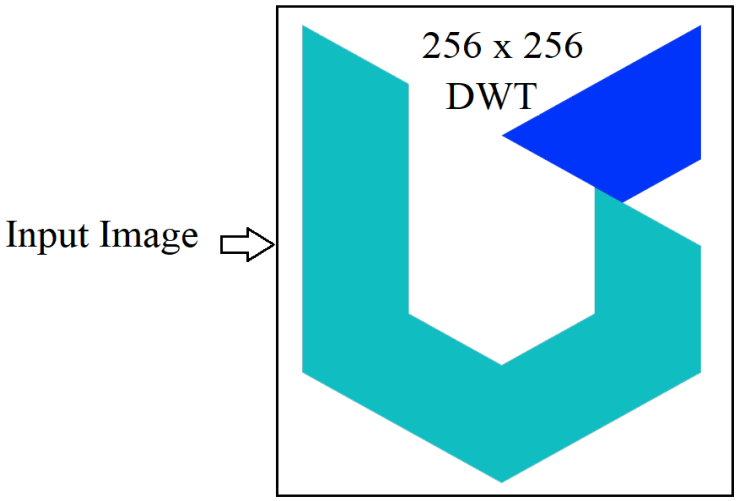
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course: Digital Image Processing AVEG8005 **Programme: M.Tech (UAV)**
Time: 03 hrs. **Max. Marks: 100**
Instructions:

SECTION A
All questions are compulsory

S. No.		Marks	CO
Q 1	What is image compression? Why it is needed?	**4M**	**CO1**
Q 2	Write the difference between Fourier transform and wavelet transform.	**4M**	**CO2**
Q 3	Define convolution and explain its use in image processing.	**4M**	**CO3**
Q 4	What is the significance of local variance in adaptive filters?	**4M**	**CO4**
Q 5	Define an image. List out and explain the various areas of applications of image processing	**4M**	**CO3**
	SECTION B **All questions are compulsory and each carries 10 marks.**		
Q.6	Explain image sharpening using Butterworth high pass and Gaussian high pass filters.	**10M**	**CO3**
Q.7	Explain about image smoothing using Ideal low pass filter.	**10M**	**CO3**
Q.8	Suggest the significance of noise model in image processing. Detail the mathematical expressions, and plot for different noise probability functions to support their features.	**10M**	**CO4**
Q.9	State and Prove the Fourier Slice Theorem for Image Tomography	**10M**	**CO5**
	SECTION-C **Attempt any two questions and each carries 20 marks**		
Q 10	Consider the image segment shown 3 1 2 1 (q) 2 2 0 2 1 2 1 1 (p) 1 0 1 2 Let V={0,1} and compute the lengths of the shortest 4-,8- and m-path between p and q.If a particular path does not exists between these two points,explain why?	**20M**	**CO1**
Q 11	Draw the frequency response curve of low pass, high pass, Band pass and Band reject filters with respect to image filtering operations and suggest the suitable example of each.	**20M**	**CO2**

Q 12	**(a)** Explain the role of median filter in image processing. Compute the value of the marked pixels shown in 3 x 3 mask. $\begin{bmatrix} 18 & 22 & 33 & 25 & 32 & 24 \\ 34 & 128 & 24 & 172 & 26 & 23 \\ 22 & 19 & 32 & 31 & 28 & 26 \end{bmatrix}$ **(b)** Detail the wavelet decomposition technique using HAAR wavelet. Consider 256 x 256 DWT and decompose the image shown in fig. till 2nd level. 	**[10+10]**	**CO4**