Program: **Computer Engineering**
Curriculum Scheme: Rev2016
Examination: Final Year
Semester: VII
Course Code: CSC701   Course Name : Digital Signal & Image Processing

Time: 2.5 hour (150 minutes)                                        Max. Marks: 80

# Q1. All questions compulsory 2 marks each          (20 Marks)

| | |
|---|---|
| Q1. | Consider the given discrete time signal, x[n]=[5,6,3,8,0,0,2,5] (Origin:8). Compute x(n-2) |
| Option A: | [5,2,0,0,8,3,6,5] (Origin:8) |
| Option B: | [5,6,3,8,0,0,2,5] (Origin:6) |
| Option C: | [5,6,3,8,0,0,2,5] (Origin:0) |
| Option D: | [3,4,1,6,-2,-2,0,3] (Origin:6) |
| | |
| Q2. | In Discrete Fourier Transform for N=8, total complex additions = ? |
| Option A: | 64 |
| Option B: | 8 |
| Option C: | 56 |
| Option D: | 41 |
| | |
| Q3. | Determine whether the given signal is periodic or not. If yes, specify its fundamental period x(n)=cos(πn/2) - sin(πn/2) + 3cos(πn/4 + π/3) |
| Option A: | Periodic, 4 |
| Option B: | Non-periodic |
| Option C: | Periodic, 8 |
| Option D: | Periodic, 16 |
| | |
| Q4. | Consider the analog signal x(t)=3cos (200πt), Suppose that the signal is sampled at the rate Fs = 150 Hz. What is the discrete-time signal obtained after sampling? |
| Option A: | 3cos(πn/2) |
| Option B: | 3cos (2πn/3) |
| Option C: | 5cos(πn/4) |
| Option D: | 5cos(2πn/3) |
| | |
| Q5. | Consider the given discrete time signal, x[n]=[2,3,4,5,6,0,2,9] (Origin:5). Compute x(n-2) |
| Option A: | [4,5,6,7,8,2,4,11] (Origin:7) |
| Option B: | [2,3,4,5,6,0,2,9] (Origin:3) |
| Option C: | [2,3,4,5,6,0,2,9] (Origin:0) |
| Option D: | [0,1,2,3,4,-2,0,7] (Origin:3) |

| | |
|---|---|
| Q6. | Not an image file format. |
| Option A: | TIFF |
| Option B: | BMP |
| Option C: | JPEG |
| Option D: | PDF |
| | |
| Q7. | Image enhancement is a purely _____ processing technique as the desired result varies from _____ . |
| Option A: | subjective, person to machine |
| Option B: | subjective, person to person |
| Option C: | objective, person to person |
| Option D: | objective, person to machine |
| | |
| Q8. | For any location (x,y), the output image g(x,y) is equal to the result of applying T to the neighborhood of (x,y) in f. |
| Option A: | $f(x,y) = T(g(x,y))$ |
| Option B: | $g(x,y) = T(f(x,y))$ |
| Option C: | $g(x,y) = T(g(x,y))$ |
| Option D: | $f(x,y) = T(f(x,y))$ |
| | |
| Q9. | Highlighting the contribution made to total image appearance by specific bits. |
| Option A: | Contrast stretching |
| Option B: | Gray-level slicing |
| Option C: | Bit-plane slicing |
| Option D: | Thresholding |
| | |
| Q10. | A subset R of pixels in an image is called a _____ of the image if R is a connected set. |
| Option A: | Region |
| Option B: | Portion |
| Option C: | Part |
| Option D: | Subset |
| | |

| Q2.<br>(20 Marks Each) | Solve any Four out of Six                                                                 5 marks each |
|---|---|
| A | x(n) = {1,2,3,4}is periodic, find x(0), x(5), x(7), x(102) |
| B | Determine the power of the unit step sequence |
| C | For the given causal sequences x(n)=[3,2,8,9] and y(n)=[4,3,6]. (Origin:3 in x(n) and 4 in y(n) ) Find the cross correlation. |
| D | How to represent an image? Give an example. |
| E | Justify or Contradict.<br>"Point processing techniques are called as no Zero memory operations." |
| F | What do you mean by image segmentation? Why is segmentation important? |

| Q3.<br>(20 Marks Each) | Solve any Two Questions out of Three                                              10 marks each |
|---|---|
| A | X(K)={8, -2,0,-2} find x(n) by Inverse Discrete Fourier Transform |
| B | *What is the circular convolution of the sequences X1(n)={1,2,3,4} and x2(n)={5,6,7}* |
| C | Perform Histogram Equalization on the following 3 bpp image. Calculate the new histogram. Plot the original and new histogram and show the new image. |

| 5 | 0 | 7 | 7 | 5 | 4 | 5 | 2 | 0 | 1 |
|---|---|---|---|---|---|---|---|---|---|
| 7 | 5 | 6 | 4 | 5 | 3 | 4 | 3 | 2 | 5 |
| 4 | 3 | 6 | 1 | 7 | 3 | 2 | 4 | 3 | 5 |
| 7 | 4 | 4 | 1 | 6 | 4 | 3 | 7 | 7 | 4 |
| 3 | 2 | 5 | 1 | 1 | 1 | 1 | 5 | 4 | 0 |

| Q4.<br>(20 Marks Each) | Solve any Two Questions out of Three                                              10 marks each |
|---|---|
| A | *x(n)= {1,3,4,2,1,2,3,4} find X(K) by FFT* |

| B | Explain Contrast stretching. Perform Contrast stretching on the following 4 bpp images. |
|---|---|
| | **r1=5, r2 = 9, s1= 3, s2 = 10** <br> **4 BPP IMAGE** <br><br> 7 8 5 1 <br> 7 8 9 2 <br> 5 9 8 7 <br> 8 8 12 15 |
| C | Discuss different approaches of edge detection. |