**History of Printing and Imaging**

**Student Notes Outline**

1. Woodblock Printing

a. The first method of printing images, text and patterns on fabrics and other textiles used

wooden blocks , and then the exposed surface was dipped in paint or ink

and firmly applied or stamped onto the cloth.

b. One early example is the use of seals, blocks carved with images or text, then pressed

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|  | into | . | | |  |  |
|  |  |  |  |  |  | |
| c. |  |  | are made by placing the cloth on the carved block and the top is rubbed | | | |
|  | with a hard substance to create the pressing. | | | | |  |
| d. | The earliest surviving fragments of are from | | | |  | around AD 200. |

e. Woodblock Printing developed in Asia several centuries before \_\_\_\_\_\_\_\_\_\_\_.

1. Movable Type
   1. A system of printing using movable pieces of \_\_\_\_\_\_ type carved in \_\_\_\_\_\_ like woodblocks.
   2. Page setting was \_\_\_\_\_\_\_\_\_ and more\_\_\_\_\_\_\_\_\_\_ than woodblock printing.
   3. The metal type pieces also helped lettering become more \_\_\_\_\_\_\_\_, which increased the quality of printing and lead to the development of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

d. developed the movable type printing press in Mainz,

Germany around AD 1439.

* 1. Acknowledged as the most important invention of the
  2. Although others in \_\_\_\_\_\_\_ developed movable type systems using \_\_\_\_\_\_\_\_\_\_, wood, clay and even metal, historians consider Gutenberg’s press as the invention that sparked the Printing Revolution.
  3. The oldest known book printed with movable metal type was printed in \_\_\_\_\_\_\_\_\_\_\_

around AD 1377.

1. Printing Press
   1. Process:
      1. Movable type pieces were put in a tray (\_\_\_\_\_\_\_\_\_\_\_) in the bottom of the press and ink was applied.
      2. Paper was clipped to an extension then \_\_\_\_\_\_\_\_\_\_\_ into place above the type.
      3. The paper and type were rolled into place and a \_\_\_\_\_\_\_\_\_\_\_ press evenly applied pressure on the paper pushing it onto the inked type.
      4. The process was reversed and repeated.
   2. Men operating the press, a very labor-intensive job, were called ‘\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_’.
   3. A European printing press in the 16th century could produce about \_\_\_\_\_\_\_\_\_\_\_

impressions per workday.

Printing Houses

* 1. \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ owned the shops, selected the manuscripts, determined the size of print runs, sold the printed works, and organized distribution.
  2. The printing was completed by \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the print house.
  3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ first set the movable type for printing in a tray.
  4. Pressmen then \_\_\_\_\_\_\_\_ \_\_\_\_ \_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_ \_\_\_\_ \_\_\_\_\_\_\_ with the printing press.
  5. \_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_ had to work for years to become Compositors or Pressmen.

V. Intaglio Printing

* 1. A family of printing techniques in which the \_\_\_\_\_\_\_\_ is cut into a surface, and the sunken area holds the ink.
  2. Normally \_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_ plates are used as the surface or matrix.
  3. \_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_ are types of Intaglio.
  4. Today Intaglio engraving is used for printing currency and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

VI. Lithography

1. Printing from a smooth flat \_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_ surface (also called a plate) using a chemical process to create an image.
2. Invented in 1796 by \_\_\_\_\_\_\_\_\_\_\_\_ author and actor Alois Senefelder
3. Process:
   1. Because \_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_ don’t mix, an oil based image is first created on a smooth stone or metal surface.
   2. The surface is then treated with an \_\_\_\_\_\_\_\_\_ and gum arabic mixture,

\_\_\_\_\_\_\_\_\_\_\_\_\_ areas not protected by the grease-based image.

* 1. The etched area retains \_\_\_\_\_\_\_\_\_ and repels the \_\_\_\_\_\_\_\_\_ based ink, which sticks to the image.
  2. The image can then be transferred and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ many times on paper

VII. Color Printing

1. Using different color inks on separate plates

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ helped achieve color prints, but the process was costly and very time consuming, taking months to set the colors in the stone and months to do the multiple pass printing.

1. Master Printers had to correctly line up the color plates (this is called \_\_\_\_\_\_\_\_\_\_\_\_\_)
2. High quality color prints were called ‘\_\_\_\_\_\_\_\_\_\_\_\_’ and used many color plates.
3. Lower quality and lower cost prints could be made by using \_\_\_\_\_\_\_\_\_\_\_\_ of color requiring fewer color plates; so many \_\_\_\_\_\_\_\_\_\_\_\_\_\_ were created this way, it became a style of image coloring.

VIII. Photography

1. It is the combination of the pinhole camera obscura concept with the observations that certain substances are \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_ by exposure to light.
2. Pinhole Camera Obscura – Light coming through a pinhole projects an image (\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_) in a dark box.
3. Different light sensitive \_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_ were tested over many years; each building a quicker more stable camera.
4. Faint ‘latent’ images were enhanced with various vapors decreasing \_\_\_\_\_\_\_\_\_\_ times.
5. Color photographs originally came from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 3 color sensitive images.
6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ replaced the pinhole bringing more clarity and focus to the photos.
7. Metal plates used to capture exposures were eventual replaced by photosensitive

\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_.

IX. Typesetting

* 1. Hot Metal - \_\_\_\_\_\_\_\_\_\_\_\_\_ machines mechanized letterpress printing (similar to Gutenberg printing press) by using molten type metal (\_\_\_\_\_\_\_) molded temporarily for press ink printing.
  2. Slugs, or entire \_\_\_\_\_\_\_\_ \_\_\_ \_\_\_\_\_\_\_\_\_\_, were created.
  3. After printing, the slugs are reheated and \_\_\_\_\_\_\_\_\_\_\_\_\_\_ for use on another print project.
  4. Photo typesetting is a form of \_\_\_\_\_\_\_\_\_\_\_\_\_ printing in which machines project characters onto \_\_\_\_\_\_\_\_\_\_\_\_ first.
  5. This ‘\_\_\_\_\_ \_\_\_\_\_’ typesetting could now be done in an office instead of a warehouse
  6. With the development of \_\_\_\_\_ screens composition and markup became even easier.
  7. These advances in typesetting technology would eventually lead to consumers being capable of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

X. Offset Printing (\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

* 1. Today, most high-volume printing of posters, books and newspapers use offset \_\_\_\_\_\_
  2. Process:
     1. A photographic negative or a CTP (computer-to-plate) laser image is applied to a

\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ covered with a photosensitive emulsion.

* + 1. The plate is attached to a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on a printing press where dampening rollers apply water.

1. The water is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by the emulsion of the image area, then hydrophobic ink is applied to the plate, which is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by the water, but it sticks to the emulsion of the image area.
2. A rubber ‘\_\_\_\_\_\_\_\_\_\_\_\_\_’ cylinder squeezes away the excess water.
3. By means of uniform pressure and with the help of an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

cylinder the image is finally transferred to the paper.

XI. Screen Printing

1. Also called \_\_\_\_\_\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or serigraphy
2. It uses a woven mesh to support an \_\_\_\_\_\_-\_\_\_\_\_\_\_ stencil to receive a desired image.
3. The open areas of mesh allow ink to be pressed through to the

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (surface to be printed).

1. Modern uses for screen printing include posters, stickers, vinyl, wood, and of course T-shirts.
2. Screen-printing on \_\_\_\_\_\_\_\_\_\_\_\_\_\_ currently accounts for over half of the screen printing activity in the United States.

XII. Dot Matrix Printing

1. It uses a print head that prints back and forth on a page and impacts an \_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ like a typewriter creating letters out of dots.

1. Normally used for high volume data specific printing on \_\_\_\_\_\_\_\_\_\_\_\_\_-\_\_\_\_\_\_\_\_ paper.
2. Because it uses impact printing, \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_ could be printed as well.
3. Print heads went from 9 pins to 25 pins increasing the \_\_\_\_\_\_\_\_\_ and dots per inch of printouts
4. \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_ (NLQ) was created by printing a second or third pass, but it was slower

XIII. Inkjet Printing

1. The printing of a digital image by projecting \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of ink onto the print medium; paper, plastic, metal, etc
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (CIJ) – Ink is pumped at high speed through a microscopic nozzle and separated into drops by a vibrating piezoelectric crystal.
3. In \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (DOD) Drop on Demand an electronic signal heats the ink just enough to create a drop for printing placement.
4. In \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (DOD) Drop on Demand uses a piezoelectric print head creating a pulse to force drops out for printing placement.

XIV. Dye-sublimation Printing

1. Uses \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to transfer dye to materials like paper, plastic or fabric.
2. Excellent for printing \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. Many consumer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ printers are dye-sublimation printers.
4. Slower than \_\_\_\_\_\_\_\_\_\_\_\_\_ printing.
5. Uses transfer paper to get graphics to fabrics, but better than screen printing because the image is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with the material not just placed on top of it.

XV. Xerography (Photocopying)

1. Also called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, it is a \_\_\_\_\_\_\_\_\_ photocopying technique using an image projected onto an electrically charged drum to create high quality reproductions of the original.
2. Process:
   1. After the drum head is \_\_\_\_\_\_\_\_ it is charged and readied to receive the image.
   2. The image is scanned and exposed onto the \_\_\_ \_ drum creating a latent image
   3. Electrically charged powdered ink (\_\_\_\_\_\_\_\_\_\_) is attracted to the latent image
   4. The image is transferred to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
   5. Then heated and pressed through rollers to \_\_ \_the toner in place on the paper

XVI. Laser Printing

1. Actually an \_\_\_\_\_\_\_\_\_ digital printing process that uses an image that is laser projected on a negatively charged drum to create high quality text and graphics with toner
2. Process:
   1. After the drumhead is \_\_\_\_\_\_\_\_, it is charged and readied to receive the image
   2. The image, which is stored in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ memory, is written to the drum with a laser, creating a latent image.
   3. Electrically charged powdered ink (\_\_\_\_\_\_\_\_\_\_) is attracted to the latent image
   4. The image is transferred to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   5. Then heated and pressed through rollers to \_\_\_ the toner in place on the paper

XVII. Digital Photography

1. Uses a camera to capture images by projecting light through lenses to

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ photodetectors (image sensors) instead of film

1. The image sensors are \_\_\_\_\_\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (CCDs) which store information in the form of pixels
2. Images are stored \_\_\_\_\_\_\_\_\_\_\_\_ eliminating the need to purchase film for the camera
3. Digital cameras can also capture images quicker, perform better in low light, have a greater \_\_\_\_\_\_\_ \_\_\_ \_\_\_\_\_\_, and they can have a higher resolution than film cameras
4. But regular film cameras do not have \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or unusual pattern displays on large blocks of color in images

XVIII. 3D Printing

1. Also called \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, uses a virtual 3D model to create a physical ‘print’ by building layers of material to form the finished object.
2. Process:
   1. \_\_\_ the image requires computer aided design (CAD) software or a 3D scanner
   2. The ‘fix up’ stage makes sure there are no \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ (e.g. lines not connecting properly) in the model.
   3. Successive layers of material are then printed from \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ of the model and fused to create the final shape.
   4. Completed the printing may require \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of edges and/or painting, which some 3D printers can do.