PAPER ID-421710

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM IV) THEORY EXAMINATION 2021-22
SIGNAL SYSTEM

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If you require any missing data, then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2*10 = 20

Qno	Questions	CO
(a)	Define a signal with example.	1
(b)	Draw the signal u(n) – u(n-3).	1
(c)	Check whether the given system is causal and Time variant y(t) = t.x(t).	1
(d)	State Nyquist theorem.	5
(e)	Determine the sufficient condition for the existence of CTFT.	3
(f)	Find Z-Transform of the signal x(n) = $(1/2)^n.u(n)$ and its ROC.	4
(g)	Determine the fundamental period of the following, if the signal is periodic x(t) = cos(πt) + cos(2πt).	1
(h)	State the expression of Convolution Integral.	2
(i)	Compare CTFT and DTFT.	3
(j)	Find the z transform of u(n).	4

SECTION B

2. Attempt any *three* of the following: 10*3 = 30

Qno	Questions	CO
(a)	i) State and prove the frequency shifting theorem of CTFT. ii) Explain the principle of Linearity property corresponding to CTFT.	3
(b)	Consider x(t) = Cos $(2\pi f_o t)$. Determine it is a power signal or energy signal.	1
(c)	Determine the even and odd components of the following signals i) x(t) = cos (t) + sin (t) + cos (t). sin (t) ii) x(n) = { 1,1,1,1,1}	1
(d)	Find the Fourier transform of the signal given below: x(t) = $e^{-at}\,u(t)$ and sketch the magnitude and phase spectrum.	3
(e)	Using Fourier transform, find the convolution of $x_1(t) = e^{-2t}\,u(t)$, $x_2(t) = e^{-3t}\,u(t)$	3

SECTION C

3. Attempt any *one* part of the following: 10*1 = 10

Qno	Questions	CO
(a)	Find the inverse Laplace of the following $X(S) = \frac{2}{(S+4)(s-1)}$ if the region of convergence is **a)** -4 < Re{s} < 1	3

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	b) Re{s} > 1	
(b)	Using Laplace transform obtain the impulse response of the given second-order system $\frac{d^2y(t)}{dt^2} + 3\frac{dy(t)}{dt} + 2y(t) = x(t)$.	3

4. Attempt any *one* part of the following: 10 *1 = 10

Qno	Questions	CO
(a)	Determine the Z transform of $x(n) = \cos(\omega_o n)\, u(n)$ and sketch the ROC.	4
(b)	Determine the inverse Z transform of the following function $H(z) = \frac{0.2z}{(z+0.4)(z-0.2)}$ ROC : $\|z\|>0.4$	4

5. Attempt any *one* part of the following: 10*1 = 10

Qno	Questions	CO
(a)	Explain and proof Parseval's Theorem.	3
(b)	Analyze the Discrete Time Fourier Transform of the following $x(n) = 0.5^n\, u(n) + 2^{-n}\, u(-n-1)$	3

6. Attempt any *one* part of the following: 10*1 = 10

Qno	Questions	CO
(a)	Implement the Convolution integral on the signals $x(t) = e^{-2t}\, u(t)$ and $h(t) = u(t)$.	2
(b)	Implement the Convolution sum on the signals $x(n) = a^n\, u(n)$ and $h(n) = u(n)$.	2

7. Attempt any *one* part of the following: 10*1 = 10

Qno	Questions	CO
(a)	State and prove the Sampling theorem and discuss the effect of under-sampling.	5
(b)	Explain reconstruction of signal from its samples using Interpolation.	5