PRINTABLE VERSION

Quiz 6

You scored 70 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 INCORRECT.

An object is in simple harmonic motion. Find an equation for the motion given that the frequency is $2/\pi$ and at time t = 0, y = 0, and y' = -4. What is the equation of motion?

a) $y(t) = \sqrt{2}\,\sin\left(4t + \frac{1}{2}\pi\right)$

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

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

d) $y(t) = \sin\left(4t + \frac{1}{2}\pi\right)$

e) $y(t)=\sqrt{2}\,\sin\left(\frac{1}{4}t+\frac{1}{2}\pi\right)$

f) None of the above.

Question 3

Your answer is CORRECT.

Find the general solution of

$$y''' - 2y'' - 25y' + 50y = 0$$

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

a) $y = C_1 e^{2x} + C_2 e^{5x} + C_3 e^{5x}$

b) $y = C_1 e^{2x} + C_2 e^{5x} + C_3 e^{-5x}$

c) $y = C_1 e^{2x} + C_2 e^{5x} + C_3 x e^{5x}$

d) $y = C_1 e^{-2x} + C_2 e^{-5x} + C_3 e^{5x}$

e) $y = C_1 e^{-2x} + C_2 e^{-5x} + C_3 e^{-5x}$

f) None of the above.

Question 4

Your answer is INCORRECT.

Find the general solution of

$$y''' + 5y'' + 8y' + 4y = 0$$

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

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

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

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

d) $y = C_1 e^{2x} + C_2 x e^{2x} + C_3 e^{x}$

e) ◯ $y = C_1 e^{-2x} + C_2 e^{-x} + C_3 x e^{-x}$

f) ◯ None of the above.

Question 5

Your answer is CORRECT.

Find the general solution of

$$y^{(4)} - 6y''' + 12y'' + 6y' - 13y = 0$$

given that $r_1 = 3 + 2i$ is a root of the characteristic equation.

a) ◉ $y = C_1 e^{x} + C_2 e^{-x} + C_3 e^{3x} \cos(2x) + C_4 e^{3x} \sin(2x)$

b) ◯ $y = C_1 e^{-x} + C_2 x e^{-x} + C_3 e^{2x} \cos(3x) + C_4 e^{2x} \sin(3x)$

c) ◯ $y = C_1 e^{x} + C_2 x e^{x} + C_3 e^{3x} \cos(2x) + C_4 e^{3x} \sin(2x)$

d) ◯ $y = C_1 e^{x} + C_2 e^{-x} + C_3 e^{2x} \cos(3x) + C_4 e^{2x} \sin(3x)$

e) ◯ $y = C_1 e^{x} + C_2 e^{-x} + C_3 e^{3x} \cos(2x) + C_4 e^{2x} \sin(3x)$

f) ◯ None of the above.

Question 6

Your answer is CORRECT.

Find the solution of the initial value problem:

$$y^{(4)} - 4y''' + 4y'' = 0$$
$$[y(0) = 4,\ y'(0) = -3,\ y''(0) = 0,\ y'''(0) = 0]$$

a) ◉ $y = 4 - 3x$

b) ◯ $y = 4e^{2x} - 3x e^{2x}$

c) ◯ $y = -3e^{2x} + 4x e^{2x}$

d) ◯ $y = 4 + 3x$

e) ◯ $y = -3 + 4x$

f) None of the above.

Question 7

Your answer is CORRECT.

Find the solution of the initial value problem:

$$y''' - y'' + 4y' - 4y = 0$$
$$[y(0) = 0,\ y'(0) = 0,\ y''(0) = -3]$$

a) $y = \frac{3}{5} e^{x} - \frac{3}{5} \cos(2x) + \frac{3}{10} \sin(2x)$

b) $y = \frac{5}{3} e^{x} + \frac{5}{3} \cos(2x) - \frac{10}{3} \sin(2x)$

c) $y = -\frac{3}{5} e^{x} + \frac{3}{5} \cos(2x) + \frac{3}{10} \sin(2x)$

d) $y = -\frac{3}{5} e^{x} - \frac{3}{5} \cos(2x) - \frac{3}{10} \sin(2x)$

e) $y = -\frac{5}{3} e^{x} + \frac{5}{3} \cos(2x) + \frac{10}{3} \sin(2x)$

f) None of the above.

Question 8

Your answer is CORRECT.

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

$$y = C_1 e^{-4x} + C_2 x e^{-4x} + C_3 e^{x} \cos(5x) + C_4 e^{x} \sin(5x)$$

a) $y''' + 10y'' + 58y' + 240y + 416 = 0$

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

c) $y^{(4)} + 6y''' + 26y'' + 176y' + 416y = 0$

d) $y^{(4)} - 6y''' - 24y'' + 224y' - 384y = 0$

e) $y^{(4)} - 10y''' + 58y'' - 240y' + 416y = 0$

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

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

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

b) $y = C_1 e^{x} + C_2\cos(4x) - C_3\sin(4x) - \frac{9}{4} - \frac{1}{2}e^{x}$

c) $y = C_1 e^{-4x} + C_2\cos(x) + C_3\sin(x) + \frac{3}{4} + \frac{1}{6}e^{x}$

d) $y = C_1 e^{-x} + C_2\cos(x) + C_3\sin(x) + \frac{3}{4} + \frac{1}{6}e^{x}$

e) $y = C_1 e^{-4x} + C_2\cos(x) + C_3\sin(x) - \frac{3}{4} - \frac{1}{6}e^{x}$

f) None of the above.

Question 11

Your answer is INCORRECT.

Find the general solution of the nonhomogeneous equation

$$y^{(4)} + 2\,y'' + y = \cos(3x) + 3$$

a) $y = C_1\cos(x) + C_2\sin(x) + C_3 e^x\cos(x) + C_4 e^x\sin(x) - 3 + \frac{1}{64}\sin(3x)$

b) $y = C_1\cos(x) + C_2 e^x + C_3 x\cos(x) + C_4 x\sin(x) - 3 - \frac{1}{64}\cos(3x)$

c) $y = C_1\cos(x) + C_2\sin(x) + C_3 e^x\cos(x) + C_4 e^x\sin(x) + 3 + \frac{1}{64}\cos(3x)$

d) $y = C_1 e^x + C_2 x e^x + C_3\cos(x) + C_4\sin(x) + 3 + \frac{1}{64}\sin(3x)$

e) $y = C_1 e^x + C_2 x e^x + C_3\cos(x) + C_4\sin(x) - 3 - \frac{1}{64}\cos(3x)$

f) None of the above.

Question 12

Your answer is INCORRECT.

Give the form of a particular solution of

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

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

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

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

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

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

f) None of the above.

Question 13

Your answer is INCORRECT.

Give the form of a particular solution of

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

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

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

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

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

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

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

f) None of the above.

Question 14

Your answer is CORRECT.

Give the Laplace transform of

$$f(x) = \sinh(3x)$$

a) $F(s) = \dfrac{s}{s^2 - 9}$

b) $F(s) = \dfrac{3}{s^2 - 9}$

c) $F(s) = \dfrac{3}{(s^2 - 9)s}$

d) $F(s) = \dfrac{3s}{s^2 - 9}$

e) $F(s) = \dfrac{s^2}{s^2 - 9}$

f) None of the above.

Question 15

Your answer is CORRECT.

Give the Laplace transform for

$$f(x) = 5 + 4x + x^2$$

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

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

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

d) $F(s) = \frac{6}{s} + \frac{4}{s^2} + \frac{2}{s^3}$

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

f) None of the above.

Question 16

Your answer is CORRECT.

Give the Laplace transform for

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

a) $F(s) = \frac{2}{s(s+1)} + \frac{20}{s(s^2+16)}$

b) $F(s) = -\frac{1}{s+1} - \frac{20}{s^2+16}$

c) $F(s) = \frac{2}{s+1} + \frac{20}{s^2+16}$

d) $F(s) = \frac{1}{s+1} + \frac{10}{s^2+16}$

e) $F(s) = -\frac{2}{5(s+1)} - \frac{4}{s^2+16}$

f) None of the above.

Question 17

Your answer is CORRECT.

Give the Laplace transform for

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

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

b) ○ $F(s) = -\frac{1}{s} + \frac{5}{s-4} + \frac{5s}{s^2+9}$

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

d) ○ $F(s) = \frac{3}{s} - \frac{5}{s-4} - \frac{5s}{s^2+9}$

e) ○ $F(s) = -\frac{1}{s^2} + \frac{5}{s(s-4)} + \frac{5}{s^2+9}$

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

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

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

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

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

f) ○ None of the above.

Question 19

Your answer is CORRECT.

Give the Laplace transform for

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

a) $F(s) = \frac{10}{s^3} + \frac{9}{(s-4)^2+9}$

b) $F(s) = \frac{10}{s^2} - \frac{9}{(s-4)^2+9}$

c) $F(s) = \frac{10}{s^3} - \frac{9}{(s-4)^2+9}$ (selected)

d) $F(s) = \frac{5}{s^3} + \frac{9}{(s-4)^2+9}$

e) $F(s) = \frac{5}{s-2} - \frac{3(s-4)}{(s-4)^2+9}$

f) None of the above.

Question 20

Your answer is CORRECT.

Give the Laplace transform for

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

a) $F(s) = \frac{2}{s} - \frac{4}{s^2} - \frac{72}{(s-5)^5}$ (selected)

b) $F(s) = \frac{2}{s} + \frac{4}{s^2} - \frac{72}{(s+5)^5}$

c) $F(s) = \frac{2}{s} - \frac{4}{s^2} - \frac{72}{(s-5)^4}$

d) $F(s) = \frac{2}{s} - \frac{4}{s^2} - \frac{72}{(s+5)^5}$

e) $F(s) = \frac{2}{s^2} - \frac{4}{s^3} - \frac{72}{(s-5)^5}$

f) None of the above.