

SEAT No. _____

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SARDAR PATEL UNIVERSITY

III Semester

Signal Processing

Date 2 /12/2019, Time: 2:00 am to 5:00 pm

Course Code:

U S O 3 C E L C 0 1

Total Marks: 70

Q-1 Multiple Choice questions: 10

1. Mathematically, signal is described as function of ----- independent variables.

- (i) One
- (ii) Two
- (iii) One or more
- (iv) Infinite.

2. The electrical signals derived in proportion with physical quantities such as temperature, pressure, sound etc. are generally ----- signals.

- (i) Continuous
- (ii) Discrete
- (iii) Digital
- (iv) None of these

3. -----Signals have values only at certain instants of time.

- (i) Continuous
- (ii) Discrete
- (iii) Periodic
- (iv) All of the above

4. The resonant frequency for an LC tunes circuit is given by

(i) $f = \frac{1}{2\pi\sqrt{LC}}$

(ii) $f = \frac{1}{4\pi\sqrt{LC}}$

(iii) $f = \frac{2}{2\pi\sqrt{LC}}$

(iv) None of the above

5. If two attenuators are connected in cascade then total attenuation is given as

- (i) Subtraction of individual attenuator
- (ii) Addition of individual attenuator
- (iii) Product of individual attenuator
- (iv) Division of individual attenuator

6. $\sin n\pi =$

(i) $-n$

(ii) $(-1)^n$

(i) 0

(iv) 1

7. A function $f(x)$ is said to be odd if $f(-x)$

(i) $=f(x)$

(ii) $=-f(x)$

(iii) $= 0$

(1)

(P.T.O.)

(iv) = 1

8. The Laplace Transform of $t^n, n>0$ is given by

- (i) $\frac{1}{s}$
- (ii) $\frac{n!}{s^{n+1}}$
- (iii) $\frac{\Gamma(n+1)}{s^{n+1}}$
- (iv) s

9. The numerical value of $\Gamma(3/2)$ is

- (i) $\sqrt{\pi}$
- (ii) $\sqrt{\pi}/2$
- (iii) 1
- (iv) 0

10. Laplace transform of $\cosh at$

- (i) s/s^2+a^2
- (ii) s/s^2-a^2
- (iii) a/s^2+a^2
- (iv) $2s/s^2+a^2$

Q. 2 Answer any Ten questions in short.

20

1. Define a signal.
2. Define rise time and fall time of a pulse.
3. Define Even signal and odd signal with example.
4. Define Attenuator.
5. What is function of PAD in piston type attenuator?
6. The frequency and amplitude accuracy depends on design of which blocks of signal generator?
7. Find a_0 for the Fourier series to represent x^2 in the interval $(-\pi$ to $\pi)$
8. Give expressions for a_0, a_n and b_n for a fourier series.
9. Find a_0 for $f(x) = x+x^2$ in the fourier series for the interval $-\pi < x < \pi$.
10. Find Laplace's transform for $t - \sinh 5t$
11. Differentiate even and odd functions.
12. Find Laplace's transform for $1 + 2\sqrt{t} + \frac{3}{\sqrt{t}}$

Q.3 Show classification of signals and describe in detail any two types of signals. 10

OR

Q.3 Explain in detail pulse characteristics and terminology with neat diagram. 10

Q.4 Derive an expression for resistors R1, R2 and R3 in Pi attenuator if the decibel attenuation is $10 \log N$. 10

OR

Q.4 Explain in detail working of function generator. 10

Q.5 Find the fourier series expansion of $f(x) = e^{-ax}$ in the interval $-\pi < x < \pi$. 10

OR

Q.5 Prove that $x^2 = \frac{\pi^2}{3} + 4 \sum_{n=1}^{\infty} (-1)^n \frac{\cos nx}{n^2}$ 10

Q.6 Find Laplace's transform for (i) $\sin 2t \sin 3t$ 10

- (ii) $e^{6t}(\sin 4t \cos 7t)$
- (iii) $t^2 \sin at$

OR

Q.6

Find the fourier transform of

OR
(i) $\frac{\cos at - \cos bt}{t}$

10

(ii) $t^2 \cos at$

(iii) $e^{-3t} \sin 5t \sin 3t$



