**SRM Institute of Science and Technology**

**Batch 1**

**College of Engineering and Technology**

**DEPARTMENT OF ECE**

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

**Academic Year: 2023-2024 (EVEN)**

**Test: Practice Assessment** **Date:28/03/2024**

**Course Code & Title: 18ECC204T Signal Processing Duration: 2 periods**

**Year & Sem: II Year/ IV Sem Max. Marks: 50**

**Course Articulation Matrix:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| S.NO | 18ECC204T- Signal Processing | Program Outcomes (PO) | | | | | | | | | | | | Program Specific outcomes (PSO) | | |
| Course Outcomes (CO) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| 1 | Summarize the classification of Signals and Systems and various operations on signals | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - | 1 |
| 2 | Apply Fourier Transform and Laplace transform on solving continuous time signals and systems | - | 2 | - | 3 | - | - | - | - | - | - | - | - | - | - | 2 |
| 3 | Apply Discrete Fourier Transform and Z-transform on Discrete time signals and systems | - | 2 | - | 3 | - | - | - | - | - | - | - | - | - | - | 2 |
| 4 | Design Finite Impulse Response Filters using different types of windowing techniques | - | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 |
| 5 | Design analog and digital Infinite Impulse Response Filters | - | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 |

|  |  |  |  |  |  |
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| **Unit 4 (Each Question Carries 10 Marks)** | | | | | |
| **Q. No** | **Question** | **Marks** | **BL** | **CO** | **PO** |
|  | | | | | |
|  | Determine the Fourier Transform of the signal shown below: | **10** | **2** | **2** | **2** |
|  | Find the Fourier Transform of the signal defined by:  x(t)= t cos 5t | **10** | **2** | **2** | **2** |
|  | Using the suitable property determine the Fourier Transform of the signal x(2-t) + x(-2-t) | **10** | **3** | **2** | **2** |
|  | An LTI system is described by the following differential equation:  . Determine the impulse response of the system using Fourier Transform and inverse Fourier Transform. | **10** | **2** | **2** | **2** |
|  | A certain function of time has the following Fourier Transform:  Using properties of FT determine   1. f(2t) | **10** | **3** | **2** | **2** |
|  | Find the Fourier Transform of one cycle of sine wave. | **10** | **3** | **2** | **2** |
|  | Find the Laplace Transform of the given signal and sketch the Region Of Convergence (ROC)  x(t)=e-2t u(t) - e2t u(-t) | **10** | **3** | **2** | **2** |
|  | Determine the Laplace Transform of   1. Hyperbolic Cosine signal | **10** | **3** | **2** | **2** |
|  | Determine the Inverse Laplace Transform of the given signal: | **10** | **3** | **2** | **2** |
|  | Solve the given differential equation and find the output y(t)  .  Assume zero initial conditions. | **10** | **2** | **2** | **2** |
|  | Find the initial and final values of the function whose Laplace Transform is given as: | **10** | **2** | **2** | **2** |
| **Unit 5 (Each Question Carries 10 Marks)** | | | | | |
|  | 1. Compute the 4-point DFT of the sequence x(n)= sin (nπ/2)(using DFT formula) 2. Compute the 4-point IDFT of the sequence x(n)= {1,0,1,0} (using IDFT formula) | **10** | **2** | **3** | **4** |
| **2** | Find 8-point DFT of the sequence (using DFT formula)  x(n)= {1,1,1,1} | **10** | **2** | **3** | **4** |
| **3** | Find the IDFT of the sequence: (using IDFT formula) N=6  X(k)={12 ,-1.5+j2.598,-1.5+j0.866,0, -1.5-j0.866, -1.5-j2.598} | **10** | **3** | **3** | **4** |
| **4** | Given x(n)= 2n and N=8, find X(k) using DIT-FFT algorithm. | **10** | **3** | **3** | **4** |
| **5** | Given x(n)= n+1and N=8, find X(k) using DIF-FFT algorithm. | **10** | **3** | **3** | **4** |
| **6** | 1. Compute the DFT of the sequence x(n)= {1, -1, 1, -1} using DIT FFT 2. Find IDFT of the sequence using DIT-FFT   X(k)= {6, -2+j2, -2, -2-j2} | **10** | **3** | **3** | **4** |
| **7** | Given x(n)= {2,1,2,1,1,2,1,2}  , find X(k) using DIT-FFT algorithm. | **10** | **3** | **3** | **4** |
| **8** | Given x(n)= {1,3,5,7,2,4,6,8}  , find X(k) using DIF-FFT algorithm. | **10** | **3** | **3** | **4** |
| **9** | Find inverse DFT x(n) for the given sequence using FFT:  X(k)= {36, -4+j9.656, -4+j4, -4+j1.656, -4, -4-j1.656, -4-j4,  -4-j9.656} | **10** | **3** | **3** | **4** |
| **10** | Perform Linear Convolution of the given sequence  x(n)={1, 2, 0.5, 1}; h(n)={1, 2,1,-1} | **10** | **3** | **3** | **4** |
| **11** | Perform Circular Convolution of the given sequence  x(n)={2,1,2,-1}  h(n)= {1,2,3,4}  Using concentric circle method and verify the result using matrix method. | **10** | **3** | **3** | **4** |
| **12** | Perform Linear Convolution of the given sequence  x(n)= {1, -1,2,3}; h(n)={1, -2,3,-1} | **10** | **3** | **3** | **4** |
| **13** | Perform Circular Convolution of the given sequence  x(n)={1,2,3,4}  h(n)= {2,3,4,1}  Using concentric circle method and verify the result using matrix method | **10** | **3** | **3** | **4** |