

1- Convert the following:

a- 4 m/s^2 to $(\text{km/h})/\text{s}$

b- 30 bar to MPa

c- 90 MPa to N/mm^2

d- 35 psi to kPa

e- 66 kW to HP

f- 55 mph to km/h

g- 108 km/h to m/s

* $1 \text{ m/s} = 3.6 \text{ km/h}$, $1 \text{ bar} = 0.1 \text{ N/mm}^2$, $1 \text{ lb/in}^2 = .00689 \text{ N/mm}^2$, $1 \text{ kW} = 1.36 \text{ HP}$,

$1 \text{ mile} = 1.6 \text{ km/h}$.

2- Write down the units of:

a- force

b- pressure

c- torque

d- work

e- energy

f- power

g- velocity

h- volume

i- acceleration

3- A car has a 4 cylinder engine which has a compression ratio of 9:1, bore/stroke ratio (mm) 80/72, net power of 80 kW at 5500 rpm, and maximum speed of 150 Nm at 3700 rev/min. The fuel tank capacity is 55 L and fuel consumption is 10 L/100 km. Find:

a- Engine swept volume.

b- Cylinder Clearance volume.

c- Engine power at max torque

d- Engine torque at max power

f- Max distance the car can cover without refueling

4- A 6-cylinder four stroke engine running at 4000 rev/min its bmep is 860 kPa, the bore is 70 mm and the stroke 68 mm. Calculate:

a- the engine power.

b- the engine torque.

5- The swept volume of a six cylinder engine operating on the four-stroke cycle is 0.002 m^3 , and it develops a torque of 111.2 N m and has a mechanical efficiency of 85%.

Calculate:

a- the bmep.

b- the imep.