SIGNALS AND SYSTEMS

1. What about the stability of system in $H(z) = \frac{z(3z-4)}{(z-0.5)(z-0.2)}$

A. system is stable

B. unstable

C. stable at 0.4

D. cant say

2. Which one most appropriate dynamic system?

A. $y(n) + y(n-1) + y(n+1)$

B. $y(n) + y(n-1)$

C. $y(n) = x(n)$

D. $y(n) + y(n-1) + y(n+3) = 0$

3. An energy signal has $G(f) = 10$. Its energy density spectrum is

A. 10

B. 100

C. 50

D. 20

4. If $\mathcal{L}[f(t)] = F(s)$, then $\mathcal{L}[f(t-T)] =$

A. $e^{st}F(s)$ B. $e^{-st}F(s)$ C. $F(s)/1+e^{st}$ D. $F(s)/1+e^{-st}$

5. If transfer function of a system is $H(z) = 6 + z^{-1} + z^{-2}$ then system is

A. minimun phase

B. maximum phase

C. mixed phase

D. none

6. The period of the function cos is $\frac{\pi}{4}(k-1)$ ps

A. $\frac{1}{8}s$ B. $8s$ C. $4s$ D. $\frac{1}{4}s$

7. Which one is a linear system?
   A. $y[n] = x[n] \times x[n-1]$
   B. $y[n] = x[n] + x[n-10]$
   C. $y[n] = x^2[n]$
   D. (a) and (c)

8. Laplace transform of a pulse function of magnitude E and duration from $t = 0$ to $t = a$ is
   A. E / s
   B. $\frac{E}{s} e^{-as}$
   C. $E\left(\frac{1}{s} - \frac{1}{s} e^{as}\right)$
   D. $\frac{E}{s^2}(1 - e^{as})$

9 If $I(s) = \frac{5(s + 250)}{s(s + 100)}$, initial value of $i(t)$ is
   A. 5A
   B. 12.5 A
   C. 0.05 A
   D. 1250 A

10. The analog signal m(t) is given below m(t) = 4 cos 100 pt + 8 sin 200 pt + cos 300 pt, the Nyquist sampling rate will be

A. 1/100

B. 1/200

C. 1/300

D. 1/600

11. The ROC of sequence in the Z.T. of sequence $x[n] = a^n \cup [n]$ is

A. $z > a$

B. $z < a$

C. $|z| > a$

D. $|z| < a$

12. In Laplace transform, multiplication by e^{-at} in time domain becomes

A. translation by a in s domain

B. translation by (-a) in s domain

C. multiplication by e-as in s domain

D. none of the above

13. A function having frequency f is to be sampled. The sampling time T should be

A. $T = \frac{1}{2f}$

B. $T > \frac{1}{2f}$

C. $T < \frac{1}{2f}$

D. $T \geq \frac{1}{2f}$

14. The final value theorem is

A. $\lim_{t \to \infty} f(t) = \lim_{s \to 0} sF(s)$

B. $\lim_{s \to \infty} f(t) = \lim_{s \to \infty} sF(s)$

C. $\lim_{t \to 0} f(t) = \lim_{s \to \infty} F(s)/s$

D. $\lim_{s \to \infty} f(t) = \lim_{s \to \infty} F(s)/s$

15. If $[A] = \begin{bmatrix} 3 & 0 & 0 \\ 5 & 8 & 4 \\ 6 & 3 & 1 \end{bmatrix}$, $\det[A] =$

A. - 12

B. 12

C. 20

D. - 20

16. Inverse Fourier transform of sgn (ω) is

A. $j/\pi t$

B. 1

C. U(t)

D. 2/3t

17. If $I(s) = \frac{5(s+250)}{s(s+100)}$, the final value of i(t) is

A. 5A

B. 12.5 A

C. 0.05 A

D. 1250 A

18. A signal m(t) is multiplied by a sinusoidal waveform of frequency fc such that v(t)=m(t) cos 2pfct. If Fourier transform of m(t) is M(f), Fourier transform of v(t) will be

A. 0.5 M(f + fc)

B. 0.5 M(f - fc)

C. 0.5 M(f + fc) + 0.5 M(f - fc)

D. 0.5 M(f - fc) + 0.5 M(f - fc)

19. A voltage wave having 5% fifth harmonic content is applied to a series RC circuit. The percentage fifth harmonic content in the current wave will be

A. 5%

B. more than 5%

C. less than 5%

D. equal or more than 5%

20. Assertion (A): If $I(s) = \frac{5(s+250)}{s(s+100)}$, the initial value of i(t) is 5A

Reason (R): As per initial vaue theroem $\lim_{t \to 0} f(t) = \lim_{s \to \infty} sF(s)$

A. Both A and R are correct and R is correct explanation of A

B. Both A and R are correct but R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

21. $\delta(t)$ is a

A. energy signal

B. power signal

C. neither energy nor power

D. none

22. The analog signal given below is sampled by 600 samples per second for $m(t) = 3 \sin 500 pt + 2 \sin 700 pt$ then folding frequency is

A. 500 Hz

B. 700 Hz

C. 300 Hz

D. 1400 Hz

23. The signal defined by the equations $f(t) = 0$ for $t < 0$, $f(t) = E$ for $0 \leq t \leq a$ and $f(t) = 0$ for $t > a$ is

A. a step function

B. a pulse function

C. a shifted step function originating at $t = a$

D. none of the above

24. Inverse Laplace transform of is $\frac{2s+5}{s^2+5s+6}$

A. $2 \exp(-2.5 t) \cosh(0.5 t)$

B. $\exp(-2 t) + \exp(-3 t)$

C. $2 \exp(-2.5 t) \sinh(0.5 t)$

D. $2 \exp(-2.5 t) \cos 0.5 t$

25. Two function g1(t) and g2(t) with correlation of 6 has average power of 4 and 5 respectively. The power of g1(t) + g2(t) is

A. 9

B. 21

C. 3

D. 15

26. A box has 4 white and 3 red balls. Two balls are taken out in succession. What is the probability that both are white?

A. 4/7

B. 1/2

C. 2/7

D. 1/7

27. Z transform is a non-linear operation.

A. True

B. False

28. A signal g(t) = A then g(t) is a

A. energy signal

B. power signal

C. neither energy nor power signal

D. insufficient data

29. The Fourier series of an odd periodic function contains

A. odd harmonics only

B. even harmonics only

C. cosine harmonics only

D. sine harmonics only

30. If $F(s) = \frac{s+3}{(s+1)(s+2)}$, the terms in f(t) will have

A. e-t and e-2t

B. et and e2t

C. te-t and te-2t

D. none of the above

31. An impulse function consist of

A. pure dc

B. pure a.c

C. entire frequency range with constant phase

D. infinite bandwidth with linear phase vaariations

32. As per time displacement theorem in Laplace transformation, displacement in the time domain by T becomes

A. division by s in the s domain

B. division by e-sT in the s domain

C. multiplication by s in the s domain

D. multiplication by e-sT in the s domain

33. Which one is a causal system?

A. y(n) = 3x[n] - 2x[n - 1]

B. y(n) = 3x[n] + 2x[n + 1]

C. y(n) = 3x[n + 1] + 2x[n - 1]

D. y(n) = 3x[n + 1] 2x[n - 1] + x[n]

34. If $F(s) = \frac{s+3}{(s+1)((s+1)^2+s)}$, the coefficient of term e-t in f(t) will be

A. 1

B. 0

C. 0.5

D. 2/3

35. Double integration of a unit step function would lead to

A. an impulse

B. a parabola

C. a ramp

D. a doublet

36. If f(t) = A d(t - a), F(s) is

A. A e-as

B. A eas

C. A a e-as

D. Aa eas

37. If $\left(\frac{27s+97}{s^2+3s8}\right)$ is the Laplace transform of f(t) then f(0+) is

A. 0

B. 97/3

C. 27

D. ∞

38. If f(t) is in volts, then F(jω) is in

A. volts

B. volt seconds

C. volts/sec

D. volt-sec2

39. Assertion (A): If $I(s) = \frac{2s+10}{s(s+2)}$, the final value of i(t) = 10

Reason (R): If $I(s) = \frac{2s+10}{s(s+2)}$, the initial value i(t) = 2

A. Both A and R are correct and R is correct explanation of A

B. Both A and R are correct but R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

40. Which of following is recursive system?

A. y(n - 1)

B. y(n + 1)

C. y(n)

D. y(n) + y(n + 1)

41. In terms of signum function sgn(t), unit step function u(t) =

A. 1 + sgn(t)

B. 1 - sgn(t)

C. 0.5 + 0.5 sgn(t)

D. 0.5 - 0.5 sgn(t)

42. Choose correct option

A. var (X + Y) = Var (X) + Var (Y)

B. var (X - Y) = Var (X) + Var (Y)

C. var (X + Y) = Var (X) x Var (Y)

D. Both (a) and (b)

43. If $I(s) = \frac{5(s+250)}{s(s+100)}$, final value of i(t) is

A. 0

B. 2.5

C. 12.5

D. ∞

44. If sequence y(n) = x(-n) then it is

A. Causal

B. Non-Causal

C. Depends on x(-n)

D. None

45. The function δ(t - b) is

A. an impulse function

B. a step function originating at t = b

C. an impulse function originating at t = b

D. none of the above

46. If Laplace transform of f(t) is F(s), then $L\left[\frac{d}{dt}f(s)\right] =$

A. s F(s) - f(0-)

B. $\frac{1}{s}F(s) - f(0^-)$

C. s F(s) + f(0-)

D. $\frac{1}{s}F(s) + f(0^-)$

47. If $H(z) = \frac{z(3z-4)}{(z-0.4)(z-2)}$ then system is

A. casual

B. uncasual

C. casual at z = 0.4, 2

D. uncasual at z = 0.4, z = 2

48. A pulse function having magnitude E and duration from t = 0 to t = a can be represented as

A. sum of two pulse functions

B. difference of two pulse functions

C. difference of two step functions each of magnitude E and one originating at t = 0 and the other at t = a

D. none of the above

49. If $F(s) = \frac{10}{s^2+4s+4}$, f(t) =

A. 10 te-2t

B. 10 t2e-2t

C. 10 e-2t

D. 5 t2e-2t

50. The DTFT of x(n) = δ(n) will be

A. 1

B. 0

C. ∞

D. not defined

ANSWERS

1	A	2	D	3	B	4	B	5	A
6	B	7	B	8	C	9	A	10	C
11	C	12	A	13	C	14	A	15	A
16	A	17	B	18	C	19	B	20	A
21	B	22	C	23	B	24	B	25	B
26	C	27	B	28	B	29	D	30	A
31	C	32	D	33	B	34	D	35	B
36	A	37	C	38	B	39	D	40	A
41	C	42	D	43	C	44	C	45	C
46	A	47	A	48	C	49	A	50	A