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RESEARCH ARTICLE

ALTERATION IN CURRENCY

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ABSTRACT

Question document is the science that deals with suspicious and questionable documents including forgeries in handwriting, addition, obliterations in currency notes, cheques etc. on encountering such cases suspecting of a certain type of forgery, on examination it was seen that there were alterations in various number series of notes. Thus case study was performed to know how alteration can be detected.

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INTRODUCTION

Questioned document examination (QDE) is a term for a **forensic** science discipline pertaining to documents that are potentially disputed in a court of law. Its primary purpose is to provide evidence about a suspicious or questionable document using scientific processes and methods. As we know this type of science mainly deals with all type of forgeries in handwriting, addition, obliterations in currency notes, cheques. So is this case study , this study is based on the additions made in the notes so that these additions can help in developing same number of series and can be used by the people. In this case notes of denomination 100 and 500 were encountered.

Marking explanation

- **See through register**: (1 & 10) The floral designs printed both on front and back side of the 100 domination note in the middle of the vertical b and to the side of the water mark window has the dominational numeral '' 100''. Half the numeral is printed on the obverse and half in the reverse. Both the printed portions have back to back registration so that the numeral appears as one when viewed against light.
- **Watermark:** The portrait of Mahatma-Gandhi ji, the multi-directional lines and an electrolyte mark showing the denomination all numeral 100 appear in this section and these can be viewed better when the banknote is held in an oblique light.
- **Fluorescence:** Number panels of the banknote are printed in fluorescent ink. The banknote has optical fibers as well. Both can be seen when seen under ultraviolet light.
- **Security Thread:** 2mm wide security thread with inscriptions ''Bharat'' (in Hindi) and ''RBI'' and exclusive colour shift from green to blue when viewed from different angles. It will fluorescence in yellow on the reverse and texts will florescence on the obverse under ultra violet light. The thread appears as a continuous line from behind when held up against light.
- **Intaglio Printing:** The portrait of Mahatma Gandhi, the reverse bank seal, guarantee and promise clause, ashoka pillar emblem on the left, RBI Governor's signature on the banknote and the identification mark for the visually impaired persons are printed in intaglio i.e. raised prints, which can be felt by touch.
- **Latent Image:** The vertical band contains latent image showing the numeral 100 when banknote is held horizontally at eye level.
- **Micro lettering:** The letters, ''RBI'' and numeral, ''100'' can be viewed with the help of the magnifying glass in the zone Mahatma Gandhi portrait and the vertical band.

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- **Identification mark:** A triangle with improved intaglio print that helps the visually impaired to identify the denomination.
- **Year of printing: (9 & 11)** year of printing appears on the banknote.
- **Point 12:** It has various languages written on it.

Security features of 100 rupee note

Fig.1. Front side of 100 rupee note

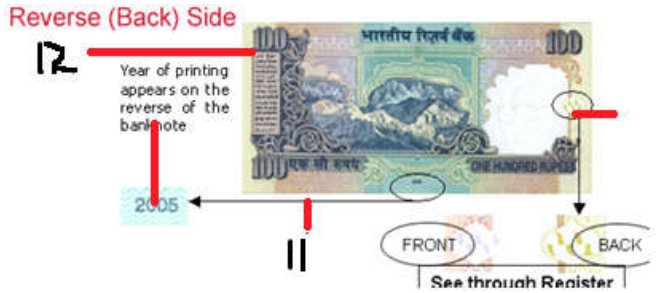

Fig.2. Back side of 100 rupee note

Security features of 500 rupee Note

Fig 3. Front side of 500 rupee note

- See through Register: The small floral design printed on both front and back of the note has an accurate back to back registration. The design will appear as on floral design when seen against the light.
- Identification Mark : A feature in intaglio has been introduced on the left of the watermark on all notes except Rs 10 note. There are different shapes for different denominations (500-circle). It helps the visually impaired.
- Fluorescence: Number panels of the banknote are printed in fluorescent ink. The banknote has optical fibers as well. Both can be seen when seen under ultraviolet light.
- Watermark: The bank note contains the mahatma Gandhi watermark with a light and shade effect and multi-directional lines in water mark window.
- Optically variable ink: in this security feature the 500 rupee note is printed in optically variable ink. The colour of the numeral appears green when the note is held flat but will change to blue when it is held at an angle.
- Intaglio printing: The portrait of mahatma Gandhi, Reserve bank seal, guarantee and promise clause, Ashok pillar emblem and RBI Governor's signature are printed in intaglio.
- Security Thread: rupee 500 contains a readable security thread alternatively visible on the obverse with inscriptions 'Bharat' and 'RBI'. When held against light, the thread can be seen as a continuous line.
- Microlettering: The feature appears between the vertical band and Mahatma Gandhi portrait. In this the dominational value is in Microlettering.
- Latent Image: on the obverse side there is a vertical band on the right hand side of mahatma Gandhi's portrait contains a latent image showing the respective denominational value in numeral.

Instrumentation

Stereo Zoom Microscope

The stereo or stereoscopic or dissecting microscope is an optical microscope variant designed for low magnification observation of a sample, typically using light reflected from the surface of an object rather than transmitted through it. The instrument uses two separate optical paths with two objectives and eyepieces to provide slightly different viewing angles to the left and right eyes. This arrangement produces a three-dimensional visualization of the sample being examined. Stereomicroscopy overlaps macro photography for recording and examining solid samples with complex surface topography, where a three-dimensional view is needed for analyzing the detail. The stereo microscope is often used to study the surfaces of solid specimens or to carry out close work such as dissection, microsurgery, watch-making, circuit board manufacture or inspection, currency reading and fracture surfaces as in fractography and forensic engineering. Advantages: It provides zoom that will allow you focus in the object that you want to study by as much as you want, the illuminator (available as single or double) allows you to study it, under light.

In addition, a stereo microscope may come with one or more of the following features:

1. Digital camera
2. LED
3. Display
4. Supplemental lens
5. Wide surface
6. Stereo boom

Uv transilluminator

Ultraviolet-visible spectroscopy or ultraviolet-visible spectrophotometry (UV-Vis or UV/Vis) refers to absorption spectroscopy or reflectance spectroscopy in the ultraviolet-visible spectral region. Absorption spectroscopy refers to

spectroscopic techniques that measure the absorption of radiation. Ultraviolet (UV) light is electromagnetic radiation with a wavelength shorter than that of visible light, but longer than X-rays, in the range 10 nm to 400 nm. The visible spectrum is the portion of the electromagnetic spectrum that is visible to (and can be detected by) the human eye, in the range of 390 to 750 nm. This means that UV spectrophotometry uses light in the visible and nearby (near-UV and near-infrared (NIR)) ranges.

Fig.4. Stereo Zoom Microscope

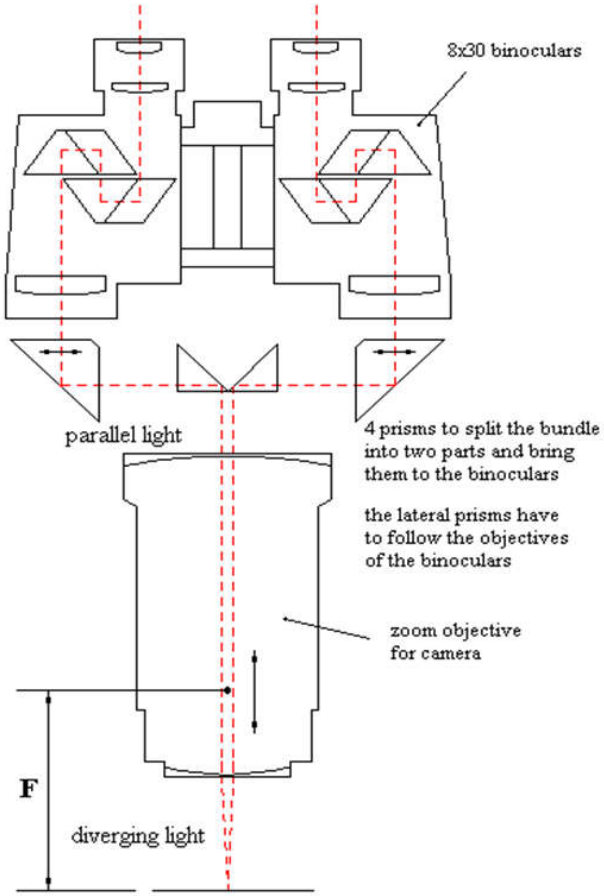

Fig. 5. Working of Stereo zoom microscope

The study

During the case study, the notes of denomination Rs.100/- and Rs.500/- (Mahatma Gandhi series) were encountered. The analysis was performed with stereo zoom microscope, uv microscope and hand lens at various angles. During the analysis at various light angles.

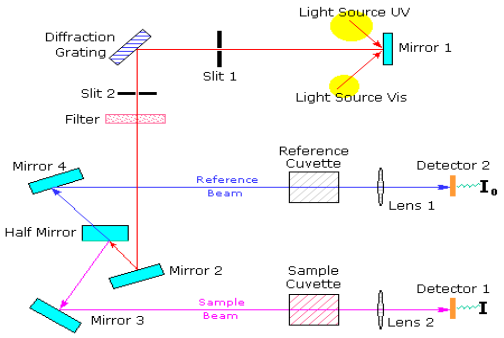

Fig.6. Working of uv instrument

Fig.7. **Fig.8.**

Fig7 & 8. Document analyser used in analysis of notes

As shown in the figures

Figure 8. Showing addition in the serial numbers of 100 rs notes under stereo zoom microscope, marked as I1 TO I17.

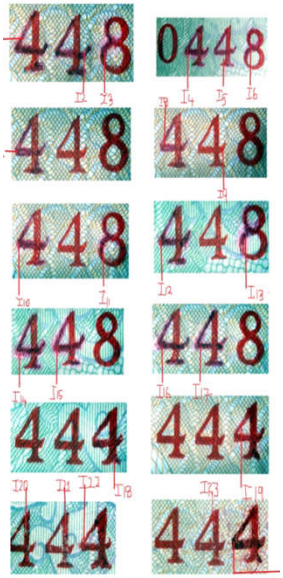

Figure 8. Addition in the serial numbers of 100 Rs notes under stereo zoom microscope, marked as I1 TO I24

Figure 9: Showing addition in the serial numbers of 500 rs notes under stereo zoom microscope, marked as I25 TO I30.

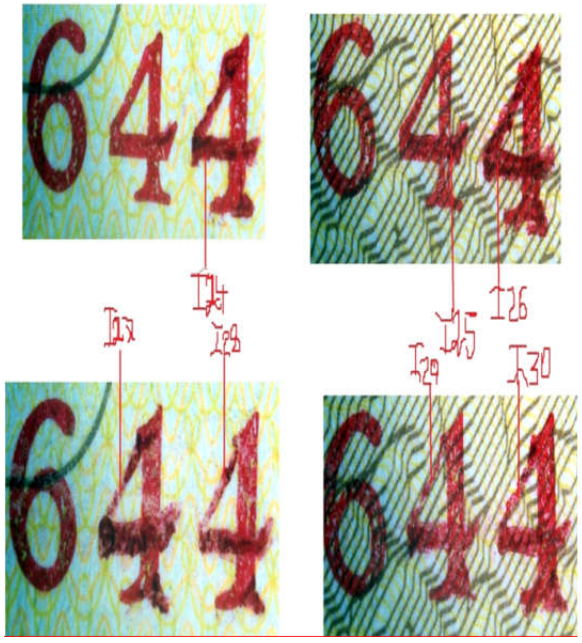

Figure 9. Addition in the serial numbers of 500 Rs notes under stereo zoom microscope, marked as I25 TO I30

Figure 10: Showing addition in the serial number of 500 rs notes Under UV light, marked as I31 TO I34.

Figure 10. Addition in the serial number of 500 Rs notes Under UV light, marked as I31 TO I34

Conclusion

On the above study it was concluded that alterations were made in notes and there were marks of additions in the exiting figures '8', '4' & '4', which when deciphered the original figures was read as '3', '1' & '1'.

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