Ques 1. The estimates of mean and variance of noise in an image are respectively given by 5 and 25. Obtain the exact pdf of noise if the noise type is
a) Exponential   b) Uniform   c) Erlang   d) Rayleigh   **(6)**

Ques 2. Given the following image

$$\begin{bmatrix} 2 & 3 & 4 & 2 & 3 \\ 1 & 3 & 3 & 1 & 2 \\ 2 & 4 & 8 & 2 & 1 \\ 1 & 4 & 4 & 2 & 3 \\ 1 & 4 & 3 & 3 & 1 \end{bmatrix}$$

For a neighbourhood of size 3X3, what is the result of applying the following filters on the circled pixel values
a) Geometric mean   b) Harmonic mean   c) Arithmetic mean   **(6)**

Ques 3. Explain adaptive median filter. Explain why it outperforms regular median filter.   **(4+2)**

Ques 4. What are the frequency domain expressions for (a) Weiner filter, (b) Constrained Least Squares filter? Compare the two filters and describe the difference in the two approaches to image restoration.   **(2+4)**

Ques 5. Given

$$f(x,y) = \begin{cases} A; & x^2 + y^2 \le r^2 \\ 0 & \text{otherwise} \end{cases}$$

Obtain $p(\alpha, \beta)$ the fan beam projection corresponding to the slice $f(x,y)$ **(8)**

Ques 6. Given the following projections

$$g(\rho, \theta) = \begin{cases} 2A\sqrt{r^2 - \rho^2}; & |\rho| \le r \\ 0 & \text{otherwise} \end{cases}$$

Obtain the original slice $f(x,y)$ using Fourier Slice Theorem.   **(8)**