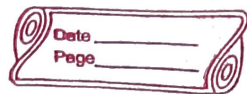


# MODEL QUESTIONS

Paper - DSE - III



## GROUP - A

### Multiple choice Questions (MCQ)

- 1) Graphical representation of a signal in time domain is called
- (a) Frequency spectrum (b) Frequency waveform  
(c) waveform (d) None of these
- 2) Graphical representation of a signal in frequency domain is called
- (a) Frequency spectrum (b) Frequency waveform  
(c) waveform (d) None of these.
- 3) A signal can be represented in
- (a) Time domain (b) Frequency domain  
(c) Both (a) and (b) (d) None of above
- 4) Analog signal can be converted into discrete-time signals by
- (a) Sampling (b) Coding  
(c) Quantizing (d) None of the above
- 5)  $t\delta(t) =$
- (a)  $t$  (b)  $0$  (c)  $1$  (d)  $u(t)$
- 6)  $\int_{-\infty}^{\infty} (t-a)^2 \delta(t-a) dt =$
- (a)  $4$  (b)  $2$  (c)  $(t-a)$  (d)  $0$
- 7) A deterministic signal has
- (a) No uncertainty (b) Uncertainty  
(c) partial uncertainty (d) None of these

- 8) A random signal has
- (a) No uncertainty
  - (b) uncertainty
  - (c) partial uncertainty
  - (d) None of these
- 9) The fundamental period of a sinusoidal signal is  $T =$
- (a)  $\frac{2\pi}{\omega}$
  - (b)  $2\pi$
  - (c)  $\frac{\omega}{2\pi}$
  - (d)  $2\pi\omega$
- 10) A signal is an energy if
- (a)  $E \geq 0, p = 0$
  - (b)  $E = \infty, p = \text{finite}$
  - (c)  $E = \text{finite}$
  - (d)  $E = \text{finite}, p = \infty$
- 11) A system is a
- (a) physical device
  - (b) mathematical model
  - (c) linear model
  - (d) ideal device
- 12) A lumped parameter system is described by
- (a) Ordinary differential equation
  - (b) PDE
  - (c) Both (a) and (b)
  - (d) None of above
- 13) The inverse Z transform of  $2 + 3z^{-1} + 4z$  is
- (a)  $\begin{bmatrix} 2 \\ \uparrow \\ 3 \\ \uparrow \\ 4 \end{bmatrix}$
  - (b)  $\begin{bmatrix} 3 \\ \uparrow \\ 4 \\ \uparrow \\ 2 \end{bmatrix}$
  - (c)  $\begin{bmatrix} 4 \\ \uparrow \\ 2 \\ \uparrow \\ 3 \end{bmatrix}$
  - (d) None of these
- 14) The response of the system due to input alone, when all initial conditions are neglected is called the \_\_\_\_\_ of the system.

- (15) The only signal whose ROC is the entire  $z$ -plane is  
 (a)  $\delta(n)$  (b)  $4^n$  (c)  $r^n$  (d)  $a^n$
- (16) ROC is defined as the range of values of  $z$  for which  $X(z)$   
 (a) converges (b) diverges (c) 0 (d)  $\infty$
- (17) The ROC of  $X(z)$  cannot contain any  
 (a) poles of  $X(z)$  (b) zeros of  $X(z)$   
 (c) poles or zeros of  $X(z)$  (d) None of these
- (18) For a finite duration causal sequence, the ROC is entire  $z$ -plane except at  
 (a)  $z=0$  (b)  $z=\infty$  (c)  $z=0$  &  $z=\infty$   
 (d) None of these
- (19) A system is described by  $H(z) = \frac{z(z+1)}{(z-2)(z+2)}$   
 The initial values of the  $H(z)$  is  
 (a) 1 (b)  $-1/4$  (c) -4 (d)  $\infty$
- (20) Which statement about ROC is not true?  
 (a) ROC does not contain any poles  
 (b) ROC consists of a circle in  $z$ -plane centered at origin  
 (c) ROC is a ring or disc in  $z$ -plane  
 (d) ROC contains both poles and zeros.

## Group: B

### SHORT ANSWER TYPE QUESTIONS



- ① What are Digital signal processing and signal processing?
- ② Explain Real time and Non-real time processing. Also explain basic elements of DSP.
- ③ What are operations performed by DSP system?
- ④ What is discrete time system? Explain the different types of system.
- ⑤ What is LCCDE? What are the two solutions of response of an LTI system?
- ⑥ What is Z-transform? Explain ROC.
- ⑦ Obtain the Z-transform of  
(i)  $u(t)$       (ii)  $x(t)$
- ⑧ Explain BIBO stability criteria of an LTI system.

### LONG ANSWER TYPE QUESTIONS

- ① Explain the properties of ROC. What is the difference between Laplace Transform and Z-transform?

② What is the  $\rightarrow$  Linearity  $\rightarrow$  Time reversal  $\rightarrow$  Scaling  $\rightarrow$  Time shifting  
⑤ Differentiation property of the Z-transform?

③ Check whether the following systems are:

- ① Static or dynamic
- ② Linear or Non-linear
- ③ Causal and non-causal
- ④ Time variant or Time-variant.

⑥ 
$$\frac{d^3 y(t)}{dt^3} + 2 \frac{d^2 y(t)}{dt^2} + 4 \frac{dy(t)}{dt} + 3y^2(t) = x(t+1)$$

⑦ 
$$y(n) = a^n u(n)$$

④ Determine whether the following systems are stable or not

①  $y(t) = x(t) + 2$

②  $y(t) = 5e^{2t} x$

③  $y(n) = n u(n) + \delta^{(n-2)}$

④  $y(n) = 8 x(n-4)$

⑤ Find the Z-transform of the following signals

①  $x(n) = u(-n)$

②  $x(n) = u(-n+1)$

(6) Find the inverse z-transform of

$$X(z) = \frac{3z^{-1}}{(1-z^{-1})(1-2z^{-1})}$$

by partial fraction.