Started on	Wednesday, 17 January 2024, 4:45 PM
State	Finished
Completed on	Wednesday, 17 January 2024, 5:30 PM
Time taken	44 mins 38 secs
Grade	**9** out of 10 (**90**%)

Question **1**

Correct

Mark 1 out of 1

Using the method of undetermined coefficients, let $Y(t)$ be a particular solution of the differential equation $y^{(4)} - y^{(3)} = -24t$, then $Y(2) =$

Select one:

- 48 ✔
- 16
- 32
- 24

The correct answer is: 48

Question **2**

Correct

Mark 1 out of 1

A particular solution of the differential equation $y'' + y = \sec^2 t$ has the form $Y(t) = u_1(t)\cos t + u_2(t)\sin t$ where $u_1(t) =$

Select one:

- $-\sec t$ ✔
- $\ln|\csc t + \cot t|$
- $\ln|\sec t + \tan t|$
- $\sec t$

The correct answer is: $-\sec t$

Question **3**

Correct

Mark 1 out of 1

A particular solution of the differential equation $y'' - 2y' + y = \frac{e^t}{t}, t > 0$, has the form $Y(t) = v_1(t)e^t + v_2(t)te^t$ where $v_1(t) =$

Select one:

- $-t$ ✔
- $\ln t$
- $t \ln t$
- t

The correct answer is: $-t$

Question **4**

Correct

Mark 1 out of 1

The characteristic polynomial of the differential equation $y^{(4)} + 4y''' + 8y'' + 8y' + 4y = 0$ has roots $-1 \pm i, -1 \pm i$. The general form of a particular solution of the equation $y^{(4)} + 4y''' + 8y'' + 8y' + 4y = e^{-t}\cos t$ is

Select one:

- $At^3e^{-t}\cos t + Bt^3e^{-t}\sin t$
- $At^2e^{-t}\cos t + Bt^2e^{-t}\sin t$ ✔
- $Ate^{-t}\cos t + Bte^{-t}\sin t$
- $Ae^{-t}\cos t + Be^{-t}\sin t$

The correct answer is: $At^2e^{-t}\cos t + Bt^2e^{-t}\sin t$

Question **5**

Correct

Mark 1 out of 1

The general solution of the differential equation $y^{(4)} + 2y^{(3)} + 4y'' - 2y' - 5y = 0$ is

Select one:

- $y(y) = c_1e^t + c_2e^{-t} + c_3e^{-t}\cos(2t) + c_4e^{-t}\sin(2t)$ ✔
- $y(y) = c_1e^t + c_2e^{-t} + c_3e^{2t}\cos(t) + c_4e^{2t}\sin(t)$
- $y(y) = c_1e^t + c_2e^{-t} + c_3e^{t}\cos(2t) + c_4e^{t}\sin(2t)$
- $y(y) = c_1e^t + c_2e^{-t} + c_3e^{-2t}\cos(t) + c_4e^{-2t}\sin(t)$

The correct answer is: $y(y) = c_1e^t + c_2e^{-t} + c_3e^{-t}\cos(2t) + c_4e^{-t}\sin(2t)$

Question **6**

Correct

Mark 1 out of 1

The general form of a particular solution of the differential equation $y^{(4)} + 2y^{(3)} + y'' = 1 + t\sinh t$

Select one:

- $Y(t) = At^2 + (Bt + C)\sinh t + (Dt + E)\cosh t$
- $Y(t) = (At + B)e^t + (Ct + D)e^{-t}$
- $Y(t) = A + (Bt + C)\cosh t + (Dt + E)\sinh t$
- $Y(t) = At^2 + (Bt + C)e^t + (Dt^3 + Et^2)e^{-t}$ ✔

The correct answer is: $Y(t) = At^2 + (Bt + C)e^t + (Dt^3 + Et^2)e^{-t}$

Question **7**

Correct

Mark 1 out of 1

The general form of a particular solution of the differential equation $y'' - 2y' + y = te^t$ is

Select one:

- $Y(t) = (At^2 + Bt)e^t$
- $Y(t) = (At^3 + Bt^2)e^t$ ✔
- $Y(t) = (At + B)e^t$
- $Y(t) = (At^2 + Bt + C)e^t$

The correct answer is: $Y(t) = (At^3 + Bt^2)e^t$

Question **8**

Incorrect

Mark 0 out of 1

If $Y_1 = 1 + 2t, Y_2(t) = 1 + t + e^t$ are solutions of a second order nonhomogeneous differential equation then one of the following is a solution of the corresponding homogeneous equation

Select one:

- $2t + e^t$
- $t - e^t$
- te^t
- $1 + e^t$ ✖

The correct answer is: $t - e^t$

Question **9**

Correct

Mark 1 out of 1

Using the method of undetermined coefficients, let $Y(t)$ be a particular solution of the differential equation $y''' - y = e^t$, then $Y(6) =$

Select one:

- $2e^6$ ✔
- $\frac{1}{3}e^6$
- $3e^6$
- $\frac{2}{3}e^6$

The correct answer is: $2e^6$

Question **10**

Correct

Mark 1 out of 1

Using the method of undetermined coefficients, let $Y(t)$ be a particular solution of the differential equation $y'' + y' = t^2$, then $Y(3) =$

Select one:

- 9
- 6 ✔
- 3
- 27

The correct answer is: 6