

Code: 9A04304

B.Tech II Year I Semester (R09) Supplementary Examinations June 2016

SIGNALS & SYSTEMS

(Common to EIE, E.Con.E, ECE & ECC)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

- 1 (a) The two periodic functions $f_1(t)$ and $f_2(t)$ with zero dc components have arbitrary waveforms with periods T and $\sqrt{2}T$ respectively. Show that the component in $f_1(t)$ of waveform $f_2(t)$ is zero in the interval $T_1 < t < T_2$.
- (b) State the properties of impulse function.
- 2 (a) Derive polar Fourier series from the exponential Fourier series representation and hence prove that $D_n = 2|C_n|$.
- (b) Show that the magnitude spectrum of every periodic function is symmetrical about the vertical axis passing through the origin.
- 3 Find the Fourier Transform of the following function:
 - (a) A Single Symmetrical Triangular pulse.
 - (b) A Single Symmetrical Gate Pulse.
 - (c) A Single Cosine Wave at $t=0$.
- 4 The output $y(t)$ of a causal LTI system is related to the input by the equation:

$$\frac{dy(t)}{dt} + 10y(t) = \int_{-w}^w x(\tau)z(t-\tau)d\tau - x(t) \text{ where } z(t) = e^{-t}u(t) + 3\delta(t).$$
 - (a) Find the frequency response of this system $H(w)$.
 - (b) Determine the impulse response of this system.
- 5 (a) State sampling theorem for low pass signals and band pass signals.
- (b) What is aliasing effect? How it can be eliminated? Explain with neat diagram.
- 6 (a) Find the average autocorrelation function of the sinusoidal wave: $x(t) = A\sin(\omega t + \gamma)$ where $\omega = \frac{2\pi}{T}$.
- (b) Determine the output of an LTI system whose input and unit sample response are given as follows: $x(n) = b^n u(n)$ and $h(n) = a^n u(n)$.
- 7 (a) State and Explain ROC property of Laplace transform if $x(t)$ is two sided.
- (b) Find the Laplace Transform of the signal $x(t) = e^{-|b|t}$.
- 8 (a) What are the methods by which inverse Z- transformation can be found out?
- (b) Given $X(z) = \frac{1}{(1-az^{-1})}$, $|z| > |a|$. Find $x[n]$ using long division method.
