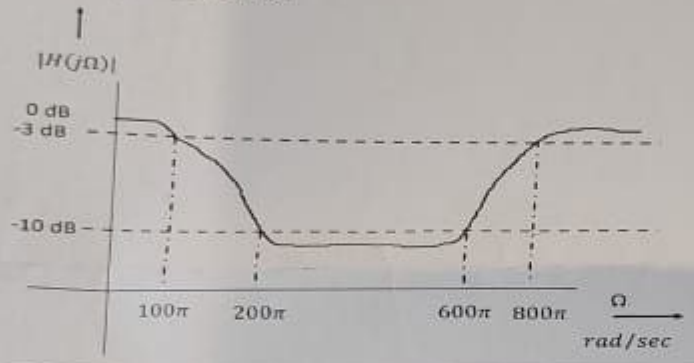
VIT
Vellore Institute of Technology

SCHOOL OF ELECTRONICS ENGINEERING
WINTER SEMESTER _ 2023-24
CONTINUOUS ASSESSMENT TEST (CAT)-2
BECE301L– DIGITAL SIGNAL PROCESSING

Course : B.Tech (ECE)
Class Nbrs : VL2023240501354, 1338, 1343, 1345, 1348, 1352, 3749,
Slot : C2+TC2
Date : 3rd April 2024 Course Type : ETH Course Mode : CBL
Marks : 50 Duration : 90 Min
Faculty: RAMACHANDRA REDDYS KALAIVANI, ABHIJIT BHOWMICK, SUDHAKAR M S, LAVANYA N, SARANYA K.C, ANANTHAKRISHNA CHINTANPALLI.

Each Question carries 10 marks

Q.No	Question	Marks
1.	Design a band-stop Butterworth filter that satisfies the following magnitude response specifications. 	10
2.	Obtain an analog Chebyshev filter transfer function that satisfies the constraints: $0.707 \leq \lvert H(j\Omega)\rvert \leq 1, \quad 0 \leq \Omega \leq 2;$ $\lvert H(j\Omega)\rvert \leq 0.1, \quad \Omega \geq 4$	10
3.	Using the bilinear transformation approach with $T = 1$ sec, find the system function $H(s)$ of the lowest order Butterworth filter for the following specifications: 3dB ripple in pass band $0 \leq \omega \leq 0.2\pi$ 25dB attenuation in stop band $0.45\pi \leq \omega \leq \pi$	10
4.	Given a transfer function, $$H(s) = \frac{2}{(s+0.5)^2 + 4}$$ Use impulse invariant technique to convert that into digital filter $H(z)$, using sampling interval of 1 *sec*. And also locate the poles and zeros of $H(z)$ in the $z-$ *plane*.	10
5.	Realize the given H(z) as cascade form of two second order transfer functions: $$H(z) = 1 + \frac{3}{2}z^{-1} + \frac{5}{4}z^{-2} + \frac{1}{2}z^{-3} + \frac{1}{8}z^{-4}$$ Additionally, compute the difference equation for each of the stages.	10