UNIT – IV - FILM PROCESSING

PART –A

1 Mark Questions

1. State the types of films based on light sensitivity.

   Types of films based on Color sensitivity - Orthochromatic, Panchromatic and blue-sensitive films.

2. What do you mean by film contrast?

   The tonal differences between highlight and shadow areas of an image represent its contrast.

   High-contrast graphic arts film is referred to as lith-type film.

   Continuous - tone graphic arts film is of lower contrast than the lith-type film.

3. What is film speed?

   Film speed is a term describing the film’s time response to exposures. A film may be fast or slow, depending on the amount of light required to expose it purposely. A film that requires intense or long exposure is considered to be a slow film. The films used in graphic arts are in this category.

4. Define film contrast.

   The tonal differences between highlight and shadow areas of an image represent its contrast.

   High-contrast graphic arts film is referred to as lith-type film.

   Continuous - tone graphic arts film is of lower contrast than the lith-type film.

5. State the purpose of stop bath in film processing.

   After a negative or print has been developed, it is usual to rinse it in clean water for a minute to stop the development action before transferring it to the fixing bath. A solution of 2-5% acid or citric acid, or potassium meta-bisulphite is commonly used for this purpose.

6. What is the necessity of fixing stage in the film processing?
After the development is stopped, the image on the film is made visible, but they are not permanent. The fixing bath is used to remove any remaining unexposed salts and to make the image permanent.

7. What is CTF technology?

Computer to film technology (CTF) is the direct imaging of films from the digital image data. CTF Technology uses Film Imagesetter and Raster Image Processor (RIP) for film imaging.

8. State the purpose of RIP in Computer to Film technology.

A RIP operates by transforming the front-end instructions from the host DTP / EPC system, which are stored in PostScript language, into a 'digestible' bitmap form of managed data the output device can understand and utilise.

9. What are the different types of CTF technology?

Types of CTF Technology
i) Capstan (Flatbed) CTF Technology
ii) Drum CTF Technology
   a) Internal Drum CTF Technology
   b) External Drum CTF Technology

10. Expand CTPP.

   CTPP - Computer to Polyester Plate.

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**Color proofs**: Simulations of eventual output of a reproduction device. Because it is costly to proof in a press, a number of methods are used to proof offline. In digital printing, a proof is a run of one.

**Developer**: In photography, the chemical agent and process used to render photographic images visible after exposure to light. In lithographic plate making, the material used to remove the unexposed coating.

**Digital color proof**: A color proof produced from digital data without the need for separation films.
**Imagesetters:** In digital imaging, a generic term that applies to film – output devices for type and graphics. A device used to output fully paginated text and graphic images at a high resolution onto photographic film, paper, or plates.

**Imposition:** In image assembly, the positioning of pages on a signature so that after printing, folding, and cutting, all pages will appear in the proper sequence.

**INTERFACE** The electronic device that enables one kind of equipment to communicate with or control another.

**Laser:** (Light Amplification by Stimulated Emission of Radiation) - The laser is a high energy, intense light beam with very narrow bandwidth used in digital-imaging devices to produce images by electronic impulses from computer to facsimile transmission.

**Page makeup:** In stripping, assembly of all elements to make up a page. In digital imaging, the electronic assembly of all page elements to compose a complete page with type, graphics, images and color in place on a display screen for output to plate or printer.

**PAGE LAYOUT** A dummy indicating page size; trimmed job size; top, outside, and foot trims; untrimmed page size; and head, foot, outside, and bind margins.

**Pagination:** In computerized typesetting, the process of performing page makeup automatically.

**PROCESSOR** An automatic device that feeds exposed photosensitive paper or film over rollers through baths to develop and dry them before they reach the delivery area.

**RASTER** An image composed of a set of horizontal scan lines that are formed sequentially by writing each line following the previous line, particularly on a television screen or computer monitor.

**RASTER IMAGE PROCESSOR (RIP)** The device that interprets all of the page layout information for the marking engine of the image setter. PostScript or another page description language serves as an interface between the page layout workstation and the RIP.

**RESOLUTION** The precision with which an optical, photographic, or photo-mechanical system can render visual image detail. Resolution is a measure of image sharpness or the performance of an optical system.

**Server:** A file server provides file data interchange between compatible peripheral devices on a local area network. Servers are identified by the type of resource they provide (e.g., disk server, file server, printer server, communications server).

**SILVER HALIDE** A silver salt suspended in gelatin to prepare the emulsion of photographic film.

**Stripping:** In image assembly, the positioning of film negatives (or positives) on a flat to compose a page or imposed layout for plate making.
1. State the different layers of photographic film.
   - Antistress layer
   - Emulsion layer
   - Base material
   - Substratum layer
   - Antihalation backing layer

2. Explain Film sensitivity.

   Silver-based emulsions have colour sensitivity, meaning that they are sensitive to specific colour or colours of light. Normally, the sensitivity of silver halide emulsions is limited to the ultraviolet, blue violet, and blue regions of the spectrum. To extend the colour sensitivity of the emulsion, dyes must be added. The resulting differences in colour sensitivity become three emulsion types: blue-sensitive, orthochromatic, and panchromatic.

3. Define film speed. State the factors which influence film speed.

   Film speed is a term describing the film’s time response to exposures. A film may be fast or slow, depending on the amount of light required to expose it purposely. A film that requires intense or long exposure is considered to be a slow film. The films used in graphic arts are in this category.

   Two additional factors influence a film's speed: the film's colour sensitivities and the light source used for exposure. Blue-sensitive film will be slower when a tungsten light source is used than if exposed with a pulsed xenon lamp because tungsten light contains far less blue light than the pulsed-xenon. Two films of different colour sensitivity will also differ in speed exposed by the same light source. Thus, panchromatic film is faster than blue-sensitive film when exposed to a tungsten light because the pan film is also affected by the green, yellow, and red light present in the light source.

4. What are the ingredients of a developer solution?

   The developing solution consists of:
   1. A solvent, such as water.
   2. A developing or reducing agent, such as metol or hydroquinone.
   3. A preservative, such as sodium sulfite.
   4. A restrainer, such as potassium bromide.
   5. An accelerator or alkali, such as sodium hydroxide.
5. State the different stages in film processing.

Manual film processing involves the following steps:

1) Developing
2) Stop Bathing
3) Fixing
4) Washing
5) Drying

6. Write notes on film processing trays.

**Processing Trays**

A processing tray is an open-top container that holds one of the solutions used to process photographic materials. One tray is used for each processing solution. Processing trays are sized slightly larger than a specific, standard film size. Keep developing trays in all the standard film size to be used. Generally, two trays for each film size, in addition to the stop bath and fixing bath trays are needed in every dark room.

Processing trays are made of many materials including stainless steel, enamel, hard rubber, plastic and glass. Because glass trays are easily broken, their use is limited. Stainless steel is the best material. Trays are either transparent or opaque. A transparent tray has a major advantage over an opaque tray. By being transparent, it can easily be illuminated by a correctly positioned safelight. This aids in the visual inspection of the material while it is being processed in the tray.

7. State the advantages of Automatic film processing.

An automatic processor automatically develops, fixes, washes and dries large volumes of exposed photographic material with very little operator time required. Automatic processor reduce the man power, improves reproduction quality and standardizes processing procedures.

1) Any length of roll material can be handled.
2) Less space required for the feed table of the processor in the darkroom.
3) Exposed film directly sent to processor.
4) Time reduction- processors can complete a sheet of film in four to six minutes.
5) Cost reduction – avoids exhaustion of developer, since air contact is less.
6) Negative of consistent quality can be produced.
8. What are the components of CTF workflow?
   1. Computer system for pagination & designing & Imposition
   2. RIP (Raster Image Processor)
   3. Film Imagesetter
   4. Automatic Film Processor.

9. State the different types of film imagesetters.
   i) Capston (Flatbed) Imagesetter.
   ii) Drum Imagesetter.
      a) Internal Drum Imagesetter.
      b) External Drum Imagesetter.

10. Write notes on flat bed film imagesetters.
    Flat-bed Imagesetter In flat-bed imagesetters the material lies flat in the machine during exposure. This allows a simply constructed exposure table and substrate holder. As the format of the total area to be exposed increases, the optical system required becomes more complex in order to guarantee the exact placing of the pixels at constant spot diameter on each part of the exposure area. Flat-bed imagesetters are renowned for their robust construction, high reliability and throughput for small to medium formats, which makes them particularly suitable for the newspaper sector.

\[PART \text{-} C\]

12 Marks Questions

1. Explain the structure of photographic film with necessary sketches. Define film speed.

2. Describe the different types of films and their characteristics.

3. Explain the automatic film processor with necessary diagrams.

4. Describe the Computer to Film Workflow.

5. Explain the working principles of internal drum film imagesetter with necessary sketches.

6. Describe the working principles of external drum film imagesetter with the diagrams.

7. Write notes on (i) Film processing chemicals, (ii) Advantages of CTF technology.