

Menoufia University.  
Faculty of Electronic Engineering.  
Dept. of Electronics and Electrical  
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Digital Image Processing  
Final Exam 2019-2020  
Time allowed: 3 Hr.  
Exam Date: 1-1-2020  
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**Read the following questions carefully and answer only 14 questions (5 degree/question)**

1. What is meant by image encryption? Explain the goals of image cryptography. Discuss the classification of encryption algorithms according to encryption structure and keys.
2. Compare in detail between symmetric image encryption and asymmetric image encryption.
3. Define the meaning of cryptanalysis and describe in detail different five types of cryptanalytic attacks.
4. Explain in detail the steps of the data encryption standard (DES) algorithm.
5. Compare in detail graphically between the ECB, CBC, CFB, and OFB encryption modes of operation.
6. What is the difference between image restoration and image enhancement? What is the objective and categories of image enhancement? Discuss the Homomorphic filtering for noise cleaning and image enhancement.
7. What is the aim of Histogram? What is the meaning of histogram equalization technique? What is the meaning by image restoration? What is the aim of image restoration algorithms, also mention different two approaches for image restoration?
8. Discuss with showing the mathematical model of the linear minimum mean square error (wiener) technique for restoration of images? Mention the advantages versus drawbacks of the LMMSE image restoration technique.
9. Discuss with showing the mathematical model of the inverse filter technique for restoration of images? Mention the advantages versus drawbacks of the inverse filter image restoration technique.
10. Discuss with showing the mathematical model of the regularized filtering technique for restoration of images? Mention the advantages versus drawbacks of the regularized image restoration technique.
11. Discuss the Generic compression system and mention its constraints? Compare between Lossless and Lossy compression. Mention some of issues in compression method selection process.
12. Discuss in detail the operation process of JPEG compression standard, Also, discuss the operation process of MPEG compression standard.
13. Use a Huffman code word construction algorithm to find two different bit representation for the blocks image symbols with the following probabilities: Block1=0.05, Block2= 0.2, Block3=0.1, Block4=0.05, Block5=0.3, Block6=0.2, and Block7=0.1.
14. What is the difference between permutation-based encryption algorithms and diffusion-based encryption algorithms from the noise immunity and security perspectives?
15. Explain the basic idea of wavelet compression. Sketch the block diagram of the perfect reconstruction wavelet filter bank. Derive the PR conditions. Also, if for Haar wavelet transform with  $P(z) = \frac{1}{2}(z + 2 + z^{-1})$ , find  $G_0$ ,  $H_0$ ,  $G_1$ , and  $H_1$ .
16. Explain in detail the basic steps of Karhunen-Loeve transform for image encryption.
17. What is the meaning by ANN, and discuss its mathematical model assumptions with explaining how to characterize it? Discuss the operation of the Image compression using neural networks?

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*Best Regards*

*Dr. Walid El-Shafai*