

[06 – 2205]

II/IV B.E. DEGREE EXAMINATION.

Second Semester

Electrical and Electronics Engineering
SIGNALS AND SYSTEMS

(Common with Electronics and Communication
Engineering and Dual Degree Programme in
ECE and EEE)

(Effective from the admitted batch of 1999-2000 and
after batches)

Time : Three hours

Maximum : 70 marks

Question No. 1 is compulsory.

Answer any FOUR from the remaining.

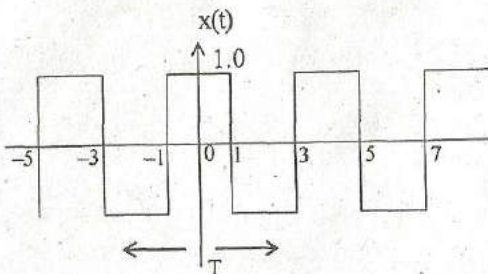
All questions carry equal marks.

1. (a) Define unit Signum function.
- (b) What is even symmetry? How does it help in simplification of calculations?
- (c) What are Dirichlet's conditions? State them.
- (d) What is meant by system bandwidth and signal bandwidth and give differences between them.

7. (a) What is the relation between Fourier transform and z-transform? What is ROC and explain its properties?
- (b) Find the z-transform and ROC of $x(z)$ for $x(n) = 3\left(\frac{5}{7}\right)^n u(n) + 2\left(\frac{-1}{3}\right)^n u(n)$.
8. (a) What is meant by Hilbert transform? Mention its properties and hence find the Hilbert transform of $x(t) = \cos \omega_0 t$.
- (b) Determine energy spectral density of $x(t) = e^{-at} u(t)$.

- (e) State sampling theorem.
- (f) Find the fundamental period of continuous time signal. $x(t) = 20 \cos(10\pi t + \pi/6)$.
- (g) Write the properties of autocorrelation of energy signal.
2. (a) Explain the basic properties of the system with examples.
- (b) Sketch the following signal and mention whether it is energy or power signal and calculate their energy or power.
- (i) $x(t) = \text{rect}(t/\tau)$
- (ii) $x(t) = Ae^{-\alpha t}u(t), \alpha > 0$.
3. (a) Find the output response $y(n)$ for the input $x(n) = \alpha^n u(n)$ and $h(n) = u(n)$ using convolution.
- (b) For the signal $x(t)$, find the signals.
- (i) $x(2t+2)$ and $x(t/2-2)$
- (ii) $x(5t/3)$ and $x(3t/5)$
- (iii) $x(-t+2)$ and $x(-t-2)$.

4. (a) Find the trigonometric Fourier series for the periodic signal $x(t)$ given below.



- (b) Find the Fourier series coefficient for the continuous time periodic signal $x(t) = 1.5$ for $0 \leq t \leq 1$.
5. (a) Explain the properties of Fourier transform.
 (b) Determine the Fourier transform of
 (i) $x(t) = 1/t$
 (ii) $x(t) = 1/(1+t^2)$.
6. (a) Using the properties of DTFT, find the following
 (i) $\left(\frac{1}{u}\right)^{|n-2|}$
 (ii) $n3^{-n} u(-n)$
 (b) A discrete system is given by the following difference equation
 $y(n) - 5y(n-1) = x(n) + 4x(n-1)$. Find transfer function, frequency response, magnitude and phase response.