

KTU B.Tech S4 model Questions for Signals & Systems

MODEL QUESTION PAPER Prepared by ktubtechquestions.com

FOURTH SEMESTER B.TECH DEGREE EXAMINATION

May/June 2017

EC202 Signals and Systems

Time: 3 Hrs

Marks: 100

PART A

(Answer **any One from 1 and 2**. Q.No: 3 is Compulsory)

1. a) Define the following continuous functions.
(i) Signum function (ii) Sync function (**3 mark**)
b) Plot the signals

$$y(t) = u(t+1) - 2u(t-1) + u(t-3) \quad (7 \text{ marks})$$

OR

2. a) Determine the odd and even part of the signal, $x(t) = (1+t^3) \cos 3.14t$
(**2 marks**)

b) Check whether the following signals are Energy signals or power, Also determine energy / power.

(i) $x(t) = A \cos (\omega_0 t + \theta)$

(ii) $x(t) = u(t+1)$ (**8 Marks**)

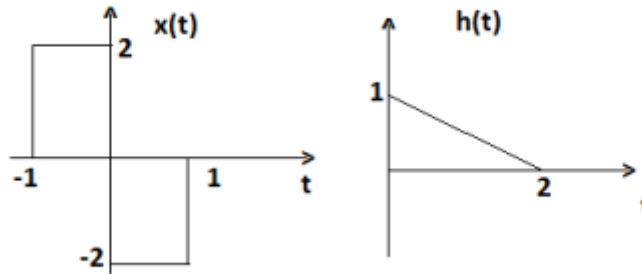
3. (a) Determine the convolution of signals $x_1(t) = \cos t u(t)$, $x_2(t) = tu(t)$.

(4 Marks)

(b) Plot the signals (6 marks)

$$y(t) = x_1(t) + x_2(t), \text{ where } x_1(t) = \begin{cases} 1; & 0 < t < 1 \\ 2; & 1 < t < 2 \\ 1; & 2 < t < 3 \end{cases} \quad x_2(t) = \begin{cases} t; & 0 < t < 1 \\ 1; & 1 < t < 2 \\ 3-t; & 2 < t < 3 \end{cases}$$

(c) Graphically determine the convolution of signals (10 Marks)



PART B

(Answer any One from 4 and 5. Q.No: 6 is Compulsory)

- 4 i) Find LT of $x(t) = e^{2t} (u(t) - u(t-4))$ (4 Marks)

ii) Find the complex exponential Fourier series representation of the signal given by $x(t) = \cos \omega_0 t$.

(6 marks)

OR

5 i) Plot Magnitude spectrum and Phase spectrum of the signal $x(t) = e^{-at} u(t)$. (6 marks)

ii) Write down the time convolution property of Fourier Transform

(4 marks)

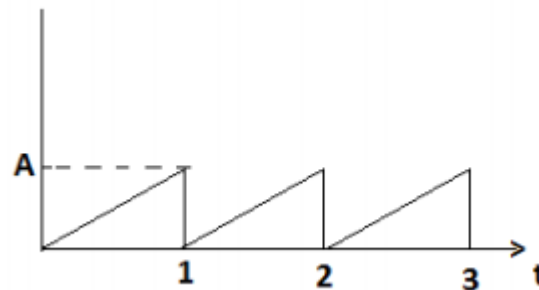
6 i) Verify initial value theorem for the function $x(t) = 2 - e^{-5t}$ (5 marks)

ii) State and prove convolution theorem of Fourier series. (5 marks)

iii) Write down the time convolution property of Fourier Transform

(5 marks)

iv) Expand the function $x(t)$ shown, by trigonometric Fourier series over interval (0,1)



(5 Marks)

PART C

(Answer any One from 7 and 8. Q.No: 9 is Compulsory)

7 i) What are the different sampling techniques? Explain in detail. (7 marks)

ii) Write a note on Discrete Hilbert Transform. (3 marks)

OR

8 i) Determine Z transform and ROC of the signal $x(n) = u(n) - u(n-8)$

(6 Marks)

ii) Find DTFT of the sequence $x(n) = -a^n u(-n-1)$ (4Marks)

9 i) A band limited signal $x(t)$ is sampled by a train of pulses of width τ and period T . Determine the spectrum of sampled signal and sketch it. Also find expression for sampled signal (10 marks)

ii) Find the Inverse Z transform of the signals (10 marks)

$$(i) X(Z) = \frac{1}{1-15z^{-1}+0.5z^{-2}} \quad \text{for ROC } |z| > 1$$

$$(ii) X(Z) = \frac{5z^3-29z^2+8z+60}{z^2-7z+10}$$