

U.G. 6th Semester Examination-2021

PHYSICS

[HONOURS]

Discipline Specific Elective (DSE)

Course Code : PHY-H-DSE-T-03

(Digital Signal Processing)

Full Marks : 40

Time : 2½ Hours

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.*

GROUP-A

1. Answer any **five** questions : 2×5=10
- Give the steps for checking time invariance with a suitable example.
 - Give the combined conditions for causality and stability of any DT LTI systems in Z domain.
 - State any two properties of DTFT.
 - State transposition theorem.
 - Give the advantages and limitations of DSP.
 - State Parseval's Theorem.
 - What is a whitening filter?
 - What is sub-band decomposition?

[Turn Over]

2. Answer any **two** questions: 5×2=10
- Derive the expression for convolution sum. 5
 - Give the steps for obtaining tabular and functional convolution sum with suitable examples. 5
 - State the desirable properties required to convert an analog filter to a digital IIR filter. Give methods for the same. 5
 - State and prove any two properties of Z transform. 2+3

GROUP-C

3. Answer any **two** questions: 10×2=20
- Check whether the given systems are linear, shift variant, causal and stable:
 - $y[n] = x[4n+1]$
 - $y[n] = x[n]u[n]$ 5+5
 - What is effect of round off noise in digital filters? Analyze the direct form of IIR structure. 5+5
 - What is the design specifications needed for designing a high pass FIR filter design using

Kaiser window? Explain Design procedure
briefly. 5+5

- d) Discuss the following by giving suitable
mathematical expressions: Group Delay, Linear
Phase system, Maximum Phase System.

3+4+3
