocean of Time

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In a Digital System each and every activity that took place is logged at various places in vivid formats, like MFT, LOG files, History, SQLite Database, Registry etc., Pooling all these activities together and Construction of a time line starting from the point of installation of the file system can give an in depth view of various activities that took place. This will help the Digital Forensic investigator to have a better understanding of the evidential data to support the investigation.

CyO-12

Primary Memory: Methods of Collection and Analysis

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All the activities that took place in a digital system are virtually performed in the Primary memory RAM. The availability of high capacity RAM in the Personal Systems and Servers, also availability of only RAM in Cloud Systems along with the increase in the isomorphic malwares which function from the primary memory makes the collection and analysis of this Primary memory as part of Information Security Management System. This paper discusses various methods for the collection of the Primary Memory and techniques for the analysis of the Primary Memory.

CyO-13

Art of Registry Analysis in Windows Forensics

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Registry is a Hierarchical database of vivid logs produced by different system and application activities. The analysis of this database as the first step in the forensics of a windows machine provides vital leads related to the recent activities that took place and sometimes help in the completion of analysis of digital media in minimum turnaround time. There are more than 200 registry artefacts available which provide useful information related to a large number of system, application, user and device peripheral activities.

CyO-14

Decryption of Encrypted Whatsapp Databases of the Android Devices

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WhatsApp is a cross-platform instant messaging application available for Android, iOS, blackberry, Windows Mobile, Symbian, and Asha operating systems .WhatsApp Messenger is designed to use secure and encrypted end –to –end communication makes it difficult for the investigation agency to get WhatsApp details from the carrier's side as WhatsApp activity logs are nit maintained by the mobile phone service provider and internet service provider. Hence, the only way to acquire WhatsApp details is imaging end-user devices or pulling data from local or cloud backup. WhatsApp database encryption key mainly used for WhatsApp Android platforms. In present study, we identify various challenges in the data security issues in instant messaging application on the android platform which aid in forensic investigation and describe about the details of WhatsApp database file stored in various OS based mobilephones,Decryption of the WhatsApp database file of a such mobile phone has been carried out, which is not possible by standards forensic software, by developing a method

with help of open source software and tools.Thus,we tried to elaborated decrypted chat messages and other artifacts forensically with relevant metadata.

CyO-15

Time Stamp: Important Measure in terms of Digital Evidence

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The uses of wireless technology has changed tremendously in the form of various electronic devices. The types of smartphones are increases in market and people majorly depends on them for the communication and business purpose which leads into increasing cybercrimes. Timestamp is very important major for the valid evidence. Generally many cases relies on timestamp. In this paper we share how we experimented in particular model of smartphone that date of file created of evidence file received from whatsapp is differ from the actual date of file received on device which should follow mobile default timezone UTC+5:30.

CyO-16

An Overview of Forensic Tools used in analysis of digital evidences

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Nowadays wide range of digital forensic tools are available for analysis of digital evidences. As technological advancements are increasing investigators are facing with a diverse set of digital evidence and being able to identify a particular tool for conducting a specific analysis is an essential task. In this paper, we introduce digital forensics investigation process and present a systematic study of computer forensic tools using a hypothesis based review to identify the different functionalities supported by these tools. This paper is based on a comparative study Computer forensic tools. It also includes a brief description of the tools which are used for the comparative study and the details of the parameters which would be used for the comparison.

CyO-17

Investigation of Video and Audio content – A Metamodeling Approach

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The versions of Android, iOS and Windows software are different among themselves on their installed applications and are becoming a challengeable job for the forensic scientists to know-how the details of properties of the applications in the software in smart phones. A difficulty and ambiguity being faced while identifying the criminal activities being carried out when transfer of the video with audio files to other mobile phones. This study is to identify and differentiate whether the video and audio content recorded using the android based mobile phone is having the same property when the recorded video and audio content sent to other mobile phones through various applications such as Shareit, DCIM, Bluetooth, Whatsapp, MobileTrans, Universal Serial Bus (USB) transfer,

Media Transfer Protocol (MTP) etc. In this study, it has been observed and found that there is a challenge of identifying if the video with audio content recorded from the same mobile device used to transfer to many other mobile devices or otherwise? to overcome the difficulty in identifying the original recording source of video files with audio content, a ten number of various branded mobile phones based on different versions of Android, iOS and Windows software have been used to expose the video with audio for a period of time and transferred the recorded file to other mobile phones through various transfer protocol applications. A metamodeling +metadata approach using Mobile Forensics Metamodel (MFM) was conducted to finalise and conclude to reply the query as stated. This study will help in identifying whether the file is originated from its original recording device or was reached from the second device which received from the original device.

CyO-18

A Systematic Approach for Cloud Forensics

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In the contemporary world of digitalization, local storages are not enough to fulfil user's need. So a new technology was derived termed as cloud computing. Cloud computing is very significant due to its utility services provisioned with shared utilities and virtualized resources. Cloud computing is new model which enables convenient and on demand network access to shared resources like Network, Servers, Storage, Applications and Services. But, Cloud computing is facing many challenges as far as security is concerned. So, cloud forensics is one of the measures to provide counteract to security concern. This paper focuses on performing comparative analysis, source of evidence, analysis process of the evidence and other important artefacts found from cloud storage devices. Collected evidence will further separated with the use of data mining technique. Moreover, this paper also explains about challenges faced by investigators in cloud forensics and introduce new systematic approach for cloud data analysis and log analysis.

CyO-19

Detection of Malicious Codes inside JPEG Images

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Malwares have become the new vector of cybercrime and hackers are finding new ways to propagate these in all available platforms. Hackers/Attackers are tactfully using social media as a medium to spread malwares to create backdoor & infect the machines over network to acquire important data and resources. In the present scenario, several automatic readymade tools are available over internet using which any script kiddies can create a dangerous malwares and victimize his target. These malware generator are also have categories & generations. JPEG embedded with malicious codes or JPEG backdoor are one of them and regularly used by the hackers for their purpose. All tools discussed in this paper are actually used in actual scenario of crime of steeling data either in dark net or as a paid service. So, in this paper we detail different virus creator generator and analyze the several collected

samples from several info-security/ malware databases companies to find the artifacts of malicious JPEG.

CyO-20

An Approach for Malware Analysis using Memory Forensic Technique

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Memoryforensics is the most interesting and provocative field of digital forensics. It is an analysis of computer memory dump. It contains everything in the OS traverses RAM, i.e. Processes, threads, Network sockets, URLs, IP addresses, Hardware and software Configuration, Windows registry keys and event logs etc. Memory forensics also provides the complete analysis of malware, which check traces of malware, Trojan, Rootkits, worm, spyware, virus, in malware dumps that have been created while running in an operating system. It is a complicated task for forensic investigator to analyze all the part of Digital media. In this paper, we monitor malware running in secured system and analyze its system behaviors, such as process, CPU, Disk, registry, and network activities. We furthermore determine how to analyze malware behavior from memory and verify the results with different malware samples which shows suspicious activities, which is also helpful for cyber security defense.

CyO-21

Virtual Reality and 3D Animation in Forensic Visualization

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Computer-generated three-dimensional (3D) animation is an ideal media to accurately visualize crime or accident scenes to the viewers and in the courtrooms. Based upon factual data, forensic animations can reproduce the scene and demonstrate the activity at various points in time. The use of computer animation techniques to reconstruct crime scenes is beginning to replace the traditional illustrations, photographs, and verbal descriptions, and is becoming popular in today's forensics. This article integrates work in the areas of 3D graphics, computer vision, motion tracking, natural language processing, and forensic computing, to investigate the state-of-the-art in forensic visualization. It identifies and reviews areas where new applications of 3D digital technologies and artificial intelligence could be used to enhance particular phases of forensic visualization to create 3D models and animations automatically and quickly. Having discussed the relationships between major crime types and level-of-detail in corresponding forensic animations, we recognized that high level-of-detail animation involving human characters, which is appropriate for many major crime types but has had limited use in courtrooms, could be useful for crime investigation.

CyO-22

A Technique of Detection and Analysis of Distant Ransomware

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In today scenario, Ransomware is one of the most concerning and prevalent forms of malware, which encrypts the data and demands for ransom for getting decrypted. Ransomware exactly blocks access of your device & may lock the data in such a way that normal person can't longer to decrypt, as due to they use different asymmetric cryptographic algorithm. These populous ransomware, i.e WannaCry, Petya, Bad Rabbit, Double Locker, Lockybot, Riper etc. which affects smartphone, system & network and encrypts whole information. In this paper we will present & analyze the observation of above ransomware samples and find the conclusions which can draw some good results. Above analysis will provide a number of preventive measures that user can take in order to protect their data and get prevent from ransomware.

CyO-23

Reverse Shell Attack – Innovative Method For Data Acquision From Remote System

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Work on computer malware was started around 1950. Malware, short for malicious software derived to harm, steal confidential information or gain unauthorized access of infected system. So, the same procedure could be used to gather all precarious evidence about criminal and monitor their activity by penetrating into the criminal's system. The real-time cyber-criminals are difficult to outsmart if we go through-out the virtuous way. That's the reason here an infected backdoor file has been developed which reveals all accurate information about the criminal's system after installation. By this way the investigative agencies can access and control all the features, programs, tools and database of criminal's machine, even if he/she is roaming around the world.

CyO-24

A Study on Retrieving Data After Private Browsing

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Private browsing has been a popular privacy feature built into all mainstream browsers. A criminal can use the private browsing feature of various browsers to do any sort of criminal activity so that the information that they are accessing will not be deposited onto the hard disk in the form of history, cookies, etc. The aim of the study was to detect residual information which is left by web browsers on the computer system's memory. No traces as such are supposedly deposited onto the system's hard disk which is a great repository of evidence in any given With respect to this, the volatile memory can be checked in order to see if any of this data can be found. RAM being another main repository of evidence can be searched and checked for such information which can help provide leads to investigation, evidence to support investigation in a forensically sound manner.

CyO-25

Threat Perception and Security Management Models for Online Financial Transactions

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With the greater than ever reach of internet and almost all operations of the world on the fingertips of human, the world of online transaction have become omnipresent and has attained prominence. Not only the online customer base and online business houses & service providers have increased tremendously, but also the threats to such online financial transactions. Standard industry security mechanisms help to provide protection for financial transactions, but do little to protect the network itself and thus, the threat remains.This study is an attempt to identify such threat vectors and the security measures/ management models put in place to counter such threats. Gaps and solutions are outlined for each component of online transaction processing, with particular reference to most used websites in India.

CyO-26

A Novel approach for image forgery detection

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The proverb that a picture doesn't lie has no meaning in digital era. A digital image is not only manipulated but also abused with malicious intention. Doctored image may even found on internet and many of the celebrity became victim of such a manipulation. The present study addresses an automatic approach for image forgery detection based on discrepancies in noise profile. The algorithm has been designed to detect image forgery for spliced images. A database of 460 spliced facial images has been created using Photoshop. The database had been utilized for evaluation of the proposed algorithm. The result of the proposed algorithm is quite satisfactory.
Key words: Image forgery detection, digital image, photoshope, automatic approach.

CyO-27

Cryptocurrency- 21st Century Currency

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Technology-the main factor for humans in today's world is evolving day by day. This also includes a small system that is the currency system which has been constantly evolving since the concept of money was introduced. But in this age of technology, the next level of the currency system is Digital Currency, which is better known as the "cryptocurrency". The first cryptocurrency was introduced in late 2008 by Satoshi Nakamoto. The very first cryptocurrency that came into existence was "Bitcoin".

Bitcoin is a digital currency designed for various transactions, which works totally in a decentralized manner. There are several cryptocurrencies came into existence as an alternatives of Bitcoin. However cryptocurrency is not without its weaknesses, such as digital security, market regulation, speculative attacks etc. So in this paper, we discusses history, transaction procedure with its trends. We also discuss various pros & cons of different cryptocurrencies available in the virtual market.

PSYCHOLOGY

PsO-01

Effect of Surprise Question on Polygraph Examination

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This study tested the effects of surprise question (SQ) during the polygraph recording and its magnitude with respect to relevant and control questions of that questionnaires. A sample of 50 real case subjects were tested with an introduction of the SQ as the final question in the final run of the polygraph recording. Study shows noticeable response in all physiological parameters. Blood pressure and GSR are found to be more reactive to the SQ and the *inter se* comparison of questions revealed that SQ triggers more physiological response than that of Relevant and Control Questions. Study confirms that it is prerequisite to review the questionnaire before the actual recording and to make the subject familiar about the questionnaire.

PsO-02

Application of Polygraph test in a Terrorist Case

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This case study tested if the Polygraph (Lie Detection) test can be a better tool to verify the veracity statement of a hardcore criminal like terrorists. It was revealed that Polygraph test results gave a lead to investigating agency beyond verifying the statement leading to the arrest of another terrorist. Polygrams of the terrorists showed characteristic universal deceptive/truthful signs to the contrary belief that hardcore criminals can defeat polygraph test. Further investigation confirmed the findings of the polygraph results. This study proved again that the conscious effort to beat the polygraph test elicits more physiological responses.

PsO-03

Psychological Method to Ascertain Mode of Death: A Case Study of Accidental Death

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In the present case, suspected persons who were having enmity with the victim where exonerated after the polygraph examination. The crime scene profiling was done to understand the place of the incidence which was found to be prone for accidental slip. The physical, environmental and his psychological state was analysed to ascertain the mode of death as an accident. The present case study is to highlight the means of death using psychological methods where there were no any material evidences to suggest the contrary.

PsO-04

Polygraph Test of Eye-Witness Helped To Catch the Accused of the Blind Double Murder Case - A Case Study

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Polygraph helps in ascertaining the truth in the statement made by the person i.e. suspect, complainant, witness. It helps in distinguishing the innocent and the real offenders. During the Polygraph examination the innocent person remains stable and non-deceptive responses are disclosed while the real offender show nervousness and deceptive responses are revealed.

In this case, a blind double murder was committed at night. One of the deceased was police officer having his service revolver with him. The eye witness (a dhaba boy) saw their murder being committed, but he did not disclose. He went to the spot when the murderers fled from the spot and took away the service revolver of the deceased police officer lying on the spot and concealed it under the earth in his dhaba. After some days he with the help of his friend sold the revolver to some person. One murder was committed with this service revolver after some days. When the dhaba boy came to know that a murder has been committed using the service revolver he had sold, he surrendered to the police. During investigation he told the police that the revolver with which this murder has been committed was sold by him and narrated the police how and from where he got the revolver. He told the police how the double murders had been committed on that night. He also told the names of the accused who have committed the murders on that night and from where he had lifted the service revolver. The investigating authorities did not believe him and brought him for lie-detection test to ascertain the truth in his statement. The Lie-Detection test of the witness (dhaba boy) was conducted firstly. Based on the Polygraph test report of the witness (dhaba boy), the Polygraph test of the accused disclosed by the witness (dhaba boy) was performed at Forensic Science Laboratory, Haryana, Madhuban. Results of Lie –Detection test proved that the eye witness (dhaba boy) was truthful in his responses and the accused were found deceptive. With the help of Lie-Detection test of the witness only the accused could be caught and the mystery of the blind double murder case was unfolded.

PsO-05

Aggressive Behavior among Juveniles at Observation Home of Gujarat State: A Comparative Study

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Over the years it has been seen that the number, variety and nature of crimes committed by juveniles are increased.Juvenile criminals between 14 and 18 years accounted for more than 60% of the crimes registered against minors in India last year 2016. Recently released figures of the National Crime Records Bureau (NCRB) have revealed out of the 43,506 crimes registered against minors under the Indian Penal Code (IPC) and the Special Local Law (SLL) by juveniles, 28,830 had been committed by those between the ages of 16 to 18. Society has seen an increase in the incidents of aggression/violence among juveniles which includes behaviors such as slapping, hitting, rape, recklessness, driving and shooting in school, truancy, road rage and other high-risk behaviors. This study focuses on the different types of aggression and its magnitude among juveniles at different observation homes of Gujarat state. To examine this; a self-report questionnaire was filled by juveniles and for that a sample of 30 male juveniles (10 from Ahmedabad, 10 from Surat, 10 from Vadodara) who are in conflict with the law and living in a state observation home. A questionnaire examining aggressive behavior was classified in four types – Physical aggression, Verbal Aggression, Hostility and Anger. To interpret the data the t-test and correlational method was employed. It was found that there is a correlation between the various dimensions of aggression.
Keywords: Juvenile, Observational Homes, Aggression

PsO-06

Tobacco Use and Its Relevance with Impulsivity

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Tobacco has been related with the various aspects of personality and especially impulsivity has been linked by different studies too. Although tobacco dependency and its correlation with the behavior is a vast area and it has a dynamic impact with the changing times. According to a general notion the drug users are supposedly more impulsive as compared to the non drug users. Impulsivity, thus, implies upon the unpredictable behavior without understanding the repercussions of the acts being conducted. This kind of impulsivity is also hub to criminal acts at some point of time or other. Thus, the present study aims on linking tobacco dependence with the impulsivity using psychological testing batteries and preliminary psychological examinations.
Keywords: Drug users, Tobacco dependence, Impulsivity, Behavioral aspects.

PsO-07

Investigation of Factors Affecting To the Criminal Direct and Its Effect on Their Personality

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Are criminals born or made? The argument, known as the "nature versus nurture" debate, raises the question, whether criminality is due to genetic factors, and therefore unavoidable, or whether it is the product of social, situational, environmental surroundings, and other external factors. To determine what makes a criminal "a criminal," one must understand his/her personality traits. The objective of this study was to examine the relation between personality traits and criminal behavior by using MPI. The result showed that there are differences in personality types among the control group and experimental group due to some personal & demographic details like education, occupation birth order, habits etc. The outcome of the study will help to narrow down the psychological interrogation of offenders and to develop interventional modules for the correction/rehabilitation of offenders.
Keywords: Personality, Offenders, Criminal Behavior, MP Inventory

PsO-08

Lie Detection through Scientific Methods – Their Validity and Legal Acceptability in Criminal Justice System

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The methods applied for detection of deception have been found useful and sophisticated methods of interrogation however their scientific validity and legal acceptability is a matter of debate among scientific and judiciary but significant utility of Polygraphy, Brain fingerprinting and Narco-analysis in the criminal investigation cannot be overlooked. As the credibility of an expert witness depends on the strength of the reasons stated in support of his conclusions and the data and material furnished, which form the basis of his conclusions. In the present paper constitutional issues like "witness against himself" as per the protection granted by Article 20(3) of the Constitution , Expert witness & Provisions of Section 45 of the Indian Evidence Act and its credibility w.r.t to detection of deception have been reviewed and discussed.

PsO-09

Braid Chopping a Mass Psychogenic Illness in Gujarat: A Qualitative Study

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Some mysterious events occur nearly every year in India and several people become victimsof such events. It is noticed that this type of events affect particular segments of populationwhich have shared common beliefs. This type of phenomenon transmits collective illusionsof threats, either real or

imaginary, through a segment of population in a society as a result ofrumour and fear. This phenomenon is therefore called Mass Psychogenic Illness (MPI) andhas been reported since hundreds of years in different socio-cultural settings. MPI is neitherspatially nor temporally confined and can strike anywhere and anytime. One suchphenomenon that has characteristics similar to MPI is braid chopping. The braid chopping orhair cutting incidents occurred in different parts of India in the month of July –August 2017.A study was conduct to comprehensively analyze the causal factors of this particular MPIphenomenon. Case study method of research was adopted for this study and 9 cases werestudied by using unstructured interview method. These 9 cases were reported in differentregions of Gujarat. Only police reported cases were studied as investigative team was formedby the Crime Investigation Department, (CID) Gujarat, to reach the bottom of the epidemicand control it as soon as possible. The findings indicate that all the victims shared somecommon characteristics in terms of gender, level of education, socio economic condition,mental set up, kind of illness during the time of incident, level of stress, satisfaction levelwith present living conditions, past history, etc.

Keywords: victim, mass hysteria, mass psychogenic illness, crime investigation, epidemic

PsO-10

Effect of Simulated Stress on Psychophysiology to Determine Deception

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An individual feel stressed when passed through a negative emotion or face conflict, and these underlying emotions and feelings are called stressors. These stressors can be physical, psychological or both but the resulted initial response are the same. Deception relies on one basic principle that an individual undergoing stress will exhibit certain involuntary reactions. A stressor that involves social-evaluative threat (e.g. when performance can be evaluated by other) is the most powerful way to induce stress in laboratory settings. Studies suggest that cardiovascular, electrodermal, and respiratory measures are effective in discriminating between truth and deception; that can be measured by polygraph and interpreted by an expert. This can help in distinguishing between truthful and deceptive subjects. This study focused on the effects of simulated stress on Psychophysiological reactions to determine deception in a comparison question test by using Utah Direct Lie method. Two-group simple randomized experimental design was used. Fifty two college going students were selected through purposive sampling method and students were divided in two groups by fish-bowl method, each having 26 students. Written consent from all participants was collected and information regarding the simulation was provided prior to the experiment. Mock crime scenario of stealing was designed for the study and five items were selected, each having same value of INR rupees 200/-The group which actually performing the act was called an experimental condition-I and the group which did not directly participate in the simulation but was exposed to the situation was called experimental condition-II. All participants were tested on polygraph within an hour of simulation. Result shows that deceptiveness was 7.8% higher in experimental condition-1 than experimental condition-2. Total percentage of truthfulness was 77% and 23% subjects were found to be deceptive.

Keywords: CQT, Polygraph, Deception, Psychophysiology, stress

PsO-11

A Preliminary Statistical Study on Impact of Internet Addiction on Juveniles Which Leads To Anti-Social Criminal Behaviour

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People, especially juveniles are using excessive internet in their daily life and its imapact has become more significant and undenialbale.internet addiction or pathological internet use is regarded as uncontrollable and damaging use of internet. Daily we can blare out lot of crime committed in the internet. Antisocial, criminal behavior is regarded as illegal downloading. Pornography or aggressive information. Cyber bullying, cheating behavior, online gambling etc. there are so many legal provision to protect the cybercrime, still effective provision have to be made and it has to be implemented effectively. The present study was conducted to 200 juveniles, selected through random sampling from school of Jhansi such as Gyansthali public school and modern public school. Internet addiction test by young and criminal behavior scale (self-made inventory) were used as an assessment tools for data collection. Data was analyzed by using correlation test

Keywords: internet addiction, antisocial behavior, juvenile delinquent

PsO-12

Personality Profiling of Personnel Involve in VVIP Security on MCMI-III to Determine Their Personality Pattern & Mental Health

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Do police officers possess certain personality characteristics that make them unique compared to the non-police population? This question has been the subject of an extensive line of research. Several researchers have found evidence of a so-called police personality, while other researchers have failed to detect personality differences between the police and the public. Also, some researchers have found that officers differ from each other in terms of job performance, and that personality differences predict such variation in performance. State Governments have their own mechanism for assessing threat, providing security and reviewing security. The personnel who discharge these duties are special wings of the police force who guard our VVIP, they should be always alert, while guarding the persons assigned to them. They have the high responsibility, stay sharp & attentive and good presence of mind. Therefore, their personality and mental health is become very important factor to determine their competency in the performance of duties. A study was conducted to determine the personality profiles of these security personnel by using Million Clinical Multi-Axle Inventory (MCMI-III). **Methodology:** Single group design and purposive sampling was adopted and total 163 security personnel were participated in the study. Group test was administered and three batches were formed, first two batches comprised of 54 security personnel each and third batch comprised 55 security personnel. **Results**: Result revealed that more than 75% personals were possessed narcissistic and

compulsive personality pattern. Approximately 20% of the screened personnel have some kind of psychological problems. Total 133 security personnel appear suitable to the present type of job. Whereas, 30 security personnel require psychological help to improve their mental well being.
Keywords: Psychological profiling, mental health, security personnel, personality pattern

ABSTRACTS
POSTER PRESENTATION

BIOLOGICAL SCIENCE

BP-01

Analysis of Suicidal Hanging in Port Blair(Andaman and Nicobar Islands)

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It is a grave problem of hangings in Andaman and Nicobar Islands. Every year a lot of people die due to suicidal hanging here. The tendency of suicide by hanging is common and the command on the stress is less. There are so many cultures intermingling together in Andaman and Nicobar. Present scientific study is basically a trial for searching the cause of the suicidal tendencies. The study comprises the factors on which study is based like age, sex, marital status, Place of hanging, time of hanging, ligature material, external examination of the body, type of hanging, occupation and Socio Economic Status of the 26 hanging cases visited by FSL team. A basic idea of the total suicidal death in A & N Islands for the year 2013 to 2015 is also indicated in this study.

BP-02

Analysis of Sexual Offence Cases inTripura

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Tripura is reported to have alarming crime rate against women based on population ratio and case registered. The total cases of three years have been analyzed in FSL on the following heads: (i) percentage of sexual offence victims of different age groups, (ii) percentage of sexual offence victims acquainted with their assailants, (iii) percentage of sexual offence cases occurring at different places (indoor/outdoor), (iv) percentage of victim becoming pregnant as a result of sexual assault, (v) percentage of offenders of different age groups, (vi) percentage of incidence of sexual offence at various hours in a day, (vii) month wise percentage of incidence of sexual assault, (viii) percentage of intra-racial and inter-racial category of the sexual assaults, (ix) percentage of sexual offence occurring among different racial categories, (x) percentage of cases found to be positive for presence of human spermatozoa, (xi) educational qualification of the victims and assailants, etc. The findings of the analysis have been discussed in details in this paper.
Keywords: Sexual offence, rape victims, offenders, crime victimization statistics.

BP-03

Mental Chronometry revealed the TRUTH

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This case study tested if the Mental Chronometry can be of a significant importance in discerning the real and the staged incident by studying the time taken to respond to the stimulus by the reflex action of the brain. Video footage recorded the attempt to assault and the dodging by the victim was analyzed with the appropriate software frame by frame. Reaction time of the victim and the assailant was compared with the reaction time of similar tasks. Appropriateness of the study conducted abroad in this regard is compared. Study revealed the better application of Mental Chronometry in discerning the genuine attempt to dodge from the staged one. Findings are in line with the Scene of Crime investigation conducted by the forensic team.

BP-04

ABO and RH Typing Among Two Population Groups: Prajapatiand Saini of Sambhal District, Uttarpradesh

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Blood group systems have widely been used for understanding human variations however the available information regarding the genetic makeup of Prajapati and Saini population Sambhal district, Uttarpradesh is scanty. The present study was therefore planned to generate a baseline data on ABO and Rhesus system polymorphisms in the studied population groups of the area. Phenotypically blood groups B and A was dominant in Prajapati and Saini Population respectively. Allele frequencies of A, B and O alleles were estimated as 0.2919, 0.4866 & 0.2215 respectively among Prajapati while it was 0.4267, 0.3000 & 0.2733 respectively among Saini Population.
Keywords: ABO, RH, Antigen, Antibody, Agglutination

BP-05

A Heinous Crime Solve By Crime Scene Investigation and DNA Fingerprinting Technology

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An unknown female dead body found at spot with suspected heinous murder and sexual assault. Prompt action and scientific collection of evidences by crime scene officer played a crucial role for the investigation agency to crack the suspect. Investigation agency send exhibits to FSL for DNA examination to establish link between crime scene, victim and suspect. DNA examination result revealed that the Y-Chromosome STR DNA profile on source of victim's vaginal slide, undergarment and nail scrapping matching with source of suspect's blood sample. The Autosomal STR DNA profile obtained from source of victim clothes was in concordance with the Autosomal STR DNA profile obtained from the source of stones (crime scene), murder weapon (knife) and clothes of suspect. Hence, DNA fingerprint result linked among crime scene, victim and suspect.
Keywords: DNA profile, STR, Investigation agency, Crime Scene.

BP-06

Forensic DNA Typing: Tool to Exonerate the Innocence

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Short tandem repeats (STRs) based forensic DNA typing reflects an effective approach for identification of mutilated bodies, establishment of parentage, and solving violent & sexual crimes.DNA typing results not only convict the suspect but also can exonerate the innocence.Personal rivalry & government compensation leads to file false rape allegations. The present study describes one such allegation against two individuals. Forensic evidence collected, preserved and sends for DNA examination along with reference sample of suspected persons. On examination, both suspects were excluded from mixed autosomal STR DNA profile of complainant's exhibit. For further investigation, we requested reference samples from complainant and her husband. Presence of husband's DNA profile was confirmed in mixed profile of complainant's exhibits and false allegation by the complainantwas proved.

BP-07

Hair Analysis Saved the Innocent Accused From Punishment: A Case Study

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An injured person with motorcycle was found on the road by Police vehicle carrying barricades. Police personnel admitted the injured into hospital where he was declared dead. Next day the Newspaper published that the death was due to Police Vehicle. So the Police Vehicle and the Motor Cycle of deceased were seized and sent to RFSL, Nagpur for analysis. Paint transfer analysis showed the negative results. Both vehicles were also searched for biological evidences. Hair samples were found on the Motorcycle. Morphological analysis showed that the hair samples were not from human origin. So, the samples were processed for DNA analysis. DNA analysis using Real Time -PCR proved that the hair samples were from Cow species of male origin which confirms that the reason of road accident may be due to Cow species. So the involvement of Police Vehicle was excluded from the case and which in turn saves the innocent driver of Police vehicle from being punished.

Keywords: Hair Analysis, DNA, Real Time PCR, Cow, Road Accident

BP-08

DNA Profiling Proved the Rape of Mentally Retarded Girl by 70 Years Old Man

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In Crime investigation, DNA fingerprinting is a powerful tool in hands of biologist to detect criminal. DNA is extracted from variety of biological sources like blood, tissue, semen, bones, hairs, saliva etc. In this sexual assault case, 14 years mentally retarded girl was repeatedly raped by 70 years old Man resulted into pregnancy. After 3 months of pregnancy, Medical Officer sent the abortous material in the formalin for Paternity test using DNA technique. Due to formalin it was very difficult to isolate the DNA from abortous material. But still with the continuous efforts and multiple DNA isolation procedure followed from various abortous parts such as undeveloped bones and tissue matter, analyst succeeded in isolating DNA. For the identification of rapist, analyst used 15 STR loci and gender specific Amelogenin locus using PCR Amplification technique followed by DNA typing with Applied Biosystems 3500 Genetic Analyzer. The DNA report concludes 70 years old man to be the biological father of Abortous material.

Keywords: DNA, Polymerase chain reaction, STR profiles, DNA fingerprinting

BP-09

DNA Fingerprinting Confirmed the Accused Out Of 16 in ASexual Assault Case

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DNA from biological source plays a vital role in unveiling sexual assault cases in forensic sciences. Blood, blood stains, semen, tissues, and bones are a source for DNA fingerprinting in cases like rape, missing identity, murder and paternity. In this sexual assault case, 12 year old girl was brutally raped by an Unknown male, while returning from her classes, in an open dump yard in Nagpur, Maharashtra. A total of 16 suspected accused were caught by the investigating officer and their blood and biological samples were collected for DNA analysis. Clothes of Victim, accused and evidences collected from crime scene were submitted to RFSL Nagpur for confirming the presence of biological material. Blood and blood mixed semen stain were found on cloths of victim and accused. All the samples were analyzed with PCR amplification techniques and STR profiles were obtained. 15 accused were ruled out to have any involvement in the case. DNA profiles obtained from blood mixed semen stains on the cloths of victim contained DNA profiles of victim as well as accused. DNA profile obtained from blood detected on cloths of accused matched with DNA profile of victim. Also earth comparison was performed on cloths and chappal of victim, shoes of accused and crime scene and results revealed that earth found is from one and the same source i.e. scene of crime. Thus, DNA profiling gives full proof evidence of sexual assault in rape cases.

Keywords: DNA, Polymerase chain reaction, STR profiles, DNA fingerprinting

BP-10

Use of Immunochromatography Strips in Forensic Science for Human Species Identification- A Case Study

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In forensic investigations, it is important to identify body fluids like blood, semen, saliva etc. In most of the cases, immunological based techniques are used to detect species origin of body fluids. Here we used RSID (Rapid Stain Identification, Galantos Genetics GmbH-Germany) blood immunochromatographic strips to identify species origin in rape case of minor victim where the case is connected by presence of blood only.RSID strips are easy to handle and can be carried even on crime scene . In RSID strips, monoclonal antibodies against glycophorin-A protein (a red blood cell membrane Ag in human blood) is present. These strips are very sensitive and specific.

BP-11

Bottlenecks in Biological Sample Analysis for DNA Profiling

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DNA profiling technology playing a vital role as a useful investigation tool in Forensic science tosolve various heinous crimes like murder, sexual assault, paternity dispute, identity establishmentetc. But the accurate, precise and robust result needs special guidelines for biological samplecollection, preservation and forwarding. In the present topic we intend to impart some precautionarymeasures for sample collection, preservation and analysis procedure for DNA profiling. In additionto above precautionary measurements various inhibitors affecting the DNA profiling of biologicalsamples are also highlighted.

BP-12

An Overview of Child Sexual Abuse in Haryana

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Child sexual abuse (CSA) has been a conspicuous topic of public concern for more than a decade and still many basic features about this problem remain unclear or challenging. Regarding this Records of criminal cases sent to the Forensic Science Laboratory (H) Madhuban were examined retrospectively and have conducted an interpretation of 100 cases of CSA in order to highlight the epidemiological features, relation of suspect vs. victims and to emphasize the need for a multidisciplinary approach to the primary prevention of CSA. We observed an increase in case number with male predominance

and most of the victims came from lower socio-economic classes. The perpetrators were male in 100% of cases; acquaintances in 78% of cases and family members in 22 cases. Medico-legal examination reports are showing many physical effects, 4 attempted suicide, and two pregnancies.
Keywords: Child, abuse, Victim, suicide.

BP-13

Role of Diatoms in Crime Investigation

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Diatoms are aquatic photosynthesizing algae, have extracellular coat or siliceous skeleton frustules, which is composed of silica. Diatoms playan important role in identification of drowned body, whether the drowning was ante-mortem or post- mortem in nature. In the case of ante-mortem, the person drowned when he was alive, may be accidental, suicidal or homicidal. When the person was killed by someone and thrown into water to conceal crime, it points to homicide. If the person breaths inside the water, some water enters into the lungs, resulting in rapturing of alveoli, water keeps on mixing with the blood due to respiratory pressure. Smaller diatoms tend to push into various organs like blood, liver, spleen, kidneys, brain and bone marrow. In the case of post-mortem drowning, diatoms can be detected in the lungs due to passive absorption of water. Due to non-respiratory pressure, the journey of diatoms ends in the lungs.

BP-14

DNA Profiling From Mixed Samples

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DNA analysis has become an integral part of a forensic laboratory and a key tool for investigators but an important query in forensic investigation has long been “How to improve the analysis of mixed DNA samples in cases of sexual assault and homicide?” .Mixed DNA samples contains DNA from two or more sources so generate combined profile of all contributors. These mixed samples contain complex profile having more than one pair of alleles for a single locus. Interpretation of results in mixed samples becomes highly complex in the cases if sample contributors are blood relatives. In present study an attempt was made to generate accurate and rapid data with greater sensitivity and probability theory.
Keywords: DNA, Mixed blood samples, Blood Relatives, Sexual assault

BP-15

DNA Fingerprinting in Crime Investigation: A Case Study

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This is a case study of human trafficking and paternity solved using DNA fingerprinting technique. Molecular marker is a useful tool for investigation of crime at genetic level. The Forensic Use of DNA Profiling is a major contribution to the technology which can help not only in including the culprit but also to exclude the innocent. In this article an attempt is made to elaborate the changing scenario of the technology in the recent years using different variants of the DNA fingerprinting technology in solving various cases in our laboratory. A baby girl of age 2 years was found admitted in trauma centre, AIIMS, New Delhi, having various injuries on her body with alleged history of fall. On detailed enquiry by the police it came to know that the couple who admitted the child were not her biological parents. The team of police was made to trace out the biological parents of the child. During the investigation , a case of human trafficking came to light where the child was brought from Bihar. While undergoing treatment**,** thechild could not survive**.** For DNA examination, a piece of sternum of the deceased, blood stained exhibits from the spot of the house and blood sample of suspected parents were sent to this laboratory. The case was concluded on the basis of DNA profiling using AmpFl STR Identifier plus PCR amplification kit in 24-Capillary Genetic analyzer and data analysis by Gene-Mapper IDx Software.
Keywords: DNA, STR, Biological parents, DNA profiling, Genetic Analyzer.

BP-16

A Case of Child Trafficking and Swapping: Need of DNA Based Identity System

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One of the main social problems that have been increasing recently is human trafficking. As per the reports an average 1.2 million children are victims of trafficking every year. The application and usefulness of DNA identity testing is already well-documented. Present study focuses on a real case on child trafficking and child swapping in Madhya Pradesh. The identity of three children was in question and biological relationship was established by the genetic analysis. STR based DNA profiling not only proved the biological relationship but also established social and legal relationship. There have been few attempts at global level notably DNA Prokids but we are lacking far behind on this sensitive issue of legal and social concern. This paper is an attempt to raise the need of DNA based identity of the child at the time of birth to meet the future challenges.

BP-17

A Case Study: Importance of Biological Examination

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Forensic biology is the analysis of body fluids stains and other bodily material to help solve a crime. Typically this involves the positive identification of blood, semen or saliva and further genetic testing (DNA) to determine who the material may have originated from victim, suspect or other involved party. During biological (semen) examination of case from police station Varaseoni district Balaghat (M.P.) crime no. 243/17, under section 376 (2) IPC . Some interesting finding were observed . A minor female child aged 4 years was physically exploited by an accused aged 17 years. The exhibits from victim were vaginal slide,laggy and from accused pubic hair and underwear. The exhibits of victim were containing blood stains and human spermatozoa, though the hymen was intact as per medical report (MLC).The underwear of accused was also containing blood stains and human spermatozoa. These exhibits have been sent for DNA examination by investigating officer to correlate the accused with victim. Thus the biological examinations are helpful to resolve such types of cases which are highly affecting the society.

BP-18

Sex Determination from Pulp Tissue of Teeth

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To evaluate the diagnostic performance of X (Barr body [BB]) and Y (F body [FBI]) chromosomes observed in dental pulp tissue for gender determination of an individual going to the scientific advancement and technology a drastic change is seen in the criminal scenario, road traffic/ rails /aviation accidents, mass disasters, wars; and the bodies which are found beyond recognition. Sex identification becomes the most intriguing, complex, and some time controversial challenge. Teeth, being the hardest substance in human body, potentially can survive most of insults and consequences and accounted at teeth at death and during decomposition. The tooth pulps remain protected in the hard tissue and this technique is very beneficial in the identification and sex determination.
Keywords; Forensic science, Barr bodies, Forensic odontology, Gender determination, Pulp tissue

BP-19

Significance of Polilight in Forensic Science

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Identification of biological evidences, such as blood, semen, saliva and urine, are important for crime scene investigation. As we know that biological stain can difficult to detect and recovered from crime scenes so forensic light source have been used for biological evidences. This method is a simple, presumptive, non-destructive test. The polilight was able to detect stains that were not apparent to the naked eyes. Biological evidences on different materials would have different effect in detection of stains and can be detected by forensic light source due to their natural characteristic, such as light absorption (blood) or fluorescence effect (semen, saliva and urine) so in forensic science polilights are very useful in detection of biological stain.
Keywords: Forensic Science, Biological Evidence,Polilight.

BP-20

Sensitivity Determination of Reagents for Detection of Seminal Stain on Soil Surface

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Identification of semen is particularly useful in the investigation of sex crimes. Semen is a suspension of spermatozoa in seminal plasma which is a pool of different secretions by different structures and such as vas deferens seminal vesicles, prostate gland, and mucous gland. Seminal plasma consists of a very high concentration of citric acid , fructose , zinc , phosphoryl choline , glycerol phosphoryl choline , Spermine and spermidine ,acid Phosphatase , Y- seminal protein , 19-OH.Prostaglandin, etc. Seminal fluid is type of body fluid presenting in human species and is highly important in the process of human reproduction volume is about 3ml per ejaculate. It is a suspension of spermatozoa in seminal plasma.
Keyword- seminal fluid, sodomy, bestiality, sexual murder, sexual abuse.

BP-21

Origin of Species Determination of Bloodstain Using FTIR Spectroscopy

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The main objective of the present study is to identify the origin of blood to determine the species from where it came from during the process of investigation related to blood and blood stain. In this study, Fourier transform infrared (FT-IR) Spectroscopy is used as a confirmatory, non-destructive, and rapid method for distinction between human and animal (nonhuman) blood. FTIR Spectroscopy demonstrated complete separation between human and animal donors as well as distinction between four separate species i.e., human, pig, sheep and goat. It is very important for the forensic examiner to determine the species origin of blood encounter at the scene of crime so that it is easily to know its origin. The blood was collected from different species such as human, pig, sheep and goat. The species collected from healthy donors were subjected to laboratory analysis with spectroscopic technique. Perkin Elmer Model, Spectrum-2 was the instrument used to analyze the species of blood. The spectra obtained after analysis of different species of blood is subjected to study further.
Key Words: Bloodstain, FTIR Spectroscopy, Human Blood, Animal Blood

BP-22

Gender Determination through Dried Blood Stain

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Y-Chromosome short tandem repeat markers have a number of applications in identity testing, in case of sexual assault and tracing paternal lineages for missing person investigations. In order for Y-STR system to becomes more widely accepted within the forensic DNA typing community. It have to learn how it work then it was collected 14 blood samples and dried these blood samples for different time duration after that time duration extract the DNA form all different samples by changing the traditional method of DNA extraction. Through Agarose gel confirm the presence of all DNA samples because it was extract from dried blood samples. It was choosing randomly eight primers (DYS390, DYS460, DYS497, DYS494, DYS464, DYS481, DYS453, and YGATA)in which some were tetra nucleotide and tri nucleotide repeats. Primers for the marker to amplified the duplicate regions which were present in Y chromosome then it was able to find out our which samples were belongs to male one and which samples was belongs to be female. In these sample due to this analysis confirm that blood sample- 2 and 12 were may be female one and rest of samples 1,3,4,5,6,7,8,9,10,11,13,14, were belongs to male.

Key words: Gender,identity, testing, primers, regions, amplified.

BP-23

Gender Identification by the Comparative Study of Index and Ring Finger Ratio

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Personal identification is required when the identity of the dead body is unknown and the recovered body parts whether it is Hand, leg, or their bones are dismembered, mutilated or decomposed, or there are some cases where the culprit mutilate the body parts just to hide the identity of the dead body, or in the case of mass disaster, bomb blast, the forensic anthropologist play an important role because in forensic anthropology there are several techniques, methods for the determination of the identity of the person. The length of the index and ring finger is a sexually dimorphic characteristic, which can be used in the determination of the sex in the cases explained above. This study was conducted in Delhi Region. 300 participants were involved. The length of the index and ring is used to calculate the index to ring finger ratio. On the basis of mean value of these ratios in both sexes the sectioning point is determined. On the basis of sectioning point this is concluded that the value of ratio equal or more than 0.97 is indicative of a female's hand. And the value lower than 0.97 belongs to the male.

Keyword: Personal identification, Gender discrimination, Index finger, Ring finger, Sectioning point, Disaster.

BP-24

Future Aspects in Forensic Onychology: An Essential Entity against Crime

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Forensic Onychology (Greek word, Onuks = nail, Logia = study of) is the subject which deals with study of fingernails and toenails for better administration of justice in the court of law. Identification me and determination of individuality of a person. Nails are important tissues for human identification. One of the major advantages of utilizing nail is that, in comparison with other tissues, sample size and sampling process can be considered relatively non invasive and non destructive and yet each nail retains a discrete record of detailed information on genetic inheritance, drug use, pathology, diet and location history as well as exposure to explosives residues or other pollutants. In contrast to soft tissues, nails survive relatively well in the decomposition environment. Furthermore, in contrast to other long lasting tissues (such as bone and teeth) nails are easy to decontaminate from external sources of DNA. Thus examination of nail is very useful in many ways against crime. In this paper, we discussed about structure and method of analysis of nail, utility of examination, drug use and nails and detection of DNA from nails.

BP-25

ATR FT-IR Spectroscopy: A Non- Destructive Tool for the Detection of Blood on Different Substrates

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Blood is commonly encountered trace evidence found at the crime scene. In present study, we report the detection of blood by using ATR FT-IR spectroscopy on various substrates in which the case samples are most likely to be encountered. In addition, other simulated substances which can cause false positive result were also examined. The result showed that ATR FT-IR spectroscopy is an excellent choice for the detection of blood on the front surface of all porous and non-porous substrates, but there is interference due to the porosity of substrates. The simulated samples easily distinguished from blood and not provide any misleading signal.

Keywords: Detection of Blood, Attenuated Total Reflectance Fourier Transform Infrared Spectroscopy, Forensic Science.

BP-26

DiatomologicalStudies of PondohDam of Himachal Pradesh by Using Light and Scanning Electron Microscopy: A Forensic Perspective

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Forensic significance of diatoms in ascertaining the place of drowning as well as the manner of drowning is vital. However, to do so, it is imperative to perform the diatomological mapping of water bodies of different regions. Present study include the diatomological profiling of Pondoh dam (River Beas) with the aim to generate a database of diatoms using LM and SEM which help in the identification of diatoms. The common species encountered include Nitzschia*minuta*,Didymospheni*ageminate* and Cocconeis*placentula*. Results showed that the existing diatom flora in all the seasons, help in solving the drowning cases related with Pondoh dam.
Keywords: Diatoms, Season, Microscopy, Forensic, Himachal Pradesh.

BP-27

TMB 'Blood Presumptive' Test Reagent Induces DNA Degradation Using Single Cell Gel Electrophoresis Assay: A New Molecular Approach to Assess Fate of DNA

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Tetramethylbenzidene (TMB)is one of the most sensitive chemical used for blood detection in the presence of H_2O_2. H_2O_2 is known DNA degrading chemical. Therefore,in this study,an attempt was made to assess the fate of DNA in TMB exposed blood sample using single–cell gel electrophoresis assay. This is rapid and sensitive assay used for the detection of DNA degradation. Our results exhibited that TMB alone and combined with H_2O_2 induce DNA degradation in blood sample exposed to it. Therefore, blood sample on which TMB presumptive test has been performed, cannot be used for further DNA analysis.

BP-28

New Presumptive Test for Blood Detection

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Bloodstains are invaluable informative evidence, help in reconstructing crime events and contain DNA which can lead to identify donor. Commonly used reagents for blood detection are benzidine, *ortho*-toluidine, tetramethylbenzidine, phenolphthalein, leucomalachite green, luminol and fluorescein. Among these reagents some are known toxic and some are showing false positive results.

Here in this study an attempt was made to investigate a new non-toxic dye which could be useful for blood detection as a screening method. Our results revealed that dichlorofluoresceindiacetate, a fluorescent dye is non-toxic in nature, capable to detect blood on dark surface and also mitigate false positive results.

BP-29

Qualitative and Quantitative Analysis of DNA from Different Substrates Stored at Environmental Conditions

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Objective: Quantitative and Quantitative analysis of DNA obtained from blood on different substrates stored at environmental conditions.
Methodology: The study samples conducted for the DNA quantitation from different substrates (leaf, synthetic and cotton cloths, cotton swab, Jute, wood, cloth). The samples were analyzed on different durations. DNA was extracted by organic extraction protocol and the quantitative and qualitative analysis was done by nano-drop spectrophotometer.
Result: DNA quantity is highest in cotton cloth and plant leaf, average in case of cotton swab, wood and whereas the lowest in the case of simple washing and detergent washing. The increase in DNA quantity and decrease in DNA quality was observed in all the samples with storage probably due to microbial growth except to wash clothes.
Conclusion: The recovery of DNA from the sample is highly dependent on the nature of the substrate, temperature and duration used for storage of samples.

BP-30

Time Saving and Cost Effective DNA Extraction Method from Human Hair Root & Shaft

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Human hair DNA is one of the most vital biological material associated with legal investigations. Large amount of DNA is located in the root but mostly absent in hair shaft (negligible or without nuclear DNA), due to cornification, making it a challenging sample in forensic analysis. We carried out DNA extraction from hair root and shaft with conventional PCI method. Surprisingly it resulted in good yield & sufficient DNA recovery from root as well as distal (3cm) shaft region from root than the closure one as compared to previous reported methods. This study reinforces the use of regular time saving and affordable conventional method for hair DNA extraction (6 cm total length.). Our

further approach is to recover better DNA yield in minimal quantity or single hair using same manual method.

BP-31

Diversity of Diatom Species from Two Tributaries of Betwa River: A Comparative Approach

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Nowadays, drowning cases are increasing day-by-day which always raise a question in examiners' mind whether the person drowned at the same place or his body has been migrated from some other place. Answer to such question can be obtained by performing diatom analysis which is considered as one of the important tool in forensic science. The present study also deals with the site specificity of diatoms and in order to proceed the examination, 10 samples were collected from two tributaries of Betwa.

BP-32

Identification of the Prominent Diatom Species in Water Bodies of Kurukshetra, Karnal and Kaithal Districts of Haryana

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Diatoms are commonly used in forensic science to study ante-mortem and post-mortem drowning. In the present study, an attempt was made to create a database of common diatoms found in different water bodies of three districts of Haryana, viz, Kurukshetra, Karnal and Kaithal. For this, the water samples were collected from the euphotic zone of different water bodies. The collected samples were centrifuged and identified as per the standard methodology. Nine diatom species were commonly observed namely, *Cymbellatumida, Tabelaria sp., Stephanodiscus sp., Rhopalodiagibba, Melosira granulate, Navicula sp., Gomphonemastriata, Penniumsp.andSynedra ulna.*
Keywords: Diatoms, Forensic Science, Drowning, Haryana.

BP-33

Wildlife Crime Investigation

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Wildlife crime investigation is one of the important facets of forensic science. Crimes against wildlife encompass a wide range of offences, from the illegal trade in endangered plant and animal species to the persecution of birds of prey or the cruelty inflicted on some wild animals for sport. Enforcement officers are increasingly turning to wildlife forensic science to answer investigative questions, and this field is constantly developing to provide new tools. The wildlife crime forensic guide is an invaluable resource which illustrates how traditional methods and specialist wildlife forensic techniques can be used in the investigation of wildlife crime. The purpose of this study is to provide a series of suggested guidelines to assist wildlife investigators in properly locating, documenting, collecting, marking (for later identification), preserving, packaging and transporting physical evidences and then successfully presenting that evidences in a court of law.

Keywords- Forensic Science, Endangered Species, Wildlife Crime, Crime Investigation

BP-34

Sexual Assault Crimes in Haryana - With Special Reference to Age and Profession

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Sexual assault leading to rapeis the fastest growing crime against women in our country. The report of women's commission of Punjab and Haryana also indicates a steep rise in suchcases. For the present investigation a data of 500 attempted rape cases were selectedfrom the case files submitted to Forensic Science Laboratory (H), Madhuban, forQuantitative and qualitative study. We sought to develop a profile of rapecases within a constabulary in the state and identity factors associated withattrition. Present studies indicate that more than 50% of women were targetedfor rape in a specific age group of adolescent stage.

Keywords: Crime against women, rape, Haryana, sexual assault etc.

BP-35

Pathological Changes Observed in Electrocution Deaths of Wild Life Animals A Retrospective Study

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Flora and fauna are been fragmented by the human being causing conflicts between various wildlife species. Importance of post-mortem pathological changes and finding the cause of death due to electrocution of wildlife mammals have been studied to prove the poor documentation of external injuries of animals and misinterpretation of burnt injury as either electrocution or gun – shot injuries.

By reviewing the postmortem reports of the electrocuted wildlife mammals, a data base was generated revealing the mandatory forensic science approach in the same is suggested.
Keywords: Wildlife, Forensic Science, Electrocution

BP-36

Distinctive Features of Human and Animal Hair: Analysis during Crime Scene Investigation

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Hair being the most common biological material found at the scene of crime, plays a crucial role in criminal investigations related to wildlife, taxonomy, Investigative dermatology, pathology and other applied fields of forensic science. As the growth is continuous from birth of an individual till death, there is constant loss and replacement of the hair strands. Its microscopic comparison and chemical analysis plays a very significant role other than blood and fingerprints. Hair is usually used to study characterization of the known sample versus the questioned hairs recovered from the crime scene to check if they are from a common source for the establishment of a relation between crime and the criminal.

Hair identification provides very precise results along with other relevant information about the suspect and proves its utility over other evidences in the detection of drugs, other illegal substances along with the information of habits and geographical region. Presently it is a widely accepted tool to identify the age, sex, colour, race, disease profile, diet, occupational and environmental exposure, metal poisoning, geographical indicator, illegal wildlife trade, sexual assault, rape, disputed maternity and paternity matters and in cases of mitochondrial DNA examination where the questions are raised related to evolution and inheritance. Examination of human hairs in the forensic laboratory is conducted through light microscopy and the comparison of questioned and known hairs using comparison microscopy. Hair is always considered to be associative evidence and its ultimate objective being to associate a suspect and the victim in the act of crime supported by evidences based on the scientific approach and the crime scene scenario.

BP-37

Forensic Relevance of Signature Microflora

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Microbial forensics is a newly emerging discipline in forensic science, which is interplay of classical microbiology, microbial genomics, phylogenetics and bioinformatics. The omnipresence of bacteria and its uniqueness to a particular individual makes microbial genome analysis a potential tool for personal identification in addition to human genome analysis. Most of the studies on microbial forensics are based upon bioweapons, however, use of bacterial community for individualization is also of major concern and needs to be explored. From microbial forensics point of view, in addition to the conventional practices such as 16S rRNA and other house-keeping gene sequencing, metagenomic

analysis by using high throughput sequencing and polyphasic taxonomic approach can be employed for a better output in criminal investigation. This paper unveils the role of bacteria as source of identification and takes the account of future requisites that should be inculcated in the present technology to probe forensic microbiology in criminal casework more efficaciously.

BP-38

Study of Substrate and Environmental Condition for Detection of Blood Group from Bloodstains

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Blood and bloodstains on crime scene have always been a challenging task for criminalists. The objective of this research was to examine and compare characteristics of bloodstains on different substrates in various environmental conditions. Forensic experts confronted problems for the grouping of dry bloodstains, these are due to environmental factor which may mislead the analysis and may ruin the chain of custody. In the present work absorption elution methodology was adapted. The grooves and cracks of cotton fiber in dry condition comparison to other fibers leads to store the blood stains as a evidence, because of two most important infrastructures i.e. absorbency rate and absorbent capacity. The results have shown an encouraging trend and will be discussed during presentation of poster.

BP-39

Innovation Technique for Blood Group Detection

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Blood group detecting device plays an vital role in forensic science as for the investigating purpose so with the use of an blood group detector we can easily even find the individuality of the person without use of DNA techniques. Firstly developed technique in which the sensors or resistance in the blood isusedfor different cations and anions present with different particles like potassium, sodium and different particles which varies in each and every person so it will be helpful to know in personal identification with the use of resistance in the blood. with the use of an trans- receiver circuit a light is falls on sample and due to optic variation in light or resistance in blood, we are able to get an voltage variation and resistance we get to differentiate human blood group with an easiest technique as well as without using an DNA for finding the individuality of that person.
Keywords: Blood group detection, Resistance measuring sensor, optical fiber sensor, personal identification.

BP-40

A New Approach to Sort-Out the Problems Faced By Scientist during Examination of Blood from Evidences Recovered After Prolong Duration of Burial

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In homicidal crimes for disguising the investigation process, suspects generally tried to conceal blood laden evidences (i.e. knife, gun, iron rod, hockey, bat, and for cleaning purpose used clothes or any paper), by either submerging or burial activity. If these evidences kept for prolonged duration under soil, numerous microorganisms present in soil degrade the blood, which causes problem during its examination. Present study is carried out for a new approach to check the presence of blood on absorbent (cloth, tissue paper, and cotton) and non-absorbent (iron and steel knife) surfaces, at regular interval of 7 days, which are buried under soil for 6 months. After examination, it was found, that TMB, Luminol and Teichmann were highly sensitive for the blood stains recovered from non-absorbent surfaces rather than absorbent surfaces.
Keywords: Blood, Soil, Forensic Science, and Buried.

BP-41

Association between the Dermatoglyphicsand the ABO Blood Group

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Fingerprint patterns are dermatoglyphic patterns whereas the blood groups have a genetic basis. The various class and individual characteristics are responsible for the uniqueness of a fingerprint, which include the pattern type, the ridge count or ridge tracing and the minutiae characteristics. Various studies have been done to determine the sex and the identification of the individual from fingerprints. The current study aims to find the correlation of ridge count to that of the ABO blood group.The study was undertaken at the Gujarat Forensic Sciences University among the age group of 20-25. The total number of subjects considered were 100 (50 males and 50 females). It could be clearly observed that the ridge counting was found to have a significant difference ($p<0.05$) with the blood group. The frequency of loop was highest in that of the blood group B, Whorl in O and Arch in AB.
Key words: Blood group, ridge count

BP-42

Evaluation of Increased Blood Lead Level of People Working in Shooting Range

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In the shooting ranges, the shooters get exposed to lead(Pb) which is present in either the primers or the projectiles that is discharged during the process of firing. This frequent exposure to lead(Pb) leads to toxicity resulting in serious health issues amongst the people working in shooting ranges. The objective of the study is to determine the extent of increase in the concentration of lead(Pb) in blood from normal Blood Lead Level i.e. 10µg/deciliter. For the purpose of analysis, blood samples of the

25 people working in the shooting range of Gujarat Forensic Sciences University for various periods of time(years) the estimated time of exposure per day was almost 8 hours. The blood sample of such targeted sample pool was analyzed. The concentration of lead was found to be increased up to approximately 11- 45 µg/deciliter which is considered to be hazardous.

Keywords: Forensic Science, Ballistics, Shooting Range, Blood Lead Level.

BP-43

Tooth and Its Story for Humanity

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Humanitarian forensic action is the application of forensic knowledge to humane causes especially following manmade or natural disasters. Teeth being the hardest structures resist decomposition and high temperatures; they also provide tremendous information in disaster victim identification, missing and unidentified persons, child abuse, domestic violence, sexual abuse, age estimation of minors in human trafficking and during unaccompanied migration across the borders. It can also lead to swift identification of nameless cadavers in cases of genocide or mass graves which helps to restore one's fundamental rights even when the victim himself cannot avail them.

Keywords: Teeth, humanitarian action, humanitarian forensics, DVI, forensic odontology

CHEMICAL SCIENCE

CP-01

Unique Case of Modes of Operandi for Drug Trafficking of Narcotic Drugs and Psychotropic Substances (NDPS) and Its Examination

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One case of its unique and astonished nature of drug trafficking was encountered by the laboratory. New brand big size bath towels of multi colours like white, blue, red, pink, maroon, purple, brown etc., packed in cardboard cartons, were received from the investigating agency under the case of NDPS Act for their examination for the detection of the narcotic drugs and psychotropic substances in the laboratory. The textures of the fibre of the towels containing drugs were found physically to be different from texture of the fibre of the towels which do not contain drugs. Drug contained towels were prepared by soaking and drying the towel in the water solution of the hydrochloride salt of the drugs as most of the hydrochloride salts of the narcotic drugs are soluble in water. Different colour of

the towels may be the signals/indication of a particular drug in the marked of drug trafficking. The case was chemically examined, after taking the representative samples from the exhibits of towels, by colour test, spectrophotometry and Gas Chromatograph-Mass Spectrometry (GC-MS). On examination of the case, the case, the ephedrine was detected only in all white colour towels. No NDPS could be detected in other colour towels. The contraband drug samples for trafficking.

CP-02

Rare Suicidal Poisoning Cases in Kerala- Analysis of Cartap and Fipronil in Postmortem Samples

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Cartap and Fipronil are very rarely reported poisons in the field of forensic crime investigation in Kerala. In this paper we discuss methods to detect the presence of cartap, a thio carbamate insecticide and fipronil, a phenyl pyrazole insecticide in post mortem samples of Stomach, Liver, and Blood using GCMS and LCMS. Fipronil was detected in GCMS, whereas both the poisons were detected in LCMS. The method consists of a gradient run of acetonitrile with water(0.1% formic acid), through the column Hypersil Gold. Quechers method and SPE were adopted for sample preparation and the analytes were elutetd in less than five minutes.

CP-03

Thin Layer Chromatographic Analysis of Cannabinoids, Tropane And Ergot Alkaloids

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Cases related to Cannabis, Datura and Ergot poisoning are generally referred to forensic laboratories for their toxicological analysis. Conventional methods include colour tests and TLC analysis for the identification of active toxic constituents in viscera and gastric lavage. Due to non-specificity of colour tests the additional confirmation is needed to confirm their presence using any other authentic technique . Commonly thin layer chromatography is used in most of the laboratories , Number of TLC methods suggested for the analysis of Cannabinoids, Tropane and Ergot alkaloids using variety of stationary phases (Adsorbents), solvent systems, sample preparation methods and spot visualization techniques. In the present study efforts have been made to highlight only suitable approaches suggested for the identification of such toxic constituents , to provide ready references to the forensic toxicologist and as well as to the forensic chemists. Composition of solvent systems, locating reagents and adsorbents have also been described in detail.

CP-04

Detection of Water in Ethanol Blended Petrol- A case study

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Ethanol blended petrol has come up as an alternative fuel in recent years due to some environmental aspects. As ethanol is hygroscopic. Moisture is trapped in underground stored ethanol blended petrol tank and phase separation occur. Such petrol is not suitable for internal combustion engine. Petrol sample in similar context was received in FSL. After phase separation. Each layer was analysed separately. The case study revealed that simple conventional methods are very difficult for analysis but tlie present analysis successfully shows the composition of alcohol and water in the petrol sarnple using correlation of different parameters such as density, distillation range, refractive index and gas chromatography. Keywords: Two phase petrol, ethanol blended petrol, forensic analysis.

CP-05

ECCO (Elemental Composition Comparator) an Easy and Efficient Tool to Determine Solid Adulterant in Fuel Oil

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Nowadays we frequently encounter some solid adulterant in fuel oil, mostly in kerosene. Going through chemical analysis of all these large numbers of samples is not only time consuming or tedious job, it also consumes allots amount of samples and chemicals. ECCO (Elemental Composition Comparator) is an easy and efficient tool which can be extensively use and result found were well matching with analytical analysis. In this work we have done a detail study of some silica base solid samples which were used as adsorbent to disguise the blue colour of PDS kerosene.
Keyword: ECCO, Fuel oil, Adsorbent

CP-06

Mass Murder by Psychopath- A Case Study

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Mass murder generally involves more than one victim occurring at one location, approximately same time and as a single act, In this case fourteen members of family ranging from few months to 60 years, had been slaughtered by their only son. It was done in gruesome manner. Toxicological evaluation of biological and non-biological samples (Food material) using different techniques such as HPTLC, UV GC and GCMS shows the presence of antipsychotic drug CLOZAPINE (Tablet SIZOPINE) in all fourteen cases except accuse who killed himself by hanging. This shows that accused first feed them with food laced with drug and when they become fast asleep he killed them with butcher knife.

CP-07

Quantitative Estimation of Zinc in Fatal Zinc Phosphide Poisoning Cases Using Inductively Coupled Plasma-Atomic Emission Spectrophotometry (ICP-AES)

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Use of zinc phosphide (ZnP) as a rodenticide in India is huge because of its massive use in agricultural sector. The considerable use, cheap and easy availability along with extremely high mortality enhances its misuse as a suicidal agent especially in northern part of country. Until now the cause of death has been given on the basis of police inquest proceedings, post-mortem findings and presence of phosphine gas in viscera using a silver nitrate (AgNO3) test during toxicological examination. The case may be reported as false positive as putrefied viscera also give positive result and the cause of death remains inconclusive. Also it can't be commented whether it was zinc phosphide or aluminium phosphide.

CP-08

Determinationof Congenersin Liquor Samples to Identify Suspected Adulteration

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Forensic science laboratories in Maharashtra state receives number of duplicate foreign liquor samples from police and excise department, under section 420 of IPC Act. The study was under taken to know whether these samples confirm as per specifications of the manufacturers. The illegal syndicates adjusted the liquor percentage to the specified manufacturer's values, and the routine methods for alcohol percentage do not reveal adulteration. So it is very difficult to find out adulteration in suspected duplicate samples. The illegal syndicates were preparing duplicate liquor samples of different brands by using rectified spirit, caramel, coloring agents, flavouring agents and essential oil. In this paper, an attempt is made to solve this problem by Congener analysis is useful way to find out adulteration in suspected foreign liquor.
Keywords: Forensic, Congeners, Gas Chromatograph, Duplication,

CP-09

Detection of Mono Sodium Glutmate (MSG) suspected to be mephedrone: A case study

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Glutamic acid under the form of monosodium salt (monosodium glutamate) is regulated in the EU as a food additive (E 621), a flavoring agent, to give the so-called „umami“taste. Endogen glutamic acid is the major excitatory neurotransmitter of the central nervous system. Cortico-striatal glutamatergic transmission has been implicated in both the initiation and expression of addiction-related behaviors. Mephedrone, also known as 4-methyl methcathinone (4-MMC) or 4-methyl ephedrone, is a synthetic stimulant drug of the amphetamine and cathinone classes. Slang names include drone, M-CAT, White Magic and meow meow.Users have reported that mephedrone causes euphoria, stimulation, an enhanced appreciation for music, an elevated mood, decreased hostility, improved mental function and mild sexual stimulation; these effects are similar to the effects of cocaine, amphetamines and MDMA, and last different amounts of time, depending on the way the drug is taken. But the present case mono sodium glutamate is detected with the help of colour tests and by FTIR. It is a challenge to enforcement agencies to detect and send to forensic science laboratories for confirmation. Mephodrone is covered under NDPS act and whereas monosodium glutamate is normal salt which is used as food additive.

Keywords: Colour Test, FTIR, Mephedrone, Monosodium glutamate.

CP-10

A case of Homicidal Poisoning involving Endosulfan, Ketamine, Promethazine and Pentazocine intravenously

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Homicidal poisonings are not nearly as common as people think. The fact is, successfully poisoning someone takes work. One must first acquire the means to carry it out, which entails researching the poison and procuring it. Then a plan must be constructed so that the death appears natural not suspicious. Carrying out the poisoning also requires detailed knowledge of the victim-their tendencies, habits and manners so that the poison can be delivered without their knowledge.In present toxicological studies the eldest son of the family has given the poison intravenously to his father, mother and two young brothers. They all were died. The viscera, blood samples and other articles were forwarded to FSL. On the basis of micro chemical and modern instrumental techniques endosulfan, ketamine, promethazine and pentazocine were detected simultaneously in autopsy material. The SOP was developed.

Keywords: Endosulphan, Ketamine, Promethazine and Pentazocine.

CP-11

Comparison *In-Tito*and Interpretation of Postmortem Findings in Aluminum Phosphide Poisoning Cases in Forensic Toxicology

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Forensic analysis is an important tool for delivering justice to the people. The Judiciary always seeks the elucidation from the Forensic Experts regarding complex issues of a medico-legal nature. The Forensic Scientist or Reporting Officers at CFSLs/FSLs are active contributors to the core of inquest of cases and their observations one of aid to the Court of Law. Now a day, Aluminium phosphide (ALP) poisoning is

very common in society due to its easy accessibility due to household use and low price. It's an inorganic phosphide (Volatile Poison) used to control insects and rodents. Apart from that, in some prospective, it is commonly used to commit suicide or for homicidal purposes. This paper aims to establish a correlation in between the autopsy findings (on the basis of some individualistic common sign and symptoms) and Aluminium Phosphide poisoning to identify the linkage with common points. Furthermore, it's a study to evaluate the imperative role of collection and preservation of visceral samples for laboratory analysis through the window of some toxicological cases of ALP poisoning that were already examined at CFSL, Kolkata.

Keywords: Aluminum Phosphide, Poisoning, Forensic, Judiciary etc.

CP-12

Rapid Detection of Pesticides of Forensic Importance by HPTLC

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Pesticides are being used extensively worldwide for pest control pose a substantial hazard to both environment and human health. They are common agents of suicidal and accidental poisoning, because of their potential toxicity, ready availability and easy accessibility. Rapid identification of casual pesticide would be very useful to both clinician and forensic toxicologist.

For this purpose, a simple, rapid and cost-effective HPTLC method was developed for the detection of various pesticides of forensic relevance. A total of 22 pesticides (anilofos, ethion, ketazin, phenthoate, phosalone, carbaryl, thiodicarb, etofenprox, acetamiprid, thiacloprid, thiamethoxam, atrazine, metalaxyl, propiconazole, difenoconazole, fipronil, triadimefon, chlorantraniliprole, cyantraniliprole, imazethapyr, thiophanate-methyl and emamectin benzoate) have been selected due to their market presence, extensive application for pest control and reported cases of lethal intoxication. Separation of pesticides was achieved on aluminium foil HPTLC plates coated with silica gel $60F_{254}$ using poly-component mobile phases consisted of n-hexane-acetone in the proportion 9:1 and 8:2 (v/v) and chloroform-acetone in the proportions 9:1 and 8:2 (v/v). Preliminary data such as R_F, detection wavelength (UV λmax) and *in situ* UV spectrum was recorded for each pesticide and the analytical data gathered was stored in the HPTLC library.

The developed HPTLC data was successfully applied to "general unknown screening" for identifying casual pesticide in forensic cases. The method is highly suited to toxicological analysis for solving suicidal, accidental and homicidal poisoning cases in which the poisoning source is uncertain.

Keywords: Pesticides, Screening, HPTLC, UV spectrum

CP-13

Separation Evaluation of Four Neonicotinoid Insecticides by Normal-Phase HPTLC

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Optimization of separation conditions for newly available pesticides is usually achieved by evaluating retention and separation parameters, which is of primary interest to forensic analyst. In the present work, a method is proposed for the separation evaluation of four neonicotinoid (neonics) insecticides acetamiprid (A), imidacloprid (I), thiacloprid (T) and thiamethoxam (TM) by normal-phase high-performance thin-layer chromatography (NP-HPTLC).

Separation evaluation of four neonics was studied on silica gel $60F_{254}$ plates with varying mobile phase compositions (10:0-5:5, v/v) of chloroform-acetone. Optimum separation was achieved with chloroform-acetone 9:1 (v/v) as mobile phase. Densitometric detection was performed at 254 nm for A, 279 nm for I, 252 nm for T and 262 nm for TM. These wavelengths resulted in higher values for peak area and peak height. Retention (R_F and R_M) and separation (ΔR_F, R_F^{α}, α, andR_S) parameters for each neonics was calculated. R_F values of four neonics increased with increasing mobile phase acetone content. Thiamethoxam was adsorbed the strongest on normal-phase layer as indicated by the obtained higher R_M values in all the mobile phase compositions. The optimized mobile phase resulted in $\Delta R_F \geq 0.04$ for the compound pairs A-I, T-I, T-TM, A-TM and I-TM, except for the pair of compounds T-A. Peak resolution (R_S) values greater than 1.25 were obtained for the compound pairs T-I, T-TM, A-TM and I-TM, except for the pair of compounds A-I and T-A. The system of NP-HPTLC with chloroform-acetone as mobile phase did not provided the complete separation of acetamiprid from imidacloprid and thiacloprid from acetamiprid.

Keywords: Normal-phase, Neonicotinoids, Retention parameters, Separation parameters

CP-14

A Multi-Analytical Approach for the Rapid Detection of Adulterants In Toddy Samples

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Toddy samples having very low ethanol content in combination with other substances were a common feature. Forensic science laboratories frequently receive toddy samples for the detection and estimation of ethanol content and adulterants. The chemical analysis of the toddy samples revealed the frequent presence of chloral hydrate, along with citric acid, calcium carbonate, starch, saccharin, alprazolam and paracetamol.

A simple, rapid and specific high-performance thin-layer chromatography (HPTLC) method was established for the simultaneous analysis of alprazolam, paracetamol and saccharin in toddy samples. The method involves extraction of analytes with ethyl acetate from toddy samples and separation on silica gel $60F_{254}$ HPTLC plates with an optimized mobile phase consisted of chloroform-methanol in the ratio 9:1 (v/v). Densitometric evaluation was carried out at 254 nm in absorbance mode. R_F values recorded for alprazolam, paracetamol and saccharin were 0.53, 0.41 and 0.07, respectively. Detection of analytes was based on R_F, in situ UV spectrum and color obtained after post-chromatographic derivatization.

Ethyl alcohol was determined by GC-FID and found to be in the range of 0.01 to 0.55% in toddy samples. Chloral hydrate, citric acid, calcium carbonate, starch and saccharin were detected by color tests. In addition, presence of chloral hydrate, citric acid, saccharin was confirmed by IR spectrum. The present work involving application of different analytical procedures afford rapid and specific detection of adulterants present in toddy samples.

Keywords: Toddy, HPTLC, IR, GC, Color tests

CP-15

Gamhar Fruit: A pesticide smell quencher in case of criminal cattle poisoning

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A case received from P.S Rajendragram district Anooppur in which accused used "Gamhar fruit" mixed with rice and pesticide to kill goats. Upon examination of visceral material, methyl-parathion (Metacid) has been detected as pesticide and the Gamhar fruit is used to quench the smell of methyl-parathion. The rotten egg or garlic like smell of Methyl-parathion is completely suppressed by strong sweetish smell of Gamhar fruit.

CP-16

Exploration of a Non - Residual Explosion Accompanied With Fire in A Place of Occurrence

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Explosion, a sudden release of energy in the form of heat, sound, and pressure along with fire leaving no residual evidences of explosive is a challenge to forensic experts towards Determination of seat and cause of incident. This presentation contents a specific incident of Explosion along with the fire that happened in the year of 2015 in a three storied living house.

Finding of cause of death and severe burn injury of seven persons of a family at late night in Different floor of a three storied building at a time was a challenge. The manifestation of Incident of fire and explosion was quite evidence with the burnt residuals of household articles, Deposited black soot. Broken wooden panes and frame of the door etc. the household articles were found to burn more extensively at the upper portion from a certain height from floor Level in compare to the lower portion. The same pattern of burning also found in 2nd floor Examination and vivid observation on the pattern of blast with fire. Its propagation and Degree at different places appeared that it was a non-residual blast with sudden generation of Fire. No evidence could be detected in favour of gradual transmission of fire anywhere inside. The room. Circumstantial evidences suggests that the incident had happened from the LPG (liquid petroleum gas) leaked from the cylinder kept at the 1st floor for a long span of time From the loose nozzle which engulf the whole 1st and 2nd floors and caught fire in contact with any fire source. A minute spark even sparking generated during electrical switches ON/OFF is sufficient to initiate the fire highly inflammable LPG. The high air pressure Generated within the room immediately after fire released from the weaker point like doors, Windows etc. and the impact of pressure generated was so high that the door and windows Blown off & dismantled.

CP-17

A Method for Qualitative and Quantitative Estimation of Palladium and its Application in a Theft Case

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The definition of forensic science is any scientific work, research method or theory used to analyze evidence in an attempt to solve legal cases. Forensic science laboratory receives cases of different types.Palladium on charcoal was used as catalyst in production unit. This powder was stolen by accused. Production unit filed FIR in nearest police station. Forensic unit visited to crime scene spot and collected evidence according to accused path. After investigation of police seized steal powder from accused. Investigation officer sent crime scene exhibits viz. a pair of gloves, a bucket of blackish powder and sample from seized powder for analysis, In present paper a methodology is discussed for identification and confirmation of palladium from the exhibit samples. Palladium is extracted from all exhibits and identified by physical and chemical test. Further quantitative analysis done by gravimetric methods as PD and PdI_2.

CP-18

Development of HPLC-Method for Determination ofMono Sodium Gultamate

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MSG is a taster enhancer with the chemical name monosodium glutamate. It is the sodium salt of an amino acid called glutamic acid, found in life forms. Human body also produces glutamic acid and play essential role in normal body functioning. Glutamate functions as a neurotransmitter in the brain. Monosodium glutamate is an excitatory neurotransmitter means it excites excessive stimulations of nerve cells. For this reasons it referred as an excitotoxin. Monosodium glutamate causes glutamate levels to spike in blood, this may cause brain problems. Although a monosodium glutamate is considered safe, it comes under controversy after unconfirmed reports of the Chinese restaurant syndrome which people claimed arose after eating Chinese food.

Now days in criminal groups the awareness about excitotoxin nature of monosodium glutamate has been developed and they are using it as an adulterant in illicit drug preparation to gain more profit. The MSG determination is important because it is related with food sanitary quality and abuse by culprit. In this work a new, simple, and inexpensive methodology has been developed to determine monosodium glutamate. A method was developed by using reversed-phase HPLC with UV/visible detection at 205nm without derivations. Separation was achieved on HPLC column Kormasil c18 with 80:20(v/v) aqueos orthophospheric acid (ph=2.6) and acetonitrile as an optimum mobile phase. The relationship between peak area and concentrations is linear in investigated range (0 to 100ug/ml).

CP-19

The Identification of Burnt Cloth by Scanning Electron Microscopy Energy Dispersive X-Ray Spectrometry- A Case Study

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The frequent use of various fire accelerants to burn the forensic evidences in murder mystery is Routine and quite common practice in criminology. Forensic sciences laboratories always deal with such destroyed evidence for examination.The laboratory received traces of cloth piece from scene of crime in one of murder mystery case. In which the accuse has brutally murdered deceased, set the body on blaze and destroyed the evidences from the scene of crime the cloth piece was corroborative evidence for criminate. We confirmed the presence of petroleum hydrocarbon residues on it by gas chromatography technique. But as per Query of investigating officer, practically it was very difficult to prove that the cloth piece was burned, as visible charging or burning signs were not noticed. The SEM/EDS technique is found to be very fruitful for examination of such crime evidences.
Present study describes the technology of scanning electron microscope coupled with energy Dispersive x-ray spectrometry which contribute significantly in assessing and characterizing the Surface morphology of various regions and their elemental profile which in turn to helpful in Examination of such corroborative evidences.
Keywords: Forensic evidences, trace burnt, corroborative, criminate, SEM/EDS.

CP-20

Synthesis, Photoluminescence and Forensic Application Property of Novel 2-[(4-butylphenyl)imino] methyl-4-nitrophenol as an Efficient Orange Red OLED

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Certain novel blue light emitting Bis (Salicylidene)/2-hydroxy-1-napthalidene cyclohexyl-1,2- daimio Zn(II) metal complexes (3d-d) and Schiff base 2-[(4-butylphenyl)imino]methyl-4-nitrophenol (3a) was prepared and characterized by elemental analysis (CHN),FTIR And HNMR spectroscopy. Photo physical study of the Schiff base (3a) was systematically studied and reported on this work. The surface morphology by SEM analysis showed smooth rod like structure for 2-[(4-butylphenyl)imino] methyl-4-nitrophenol Schiff base (3a) From the diffused Reflectance spectrum, emission peaks at 523 nm (sharp) and 618 nm (broad).At 523 nm the maximum excitation peak was found at 468 nm. The PL results shows the position of the colour coordinates shifted towards orange red emission therefor, the present phosphor 2-[4-butylphenyl)imino] methyl-4-nitrophenol Schiff base (3a) could be a promising orange red component for possible applications in the field of OLEDs. Hence Due to the significant photo Physical properties, exhibited by the Schiff base (3a) was proved as a promising

warm orange red light emitting diode that can be used in developing strong electroluminescent materials for flat panel display.

CP-21

Radiation Toxicology: A New Approach in Forensic Science

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Poisons are silent weapon of crime. As radiation toxicology is not untouched with that one. Radiation toxicology is the quantification of radiation pathophysiology. It is based upon the more precise and accurate radiation data in humans. Ionizing radiation affects deleterious effects in the living organism. A small dose have probably causes some initial signs of radiation sickness, such as loss of white blood cells, nausea, vomiting and headache and heavy dose you may lose hair temporarily- your nerve cells and those that line the digestive tract will be damaged. The search for models which will predict radiation injury is presented along with innovative approaches to the 3-dimensional reconstruction of isotope curves in autopsy material and ultra-structural studies.

This review mainly dwells on the radio protective potential of plant and herbal extracts. Its major probability may be in the persons who are engaged in works related to nuclear laboratories/ factories etc. as Polonium, Uranium, Thorium etc. Such information is particularly important because of the development of combine radiation therapy and chemotherapy. Nowadays human death occurs due to radiation toxicity in some cases. The time has come to be advance for such examination and report. However in this review few prominent issues focusing to radiation toxicology are discussed.

CP-22

Evaluating Medical Health Condition of Spasmo Proxyvon Abuse Persons

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Spasmo proxyvon tablet is an antispasmodic drug and is covered under Narcotic Drugs. It is increasingly being abused for its opoid effect due to easily available. Substance abuse is a major health problem worldwide. In this study, medical health condition and type of illness were concerned. Out of 150 drug abusers, 96 drugs abuser were under medication, 52 drug abusers were in non-medication. In study of illness type of Spasmo Proxyvon abusers, percentage of drug abusers who has liver problem, kidney problem, stomach problem, skin problem were 28%,21%,19%,19% respectively. Most of the drugs abusers were found under medication. Liver problem and kidney problem are some of the problem which they suffered. Addiction in Spasmo proxyvon drug leads to such kind of illness and ultimately end of life. Drug abuse is a disease and it cannot be treated overnight.

CP-23

Effect of Agrichemicals on Human Health

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The use of pesticides and nitrogen fertilizers in agriculture has grown dramatically over the past 30 years. Environmental exposure of humans to agrichemicals is common and results in both acute and chronic health effects, including acute and chronic neurotoxicity (insecticides, fungicides, fumigants), lung damage (paraquat), chemical burns (anhydrous ammonia), and infant methemglobinemia (nitrate in groundwater). A variety of cancers also have been linked to exposure to various pesticides, particularly hematopoietic cancers. Immunologic abnormalities and adverse reproductive and developmental effects due to pesticides also have been reported. The health effects associated with pesticides do not appear to be restricted to only a few chemical classes. Therefore, enhanced efforts are needed to control or eliminate human exposures wherever possible. Research also is needed to better characterize and quantitate the adverse effects of agrichemicals on human health.

Keywords: Health, cancer, pesticide, herbicide, insecticide, agrichemical.

CP-24

VIRTUAL AUTOPSY

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An autopsy is a highly specialized surgical procedure for the forensic examination of a corpse to determine the cause and manner of death. At present scenario, technologies are more advanced, So Virtual Autopsy or Virtopsy is a new and non-intrusive form of performing an human autopsy. This system utilizes a Computer Tomography or CT unit and an (MRI) Magnetic Resonance Imaging unit to obtain a detailed view of a body. Here the MRI images and the detailed X-rays are combined to create a full three-dimensional view of the body which create digital and permanent records of the body, this technology can also be used to study blunt force trauma cases in forensic science. A Virtual autopsy is also a good method in bioterrorism incidents as it lowers the risk of contaminating pathologists and other medical personnel.

Keywords: Forensic Science, Autopsy , Virtual Autopsy .

CP-25

Toxic effects of Heavy Metals present in Cosmetic Products

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Heavy metal toxicity to the humans and animals is the result of long term low or high level exposure to pollutants common in our environment including air, water, food and numerous consumer products like cosmetics and toiletries. The aim was to find out if the Cosmetic product contained any of the heavy metals and if so, what quantity and in what quantities is acceptable for health purposes. In this study, the cosmetic items included face cream, shampoo, face wash, toothpaste of different brands of Sagar market. The cosmetics were analyzed for heavy metals (arsenic, cadmium, lead, mercury and nickel) after digestion with concentrated acids HNO_3:$HClO_4$ in ratio 3:1 by using AAS/ICP-MS. It is concluded from the study that the use of some cosmetic products exposes users to low concentrations of toxic heavy metals which could constitute potential health risk to users since it has been known that heavy metals can accumulate in the biological system over time and are known to induce skin problems or diseases such as cancer.

Keywords: Toxic Heavy Metals, Cosmetic products, AAS/ICP-MS

CP-26

Asphyxial death – A retrospective study in Varanasi

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Introduction: The term "asphyxia" literally means defective aeration of blood, due to any cause. Asphyxial death can be classified into different groups based on mechanism of production. Mechanical, when air is prevented to reach lung by mechanical means, e.g. hanging, strangulation, suffocation (smothering, gagging, choking, traumatic asphyxia, positional asphyxia), drowning etc. Pathological, Toxic, Environmental, Traumatic etc. are other means of asphyxial death. Hanging is most common form of violent asphyxial death in which body is suspended by ligature around neck. Hanging is one of the 10 leading cause death worldwide. In India, hanging is leading means for suicide.
Material and Method: This is a retrospective study of the cases brought for post mortem examination in mortuary of Forensic Medicine Department, Institute of Medical Sciences, BHU, Varanasi, over a period of one year from 18/10/2016 to 17/10/2017.
Result: This retrospective study reveals that out of 2337 post mortem examination conducted in one year, 238 deaths were result of asphyxia, out of which hanging constitute 116 deaths, drowning 116 deaths, strangulation 5 deaths and smothering resulted one death.
Discussion: This study showed that hanging is the most prominent cause of asphyxia death along with drowning. Strangulation and smothering was the least common cause of asphyxia death.

CP-27

A literature review of Colorimetry, TLC and spectrophotometer for the detection of nicotine in tobacco containing products

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Many tobacco products are consumed by adolescents as well as by adults in country like India. Now-a-days this includes in professional behavior. They have many physiological and psychological effects on body and may also have chronic effects which can cause cancer and many severe diseases. In the present study different tobacco containing products are involved for detection of Nicotine and data obtained was recorded. Study also contains a data of survey conducted in particular zones of Malwa region by people consuming nicotine containing products i.e. Bidi, Cigarette, Cheelam, Hukkah and Cigar. A comparable study was done for the analysis and the best result is represented.
Keywords: Nicotine, Thin Layer Chromatography.

CP-28

Isolation and Identification of Pharmaceutical Drugs from Blood and Urine Using GC-MS System

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Pharmaceutical drugs are synthesized in laboratories for medicinal purposes. Capsules of Spasmo proxyvon plus contains Morphine derivatives and are known to act as great analgesics. Due to its effect on CNS, it has been abused abundantly. In the present work an attempt had been made for the isolation and identification of these drugs from the spiked sample of blood and urine by using GC-MS system. The recorded Retention time in Gas Chromatography for Tramadol hydrochloride, Dicyclomine, and Acetaminophen were found to be 17.775, 19.200, and 17.445 minutes respectively. GC-MS has once again proved to be cheaper and more efficient technique for drug detection from blood and urine.
Keywords: Spasmo proxyvon plus, Isolation, Blood, Urine, GC-MS, Retention time

CP-29

Biomarkers of Acute and Chronic Alcoholism

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Conventional tests for alcoholism fail to confirm hazardous and harmful alcohol use (HHAU) accurately and objectively. Alcoholism has severe consequences for society. The direct and indirect costs of alcoholism are relatively constant across different countries in Europe, North America and Asia. Several studies indicate that, even after active screening, general practitioners identify maximally 60% of their alcoholic patients. The main reasons for under- diagnosis are denial on the part of patients, insufficient sensitivity of screening instruments in detecting patients with less severe alcoholism, insufficient skills of physicians, and questioning the rationale of diagnosis and intervention in certain groups of problem drinkers, such as young hazardous drinkers.

Various researchers have hypothesized numerous markers to ascertain susceptibility to alcoholism and markers for alcohol abuse. Though some markers were subsequently ascertained to be a futile exercise, a few biochemical assets were found to have a high probability for diagnosing recent and long-term alcohol abuse.

The paper reviews the various biomarkers that can be effectively used in a medico-legal context for diagnosing recent and long term use of alcohol by a patient as well as provide a quantitative estimate on whether heavy drinking was involved or not.

CP-30

Food Safety Compliance – A real picture

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Changing lifestyle has also influenced the food habits and the quality of food available in themarket. Authenticity of food products has always been an area of concern as far as public healthis concerned. Adulteration, inappropriate labelling, insufficient information etc. on food productsare different types of problems observed when food quality is an issue. FDA and FSSAI hasprovided the guidelines for maintaining the food quality. The implications of these rules andregulations need to be verified time and again. The present study is an attempt to understand thereal picture of food products available and their adherence to the laws framed by the regulatorybodies.

Key words: Food quality, FDA, FSSAI, adulteration, inappropriate labelling, banned products.

CP-31

Determination of an Organophosphate Insecticide in Citrus Fruits by Using Micellar Liquid Chromatography

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Insecticides are agents of chemical or biological origin that control insects to destroy or harm the crops. They are used in agricultural fields, gardens and veterinary practices as well as at home. Profenofos is one of the organophosphorus insecticide which is used to prevent the fruits from insects. It is widely used for household and agriculture purposes and for the production of fruits in India and other countries. It is extremely toxic to many living beings including mammals, insects, fish, and micro invertebrates. World Health Organization has classified it as a moderately hazardous pesticide. Due to its polar nature and thermal instability, universal methods are not available to analyze this compounds. Hence, an analytical method is needed to determine all the possible residues of insecticides in edible samples whose chemical treatment history is usually unknown. Therefore, an urgent need is required to develop an alternative, simple, selective and sensitive analytical technique. In this present study a direct injection, ecofriendly Micellar Liquid Chromatographic method has been developed and reported to determine profenofos in orange fruits using C_{18} stationary phase and a micellar mobile phase containing 0.05 M SDS and 2% pentanol (v/v) buffered at pH 7. This method can be successfully applied for the determination and routine analysis of profenofos in various other fruits, vegetables and agricultural samples where food and health safety is concerned.

Keywords: Oranges, Organophosphate insecticide, Profenofos, Food Safety, Micellar liquid chromatography

PHYSICAL SCIENCE

PP-01

A Case Study on Tampering of Firearm Code

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The serial number of a standard firearm on the frame remains permanent and unchanged throughout the life of the firearm similar to the fingerprint of an individual. As per convention, the serial number may be mechanically punched on the metallic body parts of numerous types of factory made firearms for identification purpose. Evidence of tampering with the original serial number is often reported for various criminal intentions. In one case, a service firearm along with fired cartridge cases recovered from crime scene was received in the forensic science laboratory. On examination, forensic evidence like linking of crime cartridge case with the firearm and tampering of the firearm serial number were identified showing different than what was originally placed. The details have been discussed in this paper.

Keywords: Serial number, Tampering, Forensic evidence, Identification, microscopic examination

PP-02

Forensic Identification of Contrivance from an Unusual Tool-Mark – A Case Study

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In a case of amysterious burglary, wherein only a incise portion of a metallic sheet was available which was having a clear and contiguous tool marks in form of curl-up/spiral formation, which were in an unusual variety. These curl-up/spiral formation of residual metal on the metallic sheet were called as 'curl-chips' and was the only inkling evidence. This paper elucidates a complete forensic interpretation of the formation of 'curl-chip' formation principle based on the friction fatigue metallographic study of the three distinct heat formation sources that are generally formed when a tool is implimented on a metallic sheet viz. (i) Plastic Deformation of Metal; (ii) Secondary Plastic Deformation; (iii) the Tool Implimented Interface. This forms the source for 'curl-chip formation' principle in metallic sheets. Using this principle, authors were able to identify the contrivance as "**RIPPING SHEAR" or "METAL NIBBLER"** which had been used for making peculiar incise on the metallic sheet.

Key Words : Tool marks, Curl-ships, contrivance, friction fatigue.

PP-03

Identifying of Individual from the Chance Print after Four Year of Crime"- A Case Study

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The fingerprint science is the most positive means of identifying individual and to connect the criminal with crime. Chance prints developed/ detected from the scene of crime play important role to connect the criminal with crime. In this case a Junior college Principal of S.C. ZapkeAdhyapakVidyalaya, Sangola, Distt. Solapur, Maharashtra was found murdered in his office by the unknown persons and four chance prints were developed/detected by Fingerprint expert from the scene of crime but local police and CID could not connect the criminal with the crime during the

Investigation. Bombay High court ordered for fresh CBI Investigation on the basis of the petition filed by the deceased family. During CBI investigation fingerprints slip of many persons were prepared for comparison with chance prints. The quality of chance prints was enhanced by using different filters/ image processing technique and compared with specimen fingerprints of many suspected persons. The identity of two chance prints could be established with a suspected person after four years committed the crime.

Keywords: Chance print, Identification, Crime Scene, deceased, fingerprint, CBI, Investigation,

PP-04

Analysis of Dispersion Pattern of Gun Shot Residue (GSR) Of Country Made Firearms

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The firearm is a device by which we can project a projectile in a particular direction and the country made firearm are commonly used for the crime in the various states of India. The manufacturer of country made firearm is not able to manufacture country made firearm in a proper way by the use of local hand tools and machining. Hence, the investigators as well as the forensic scientist are facing lot of difficulties in establishing the range of firing where a country made firearm is used in a crime. Efforts has been made in the present work to establish the range of fire of country made firearm by conducting test firing from country made firearms and subsequent analysis of their Gun Shot Residue dispersion pattern in the laboratory condition.

FORENSIC STUDY:

During the examination of the 7.65mm country made pistol firearm in the ballistics division of CFSL/CBI, the firearm was test fired from the different ranges like 4",8" 12". After the test firing from the above said ranges, the pattern of GSR (Gun Shot Residue) was examined. Dispersion pattern was measured by taking outer and inner dispersion area. After the examination of the pattern of GSR, it was observed that the pattern was same at the particular range and we can able to conclude the range of fire with the help of this study. The study can help in determining range of firing in cases where range of fire is not known.

Key words: Firearm, Projectile, Country made firearm, Manufacturer, Local Hand Tools, Machining, Gun Shot Residue, Outer and Inner dispersion.

PP-05

Fire-Arm Tampering – A Case Study

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A tampered fire-arm is that fire-arm which has been meddled with or some unauthorized changes are introduced in its structure. It is not always prerequisite that the fire-arm has been tempered completely. Even if a small part of it, such as firing pin, is found to be tempered than the fire-arm

would be called as a tampered fire-arm. Tempering in a standard Fire-arm is easily detectable but any tempering in case of country made Fire-arm is not easily detectable.

Fire-arm tampering is generally done by the criminal or suspected person in order to mislead the investigating agency.

Brief-history:-

In a case a large number of fire-arms from different Police Station of Delhi Police were received in the Ballistics Division of CFSL/CBI, New Delhi, which were used by the police to control a riot situation, for linking of fired cartridge cases and bullets recovered from the spot and from the body of injured and deceased by the doctor. During physical examination of said exhibits, tampering in some of these fire-arms were observed. After test firing and microscopic examination of the said fire-arms, the tampering has been confirmed in some of the fire-arms.

Forensic finding:-

The object of this poster is to provide a comprehensive idea how tempering has been detected during laboratory examination.

Key word: Tampered, Meddled, Unauthorized changes, Damage & Prerequisite.

PP-06

Role of Key Examination in Vehicle Theft Cases and Various Dimensions of Examinations

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Vehicle thefts are being one of the common crimes in these days, Law and order is at stake whenever such thefts are reported. Its often observed that in most of the cases there is a contribution of the vehicle owner which leads to losing the vehicles. The negligence of the vehicle owners which leads to the vehicle thefts and the statements which they record in such theft cases are in sometimes far from the truth.

The Examination of Vehicle Keys / duplicate keys plays a critical role in ascertaining the involvement of the vehicle owner / negligence of the vehicle owner in vehicle theft cases. This study is focused on examination of vehicle Keys and co-relation of the result with regards to the statements recorded by the vehicle owners which shall lead the Investigation agency or insurance agency to take further decisions.

Keywords: Vehicle Theft, Negligence, Wear and tear characteristics of vehicle key

PP-07

Classification of the Firearm from Gun Shot Injury- A Case Study

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Generally the firearms are classified either from the fired bullets or cartridge cases as regards to class characteristics because the class characteristics are studied first then experts go for the individual characteristics for the identification of firearms, which known as the firearm finger printing. But in this paper the firearm is classified first from the entry hole on the human target. The classification of the firearm can be studied from the entry gunshot hole when it is fired within the close range whereas

the firearms are classified either from the pattern of the rifling on the surface of the fired bullet or from the pattern of the firing pin impression on the percussion cap of the fired cartridge case. Hence the classification of the firearm (design of the muzzle end) is studied from the pattern of entry hole on the target.

PP-08

GSR Analysis: Trends in Recent Development

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Gunshot residue (GSR) examination is often sought by the law enforcement agencies (LEA) to established linkage or elimination of the suspect from involvement of crime(s) in shooting incidets.Cotton swabs or GSR stubs are used to lift the GSR evidence from different body parts of suspect or victim or intermediate objects. Recent studies have shown that unique GSR particles contains Pb-Sb-Ba composition and possess charatcteristics spheroidal shape. Some more study also shown that particles of near similar elemental composition with similar shape also originate from non-firearms source such as brake linings, battery workers.etc. So, doubt arise in the mind of examiner to decide, whether the GSR particles is originated from gun firing or not. Ballistics expert(s) often examines this type of clue material and offer expert opinion to identify the source of origin and relevant techniques employed in GSR analysis are reviewed and presented in this paper. The finding of this study may help the LEA .judicial offices, forensic experts, crime scene manages for better understanding and interpretation of GSR evidence during crime investigation and trials.

PP-09

FSpIdCases: Limited efficacy of Automatic System

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The automatic person recognition systems based on voice biometric have shown more vulnerability than the automatic recognition systems based on other physical traits being used, like the fingerprints, face and iris. The 'Forensic Speaker Identification (FSpId)' requires careful consideration of the concomitant complexities presented by number of factors e.g. ambient as well as electronic noise, inappropriately chosen codec and voice imitation during crime or at the time of acquisition of the reference specimen as frequently attempted by non-cooperating subject. The results of present study demonstrate that the semiautomatic approach of speaker identification, based on auditory as well as spectrographic analysis done by expert, is more robust against the foresaid complexities. Present study is intended to critically demonstrate the limited utility of the automatic speaker recognition system in the 'Forensic Speaker Identification (FSpId)' work.
Keywords: Automatic Speaker recognition, Forensic Speaker Identification

PP-10

Target defeating capacity of Modern bullets: A complete review

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Lead is treated to be an ideal material for fabrication of bullets due to its high specific gravity, cost effectiveness, easily mouldable and availability in abundance. Its properties such as easy mould ability to give desired shape in less time with less effort and to make less destruction to the barrel while passing through the length of barrel, also makes it a good choice for a bullet material. Softness of lead is the only drawback which concerns to shooters when a lead bullet is fired which easily gets deformed and defeated when hit a target. In present paper we have discussed various parameters, materials and their properties which make a modern bullet more effective having target defeating capacity more than the older version of lead bullets.

Keywords: Specific gravity, Bullet.

PP-11

Forensic Analysis of Varying Barrel Dimension at Breech and Muzzle End of Unusual Firearms

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Present scenario of crimes in India reveals that a variety of factory made firearms and unusual firearms such as country made/ improvised pistols are rapidly used in crimes like shooting incidents, murder cases, armed dacoit or robbery, etc. Being a cheap cost of manufacturing and easily available parts unusually firearms such as country made firearms are used in crimes. In India, more than 40% of unusual firearms are used in crimes related to firearms and ammunition. As per golden rule of Forensic Science each firearms is unique in their design capacity of loading ammunition and cocking mechanism. It is observed that the barrels of country made firearms also vary from standard or factory made firearms. In this regards paucity of information is not available in literature.

In present paper author had attempted to study and analyses the relationship of varying barrel dimension at muzzle and breech end diameter. It is observed that some bore of barrels can be loaded for different caliber of ammunitions or vice versa. This study will be useful to Forensic Scientists, Crime Scene Manager and Investigation Agencies. The bore diameter of unusual firearms is not normally, specific may be it is riffled or smoothbore. In unusual firearm bore is usually oversized in true cylindrical barrels or undersized near the muzzle end and oversized at the rear.

It is also observed that the bore diameter may also be different sized to fire the same specific ammunition. In contrast the bore diameter may also be the same for firearms meant to fire different calibers ammunition. It is revealed that breech diameter and muzzle diameter are varying with each other. In brief, bore dimension of unusual barrel vary at internal diameter of muzzle and breech end.

Keywords: Unusual firearms, caliber, country made pistols, ammunition, shooting incident.

PP-12

Identification of Manipulated Insurance Claimed Photograph

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The depiction of untrue story in real look is common practice of the digital photo manipulator by using the high resolution digital camera and easy available of sophisticated photo editing software in the market. Investigating agencies are becoming clueless about the originality of image. In one such case, one post card size printed color photograph was received from one consumer disputes redressal commission to identify its originality. The photograph shows some burning pattern on stacks of some gunny bags containing potatoes of a cold storage which looks original fire. The image processing techniques for identification of manipulated image was applied but failed to identify initially with help of available technique, because of expertise work of photo editor on the image. Later, it was proved with the knowledge of possible editing method such as stamping method in digital manipulation of expertise photo editor what they generally do. In this case we found four cloned pattern of flame on the photograph which helped to identify the digital manipulation of the photograph.

Keywords: Image processing, cloned image, digital manipulation

PP-13

Nano- Forensics: Forensic Application of Nano-Technology

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Nano-Forensics is applying the science and techniques of Nano-Technology to identify, individualize and evaluate evidence of nano-size materials. With the advancement of Nanotechnology, Forensic scientists will be encountering nano-scale evidences in future. Nano-Forensics on one hand could aid in detection and analysis of samples in the Nano-scale and on the other, Nano-materials possess novel properties that can assist detection of evidence which could not be acquired previously. Nano-Forensics most commonly utilizes the instrumentation techniques like Transmission Electron Microscope (TEM), Scanning Electron Microscope (SEM), Atomic Force Microscope (AFM) , Raman Microspectroscopy etc.,. This paper presents the case study of Forensic identification of Nano-materials and the techniques utilized.

Keywords: Nano-Technology, SEM,TEM,AFM .

PP-14

The arms rules-2015-New challenges in ballistics examination

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After53 years,Govermetn of India has promulgated the arms rules 2016 replacing the arms rule 1962.several modification are included in the arms rules 2016 pertaining to small arms and ammunition.Central & state FSLs may help require to amend or set-up facilities for complying these new rules. A workshop on “Recent trends in forensic ballistics” organized by CFSL ,Kolkata (july-2017) has drawn attention on some procedures in examination of firearms, serviceability of homemade firearms without ammunition serviceability of ammunition only, arms other than firearms air weapon etc. and urged to suitably devise or modified examination facilities .in this paper new provision of rules and outcome of workshop discussion with possible solution are presented which

may educate &help the field expert ,investigating offices and judicial offices in ballistics crime investigation and trials.

PP-15

Aerial Firing and Accidental Death: The Stray Bullet

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Aerial firing is shooting, using fire arm, into the air usually during a celebration in our country. In the Gwalior Chambal region of Madhya Pradesh the most common events leading to aerial firing and **Stray Bullet** injuries are encountered during marriage ceremonies, firing in political rallies, electoral victories, child birth and Dussehara celebrations to express happiness and power. In present case a boy was sleeping over the roof of his house, along with his family members in night. All of sudden he got critically injured by an 8 mm soft nose bullet and consequently died in hospital during the treatment. Careful scientific investigation revealed that, it was the bullet fired by someone in air, which on return journey towards earth caused fatal injury to the boy. The lethal impact of stray/falling bullets, important phenomenon associated, and systematic crime scene inspection has been discussed.

Keywords: Aerial firing; Stray Bullet; Soft Nose Bullet; Injury

PP-16

Retrospective Death Analysis-A Case study

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This case study tested if the Psychological Autopsy, the retrospective death analysis can be of significant importance in discerning the mode of death with better accuracy than the material evidences available in the given case. Case study also suggested most probable interpretation of the material evidences in the light of the psychological autopsy findings. Study confirmed the retrospective death analysis is of great help in finding out the possible suicide cases Findings are in line with the Scene of Crime investigation conducted by the expert team at the vicinity.

PP-17

Suicide or Homicide

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In cases of death by fire arms sometimes it is very difficult to decide whether it is a case of suicide or homicide & meticulous scientific investigation is the only way to find out the truth. As per report of National Crime Records Bureau (NCRB), Government of India, in our country the suicides by firearm

are not very common in comparison to the other ways of committing suicide. The numbers of deaths due to firearm are continuously increasing in Madhya Pradesh because of easy availability of standard as well as country made firearms. The locally made firearms and ammunition are easily available in very nominal price. In present case a middle aged goldsmith was found dead at the bank of canal & a firearm entry wound was found in his front lower portion of his neck. Body was found partially immersed in water in prone position. On the basis of the report of son of deceased the case was registered U/S 394,302 IPC, 11, 13 MPDK Act. There was a great agitation in the Bhander town. The track of the entry wound mentioned in post-mortem examination report also eliminated the possibilities of homicide. This case was highly complicated from the very beginning because of its suspicious nature but systematic inspection & reconstruction of crime scene, examination of physical evidences in FSL, Sagar& other circumstantial evidences proved beyond any doubt that it is a case of suicide

Keywords: Suicide; Country made firearm; Entry wound

PP-18

An Overview of Modern Characterization Techniques to Distinguish Glass

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Glasses are important forensic exhibits encountered on day to day crime scene. Distinction of questioned glass pieces from that of the controlled specimen based on physical parameters has got limited scope as they only define the class characteristics of the glass. Employing modern sophisticated instruments can easily pin point one type of glass from other. The differences in properties of glass arise from compositional difference and manufacturing conditions. These cause of differences can be exploited to separate each type of glass. The thermal parameters like glass transition temperature (T_g), crystallization temperature (T_c) and melting temperature (T_m) obtained by differential thermal analyzer (DTA) linear coefficient of expansion(α) and softening temperature(T_s) given by dilatometry can be more comprehensive in comparing inherent behavior of one glass from others. Similarly structural characterization of glass using Fourier Transform Infra-red spectroscopy (FTIR) and Raman spectroscopy clearly designates the various structural forming/modifying units of glass and used as benchmark in distinguishing glasses. Last but not least optical response using UV-Visible spectroscopy and dielectric behavior add further dimensions for the comparison of glass.

Keywords: structural units, processing conditions, thermal properties

PP-19

Study of Latent Fingerprint Development Methods from Non-Porous Surfaces Submerged In Water: A Comparative Approach

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Fingerprints being uniquely individual remains most reliable and accepted evidence in court of law. As the use of waterways increases for recreational purposes, so do the incidents of criminals using waterways to dispose-off the evidence. Since criminals may believe that items recovered underwater

will have no forensic value, this study aims to ascertain whether certain fingerprint methods can recover latent prints on non-porous surfaces at different time intervals submerged in stagnant water. Fingerprints were recovered with different powders, fuming methods and chemical methods. This study showed that the duration of exposure to stagnant water and the methods selected for enhancement influenced the quality of detected finger prints though the best results were achieved with cyanoacrylate and SPR.
Keywords – Submerged Fingerprint, Evidences found in stagnant water, non-porous surfaces

PP-20

Review Study: Forensic Biometric System and It Applications

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This study review about the forensic biometric identification system. Utilizing Morden tool, the ultimate target gets the fast identification of person, making biometric industry and so many thing which help to establishment an Indian biometric identification system (IBIS). The review result shows that whole picture of Indian scenario about biometric system.

PP-21

Automated Fingerprint Identification System

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This contribution describes the development and the forensic use of Automated fingerprint identification system(AFIS).AFIS were initially developed in order to overcome the limitations of the paper based fingerprint collection , by digitizing the ten print card in computerised data bases and to translate the manual pattern classification into computer friendly codes. Automatic identification technology becomes a urgent needs of production of life , authentication technology gained worldwide attention because of its high reliability ,fingerprint identification technology which applied to social security system can accurately determine to protects a person's and prevent the phenomenon of the pension of falsely claim. Although no exactly the same fingerprint from distinct identities was found. Further development of the fingerprint biometric technology allow for the inclusion of palm print reference data bases and for the processing of finger marks and palm marks with, as a result , the partial automation of the forensic investigation and intelligence process. In this field of AFIS the challenges for the future call for further automation of the feature extraction from the low quality fingerprint and finger-marks images.
Keywords: Finger-marks, fingerprint, forensic evaluation, forensic identification

PP-22

Firearms Suicides by Indian Soldires – A Forensic Review

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During the past few decades the highly disciplined Indian forces lost number of soldiers due to firearm suicides. Though various measures are being taken to create an appropriate environment for defense personnel, so that the soldiers can perform their duty without any hassle, but in the last few years, they have committed suicide at an unprecedented level. This paper presents data of 108 firearm suicides by the soldiers of Central Armed Police Forces and various state police organizations in India. Data was collected from newspapers and internet for the period from 2010 to 2015. Most of the parameters considered for the present study are; type of firearm used, age of victim, gender of victim, cause of suicide, site of wound and location of suicide. Findings of the study reveal that the suicides were caused due to harassment by seniors, depression and long illness. Head was found to be the choicest site of wound and indoor location as the most preferred site for committing firearm suicides. The findings of the analysis would be useful for the agencies such as Central Armed Police Forces, military, paramilitary forces, police organizations and policy makers in India to address the problems faced by the Indian soldiers and to take necessary measures well in time.
Keywords: Firearm suicide, Site of wound, Paramilitary Forces

PP-23

Firearm Injury – A Retrospective Study in Varanasi

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Introduction – Firearm wound is an injury produced by a projectile hitting on the body fired from a firearm. Firearm related injury is a leading cause of morbidity and mortality in the world. It is preferred mode of homicide in the northern parts of India. Firearm wounds are normally recognized easily as they have a characteristic entrance wound and may have exit wound. Gunshot wound are often seen in trauma centers and in autopsy room in Forensic Medicine Department.
Material and Methods: This is a retrospective study of cases brought for post mortem examination in mortuary of Forensic Medicine Department, IMS, BHU, Varanasi, for a period of one year from 18/10/2016 to 17/10/2017.
Result: This retrospective study reveals that out of 2337 post mortem examination conducted for the period of one year, 22 deaths were result of firearm injury and its complication; out of which, 16 deaths were due to excess hemorrhage and blood loss.
Discussion: This study shows that out of the total homicidal deaths that were brought to our department, death due to gunshot injury in Varanasi region was found to be of total homicidal deaths autopsy conducted in one year.

PP-24

Mineralogical Study of Soil through XRD: A Forensic Approach

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Soil is potential evidence and helps to establish an affiliation between the crime scene and suspect. Soil contains a number of minerals, many microorganisms, organic and inorganic matter but another factor which makes it unique is the difference in particle size of the soil.X-Ray Diffraction method is the best one for mineral analysis as it is fast, cheap, less time consuming and also non-destructive in nature. In the present work, a soil profile has been generated for different regions of the Jhansi city. Results demonstrated that 17 minerals were found to be common among different sites but 27 minerals were found which were highly site specific and thus, could be used to relate a soil sample to a particular location.

Keywords: Mineralogical, Soil, XRD, Nutrients

PP-25

Study of Frequency of Fingerprint Patterns in Children of Gujjar Population of West Uttar Pradesh

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The present study was a population study, which focused on the frequency of fingerprint patterns in Gujjar population of West Uttar Pradesh. In this study, the authors had included 50 samples of young children ageing between 3-10 years of Gujjar community and 50 samples of Non-Gujjar young children ageing between 3-10 years as control samples. The standard 10-digit fingerprint slip was used to take the plain fingerprint impressions of the subjects using lipstick as the ink. The analysis of the slips was done by identifying the fingerprint patterns using Galton's five-fold classification system. The data was analyzed using statistical tools.

Keywords: Fingerprint pattern, fingerprint frequency, population study.

PP-26

An Efficient Way to Develop Latent Finger Print by Using Talcum and Roli Powder

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Fingerprint as an evidence can provide several important information during criminal investigation. Usually fingerprints are found in latent or plastic form at any crime scene. Such prints on non- porous surfaces are usually developed by powder method. In the presentwork,two new substances -talcum powder and roli powder has been used as a potential developer for latent fingerprints on non- porous surfaces. These substances are readily available in markets, non-toxic and easy to apply. Significant results have been obtained demonstrating that the above mentioned powders have a potential to be used physical developers.

Keyword: Fingerprint, Talcum, Roli,Non-porous Surfaces.

PP-27

The Diverging Path of Biometrics

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Biometrics is automated methods of acknowledging a person based on physiological or behavioural characteristics. Among the features face, fingerprints, hand geometry, handwriting, iris, retina, and voicethe widely accepted biometric is fingerprint. Fingerprints are the friction ridges present on fingers and thumbs. The impressions left by these friction ridges are prominently used for personal identification purposes. The aim of this paper is to highlight the other side of the biometric and thus sheds light on whether the biometric technology employed now-a-days is fully reliable or not. In this paper, the author has studied twenty fingerprints (only index and thumb) of different individuals which are examined and analysed.
Keywords: Biometrics, Fingerprints, Personal Identification

PP-29

Fingerprints in Destructive Adverse Environment

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Fingerprints are one of the most reliable commonly used techniques and are most ubiquitous evidence found at the crime scene .However successful latent prints recovery is not always possible from the crime scene especially when the prints have been exposed destructive condition. Criminal offender have fundamental goals not to leave any trace at the crime scene. Detecting fingerprints in wet or humid conditions is more complex and posses a number of challenges, particularly on dark and patterned material where results often lack sufficient contrast. These surfaces can be wet by water from several sources that differ in their pH and particulate matter, such as rain, roadside or sea water. Small Particle Reagent (SPR) is an advantageous technique for latent fingerprint detection on wet surfaces. SPR is a dry powder that can mix with water and Photo Flo. These reagents are also used for developing fingerprints on items covered with dust, soil or soot, after washing the concerned article with water.
Keywords: Forensic science, Fingerprint, Latent print, Photo Flo.

DOCUMENT SCIENCE

DP-01

Determination of Copied or Dictated Handwriting Based on Examination of Handwriting Characteristics

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The purpose of this study is to determine whether a writing sample has been copied or dictated. This can help in comparison of questioned handwritings with exemplars. If it is known that certain

characteristics can help in identifying whether a document has been copied or dictated then an exemplar can be collected by the method of copying or dictation in order to compare those characteristics with the questioned sample so that the conditions under which the exemplar is authored can more closely simulated the conditions under which the questioned writing was authored. No differences in copied and dictated samples would further prove that the method by which the handwriting is executed does not affect the characteristics of handwriting.

DP-02

Identification of Deception through Handwriting Characteristics

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While handwritings is examined to fix the authorship of any signature or handwritten Notes the same Handwritten can also be used to understand the psychological traits of the writes. Handwriting being a sub- conscious habit, and when the theories also suggest that the write's behavioral pattern can be observed in handwriting, this study is conducted to ascertain if the deception in statement can be identified on the basis of forensic Handwriting Examination .The characteristics of handwritings are studied at macro and micro level established stabled the common Handwriting characteristics which indicate deception in writings. The result of this study is expected to help the investigation offices to relaying on the contents of nay handwritten statements.

Key words: deceptive statement, handwritings characteristics, investigation.

DP-03

False claim by handwriting fraud- A case study in the light of Disguising one's own writings/signature

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A person's signature, unlike his name,is not imposed by society but chosen by him. Many people may have the same name but no two persons have identical signatures.The fact that a person writes his signature so often means that it is deeply engraved on his subconscious. Anyone who wants to change the pattern of his own writing/signature has to fight against the power of his/her subconscious. Since this subconscious does not readily accept imposed changes; in most cases, it wins over the conscious. The resemblance will therefore be so obvious that the expert will quickly realize that writings/signatures are only a disguised version of the person's own genuine writing/signature.In a very difficult problem referred to this laboratory by the Hon'ble High Court of Himachal Pradesh whereinthe applicant claimed that her answer-sheets have been changed in the 10=2 exams and made a defamation claim for Rs.25.00 lacs from the H.P. Board. Initially, the Hon'ble High Court has allowed the applicant for her admission in the Medical College provisionally. However, the authors/examiner by their concerted efforts analysed the writing characteristics and were able to pin-point the consistencies in the writing characteristics in the forged writing/signature through

juxtaposed chart proving that the writer attempts to camouflage her own handwriting through allograph technique in her standard writings and after the report of this laboratory the Hon'ble High Court invalid her claim for admission in the Medical College.

Key words: signature, disguised, resemblance, writing characteristics, allograph technique

DP-04

Technology Intensive Examination/Analysis of Forensic Document Crime Exhibits to reveal the Hidden Truth

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Forensically speaking the documents submitted in the laboratory are not, sometimes, true what they are representing. With the advancements in digital image acquisition, processing and reproduction technologies, the fabrication of documents has become easier and closer to perfection. This has led to the uncovering of new dimensions and intricacies of white-collar crimes on one hand and facing of new challenges of their detection on the other. This poster presents case studies of a case consisting of fabricated and manipulated documents using digital image processing and reproduction tools and another case, where the fraudster adopts unconventional tricks to the perfection to legitimise a document to have pecuniary gain such as lifting of part of signatures and affixing the same on spurious document. Extensive scientific examination of the questioned documents with the use of modern scientific instruments and techniques revealed evidence of trickery and the result accompanied with laboratory report were nothing less than demonstrative truth of fabrication.

DP-05

Study of security features of new indian currency notes

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After devaluing old Indian currency, RBI issued new Indian currency notes of various denominations. In this paper detailed study about dimensions, colour scheme, security features etc. of these newly introduced Indian currency notes have been evaluated. Features of new Indian currency notes with the help of various scientific instruments under different lighting conditions have been examined.

Keywords: Security Features, Scientific Instruments, Light Sources, Indian currency etc.

DP-06

100 EURO: Counterfeit V/S Genuine

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The counterfeiting of currency note is one of the most serious economic offences witnessed globally. Due to access of high quality and relatively inexpensive high tech sophisticated equipment's like computers/laptop, multimedia devices. Colour laser copier, high resolution scanner, printer, digital image acquisition and retrieval mechanism etc. the incidence of counterfeiting has been increased

manifold in the modern era of science and technology. A variety of methods has been used by the counterfeiters to escape its detection at one hand and produces challenges to the forensic document examiner on other hand to help the law enforcement agency for curbing/preventing such incidences of counterfeiting. Counterfeiting produces challenges too to the financial institutions as well as security devices producing industries to produce such a security feature that cannot be counterfeited or be a powerful deterrent to counterfeit. This poster deals with the detail study of the counterfeit 100 Euro note. The examination reveals the very fact that the counterfeit 100 Euro look like genuine one in their physical appearance but examination under various light arrangements under Docucentre Expert, Stereo zoom microscope, hand magnifier etc. high lightened its deficiencies in security features compared to the genuine one. The result and detail features of forgery of 100 Euro are discussed in detail in this poster.

Keywords: Counterfeit currency, Docu center expert, high tech equipments etc.

DP-07

The Study of Identification and Comparison of Faces in the Photographs

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The objective of this paper is to enumerate the features of face identification in forensic photo examination and their comparison with the faces in the photographs. Examination of face identification includes wide variety of examining of photographs by means of pasted or scanned on material or documents such as identity cards, bank account opening form, admission forms, admit cards or on machine generated documents such as photocopied/scanned documents, fax machine output and other media which are taken into consideration in forensic examination for their expert opinion. Generally forensic photo expert prefers non-destructive method of techniques for analysis of photographs so that the originality of photograph is maintained. Forensic experts in photo examination are taught to compare images for attaining individual features on face identification or permanent marks need to find the similarities and dissimilarities between the facial features. For this purpose various equipments/software based technologies such as Adobe Photoshop, infrared and ultraviolet source techniques, superimposition techniques, photogrammetric measures as well as enlarge photographic technique are in used. Forensic experts compare facial features and their characteristics present in the photographs to provide expert opinion in cases referred by the CBI and investigation agencies. Forensic experts provide testimony based on image comparison analysis in the court of law. This role is performed by the specialized experts in the field of Photography.

Keywords: Forensic Photo Examination, Scientific Photography, Adobe Photoshop, superimposition techniques, enlarge photographic technique etc.

DP-08

Forensic Examination of Nigerian Passport- A Case Study

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Although there are number of security features are present in the Passport of every country but fraudster may replicate the almost the each one. It is only the Machine Readable Zone (MRZ) that it complex to forge. Most of countries passport are very complex to forge while some are of easier in

nature. The present case was forwarded through Economic Offence, CBI, New Delhi which involves the examination of passport issued by Federal Republic of Nigeria. Although they have not provided the standards but the report of its genuineness was expressed only by the basis of examination of MRZ. The format and the calculation criteria of the MRZ are fixed by the every country. Similar in case of Nigerian Passport that was analyzed for its MRZ including of its check digit and the passports are failed to pass the fixed criteria.

DP-09

Sequencing of Strokes: A Forensic Case Study

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In recent age of high-end white collar frauds, Forensic document laboratory receive cases where perpetrators of the crimeare using sophisticated techniques to manufacture documents viz. fake deed, promissory note, Legal Documents etc. for fraudulent means. A case of such sophistication where a Built- up document where the legal deed was prepared on Non Judicial Stamp Papers, received in the laboratory for analysis. A strategy was adopted which involves preparation of samples, analysis, and conclusion of results after which study was conducted in the original case exhibits. The case study involves a scenario where the signatures/printings were taken on blank paper knowingly or unknowingly and after that printed matter/signatures were inserted into the document. Detailed analysis in relation to the sequence of writings (ballpoint pen) over the printing (toner technology) was undertaken utilising firstly spectral techniques by using VSC 5000 at the cross-sectional points and also the use of conventional stereo-microscopy. Study included the preparation of sample analysed with the above procedure and then compilation of the result. The results obtained were then utilized as reference material in the case work.
Keywords: Spectral analysis, cross-section, sequence of strokes, toner, Built-up document.

DP-10

Visualization of Disappearing Ink Writings

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A new tactic for committing bank frauds using ***'disappearing inks'*** in the preparation of various spurious bank instruments is an interesting trend leading to an alarming situation both for the individual and financial institutions. Such types of inks become invisible over a period of time and thereafter not normally seen under visible light with naked eyes, making a very handy tool for forgers wishing to cheat society. These inks are not illuminated even when seen under infra-red and ultraviolet lights. The disappearing inks are water based ***acid- base indicators(pH indicators)*** which change from a colored to colorless solution upon exposure to air over a period of time due to change in pH value of the indicator. The most common pH indicator for ink is ***thymolphthalein (blue)*** which has a transition range of ***pH value approximately 9.3-10.5***.Visualization of such secret ink writings is possible by examining the suspect document under specific combinations of wavelength and filters under a strong beam of light even after its disappearance.

DP-11

Examination of Forgery in Banking Instrument – A Systematic Approach

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Now a day's perpetrators having knowledge of the sophisticated and Hi-Tech printing and technology are involved in economic crimes. They not only forge the signatures but also invade on the printing due to its easy access to alter and reproduce the desired contents on the banking instrument. The experienced expert can examine such type of problems even in the absence of samples. Besides examining the different types of forgery involved in the signatures, the printing on the instruments whether conventional or by any other methods used locally by issuing bank also needs to be examined. In the present paper the systematic method of identification of fraudulent nature of the banking instrument are discussed even in the absence of samples or exemplars.
Keywords: forgery, exemplars, traced forgery, conventional printing, laser printing.

DP-12

Analysis of Speed of Handwriting

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According to one of the pioneer of the Handwriting Ordway Hilton "Writing Speed cannot be measured precisely from the finished writing but can be interpreted in broad terms of slow, moderate and rapid".

Differences in the comparative speed of two writings can be determine through careful study of slant, smoothness, alignment and symmetry of the connecting stroke and angular strokes, size of the letters large or small.

In the present study, factors of intoxication, physical factors like sitting, standing and moving as well as embellishment have been studied and compared for analysis of speed of handwriting.
Keywords: Speed, slant, writing, smoothness, symmetry, connecting stroke, angular strokes, intoxication, embellishment.

DP-13

Secret Writing Using Plant Exudates and Its Decipherment

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Secret writing is the art of hidden exchange of information, a way of communication of a secret message between two parties rendering the message unreadable by third party. Three techniques – iodine fuming, heating and handheld UV lamp have been employed for the decipherment in the

present study. Present work involves exudates of commonly available plants like Dandelion, Aloevera, Cannabis, Weeping fighave been used as invisible inks for the purpose of secret writing on porous and non-porous substrates. Thirty three samples (eleven samples each for three techniques) have been employed. The writings got revealed to the level of clarity, legibility and readability.

DP-14

Forensic Way to Examine a Disputed Envelope

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Although an envelope is used to hide any information, still a lot can be revealed by its forensic examination. Envelopes can be linked with various types of crimes including sending threatening message, submission of number of tenders in others name, transmitting chemical or biological harmful agents and delivery of extortion or kidnapping demands. At number of times, Forensic Document Experts are requested to examine these questioned envelopes. Mostly, the query is to determine whether the multiple envelopes have a common origin or not. First of all, the physical examination of these envelopes are carried out by examining their size, shape, colour, printed pattern, placement and dimensions of adhesive strips and general format of the flaps and seals. Production markings including repeating or transient defects are also examined as discriminating features from various batches of envelopes. Nevertheless, chemical examinations can also be useful by performing on various components of an envelope to determine, if there are commonalities that may link the sample with comparable similar standards. The authors procured several different types of envelopes from various retailers of Jhansi city market and performed numerous examinations in an attempt to characterize and differentiate them based on their physical properties. The envelopes were also examined to determine, whether they had diagnostic defects in their printed patterns, if applicable and in their construction to identify possible class characteristics that could yield critical information during a criminal investigation.

Key words: Envelopes, forensic examination, questioned document, postal seal examination.

DP-15

Visualizing Latent Fingerprints on Thermal-Papers

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Thermal papers in form of ATM slips can be crucial evidence in linking the criminal in case of ATM frauds. There are many classic and recent techniques to develop fingerprints on different surfaces; present paper purports to visualize the latent fingerprints on thermal papers using VSC (Video Spectral Comparator), which is as a very simple, contemptible, non-destructive technique. VSC provides different spectral ranges thus helpful in directly visualizing fingerprints in different wavelength light source. A video camera, light source and filters including the visible, UV and near

infrared part of electromagnetic spectrum constitute the elementary part of video spectral comparator imaging instruments. There is no need to pre-treat the paper with any chemical or to apply any heat or any other physical methods on the paper in order to visualize the fingerprints on thermal papers. A total of hundred samples of ATM slips were collected from different sources and of different time period were visualized in Video Spectral Comparator. Most important observation in the present study was the permanency of the developed finger marks in the VSC without application of any chemical reagents over a long period of time. Finger prints of fresh origin as well as up to four months old were clearly visualized using VSC.

Keywords: Thermal paper, Video Spectral Comparator, latent fingerprints, thermal papers, non-destructive technique.

DP-16

Examination of Complex Signatures for Conclusive Opinion

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The verification of signatures handwritten signatures is one of the oldest and most popular biometric authentication methods in our society. A history which spans several hundred years have ensured that is also has a wide legal acceptance all around the world.Signature execution is an art with the co-ordination of neuromuscular activity of brain that place part of writer's name in form of signature initial stroke, connecting and terminal stroke on specific surface called as placing of signature and if there is placing then it will be on specific angle. The placing of signature part with specific angle from different point is unique because of the unconscious activity of brain. The starting of signature with specific angle and end of signature with specific angle and these angles from different point of signature will show the genuineness. The angle measurement will help to identify the writer and also help in comparison with forged signature either the simple or the complex signature.

A methodology adopted for examination of complex signature based on angle measurement of cross-section of strokes in signature that was previously validated has been applied to 30 writers in order to quantify the degree of angle of cross-section of stroke at the 5 different points at different cross-section among handwritten signatures. In this methodology, the discriminating power of parameter extracted from signature was investigated. The angle of connecting strokes (1st, to 5th point) appeared to be most discriminant. Finally the difference between writers could be characterized more precisely the individual writers were distinguished by the variability of parameters of angle of their cross-section in stroke and the morphological cross-section between its different letters. The correct discrimination rates reached in the study suggested that carrying out an expertise of fragmentary samples of handwriting comprising only angle of cross-section is completely possible

DP-17

Forensic Accounting and Auditing

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The Standards on Auditing (SAs) limits the auditors categoricalrequirement's on fraud detection in financial statements.Users of financial statements believe that auditors are able to identify by

performing audit procedures, the risk of misstatement formed by fraud. Audit procedures are designed to detect only material misstatements and thus auditors might not be able to detect all fraud even if they apply reasonable procedures that react on arising of fraud. Here an approach is made in forensic audit & accounting appliedfor specific procedures, purposes, methods and techniques. The main objective of this research is to summarize the detection of fraudulent activities and prevention from their happening through forensic accounting & auditing.

Keywords: Standards on Auditing (SAs), forensic accounting & auditing, fraud.

DP-18

Handwriting Discriminability of Hindi Medium and English Medium Students of Uttar Pradesh: A Comparative Approach

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The handwriting of an individual is a neuromuscular activity which has been acquired over time. It is the image of an individual's personality. The study of handwriting of a person may reveal their educational background as well. The Present paper emphasizes on estimating the probable medium of education of the writer based on statistical validation of features observed in 200 handwriting samples, 100 of each Hindi medium and English medium students of Uttar Pradesh. The frequency of features in samples was computed and relative probability was calculated. A simple tool has also been proposed here which computes the input values given by user and suggests the probability of medium of education of the writer. The tool was validated by 50 unknown samples and found to be 85.6% accurate.

Keywords: Handwriting, Educational background, Hindi medium, English medium

DP-19

Security Features of Indian Bank Note: A Comparative Study Of Old and New Denomination

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Proper circulation of money across the market is a vital pre-requisite in order to continue the working mechanism of the economy of a country. But above that what seems to be even more important is to avoid the circulation of a counterfeit ones. Therefore, security features are the special characteristics incorporated in bank notes with the intention to make them counterfeit-proof. A direct proportionality relationship is generally seen in the complexity of the security features with increase in the amount of denomination. This study focuses on deciphering the security features of the newly introduced denomination in the Indian market that is 50, 200, 500, and 2000. The study also aims to compare the security features of the old and newer denomination in order to aid in differentiating the fake ones from the original ones. The authors have observed numerous new security features such as absence of the latent image in new Rs.50 denomination and newer brail marks and breed lines in new Rs.200 denomination note to name a few. Moreover also been observed that the older features are modified and placed at a different location.

Keywords: security features, counterfeit-proof, comparison of bank notes.

DP-20

Statistical Analysis of Intra-Writer Variations in Handwriting under Different Physical Conditions

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Handwriting analysis can be efficiently used for individualization during forensic investigations but natural variations can arise in intra-writer samples. The research was conducted to study these intra-writer variations in 50 individuals including both men and women. Samples were taken on A4 size sheets with blue ball pen. The research included 8 different physical conditions like the posture of the writer, different surfaces provided,distraction, time limit and light conditions. The research focused on the analysis of class characteristics and natural variations. The purpose of this study is to find the handwriting characteristics that change with changing conditions and those that remain same, for effective identification of individuals.
Keywords: Forensic, handwriting, natural variations, Intra-writer variations, physical conditions

DP-21

Comparative Study of Security Features of Passports of Different Countries

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Passport is the most important identification document for a citizen of a country. To prevent passport forgery various distinctive security features are included while printing. These features are holograms, microprinting, optical fibres, UV fluorescent thread and emblem, watermark and ghost images. In this study, we have used Visual Spectral Comparator (VSC-40) for identifying these features in passports of 6 different countries, namely, India, Bangladesh, Qatar, Kuwait, Mozambique and Tanzania. After studying the different passports, it could be concluded that the most important security feature in Indian passport is the 'Ghost image' and double lamination features that prevent counterfeiting.
Keywords: Forensic, Visual Spectral Comparator, Security features.

DP-22

The Effect of drugs on Handwriting

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The goal of the study is to describe whether a simple handwriting of an individual will be affected when the individual is addicted to drugs. Handwriting of an individual is based on the neuro muscular coordination, when an individual is addicted to drugs there will be some disturbances in neuro muscular coordination which might directly affect the handwriting. Monitoring these side effects is important for patients who undergo treatment with antipsychotic medications, as these drugs often produce extra pyramidal side effects (EPS) which results in movement abnormalities. For this study, we examined writings of 9 patients who were undergoing treatment at rehabitationCentre. The subjects were instructed to write a illustrated text when in normal condition as well as under drug induced condition. There were few important observations from this study: 1) patients with drug induced exhibited impaired movement velocities and velocity scaling; 2) there was a positive correlation between the font size scaling for drug induced condition from normal; 3)participants displaced abnormalities in movement smoothness in the form of tremors in drug induced conditions and 4)there was a positive correlation between pen movement and pictorial effect of the participant before and after drug induction.

CRIME SCENE

CSP-01

Vital Physical Clues in a Brutal Rape and Murder Case

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Proper recording of clues found in the crime scene is necessary and vital to prove the guilt and produce before the court as evidence. Photography is one of the means used for such recording. However, getting the right shots is vital which easily understandable and shows all clues which can narrate the motive, sequence of crime, and link to the victim and criminal. When Forensic Experts visited a rape and murder scene of crime where the dead body was found covered with a cloth. Posture of the body, nature of wearing clothing, stains on the garments including inner, injuries on body including private parts, gold chain, foot print and a blood stained wooden stick with hair strands and hole where the stick could have been used as a fencing post were the important physical clues found in the crime scene. With further examination of these evidences and their interpretation can reconstruct the scene of crime. Photographs are presented in this paper.

CSP-03

Interpretation of Body Language in the Scene of Crime

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This case study tested the Body Language can be of any help in detecting truth at the time Scene of Crime reconstruction effort. The photographs taken at the Scene of Crime at the time of reconstruction while the accused and the witness detailing their version of the incident is taken into

account. Photographs revealed remarkable, universal deceptive signs on the part of the lying person. Study has confirmed the primitive and universal detective methods are still valid in the detection of crime. Findings are supported by the Crime Scene reconstruction, other oral and documentary evidences, polygraph test and Psychological autopsy.

CSP-04

Gaseous Poisoning and Death of Three Workers inside a Tannery Sludge Tank: A Forensic Report

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A fatal incident causing death of three human lives have taken place inside a tannery sludge tank situated at leather complex premises in Kolkata, West Bengal. The incident happened during the cleaning operation of biological waste materials from the sludge tank, a confined space where the biological waste-matters along with different chemicals are stored for cleaning purpose. A Forensic team visited and examined the place of occurrence. The investigation reveals that the sludge tank full of bio-waste liberates predominantly C along with some other gaseous species. The gases are generally produced due to the bacterial decomposition of biological waste materials inside the sludge tank. The concentration of gases liberated from the sludge tank depends on the type of operational procedures during cleaning and also the aging of the biological materials inside the sludge tank. The present report aims to explore the root cause analysis of such fatal incident and also suggests the scientific measures to avoid such type of incident in future.

Keywords: Tannery, place of occurrence, gaseous poisoning, hydrogen sulfide

CSP-05

Importance of Photo Coverage in a Crime Scene: Photograph a Best Forensic Tool

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Photographs served the investigators as a visual documentation of crime scene which can be examined further for future investigation. A photograph gives precise measurements and distances between two points in a crime scene. Photos are essential requirement in court hearings and trials because it is a permanent visual record of the scene along with other collected evidence. Even though a scene has been video recorded, still the photograph is necessary in every crime scene. Generally camera enables us to look the hidden object which our naked eyes neglect to see. This paper focuses on the importance of the photos and why it must be always taken in the process of solution of the crime.

CSP-06

Chance Prints-Criminal Visiting Card & Scientific Aid of Investigation

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Fingerprint science is an important branch of forensic science and scientifically aid to investigate not only excludes the crime victim, suspects but also authentically establishes the identity of an accused person. Fingerprints identification is widely accepted by various investigating agencies, recruitment agencies, scientists and courts. The science was originated in India pertaining to great honour for our country. The first fingerprint bureau was established in the world in 1897 at Kolkata. The fingerprint science is a most reliable and errorless human identification. Chance prints are criminal visiting card and it can also provide scientific aid of investigation. In an attempt had been made in the scene of crime inspection and fingerprint examination work.

The visible/latent prints are collected from crime scene and it can be used to identify the accused persons. Investigating agencies, courts and general public took some time to believe and beyond the doubtful in the utility of fingerprint science as a scientific aid of investigation. The prospective individual study of crime scene inspection and fingerprint examination work was carried out in the sensational murder and robbery cases.

Keywords: visible/latent print developing kit, forensic light sources, lens, marker, finger/ palm/foot print impression slips, enlarged 3x photographic prints.

CSP-07

A Note on the Innovations of Making Improvised Explosive Devices by Maoists of Bastar Range, Chhattisgarh State, India

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The Communist Party of India(Marxist-Leninist) people's war group which is popularly known as People's War Group (PWG) and now known as CPI(Maoist) after merger with another left wing extremist group Maoist Communist Centre of India(MCCI). It has an expertise in the use of Improvised explosive devices (IEDs) like Landmines, directional mines, rocket launchers and grenade shells to target the security forces. The IEDs are very potent weapon in the hands of Maoists. They give them much strength to fight against security forces. In the last 15 years more security force personnel have lost their lives in the incidents of IEDs blast in Maoist affected areas of Chhattisgarh state, India. They use the easily available materials in the local market for the preparation of the IEDs. A comprehensive description of the, explosive materials used in the scene of explosions , mechanism adopted and the special features of IEDs has been provided in this article to apprise the security personals who are involved in the anti-naxal operations.

CSP-08

A Mysterious Gunshot Case

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An important and rare gunshot case is discussed presently, where a youth committed suicide. Before the occurrence of incident, deceased walked out from his house, while speaking over phone. Next day morning he was found died in the near vicinity of his house. He had one gunshot wound on his chest and another at back, but no weapon or bullet could be recovered from spot since it was a busy path. During the autopsy, wound present over the dorsal surface was declared entry and case was registered under section 302 IPC against unknown person. On the basis of wound observation and findings of crime scene, the wound present over the chest was declared entry wound by forensic scientist. Further one suicide note was recovered from the clothes of deceased. When the case was referred to Medico legal experts and FSL Sagar, findings of forensic scientist were endorsed in their opinion. Finally the autopsy findings were proven wrong and the case has been registered under section 306 IPC and 3, 2 , 5 SC/ST Act against three known persons.
Keywords: Gunshot, Suicide, Chest

CSP-09

Crime Scene Management and Forensic Photography

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A scene of occurrence of a crime is the place were a particular crime has been committed or where physical evidence of such crime is found when it is first brought to notice of the police. Crime scenes are dynamic, rapidly changing environments and the first officers to arrive on the scene must be concerned with countless details. The crime scene is the locale from which the majority of the physical evidence associated with the crime is obtained. Physical evidence found at the scene can be the key to the solution of the crime. The first officer's most important task at the scene is to prevent the destruction or diminished value of potential evidence that may lead to the apprehension of the criminal and the ultimate resolution of the crime. Crime scene investigators arrive at the scene with evidence collection kits and all tools and equipment needed to conduct the search and collect the evidence thoroughly. FSL Photo Expert are used for specialized photography. Forensic photographers are utilizing digital photography more for general forensic photography as well as crime scene photography. Following the initial crime scene search, photography, and sketching of the crime scene, physical evidence may be collected.

CSP-10

Physical Evidence in a Blind Murder Case

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Scene of Crime is a place where crime is committed and criminal makes contact with the surrounding environment. One such crime scene found at Nety Khedi village, helped Chachara police station to connect the crime to the criminal. From the observation and physical evidences found at the scene it was found that a young male was murdered and post-mortem reports revealed the cause of death which was due to the heavy hitting on the head by sharp stone.

CSP-11

Cut Throat Case:A Murder Transformed To Atypical and Rare Suicide

H. Sharma, & P. Ajay Soni #

The first and essential role of an investigating officer is to identify the nature of incident i.e., HOMICIDAL, ACCIDENTAL or SUICIDAL. Any kindprejudice,inclination based on public perception or background information may distract the direction of entire investigation. We report a case where a lady was found died in her house having cut wound on her neck. Considering the severity of case, position of dead body and general perception of homicidal nature of cut throat, Police was about to register crime under section 302 IPC, against the unknown person. Although rare but few cases are reported where the autopsy surgeons has declared a cut throat suicidal but it is exceptional that crime scene findings and external body observation may be sufficient enough to decide the nature of crime. On the basis of keen observations and systematic recording of facts and findings of crime scene, case was proven suicidal. Hence the registration of a heinous crime and entire futile exercise could be avoided by systematic crime scene investigation.

Keywords: Cut throat, Suicide, Crime scene findings

CSP-12

The Role and Impact of Forensic Science in Different Case Studies

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Various investigations of any crime is based upon theories and principles of basic science and a Forensic Scientist applied those principles and laws for crime investigation to provide better justice so we can say knowledge of Forensic science is provide better techniques in crime and criminal investigation. This paper focused on the role and impact of forensic science in different case studies (hanging, burning, drowning, shooting incident etc.).

Keywords: Physical evidences, Photography, Crime Scene Investigation Kit, Searching Methods, Chain of custody.

CSP-13

A Charred Crime Scene: Plot of Crime Still Deciphered

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A married woman, aged 28 years was found burning in the middle of night (0330 hours) in her bedroom. By the time the fire could be doused the body of the deceased had almost charred. Along

with the deceased her son also got burnt, but he was rescued by his maternal uncle who later on succumbed to his burn injuries in the hospital. Initially, at the crime scene nothing was amiss. The whole room was burnt and the seat of fire appeared to be in and around the bed. The woven threads of the bed along with mattress and other cloths were burnt to ashes and were laying on the floor. The wooden structure of the cot was found intact. A dead body was located on the floor lying transverse to the length of the wooden cot. The dead body was completely charred so nothing could be said about ante mortem or post mortem burning. During reconstruction of the events it was revealed that one of the doors of the house remained unlatched from inside thus leaving room for anyone to leave the house undetected. It also came to our notice that the husband of the deceased was sleeping outside the house (around 100 meters away) on the eventful night. One particular thing that caught our attention was too much spread of the fire in an earthen house which is not expected at all until and unless it is burnt purposefully. Very slight stench of unburnt kerosene oil could be felt at various places in the room, but container of the oil could not be located. Almost everything in the room expect the wooden frame of cot had charred or burnt to ashes. While inspection of the crime scene it was found that the corpse was overlain by charred remains of the mattress followed by woven threads of the cot. This was suggestive of the fact that the corpse was lying underneath the cot before the fire had set in. This led us to believe that the woman was first murdered subsequently body kept under the cot and whole room was set alight in order to avoid detection of the crime and destruction of the evidences. Other physical evidences and circumstantial evidences reinforced our hypothesis. Our first suspect was the husband of the deceased based on his easy and undetected access to the bedroom. Upon initial interrogation the suspect kept on evading the truth but he broke down and confessed to the crime when confronted with evidences. Thus corroborating our hypothesis. He is in police custody right now.

Keywords: crime scene, seat of fire, ante mortem, post mortem burning, reconstruction of the events, spread of the fire, kerosene oil, charred, murdered, avoid detection of the crime, hypothesis

CSP-14

Importance of Scientific Examination &Reconstruction of Scene of Crime – A Case Study

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Scientific examination of Crime Scene and its reconstruction play a vital role in the investigation and enable the investigation agencies to draw an accurate & logical conclusion. It also help in finding out the actual truth.

An incident of alleged firing has happened on Mr. XYZ aged about 25 years old while he was sitting in his office in day time. As stated by the complainant that two unknown person visited his office chamber & requested him for placing a stall in front of his office. On refusing, one person fired at him & after firing both of them ran away from his office. Mr. XYZ try to chase them but could not catch them. In order to check his injury when Mr. XYZ removed his shirt from his body, a .315" fired bullet dropped down from his shirt on the floor.

In this regard CFSL, CBI, New Delhi receive a requisition from Delhi Police for examination of Scene of Crime.

The object of this paper is that the line of investigation can be change by the Scientific examination and reconstruction of Scene of Crime.

Keyword: Reconstruction, Scientific examination, Line of investigation, Truth, Firing.

CSP-15

Survey of Development and Enhancement Techniques for Chance Finger Prints

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Fingerprint is a unique biometric trait on which an individual can be identified without any doubt. Individuality and Persistency are the fundamental principles on which Fingerprint science is based. Chance prints are the prints found at the scene of crime and broadly are of two types i.e. visible & invisible to naked eye, also known as latent print which are developed by the Expert using various Techniques/developers. Chance print may have a small portion which is usually not clear and thus require filtering and enhancements. Various enhancements may be performed on the chance print in order to make its comparison feasible. Depending upon the nature of the Surface and Chance print, the different developing and enhancement techniques may be applied so that the ridges in the print are clear and the ridge details can be identified. This paper explores the different latest methods in development and enhancement in identification of finger prints found at scene of crime.
This paper also discusses some important case studies of Goa.
Keywords: Fingerprint, biometric, chance print, finger print expert.

CSP-16

Cryptic Death in the Tourist Bus

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Crime scene photography helps to capture the scene and analyse, it at a later date.It provides a permanent record of the scene & helps to understand the complexities and details of the case. Forensic photography is quite different from the regular photography. Forensic photography highlights mainly on the cases as it provides a concrete proof which can be used as evidence in court of law. Criminal investigation is a complex business that requires professionals from a wide variety of disciplines all working cooperatively toward a common goal. Science and technology applied to the solution of criminals,acts, or forensic science,solves crime by assisting police investigation to identified suspect and victims.It is mandatory to know about the basic concepts of forensic photography and art of crime scene photography to deal and record the evidence in an efficient manner.

CSP-17

Catch fire due to frictional spark in fatal Truck Motorcycle Accident

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Crime scene photography helps to understand the complexity of a crime scene and analyze it in later date. It helps to capture crime scene as permanent record. But forensic photography is very different

from normal photography. Whereas normal photography is dealt with peace of mind forensic photography is directly linked to justice, as it encompasses concrete proof which produced in court of law. Expertise in scientific aspect required in this field which helps to understand different links of different point with crime scene, particular case ,victim as well as suspect. Forensic investigation requires wide variety of discipline toward a common goal i.e. establishing the crime. Hence it is mandatory to know the basic concept of Crime Scene photography that which is useful to record evidence in efficient manner.

CSP-18

Skull Detachment: An Unusual Pattern in Hanging

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In India hanging is one of the common methods of committing suicide along with poisoning, burn and drowing.The Ligature mark is the most relevant feature of hanging, the type and position of the knot plays an important role. But this is the case study with some unusual circumstantial evidences which supports hanging seem suicidal in nature rather than a homicidal incident .A head-less decomposed body was found lying under the tree on the mad of a farm, having highly decomposed neck part almost ruined by the maggots and by the atmospheric conditions. A skull was found submerged into the water filled in the farm in a relative position with the trunk (almost 2 feet far from the trunk). All clothes of deceased were well arranged and buttons of the shirt was found intact. Clothes smudged with body fluid indicating downwards flow, lower part of the tree and the mad around the tree was smudged with pool of body fluid with a downwards flow pattern without any type spurting or splashing, bunches of hairs was found only in a confined area below the tree, was showing the loosen of hairs by a natural phenomenon rather than the possibilities of struggle , systemic arranged sandals of the deceased beside the tree was one of the sign to be a suicidal incident , two pieces nylon ropes (ligature material), one out of them was lying near by the trunk, was having loop of enough circumference, sliding knot, requisite length and another part of same kind nylon rope was found tied with a branch of the tree . And both the pieces of rope were having same type of stretching effect at their free ends. Both tree and ligature material was found strengthen enough to be approachable. And no finding about any type of injuries was given in autopsy findings. These circumstantial evidences indicate suicidal hanging simulates a homicidal case.

Keywords: Ligature mark, Spurting, Splashing, Homicidal, Suicidal, Head-less decomposed body, Maggots, Body fluid.

CSP-19

Scene of Occurrence Inspection in Custodial Deaths- A Case Study

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Death of a person in custody whether of the Police or Judicial will amount to custodial death. Death in custody causes one of the most embarrassing situations for the law enforcement agencies. The Magistrate inquest is mandatory for any death of a person in custody to ensure examination of the

circumstances leading to death. In this study, two cases inspected by the District Scene of Crime Mobile Unit Tikamgarh, have been discussed. One case of scene of occurrence is of an unnatural death of an apprehended person in the lock-up of a police station while another one belongs to custodial death of a prisoner in jail. Findings and spot proceedings of such cases i.e. recording of scene, observation of circumstantial and physical evidence, collection of physical evidences and required reconstruction of the scene done at the spot have been discussed. Other aspect of inquest of custodial deaths under NHRC guidelines has also been discussed.

Keywords: Custodial death, Magisterial inquest, Hanging, Suicide

CSP-20

Looks Can Be Deceptive

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In general many cases we encounter there law and order situation arises and a customary suicidal hanging case becomes matter of extensive investigation. People want to prove that this is a homicidal act and sometime due to grudges innocent person may get punished. One such crime scene was visited by me where deceased was found hanging from a mango tree in his own field with single rope Fig. (a), his face was covered by two bags Fig. (b), and his both hands were tied in his back, with fall of motor cycle on the ground in the close vicinity of the line of the body. In prima facie overall scenario appears to be a case of homicidal act (murder). On the basis of scientific investigation, minute observation of the body, circumstantial evidence, reconstruction of the scene (self binding of his both hands and neck was accessible), I was convinced that this case is of suicidal hanging having single oblique ligature mark with an impression of the used ligature rope on his neck Fig (c).

The body was then subjected for autopsy examination. On contrary, to my inspection report, team of autopsy surgeon reported that this case is of strangulation and homicidal in nature with single ante mortem ligature mark over the neck. Then question arises that if it is the case of strangulation and during my inspection the body was in hanging condition then why there is no double ligature mark and no struggle or scuffle marks? Because, if death due to strangulation and body was in hanging condition then one circular ante mortem and another oblique post-mortem ligature mark should be there. Therefore, the case was then referred to the Director of Medico legal Institute Bhopal for their final and expert opinion.

This case was reported because post-mortem examination initially raises the doubt of homicide in the mind of autopsy surgeons. Hence, the findings were assisted with the circumstantial evidence, reconstruction and scientific evidences used, witnesses, Director medico legal report and concluded that it is a suicidal hanging case. A person who is extremely dedicated towards suicide and don't want to leave any chance of survival, still left some scientific clues. As, before his death, he used to say his friends"Mai marunga to dunia dekhegi" turn out to be true in the form of atypical case. Finally, the closer report was then submitted for the same and interesting findings on reconstruction would be discussed in the full length paper.

Key words: Reconstruction, Suicidal hanging, homicidal hanging, strangulation, and ligature marks.

CSP-21

Domestic Homicide Unravelled By Forensic Investigation: A Case Study

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Recognition of physical evidences and their collection and preservation is very important for the investigation and solving a nature of crime. In the present paper, we summarize a domestic homicidal death, in which an unknown dead body was found near Kotma-Ram nagar main road, village-Reunda, District Anuppur. Primarily, police registered the case under 174 CrPC. During careful scientific observation of crime scene by the forensic team, it was observed that deceased had lacerated wounds on his fore head and one rectangular block pattern (5.5" × 2.5") on chest. Post-mortem staining was well developed over back surface and rigor mortis was present (Figure 1). It was advised to the Investigating Officer (I.O.) that it might possibly be homicidal.

Dry-clotted blood drops were also found between the places where deceased body was found and his own house at some intervals. While inspecting deceased room blood spatter in the form of small blood droplets were found on walls and also some blood stains on floor which was chemically tested for the presence of blood using a Benzidine test. All the evidences cumulatively suggest that the culprit must be a family member. On the basis of this, the Investigating officer of the case was informed and guided accordingly and the deceased father was interrogated. He had no answer for our findings and confessed that he planned the murder. The murder weapon (Charpai ka pava) and blood stained clothes were seized from accused. Biological relation was also established between clothes of deceased and Charpai ka pava (murder weapon) and blood stained clothes of accused via DNA test from State forensic Science laboratory, Sagar, M.P.

CSP-22

Homocidal Stimulate Accidental

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In general, when a body is found on road or khai, perceptions are made that it's an accidental case by traffic or fall down in drunken stage. Especially those cases where external injuries like (sharp incised, bullet wound, ligature mark) are not present on body. This type of facts may confuse common people and investigator because autopsy report is unable to differentiate the nature of incident. In present case, no sharp bullet, ligature injury was present. Keen observation of blood pattern- like blood pool in different place, no sputtering of blood spot, blood drop size study creates suspicion. Measurement of height of khai and distance of body from base of khai creates suspicion. Observation of position of body concluded that it's not a fall down case. Observation of injury pattern on body reflects it's an abnormal thing. From four types of study (injury, blood pattern, measurement, position of body) concluded it's a murder case after interrogation criminal accept his crime followed from witness.

CSP-23

Forensic and Investigative Study In Case Of a Murder Planned By a Man to Implicate His Wife in the Murder of the Man Himself

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This report describes a typical and rare case study in which a man murders a lunatic man and burns him. He leaves his belongings near the burnt body, so that it may be considered as murder and death of the man himself. In the belongings, he leaves such things which may implicate his wife in the murder. His wife had left him and had filed a case against him. Hence, the man wanted to show that his wife has murdered him. The forensic investigations including the multiple DNA tests and the handwriting examinations as well as the police investigations were done. Search was made for the man and the man was arrested. On the basis of physical evidences, the court found the man guilty of murder and awarded him life imprisonment.

CSP-24

Forensic Aspects and Investigation of Death Due To Fall from Height

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The investigation of death due to fall from height either suicide or homicidal throwing from height requires special expertise and eagle eye for solving such type of incidences. In such type of cases microscopic inspection of crime scene spot, circumstantial evidences, postmortem report and forensic physics aspects plays important role and crime scene itself provides several vital information's.
In this study some important cases of fall from height and some forensic physics aspects are discussed in which the subjects were found just below the suicide point of famous ancient Gwalior forte in the different positions at the crime scene spot.
Keywords: forensic physics, suicide, fall from height.

CSP-25

Four Wounds Inflicted By Single Bullet: A Rare Accidental Case

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In some provinces of our country, where people are more attracted toward firearms, the probability of homicides and accidents increases tremendously. Further the unreasonable expectations, deteriorating morality and ongoing enmity have worsened the circumstance in regions like **GWALIOR-CHAMBAL ZONE**. Since the firearm cases leads to the registration of heinous offences, investigating officer, forensic scientist and medical examiner must be vigilant about any foul play in such areas. In present case victim alleged that, the assailants made an "attempt to murder" by firing

twice on him. In an alarming health condition, with four wounds on his body, he was admitted to hospital of UTTAR PRADESH. Police registered a case of ***attempt to murder*** against the four persons of same village. Initial communication with victim (Regarding the details of occurrence) was recorded followed by spot and wound inspection. On the basis of wound inspection, clothes and finally the reconstruction carried out, the statement of complainant was found fallacious. Ultimately the spot and wound inspection report of forensic expert, enabled the court to dismiss the complaint.

Keywords: Gunshot, Forged, Single bullet, Multiple wounds

CSP-26

Fabricated and Actual Road Accident Sites

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Road accident inspection includes, measuring of amount of damage, damage profile of the vehicle, mechanical components of the vehicle, evidences left by the vehicle such as point of impact, final resting positions, skid marks etc. After careful inspection of accidental site, an accident reconstruction can be performed. Viewing the scene first hand, can provide vital clues about the dynamics of the accident and the source of injuries. In present paper two case studies are used to differentiate homicide from road accident. In first case a motorcycle was found backside of a tractor trolley which was at rest from two days on road. Motorcycle was in damaged condition, blood stains found on road and dead body found in bushes beside the trolley. In first look the spot was looking like road accident but keen observation of crime scene opened actual aspect. On reconstruction, possibility of collision of motorcycle and tractor trolley excluded from the case and shown it to fabricated accident scene then police registered case of murder and arrested two accused.

In another similar case damaged motorcycle was found on road. Investigating officer sent dead body for post mortem and since found sharp injury on the forehead of deceased therefore predicted the possibility of homicide so informed FSL team to visit the spot. From site inspection all observations supported the condition of road accident we found a hidden physical evidence also to establish the type of unknown vehicle involved in collision with motorcycle. On the basis of physical evidences and observations, reconstruction of the accident performed.

In this way, on the basis of spot inspection and reconstruction, characteristics of homicide and road accident are highlighted in two similar sites.

Keywords: Reconstruction, Point of impact, Fabrication of accident scene, Hidden evidences, Road accident.

CSP-27

A rare fatal outcome of road traffic accident-A case study

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Along with the benefits it provides, road transportation has many disadvantages. The unexpected deaths in traffic accidents make the situation complicated to analyze the fact, sometimes they looks dramatic. In order to draw the finer conclusion forensic autopsy cannot stand alone to prove any causal relationship between the accident and the death, in such cases an analytical task that requires observation of the three major traffic accident factors: the body, the vehicles involved, and the scene of the accident. This study reports the case of a 21-year-old Medical student who decapitated in a road

accident with a motorized two wheeler. It developed a complication in analyzing the case, as the head of the deceased found separated from the trunk and found 60 feet away from the body. The media projected the accident as homicide, anguish parents supported media. The present study involves thorough analysis and acceptable calculations, which assisted in arriving at the conclusion.

Keywords: Traffic Accidents, decapitated body, alcohol, vault, G-forces.

CSP-28

Suicidal Multiple Gun-Shot Injury-A Case Study

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Suicide by firearm is a frequent mode of death and the most common mode of suicide. The presence of multiple gunshot wounds on the body creates doubt. But the complete examination of scene of occurrence, ammunitions, weapon and the body of the deceased gives the clear picture about the homicide or suicide. Multiple gunshot wounds occurs when a person commits suicide by inflicting multiple gunshots on themselves before becoming incapacitated. This report is a study such case where the multiple gunshot injuries sustained by the victim lead the investigation in to the homicide direction. But the proper and complete examination of the crime scene, blood spatter interpretation and the body indicated that the death was due to suicidal, multiple gunshot injuries.

Keywords: Gunshot, Multiple, Suicidal death, Scene of Crime, Blood Spatter.

CSP-29

Complex Suicidal hanging at Bangalore: Case Studies

Radhika Bhat, B.C. Ravindra, Kiran Kumar M, Srinivas. M

Number of hanging cases are being increased worldwide including in India and many cases remains mystery due to the lack of proper investigation process. In-order to establish the different between homicidal and suicidal hanging, complete crimes scene investigation and through body examination is so crucial. We present two cases of hanging reported in Bangalore which were suspected as homicidal in nature.; in the first case, a female aged about 18 year old, found hanging in a bathroom with her feet touching the ground. This has made the family members to think that, lit was homicidal hanging. The medical officer opined that the death is due to asphyxia as a result of hanging, but the remained silent about the manner of death. At these circumstances it was difficult for an investigation officer to conclude the case as either homicide or suicide. In contrary, in another case, where a Male aged about 48 year old found hanging on the tree besides the road with his both hands tied at backside. The Medical officer concluded that, it is a case of homicidal hanging. But through crime scene investigation, examination of body prior to autopsy, circumstantial evidences available in the scene of crime, re-enactness of sequence of events; we have arrived at the conclusion that both the deaths are suicidal in nature.

Keywords: Suicide, Hanging, Homicide, Saliva, Partial Hanging, Full Hanging

CSP-30

Reconstruction of the Occurrence: A Dummy Experiment

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A B. Tech first semester student of IIT, Gauhati was found dead in the grassland of his hostel on 14th September 2014, stated as committing suicide, jumping from the top of his hostel but the father of the boy complained it as a murder stating that it was not possible to fall in that place from the top of the building and commit suicide. There was no immediate forensic intervention and forensic aid was called after eleven months of the occurrence. There was no clue except a depression in the grassland. Our dummy experiment conclusively and scientifically negated this claim.

CSP-31

Radio Frequency Identification (RFID) Tag Cloning: Detection and Prevention Methods for Secure Evidence Tracking In Forensics

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The RFID (Radio Frequency Identification) system can prove to be highly assistive in maintaining the electronic chain of custody. This method is suitable for low-cost tags and it detects intervention (tag cloning attacks) as soon as both the genuine and the cloned tag are scanned. The details of the authorized person, time and place are also maintained. This study is the implementation based on EPC tags and is an effective way to secure evidences from substitution. As no such system is in practice till date in India, this initiative will prove highly assistive in proper maintenance of evidence.
Keywords: Security; evidence tracking; detection; RFID; TAG Cloning

CSP-32

Underwater Forensic Investigation

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Forensic science plays a significant role in identification of various evidences during criminal investigation. The scenario of crime scene investigation is completely different when the crime is done in water or underwater, as it requires special trained professionals for investigation. The success of the analysis of the forensic evidence is based upon a system that emphasizes teamwork, advanced investigative skills and tools and the ability to process a crime scene properly by recognizing, collecting and preserving all relevant physical evidence. This abstract is about the management of

underwater crime scene as the science of water-related investigations is still in its infancy, and hence, the field needs accurate and useful sources of education. The incorporation of the various procedure presented will enable those tasked with working these scenes to develop a greater degree of objectivity, thoroughness, and accuracy relating to the investigation of water related incidents-increasing the chance for successful resolution of difficult cases.

Key words: criminal investigation, underwater crime scene, evidences

CYBER/COMPUTER

CyP-01

Graphical Password Scheme Applications in Digital Security

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Cybersecurity or digital security is the body of technologies, processes and practices designed to protect networks, computers, programs and data from attack, damage or unauthorized access. In a computing context, the term security implies cybersecurity. Authentication is the first line of defense against compromising confidentiality and integrity. Human beings remember pictures better and for longer periods than alphanumeric passwords. All graphical passwords have two different aspects which are usability and security. Woefully none of these schemes were being able to fulfill both of these aspects at the same time. In this paper we summarized the usability and security of features of graphical password schemes.

Keywords: Digital Security, Cyber security, graphical password authentication, Recognition based, graphical password, recalled based graphical password.

CyP-02

Data Retrieval from Non-Working Hard Disk Drives (Hdds)

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Data retrieval from Non-Working Hard Disk Drives is a challenge for Computer Forensic Examiner. Sometimes, even a very small problem like power is not reached properly to device, breakage of jack / various pins of power supply etc. or physical damaged condition of HDD turns into non-retrieval of data from HDDs. So, Expert always looks at the HDD in working condition. Problem arises, when exhibits is non- responsive may be due to logical problem or physical damage condition of HDD and is not responding with the Forensic Work Station. In this POSTER, author is restricted himself for Data Retrieval from Non-Working HDDs either physical damaged or some logical reasons etc. by using hardware tool kit (Commercial).

K**eywords:** HDD, Logical / Physical damaged HDD, DATA Retrieval etc.

CyP-03

Fraudulent Real Time Gross Settlement (RTGS) Transactions via Trojan

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A fraudulent RTGS transaction case of a reputed bank in Maharashtra was reported. It was suspected that the bank account details were illegally accessed from one of the bank systems. On careful analysis by cyber forensic tools it was found that a phishing email was sent to the bank's email ID which seemed to have been originated from RBI. The fraud was done by injecting malwares like Trojan and keyLogger in an email attachment. This email attachment was found in hard disk of the bank. Online Bank frauds are increasing at an alarming rate. The reason why online fraud cases are increasing is because crime follows money and as more people start using e-commerce and online banking, the fraud cases naturally increase.In this case study we are presenting analysis or behavior of Trojan in real time fraudulent of financial.
Keywords:Phishing mails, Trojan, RTGS, keylogger, Malware analysis, spyware, spybot, browsing history, temporary files, unallocated clusters, Cyber forensic tools

CyP-04

Digital Forensics with Open Source Tools- Advantages and Limitations

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Digital Forensics is a challenge to experts world- wide not only due to the variety of electronic evidences but also due to rapid rate of innovations and updates. With the advancements in technology, markets are flooded with electronic items of new versions and new models. Even before the literature of the electronic item is published, it is most commonly found that the item has been part of a crime and thus become digital evidence. To examine such wide variety and novel type of digital evidences; it has become the need of the hour to resort to open source tools for carrying out digital examination and report in time. This paper presents some of the open source software tools that are used for digital forensic analysis; the advantages, authenticity, acceptance, challenges and limitations of such open source tools are discussed.
Keywords: Digital Evidence, electronic items and Open source tools.

CyP-05

Identification of a Person beyond Facial Indices – A Forensic Evaluation

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Although the importance of identifying, determining, evaluating, characterizing etc. of the clue material to conclude as a consolidated evidence for the suspected items, the identification of the person through facial feature indices is an inevitable examination in forensic science. Beyond the facial identification, a most significant biometric, the identification marks such as mole, scars, freckles etc. are also vast important to determine the person, who involved in criminal activities, in the absence of face of the suspects. In this study, a person who involved in sexual offence has been identified and concluded on the basis of only the freckles, hair pattern and size of the mole, which appeared on top of the left solder of the person. The difficulties are being faced for determining the facial features even when produced similar symmetry of the faces of the same image, with this study, it has been strongly suggested that it is possible to make the somatometries observations are more accurate by constant and careful examination along with the use of the software, Adobe Photoshop, by using the Gaussian filter in order to identify the person, without his facial features.
Keywords: Somatometry, freckles, mole, Adobe Photoshop, scars.

CyP-06

Thumb Rules for Time

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With the evolvement of modern files systems like NTFS, HPFS for Windows operating system, the understanding of the file metadata with reference to time, plays an important role in understanding the transactions performed on a particular file. The MAC timings of a file will go several updations as and when a file is subjected for various transactions. This poster will depict the effect of various transactions on the MAC timings of a file under modern file systems for windows operating system.
Keywords: File Attributes, MAC Timings, Thumb Rule.

CyP-07

Steps involved in USB Device Tracking

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Off late it is very common to identify the various storage devices that have been connected to a digital system and the data transactions that took place with these devices. There are various artifacts available in the system at different locations like Registry, Link Files etc., that provide a digital forensic investigator vital leads in the identification of these storage devices and the activities that performed with these devices. This poster gives a detailed pictorial view of the flow chart for tracking and identifying the Secondary Storage Devices that have been connected via USB.
Keywords: Flow Chart, Secondary Storage Devices, USB Connectivity, Tracking.

CyP-08

Review on Big Data Analytics for Cyber Security

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Big Data Analytics is becoming a robust weapon which assists big organizations in combating against cyber-attacks and security threats. Storing, selecting, and processing data in petabytes up to zeta bytes using different techniques and tools help you get the most valuable information or processed data and plays an important role in detecting advanced cyber threats, which in turn, can be used to build up their defenses. Moreover, it also applies PDR paradigm (prevent, detect and respond) on explosively growing data providing a wide spectrum of business benefits along with improvised customer services, impressive competitive, marketing advantages over competitors, etc. Monitoring activities of employees of an organization, optimizing historical data, intrusion detection system deployment, etc., aresome of the examples educating on how Big Data Analytics can be used in various domains to analyze and obviate cyber-attacks. Big data sources likemobiles, cameras, social media, sensors, etc., badly need big data analytics as these sources create 2.5 quintillion bytes of data almost every day which cannot be processed using traditional database storage systems and attackers are continuously seeking for loopholes in security of data available online or produced by an individual and businesses. In this review paper I am recollecting the tools and technologies used in Big Data scenarios with their advantages and drawbacks which are getting enormous acceptance by large scale organizations to handle this amount of data.

Keywords:-Big data, Big Data Analytics, PDR paradigm.

CyP-09

Architectural Comparison of Memory Forensics Tools

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There are several live memory collection tools and techniques free available on a windows system. These all tools uses three major steps for memory forensics which are acquire, analyze and recovery of evidences of crime from volatile memory. Volatile memory analysis can give the sensitive information such as User Ids, Passwords, Hidden Processes, Root kits, Sockets etc. which are not stored on the physical drive. The tools like Ftk Imager and Belkasoft represent the data as a tree structure which makes it difficult to analyze the data. The tools can be improved by combining it with machine learning techniques. So, in this paper we find out the strengths and drawbacks of all the tools and also provides better understanding of the working purpose of the tools in specific scenarios. This paper also discusses the improvements that can be done in order to make the working of the tools easier and yielding better results.

CyP-10

An Intelligent Approach Using Data Mining Technologies in Cyber Security

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Cyber security deals with various cybercrimes but it is essential to identify the similarities in existing cybercrimes using data mining technologies. Here we explore various types of data mining methods to combat various cybercrimes. Data mining plays critical role to provide predictive solution to rectify possible cybercrime and modus operandi and explore defence against them. This is the era of Big Data so it is very difficult to analyse and investigate the irregular activity on cyber space. The proposed solution is to provide an automated approach in the field of cyber security. Data analysis and mining methods helps law enforcement agencies to leverage capabilities of cyber and forensic investigations. This review paper proposes data mining methods to identify mechanism to improve cyber security and rectification of threats. Data mining approach is used to help in the development of predictive model which helps to tackle real time cyber response of process like data sampling, selection, analysis and mining huge amount of data which classify and detect the attack strategy.

CyP-11

Analysis of Different Tools Used For Memory Forensics for Windows 10 Versions 1709

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At the time of the different kind of attack the forensic examiner play an important role in the Forensics investigation. Forensic examiner must have vast knowledge and proper list of tools which are used for the investigation. So in this review paper we will analyse different tools used for the memory forensics on the windows 10 version 1709. As in day to day life the cyber-attacks are increasing so forensic expert should have deep knowledge of which tool is best for the analysis and investigation of evidence in respect to time and authenticity and other factor which affect the case. As in the forensic process no single tools is sufficient for analyse the evidence. So in this review paper we will analyse the different kind of data extracted from the different tools for windows 10 version 1709. Here we will analyse the different tools and find out the best result recover by each tools on windows 10 version 1709.

CyP-12

Profiling of Cyber-Stalkers Using Behavioural Evidence Analysis: A Review

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Behavioral Evidence Analysis (BEA) is, in theory, useful in developing an understanding of the offender, the victim, the crime scene, and the dynamics of the crime. It can add meaning to the evidence obtained through digital forensic techniques. Cyberstalking has many new manifestations with the opportunities offered by modern technology. This type of crime presents difficulty to computer forensic investigators in large amounts of digital evidence accumulated over time and in offender apprehension. This study addresses this gap by examining the utility of BEA for cyberstalking cases in terms of understanding the behavioral and motivational dimensions of offending, and the way in which digital evidence can be interpreted. Results showed that BEA helps to focus an investigation, enables better understanding and interpretation of victim and offender behavior, and assists in inferring traits of the offender from available digital evidence.
Keywords: Behavioral Evidence Analysis; profiling; cyberstalking; digital forensic techniques, Digital evidence interpretation.

PSYCHOLOGY

PsP-01

Advancement of Social Media and Analysis of Human Behaviour in perspective of Cyber-Forensic Psychology

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The last half century has seen an explosion of technical advancement in media that has transformed our society. This changing digital scenario demands advancement in crime investigation process. Presented article offers a noble approach for law enforcement agencies to extract psycho-social attributes and behavioural patterns of individuals by using their digital footprints on social media. Principles of Cyber-Forensic Psychology can be applied to assess several activities of a person on social media, which may produce more useful results about the psycho-social attributes and behavioural patterns of that person. It will provide added investigative value for crime investigation in dispensation of justice.
Keywords: Cyber-Forensic Psychology, Psycho-social Attributes, Behavioural Patterns, Crime Investigation, Social-Media.

PsP-02

Investigative Psychology- A Critical Review

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Investigative psychology as the name suggests refers to the thought process and mind set of the investigators and the associated teams that works in an integrated manner to decipher the sequence of events that may have occurred during the commission of a crime. Investigative psychology is a sprouting amalgam of forensic as well as social psychology and is associated with rationality that

forms the basis towards the solving of crime as a result of a structured or organized thinking ability of the investigating team. Moreover cognitive processing of criminal, suspect, witness, victim and that of the investigator itself shapes the fundamental pillars to make inferences from the crime scene observations and steer towards a successful investigation. Our aim is to showcase the importance of use of investigative psychology in relation to criminal profiling as well as modus operandi analysis etc. In addition to this aim, the study also puts forth some suggestions for the amelioration of Indian status of investigation using which a better investigation protocol can be prepared. The authors have also incorporated certain case studies in order to justify the indeliberate misapprehension on the crime scene.

Keywords: Investigative psychology, investigation, criminal profiling, modus operandi cognitive processing.

PsP-03

Figuring Out Figures of Crime Due to Psychological Disorders

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Mental disorders refer to a wide range of mental illness conditions that affect the temper, thinking and behavior of a person which can be a causative factor for commission of some crimes as well. Many people suffer from more than one disorder at a given time which can result in crime. This study provides approximate data on rate of commission of crime due to psychological disorders. It discusses the way in which psychologic disorder plays a role in commission of crime; whether or not he or she was in the mental state that is required for guilt for the crime.

Keywords: psychological disorder, temper, crime

PsP-04

Social Stigma on Mental Illness and Its Influenceon Access to Mental Health Services

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Rapid modernization and globalization has resulted in high work load on people resulting in lesser personal time and social interaction and more stress which has led to the tremendous increase in one of the most common mental disorders i.e depression. Studies have shown that one in every twenty people is found to be diagnosed with depression. There are many people who require mental health services but most of the time they choose not to pursue them or fail to fully participate once they have begun the treatment. One of the main reasons for this hesitation among patients suffering from mental illness is the fear of being judged. Often society tends to label individuals to seek help and any discussion about mental health is regarded to be a taboo subject.

Considering these circumstances, this research aims at identifying people's perception of mental illness and their awareness about importance of mental health services. Also the research intends to find out how the society's opinion on mental health illness impacts an individual's access to mental health services.

Keywords: Mental Illness, Depression, Eating Disorders, Mental Health Services, Societal Stigma, Public Attitudes and Bias.