# PRINTABLE VERSION

## Quiz 6

You scored 80 out of 100

**Question 1**

Your answer is CORRECT.

An object is in simple harmonic motion. Find an equation for the motion given that the period is $\pi/4$ and at time $t = 0$, $y = 1$, and $y' = 0$. What is the equation of motion?

**a)** $y(t) = \sin\left(\frac{1}{4}t + \frac{1}{6}\pi\right)$

**b)** $y(t) = \sqrt{2}\sin\left(8t + \frac{1}{2}\pi\right)$

**c)** $y(t) = \sqrt{2}\sin\left(8t + \frac{1}{4}\pi\right)$

**d)** $y(t) = \sin\left(8t + \frac{1}{2}\pi\right)$

**e)** $y(t) = \sin\left(\frac{1}{8}t + \frac{1}{4}\pi\right)$

**f)** None of the above.

**Question 2**

Your answer is CORRECT.

An object is in simple harmonic motion. Find an equation for the motion given that the frequency is $6/\pi$ and at time $t = 0$, $y = 0$, and $y' = 12$. What is the equation of motion?

**a)** $y(t) = \sin\left(12t + \frac{1}{2}\pi\right)$

**b)** $y(t) = \sqrt{2}\sin\left(12t + \frac{1}{4}\pi\right)$

**c)** $y(t) = \sqrt{2}\sin\left(12t + \frac{1}{2}\pi\right)$

**d)** $y(t) = \sin(12t)$

**e)** ○ $y(t) = \sin\left(\frac{1}{12}t + \frac{1}{4}\pi\right)$

**f)** ○ None of the above.

**Question 3**

Your answer is CORRECT.

Find the general solution of

$$y''' + 3y'' - 6y' - 8y = 0$$

given that $r_1 = 2$ is a root of the characteristic equation.

**a)** ○ $y = C_1 e^{2x} + C_2 e^{-x} + C_3 e^{4x}$

**b)** ○ $y = C_1 e^{2x} + C_2 e^{-x} + C_3 x e^{-x}$

**c)** ◉ $y = C_1 e^{2x} + C_2 e^{-x} + C_3 e^{-4x}$

**d)** ○ $y = C_1 e^{-2x} + C_2 e^{x} + C_3 e^{-4x}$

**e)** ○ $y = C_1 e^{-2x} + C_2 e^{x} + C_3 e^{4x}$

**f)** ○ None of the above.

**Question 4**

Your answer is CORRECT.

Find the general solution of

$$y''' + 9y'' + 24y' + 16y = 0$$

given that $r_1 = -1$ is a root of the characteristic equation.

**a)** ○ $y = C_1 e^{-4x} + C_2 e^{-x} + C_3 x e^{-x}$

**b)** ○ $y = C_1 e^{4x} + C_2 x e^{4x} + C_3 e^{x}$

**c)** ○ $y = C_1 e^{-4x} + C_2 x e^{-4x} + C_3 e^{x}$

**d)** ○ $y = C_1 e^{-4x} + C_2 e^{4x} + C_3 e^{-x}$

**e)** $y = C_1 e^{-4x} + C_2 x e^{-4x} + C_3 e^{-x}$

**f)** None of the above.

**Question 5**

Your answer is CORRECT.

Find the general solution of

$$y^{(4)} + 2y''' + 9y'' - 2y' - 10y = 0$$

given that $r_1$ = -1 + 3$i$ is a root of the characteristic equation.

**a)** $y = C_1 e^{x} + C_2 e^{-x} + C_3 e^{3x} \cos(-x) + C_4 e^{3x} \sin(-x)$

**b)** $y = C_1 e^{x} + C_2 e^{-x} + C_3 e^{-x} \cos(3x) + C_4 e^{3x} \sin(-x)$

**c)** $y = C_1 e^{x} + C_2 e^{-x} + C_3 e^{-x} \cos(3x) + C_4 e^{-x} \sin(3x)$

**d)** $y = C_1 e^{x} + C_2 x e^{x} + C_3 e^{-x} \cos(3x) + C_4 e^{-x} \sin(3x)$

**e)** $y = C_1 e^{-x} + C_2 x e^{-x} + C_3 e^{3x} \cos(-x) + C_4 e^{3x} \sin(-x)$

**f)** None of the above.

**Question 6**

Your answer is CORRECT.

Find the solution of the initial value problem:

$$y^{(4)} - 6y''' + 9y'' = 0$$
$$[y(0) = -4,\ y'(0) = 5,\ \ y''(0) = 0,\ \ y'''(0) = 0]$$

**a)** $y = -4e^{3x} + 5xe^{3x}$

**b)** $y = -4 - 5x$

**c)** $y = 5e^{3x} - 4xe^{3x}$

**d)** $y = -4 + 5x$

**e)** $y = 5 - 4x$

**f)** None of the above.

**Question 7**

Your answer is CORRECT.

Find the solution of the initial value problem:

$$y''' - y'' + 36y' - 36y = 0$$
$$[y(0) = 0,\ y'(0) = 0,\ y''(0) = -4]$$

**a)** $y = \frac{4}{37} e^{x} - \frac{4}{37} \cos(6x) + \frac{2}{111} \sin(6x)$

**b)** $y = -\frac{4}{37} e^{x} + \frac{4}{37} \cos(6x) + \frac{2}{111} \sin(6x)$

**c)** $y = \frac{37}{4} e^{x} + \frac{37}{4} \cos(6x) - \frac{111}{2} \sin(6x)$

**d)** $y = -\frac{4}{37} e^{x} - \frac{4}{37} \cos(6x) - \frac{2}{111} \sin(6x)$

**e)** $y = -\frac{37}{4} e^{x} + \frac{37}{4} \cos(6x) + \frac{111}{2} \sin(6x)$

**f)** None of the above.

**Question 8**

Your answer is CORRECT.

Find the homogeneous equation with constant coefficients that has the given general solution

$$y = C_1 e^{-2x} + C_2 x e^{-2x} + C_3 e^{x} \cos(x) + C_4 e^{x} \sin(x)$$

**a)** $y^{(4)} - 6y''' + 14y'' - 16y' + 8y = 0$

**b)** $y^{(4)} - 2y''' - 4y'' + 8y' = 0$

**c)** $y^{(4)} + 2y''' + y'' - y' + y = 0$

**d)** $y^{(4)} + 2y''' - 2y'' + 8y = 0$

**e)** $y''' + 6y'' + 14y' + 16y + 8 = 0$

**f)** None of the above.

**Question 9**

Your answer is CORRECT.

Find the homogeneous equation with constant coefficients of least order that has the following as a solution

$$y = 2e^{3x} - 3\sin(3x) + 2x$$

a) $y^{(5)} - 3y^{(4)} - 9y''' + 27y'' = 0$

b) $y^{(5)} + 3y^{(4)} - 9y''' - 27y'' = 0$

c) $y^{(5)} + 9y^{(4)} - 27y''' - 9y'' = 0$

d) $y^{(5)} - 3y^{(4)} + 9y''' - 27y'' = 0$

e) $y^{(5)} - 27y^{(4)} - 9y''' - 9y'' = 0$

f) None of the above.

**Question 10**

Your answer is INCORRECT.

Find the general solution of the nonhomogeneous equation

$$y''' - 3y'' + 4y' - 12y = e^{x} + 2$$

a) $y = C_1 e^{-3x} + C_2\cos(2x) + C_3\sin(2x) - \frac{1}{6} - \frac{1}{10}e^{x}$

b) $y = C_1 e^{-3x} + C_2\cos(2x) + C_3\sin(2x) + \frac{1}{6} + \frac{1}{10}e^{x}$

c) $y = C_1 e^{3x} + C_2\cos(2x) + C_3\sin(2x) - \frac{1}{6} - \frac{1}{10}e^{x}$

d) $y = C_1 e^{-2x} + C_2\cos(2x) + C_3\sin(2x) + \frac{1}{6} + \frac{1}{10}e^{x}$

e) $y = C_1 e^{2x} + C_2\cos(2x) + C_3\sin(2x) - \frac{1}{3} - \frac{1}{5}e^{x}$

f) None of the above.

**Question 11**

Your answer is INCORRECT.

Find the general solution of the nonhomogeneous equation

$$y^{(4)} + 18\,y'' + 81\,y = \cos(2x) + 2$$

**a)** $y = C_1 e^{3x} + C_2 x e^{3x} + C_3 \cos(3x) + C_4 \sin(3x) - \frac{2}{81} - \frac{1}{25}\cos(2x)$

**b)** $y = C_1 \cos(3x) + C_2 \sin(3x) + C_3 e^{x} \cos(3x) + C_4 e^{x} \sin(3x) + \frac{2}{81} + \frac{1}{25}\cos(2x)$

**c)** $y = C_1 \cos(3x) + C_2 e^{3x} + C_3 x \cos(3x) + C_4 x \sin(3x) - \frac{2}{81} - \frac{1}{25}\cos(2x)$

**d)** $y = C_1 \cos(3x) + C_2 \sin(3x) + C_3 e^{3x} \cos(3x) + C_4 e^{3x} \sin(3x) - \frac{2}{81} + \frac{1}{25}\sin(2x)$

**e)** $y = C_1 e^{3x} + C_2 x e^{3x} + C_3 \cos(3x) + C_4 \sin(3x) + \frac{2}{81} + \frac{1}{25}\sin(2x)$

**f)** None of the above.

**Question 12**

Your answer is CORRECT.

Give the form of a particular solution of

$$y^{(4)} - 16y = 2e^{-2x} + 3e^{3x} + \cos(2x) - 1$$

**a)** $z = Axe^{-2x} + Be^{3x} + C\cos(2x) + D\sin(2x)$

**b)** $z = Axe^{-2x} + Be^{3x} + Cx\cos(2x) + Dx\sin(2x) + E$

**c)** $z = Axe^{2x} + Be^{3x} + Cx\cos(2x) + Dx\sin(2x) + E$

**d)** $z = Ae^{-2x} + Be^{3x} + Cx\cos(2x) + Dx\sin(2x) + E$

**e)** $z = Axe^{2x} + Be^{3x} + C\cos(2x) + D\sin(2x) + E$

**f)** None of the above.

**Question 13**

Your answer is CORRECT.

Give the form of a particular solution of

$$y^{(4)} - 6y''' + 10y'' - 6y' + 9y = 2e^{-3x} + \sin(2x) + 3$$

given that $r_1 = 1i$ is a root of the characteristic equation.

a) $z = Ax^2 e^{3x} + Bx\cos(x) + Cx\sin(x) + D$

b) $z = Ae^{-3x} + B\cos(2x) + C\sin(2x) + D$

c) $z = Axe^{-3x} + Bx\cos(x) + Cx\sin(x) + D$

d) $z = Ae^{-3x} + Bx\cos(x) + Cx\sin(x) + D$

e) $z = Ax^2 e^{3x} + B\cos(2x) + C\sin(2x) + D$

f) None of the above.

**Question 14**

Your answer is CORRECT.

Give the Laplace transform of

$$f(x) = \sinh(4x)$$

a) $F(s) = \frac{4}{s^2 - 16}$

b) $F(s) = \frac{s}{s^2 - 16}$

c) $F(s) = \frac{4}{(s^2 - 16)s}$

d) $F(s) = \frac{4s}{s^2 - 16}$

e) $F(s) = \frac{s^2}{s^2 - 16}$

f) None of the above.

**Question 15**

Your answer is CORRECT.

Give the Laplace transform for

$$f(x) = 5 - 2x + x^2$$

a) $F(s) = \frac{6}{s} - \frac{2}{s^2} + \frac{2}{s^3}$

b) $F(s) = -\frac{4}{s} + \frac{2}{s^2} - \frac{2}{s^3}$

c) $F(s) = \frac{5}{s^2} - \frac{2}{s^3} + \frac{2}{s^4}$

d) $F(s) = -\frac{4}{s^2} + \frac{2}{s^3} - \frac{2}{s^4}$

e) $F(s) = \frac{5}{s} - \frac{2}{s^2} + \frac{2}{s^3}$

f) None of the above.

**Question 16**

Your answer is CORRECT.

Give the Laplace transform for

$$f(x) = 4e^{-x} - 3\sin(4x)$$

a) $F(s) = \frac{4}{3(s+1)} - \frac{4}{s^2+16}$

b) $F(s) = \frac{4}{s(s+1)} - \frac{12}{s(s^2+16)}$

c) $F(s) = \frac{2}{s+1} - \frac{6}{s^2+16}$

d) $F(s) = \frac{4}{s+1} - \frac{12}{s^2+16}$

e) $F(s) = -\frac{3}{s+1} + \frac{12}{s^2+16}$

f) None of the above.

**Question 17**

Your answer is CORRECT.

Give the Laplace transform for

$$f(x) = 3 - 5\,e^{4x} - 5\cos(5x)$$

a) $F(s) = -\dfrac{2}{s^2} + \dfrac{5}{s(s-4)} + \dfrac{5}{s^2+25}$

b) $F(s) = \dfrac{3}{s^2} - \dfrac{5}{s(s-4)} - \dfrac{5}{s^2+25}$

c) $F(s) = \dfrac{4}{s} - \dfrac{5}{s-4} - \dfrac{5s}{s^2+25}$

d) $F(s) = \dfrac{3}{s} - \dfrac{5}{s-4} - \dfrac{5s}{s^2+25}$

e) $F(s) = -\dfrac{2}{s} + \dfrac{5}{s-4} + \dfrac{5s}{s^2+25}$

f) None of the above.

**Question 18**

Your answer is CORRECT.

Give the Laplace transform for

$$f(x) = 4\,x\,e^{-5x} + 5\,e^{5x}\cos(2x)$$

a) $F(s) = \dfrac{4}{(s+5)^2} + \dfrac{10}{(s-5)^2+4}$

b) $F(s) = \dfrac{8}{(s+5)^2} + \dfrac{5(s-5)}{(s-5)^2+4}$

c) $F(s) = \dfrac{4}{(s+5)^2} + \dfrac{5(s-5)}{(s-5)^2+4}$

d) $F(s) = \dfrac{4}{(s+5)^2} + \dfrac{5(s-5)}{(s-5)^2+2}$

e) $F(s) = \dfrac{4}{s+5} + \dfrac{5(s-5)}{(s-5)^2+4}$

f) None of the above.

**Question 19**

Your answer is INCORRECT.

Give the Laplace transform for

$$f(x) = 4x^5 - 2e^{2x}\sin(3x)$$

a) ◯ $F(s) = \frac{4}{s^6} + \frac{6}{(s-2)^2 + 9}$

b) ◯ $F(s) = \frac{480}{s^5} - \frac{6}{(s-2)^2 + 9}$

c) ◉ $F(s) = \frac{480}{s^6} + \frac{6}{(s-2)^2 + 9}$

d) ◯ $F(s) = \frac{4}{s-5} - \frac{2(s-2)}{(s-2)^2 + 9}$

e) ◯ $F(s) = \frac{480}{s^6} - \frac{6}{(s-2)^2 + 9}$

f) ◯ None of the above.

**Question 20**

Your answer is INCORRECT.

Give the Laplace transform for

$$f(x) = 3 - 5x + 4x^2e^{5x}$$

a) ◯ $F(s) = \frac{3}{s^2} - \frac{5}{s^3} + \frac{8}{(s-5)^3}$

b) ◯ $F(s) = \frac{3}{s} - \frac{5}{s^2} + \frac{8}{(s-5)^2}$

c) ◯ $F(s) = \frac{3}{s} - \frac{5}{s^2} + \frac{8}{(s+5)^3}$

d) ◯ $F(s) = \frac{3}{s} - \frac{5}{s^2} + \frac{8}{(s-5)^3}$

e) ◉ $F(s) = \frac{3}{s} + \frac{5}{s^2} + \frac{8}{(s+5)^3}$

f) ◯ None of the above.