

Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

EVENING

[Total No. of Questions: 09]

09 MAR 2021

[Total No. of Pages: 2]

Uni. Roll No.

Program/ Course: B.Tech (Sem. 4th)
Name of Subject: Signals and Systems
Subject Code: PCEE-108
Paper ID: 16189

Time Allowed: 3 Hours

Max. Marks: 60

NOTE:

- 1) Parts A and B are compulsory
- 2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
- 3) Any missing data may be assumed appropriately

Section – A

[Marks: 02 each]

Q1.

- a) Define deterministic and random signals.
- b) What is the period T of the signal $x(t) = 2 \cos(t/4)$.
- c) Differentiate Time-invariant and Time-variant system.
- d) What are the Dirichlet Conditions?
- e) List the property of CT Fourier Series.
- f) Define sampling theorem.

Section – B

[Marks: 04 each]

- Q2. Evaluate the power and energy of signal $y(t) = \cos(t) + j\sin(t)$. If the energy of signal $x(t)$ is E then calculate the energy of signal $x(-at+b)$.
- Q3. A discrete time signal is given as $x(n) = n \left(-\frac{1}{2}\right)^n u(n) \otimes \left(\frac{1}{4}\right)^n u(-n)$ solve it using convolution property.
- Q4. State initial and final value theorem of Laplace transform.
- Q5. Explain the state space representation of system with appropriate example.
- Q6. An analog signal is expressed by the equation $x(t) = 3 \cos 50\pi t + 10 \sin 300\pi t - \cos 100\pi t$. Calculate the Nyquist rate for this signal.
- Q7. Derive mathematically coefficient a_0 , a_n , b_n of Fourier series.
- Q8. Differentiate DTFT and DFT.

Q9. Determine the Fourier transform of $x(t) = e^{-t}u(t)$ and sketch

- a) $X(\omega)$ b) $\text{Re } X(\omega)$ c) $\text{Im } X(\omega)$

OR

Explain modulation for communication. Also discuss the filtering & feedback control systems.

Q10. Explain the below terms:

- a) ROC in Z transforms
b) Causal & Non-causal
c) Parseval's Theorem
d) Multi input and multi output system

OR

Explain the different types of signals with appropriate example.
