**Code No.PC302EC**

**METHODIST COLLEGE OF ENGINEERING & TECHNOLOGY (An Autonomous Institution)**

**B.E. (ECE) III-Semester (AICTE) (Supplementary) Examination, Aug -2023**

**Subject: SIGNALS AND SYSTEMS**

**Time: 3 hours Max.Marks:60**

**Note: Missing data, if any, maybe suitably assumed.**

**PART-A**

**Answer all the questions.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q.No.** | **Questions** | **Marks** | **CO** | **BTL** |
| 1. a  | Check whether the given signal is an energy or power signal x(t) = e-3t.u(t)  | 2 | 1 | L2 |
| b | Define Causal system with example. | 2 | 1 | L1 |
| c | Define exponential Fourier series. | 2 | 2 | L1 |
| d | State the condition for orthogonality between the signals x(t) and y(t). | 2 | 2 | L1 |
| e | Find the Fourier Transform of e-2t u(t).  | 2 | 3 | L2 |
| f | Find the Laplace transform and ROC of the signal x(t)=$e^{-at}.u\left(t\right)$ | 2 | 3 | L2 |
| g | Determine whether the system y(n)=$x^{2}(n-2)$ is linear or non-linear system? | 2 | 4 | L2 |
| h | Find the DTFT of the unit step function? | 2 | 4 | L2 |
| i | Find the transfer function of the system given by y(n-2)+2y(n-1)+3y(n)=x(n-1)+4x(n) using Z-Transform. | 2 | 5 | L2 |
| j | Using initial value theorem, find x($0$), if X(z) =$\frac{z+3}{\left(z+1\right)(z+2)}$ | 2 | 5 | L2 |

**PTO**

**PART-B**

**Answer Any Five questions**.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q.No.** |  | **Questions** | **Marks** | **CO** | **BTL** |
| 2. | a | For the signal x(t) given below, sketch the following signals. i. x(t -2)ii. x(2t+3)iii. x($\frac{ 3}{2}$ t) iv. x(1 - t) | 5 | 1 | L2 |
| b | Explain the continuous elementary signals.  | 3 | 1 | L1 |
| 3. | a | Determine the trigonometric form of Fourier series representation of the signal x(t) as shown in figure. | 5 | 2 | L3 |
| b | Check whether the following signals are orthogonal or not?X1(t)=Sinnwot and X2(t)=Cosmwot[to, to+(2π/wo)] | 3 | 2 | L2 |
| 4. | a | State & prove the Fourier Transform properties.  a) Time shifting property b) Convolution in time domain | 4 | 3 | L2 |
| b | Find the inverse Fourier transform of the function X(w)=$\frac{4jw+6}{(jw)^{2}+6jw+8}$ | 4 | 3 | L3 |
| 5. | a | State and prove Sampling Theorem with neat Sketch?  | 5 | 4 | L2 |
| b | Find the DFT of the given periodic sequence$$x\left(n\right)=\{ 1,2,3,4\}$$ | 3 | 4 | L2 |
| 6. | a | State and Prove Initial value theorem and final value theorem of Z-Transform? | 4 | 5 | L2 |
| b | Find the inverse Z-Transform of the signal X(z)= $\frac{3z}{\left(z-1\right)(z-2)}$ by using partial fractions method, if 1. ROC: $\left|Z\right|>2$
2. ROC: $\left|Z\right|<1$
 | 4 | 5 | L3 |
|  |  |  |  |  |  |
| 7. | a | Check whether the following system is static or dynamic, causal or non-causal? y(t)=x(t)+x(t-2) | 4 | 1 | L2 |
| b | State and prove properties of Laplace transform. (i)Linearity property (ii) Time shifting property | 4 | 2 | L2 |
| 8. | a | Find the unilateral Laplace transform and ROC of the signal x(t)=$sinw\_{0}t$ | 4 | 3 | L3 |
| b | Find the DTFT of the signal x(n)=cos$w\_{0}$n.u(n) | 3 | 4 | L2 |
| 9. | a | Find the Z-transform and ROC of the signal x(n)=$-a^{n}.u\left(-n-1\right)$ | 4 | 5 | L3 |
| b | Find the inverse Laplace transform of the signal X(s) =$\frac{s+4}{s^{2}+5s+6}$ by using partial fractions method? | 4 | 3 | L3 |

**\*\*\*\*\*\***