TOTAL PAGES: 2

**20SSP27**

**PSG COLLEGE OF ARTS & SCIENCE**
(AUTONOMOUS)

**MSc DEGREE EXAMINATION MAY 2022**
(Fourth Semester)

Branch – **SOFTWARE SYSTEMS (Five year Integrated)**

**TRANSFORMATION TECHNIQUES**

Time: Three Hours Maximum: 75 Marks

**SECTION-A (10 Marks)**
Answer **ALL** questions
**ALL** questions carry **EQUAL** marks (10 x 1 = 10)

1. The Laplace transform of Sin*hbt* is ____________.
(i)$b/s^2-b^2$ (ii)$b/s^2+b^2$ (iii) $1/s^2-b^2$ (iv) $1/s^2+b^2$

2. The inverse Laplace transform of $16/s^3$ is __________.
(i)8t (ii)$8t^2$ (iii) $4t^2$ (iv)4t

3. The solution of x[n+1] – 2x[n]=0 is __________.
(i)$x[n] = 2^n$ (ii)$x[n] = 2^{-n}$
(iii)$x[n] = n2^n$ (iv) $2^{n+1}$

4. Discrete time filter is otherwise called as ___________.
(i) Low pass filter (ii)High pass filter
(iii)Digital filter (iv) Filter

5. The sequence f(k)= {1 if k=0 and 0 if k≠ 0} is called _____________.
(i) Delta sequence (ii)Absolute convergence sequence
(iii)Kronecker delta sequence (iv)Unit step sequence

6. The Z-transform of a unit step function is ___________.
(i)u(t) = 1/z-1 (ii)$u(t) = z^2/z-1$
(iii)u(t) = 2z/z-1 (iv)u(t) = z/z-1

7. The Fourier transform of f(t) = {1 if |t|≤1 and 0 if |t|>1} is
(i)F(ω) = 2 sin ω / ω (ii)F(ω) = 2cos ω / ω
(ii)F(ω) = - 2 sin ω / ω (iv)F(ω) = - 2cos ω / ω

8. ___________ is technique that allows audio signals to be transmitted as electromagnetic radio waves.
(i) Modulation signal (ii) Carrier signal
(iii) Amplitude modulation (iv) Carrier amplitude modulation

9. Inverse dft of Y(k) = {1,0,1,0} is __________.
(i)y(n) = {0, 0.5, 0, 0.5} (ii)y(n) = {0.5, 0, 0.5,0}
(iii)y(n) = {0.5, 0.5,0,0} (iv)y(n) = {0 0,0.5, 0.5}

10. The sequence x(n) = {2,3,4,3} is ____________.
(i) Circularly odd (ii) Circularly even
(iii)Partly Circularly odd or Partly Circularly even
(iv)Neither Circularly odd nor circularly even

**SECTION - B (25 Marks)**
Answer **ALL** questions
**ALL** questions carry **EQUAL** Marks (5 x 5 = 25)

11. a) Find the inverse laplace transform of $2s+3 / s^2 +6s+13$.
(OR)
b) Find the convolution of 2t and $t^3$.

**Cont...**

12. a) Explain signal processing using a microprocessor by an example.

(OR)

b) Explain Block diagram representation of difference equations.

13. a) Find the Z-transform of $e^{-k} + k$.

(OR)

b) Solve the difference equation $y[k+1] - 3y[k]=0$, $y[0]=4$.

14. a) Find $F\{ u(t)e^{-t} + u(t)e^{-2t}\}$.

(OR)

b) Find the Fourier transform of $f(t) =\{ e^{-3t}, t \geq 0$ and $e^{3t}, t < 0\}$.
Deduce the function whose fourier transform is $G(\omega) = 6 / (10+ 2\omega + \omega^2)$

15. a) Find the inverse dft of the sequence F(k) for k =0,1,2,3 given by
F[k] = -4, 1, 0,1.

(OR)

b) Find the matrix representing a three-point dft. Also using the matrix, find the dft of the sequence f[n]= 4, -7, 11.

**SECTION -C (40 Marks)**

Answer **ALL** questions

**ALL** questions carry **EQUAL** Marks (5 x 8 = 40)

16. a) Find the inverse laplace transform of $s-1 / 2s^2 +8s+11$.

(OR)

b) Solve $y'' + y' - 2y = - 2$, $y(0) = 2$, $y'(0) = 1$.

17. a) Obtain the numerical solution of the output from a digital low pass filter.

(OR)

b). Explain design of a discrete time controller.

18. a) If $F(z) = z+3 / z-2$, find f[k].

(OR)

b) Find the sequence whose z-transform is $F(z) = 2z^2 - z / (z-5)(z+4)$.

19. a). i) Show that the Fourier transform of $f(t) = \begin{cases} 3 \ if \ -2 \leq t \leq 2 \\ 0 \ otherwise \end{cases}$
is given by $F(\omega) = 6 \sin 2\omega / \omega$.
ii) Use the first shift theorem to find the Fourier transform of $e^{-jt} f(t)$ .
iii) Verify the first shift theorem by obtaining the fourier transform of $e^{-jt}$ f(t) directly.

(OR)

b) Calculate the correlation of $f(t) = u(t)e^{-t}$ and $g(t) = u(t)e^{-2t}$ where u(t) is the unit step function and hence verify the correlation theorem for these functions.

20. a) Suppose f[n] is the sequence 3,9,2,-1 and g[n] is the sequence -4,8,5.
i) Find the linear convolution h[n] = f*g.
ii) Develop a graphical interpretation of this process.

(OR)

b) i) Find the d.c.t. F[k], of the sequence f[n] = 2.4.6.
ii) Apply the inverse d.c.t to F[k] and show that the original sequence f[n] is obtained.

Z-Z-Z END