Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, Dec 2021

Course: Signals and System **Semester: IV**
Program: B.Tech Electronics & Commn Engg and B.Tech Mechatronics **Time 03 hrs.**
Course Code: ECEG 2010 **Max. Marks: 100**

Instructions:

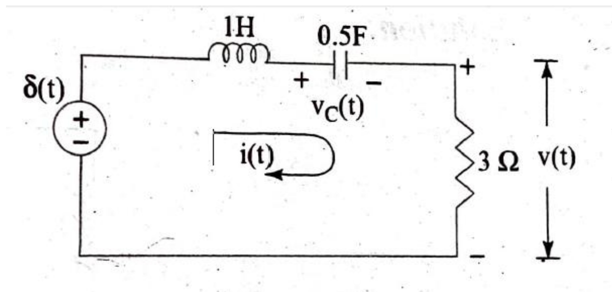
- Attempt all questions as per the instruction.
- Assume any data if required and indicate the same clearly.
- Unless otherwise indicated symbols and notations have their usual meanings.
- Strike off all unused blank pages

SECTION A **5Qx 4=20**
Write only answer in the text box(for S.No:1 & 2 write ONLY the final answer)

S. No.	Question	Marks	CO
Q1.	Find the even and odd components of the signal x(t)=Cos t + Sin t.	**4**	**CO1**
Q2.	Define energy of the signal and find whether the given x (n) = $\left(\frac{1}{4}\right)^n$ u (n) is an energy signal or power signal	**4**	**CO2**
Q3.	List the Applications of Laplace transform with examples.	**4**	**CO2**
Q4.	Distinguish Fourier transform and Laplace Fourier transform	**4**	**CO3**
Q5.	Define convolution.	**4**	**CO3**

SECTION B **4Qx10=40**

S. No.	Question	Marks	CO
Q6.	(i)Sketch the waveforms of the following signals: (a) if x(t) = u(t - 3) - u(t - 1) (b) $x(t) = e^{-2t}u(-2+t)$ (ii)Name the signals whether they are causal and non causal? (a) x(t) =e^2t u(t+ 2) (b) y(t) = u[t-4] – u[t-2] (c) x[n]={1,-1,2,2} (d) x[n]=2^nu[n]	**6+4**	**CO1**
Q7.	Find the Fourier Transform of (i) x(t) = e^{-2t} u(t+6) (ii) x(t) = Sinωt u(t)	**10**	**CO2**

Q8.	Explain the significance of LT in determining the Initial and Final values of a function in time domain. Find the initial value and final value of the function $$X(s) = \frac{(s+6)}{(s^2-3s+2)}$$	**10**	**CO3**
Q9.	Determine the voltage across the resistor as a function of time for t>0. If the current in the circuit i(0) = Vc(0)=0 from the figure 1 using suitable transform.  Fig 1	**10**	**CO4**
	SECTION C		**2Qx20=40**
Q10.	a. Determine the Z.T and ROC of the causal sequence $x[n]=\{\underset{\uparrow}{\mathbf{1}},2,-2,-4,1\}$ b. Determine Z.T and ROC of a function $y[n]=(2/3)^n u[n]+(-1/4)^n u[n]$ **.** c. Consider the signal $x[n] = \left(\frac{1}{5}\right)^n u[n-4]$, Evaluate the z-transform of this signal and specify the corresponding region of convergence	**20**	**CO4**
Q11.	a. A causal LTI system is described by the difference equation y(n)=y(n-1)+y(n-2)+x(n)+2x(n-1) Determine the system function and frequency response of the system. Plot the poles and zeroes and indicate the ROC. Determine the stability and impulse response of the system. b. Using the properties of inverse Fourier transform, of c. $X(j\omega) = \pi\delta(\omega-\omega_0) + \pi\delta(\omega+\omega_0)$ d. $X(j\omega) = \frac{1}{(1+j\omega)^2}$	[12+4+4]	**CO4**

	(OR) e. Find inverse Laplace transform of X(S)= $\frac{s+1}{(s+2)(s+3)}$ f. D.T.FT of the signal (i) x[n]={1,-1,2,2} (ii)$x[n]=a^n u[n]$ g. Using Z.T find convolution of two sequences $x_1[n]$=={1,2,-1,1,3}& $x_2[n]$=={1,4,-1}	[6+6+8]	