FORMULA SHEET FOR MECHANICAL TECHNOLOGY: AUTOMOTIVE

1. $F = m \times a$

   Where:

   $m = Mass$

   $a = Acceleration$

2. $Work\ done = Force \times Displacement$ OR $W = F \times s$

3. $Power = \dfrac{Force \times Displacement}{Time}$ OR $P = \dfrac{F \times s}{t}$

4. $Torque = Force \times Radius$ OR $T = F \times r$

5. $IP = P \times L \times A \times N \times n$

   Where:

   $IP = Indicated\ power$

   $P = Mean\ effective\ pressure$

   $L = Stroke\ length$

   $A = Area\ of\ piston\ crown$

   $N = Number\ of\ power\ strokes\ per\ second$

   $n = Number\ of\ cylinders$

6. $BP = 2\,\pi\,N\,T$

   Where:

   $BP = Brake\ power$

   $N = Revolutions\ per\ second$

   $T = Torque$

7. $Brake\ power\ with\ Prony\ brake = 2 \times \pi \times N \times F \times R$

   Where:

   $BP = Brake\ power$

   $N = Revolutions\ per\ second$

   $F = Force$

   $R = Brake\ arm\ length$

8. $\textit{Mechanical efficiency} = \dfrac{BP}{IP} \times 100\%$

9. $\textit{Compression ratio} = \dfrac{SV + CV}{CV}$

   Where:

   SV = Swept volume
   CV = Clearance volume

10. $SV = \dfrac{\pi D^2}{4} \times L$

   Where:

   D = Bore diameter
   L = Stroke length

11. $CV = \dfrac{SV}{CR - 1}$

12. $\textit{Gear ratio} = \dfrac{\textit{Product of teeth on driven gears}}{\textit{Product of teeth on driver gears}}$