PRINTABLE VERSION

Quiz 6

You scored 65 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 $y' = 8$. What is the equation of motion?

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

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

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

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

e) $y(t) = \sqrt{2}\sin\left(\frac{1}{4}t + \frac{1}{6}\pi\right)$

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

$$y''' - 9y'' + 26y' - 24y = 0$$

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

a) $y = C_1 e^{-2x} + C_2 e^{-3x} + C_3 e^{4x}$

b) $y = C_1 e^{-2x} + C_2 e^{-3x} + C_3 e^{-4x}$

c) $y = C_1 e^{2x} + C_2 e^{3x} + C_3 x e^{3x}$

d) $y = C_1 e^{2x} + C_2 e^{3x} + C_3 e^{4x}$

e) $y = C_1 e^{2x} + C_2 e^{3x} + C_3 e^{-4x}$

f) None of the above.

Question 4

Your answer is CORRECT.

Find the general solution of

$$y''' - 8y'' + 21y' - 18y = 0$$

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

a) $y = C_1 e^{3x} + C_2 x e^{3x} + C_3 e^{2x}$

b) $y = C_1 e^{-3x} + C_2 x e^{-3x} + C_3 e^{-2x}$

c) $y = C_1 e^{3x} + C_2 e^{-3x} + C_3 e^{2x}$

d) $y = C_1 e^{3x} + C_2 e^{2x} + C_3 x e^{2x}$

e) $y = C_1 e^{3x} + C_2 x e^{3x} + C_3 e^{-2x}$

f) None of the above.

Question 5

Your answer is CORRECT.

Find the general solution of

$$y^{(4)} - 2y''' + 4y'' + 2y' - 5y = 0$$

given that $r_1 = 1 + 2i$ is a root of the characteristic equation.

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

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

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

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

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

f) None of the above.

Question 6

Your answer is CORRECT.

Find the solution of the initial value problem:

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

a) $y = 3 - 4x$

b) $y = 3 + 4x$

c) $y = 4e^{2x} + 3x e^{2x}$

d) $y = 3e^{2x} + 4x e^{2x}$

e) $y = 4 + 3x$

f) None of the above.

Question 7

Your answer is CORRECT.

Find the solution of the initial value problem:

$$y'''-y''+4y'-4y=0$$
$$[y(0)=0,\ y'(0)=0,\ y''(0)=5]$$

a) $y=e^{x}+\cos(2x)+\frac{1}{2}\sin(2x)$

b) $y=e^{x}-\cos(2x)-\frac{1}{2}\sin(2x)$

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

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

e) $y=-e^{x}+\cos(2x)-\frac{1}{2}\sin(2x)$

f) None of the above.

Question 8

Your answer is CORRECT.

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

$$y=C_1e^{-4x}+C_2xe^{-4x}+C_3e^{x}\cos(5x)+C_4e^{x}\sin(5x)$$

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

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

a) $y^{(5)} + 16y^{(4)} + 16y''' + 4y'' = 0$

b) $y^{(5)} + y^{(4)} + 16y''' + 16y'' = 0$

c) $y^{(5)} + y^{(4)} - 16y''' - 16y'' = 0$

d) $y^{(5)} - y^{(4)} - 16y''' + 16y'' = 0$

e) $y^{(5)} + 16y^{(4)} - 16y''' + 4y'' = 0$

f) None of the above.

Question 10

Your answer is INCORRECT.

Find the general solution of the nonhomogeneous equation

$$y''' + 4y'' + 4y' + 16y = e^{x} + 5$$

a) $y = C_1 e^{4x} + C_2\cos(2x) + C_3\sin(2x) + \frac{5}{16} + \frac{1}{25}e^{x}$

b) $y = C_1 e^{4x} + C_2\cos(2x) + C_3\sin(2x) - \frac{5}{16} - \frac{1}{25}e^{x}$

c) $y = C_1 e^{-4x} + C_2\cos(2x) + C_3\sin(2x) + \frac{5}{16} + \frac{1}{25}e^{x}$

d) $y = C_1 e^{2x} + C_2\cos(2x) + C_3\sin(2x) + \frac{5}{8} + \frac{2}{25}e^{x}$

e) $y = C_1 e^{-2x} + C_2\cos(2x) + C_3\sin(2x) - \frac{5}{16} - \frac{1}{25}e^{x}$

f) None of the above.

Question 11

Your answer is INCORRECT.

Find the general solution of the nonhomogeneous equation

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

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 CORRECT.

Give the form of a particular solution of

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

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

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

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

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

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

f) None of the above.

Question 13

Your answer is INCORRECT.

Give the form of a particular solution of

$$y^{(4)} - 4y''' + 13y'' - 36y' + 36y = 2e^{2x} + \sin(x) + 5$$

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

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

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

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

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

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

f) None of the above.

Question 14

Your answer is CORRECT.

Give the Laplace transform of

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

a) $F(s) = \frac{1}{s^2 - 9}$

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

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

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

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

f) None of the above.

Question 15

Your answer is INCORRECT.

Give the Laplace transform for

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

a) $F(s) = -\frac{1}{s} + \frac{5}{s^2} - \frac{2}{s^3}$

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

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

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

e) $F(s) = -\frac{1}{s^2} + \frac{5}{s^3} - \frac{2}{s^4}$

f) None of the above.

Question 16

Your answer is INCORRECT.

Give the Laplace transform for

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

a) $F(s) = -\frac{2}{s+1} + \frac{12}{s^2+9}$

b) $F(s) = \frac{3}{s+1} - \frac{12}{s^2+9}$

c) $F(s) = \frac{3}{s(s+1)} - \frac{12}{s(s^2+9)}$

d) $F(s) = \frac{3}{2(s+1)} - \frac{6}{s^2+9}$

e) $F(s) = \frac{3}{4(s+1)} - \frac{3}{s^2+9}$

f) None of the above.

Question 17

Your answer is CORRECT.

Give the Laplace transform for

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

a) $F(s) = \frac{3}{s} - \frac{3}{s-5} - \frac{4s}{s^2+16}$

b) $F(s) = -\frac{1}{s} + \frac{3}{s-5} + \frac{4s}{s^2+16}$

c) $F(s) = \frac{2}{s^2} - \frac{3}{s(s-5)} - \frac{4}{s^2+16}$

d) $F(s) = -\frac{1}{s^2} + \frac{3}{s(s-5)} + \frac{4}{s^2+16}$

e) $F(s) = \frac{2}{s} - \frac{3}{s-5} - \frac{4s}{s^2+16}$

f) None of the above.

Question 18

Your answer is INCORRECT.

Give the Laplace transform for

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

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

b) $F(s) = \frac{2}{(s+5)^2} + \frac{20}{(s-5)^2+25}$

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

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

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

f) None of the above.

Question 19

Your answer is CORRECT.

Give the Laplace transform for

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

a) $F(s) = \frac{48}{s^5} - \frac{20}{(s+3)^2+25}$

b) $F(s) = \frac{48}{s^4} - \frac{20}{(s+3)^2+25}$

c) $F(s) = \frac{48}{s^5} + \frac{20}{(s+3)^2+25}$

d) $F(s) = \frac{2}{s^5} + \frac{20}{(s+3)^2+25}$

e) $F(s) = \frac{2}{s-4} - \frac{4(s+3)}{(s+3)^2+25}$

f) None of the above.

Question 20

Your answer is INCORRECT.

Give the Laplace transform for

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

a) $F(s) = \frac{3}{s} + \frac{4}{s^2} + \frac{600}{(s+2)^6}$

b) $F(s) = \frac{3}{s} + \frac{4}{s^2} + \frac{600}{(s+2)^5}$

c) $F(s) = \frac{3}{s} - \frac{4}{s^2} + \frac{600}{(s-2)^5}$

d) $F(s) = \frac{3}{s} - \frac{4}{s^2} + \frac{600}{(s+2)^6}$

e) $F(s) = \frac{3}{s^2} - \frac{4}{s^3} + \frac{600}{(s-2)^6}$

f) None of the above.