PRINTABLE VERSION

Quiz 6

You scored 85 out of 100

Question 1

Your answer is INCORRECT.

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 $y' = 0$. What is the equation of motion?

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

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

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

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

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

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 $3/\pi$ and at time $t = 0$, $y = 0$, and $y' = 6$. What is the equation of motion?

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

b) $y(t) = \sin(6t)$

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

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

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

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 CORRECT.

Find the general solution of

$$y''' - 2y'' - 4y' + 8y = 0$$

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

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

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

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

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

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

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 $r_1 = -1 + 3i$ 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:

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

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:

$$y''' - y'' + 36y' - 36y = 0$$
$$[y(0) = 0,\ y'(0) = 0,\ y''(0) = -2]$$

a) $y = \frac{2}{37}e^{x} - \frac{2}{37}\cos(6x) + \frac{1}{111}\sin(6x)$

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

c) $y = -\frac{2}{37}e^{x} + \frac{2}{37}\cos(6x) + \frac{1}{111}\sin(6x)$

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

e) $y = -\frac{2}{37}e^{x} - \frac{2}{37}\cos(6x) - \frac{1}{111}\sin(6x)$

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 CORRECT.

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

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

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

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

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

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

e) $y^{(5)} + 9y^{(4)} + 9y''' + 3y'' = 0$

f) None of the above.

Question 10

Your answer is CORRECT.

Find the general solution of the nonhomogeneous equation

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

a) $y = C_1 e^{3x} + C_2\cos(x) + C_3\sin(x) + \frac{4}{3} + \frac{1}{8}e^{x}$

b) $y = C_1 e^{x} + C_2\cos(x) + C_3\sin(x) + \frac{8}{3} + \frac{1}{4}e^{x}$

c) $y = C_1 e^{3x} + C_2\cos(x) + C_3\sin(x) - \frac{4}{3} - \frac{1}{8}e^{x}$

d) $y = C_1 e^{-x} + C_2\cos(x) + C_3\sin(x) - \frac{4}{3} - \frac{1}{8}e^{x}$

e) $y = C_1 e^{-3x} + C_2\cos(x) + C_3\sin(x) + \frac{4}{3} + \frac{1}{8}e^{x}$

f) None of the above.

Question 11

Your answer is CORRECT.

Find the general solution of the nonhomogeneous equation

$$y^{(4)} + 8\,y'' + 16y = \cos(3x) + 5$$

a) $y = C_1 e^{2x} + C_2 x e^{2x} + C_3 \cos(2x) + C_4 \sin(2x) + \frac{5}{16} + \frac{1}{25}\sin(3x)$

b) $y = C_1 \cos(2x) + C_2 \sin(2x) + C_3 x \cos(2x) + C_4 x \sin(2x) + \frac{5}{16} + \frac{1}{25}\cos(3x)$

c) $y = C_1 e^{2x} + C_2 x e^{2x} + C_3 \cos(2x) + C_4 \sin(2x) - \frac{5}{16} - \frac{1}{25}\cos(3x)$

d) $y = C_1 \cos(2x) + C_2 e^{2x} + C_3 x \cos(2x) + C_4 x \sin(2x) - \frac{5}{16} - \frac{1}{25}\cos(3x)$

e) $y = C_1 \cos(2x) + C_2 \sin(2x) + C_3 e^{x} \cos(2x) + C_4 e^{x} \sin(2x) + \frac{5}{16} + \frac{1}{25}\cos(3x)$

f) None of the above.

Question 12

Your answer is CORRECT.

Give the form of a particular solution of

$$y^{(4)} - 256y = 2e^{-4x} + 3e^{x} + \cos(4x) - 2$$

a) $z = Ae^{-4x} + Be^{x} + Cx\cos(4x) + Dx\sin(4x) + E$

b) $z = Axe^{-4x} + Be^{x} + C\cos(4x) + D\sin(4x)$

c) $z = Axe^{4x} + Be^{x} + Cx\cos(4x) + Dx\sin(4x) + E$

d) $z = Axe^{-4x} + Be^{x} + Cx\cos(4x) + Dx\sin(4x) + E$

e) $z = Axe^{4x} + Be^{x} + C\cos(4x) + D\sin(4x) + E$

f) None of the above.

Question 13

Your answer is CORRECT.

Give the form of a particular solution of

$$y^{(4)} - 2y''' + 5y'' - 8y' + 4y = 5e^{-x} + \sin(4x) + 2$$

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

a) $z = Ae^{-x} + B\cos(4x) + C\sin(4x) + D$

b) $z = Ax^2e^x + B\cos(4x) + C\sin(4x) + D$

c) $z = Axe^{-x} + Bx\cos(2x) + Cx\sin(2x) + D$

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

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

f) None of the above.

Question 14

Your answer is CORRECT.

Give the Laplace transform of

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

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

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

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

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

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

f) None of the above.

Question 15

Your answer is CORRECT.

Give the Laplace transform for

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

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

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

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

a) $F(s) = -\frac{4}{s+1} - \frac{12}{s^2+9}$

b) $F(s) = \frac{5}{s+1} + \frac{12}{s^2+9}$

c) $F(s) = \frac{5}{s(s+1)} + \frac{12}{s(s^2+9)}$

d) $F(s) = \frac{5}{2(s+1)} + \frac{6}{s^2+9}$

e) $F(s) = -\frac{5}{4(s+1)} - \frac{3}{s^2+9}$

f) None of the above.

Question 17

Your answer is CORRECT.

Give the Laplace transform for

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

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

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

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

d) $F(s) = \frac{6}{s} - \frac{2}{s-3} - \frac{4s}{s^2+25}$

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

f) None of the above.

Question 18

Your answer is CORRECT.

Give the Laplace transform for

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

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

b) $F(s) = \frac{10}{(s+2)^2} + \frac{4(s-2)}{(s-2)^2+25}$

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

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

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

f) None of the above.

Question 19

Your answer is INCORRECT.

Give the Laplace transform for

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

a) $F(s) = \frac{10}{s^3} + \frac{20}{(s+3)^2+25}$

b) $F(s) = \frac{10}{s^2} - \frac{20}{(s+3)^2+25}$

c) $F(s) = \frac{10}{s^3} - \frac{20}{(s+3)^2+25}$

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

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

f) None of the above.

Question 20

Your answer is CORRECT.

Give the Laplace transform for

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

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

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

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

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

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

f) None of the above.