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**Question Paper Code: 44404**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2019

Fourth Semester

Electronics and Communication Engineering

14UEC404- SIGNALS AND SYSTEM

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

- Which of the following is a signal?
  - mobile phone
  - walkie-talkie
  - personal computer
  - human speech
- A signal is defined at every instant of time is
  - output signal
  - input signal
  - DT signal
  - CT signal
- Fourier series is only applicable for
  - Energy signals
  - power signals
  - a periodic signals
  - periodic signals
- The frequency response is usually represented in a graph by its
  - magnitude
  - phase
  - both magnitude and phase
  - none of these
- The Laplace transform of  $u(t)$  is
  - $1/s$
  - $s^2$
  - $1/s^2$
  - $s$
- Given that  $H(s)=e^{-4s}$ . What is the impulse response of the system?
  - $\delta(t-4)$
  - $u(t-4)$
  - $e^{-4t}u(t)$
  - $e^{4t}u(t)$

7. For a finite duration causal or positive time sequence the ROC is the entire Z plane except at  
 (a)  $z=0$  (b)  $z=\infty$  (c)  $z=0$  and  $z=\infty$  (d)  $z=1$
8. The Drawback of DTFT is  
 (a) 0 inverse is in CT (b) inverse is in DT  
 (c) all the above (d) none of these
9. The output due to impulse input is called as \_\_\_\_\_ response.  
 (a) impulse (b) frequency (c) step (d) output
10. The Z-transform of correlation of the sequence  $x(n)$  &  $y(n)$  is,  
 (a)  $X^*(z)Y^*(Z^{-1})$  (b)  $X(z)Y(z^{-1})$  (c)  $X(z)^*Y(z)$  (d)  $X(z^{-1})Y(z^{-1})$

PART - B (5 x 2 = 10 Marks)

11. Define and Relation between unit step, ramp and Delta functions for CT.
12. Give the equation for trigonometric Fourier series.
13. Solve the Laplace transform of Unit step function.
14. Define system function of the discrete time system.
15. State the time shifting property of the Z-transform.

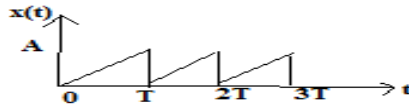
PART - C (5 x 16 = 80 Marks)

16. (a) (i) Examine whether the following signal is periodic or not? If periodic determine the fundamental period.  
 (i)  $je^{j6t}$ ,  
 (ii)  $X(t) = 3u(t) + 2 \sin 2t$ ,  
 (iii)  $x(n) = \cos 4n$   
 (iv)  $x(n) = 1 + e^{j2\pi n/3} - e^{j4\pi n/7}$ . (8)
- (ii) Express the following: (a) The power of the energy signal is Zero over infinite time (b) The energy of the power signal is infinite over infinite time. (8)

Or

- (b) Determine whether the following systems are static, causal, Time invariant, Linear  
 (i)  $y(n) = x(4n+1)$  (ii)  $y(n) = x(n) + nx(n+1)$  (iii)  $y(n) = \log_{10}x(n)$  v.)  $y(n) = x^2(n)$  (16)

17. (a) Determine the trigonometric form of the Fourier series of the ramp signal shown in Fig. (16)



Or

- (b) The input and output of a causal LTI system are described by the differential equation:  $d^2y(t)/dt^2 + 3 dy(t)/dt + 2y(t) = x(t)$ .
- Calculate the frequency response of the system
  - Calculate the impulse response of the system
  - Criticize the response of the system if  $x(t) = te^{-t} u(t)$ ? (16)

18. (a) (i) Develop  $H(S) = S(S+3)/(S+2)(S+1)(S+4)$  Using Cascade form. (8)
- (ii) Develop  $H(S) = S+1/(S+2)(S+3)(S+4)$  using parallel form realization. (8)

Or

- (b) Estimate the inverse Laplace Transform of the following Equation
- $X(s) = S^2+3S+4/S^3+5S^2+7S+3$ . (8)
  - $X(s) = S^2/S^4+4a^4$ . (8)

19. (a) Describe a real value band limited signal having no spectral components above a frequency of B Hz is determined uniquely by its values at uniform interval spaced no greater than  $1/2B$  second apart. (16)

Or

- (b) (i) State and Prove Convolution and Multiplication theorem using DTFT. (8)
- (ii) Obtain DTFT for the following DT sequence.  $x(n)=(1/2)^{n-2}u(n-2)$ . (8)

20. (a) Find the state variable matrices  $A$ ,  $B$ ,  $C$  and  $D$  for the equation
- $$y(n) - 3y(n - 1) - 2y(n - 2) = x(n) + 5x(n - 1) + 6x(n - 2). \quad (16)$$

Or

- (b) Determine the inverse Z-transform of the function ,  $X(z)=\frac{3+2z^{-1}+z^{-2}}{1-3z^{-1}+2z^{-2}}$  by following two methods
- (i) power series expansion method
  - (ii) partial fraction expansion method. (16)