

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2023

B.Tech-3rd Semester (ECE)

COURSE CODE(CREDITS):18B11EC412

MAX. MARKS: 25

COURSE NAME:FUND. OF SIGNALS AND SYSTEMS

COURSE INSTRUCTORS: Dr Rajiv Kumar

MAX. TIME: 1 Hour 30 Minutes

Note: (a) All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Qu-1: Let $y(t)$ is convolution of following two signals:

$$x(t) = e^{2t}u(-t),$$

$$h(t) = u(t-3)$$

Plot all the signals $x(t)$, $h(t)$ and $y(t)$

[4, CO-2]

Q-2: Find, $H(s)$ and $y(t)$ using the following functional relationship:

$$H(s) = \int_{-\infty}^{\infty} h(\tau) \cdot e^{-s\tau} d\tau$$

$$\text{and } y(t) = \int_{-\infty}^{\infty} x(t-\tau) \cdot h(\tau) d\tau$$

When signals are given $x(t) = \exp(j2t)$ and $h(t) = \delta(t-3)$

[4, CO-3]

Q-3: a) What is significance of Fourier series for the analysis of signals?

[1.5, CO-3]

b) Consider following periodic signal $x(t)$ with fundamental frequency 2π :

$$x(t) = \sum_{k=-3}^1 a_k e^{jk\omega_0 t}$$

Graphically plot all these signals:

(i) $x_0(t)$, (ii) $x_1(t)$, $x_0(t) + x_1(t)$ (iii) $x_2(t)$, (iv) $x_0(t) + x_1(t) + x_2(t)$, (v) $x_3(t)$,

(vi) $x_0(t) + x_1(t) + x_2(t) + x_3(t)$

[3, CO-3]

Q-4: Calculate the coefficients for the continuous-time periodic signal

$$x(t) = \begin{cases} -2, & 0 \leq t < 1 \\ 2, & 1 \leq t < 2 \end{cases}$$

Assume fundamental frequency, $\omega_0 = \pi$

[4, CO-3]

Q-5: Find the Fourier Transform of $x(t) = e^{-at}u(t)$ $a > 0$

Also, draw $X(\omega)$ with respect to frequency ω

[4, CO-3]

Q-6: a) What are three Dirichlet conditions related to Fourier series?

[2, CO-3]

b) In reference to Fourier series, what do you mean by the Parseval's relation. Explain it giving one example?

[2.5, CO-3]