9.- $\mathcal{L}\{t^2 e^{3t} \operatorname{sen}(2t)\}$

$= (-1)^2 \frac{d^2}{ds^2}\left(\mathcal{L}\{e^{3t}\operatorname{sen}(2t)\}\right)$

$\mathcal{L}\{e^{3t}\operatorname{sen}(2t)\} = \mathcal{L}\{\operatorname{sen}(2t)\}\Big|_{s\to s-3} = \frac{2}{s^2+4}\Big|_{s\to s-3} = \frac{2}{(s-3)^2+4}$

$= (-1)^2 \frac{d^2}{ds^2}\left(\frac{2}{s^2-6s+13}\right) \to \frac{d}{ds}\left(\frac{2}{s^2-6s+13}\right) = \frac{-2(2s-6)}{(s^2-6s+13)^2} = \frac{-4s+12}{(s^2-6s+13)^2}$

$= (-1)^2\left(\frac{(s^2-6s+13)^2(-4) - (-4s+12)(4x^3-36x^2+124x-156)}{(s^2-6s+13)^4}\right)$

$= (1)\left(\frac{12s^2-72s+92}{(s^2-6s+13)^3}\right)$

$= \frac{12s^2-72s+92}{(s^2-6s+13)^3}$

10: $\mathcal{L}\{(t-1)^2\, u(t-1)\}\ a=1$

$e^{t}\,\mathcal{L}\{t^2\} = \boxed{\frac{2e^{-t}}{s^3}}$

11: $\{e^{t-5} + u(t-5)\}\ h=1$

$-\frac{d}{ds}\mathcal{L}\{e^{t-5}\,u(t-5)\}\ a=5$

$-\frac{d}{ds}\, e^{-5t}\,\mathcal{L}\{e^{t}\} = -\frac{d}{ds}\quad \frac{e^{-5t}}{s-1} = \frac{(s-1)(-5e^{-5t}) - e^{-5t}}{(s+1)}$

$= \boxed{\frac{5s-4}{(s+1)^2}\cdot e^{-5t}}$