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

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

Course: Signals and Systems — **Semester: IV**
Program: B. Tech- ASE (AVE) — **Time 03 hrs.**
Course Code: ECEG -2010 — **Max. Marks: 100**

Instructions: (i) Answer all the questions.

SECTION A (30 Marks)

Each Question will carry 5 Marks
Instruction: Write briefly (5-6 lines)

S. No	**Attempt all the questions. Assume data, if not given.**	**CO**
Q 1	Differentiate continuous-time and discrete-time signals. Define few examples of signals with suitable explanation.	**CO1**
Q 2	Define and give the applications of Fourier transform.	**CO2**
Q 3	Define and give the applications of trigonometric Fourier series. Why do we need Fourier series representation?	**CO3**
Q 4	Explain transfer function of system. What is role of transfer function to determine the system response/behavior?	**CO4**
Q 5	Differentiate the Laplace transform and Z- Transform. Also, write any five properties name of Z-transform.	**CO5**
Q 6	Differentiate the time variant and time-invariant systems with industrutrial based applications in the field of Aerospace or Electrical Engineering especially.	**CO1**

SECTION B (50 Marks)

Each question will carry 10 marks
Instruction: Attempt all the questions

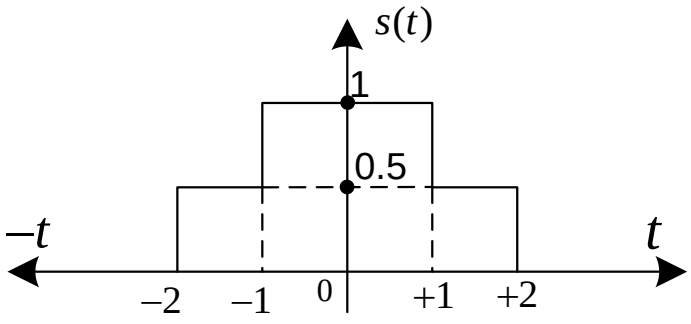
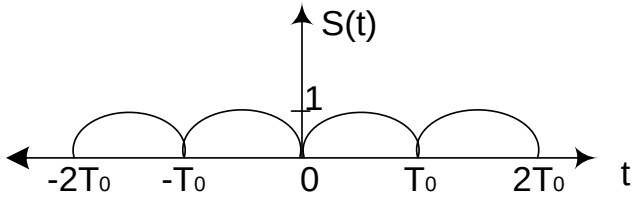
Q 1	Determine the normalized energy and power of the signal $$S(t) = 4e^{j2\pi t}u(t)$$	**CO1**
Q 2	Determine the Continuous-time Fourier Transform (CTFT) of the signal shown in Fig. (1) 	**CO2**

	Fig. (1)	
Q 3	Find the trigonometric Fourier series representation for the full wave rectified sine wave shown in Fig. (2) as,  **Figure (2)**	**CO2**
Q 4	Find the DTFT of given functions: (i) $f(n) = \gamma^n u(n)$ (ii) $s(n) = \left(\frac{1}{2}\right)^{-n} u(-n-1)$	**CO3**
Q 5	Consider the following transfer function $\frac{C(s)}{R(s)} = \frac{1}{S^2+k_1S+k_2}$. Determine the state space representation.	**CO4**

SECTION-C

Each Question carries 20 Marks.
Instruction: Write long answer.

Q 1	**Attempt both the parts:** **(a)** Determine the system function H(Z) and the frequency response of the system whose impulse response is given as, $$h(n) = \frac{1}{2}\left[\left(\frac{1}{2}\right)^n + \left(-\frac{1}{4}\right)^n\right]u(n)$$ Also locate zeros and poles in Z-plane. **(b)** Let a system be given by $s(n+2) - 5s(n+1) + 6s(n) = s(n)$ Evaluate the output response $s(n)$, when input $s(n) = \delta(n)$ and initial conditions are zero.	**CO5** **(10+10)**

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