UNIT – III - LINE AND HALFTONE PHOTOGRAPHY

PART –A

1 Mark Questions

1. State the different areas of a continuous tone photograph.
   - Highlight area
   - Shadow area
   - Middle tone area

2. Define highlight and shadow areas in a photograph.
   The **highlight area** is that portion of a picture that contains detail but has the least amount of density.
   The highlight detail begins in step 1, or with a density near 0.05. The highlight dots begin with the smallest reproducible dot (generally about 5 percent) and extend to about a 20 or 25 percent dot.
   The darkest areas of the print are called the **shadow areas**.
   The shadow detail ends in step 10, or with a density of about 1.45. The shadow dots extend from about 75 or 80 percent to the largest reproducible dot (generally about 95 percent) before solid black is reached.

3. How will you specify a screen ruling?
   Screen frequencies or rulings can be specified in lines per cm or lines per inch.

4. Define screen ruling.
   The screen ruling describes the fineness of screen in the rendering of the picture information. Screen frequencies or rulings can be specified in lines per cm or lines per inch. Screens with 25, 34 and 40 rulings per cm are classed as coarse screens (Figure), and those screens with 48, 52 and 60 rulings per cm are classed as fine screens (Figure), other very fine screens such as 80 and 118 per cm are also available. The choice of screen ruling depends on the printing process and the surface of the printing material.

5. What are screen angles?
   In four color printing the individual color screening must be angled in order to avoid moire pattern. Screen angles frequently used for sheet fed offset printing are: black 45°, magenta 75°, yellow 90° and cyan 105°.
6. What are the different exposures used in film reproduction?
   i) Main exposure
   ii) Flash exposure, and
   iii) Bump exposure.

7. What you mean by screen resolution?
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8. Define halftone printing.
   All continuous-tone images whether they are color or black-and-white-need to be converted to halftones before they can be reproduced. Printing done with halftone dots is halftone printing.

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**GLOSSARY**

**AM(Amplitude Modulation)Screening:** Traditional halftone screening, as apposed to FM (Frequency Modulated) screening, has dots of variable size with equal spacing between dot centers. Hybrid screen combines AM and FM screening.

**CALIBRATION** A process by which a scanner, monitor, or output device is adjusted to provide a more accurate display and reproduction of image.

**COLOR SCANNER** A device incorporating a digital or analog computer that separates colored originals electronically by using the three additive primary colors of light in the form of blue, green, and red filters, plus a pre-programmed black printer correctly balanced with the color separations. A light beam moves over the image point by point, generating a separate, color-corrected, continuous tone intermediate or screened halftone film negative or positive representing each of the process colors and black.

**Contact print:** A photographic print made from a negative or positive in contact with photosensitized paper, film, or printing plate.

**Contact screen:** A halftone screen on film having a dot structure of graduated density, used in vacuum contact with a photographic film to produce halftones.
CONTINUOUS-TONE GRAYSCALE A scale of uniform tones, from white to black or transparent to opaque, without a visible texture or dot formation.

CONTINUOUS-TONE NEGATIVE An inverse impression of tones from the original reproduced on sensitized film without using a visible texture or dot formation.

COPYDOT TECHNIQUE Photographing halftone illustrations and associated line copy without rescreening the illustration. The halftone dots of the original are copied as line material.

Contrast: A tonal gradation between the highlights, middle tones, and shadows in an original or reproduction.

DARKROOM The light-tight chamber in which photographic materials are handled and processed.

Densitometer: In photography, a photoelectric instrument that measures the density of photographic images, or have colors. In printing, a reflection Densitometer is used to measure and control the density of color inks on the substrate. Densitometry may be built into reproduction devices.

DENSITOMETER An instrument for measuring the optical density of a negative or positive transparency, or of a print.

DENSITY (1) The light-stopping ability of an image or base material, sometimes referred to as optical density. (2) A photographic term used to describe the tonal value of an area. (3) The specific gravity or weight per unit volume of paper.

Density: the degree of darkness (light absorption or opacity) of a photographic image.

Direct screen halftone: In color separation, a halftone negative made by direct exposure from the original on an enlarger or by contact through a halftone screen.

Drum scanner: uses photo multiplier tubes (PMT) and produces color separation with higher resolution and dynamic range than CCD (charge coupled device) scanners. Color separation equipment on which the original transparency is wrapped around a hollow, plastic rotary cylinder.

Dynamic Range: Density difference between highlights and shadows of scanned subjects.

Elliptical dot: In halftone photography, elongated dots that give improved gradation of tones particularly in middle tones and vignettes also called chain dots.

Emulsion side: In photography, the side of the film coated with silver halide emulsion.

EXPOSURE The period of time during which a light-sensitive surface is subjected to the action of actinic light.

FM (Frequency Modulation) Screening: A computerized method for digital screening.
**FILM** Sheets of flexible translucent or transparent acetate, vinyl, or other plastic base materials that are coated with a photographic emulsion.

**FOG** A photographic defect in which the image is either locally or entirely veiled by a deposit of silver. Caused by stray light or improperly compounded chemical solutions.

**Gamma:** A measure of contrast in photographic images.

**Gray Balance:** The dot values or densities of cyan, magenta, and yellow that produce a neutral gray.

**GRAYSCALE** A reflection or transmission filmstrip showing neutral tones in a range of graduated steps from black to white. Exposed along with originals during photography, it is used to time development, determine color balance, or measure density range, tone reproduction, and print contrast.

**HALFTONE** Tone values represented by a series of evenly spaced dots of varying size and shape, the dot areas varying in direct proportion to the intensity of the tones they represent.

**High Contrast:** In photography, a reproduction with high gamma in which the difference in darkness (density) between neighboring areas is greater than in the original.

**Highlight:** The lightest or whitest parts in a photograph or digital image represented in a halftone reproduction by the smallest dots or the absence of dots.

**LIGHT SENSITIVE** A material that is chemically altered after it is exposed to light.

**LPI (lines per inch):** Acronym for lines per inch. Used as a measurement of resolution or halftone screening.

**Magenta screen:** A dyed contact screen that is used for making halftones.

**Mask:** In color separation photography, an intermediate photographic negative or positive used in color correction. In offset lithography, opaque material used to protect open or selected areas of a printing plate during exposure.

**Middle tones:** The tonal range between highlights and shadows of a photograph or reproduction.

**MIDTONE DOT** A point in a middle-gray area of a halftone. Its area equals or approaches the average of the nearby background areas.

**MIDTONES** The range of tonal values between halftone highlight and shadow areas.

**Moire:** In color process printing, the undesirable screen pattern caused by incorrect screen angles for printed colors of overprinting halftones.

**MOIRE** An undesirable, unintended interference pattern caused by the out of-register overlap of two or more regular patterns such as dots or lines.
Negative: In photography, film containing an image in which the values of the original are reversed so that the dark areas in the subject appear light on the film, and vice versa.

OPI (Open Prepress Interface): An extension to postscript that automatically replaces low-resolution placeholder images with high-resolution images.

Orthochromatic: Photographic surfaces insensitive to red but sensitive to ultraviolet, blue, green, and yellow rays.

OVEREXPOSURE A condition in which too much actinic light reaches the film, producing a dense negative or a washed-out print or slide.

Panchromatic: Photographic film sensitive to all visible colors.

PHOTOGRAPHIC PROOFS Blue, brown, or silver prints made from negatives or positives and used to check layout and imposition before plates are produced.

PHOTOMECHANICAL All processes in which printing surfaces are produced with the aid of photography.

Positive: In photography, film containing an image in which the dark and light values are the same as the original. The reverse of a negative. Negatives and positives are visual opposites.

REPRODUCTION Duplicating an original by any photographic or photomechanical process.

Scanner: An electronic device used to convert reflection and transparent materials into digital files that are used in the making of halftones and color and tone-corrected separations of images. Flatbed electronic devices that are used in conjunction with desktop publishing systems to scan line art, logos, photographs, and typewritten or printed text supplied by the client.

SCREENING The process of converting a continuous-tone photograph to a matrix of dots in sizes proportional to the highlights and shadows of the continuous tone image.

Screen angles: In color reproduction, angles at which the halftone screen are placed in relation to one another, to avoid undesirable moiré pattern. A set of angles often used is: black 45°, magenta 75°, yellow 90°, cyan 105°.

Screen ruling: The number of line or dots per inch on a halftone screen.

Shadow: The darkest parts in a photograph, represented in a halftone by the largest dots.

Soft dot: Halftone dot with considerable fringe that causes dot gain or sharpening in printing or photography.

Stochastic screening: A digital screening process that converts images into very small dots (14-40 microns) of equal size and variable spacing. Second order-screened images have variable size dots and variable spacing. Also called Frequency Modulated (FM) Screening.

Surprint: In photomechanics, exposure from a second negative or flat super imposed on an exposed image of a previous negative or flat.
Tints: Various even tone areas (strengths) of a solid color.

Tone reproduction: The tonal relationship between all the elements of a reproduction.

UNDEREXPOSURE A condition in which too little actinic light reaches a photo-sensitive paper, plate, or film, producing a thin negative, a dark slide, or a muddy looking print that lacks detail.

1. Different between line and halftone reproduction.

   Line Reproduction is the most simple of all reproductions. Line reproduction is used for black-and-white copy that does not require tonal reproduction or the use of a halftone screen. This copy may be single-color or multi color, it may be of a job that is completely done in line.

   Halftone reproduction is the method by which continuous tone copy is transformed into a printable image is by photographing the original continuous tone picture through a half tone screen. The screen breaks up the continuous tone of the original into an almost countable number of tiny dots. These dots are equally spaced. However the size or diameter of the dots will vary according to the different amount of the light that was reflected from the different tones in the original.

2. What do you mean by line reproduction?

   Line Reproduction is the most simple of all reproductions. Line reproduction is used for black-and-white copy that does not require tonal reproduction or the use of a halftone screen. This copy may be single-color or multi color, it may be of a job that is completely done in line, or it may be part of a line-and-halftone combination job.

Operational Steps

   The operational steps of line negative reproduction using process camera are:

   1) Inspecting and scaling copy
   2) Placing copy on copyboard of camera
   3) Setting camera
   4) Loading film
   5) Exposing film
   6) Removing exposed film from camera
   7) Processing exposed film and
   8) Inspecting processed film.

3. What is halftone reproduction?

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screen. The screen breaks up the continuous tone of the original into an almost countable number of tiny dots. These dots are equally spaced. However the size or diameter of the dots will vary according to the different amount of the light that was reflected from the different tones in the original.

4. Write a note on contact screens.

Contact screens, used to create the illusion of continuous tone in film-based work with graphics arts cameras, has a pattern of gray or magenta dots separated by other dots of lesser density. In traditional film-based reproduction, the contact screen is held in close emulsion-side-to-emulsion-side contact with the light sensitive material being exposed to create the halftone pattern required. Manufacturers produce a variety of contact screens suitable for different purposes - coarse, medium or fine screens, special effects, gray or magenta, etc, to suit different circumstances. Contact screens are less used today due to the decline in traditional working practices.

5. State the necessity for using different screen angles in process colour reproduction.

The angle of the conventional halftone screen used in four-colour separations, must be different for each colour, to prevent the dots of successive colours becoming superimposed upon preceding ones, so forming an undesirable screen clash pattern or moiré effect when printed. Screen angles frequently used for sheet fed offset litho are: black 45°, magenta 75°, yellow 90° and cyan 105°. In web offset printing angles are often changed to black 15°, magenta 45°, cyan 75° and yellow 90°, although other permutations of screen angles are used.

6. What are the different screen angles used for process color separations?

   Cyan - 105°
   Magenta - 75°
   Yellow - 90°
   Black - 45°

This is the typical screen angle recommendations for process color printing. The black printer angle (45°) may be switched with either the magenta printer (75°) or the cyan printer (105°) inorder to eliminate moire problems between the yellow and either the magenta or cyan.
7. State the different types of contact screens.
   - Gray contact screens
   - Magenta contact screens
   - Special effects contact screens

**PART – B**

1. Explain the procedures involved in line negative reproduction.
2. Write notes on (i) High light areas (ii) Middle tone areas, (iii) Shadow areas.
3. Discuss the steps involved in halftone reproduction using scanner.
4. Write notes on (i) Halftone screens (ii) Screen ruling (iii) Screen angles.
5. Explain halftone reproduction. Describe the different areas of continuous tone photograph.
6. How the screen resolution influences print quality?