PRINTABLE VERSION

Quiz 6

You scored 55 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 $2\pi/3$ and at time $t = 0$, $y = 1$, and $y' = 3$. What is the equation of motion?

a) $y(t) = \sqrt{2}\,\sin\left(\frac{1}{3}t + \frac{1}{4}\pi\right)$

b) $y(t) = \sqrt{2}\,\sin\left(3t + \frac{1}{4}\pi\right)$

c) $y(t) = \sin\left(3t + \frac{1}{2}\pi\right)$

d) $y(t) = \sin\left(3t + \frac{2}{3}\pi\right)$

e) $y(t) = \sqrt{2}\,\sin\left(\frac{2}{3}t + \frac{1}{6}\pi\right)$

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 $5/\pi$ and at time $t = 0$, $y = 1$, and $y' = 0$. What is the equation of motion?

a) $y(t) = \sin\left(\frac{1}{10}t + \frac{1}{4}\pi\right)$

b) $y(t) = \sin\left(10t + \frac{1}{2}\pi\right)$

c) $y(t) = \sqrt{2}\,\sin\left(10t + \frac{1}{4}\pi\right)$

d) $y(t) = \sqrt{2}\,\sin(10t)$

e) $y(t) = \sin(10t)$

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

$$y''' - 4y'' - 16y' + 64y = 0$$

given that $r_1 = -4$ is a root of the characteristic equation.

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

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

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

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

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

f) None of the above.

Question 5

Your answer is INCORRECT.

Find the general solution of

$$y^{(4)} - 6y''' + 9y'' + 6y' - 10y = 0$$

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

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

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

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

f) None of the above.

Question 6

Your answer is INCORRECT.

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) $y = 4e^{2x} - 3xe^{2x}$

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

d) $y = 4 + 3x$

e) $y = -3 + 4x$

f) None of the above.

Question 7

Your answer is INCORRECT.

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 INCORRECT.

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

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

a) $y''' + 8y' + 4y'' + 16y + 16 = 0$

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

c) $y^{(4)} + 8y'' + 4y''' + 16y' + 16y = 0$

d) $y^{(4)} + 8y'' - 4y''' - 16y' + 16y = 0$

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

f) None of the above.

Question 9

Your answer is INCORRECT.

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

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

a) ○ $y^{(5)} + 2y^{(4)} - 9y''' - 18y'' = 0$

b) ○ $y^{(5)} + 9y^{(4)} - 18y''' + 6y'' = 0$

c) ◉ $y^{(5)} - 2y^{(4)} - 9y''' + 18y'' = 0$

d) ○ $y^{(5)} - 2y^{(4)} + 9y''' - 18y'' = 0$

e) ○ $y^{(5)} - 18y^{(4)} - 9y''' + 6y'' = 0$

f) ○ None of the above.

Question 10

Your answer is CORRECT.

Find the general solution of the nonhomogeneous equation

$$y''' + 4y'' + 9y' + 36y = e^{x} + 2$$

a) ◉ $y = C_1 e^{-4x} + C_2\cos(3x) + C_3\sin(3x) + \frac{1}{18} + \frac{1}{50}e^{x}$

b) ○ $y = C_1 e^{3x} + C_2\cos(3x) + C_3\sin(3x) + \frac{1}{9} + \frac{1}{25}e^{x}$

c) ○ $y = C_1 e^{-3x} + C_2\cos(3x) + C_3\sin(3x) - \frac{1}{18} - \frac{1}{50}e^{x}$

d) ○ $y = C_1 e^{4x} + C_2\cos(3x) + C_3\sin(3x) + \frac{1}{18} + \frac{1}{50}e^{x}$

e) ○ $y = C_1 e^{4x} + C_2\cos(3x) + C_3\sin(3x) - \frac{1}{18} - \frac{1}{50}e^{x}$

f) ○ None of the above.

Question 11

Your answer is INCORRECT.

Find the general solution of the nonhomogeneous equation

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

a) $y = C_1 \cos(x) + C_2 \sin(x) + C_3 e^x \cos(x) + C_4 e^x \sin(x) + 2 + \frac{1}{64} \cos(3x)$

b) $y = C_1 e^x + C_2 x e^x + C_3 \cos(x) + C_4 \sin(x) - 2 - \frac{1}{64} \cos(3x)$

c) $y = C_1 e^x + C_2 x e^x + C_3 \cos(x) + C_4 \sin(x) + 2 + \frac{1}{64} \sin(3x)$

d) $y = C_1 \cos(x) + C_2 e^x + C_3 x \cos(x) + C_4 x \sin(x) - 2 - \frac{1}{64} \cos(3x)$

e) $y = C_1 \cos(x) + C_2 \sin(x) + C_3 x \cos(x) + C_4 x \sin(x) + 2 + \frac{1}{64} \cos(3x)$

f) None of the above.

Question 12

Your answer is INCORRECT.

Give the form of a particular solution of

$$y^{(4)} - 81y = 2e^{-3x} + 3e^{2x} + \cos(3x) + 2$$

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

b) $z = Ae^{-3x} + Be^{2x} + Cx\cos(3x) + \mathrm{D}x\sin(3x) + E$

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

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

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

f) None of the above.

Question 13

Your answer is INCORRECT.

Give the form of a particular solution of

$$y^{(4)} - 6y''' + 25y'' - 96y' + 144y = 5e^{3x} + \cos(2x) + 1$$

given that $r_1 = 4i$ is a root of the characteristic equation.

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

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

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

d) $z = Ax^2 e^{3x} + Bx\cos(4x) + Cx\sin(4x) + D$

e) $z = Ae^{3x} + Bx\cos(4x) + Cx\sin(4x) + D$

f) None of the above.

Question 14

Your answer is CORRECT.

Give the Laplace transform of

$$f(x) = \sinh(5x)$$

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

b) $F(s) = \dfrac{s}{s^2 - 25}$

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

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

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

f) None of the above.

Question 15

Your answer is CORRECT.

Give the Laplace transform for

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

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

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

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

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

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

f) None of the above.

Question 16

Your answer is CORRECT.

Give the Laplace transform for

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

a) $F(s) = \frac{3}{2(s+1)} - \frac{8}{s^2+16}$

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

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

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

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

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 CORRECT.

Give the Laplace transform for

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

a) $F(s) = \frac{6}{(s-4)^2} + \frac{5(s+4)}{(s+4)^2+9}$

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

c) $F(s) = \frac{3}{(s-4)^2} + \frac{15}{(s+4)^2+9}$

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

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

f) None of the above.

Question 19

Your answer is CORRECT.

Give the Laplace transform for

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

a) ◉ $F(s) = \frac{240}{s^6} - \frac{12}{(s-4)^2+9}$

b) ○ $F(s) = \frac{240}{s^5} - \frac{12}{(s-4)^2+9}$

c) ○ $F(s) = \frac{240}{s^6} + \frac{12}{(s-4)^2+9}$

d) ○ $F(s) = \frac{2}{s^6} + \frac{12}{(s-4)^2+9}$

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

f) ○ None of the above.

Question 20

Your answer is CORRECT.

Give the Laplace transform for

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

a) ◉ $F(s) = \frac{2}{s} - \frac{5}{s^2} + \frac{96}{(s-3)^5}$

b) ○ $F(s) = \frac{2}{s} + \frac{5}{s^2} + \frac{96}{(s+3)^5}$

c) ○ $F(s) = \frac{2}{s} - \frac{5}{s^2} + \frac{96}{(s-3)^4}$

d) ○ $F(s) = \frac{2}{s} - \frac{5}{s^2} + \frac{96}{(s+3)^5}$

e) ○ $F(s) = \frac{2}{s^2} - \frac{5}{s^3} + \frac{96}{(s-3)^5}$

f) ○ None of the above.