Question Number	Scheme	Marks
5(a)	$\mathrm{E}(T^2) = \int_0^3 \frac{1}{50}\left(18t^2 - 2t^3\right)\,\mathrm{d}t + \int_3^5 \frac{1}{20}t^2\mathrm{d}t$	M1
	$= \left[\frac{1}{50}\left(6t^3 - \frac{t^4}{2}\right)\right]_0^3 + \left[\frac{t^3}{60}\right]_3^5$ or $= \left[\frac{3}{25}t^3 - \frac{t^4}{100}\right]_0^3 + \left[\frac{t^3}{60}\right]_3^5$ oe	A1
	$= \frac{1}{50}\left(6\times 3^3 - \frac{3^4}{2}\right) + \left(\frac{125}{60} - \frac{27}{60}\right)$ or $= \frac{1}{50}\left(162 - \frac{81}{2}\right) + \left(\frac{25}{12} - \frac{9}{20}\right)$ oe	M1d
	$= \frac{1219}{300} = 4.063...$	
	$\mathrm{Var}(T) = "4.063..." - (1.66)^2$	M1
	= 1.3077… awrt 1.31	A1
		(5)
(b)	$\int_3^t \frac{1}{20}\mathrm{d}x + C$ where $C = 0.9$ or $\int_0^3 \frac{1}{50}(18-2t)\,\mathrm{d}t$ **or** using F(5) =1 to find C	M1
	$\left[\mathrm{F}(t) =\right]\begin{cases} 0 & t<0 \\ \frac{1}{50}\left(18t - t^2\right) \text{ or } 1.62 - \frac{(18-2t)^2}{200} & 0 \le t \le 3 \\ \frac{1}{20}t + 0.75 & 3 < t \le 5 \\ 1 & t > 5 \end{cases}$	B1 A1 A1
		(4)
(c)	$\mathrm{P}(T>2) = 1 - "\frac{1}{50}\left(18\times 2 - 2^2\right)"$ or $1 - \int_0^2 \frac{1}{50}(18-2t)\,\mathrm{d}t$	M1
	$= \frac{9}{25}$ or 0.36	A1
		(2)
(d)	$\mathrm{P}(0 < T < 3.66) = \mathrm{F}(3.66)$	M1
	= 0.933	A1
		(2)
	Notes	**Total 13**

(a)	**M1**	Intention to find $\mathrm{E}(T^2)$ correctly. They must add the 2 integrals and attempt to integrate (at least one term $x^n \to x^{n+1}$). Algebraic integration must be seen. Ignore limits. Allow as part of Var(T) condone " – (1.66)^2" occurring twice. If no algebraic integration shown it is M0
	A1	Correct integration
	M1d	dep on previous M being awarded for correct limits and attempt to substitute. If no working shown An attempt may be implied by a correct answer **or** 1219/300 **or** 243/100 **or** 49\30 oe
	M1	For their $\mathrm{E}(T^2)$ – 1.66^2
	A1	awrt 1.31 Allow $2452/1875$ oe
(b)	**M1**	For a correct method to find the 3rd line including limits unless using F(5) = 1 method.
	B1	2nd line correct – any letter. Ignore missing inequality
	A1	3rd line correct– any letter. Ignore missing inequality
	A1	Fully correct CDF All in terms of the same letter (Ignore LHS). Allow < instead of ≤ and vice versa. Allow "otherwise" for the range on the 1st or last line but not both.
(c)	**M1**	For finding 1 – F(2) using their second line or starting again. Must subst in 2
	A1	cao
(d)	**M1**	For realising they need F(3.66) Allow F(3.66) [– F(0)] allow F("their mean +2") [– F(0)]
	A1	Cao allow answer as a fraction