EXPERIMENT NO. 1

AIM : To study different image file formats.

THEORY :

Image file formats are standardized means of organizing and storing digital images. Image files are composed of digital data in one of these formats that can be rasterized for use on a computer display or printer. An image file format may store data in uncompressed, compressed, or vector formats. Once rasterized, an image becomes a grid of pixels, each of which has a number of bits to designate its color equal to the color depth of the device displaying it.

There are hundreds of image file types. The PNG, JPEG, and GIF formats are most often used to display images on the Internet. Some of these graphic formats are listed and briefly described below:

PNG
The PNG (Portable Network Graphics) file format was created as a free, open-source alternative to GIF. Compared to JPEG, PNG excels when the image has large, uniformly colored areas. Even for photographs – where JPEG is often the choice for final distribution since its compression technique typically yields smaller file sizes – PNG is still well-suited to storing images during the editing process because of its lossless compression.

PNG provides a patent-free replacement for GIF (though GIF is itself now patent-free), and can also replace many common uses of TIFF. Indexed-color, grayscale, and truecolor images are supported, plus an optional alpha channel.

PNG is designed to work well in online viewing applications like web browsers and can be fully streamed with a progressive display option. PNG is robust, providing both full file integrity checking and simple detection of common transmission errors.

JPEG
JPEG is a commonly used method of lossy compression for digital images, particularly for those images produced by digital photography. The degree of compression can be adjusted, allowing a selectable tradeoff between storage size and image quality. JPEG typically achieves 10:1 compression with little perceptible loss in image quality. JPEG is the most widely used image compression standard on the internet.

JPEG compression is used in a number of image file formats. JPEG/Exif is the most common image format used by digital cameras and other photographic image capture devices; along with JPEG/JFIF, it is the most common format for storing and transmitting photographic images on the World Wide Web. These format variations are often not distinguished, and are simply called JPEG.

BMP

The BMP file format, also known as a bitmap image file or device independent bitmap (DIB) file format or simply a bitmap, is a raster graphics image file format used to store bitmap digital images, independently of the display device (such as a graphics adapter), especially on Microsoft Windows[1] and OS/2 operating systems.

The BMP file format is capable of storing two-dimensional digital images both monochrome and color, in various color depths, and optionally with data compression, alpha channels, and color profiles. The Windows Metafile (WMF) specification covers the BMP file format.[3] Among others, wingdi.h defines BMP constants and structures. Microsoft has defined a particular representation of color bitmaps of different color depths, as an aid to exchanging bitmaps between devices and applications with a variety of internal representations. They called these device-independent bitmaps or DIBs, and the file format for them is called DIB file format or BMP image file format.

PPM

The name "PPM" is an acronym derived from "Portable Pixel Map." Images in this format were once also called "portable pixmaps." File extension for ppm images are .ppm, .pgm, .pbn, .pnm. PPM is for "pixmap" which represents full RGB colors. Each file start with a two-byte file descriptor (in ASCII) that explains its type (pbm, pgm and ppm) and its encoding (ASCII or binary). The descriptor is a capital P followed by a single digit number.

File Descriptor	Type	Encoding
P1	Portable bitmap	ASCII
P2	Portable graymap	ASCII
P3	Portable pixmap	ASCII
P4	Portable bitmap	Binary
P5	Portable graymap	Binary
P6	Portable pixmap	Binary

The ASCII based formats allow human readability and easy transport so long as those platforms understand ASCII, while the binary formats are more efficient both at saving space in the file and easy to understand. When using the binary formats, PBM uses 1 bit per pixel, PGM uses 8 bit per pixel, PPM uses 24 bit per pixel, 8 for red, 8 for green, and 8 for blue. The binary format of the image stores each color component of each pixel with one byte (thus three bytes per pixel) in the order of red, green, and blue. The file will be smaller in size but the color information will not be readable by humans.

TIFF:

TIFF is an image file format. In this document, a file is defined to be a sequence of 8-bit bytes, where the bytes are numbered from 0 to N. The largest possible TIFF file is $2^{**}32$ bytes in length, i.e. is 4GB max. A TIFF file begins with an 8-byte image file header.

Byte 0 - 1 : *"II" (4949.H) "MM" (4D4D.H)* are the two posiible values(Little -endian or Big endian)

Bytes 2-3 An arbitrary but carefully chosen number (42) that further identifies the file as a TIFF file.

Byte 4 - 7: The offset (in bytes) of the first IFD. The directory may be at any location in the file after the header but must begin on a word boundary.

IFD Entry Each 12-byte IFD entry has the following format: Bytes 0-1 The Tag that identifies the field. Bytes 2-3 The field Type. Bytes 4-7 The number of values, Count of the indicated Type.

Different attributes :

- Rows and Column

- Physical Dimension
- Location of Data : Rows per strip, Strip offset etc

Applications of JPEG:

- high controlled degree of compression. The user independently selects the ratio quality/file size
- small file size
- format is compatible and it is displayed correctly in any browsers, text and graphics programs, on all computers, tablets and mobile devices
- suitable for full-color realistic images with a lot of color and contrast transitions;
- picture quality is high with small degree of compression.

Conclusion:

Hence we have studied reading and writing and other conversions of jpeg image using c