The human heart discharges 75 cc of blood through the arteries at each beat against an average pressure of 10 cm of Mercury. Assuming that the pulse frequency is 72 per minute, the rate of working of heart (density of Mercury = 13.6 g/cc and g = 9.8 m/s^2) is,

(A) 12 W (B) 12 mW (C) 1.2 W (D) 1.2 mW

Solution

Power $P = \frac{\delta W}{\delta t} = p\frac{\delta V}{\delta t} = pv.\delta V = h\rho g v.\delta V$

$$\therefore P = h\rho g v.\delta V = (10\times10^{-2})\times\left(13.6\times\frac{10^{-3}}{10^{-6}}\right)\times 9.8\times\left(72\times\frac{1}{60}\right)\times(75\times10^{-6})$$

$$\therefore P = 9.8\times12\times75\times13.6\times10^{-5} \approx 1.2W$$

Hence, (C)