Question	Scheme	Marks	AOs
2(a)	$\mathrm{e}^{x}=1+x+\frac{x^2}{2!}+\frac{x^3}{3!}$	**B1**	1.1b
		(1)	
(b)	$\mathrm{e}^{\mathrm{e}^{x}-1}=1+\left(\mathrm{e}^{x}-1\right)+\frac{\left(\mathrm{e}^{x}-1\right)^2}{2!}+\frac{\left(\mathrm{e}^{x}-1\right)^3}{3!}+\ldots$ or $\mathrm{e}^{\mathrm{e}^{x}-1}=\mathrm{e}^{1+x+\frac{x^2}{2!}+\frac{x^3}{3!}+\ldots-1}$	**M1**	1.1b
	$=1+\left(x+\frac{x^2}{2!}+\frac{x^3}{3!}+\right)+\frac{1}{2}\left(x+\frac{x^2}{2!}+\ldots\right)^2+\frac{1}{6}(x+\ldots)^3+\ldots$	**M1**	3.1a
	$=1+x+\left(\frac{1}{2}+\frac{1}{2}\right)x^2+\left(\frac{1}{6}+\frac{1}{2}\times 2\times\frac{1}{2}+\frac{1}{6}\right)x^3+\ldots$	**M1**	1.1b
	$=1+x+x^2+\frac{5}{6}x^3+\ldots$	**A1** **A1**	1.1b 2.1
		(5)	
			(6 marks)

Notes:

(a)

B1: Correct series (ignore terms beyond x^3).

(b)

M1: Correctly applies the exponential Maclaurin expansion at least once, either to the base exponent or in the index. Allow 2 for 2! but must have 3! or 6 in the cube term.

M1: Attempts the exponential Maclaurin series twice and cancels the 1's in the "power" expansion. Allow if the 3! is incorrect for this mark, but a polynomial in x must have been achieved.

M1: Expands the brackets and gathers terms (not necessarily fully simplified, but should have a single term for each power).

A1: Any two correct from coefficients of x, x^2 and x^3, need not be simplified.

A1: Fully correct answer with simplified terms..

NB: Question instructs to use standard Maclaurin series, so use of differentiation scores no mark.