



WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 6th Semester Examination, 2022

ELSADSE06T-ELECTRONICS (DSE3/4)

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.*

GROUP-A

1. Answer any *five* questions from the following: 2×5 = 10
- (a) State Parseval's energy theorem.
 - (b) What is the utility of FFT?
 - (c) What is aliasing effect?
 - (d) What is the condition to be satisfied for a discrete-time sinusoidal sequence to be periodic?
 - (e) Write the properties of a unit impulse function.
 - (f) What are recursive and non-recursive difference systems? How are they related to FIR and IIR System?
 - (g) What is meant by ROC? What should be ROC for a casual system?
 - (h) What is the relation between DTFT and DFT?

GROUP-B

Answer any six questions from the following

5×6 = 30

2. (a) Establish the relation between DFT and Z-transform. 2+(2+1)
 (b) What is 'Warping effect' with respect to realization of digital filters? How can it be avoided?
3. Determine the system function of a discrete-time system described by the difference equation 5
- $$y(n) - y(n-1) + 0.8y(n-2) = x(n) + x(n-2)$$
- Plot the pole-zero and determine whether the system is stable or not.
4. Using properties of DTFT, find 2 $\frac{1}{2}$ +2 $\frac{1}{2}$
- (a) $\left(\frac{1}{4}\right)^{|n-2|}$
 - (b) $7u(n-1) - 7u(n-9)$

5. (a) Check whether the following signal is periodic and if so, find the time period. 2+3

$$y(n) = \cos\left(\frac{n\pi}{3}\right) + \cos\left(\frac{3\pi n}{4}\right)$$

- (b) Prove that for a casual sequence, the ROC is the exterior of a circle of radius r .

6. Compare IIR and FIR filters. 5

7. Find the linearity, invariance and casualty of the system given by 5

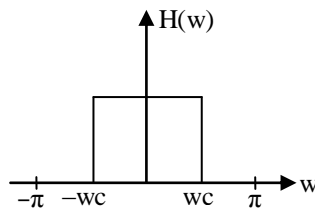
$$y(n) = -ax(n-1) + x(n)$$

8. (a) Draw the butterfly operation in DIT and DIF algorithm. 4+1

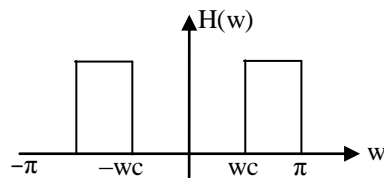
- (b) State one advantage of DFT over DTFT.

9. Determine the impulse response of the given filters.

- (a)



- (b)



10. Distinguish between: 2 1/2 + 2 1/2

- (a) Casual and Non-casual system
(b) Stable and unstable system.

- 11.(a) Using final value theorem, find $x(\infty)$ if $x(z)$ is given by 3+2

$$x(z) = \frac{2z + 3}{(z + 1)(z + 3)(z - 1)}$$

- (b) Find the input signal $x(n)$ that will generate $y(n) = \{1, 1, 2, 0, 2, 1\}$ for a system with impulse response $h(n) = \{1, -1, 1\}$.

N.B. : Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.

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