

FACULTY OF ENGINEERING

B.E. 2/4 (ECE) II-Semester (Main) Examination, April / May 2013

Subject : Signal Analysis and Transform Techniques

Time : 3 Hours

Max. Marks: 75

Note: Answer all questions of Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

1. If $x(t) = \delta'(t+3) - 3\delta(t=3) + 4\delta(t+2)$ then sketch $G(t) = \int_{-\infty}^{+\infty} x(t) dt$. (3)
2. If $x(t) = \cos\left(\frac{\pi}{3}t\right) + \sin\left(\frac{\pi}{4}t\right)$ is $x(t)$ periodic, if periodic, if periodic find the period of $x(t)$. (3)
3. Show clearly the S-plane and Z-plane corresponding. (3)
4. Write the properties of convolution. (3)
5. If $x[n] = -a^n u[-n-1]$ find the Fourier transform of $x[n]$ (3)
6. Write the relation between exponential and trigonometric Fourier series coefficients. (2)
7. What is the Fourier transform of unit step signal? (2)
8. Find the Laplace transform of $x(t) = e^{-at} u(-t)$. (2)
9. Express the ramp sequence in terms of step sequence. (2)
10. Clearly show that the unit step sequence is a power or energy signal. (2)

PART – B (5x10=50 Marks)

- 11.(a) State and prove the Parseval's power theorem applicable to periodic signals. (5)
 (b) Prove that the half wave symmetric signal contains only odd harmonics in the Fourier series. (5)
- 12.(a) If $x(t) = 1 \quad |t| < a$
 $= 0$ otherwise obtain the Fourier transform of $x(t)$ (5)
- (b) If $X(\omega) = j \frac{d}{d\omega} \left\{ \frac{e^{j2\omega}}{1 + \frac{j\omega}{3}} \right\}$ is the Fourier transform of a signal $x(t)$, then find the signal $x(t)$. (5)
13. Consider a continuous time linear time invariant system for which the input $x(t)$ and output $y(t)$ are related by $\frac{d^2 y(t)}{dt^2} + \frac{dy(t)}{dt} - 2y(t) = x(t)$
 (a) Find the system function (4)
 (b) Determine the impulse response for each of the following cases:
 (i) the system is stable (3)
 (ii) the system is causal and stable (3)