

Examination of the Typewritten Documents and Estimating Their Age on Behalf of Physically, Chemically, and Visually

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ABSTRACT

Typed documents correspond to those which have historically been used traditionally and are occasionally still printed by a typewriter. Typewritten anonymous notes, such as extortion requirements, threat letters, wills, deeds, and altered contracts, can be discovered at crime scenes.

Additionally, the prevalent mechanical typewriter forgery of papers that has been documented over previous many decades

In these situations, it is essential that the investigators look into the matter, determine the kind of printer that is being used, and establish a link connecting the disputed document and the purported printer.

This following study is focused on the examination, analysis and identification of typed documents on the basis of their specific characteristic age estimation of the typewritten document which is being examined by the help of physically and the visually ways which helped us out for determining is that particular document is altered or forged one or authentic.

Result –

PHYSICALLY Total sample size is taken about 85 in which 20 was forged and the rest 65 was typewritten in **a-synchronized** in a different period of time and had different type of fiber content structure

VISUALLY – The color tones of all of the following in taken samples 85 in which we found various color tones which is Fair white (coconut white), charcoal grey, cloudy grey, foggy grey, mushroom grey.

CHEMICALLY – In the total taken sample of 85 the all had different pH level

11= pH 4 to 3, 26 = pH 5, 16= pH 6, 21= pH 7, 6= pH 8, 5= pH 9

Keywords – Typewritten Documents, Office Printed Documents, Forensic Examination, Age Estimation, Forensic Investigation, Historical Document Analysis, Physical Examination Techniques, Chemical Analysis Methods, Visual Examination, Existing Literature Review, Primary Sources, Limitations

1. INTRODUCTION

• PRINTED DOCUMENTS DEFINITION AND FORENSIC SIGNIFICANCE

Printed documents are tangible materials created throughout the printing process, such ink on paper or letters that are handwritten on paper. These particular types may include a range of materials, for instance Books, magazines, reports, manuals, flyers, posters, stamp papers, wills, and suicide letters Printed documents are used in a variety of fields, including marketing, legal opportunities, education, official documentation, and informational dissemination.

Printed documents are materials that have gone through a distinct printing process to replicate text, pictures, and graphics onto paper or other surfaces that have been carved. These areas may include walls, stones, pillars, jewellery, and arms and ammunitions.

These documents were created using a various printing techniques such as offsets printing , digital printing or other methods that could involve the transfer of information into a substrate documents . Printed documents encompass a wide range of materials official records , books , contracts , reports , newspapers , magazines and any other text or image based contents reproduced by the printing technology for communication , distribution , or archival purposes

Printing believe it or not ,formed or developed in decades backs in as early as 3500BCWhen the Persian and Mesopotamian civilisation used cylinder seals to certify documents written with clay.

Woodblock printing would follow the moveable type until we got printing press in 1440

Forensic significations of forged printed

1. Documents authentication
2. Forgery detections
3. Handwriting analysis
4. Trace evidences
5. Reconstruction of events
6. Documentation comparison
7. Fraudulent intent
8. Financial and Business ramification
9. Investigative relevance
10. Detection of Alteration

• TYPED PRINTING DEFINITION AND FORENSIC SIGNIFICANT

Typed printing refers to the process of creating printed documents using a typewriter , computer printer , or similar devices .

It also refers the process of writing text on the pages or another medium using a typewriter.

In this method individual characters are produced by striking keys which often activates a mechanism to imprint the corresponding character over the paper to it .This process results in a printed document created by using a typewriter machine.

What is the ways of Age estimation of the type written document?

The age estimation of the typewritten document is about estimating the overall total life span of that particular type of typewritten document

Estimating the appropriate age of the any particular document can be more challenging and there is no fool-proof methods for the precise dating .However there is several factors and few couple of clues which could provide some of the insights into the approximate age of the typewritten documents

1. Watermarks:

Some papers have watermarks which are designs and patterns embedded during the paper manufacturing process. Examination of the watermarks could easily provide information about the origins of the particular paper and its age.

2. Paper composition

Changes in the paper composition and the manufacturing methods have occurred over the years. Analysing the materials which had been used to make that particular type of paper. Basically we target the fibres content to observe properly such as the cotton, linen, wood pulps, which can offer the insights into its age.

3. Colour and Discoloration:

Over the time flows the paper changes its tones due to the exposure of the light, air, moisture, and the other environmental factors which could affect the colour of the paper. Mostly the older paper exhibits yellowing, browning, mould, grey, pale white. While the newer fresh paper tends to appear white and more-brighter.

4. pH Level and Acid content :

Acidic condition can accelerate paper degradation. Acid-free paper become more common in the latter half of the 20th century. Testing the pH level of the paper can provide the information about the acidity level of the particular paper. Once the paper gets older and older its acidity levels increases lies between the pH level of 3 to 4. However the mould reaction in papers occurs when there is moisture or the paper came in contact with liquids like example water, coffee, tea, oil , other juices etc.

The pH chart which indicates the aging of the paper is given below:

(a) **Modern paper** (Post -19th century) - pH of these kinds of papers between 6 to 7.

(b) **19th century paper:** pH around 5 to 6

(c) **18th century paper:** pH below 5

5. Ink and Printing techniques:

The various kind of inks had been used and printing technology can offer the significant clues. Changes in the printing technology and the ink composition over by the time may be evident in the document.

6. Fibre content:

Analysing the Fibres content of the paper which help to determine the real source of the paper material. Different eras and region used the different type of fibres in production of the paper.

7. Water stains and the damages:

Water stains and the other forms of the damage could be accumulated over by the passing with the time. Examining the nature and the extent of these kind of damages is also been known as the mould effect which could be responsible for the insights into the papers age.

8. Printing Dates and Markings:

Look after for any kind of printed dates is present over the typed document, markings, or the manufacturer information over the paper itself. This could offer direct clues about when the paper was produced

9. Historical content and the contexts:

Consider the many historical context of the ancient documents content. References to historical events , people , or the technologies could help to narrow down the time frame of the document by examining the particular textual context if it looks someway unique while observing.

10. Cultural heritage preservation:

In the transcript the context of observing cultural heritage, knowing the age of the paper is very much essential. It would generally helps societies and the institutional safeguards their historical legacy and to ensure the continuity of the cultural knowledge.

Key characteristics of typed printing

1. **Typewriter usage :** Type printing usually involves a typewriter , or a mechanical or an electronic devices with a set of keys representing characters , numbers , and symbols .When a key is pressed , it causes an imprint of the corresponding characters over the paper
2. **Impact printing :** Traditional way of type writing creates characters by striking an inked ribbon against the paper ,leaving an impression that forms the printed words .Some of the modern electronic type writers or word processors might be uses a thermal or other methods for printing

3. Mono-spaced characters : In most of the cases character carved by the typewriter have a precise width , meaning each character occupies the same amount of horizontal space on the paper .
4. Limited fonts and formatting options : Typed printing typically has limitations in different font styles , various sizes , and particular unique formatting options compared to modern digital printing methods
5. Mechanical Nature : Traditional were mechanical devices powered by manual or electric mechanism , requiring physical pressure on the keys to create printed characters .It was mostly manual type writer ,electric typewriters ,portable type writer and electronic typewriter

Forensic significant

1. Authenticity verifications
2. Forgery detection
3. Historical records
4. Comparison analysis
5. Legal and Investigative Documentations
6. Tampering detection
7. Preventing Fraud cases
8. Trace evidences

1.2 Importance of forensic analysis in verification authenticity and detecting alteration

Overall these days Document forgery crime were increasing the problems for the both private sectors and the public administrative sectors. As it is also being responsible for the loss of the time of an individual or corporation. There were various classical solution to these problems such as the detection of an integrated security patter in such cases . As it is very much important that we should use the forensic techniques for the detection .As for that the idea behind using these forensics techniques can also be implemented using artificial intelligence and other mechanical machine learning which can be lower the cost and can provide overall same kind or of better research.

Questioned documentary examination is one if the most essential branch of overall forensic science in which the handwriting experts discuss their findings regarding the the authenticity or ownership of a questioned document. Various tools and techniques are used to study the different physical and chemical attributes of a written document. These can include handwriting, typewriting, rubber stamps, ink, pencil, paper, or printing processes, among several others.

The primary goal of a questioned document examiner is to establish a link between a specific document and a particular writing instrument or process used to create that document. If you have a question about the authenticity of a written document, or if you need help to find out if a person is lying about how a document was created, a questioned document examiner can help

1.3 Types of Printed and Typed Documents

Printed Documents Types

1. Books
2. Newspapers
3. Magazines
4. Brochures
5. Flyers
6. Pamphlets

7. Posters
8. Reports
9. Manuals
10. Newsletters

Typed Document Types

1. Letters
2. Memos
3. Reports
4. Resumes
5. Essays
6. Research papers
7. Contracts
8. Agreements
9. Proposals
10. Presentations

1.4 Differentiating between Printers and Typed documents characteristics

Characteristic	Printed	Typed
Type	It is a digital machine which is dependent and usually be connected with the computers	It is a mechanical type of machine it does not depends on any kind of digital devices
Inks	It have a various kinds of colours sets also a particular type of ink also can be replaced inside of it	It is usually have only one kind of ink which is most widely is being used in a black colours
Speed	It is having usually a more fast speed comparatively to the Typewriters	It is having a very lower speed as it consumes comparatively more time then the printers
Accuracy	It is having highly precise accuracy as it works digitally yet editing is easily possible in this printed documents	It is not having so much high accuracy yet its totally based over the stenographer or the typewriter what precautions it is taking while typing
Time consumption	Relatively it takes less time	While in the case of this its having low speed more time consuming
Cost	It is quite expensive then the typewriter	It is relatively cheap in cost

Weight	25.8 kg to 31.2 kg it is heavier than the typewriter	5.6 kg to 9.3 kg approximately
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2. LITERATURE REVIEW

(1)DOGĂROIU, Cătălin (2003). **Typed documents** and Office printed documents are of varies a document to either to the jurisdiction , **the court of a law** , or for **a investigation**, which is however is so much helpful for the police officer who try to seek types , it also had so many different forms and being produced from a very much long decades. The first type commercial typewriter was introduced in Late year !873 by the scientist name(**nickel ,1996**).Thus as technology got a bit of advanced electronic typewriter is being introduced also it had been easily seen at the both official workplaces and home. Which had been the opportunity to create **forged documents** greatly increased over the decades. The main purpose of examination to provide information about the history of evidences presents into the documents. The documents to be examined is termed as a **questioned documents** , when questioned documents Which identified that not everything is about the document is accepted for whatever it presents is to be. Every **Typed documents** conveys and contains so many different **sensitive information** in many different ways some are in codes and some are in the sequences also the most usually and firstly is the typed or printed words or the marks over the paper , the second most important thing is to be noticed which are sometimes hidden and able to be seen by the naked eyes mostly such as the **watermarks** ,misalignment of character security marks and fibre, minor damages to the typeface of a **typewriter** or the pressure indentation marks which mostly occurs when the typewriter applies so much **pressure** while typing , where paper has been mechanically held in printer and many more. Although it is in the particularly has been conveying the information that the document examiner may had a concentration on that also there are many instances where obvious forgery can be easily and immediately is being observed by the document examiner for an example one of the document obtaining to be alleged attempted purchase of the drugs by Zack individual of Iraq from Niger in which as obsolete letter head was used in which it's the wrong symbol for the other individual. Before any document is being generally examined , the administration procedures and the protocols relevantly to the other country or the state. Forged documents procedure for the evidences that is be taken into the jury may invalidate any information gained by the examination of the questioned document . The preliminary tests procedures for a typically used for the cases which is undertaken by the questioned document units of the federal bureau of the investigation are outlined by the examiner

1. As by the help of the receipt of the evidence
2. Checking the evidence against the incoming communication
3. Assigning the unique identifying the numbers to the submission (denoting whether it is questioned or known)
4. Making the arrangements for any other requested examination such as the water marks examination or the pressure examination .

Documents are examined generally by using the scientific principles of observation and deduction applying appropriate tests and comparison with the few known references standards. While examination the task of the examiner must be clear nonbiased decision to determine whether the or not two pieces of the transcript are similar or whether it is being forged by the other individual .Initially the examiner must attempt to examine the means of the particular production of the forged and disputed document , for an example is that particular questioned document is a typed document or manual type bar machine , a single

elements machine or was it produced by an ink jet or the laser printer . Documents might be examined by the either physically or by chemically interpretation S. Although the typewriter had given a way to enter the digital computers and computer printers so as that the typewritten documents is still the subject of many investigations as in the trials of the court , jury , marriage certification , domiciles , will and deeds etc. Although the examination of the transcript of the typewriter will be one of yielded evidence that it had been typed on a typewriter . Typewritten documents have both class and individuality.

Class characteristics are those of a particular make and model of the particularly the machine have been used while typing should be identified from the typeface by the comparing of the questioned documents it with a references documents which is not doubtful. For an example the William which contains images of type font specimens cross referenced to typewriter make , name , manufacture , water marks , official seal and serial number. It is now in the form of digitally into the data base of the country according to the database programs . This has the advantage over the previous methods of having the typed fonts specimens printed on the cards in that the typed manuscript which is being examined and compared it could be overlaid by the other computer , projected over a large screen , printed out or sent to another computer . The comparison of the unknown or questioned document with the known documents or the standard to effects identification is the basic approach of the document examiner. The most of the examiner criteria for comparing typewritten materials are , identifying the manufacturer name and model of the type that had produced the texts , identifying a specific type of a machine so proving the forgery and alteration in that particular document or the addition/ crafted omission in a document were made with that machine or with the other way . So apart with that which document was originally typed , based on that following year of the manufacture of the typewriter or as it is sometimes possible . Also Establishing the date of the manufacture of the paper or ink that had been used in that typed document is also being noted. There were two *main* types of **Typed writer** , A type –bar typewriter where the typeface elements are permanently fastened into the machine and the interchangeable elements where the typeface is permanently fixed to a ball , Printwheel and thimble that can be removed from the typewriter and exchanged . When the examination of the typed words of the questioned document , the examiner will look over the letters spacing and type face which were under the class characteristics of that typed machine and elements. The most common letter spacing are those where 10 to 12 letters to an inch of typewriting . It seems to be very much common while practicing for a document examiner to refer to a spacing not in characteristics as per inches and the length occupied by per 100 words of paragraph.

Typed writer which prints approximately 10 character to the inches are known as **pica** machines and have a spacing of 254 mm per 100 characters . Those who were with 12 character to the inches were referred to as **Elite** and having spacing of 212mm per 100 characters. Other machines had been using spacing of the following 185,200 , 210, 220, 225, 230, 236, 250 and 260 . These spacing can be found in manually and also the electrically . The main points for the comparison of the typeface are the overall depends on the sizes and design of the letters e.g. capital M and W , the sizes and designs of numeral e.g. with or without a straight line base , with or without a straight top , the curvature of the endings of the letters such as F and T.

Differential spacing , where the space for is narrower that for a W. Kerning which means the character in the documents appear to fit closely together . Curly apostrophes most typewriter use straight apostrophes. Centre Three lines of perfectly centred text which is easy to achieve on a computer but not over a typewriter using the differential spacing . Each of the line conducts text could have been measured. It is possibly very much easier to attribute individual characteristics to a very particular machines if it is a

type-bar machine with an interchangeable element . While it may be possible to associate the text with a particular elements it is very difficult deal it with a particular machine. The type of machine may limit the conclusions as soon as possible as a result of the examination. If it is suspected that a particular document had been recently altered or forged made to it , then finding and examining the typewriter ribbon becomes very important. There were two general type of type writer ribbon. One of them is Fabric which does not retain a legible image of the text prepared with it and carbon which can able to retain **THE READABLE TEXT** . There are two kinds of correction ribbon , lift off and cover up , then also the retained images that might had to be compared with the carbon ribbon and text .The questioned document unit of the FBI maintains a ribbon analysis workstation which is an appropriate apparatus that is used to transcript the text found on the typewriter ribbons. It is also possible to do a paper fibre transfer comparison as the low density polythene backing on a carbon ribbon can assume the imprints of the fibres in the paper. This is could be done by using a comparison microscope . Many of examination of the typed documents involve the comparison of the genuine documents with the suspects or the counterfeit documents rather than a questioned documents examination of the individual characters , alignments and typeface faults. This is all due to the computer words processing software being able to produce a wide variety of character word spacing and pages style all on the same printer. Prior to historical times, Chinese writing was based on characters, making it one of the most widely used scripts in the world that is neither syllabic nor alphabetic. The Chinese written language faced assumed alphabetic universalism throughout several decades in the shape of word processing, punch cards, stenography, Braille, Morse code, and Linotype, among other technologies designed with the latin alphabet in mind. This book tells the story of those interactions, specifically contrasting the typewriter's qwerty keyboard with thousands of Chinese characters. A remarkable array of trials, prototypes, setbacks, and victories were detailed by Thomas Mullaney in his account of the century-long search for a practical Chinese typewriter. Mullaney informs us that the first Chinese typewriters were shards of popular culture., astonishing reports of a twelve-foot keyboard with five thousand keys. The inventor of one of the first Chinese typewriters was a Christian missionary who arranged the characters according to ordinary use. Later, typewriters designed for use in Chinese offices appeared, as did typewriting schools that trained typewriters (Double Pigeon) made by the Shanghai Calculator and Typewriter Factory, which became the preferred typewriter for Mao's secretaries and clerks. However, during this time, the ries experimented with different approaches to arranging characters on their tray beds, creating the first predictive text input method. After more than a century of opposition to the most alphabetic, traditional Chinese handwriting has now not only gained, They serve as the language foundation for the thriving Chinese information technology industry. During the previous historical era, the Chinese mostly employed official seals issued by the government, which were only granted to affluent individuals who were permitted to represent themselves in court. The majority of the found Chinese artifacts have secret passcodes carved into their own traditional Chinese manuscripts.

(2) SGS-IPS testing. (2014, December 22)Testing a Paper Age is able to calculate by the IPS TESTING likely it depends actually directly proportional to the age of the wood which is used to make the paper. By using over the several specimens of the woods fibres and pulping chemistry , paper additives and surface treatments to serve as dating as it is developed by the decades ago by the Walter Rantanen an international reputation for the paper and document forensic . While the overall exact age dating of papers is not still possible. The most often process is able to excludes Specimen as being made in the time period of the **Questioned Documents**.

Walter Rantanen had also developed the various large database of the papers with known relevant ages .

Determining the age ranges of the paper sample in questioned documents . Verifying the consistency of one paper sample with the other paper under the comparison microscope by examining the fibre structure of the papers

The dating of the Questioned documents had always been remained one of the most challenging and controversial area discussed in question document examination . The dating of the Particular Questioned documents is also defined as date estimation when it was formed or produced .

(3) **Kapoor, N., Sulke, P., Shukla, R. K., Kakad, R., Pardeshi, P., & Badiye, A. (2021)**. It is being establish by using many various different practices ,including the ink analysis , paper analysis , watermark examination , photocopy toner analysis , and the elemental . Furthermore , some of the most conventional , methods include the handwriting analysis , determining the sequences of the of the intersecting lines of the each sentences and words symmetrically , printing methods is the most important factor for the identification and fibre analysis is also could be a main factor to analyse the age of the particular page. Among all of these various techniques the dating of the typed document has been potentially mastered in examining the ink analysis . Questioned documents can be generally dated by using the two examining methodologies

1. Static approach
2. Dynamic approach

The former approach focuses over the dated documents using the production of the documents example like **ink and paper** and their establishment first in the market.

Later on the focusing over the dating of the questioned document utilizing the analysis of the ageing process of the constituents of the following questioned documents There could be two possibilities while examining the ageing of the documents its could be a absolute age or relevant age which is near to it. The relevant age of the Questioned typed document can be identified by reconstruction of the documents by the method of the **Chronology**.

The **Typed Questioned documents** with the several old Historical value were primary and authentic sources of he important sensitive information about the person , place , and event occurring in the past and were termed as historical document. In the contrasts to this , modern documents are those were prepared in the few last years using present day tools and techniques. Determining the Questioned documents age became one of the foremost when the forged or the disputed documents had been significantly historical or have any monetary value like an example the artefacts of the Manuscript of the particular specimen Age of the questioned documents into the study of the forged and disputed documents in many several ways Most of the counselling of the TYPED Questioned documents is being examined to determine the Actual old as its date would indicate.

(4) **Karandikar, N. (n.d.)**. But for the several times it is used to be very much important to show the probable date of the undated Typed Questioned document .Several collection of the Questioned document or writing bearing in many different dates are not actually of the same age . **Typed Forged documents** are the sometimes are made to look like an old in order to manipulate make them appear as same like the genuine ones. In order to make same kind of the **Typed forged document** they sometimes appears wrinkled , shrunken , soiled , discoloured , and might be unnecessarily folded by the and crumped into a manner that will indicate quite a very clearly forged with a very much deliberately efforts to give the document a worn look and the aged looks appearances. In an artificially way the aged documents there were few of them certainly inconsistencies which were fabulously appears when pointed or examined out by the applying few efforts . The age of the Questioned document is can be roughly estimated by the help

of few techniques.

Chronically significance, Paper fibre analysis , Typewriting , chances marks, marks of the writing documents , Handwritings and signatures and Post stamps , rubber stamps etc.

(5) FR Author Group. (2022, August 22)Watermark examination of is the process by which a forensic Document examiner FDE tests of a watermarks is to see how well it aids the TYPED QUESTIONED analysis partially the examination of the Questioned documents report . There are various types of the watermarks are presents in the **TYPED DOCUMENTS** and FDE should be known how to examine them based on their designed characteristics. While with the examination of the watermarks on the questioned document The examiner can easily extract the following information from the Water mark which is present over the Questioned document.

The production house or the corporation who produced such kind of specific carving watermarks.

Authenticity of the particular Official bond papers , security paper , property papers , education certificates and the other business logos etc.

Many of the companies enterprises manufacture papers with the customized logo or the textual design marks as watermark for their retailer and business

If the logo is changed it can help in finding an absolute age of the questioned document. As with it watermarks with the date and year can easily be helpful for estimating the age of the **TYPED document**.

Coded watermark is also used to identify and examine the age of the absolute age of the Typed document. Coded watermarks which not only used for identifying the manufacture of the products but also the allows the examiner to possibly determine the year and the actual time period of the paper when it was manufactured.

The multinational And the international paper manufactured majorly have their own specific kind of the logos to symbolize their country of origin.

Some of the various companies uses the translucent marks which is usually present to show the type of variety of the products it relate to cheaper to the expensive one.

One of the most important role of the forger is to find out a suitable paper upon which the particular document could be easily **ABLE TO FORGED**. And the other of the daunting tasks of the question documentary examination

The importance for examining the Typed document paper arises when a document is in a doubt or questioned to real or being forged by the other individual. It is very often seen in wills or the registry property papers which is suspected to be forged , counterfeit currencies , notarised documents etc.

(6) Digest, F. (2020, September 8)Ever since the paper is being developed in India was used to be made from cotton and used as the writing medium in late 327 B.C many more attributes have been invested to be the newer raw materials and it is also had been improved by many new techniques of manufacturing. It is very complex materials , partially its beyond the scope of the concise and precise definition. The fibres maybe Natural based or Synthetic based and it maybe intermeshed by being mixture from a suspension in liquid , gas , or vapour . The appearance , strength , and the other properties of paper are determined by the quality of fibres , formation of the meshwork , strength and the other important factors. Either way these days , the watermark capacity of the most self recovery have a fragile image watermarking schemes is fixed. It meant for the more smooth regions and the textures of the region , the length of the particular watermark information is always remains the same. Well for often it is not very practical since varies recovery information is needed for the recovery of the texture regions. Its is being based over the characteristics of singular value decomposition, a new block classification method had been

introduced. The image blocks are classified into the smooth blocks and texture blocks. For most of the smooth blocks, the average pixel values had been adopted as the recovery information to recover the tampered blocks, while for the texture blocks the quantized and coded DCT coefficient are adopted as the recovery information.

(7) Zhang, H., Wang, C., & Zhou, X. (n.d.) A watermark with the advanced technology which have properties that from the visible and invisible watermarking. In the common situations our approach can be used as to transmit the multimedia files which is according to the gamma rays correction, the watermark can be revealed. The unique features that can obtain the watermark can be revealed similar to the original image after embedding watermarks. The naked could hardly able to analyse but the few adjustments into the viewing angles. It is then demonstrated the embedded watermarks. The most of the current commercial signs or notations were colour images. Which is the complexity is more than the binary image used as watermark traditionally. If a colourful sign or a notation could be displayed its outline of original image by the dark degree. As a result the grey scale watermark has become the main watermark technology currently.

Watermark is a very distinctive and unique form of image, shapes, sizes, or the universal design that appears translucent and fainter when the light passes through its surface.

When these watermark appears in the questioned document they can have different states, origin, manufacturer, authorization, retailers, and possibly the manufacturing dates.

While few of the watermarks are destructive and non destructive analysis.

Localized watermark: it appears at the specific positions of the page with the definite intervals. There is no a-synchronized or randomness in the Typed questioned documents

Random watermark: They were randomly placed on the page and also it is a-synchronized. It is like randomly stamping over the typed document. They were usually seen in a chemical watermarks that were marked.

There is almost various types of watermarks which is referred as the –

1. Physical watermark
2. Chemical watermark
3. Artificial watermark
4. Shaded watermark
5. Stamped roll watermark
6. Embossed watermark
7. Digital watermark

1. Physical watermark-

As the name justifies, these manufactures were made during the manufacturing process other names for manufactured watermarks.

Traditional watermarks

True watermarks

Patch watermark

2. Chemical watermark-

They use the specialized types of chemicals with a refractive index similar to the cellulose and make impregnated areas translucent. These chemicals replaces the entrapped air in localized areas.

There contraction and actual composition determine the extent to which they can create opacity. As for the cases traditionally the Flexo chemical watermarking techniques was widely used. It uses flexo printing

plates with the translucent chemical polymers on the impart which creates chemical watermarks. In the modern era, any printer, dot matrix, inject, or laser can be used to print these translucent chemicals on the paper. These chemicals are usually combined or being replaced by the inking cartridge systems of the printers

3. Artificial watermark-

There are many different in the sense that were only visible on one side of the paper printed over the side when viewed with an absolute angle. They were also used to be known as simulated watermarks sometimes it is also called as chemical watermarks too. Likewise the chemical watermarks they were also embedded after the production of the paper. They were created when a pattern, text, or image is printed opaque and transparent, white, or using varnish – based inks. Apparently artificial watermarks were being widely used to authenticate and to identify security of the particular documents such as banking notes, passports, other official documents which includes the transparent watermarks, one of the most common artificial watermark is the coin reactive inked watermark. They have a very unique quality, they appear similar to the other artificial watermarks, but when scratched with a coin, they turn into a darker shade of grey or a black in colour

4. Shaded watermark-

They have distinctive shadow – edged watermarks and are called shadow watermarks it is being used as a special sheet that has a very denser area of the design will impress than the rest of the paper. At first the paper design is impressed over wire mesh-like traditional watermarking. Then it is made to move manually over the specific type of denser area. Because of the high fibres density coating encircling the design, the logo appears opaque and deep transparent. And the extent of the pressure applied to the desired area adds over more depth to the watermarks. This depth is only visible as a shadow in the low degree of illumination. It could also be felt by moving fingers over the design. This technique was being developed by the William Henry Smith in 1848. There is also a light watermark that has less intensity of fibre in the design area, results in light and a more translucent watermark.

5. Stamped roll watermark –

It is the same as the stamping papers. And also known as the molette process. All processes are the same as but with the two differences majorly use as a drier paper and considerable high pressure unlike the traditional watermarks, which uses wet paper, here is relatively drier paper is being used.

Paper is brought in between the arrangement of the dandy rolls with the stamp marks and also the cylindrical drum. This replicates a translucent watermark over the sheet while maintaining the sharp edges definition.

A light line mark is also left on the sheets

The designs have very sharp edges.

(8) Kamiya, N., Yoshizato, Y., Zhou, Y., Ohyanagi, Y., & Shibasaki, K. (n.d.) The fibre content is also responsible for estimating the age of the paper it is being yet checked by extracting the fibres of the paper while mixing a little bit of distilled water or the glycerine over the slide and examining it under the microscope but yet it is very hard to detect the actual fibre content of the paper into the microscope it is got failed earlier and then it is being tested under the IPS testing method which is a chemically process done by the specific fibre extraction individual. Yet it is a very controversial topic to estimate the appropriate age of the particular questioned document but with the help of the fibre content images data we can interpret the type of the material is being used to manufacture that particular type of the paper. Also as the time undergoes the fibres of the paper become more tensed and change its colour which is then

responsible to change the colour of the whole Questioned paper, as everyone had noticed the shades of the freshly typed paper appears in a white colour of the paper and as the time goes it changes the shades and becomes more darker & darker . The older it gets it starts degradation in its form also slowly the fibre contents of the particular paper absorbs the more ink and starts reacting which results the disappearances of the few word on that particular old documents starts. The fibre content is playing an crucial roles in estimating the age of the particular **typed document** . Paper is more susceptible to the chemical degradations throughout by the hydrolysis and oxidation , resulting in the embrittlement and failure. Understanding the embrittlement process is more important to ensure the preservation and the longevity of the historical paper based documents .However the complex and the architecture papers microstructure I a major challenge for fully understanding this process. Two papers with different microstructure were artificially aged under hydrolysis and the oxidative exposure conditions in the common words the papers ages when it comes in the contact with moisture and the environment which is containing the oxygen in the environment. That's the reason the artefacts in the museum is being kept inside the vacuum container without having any atmospheric interferences so the degradation won't take place in that particular paper ageing . The Fibre embrittlement , and the fibre- fibre bonds deterioration , and the evolution of the paper microstructure over the ageing is being evaluated through microscopic and localised few mechanical tests , as well as through the morphological observations at the microscopic scales. It was all concluded , from the various tests in the two principal orientation of the paper, that the fibre embrittlement plays a more significant role in the embrittlement process than the fibre-fibre bonds deteriorations. Specifically , the cellulose chain scissions led to the fibres embrittlement which is being so much irrespective of the oxidative.

(9) IEEE Conference Publication (2013, August 1).

- Finding a document's age is a crucial topic for forensic investigations. The color of the paper varies with age based on several factors like its initial hue, storage conditions, humidity, temperature, and environment. throughout Brazil, standardized preprinted formats were utilized for papers including birth and marriage certificates throughout the latter half of the 20th century. This study suggests a method for estimating the age of these papers using the background color components of the scanned image .
- As for determining the age of the paper which is solely based on its color tones which can be challenged and imprecise , as the color of the paper changes as the timing changes over due to the lot other factors which is like an exposure to the light , air , moist and the contaminates sources which affect the fiber content of the paper which is main responsible reason to appear changes in the tone of the paper when it ages. However there is few methodologies to go through over for the observation of the color changes here it is followed as down below
- Few Typed Paper is typically appears yellow in color when it age , especially if it is exposed to light to the light , air , pollutants , or the acidic conditions . It looks different in color tones due to the different atmospheric reasons and the color tone lies between the edges and the center of the paper , as mostly the edges of the paper is might be less exposed to the external factors and thus it retains their original colors as they were used to be before more closely.
- The comparative analysis can be tone of the paper in the questioned documents to that of known samples of the paper from the different time periods. This could be challenging without access to references collection of the collection of the paper with the known ages
- Here are common colour changes observed in the aging of the paper.

1. Yellowing :

The most of the noticeable changes which is often yellowing of the paper. This is had been caused by the breaking down of the cellulose fibres of the papers, which can be accelerated by the exposure of the lights, air, moisture, and the other chemical pollutants. Acidic conditions could also be contributed to yellowing of the paper.

2. Browning :

In the addition to the yellowing , paper might develop a brownish tint , especially in the areas where it has been exposed to the lights or heat over an extended period of time. This is often seen in older documents and books.

3. Foxing:

Foxing refers to the developments or of the small, irregular brown spots on paper. It is often caused by the growth of the fungi , which can be thrive in conditions of the high humidity and poor storage of the contaminated typed documents.

4: Brittleness:

Aging paper might be become more brittle and prone to tearing. This brittleness is a result of the degradation of the cellulose fibres and it can also be accelerated by the exposure of the lights and the air pollutants.

5. Fading:

Colours in the printed or the written materials might had been fade over with the flow of the time , especially if the paper is exposed to the sunlight or the artificial rays. It is commonly is being observed in documents displayed in areas with high light intensity.

6. Discoloration at edges :

The edges of the paper may exhibit differently colour tones compared to the centre .This is because the edges is often been less exposed to the external factors and might be retain their original colours more closely.

7. Water stains:

Water stains could be cause of the localized discoloration on the paper. These stains might appear as the dark spots or the streaks and are often results of the exposure to the moistures.

(10) Mullaney, T. (2017). Few of the preservation measures, such as proper storage in the controlled environments, can be slowed down the degradation and the aging process and also preserve the original appearances of the typed paper documents .If you are dealing with the valuable evidence and the historical documents , consulting with the preservation experts is advisable for proper care and handling.

3. Aims and Objectives

- **Aim: To estimate the age of Typewritten documents.**

Why the age estimation of the typewritten document is required?

The age estimation of the typewriter documents could be important factors for the several reasons, particularly in the historical, cultural, official contracts, marriage certificates, fake property registry, fake degrees and the other technological imprints contexts.

Here are some of the main roles of determining the age of the typewriter documents might be significant.

1. Historical-documents:

Knowing the age of the typewriter written document contribute to the historical documentation of the technological and the industrial blueprints. It allows all the research scholars and historians to understand

the evolution of the typewriter documents machines fonts, inks, designs and there models and the overall manufacturing process in each evolutions between mid70s to 90s.

2. Cultural and social history:

Typewriters have played many significant role in shaping communication and office works .The age of a typewriter documents can be relevant to understand the cultural and social exchanges over the generations to generations, including shifts in business practices, writing habits, and the main roles over the courts official works.

3. Authentication and valuations:

Determining the age of the typewriter documents is essential for the authentication purposes, especially when dealing with the antique, vintage, sensitive documents information. Knowing the dates on which that particular documents is being typed which can be helpful for finding out the legal procedure records of the particular documents.

4. Legal and Copyright consideration

In some of the cases, the age of the particular typewriter documents maybe relevant plays important role for legal and copyright consideration. For an example, determining the when that specific type of typewriter had been discovered and what kind of the fonts was built in it, what type ink was used in it which could be relevant in intellectual property.

5. Museum Exhibits and Display:

Museums that features exhibits on the history of technological or official equipment is required which may find the age of typewriter documents which is very much important for the contextualizing its places history. It also helps the curators which represents it chronological narrative of the technological developments. Also the artefacts is being Bid according to the authenticity and the aging of the that particular typewriter document which is being extracted or being found by the researchers or by the explorers

6. Fraud cases of intellectual properties:

Determining the age of the typed document is being required because there is many cases is being noticed from last many decades for the intellectual property agreements which is being forged by the few lawyers as illegally which tries to misguide the law enforcements. The authenticity checking of those typewriter documents is required as for avoiding such type of altered forged type of cases.

4. Methodology

- **Material Required –VSC (Video Spectral Comparator) , Historical Documents**
- **Sample Collection**
- **Physically**

In this process the Video spectral comparator had been used. The Video Spectral Comparator is like an imaging device which acquiesce an examiner to analyse inks, visualize hidden security features, and expose alterations on a document. VSC operates using the fundamentals of light. It is more prominent than any other device with merely light sources of various wavelengths thanks to various light and filter combinations. Due to the computer compatibility of this apparatus, case examination data can be extracted, saved and retrieved as it needed. Specialized illumination instruments had been included with the equipment to examine all sample documents. We had employed the transmitted, oblique, infrared, ultraviolet, coaxial, and visible lighting situations separately or in combination. This device enabled us for

the observation and recording of papers or inks while when we had exposed it to the under many various wavelengths of light.

This is beneficial to the examination and comparison of inks, the examination of security features in documents. Although Such as wills, deeds, altered property document, business tenders and licenses of few old factories, and also its used for the examination of changed or destroyed documents which is either got forged or got exposed under the few nature circumstances which made those who had been react and so on few of the records and the inspection of entries which have faded or been washed out with the span of time. It also permits the analysis and comparison of inks revealing alterations on a document. It also makes visible security features produced on to papers and permits a quick examination of the entire questioned document. Under specific conditions, the **VSC80** combines lights, filters, and cameras to enable us an examiner to create each of these effects. Software provided by the manufacturer enables the examiner to record images of the document being examined and also allows the user to rotate, flip, zoom out , zoom in , finding of latent prints and render negative the pictures for easier viewing results after all the analysis had been taken.

- **Procedure**

We used VSC 80 in this operation to analyse the fibre content of the paper by zooming it over the 60* sometimes bigger around 70* the fibre content of all the samples which were taken under the observation had find out the few dissimilarity of the older typewritten paper to know which is the more finest the fibre content is able to examine, although the freshly paper had other kind of the fibre contents some of them were not even visible under the VSC because there is such kind of natural reactions took place. The fibre content of these papers matches with the wood, pulp, leaves, Etc as they all were made in the different era of time which is itself helps to identifying the age of the paper. After that all these samples were undertaken into the Infrared radiation and transmission of the Raman scattering light got to noticed that few of the paper were creating the luminescent into the red, green, yellow colour according to its acidity, alkalinity, and neutrality which is also indicates the pH of the paper according to that we could estimate the age of the typewritten paper.

- **Material Required – Litmus paper , Litmus strip , Glass slab , Distilled water**

- **Sample Collection**

- **Chemically-**

In the chemically method the pH level of the paper is being examined by which it can easily represents the colour of the paper according to its acidity , alkalinity , neutral levels

- Hydrogen potential" is what pH stands for. It calculates the amount of hydrogen ions (H⁺) present in a solution . The pH scale has a range of 0–14. Acidic (0–6) (higher hydrogen ions). 7: Neutral (equal amounts of hydroxide ions, OH⁻), and H⁺. Alkaline (8–14) (more hydroxide ions).

Chemical Indicator: When hydroxide (OH⁻) or hydrogen ions (H⁺) are present, a chemical indicator applied to pH paper changes color. Color Change: The pH value of a solution causes pH paper to change color when it is dipped in it. Red litmus paper: When an alkaline ingredient, or base, is present, it turns blue.

When blue litmus paper comes into contact with acid, it turns red. Paper becomes purple in a neutral solution.

The pigment responsible for the color shift is called flavin , which reacts differently with different solutions and is soluble in water.

We used this chemically method to identify the particular type of the acidity of the each a questioned document to identify its pH value which yet also it helpful to described the papers life span because the older the papers get it get many chemically changes under the influence of any environmental changes like example the moisture area, sunlight, water contact and the other radiation challenges could affect the chemical changes in the papers colour tones which could be of almost many shades of white , grey , ivory and black colours. Some of them which get to much contact with the water they starts to make a yellowish type of colour effects over that particular area which got a droplets of the water.

- **Procedure**

As we used the strip of the litmus pH Paper in this process while we had cut down the small piece of the Paper of the particular samples to examine the each solution. Although we have to be ensure that there should be not any kind contamination that might affect the pH level of the paper. Dip the strip into distilled water to moisten it. Shake off excess water before placing the strip on the paper. Gently press the moistened pH test strip against the paper sample. If using a pH meter, place the electrode on the paper surface. Allow the strip or meter to absorb the pH from the paper. pH test strips change color based on the acidity or alkalinity of the substance being tested. Compare the color of the strip to the reference chart provided with the kit. The chart typically indicates pH levels on a scale from acidic to alkaline.

- Modern paper (post-19th century): pH must be around 6 to 7
- 19th century paper : pH must be around 5 to 6
- 18th century paper : pH must be below 5 till 1

- **Material Required – Historical documents , Color tones chart , Plain paper**

- **Sample Collection**

- **Visually:** We used just the basic visual examination of the colour tones of each typed questioned document. Apart with that we also found the dating present over each paper is different document. We used the colour pattern chart to identify the type of present in each and every particular typed document. According to the appearances of the papers colours tones we could easily determine the age of the paper and by noticing the dating mentioned over the particular paper.

- **Procedure** We simply noted down first all the mentioned dates over the each particular document after that we had compared the colour tones of each page with white to greyish colour pallets which depend none other than except the time span of that particular document under the influence of the nature exposure like example air , moisture , water and the other chemical radiations Etcetera

We used this visual examination for the age determination of the each **typed document** which we had as a sample. Also we used this examination of the all different type of colours of each typed document by comparing them. As we used this process of examination to find out that if our particular document is authentic or an altered one. Because the freshly paper always appears as coconut white in colour or the fair white colour but as the each typed document ages it changes from white to pale white and then skin creamy colour after that it appears into the greyish to black paper. So as to identify that if particular document written at that period of time we used this visual examination.

5. Observation:

SAMPLE COLLECTION

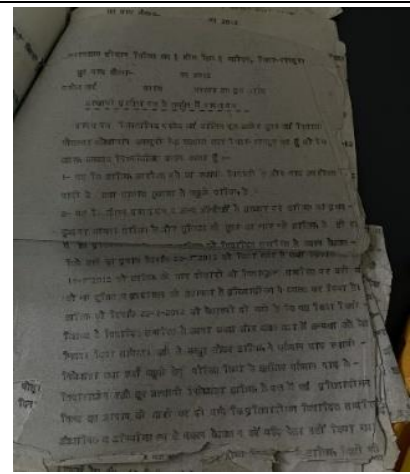
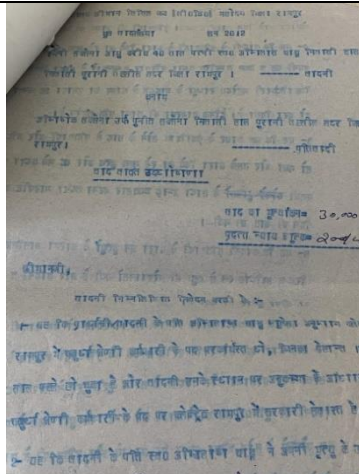
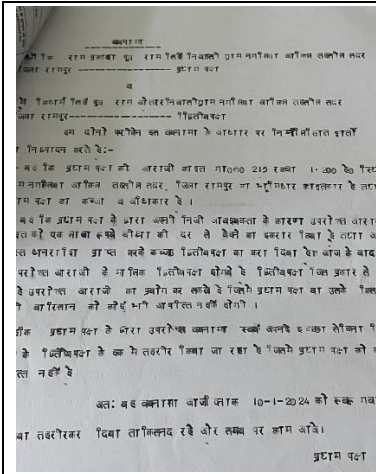


Figure 1 Questioned document sample 1 Figure 2 Questioned document sample 2 Figure 3 Questioned document sample 3

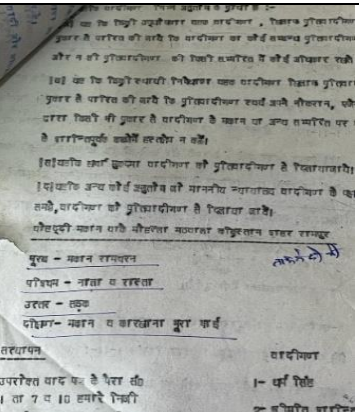
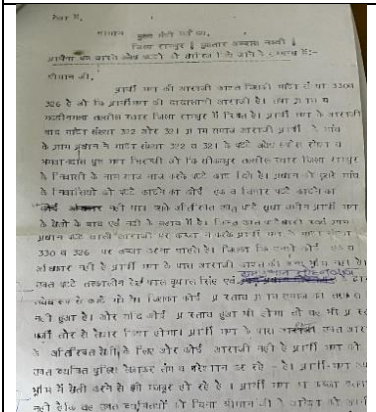


Figure 4 Questioned document sample 4 Figure 5 Questioned document sample 5

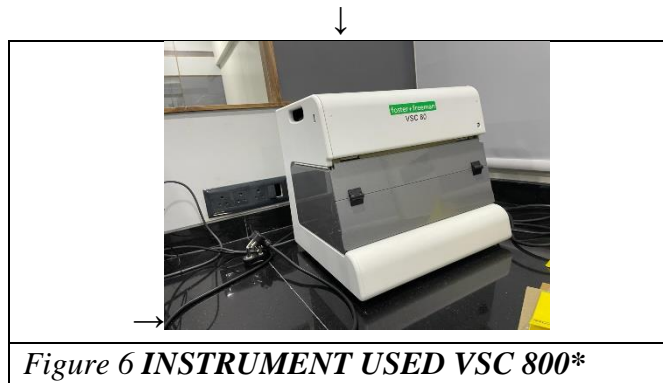
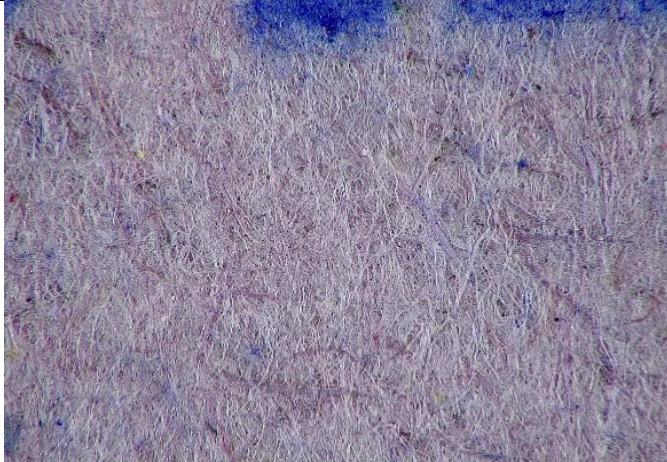


Figure 6 INSTRUMENT USED VSC 800*

FIBRE CONTENTS



Default: VSC30, Serial Number 2837
11:26:17 26/02/2023 Light=Flou (V25) Longpass=V25, Mag=59.73
Auto Exposure [1.5 s] (Integration=2076, Bit=46%), Shutter=50, ImageWidth=7.4 mm



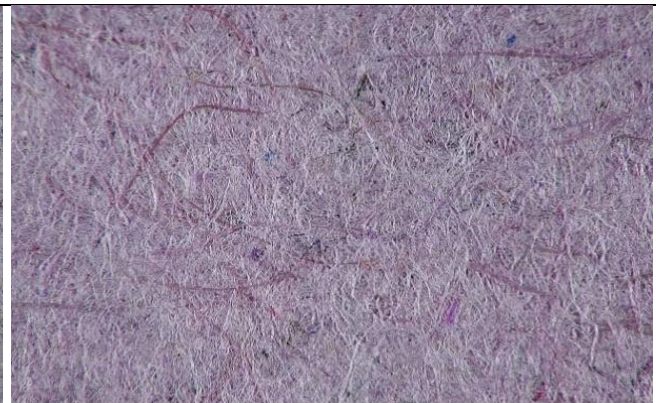
Default: VSC30, Serial Number 2927
10:36:37 26/02/2023 Light=Flou (V25) Longpass=V25, Mag=59.73
Auto Exposure [1.5 s] (Integration=2385, Bit=46%), Shutter=50, ImageWidth=7.4 mm

Figure 7 Fibre content of the Sample

Figure 8 Fibre content of the Sample



Default: VSC30, Serial Number 2987
11:25:51 26/02/2023 Light=Flou (V25) Longpass=V25, Mag=59.73
Auto Exposure [1.5 s] (Integration=1988, Bit=46%), Shutter=50, ImageWidth=7.4 mm



Default: VSC30, Serial Number 2987
11:26:39 26/02/2023 Light=Flou (V25) Longpass=V25, Mag=59.73
Auto Exposure [1.5 s] (Integration=2088, Bit=46%), Shutter=50, ImageWidth=7.4 mm

Figure 9 Fibre content of the Sample

Figure 10 Fibre content of the Sample



Default: VSC30, Serial Number 2959
10:26:04 26/02/2023 Light=Flou (V25) Longpass=V25, Mag=59.73
Auto Exposure [1.5 s] (Integration=2378, Bit=46%), Shutter=50, ImageWidth=7.4 mm

Figure 11 Fibre content of the Sample

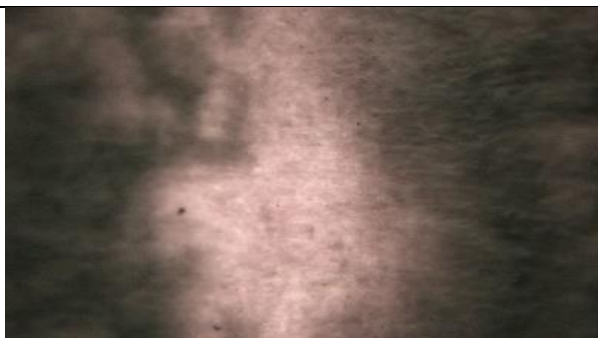
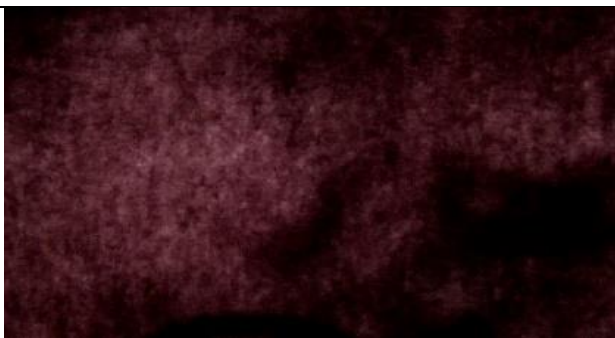


IR RADIATION EFFECTS DUE TO ENVIRONMENTAL EXPOSURES

*Figure 12 IR RADIATION EFFECTS sample1
sample2*



Figure13 IR RADIATION EFFECTS



*Figure 14 IR RADIATION EFFECTS sample 3
sample 4*

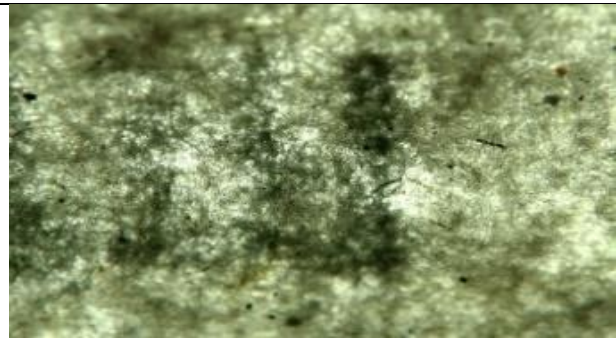


Figure15 IR RADIATION EFFECTS

Figure 16 IR RADIATION EFFECTS sample 5

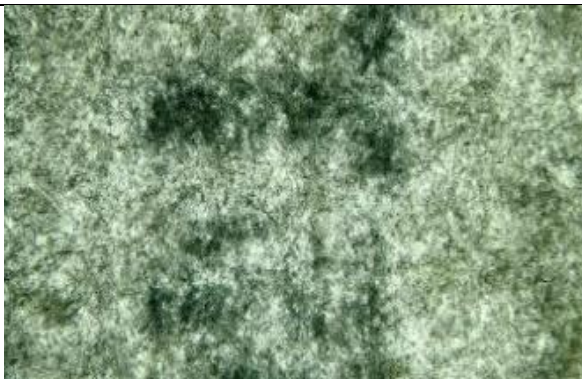
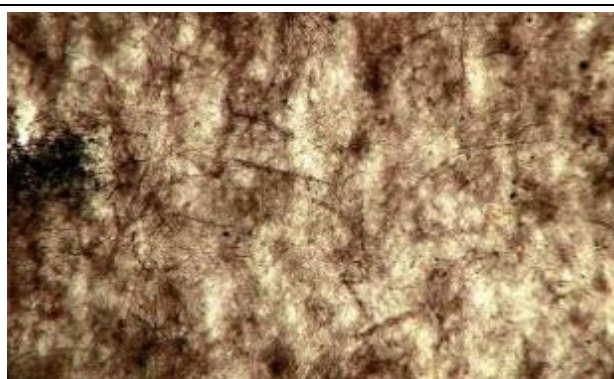


Figure 17 IR RADIATION EFFECTS sample 6



*Figure 18 IR RADIATION EFFECTS sample 7
sample 8*

Figure 19 IR RADIATION EFFECTS

SAMPLE ANALYSIS

Table 1:1 Sample analysis according to the pH levels, Dating, Colour tones

Serial number	pH value	Colour tones	Dating
1	7	Coconut white	16-01-24
2	7	Coconut white	16-01-24
3	7	Coconut white	16-01-24
4	7	Coconut white	16-01-24
5	7	Coconut white	16-01-24
6	7	Coconut white	16-01-24
7	7	Coconut white	16-01-24
8	7	Coconut white	16-01-24
9	7	Coconut white	16-01-24
10	5	Charcoal grey	3-07-12
11	5	Cloudy grey	9-11-14
12	6	Cloudy grey	28-5-19
13	7	Cloudy grey	1-11-14

Serial number	pH value	Colour tones	Dating
14	6	Foggy grey	23-5-99
15	5	Foggy grey	23-5-99
16	7	Cloudy grey	1- 11-14
17	7	Cloudy grey	1- 11-14
18	8	Cloudy grey	1- 11-14
19	6	Cloudy grey	3 - 12 - 05
20	5	Charcoal grey	22 - 5- 13
21	7	Foggy grey	21-1-12
22	8	Foggy grey	21-1-12
23	6	Foggy grey	1-11-14
24	5	Foggy grey	1-11-14

25	5	Charcoal grey	25- 5-17
26	7	Charcoal grey	25- 5-17
27	9	Foggy grey	16-4-10
28	9	Foggy grey	16-4-10
29	9	Foggy grey	16-4-10

Table 1.2 Sample analysis according to the pH value, colour tones, and dating

Serial number	pH value	Colour tones	Dating
30	9	Foggy grey	16-4-10
31	7	Foggy grey	10-4-13
32	7	Foggy grey	10-4-13
33	7	Foggy grey	10-4-13
34	6	Foggy grey	10-4-13
35	6	Foggy grey	10-4-13
36	7	Foggy grey	9-4-13
37	6	Foggy grey	9-4-13
38	6	Foggy grey	9-4-13
39	7	Foggy grey	9-4-13
40	5	Foggy grey	17-4-10
41	5	Foggy grey	17-4-10
42	5	Foggy grey	5-5-10
43	5	Cloudy grey	7-2-11
44	8	Foggy grey	1-7-17
45	8	Foggy grey	1-7-17

Table 1.3 Sample analysis according to the pH value, colour tones and dating

Table 1.4 Samples analysis according to pH value, colour tones and dating

Serial number	pH value	Colour tones	Dating
46	7	Foggy grey	1-7-17
47	8	Foggy grey	1-7-17
48	7	Foggy grey	1-7-17
49	5	Mushroom grey	23-7-12
50	5	Mushroom grey	23-7-12
51	5	Mushroom grey	23-7-12
52	5	Mushroom grey	23-7-12

53	5	Mushroom grey	23-7-12
54	5	Mushroom grey	23-7-12
55	5	Mushroom grey	23-7-12
56	5	Mushroom grey	23-7-12
57	5	Cloudy grey	3-12-14
58	6	Cloudy grey	17-7-7
59	4	Charcoal grey	22-7-12
60	4	Charcoal grey	23-7-12

Serial number	pH value	Colour tones	Dating
61	3	Cloudy grey	2-11-15
62	3	Cloudy grey	4-2-15
63	4	Cloudy grey	20-5-14
64	4	Charcoal grey	30-11-10
65	4	Charcoal grey	30-11-10
66	4	Charcoal grey	17-7-07
67	5	Charcoal grey	17-7-07
68	5	Cloudy grey	27-4-15
69	5	Cloudy grey	27-4-15
70	4	Cloudy grey	27-4-15
71	4	Cloudy grey	22-5-13
72	4	Charcoal grey	22-5-13
73	5	Charcoal grey	19-7-12
74	6	Cloudy grey	19-7-12
75	5	Cloudy grey	2-4-08
76	6	Mushroom grey	4-10-07

Table 1.5 Sample analysis according to the pH value, colour tones and dating

Serial number	pH value	Colour tones	Dating
77	6	Mushroom grey	20-5-14
78	5	Mushroom grey	20-5-14
79	5	Mushroom grey	25-8-12
80	7	Mushroom grey	11-4-19
81	7	Mushroom grey	11-4-19
82	7	Mushroom grey	11-4-19
83	7	Mushroom grey	11-4-19
84	7	Mushroom grey	11-4-19
85	7	Mushroom grey	11-4-19

Table 1.6 Sample analysis according to the pH value , colour tones and dating

6. Future aspects

A) Digital forensic advances – The digital forensic advances are like carrying all the sensitive documents digitally in biometric data in a national identity cards, dna fingerprinting in a data base of the country system, electronic chip installation in a passports.

B) Increased digital documentation- Increases digital documentation in each kind of sensitive documents can be stored in DiGi locker , Pdf based etc

C) Block chain technology for documents authentication- The meta-verse security system will get enhance in the future as the meta-verse is considered as a upcoming biggest network which is still growing.

D) Innovation in security features- Palm prints, Face recognition , the Retina iris and the dna coding which is upcoming security features to preserve our all data

E) Rarity of typewritten documents- In the upcoming era the typewritten will be rarely able to seen and might not be used any longer because of less features

F) Digital typewriters- Digital printers is being mostly used these days it might can enhances the more and more up gradation in upcoming future.

G) Smart typewriters- The smart typewriters might be very portable printer which will be able to get soon in the upcoming years as still few of them available in the Market but still it have lack of features.

7. Result

In this research for estimating the age of the type written document we had find out the various distinctive security features of the paper which is present in it however we had mainly focused on the fiber content structure of the document because the each paper was made of different pulp, woods, leaves and the cellulose so it must be having the different kind of effects while coming in the contact with the environmental changes such as moisture, water contact, getting exposed under the sunlight , and the other rays. **However** the age varies according to these following situations. In this research we also found out

the pH of the all typewritten papers by the help of the distilled water adding over to make it bit most and then slightly extracted its fiber cell to get know the pH which had very major difference because of the disturbances happened in the cells of the papers some of the papers almost absorbed the ink very densely so it had the different pH of the them. Although we had also focused over the color tones of the pages which changes similarly because of the exposure under the environmental changes

PHYSICALLY Total sample size is taken about 85 in which 20 was forged and the rest 65 was typewritten in **a-synchronized** in a different period of time and had different type of fiber content structure

VISUALLY – The color tones of all of the following in taken samples 85 in which we found various color tones which is Fair white (coconut white), charcoal grey, cloudy grey , foggy grey ,mushroom grey.

CHEMICALLY – In the total taken sample of 85 the all had different pH level
11= pH 4 to 3, 26 = pH 5, 16= pH 6, 21= pH 7, 6= pH 8, 5= pH 9

8. Conclusion

CONCLUSION – THIS PARTICULARLY RESEARCH IS BEING SUCCESSFUL FOR JUST ESTIMATING THE AGE OF THE TYPEWRITTEN DOCUMENT WHILE EXAMINING THE FIBER CONTENT, pH level, DATING MENTIONED OVER THE PARTICULARLY TYPED DOCUMENT
As more in future this particular research could be explored over the fibre contents by extracting and exploring there cellulose structure to estimate there age

The research paper culminates in recommending a multi-faceted approach that integrates physical, chemical, and visual examination techniques to accurately estimate the age of typewritten documents. This holistic approach, the authors argue, can enhance the accuracy and reliability of age estimation, consequently contributing to the field of forensic document analysis. The paper underscores the value of continued research and innovation in this domain, aiming to advance forensic methodologies and contribute to the resolution of legal disputes and historical inquiries.

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