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|  | E.G.S. PILLAY ENGINEERING COLLEGE  (An Autonomous Institution, Affiliated to Anna University, Chennai)  Nagore Post, Nagapattinam – 611 002, Tamilnadu. | Rev.1  COE/2020/QB/MCQ |

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| **1902BM504 - Biomedical Digital Signal Processing** | | | | | |
| **Academic Year** | 2021-2022 | **Question Bank** | | **Programme/Branch** | B.E - BME |
| **Year / Semester** | III/V | **Course Coordinator** | RS.Koteeshwari |
| **Course Objective** | | | **Course Outcomes** | | |
| * To teach the basic properties of signals and systems and the various methods of classification. | | | * Classify the properties of signals and systems | | |
| * To learn discrete Fourier transform, properties and its computation | | | * Apply DFT for the analysis of digital signals & systems. | | |
| * To know the characteristics of IIR filter and to learn the design of IIR filters for filtering undesired signals. | | | * Design of IIR filters for filtering undesired signals. | | |
| * To Introduce the time frequency signal analysis methods | | | * Describe the time frequency signal analysis methods | | |
| * To understand Data reduction techniques | | | * Discuss the importance of Data reduction techniques. | | |

**Module 1: Classification of Signals and Systems**

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| **Q. No** | **PART-A**  **1 MARK QUESTIONS** | | | | **[CO#, BTL]** |
| 1. | **If x(n) is a discrete-time signal, then the value of x(n) at non integer value of ‘n’ is?** | | | | [CO1, K1] |
| (a) | Zero | (c) | Negative |  |
| (b) | Positive | (d) | **Not defined** |
|  | | | | | |
| 2. | **The discrete time function defined as r(n)=n for n≥0;u(n)=0 for n<0 is an \_\_\_\_\_\_\_\_\_\_\_\_\_** | | | | [CO1, K1] |
| (a) | Unit sample signal | (c) | **Unit ramp signal** |  |
| (b) | Unit step signal | (d) | None of the mentioned |
|  | | | | | |
| 3. | The signal given by the equation  is known as \_\_\_\_\_\_\_\_\_\_ | | | | [CO1, K1] |
| (a) | **Energy signal** | (c) | Work done signal |  |
| (b) | Power signal | (d) | None of the mentioned |
|  | | | | | |
| 4. | x(n)\*δ(n-k)=? | | | | [CO1, K1] |
| (a) | x(n) | (c) | **x(k)\*δ(n-k)** |  |
| (b) | x(k) | (d) | x(k)\*δ(k) |
|  | | | | | |
| 5. | A real valued signal x(n) is called as anti-symmetric if \_\_\_\_\_\_\_\_\_\_\_ | | | | [CO1, K1] |
| (a) | x(n)=x(-n) | (c) | x(n)=-x(n) |  |
| (b) | **x(n)=-x(-n)** | (d) | none of the mentioned |
|  | | | | | |
| 6. | The odd part of a signal x(t) is? | | | | [CO1, K1] |
| (a) | x(t)+x(-t) | (c) | (1/2)\*(x(t)+x(-t)) |  |
| (b) | x(t)-x(-t) | (d) | **(1/2)\*(x(t)-x(-t))** |
|  | | | | | |
| 7 | What is the condition for a signal x(n)=Brn where r=eαT to be called as an decaying exponential signal? | | | | [CO1, K2] |
| (a) | 0<r<∞ | (c) | r>1 |  |
| (b) | **0<r<1** | (d) | r<0 |
|  | | | | | |
| 8 | The function given by the equation x(n)=1, for n=0; x(n)=0, for n≠0 is a \_\_\_\_\_\_\_\_\_\_\_\_\_ | | | | [CO1, K1] |
| (a) | Step function | (c) | Triangular function |  |
| (b) | Ramp function | (d) | **Impulse function** |
|  | | | | | |
| 9 | If the output of the system of the system at any ‘n’ depends only the present or the past values of the inputs then the system is said to be \_\_\_\_\_\_\_\_\_\_ | | | | [CO1, K1] |
|  | Linear |  | **Causal** |  |
|  | Non-Linear |  | Non-causal |
|  | | | | | |
| 10. | The system described by the input-output equations y(n)=x(-n) is a causal system. | | | | [CO1, K1] |
| (a) | True | (c) | - |  |
| (b) | False | (d) | - |
|  | | | | | |
| 11. | If a system do not have a bounded output for bounded input, then the system is said to be \_\_\_\_\_\_\_\_\_\_ | | | | [CO1, K1] |
| (a) | Causal | (c) | Stable |  |
| (b) | Non-causal | (d) | **Non-stable** |
|  | | | | | |
| 12. | Resolve the sequence [digital-signal-processing-questions-answers-analysis-discrete-time-lti-systems-q1](https://www.sanfoundry.com/wp-content/uploads/2015/10/digital-signal-processing-questions-answers-analysis-discrete-time-lti-systems-q1.png) into a sum of weighted impulse sequences. | | | | [CO1, K2] |
| (a) | 2δ(n)+4δ(n-1)+3δ(n-3) | (c) | 2δ(n)+4δ(n-1)+3δ(n-2) |  |
| (b) | **2δ(n+1)+4δ(n)+3δ(n-2)** | (d) | None of the mentioned |
|  | | | | | |
| 13. | Which of the following is the odd component of the signal x(t)=e(jt)? | | | | [CO1, K2] |
| (a) | cost | (c) | j\*cost |  |
| (b) | j\*sint | (d) | sint |
|  | | | | | |
| 14. | For a continuous time signal x(t) to be periodic with a period T, then x(t+mT) should be equal to \_\_\_\_\_\_\_\_\_\_\_ | | | | [CO1, K1] |
| **(a)** | x(-t) | (c) | x(mt) |  |
| (b) | x(mT) | (d) | **x(t)** |
|  | | | | | |
| 15. | Let x1(t) and x2(t) be periodic signals with fundamental periods T1 and T2 respectively. Which of the following must be a rational number for x(t)=x1(t)+x2(t) to be periodic? | | | | [CO1, K1] |
| (a) | T1+T2 | (c) | **T1/T2** |  |
| **(b)** | T1-T2 | (d) | T1\*T2 |
|  | | | | | |

**Module 2: Discrete Fourier Transform and Computation**

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| **Q. No** | **PART-A**  **1 MARK QUESTIONS** | | | | **[CO#, BTL]** |
| 1. | If x(n) and X(k) are an N-point DFT pair, then X(k+N)=? | | | | [CO1, K1] |
| (a) | X(-k) | (c) | **X(k)** |  |
| (b) | -X(k) | (d) | None of the mentioned |
|  | | | | | |
| 2. | If X1(k) and X2(k) are the N-point DFTs of X1(n) and x2(n) respectively, then what is the N-point DFT of x(n)=ax1(n)+bx2(n)? | | | | [CO1, K1] |
| (a) | X1(ak)+X2(bk) | (c) | eakX1(k)+ebkX2(k) |  |
| (b) | **aX1(k)+bX2(k)** | (d) | None of the mentioned |
|  | | | | | |
| 3. | If X1(n), x2(n) and x3(m) are three sequences each of length N whose DFTs are given as X1(k), X2(k) and X3(k) respectively and X3(k)=X1(k).X2(k), then what is the expression for x3(m)? | | | | [CO1, K1] |
| (a) | ∑N−1n=0x1(n)x2(m+n) | (c) | ∑N−1n=0x1(n)x2(m−n)N |  |
| (b) | **∑N−1n=0x1(n)x2(m−n)** | (d) | ∑N−1n=0x1(n)x2(m+n)N |
|  | | | | | |
| 4. | What is the circular convolution of the sequences X1(n)={2,1,2,1} and x2(n)={1,2,3,4}? | | | | [CO1, K2] |
| (a) | {14,14,16,16} | (c) | {2,3,6,4} |  |
| (b) | {16,16,14,14} | (d) | **{14,16,14,16}** |
|  | | | | | |
| 5. | If X(k) is the N-point DFT of a sequence x(n), then what is the DFT of x\*(n)? | | | | [CO1, K1] |
| (a) | X(N-k) | (c) | **X\*(N-k)** |  |
| (b) | X\*(k) | (d) | None of the mentioned |
|  | | | | | |
| 6. | Which of the following is true regarding the number of computations required to compute an N-point DFT? | | | | [CO1, K1] |
| (a) | **N2 complex multiplications and N(N-1) complex additions** | (c) | N2 complex multiplications and N(N+1) complex additions |  |
| (b) | N2 complex additions and N(N-1) complex multiplications Ramp | (d) | N2 complex additions and N(N+1) complex multiplications |
|  | | | | | |
| 7 | Which of the following is true regarding the number of computations required to compute DFT at any one value of ‘k’? | | | | [CO2, K1] |
| (a) | 4N-2 real multiplications and 4N real additions | (c) | 4N-2 real multiplications and 4N+2 real additions |  |
| (b) | 4N real multiplications and 4N-4 real additions | (d) | **4N real multiplications and 4N-2 real additions** |
|  | | | | | |
| 8 | WNk+N/2=? | | | | [CO2, K1] |
| (a) | WNk | (c) | WN-k |  |
| (b) | **-WNk** | (d) | None of the mentioned |
|  | | | | | |
| 9 | How many complex multiplications are need to be performed for each FFT algorithm? | | | | [CO2, K1] |
| (a) | (N/2) logN | (c) | (N/2)log2N |  |
| (b) | Nlog2N | (d) | None of the mentioned |
|  | | | | | |
| 10. | How many complex additions are required to be performed in linear filtering of a sequence using FFT algorithm? | | | | [CO1, K1] |
| (a) | (N/2)logN |  | (N/2)log2N |  |
| **(b)** | 2Nlog2N |  | Nlog2N |
|  | | | | | |
| 11. | The total number of complex multiplications required to compute N point DFT by radix-2 FFT is? | | | | [CO1, K1] |
| (a) | **(N/2)log2N** | (c) | (N/2)logN |  |
| (b) | Nlog2N | (d) | None of the mentioned |
|  | | | | | |
| 12. | The total number of complex additions required to compute N point DFT by radix-2 FFT is? | | | | [CO1, K1] |
| (a) | (N/2)log2N | (c) | (N/2)logN |  |
| (b) | **Nlog2N** | (d) | None of the mentioned |
|  | | | | | |
| 13. | How many complex multiplications are required to compute X(k)? | | | | [CO1, K1] |
| (a) | N(N+1) | (c) | N2/2 |  |
| (b) | N(N-1)/2 | (d) | **N(N+1)/2** |
|  | | | | | |
| 14. | The following butterfly diagram is used in the computation of \_\_\_\_\_\_\_\_\_\_ [digital-signal-processing-questions-answers-freshers-q9](https://www.sanfoundry.com/wp-content/uploads/2015/10/digital-signal-processing-questions-answers-freshers-q9.png) | | | | [CO1, K2] |
| **(a)** | Decimation-in-time FFT | (c) | All of the mentioned |  |
| (b) | **Decimation-in-frequency FFT** | (d) | None of the mentioned |
|  | | | | | |
| 15. | For a decimation-in-frequency FFT algorithm, which of the following is true? | | | | [CO1, K2] |
| (a) | Both input and output are in order | (c) | Input is shuffled and output is in order |  |
| **(b)** | Both input and output are shuffled | (d) | **Input is in order and output is shuffled** |