Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Nov/Dec – 2016**

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|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **14EC2003** | **Duration :** | **3hrs** |
| **Sub. Name :** | **Signals and Systems** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | | | | **Course outcome** | **Marks** |
| **PART-A (40X1=40 MULTIPLE CHOICE QUESTIONS)** | | | | | | |
| 1. | A DT signal x[n]=cos[2n] is periodic or aperiodic? If it is periodic find the fundamental period N? | | | | CO1 |  |
|  | a. aperiodic | b. Periodic,N=1 sample | c. Periodic,N=2 sample | d. Periodic,N=4 sample |  | (1) |
| 2. | Unit ramp signal can be represented interms of unit step signal is---------------------- | | | | CO1 |  |
|  | a. r(t)=t.u(t) | b. r(t)=t.u(t)/2 | c. r(t)=u(t)/2 | d. r(t)=u(t)/t |  | (1) |
| 3. | If one can represent the signal by mathematical equation then the signal is said to be------------------- | | | | CO1 |  |
|  | a. Deterministic signal | b. Random signal | c.Sinusoidal Signal | d.non sinusoidal Signal |  | (1) |
| 4. | Determine the power which is delivered by the signal x(t)=A cos(wt) | | | | CO1 |  |
|  | a. P=A2/2 | b. P=t2/2 | c. P=w2/2 | d. P=t2 |  | (1) |
| 5. | Find the even componet of  a CT signal x(t)=cost+ sint+costsint | | | | CO1 |  |
|  | a. xe(t)=cost | b. xe(t)=costsint | c. xe(t)=sint | d. xe(t)=cost+1 |  | (1) |
| 6. | The impulse response of discrete time system is h[*n*] = (4)*n* u[3 - *n*], the system is---------- | | | | CO1 |  |
|  | a. stable and non-casual | b. unstable and non-casual | c. stable and casual | d. causal only |  | (1) |
| 7. | What is causality condition for a LTI discrete time system? | | | | CO1 |  |
|  | a. h(n)=0 for n<0 | b. h(n)=0 for n>0 | c. h(n)=0 for n=0 | d. h(n)=0 for n-1>0 |  | (1) |
| 8. | A transmission is said to be \_\_\_\_\_\_\_\_\_\_\_\_\_ if the response of the system is exact replica of the input signal. | | | | CO1 |  |
|  | a. Distortionless | b. Distortion | c. LTI | d.Stable |  | (1) |
| 9. | A continuous-time periodic signal *x*(*t*) having a period T, is convolved with itself. The resulting signal is --------------- | | | | CO1 |  |
|  | a. periodic having a period T | b. periodic having a period T/2 | c. periodic having a period 2T | d. nor periodic |  | (1) |
| 10. | Convolution is used to find----- | | | | CO1 |  |
|  | a.The impulse response of an LTI System | b.Frequency response of a System | c. The time response of a LTI system | d. The phase response of a LTI system |  | (1) |
| 11. | No of samples in y[n]=x[n]\*h[n] is---------- If x[n]=[ 1 2 3] and h[n]=[2 2 2 2 4] | | | | CO1 |  |
|  | a. 7 | b. 6 | c.5 | d.4 |  | (1) |
| 12. | The Fourier Transform of a rectangular pulse is----------- | | | | CO2 |  |
|  | a. Another rectangular pulse | b. Triangular pulse | c. Sinc function | d. Impulse |  | (1) |
| 13. | The Fourier Transform exist only if the signal satisfies---------conditions | | | | CO2 |  |
|  | a. Superposition | b. Shannon | c. Dirichlet | d.Norton |  | (1) |
| 14. | Which one of following is correct condition to check the stability of system? | | | | CO1 |  |
|  | a. Bounded I/P unbounded O/P | b. Bounded I/P bounded O/P | c. unbounded I/P bounded O/P | d. unbounded I/P unbounded O/P |  | (1) |
| 15. | Fourier Transform of continuous non-periodic signal is | | | | CO2 |  |
|  | a. aperiodic | b. periodic | c. none | d. 0 |  | (1) |
| 16. | ------------- property of Fourier Transform states that the compression in time domain is equivalent to expansion in the frequency domain | | | | CO2 |  |
|  | a. Scaling | b. Shifting | c. Reversal | d. Linearity |  | (1) |
| 17. | The quantity |X(jω)|2plotted against ω is termed as -----------------of the signal | | | | CO2 |  |
|  | a. energy spectrum | b. power spectrum | c. frequency spectrum | d.phase spectrum |  | (1) |
| 18. | The ratio of Fourier transform of output and input of a system is called ------- | | | | CO2 |  |
|  | a. Laplace Transform | b. Z-transform | c. Transfer Function | d. efficiency |  | (1) |
| 19. | By using time shifting property, Continuous time Fourier transform of x(t-3) is --- | | | | CO2 |  |
|  | a. X(jω) | b. e(-j3ω) X(jω) | c. e(j3 ω)X(jω) | d. e(-j3 ω) |  | (1) |
| 20. | Continuous time Fourier Transform of δ(t) is --------- | | | | CO2 |  |
|  | a. 1/2π | b. 2π | c.0 | d. 1 |  | (1) |

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| 21. | Find inverse LT of X(s)=(3s+4)/(s+1)(s+2) | | | | CO2 |  |
|  | 1. x(t)=   e-tu(t)-e-2tu(t) | 1. x(t)=   e-tu(t)-e-3tu(t) | 1. x(t)=   e-2tu(t)-e-2tu(t) | 1. none |  | (1) |
| 22. | Check the system for its stability and causality. The impulse response of the system is h(t)=e-tu(t) | | | | CO2 |  |
|  | a. causal and stable | b. causal or stable | c. causal only | d. stable only |  | (1) |
| 23. | Find the inital,final values of the following signal X(s)=(2s+3)/(s2+5s+6) | | | | CO2 |  |
|  | a. 2,0 | b. 0,2 | c. 1,1 | d. 1,-1 |  | (1) |
| 24. | Find the transfer function of the system which is described by the differential equation dy(t)/dt+3y(t)=x(t) | | | | CO2 |  |
|  | a. 1/(s+3) | b. 1/(s+2) | c. 1/s | d.0 |  | (1) |
| 25. | What are the poles of [e(-3t)+ e(-2t)] u(t) signal | | | | CO2 |  |
|  | a. 2 & 3 | b. -2 &- 3 | c. -3, 2 | d. -2,3 |  | (1) |
| 26. | The signal x(t) can be recovered from xp (t) by means of a | | | | CO2 |  |
|  | a. low pass filter with gain T | b. lowpass filter with gain T and cut off frequency greater than M | c. lowpass filter with gain T and cut off frequency greater than M  and less than s -M | d. lowpass filter with gain T and cut off frequency greater than M  and less than s +M |  | (1) |
| 27. | A bandlimited signal with maximum frequency fm  can be fully recovered from its samples if sampled at a frequency greater than or equal to | | | | CO2 |  |
|  | a. fm | b. 2 fm | c. fm /2 | d. 4fm |  | (1) |
| 28. | A signal having a spectrum ranging from o to 10KHZ is to be sampled and converted to discrete form. What is the minimum number of samples per sec that must be taken to ensure recovery? | | | | CO2 |  |
|  | a. 20,000 | b. 2000 | c. 10,000 | d. 1000 |  | (1) |
| 29. | A signal is sampled at greater than nyquist rate is said to be ---------------- | | | | CO2 |  |
|  | a. oversampled | b. undersampled | c. reconstructed | d. aliasing |  | (1) |
| 30. | The signal x(t)=10 cos (10Πt) is sampled at a rate of 8 samples per sec.what is the required sampling rate? | | | | CO2 |  |
|  | a. 10 Hz | b. 1 Hz | c. 8 Hz | d. 5 Hz |  | (1) |
| 31. | Find x(n) if x(e-jω)=1-e-jω+2e-2jω+2e-3jω | | | | CO3 |  |
|  | a. {1,-1,2,2} | b. {0,-1,2,3} | c. {0,-1,3} | d. {-1,2,3} |  | (1) |
| 32. | If X(ejω) =1/(1+0.3 e- jω ) then x(n)= ---------- | | | | CO3 |  |
|  | a. (0.3)nu(n) | b. (-0.3)nu(n) | c. (1/3)nu(n) | d. (3)nu(n) |  | (1) |
| 33. | The DTFT of δ(n-k)=------------- | | | | CO3 |  |
|  | a. e-jωk | b. 0 | c. 1 | d. e-jω |  | (1) |
| 34. | The DTFT of u(n)=------------ | | | | CO3 |  |
|  | a. 1/(1-e-jω) | b. e-jωk | c. 1 | d. 0 |  | (1) |
| 35. | Find the frequency response of the system with the impulse response of  h(n)=δ(n)-δ(n-1) | | | | CO3 |  |
|  | a. 1-e-jω | b. e-jω | c. 1-e-jω/2 | d. 1 |  | (1) |
| 36. | If x(n) is a causal sequence then the ROC is the entire Z plane except at ------------ | | | | CO3 |  |
|  | a. z=0 | b. z=1 | c. z=-1 | d. z=-2 |  | (1) |
| 37. | The ROC of the signal x(n)=(0.5)nu(-n) is ------------- | | | | CO3 |  |
|  | a. |z|<0.5 | b. |z|<0.2 | c. |z|>0.5 | d. |z|>0.1 |  | (1) |
| 38. | The ROC of an LTI stable system contains--------------- | | | | CO3 |  |
|  | a. unit circle | b. circle with radius=0.5 | c. circle with radius=0.3 | d.none |  | (1) |
| 39. | Find the Z transform of the signal  x(n)=u(n)-u(n-3) | | | | CO3 |  |
|  | 1. X(z)=   1+z-1+z-2 | 1. X(z)=   1+z-1 | c. X(z)=  1+z-2 | 1. X(z)=1 |  | (1) |
| 40. | The ROC  of the signal x(n)=a|n| is----------- | | | | CO3 |  |
|  | a. a<|z|<(1/a) | b. a<|z| | c. |z|<(1/a) | d. |z|>(1/a) |  | (1) |

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| **PART B(8 X 5 = 40 MARKS) (ANSWER ANY EIGHT)** | | | |
| 41. | Check the following signals are energy signal or power signal and obtain the corresponding energy,power values.   1. x(t)=cos t 2. x[n]=(1/3)nu(n) | CO1 | (5) |
| 42. | Find the convolution of two infinite duration sequence h(n)=anu(n) for all n and x(n)=bnu(n) for all n | CO1 | (5) |
| 43. | The impusle response of the system is h(t)=u(t-3) and input the is x(t)=e2tu(-t) find the response of the system y(t) using convolution. | CO1 | (5) |
| 44. | Find the Frequency response of an LTI system described by the differential equation | CO2 | (5) |
| 45. | A signal has laplace transform of X(s)=s+2/(s2+4s+5) find the LT of Y(s) for the following signals (i) y1(t)=e-tx(t) (ii)y2(t) = x(2t) | CO2 | (5) |
| 46. | Find the laplace transform and ROC for the following signals x(t)=e-b|t| | CO2 | (5) |
| 47. | Find the Nyquist rate and Nyquist interval for the following signal  x(t)= sin(4000πt) sin(1000πt) | CO2 | (5) |
| 48. | Consider a LTI system which is characterized by the difference equation  y(n)-(3/4)y(n-1)+(1/8)y(n-2)=2x(n) Find the impulse response of the system | CO3 | (5) |
| 49. | State and prove the Time shifting and convolution properities of DTFT | CO3 | (5) |
| 50. | Using Z transform find the convolution of two discrete time sequences  x1(n)={1,2,-1,0,3}   x2(n)={1, 2,-1} | CO3 | (5) |
| **PART C( 2 X 10 = 20 MARKS) (ANSWER ANY TWO)** | | | |
| 51. | Check  the following systems are a) static or dynamic b) linear or non linear c) causal or noncausal d)time variant or time invariant  y(t)=10 x(t)+5 | CO1 | (10) |
| 52. | Find the Continuous time Fourier Transform of the following   1. x(t)= e(-at) u(t) (b) x(t)= e(-3t)[u(t+2)-u(t-3)] | CO2 | (10) |
| 53. | By using Long Division method,Find the inverse Z transform of  X(Z)=(1+2z-1)/(1-2z-1+z-2) when  a) x(n) is causal  b)  x(n) is anti causal | CO3 | (10) |

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