

Engineering Mathematics(1)

Started on	Thursday, 5 August 2021, 1:00 PM
State	Finished
Completed on	Thursday, 5 August 2021, 1:39 PM
Time taken	39 mins 46 secs
Grade	5.50 out of 6.00 (92%)

Question 1

Correct
Mark 1.00 out of 1.00
Flag question

Find the inverse Laplace transform of $F(s) = \frac{8}{(s-6)^4}$

Select one:

- ☐ a. $3t^2 e^{-6t}$
- ☐ b. $\frac{4}{3}t^3 e^{-6t}$
- ☒ c. $\frac{4}{3}t^3 e^{6t}$
- ☒ d. $3t^4 e^{6t}$



Question 2

Correct
Mark 1.00 out of 1.00
Flag question

The piecewise function

$$f(t) = \begin{cases} 3t, & 0 < t < 3 \\ 6, & t > 3 \end{cases}$$

can be written in terms of the unit step function as

$$f(t) = a(t) + b(t) \cdot u_c(t).$$

Find a(t), b(t), and c

Select one:

- ☐ a. $a(t) = 3t$ $b(t) = 6$ $c = 3$
- ☐ b. $a(t) = 3t$ $b(t) = 6 - 3t$ $c = 0$
- ☐ c. $a(t) = 6 - 3t$ $b(t) = 3t$ $c = 3$
- ☒ d. $a(t) = 3t$ $b(t) = 6 - 3t$ $c = 3$



Question 3

Correct
Mark 1.00 out of 1.00
Flag question

The Laplace transform of the function $f(t) = \frac{t^4}{e^{-7t}}$ is

Select one:

- ☐ a. $F(s) = \frac{120}{(s-7)^5}$
- ☒ b. $F(s) = \frac{24}{(s-7)^5}$
- ☒ c. $F(s) = \frac{120}{(s+7)^5}$
- ☐ d. $F(s) = \frac{24}{(s-7)^8}$



Question 4

Partially correct
Mark 0.50 out of 1.00
Flag question

Use Laplace transform to solve the IVP

$$y' - y = f(t) \text{ where } f(t) = \begin{cases} 0, & 0 < t \leq 1 \\ 1, & t > 1 \end{cases}$$

with the condition $y(0) = 0$.

Solution:

1. We apply Laplace transform to the ODE to transform it into an equation containing s and $Y = L(y)$. The resulting eqn is given by

A. $sY - Y = \frac{e^{-s}}{s}$

B. $sY - Y = \frac{1 - e^{-s}}{s}$

C. $sY - Y = \frac{1}{s}$

Answer:

A



2. We compute Y as a function in s:

A. $Y = \frac{1 - e^{-s}}{s(s-1)}$

B. $Y = \frac{1}{s(s-1)}$

C. $Y = \frac{e^{-s}}{s(s-1)}$

Answer:

C



3. Finally, we compute the IVP solution $y = L^{-1}(Y)$:

A. $y(t) = e^t - 1$

B. $y(t) = e^t - 1 + (1 - e^{t-1}) \cdot u_1(t)$

C. $y(t) = e^{t-1} - 1$

D. $y(t) = (e^{t-1} - 1) \cdot u_1(t)$

Quiz navigation

1	2	3	4	5	6
✓	✓	✓	✗	✓	✓

Show one page at a time

FINISH REVIEW

$$y(t) = (e^{-t} - e^{-2t}) \cdot u_1(t)$$

$$E. y(t) = e^t - e^{t-1}$$

Answer:

C

✖

Question 5

Correct

Mark 1.00 out of 1.00

Flag question

The Laplace transform of the function $f(t) = (t - 3)^3 \cdot u_3(t)$ is

Select one:

☐ a. $F(s) = e^{-3s} \left[\frac{6}{s^4} - \frac{18}{s^3} + \frac{27}{s^2} - \frac{27}{s} \right]$

☒ b. $F(s) = \frac{6e^{-3s}}{s^4}$

✔

☐ c. $F(s) = e^{-3s} \left[\frac{6}{s^4} - \frac{36}{s^3} + \frac{108}{s^2} - \frac{216}{s} \right]$

☐ d. $F(s) = \frac{6e^{-s}}{s^4}$

Question 6

Correct

Mark 1.00 out of 1.00

Flag question

Find the Laplace transform of the function

$$f(t) = \cos t, \quad t \in [0, \pi].$$

Select one:

☐ a. $\frac{s}{s^2 + 1} (e^{-s} - e^{-\pi s})$

☒ b. $\frac{s}{s^2 + 1} (1 + e^{-\pi s})$

✔

☐ c. $\frac{s}{s^2 + 1} (1 - e^{-\pi s})$

FINISH REVIEW