**Class Test No. 04 Thursday 22nd Aug 2019 Duration: 10 Minutes Closed notes**

Name: _____ Roll No. _____

**Choose only one option which is the most appropriate for questions 1 - 5.**

***1. Laplace transform of unit impulse input is***

(a) 1/s
(b) s
(c) 1
(d) t

***2. Laplace transform of c(t) (i.e. C(s)) as described by equation*** $T\dot{c}(t) + c(t) = 0$ ***is***

(a) c(0)/(s + T)
(b) sc(0)/(Ts + 1)
(c) c(0)/(Ts + 1)
(d) sc(0)/(s + T)

***3. For Laplace transform to exist f(t) should***

(a) tend to zero as $t \to \infty$
(b) tend to zero as $t \to 0$
(c) be continuous and 1st derivative should exist
(d) be at least piece-wise continuous

***4. In the context of unit impulse response of a second order system, g(0+) is***

(a) 1/m
(b) 0
(c) 1/k
(d) 1/c

***5. In the convolution integral approach, input is modelled as a sequence of***

(a) ramps of unit slope
(b) ramps of width 'dτ'
(c) rectangles of unit height
(d) rectangles of width 'dτ'

**Give short (1 - 2 lines) answer to the questions 6-10.**

***6. Give the expression for unit impulse response of the following system.*** $T\dot{c}(t) + c(t) = r(t)$

$$g(t) = \left(1/T\right) e^{-t/T}$$

***..... 2 (PTO)***

***7. Give the expression for y(t) for a system having g(t) as impulse response and u(t) as the input, using the convolution concept.***

$$y(t) = \int_0^t g(t-\tau)u(\tau)d\tau$$

***8. Give the integral expression for the Laplace transform F(s) of a function f(t).***

$$F(s) = \int_0^\infty e^{-st} f(t)dt$$

***9. What is the main limitation of the convolution integral approach for generating the forced response?***

The main limitation of the convolution integral approach is its lack of scalability for higher order systems and arbitrary inputs.

***10. How can we obtain the Laplace transform for the integral of a function?***

We can obtain the Laplace transform of integral of a function by dividing the Laplace transform of the function by the Laplace variable, ‘s’.