Reg.No.:								

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
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Question Paper Code: 7002

B.E. / B.Tech. DEGREE SUPPLEMENTARY EXAMINATIONS – FEB. / MAR. 2020
Third Semester
Electronics and Communication Engineering
U15EC302 - SIGNALS AND SYSTEMS
(Regulation 2015)

Time : Three Hours Maximum : 100 Marks

Answer ALL the questions

PART – A

(10 x 2 = 20 Marks)

1. Determine whether the system y(t)= x(t/3) is Time Invariant/Time Variant and also causal/non causal.
2. What is meant by BIBO stability of a Linear Time Invariant system?
3. Find the Laplace transform of signal u(t) and δ (t).
4. State Dirichlet conditions for Fourier series.
5. Determine the convolution of the signals x(n)={2,-1,3,2} and h(n)={1,-1,1,1}.
6. Define impulse response of continuous system.
7. Find the DTFT of $x(n) = \delta(n) + \delta(n-1)$
8. State low pass sampling theorem.
9. What is the Convolution Sum of the following two sequence: x(n)={1,1,1,1} , h(n)={3,2} .
10. Compare Direct form –I and Direct form –II realization structures.

PART – B

(5 x 13 = 65 Marks)

11. a) i. The system $y(t) = \int_{-\infty}^{-2t} x(\tau)d\tau$ that has input x(t) and output y(t) determine whether it is (10)

a. i.memory less
b. ii.stable
c. iii.casual
d. iv.linear
e. v.time invariant

ii. Find the fundamental time period of the given signal $x(n) = \sin[(6\pi/7)n+1]$. (3)

(OR)

b) i. The input x(t) and output y(t) of a system are related as

$$\int_{-\infty}^{t} x(\tau)\cos(3\tau)d\tau$$

Show that the system is neither time invariant nor stable system. (10)

ii. Calculate the time period of the signal $x(n) = \exp(j2\pi n/7)$ (3)

12. a) Given the transfer function

$$H(S) = \frac{s+10}{s^2+3s+2}$$

Find the impulse response and response y(t) due to input x(t)=sin2tu(t).

(OR)

b) Determine the fourier series coefficient for the continuous time periodic signal

X(t) = 1.5 for $0 \le t \le 1$

= -1.5 for $1 \le t \le 2$

With fundamental frequency π.

13. a) Find the forced and natural response of the system described by $d^2y(t) / dt^2 + 5dy(t) / dt + 6y(t) = dx(t) / dt + 6x(t)$. Using Laplace transform when the input is a unit step function and the initial conditions of the system are $y(0^+), y'(0^+) = 2$.

(OR)

b) Realize the system given by the following differential equation in direct form II.

$$\frac{d^3y(t)}{dt^3}+4\frac{d^2y(t)}{dt^2}+7\frac{dy(t)}{dt}+8y(t)=5\frac{d^2x(t)}{dt^2}+4\frac{dx(t)}{dt}+7x(t)$$

14. a) i. Find the inverse z-transform of $X(z) = z+4/(z^2 - 4z+3)$. (5)

ii. Find the inverse z-transform of $X(z) = 1/1-1.5z^{-1} + 0.5z^{-2}$ for ROC : $0.5 < |z| < 1$. (8)

(OR)

b) i. Write and Prove Parseval's Theorem of DTFT. (3)

ii. Find DTFT of the sequence $x(n) = \alpha^n u(n)$ and also determine its magnitude and phase spectrum. (10)

15. a) Determine y(n) if $x(n)=\delta(n-1)$ by Considering a casual LTI system whose input x(n) and output y(n) are related by the difference equation,

$$y(n) = \frac{1}{4}y(n-1) + x(n)$$

(OR)

b) Determine the state model of the system for the given transfer function of a system

$$H(z) = \frac{1.5 + 2z^{-1} + 3z^{-2} + 2z^{-3}}{1 + 3^{-1} + 2z^{-1} + 4z^{-3}}$$

PART – C

(1 x 15 = 15Marks)

16 a) i. A continuous time sinusoid $\cos(2\pi ft + \theta)$ is sampled at a rate f_s=1000Hz. Determine the resulting signal samples if the input signal frequency f is 400 Hz,600 Hz and 1000 Hz respectively. (10)

ii. Consider an analog signal $x(t)=5 \cos 200\pi t$. Determine the minimum sampling rate to avoid aliasing and if sampling rate Fs=400Hz .What is the DT signal after sampling. (5)

(OR)

b) Write any five properties of Fourier transform with time and frequency representation and prove them.