Sessional Makeup Quiz (20 Marks)

Write your roll number and section. Attempt ALL questions. Keep your answers BRIEF as irrelevant detail would be marked negatively. Questions that require pseudo-code should be answered ONLY with readable pseudo-code, no descriptions are necessary. Start answering ON your question paper and attach additional sheets (with your ROLL NUMBER atop each sheet) as necessary.

1. Write an algorithm to produce the 2-Dimensional DFT of an image. The real and imaginary parts are to be maintained separately. Normalize the power spectrum to the range 0-255 to be displayed as a grey scale image. [4]

2. Show that at \( u=0 \), and \( v=0 \), the 2D DFT represents the mean of the image in spatial domain. [2]

3. Write pseudo-code to implement the opening operation on any image with a specified structured element. Consider binary images and provide suggestions to extend to grey scale. [4]

4. Write pseudo-code to search an image of dimension \( N \times N \) for a T shaped structure using hit or miss operations. Assume only a single orientation and size. [4]

5. In path planning applications, it would be very useful to be able to determine costs for different destinations. How would you extract possible destinations and their associated costs given a starting location? [6]