PRESIDENCY UNIVERSITY
BENGALURU

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SCHOOL OF ENGINEERING

MAKEUP EXAMINATION – JAN 2023

Course Code	**: ECE213**	**Date**	**: 25-JAN-2023**
Course Name	**: DIGITAL SIGNAL PROCESSING**	**Time**	**: 1.00pm-4.00pm**
Program	**: B.Tech**	**Max Marks**	**: 100**
		Weightage	**: 50%**

Instructions:

(i) ***Read the question carefully and answer all the questions***

(ii) ***Scientific non-memory calculator permitted***

Part A [Memory Recall Questions]

Choose the correct answer. Each Question carries TWO marks. (15Qx2M=30M)

1. IIR filters are one of two primary types of digital filters used in Digital Signal Processing applications. Express the property of Infinite Impulse Response (IIR) filter (C.O.No.3)[Knowledge]

   a) Stable filter b) Recursive filter

   c) Both A&B d) none of the above

2. FIR filters are one of two primary types of digital filters used in Digital Signal Processing applications. Finite Impulse Response (FIR) filter is_____ (C.O.No.4)[Knowledge]

   a) Non-Recursive filter b) always stable filter

   c) Linear phase d) all the above

3. Linear phase is a property of a filter, where the phase response of the filter is a linear function of frequency. Then related condition of linear phase is_____ (C.O.No.4)[Knowledge]

   a) h(n)=h(N-1-n) b) h(n)= h(N-n)

   c) Either A or B d) Both A and B

DSP based devices have limited memory space the and ability to deal with large

4. amounts of data. For a large amount of data processing, Overlap Add and Save methods are used. It is used to compute the_____ (C.O.No.1)[Knowledge]

a) DFT b) Circular convolution

c) Linear convolution d) None of the above

5. IIR filters are realized in many forms. Which form of realization has a minimum memory unit(Delay Unit) (C.O.No.3)[Knowledge]

a) Direct Form-I b) Direct Form-II c) Both A and B d) Liner Form

6. If x(n) is a real sequence and X(k) is its N-point DFT, then Distinguish the property statement. (C.O.No.1)[Knowledge]

a) x(n-N)=X(k-N) b) x(n+N)=X(k+N)

c) Both A and B d) None of the above

7. Compared to the analog systems, digital signal processing allows

1) Programmable operations.2) Flexibility in the system design. 3) Cheaper systems.

4) More reliability. Identify the statements truthfulness. (C.O.No.1)[Knowledge]

a) 1, 2 and 3 are correct b) 1, 2 and 4 are correct

c) 1 and 2 are correct d) All the four are correct

8. Signal transformation is a mathematical method for transforming time domain representation to frequency domain representations. Identify the purpose of signal transformation. (C.O.No.1)[Knowledge]

a) Quantization b) Sampling c) Analysis d) Modulation

9. Filters are realized in many forms, and it is needful for hardware implementations. The cascade realization of IIR systems involves (C.O.No.3)[Knowledge]

a) The transfer function is broken into products of transfer functions

b) The transfer function is divided into an addition of transfer functions

c) Derivatives of the transfer functions d) all the above

10. Properties of Fourier transforms are used to simplify the procedures in computation and analysis. In the following basic properties, which is not applicable for Discrete Fourier Transform? (C.O.No.1)[Knowledge]

a) Linearity b) Circular symmetry

c) Periodicity d) None of the above

11. Exact reconstruction of a continuous time base-band signal from its samples is possible, if the signal is band-limited and the sampling frequency is greater than twice the signal bandwidth". This statement is related with__ (C.O.No.1)[Knowledge]

a) Multiplexing & Demultiplexing b) Sampling & Reconstruction

c) Encoding & Decoding d) none of the above

12. For LTI system output is characterized in time domain. To determine an output, it requires the convolution of the input with the impulse signal.

a) TRUE b) FALSE (C.O.No.1)[Knowledge]

13. Compare with analog filters digital filters are operated with wide range of frequencies. To design a digital filter, analog filter transfer function is needed.

a) TRUE b) FALSE (C.O.No.3)[Knowledge]

14. The transformation technique in which there is one-to-one mapping from s-domain to z-domain is (C.O.No.4)[Knowledge]

a) Approximation of derivatives b) Impulse invariance method

c) Bilinear transformation method d) Backward derivative

15. Parallel realization of filtering gaining importance for parallel processing of information. For parallel realization, partial fraction method is followed. For such a structure, the degree of the numerator must be less than the degree of the denominator. Check statement truthfulness. (C.O.No.4)[Knowledge]

a) TRUE b) FALSE

Part B

[Thought Provoking Questions] 1Qx20M=20M

16. x(n) ={1,2,3,4,5,6,7,8} where n varies from (-2) to (5).It means that x(0)=3; These sequences are considered as a discrete input signal to a system that produces the output by delaying the input by 2 unit time instant. That system output is y(n). Find DFT of y(n) by using DIT FFT. (C.O.No.2)[Application]

PART C

Answer ALL questions. Each question carries TEN Mark (5Qx10M=50M)

17. Using Impulse Invariant method find the transfer function in z domain from s domain when T=1sec. Where H(s)=1/((s+1)(s+2)). (C.O.No.3)[Application]
18. Using bilinear transformation method, find transfer function in z domain from s domain when T=1sec. Where H(s)=2/((s+1)(s+3)). (C.O.No.3)[Application]
19. Obtain Direct form I and II for the given difference equations y(n)+2y(n-1)+3y(n-2)=x(n)+5x(n-1) (C.O.No.3)[Application]
20. H(z)=(1/2)+1/3z-1+z-2+(1/4)z-3+z-4+(1/3)z-5+(1/2) z-6 identify and draw the suitable filter structure. (C.O.No.4)[Application]
21. Convert the analog filter with system function H(s)=S+0.2/{(S+0.2)^2+9} into a digital IIR filter using bilinear transformation. The filter should have a resonant frequency of wr is Pi/4(ie., 45degree) and Ωc=3. (C.O.No.4)[Application]