Question 39
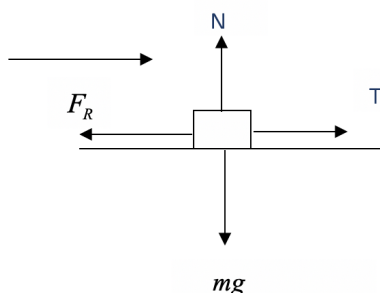
A parcel of mass 2 kg, is at rest on a rough horizontal table. The coefficient of friction between the parcel and the table is 0.25. A constant horizontal force of 10 newtons is applied to the parcel. Two seconds later the magnitude of the momentum of the parcel in kg m/s is equal to

A.   5.1

B.   10

C.   10.2

D.   20

E.   186.2

ANSWER C

Let T be the horizontal force applied now $T = 10$ N $m = 2\,\text{kg}$ $\mu = 0.25$

resolving parallel to the plane (1) $T - F_R = ma$ and $F_R = \mu N$

resolving perpendicular to the plane (2) $N - mg = 0$

and from (2) $N = mg$ (1) $a = \dfrac{1}{m}\left(T - \mu mg\right)$

$a = \dfrac{1}{2}\left(10 - 0.25 \times 2 \times 9.8\right) = 2.55,\ \ u = 0,\ \text{using}\ \ v = u + at$

momentum $mv = 2 \times 2.55 \times 2 = 10.2$ kg m/s