Name:

Enrolment No:

UPES
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UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
Online End Semester Examination, December 2020

Course: Signals & Systems **Semester: III**
Program: B Tech ECE; B Tech Mechatronics Engg **Time 03 hrs.**
Course Code: ECEG2010 **Max. Marks: 100**

Instructions:

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

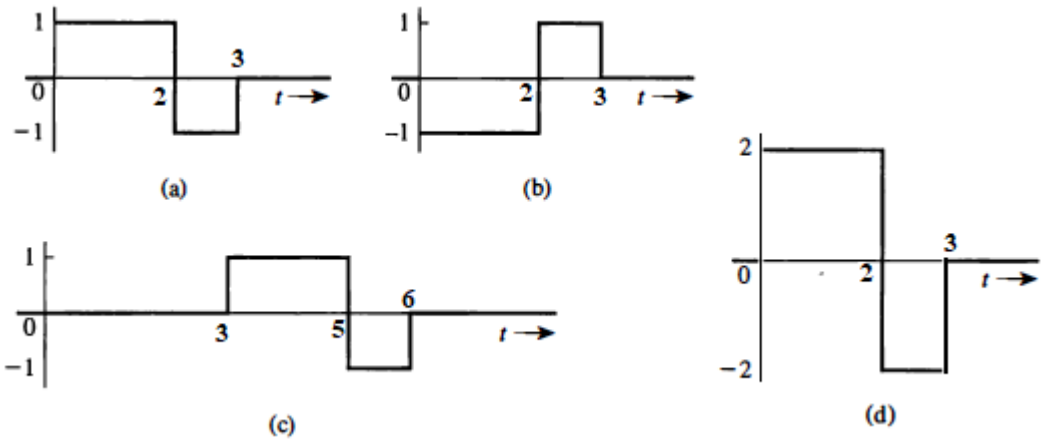
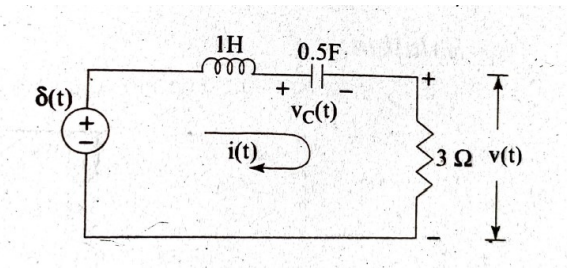
SECTION A **(6x5=30 M)**

S. No.	**Write only answer in the text box(for S.No:1,4 &6 write ONLY the final answer)**	**Marks**	**CO**
Q1.	Find whether the signals are periodic or not. (i)$x(t) = 2\cos(10t + 1) - \sin(4t - 1)$ (ii)$x(t) = u(t) - 1/2$	**5**	**CO 1**
Q2.	Write the Relation between S-Plane and Z-Plane	**5**	**CO 2**
Q3.	Distinguish between DTFT and FT . Distinguish between Sequence and Signal.	**5**	**CO 3**
Q4.	Using Z.T find convolution of two sequences $X_1[n]=\{1,1,0,-1,0,3\}$ & $X_2[n]=\{1,1,-1\}$	**5**	**CO 3**
Q5.	Distinguish Differential and Difference equations in the perspective of Signals	**5**	**CO 4**
Q6.	Consider an LTI system with a system function $H(z) = \frac{1}{1-\left(\frac{1}{2}\right) z^{-1}}$ Find the difference equation.	**5**	**CO 4**

SECTION B **5x10=50M**

Write answers, scan and upload.

Q7.	For the signal x (t) illustrated in **Fig.1** , sketch $x(t-4); x(2t-4); and\ x(2-t)$	**10**	**CO 1**

	 **Fig. 1**		
Q8.	(i)Find the Fourier transform of $x(t)=e^{-2t}\,u(t-1)$ (ii)Find the inverse Fourier Transform of $X(j\omega)=j\omega/(3+j\omega)^2$	**5+5**	**CO 2**
Q9.	(i)Find the Laplace transform of $$x(t)=\begin{cases} e^{t}\sin(2t); & t\le 0 \\ 0; & t>0 \end{cases}$$ Indicate the location of its poles and its region of convergence. (ii)Plot the pole –zero diagram of the following transfer function $H(S)=\frac{S+2}{S^2+2S+2}$	**5+5**	**CO 2**
Q10.	(i)Obtain the voltage across the resistor as a function of time for t>0. Assume that i(0)=Vc(0)=0[**Fig.2]**  **Fig.2** **(ii)** Write about initial and final value theorem and it's applications.	**8+2**	**CO 3**
Q11.	(i)Consider the signal $x[n]=\left(\frac{1}{5}\right)^{n}u[n-3]$, Evaluate the z-transform of this signal ar specify the corresponding region of convergence. (ii) Find the DTFT of $x[n]=\delta[n+2]-\delta[n-2]$	**8+2**	**CO 4**

	SECTION-C Write answers, scan and upload.		1X20=20M
Q12.	(i)Determine the system function of discrete time system described by the difference equation $y[n]-\frac{1}{3}y[n-1]+\frac{1}{5}y[n-2]=x[n]-2x[n-1]$ (ii)Using long division method determine the Inverse Z.T of a signal if x[n] is causal sequence on $X(Z)=\frac{1+2Z^{-1}}{1-2Z^{-1}+Z^{-2}}$ **(Or)**	**10+10**	**CO 4**
	(i) Evaluate the impulse response of an LTI system described by differential equation differential equation $\frac{d^2y(t)}{dt^2}$ - $\frac{dy(t)}{dt}$ - 2y(t) =x (t). (ii)A causal system is represented by $H(z)=\frac{z+2}{z^2-3z+4}$ determine difference equation and the frequency response of the system. (iii)Determine D.T.FT of the signal (i) x[n]={1,-1,2,2} (ii)$x[n]=2^n u[n]$	8+8+4	