| Question | Scheme | Marks |
|---|---|---|
| **2** | $2m^2-5m-3=0\Rightarrow(2m+1)(m-3)=0\Rightarrow m=...$ | **M1** |
| | So C.F. is $(y_{CF}=)Ae^{-\frac{1}{2}x}+Be^{3x}$ | **A1** |
| | P.I. is $y_{PI}=axe^{3x}$ | **B1** |
| | $\frac{dy_{PI}}{dx}=3axe^{3x}+ae^{3x}$, $\frac{d^2y_{PI}}{dx^2}=9axe^{3x}+3ae^{3x}+3ae^{3x}$<br>$\Rightarrow 2(9ax+6a)e^{3x}-5(3ax+a)e^{3x}-3axe^{3x}=2e^{3x}\Rightarrow a=...$ | **M1** |
| | $a=\frac{2}{7}$ | **A1** |
| | General solution is $y=Ae^{-\frac{1}{2}x}+Be^{3x}+\frac{2}{7}xe^{3x}$ | **B1ft** |
| | | **(6)** |
| | | **(6 marks)** |

**Notes:**

**M1:** Forms and solves the auxiliary equation.

**A1:** Correct complementary function (no need for $y$ = …)

**B1:** Correct form for the particular integral. Accept any PI that includes $axe^{3x}$, so e.g. $(ax+b)e^{3x}$ is fine.

**M1:** Attempts to differentiate their PI twice and substitutes into the left hand side of the equation. The derivatives must be changed functions. There is no need to reach a value for the unknown(s) but their PI must contain an unknown constant.

**A1:** Correct value of $a$ (and any other coefficients as zero). Must have had a suitable PI

**B1ft:** For $y$ = their CF + their PI. Must include the $y$ = . The PI must be a function of $x$ that matches their initial choice of PI, with their constants substituted.