## DPP - 1 (Friction)

Video Solution on Website:-
https://physicsaholics.com/home/courseDetails/40

## Video Solution on YouTube:-

https://youtu.be/uLexfXOL3Vw
Written Solution on Website:-
https://physicsaholics.com/note/notesDetalis/41

Q 1. Direction of friction on upper surface of $M$ is (all surfaces are rough)

(a) Towards right
(b) Towards left
(c) Friction is zero
(d) None of above

Q 2. A block of mass 0.5 kg has an initial velocity of $10 \mathrm{~m} / \mathrm{s}$ domn an inclined plane of inclination $30^{\circ}$, the coefficient of friction between the block and the inclined surface is 0.2 . The velocity of the block after it travel a distance of 10 m along the incline is nearly: $\left(\mathrm{g}=10 \mathrm{~m} / \mathrm{s}^{2}\right)$
(a) $13 \mathrm{~m} / \mathrm{s}$
(b) $17 \mathrm{~m} / \mathrm{s}$
(c) $24 \mathrm{~m} / \mathrm{s}$
(d) $8 \mathrm{~m} / \mathrm{s}$

Q 3. A box is projected along a line of greatest slope up a rough plane inclined at an angle of $45^{\circ}$ with the horizontal. If the coefficients of friction is $1 / 2$, then the retardation is:-
(a) $\frac{g}{\sqrt{2}}$
(b) $\frac{g}{2 \sqrt{2}}$
(c) $\frac{g}{2 \sqrt{3}}$
(d) $\frac{3 g}{2 \sqrt{2}}$

Q 4. A block of mass $M=5 \mathrm{~kg}$ is resting on a rough horizontal surface for which the coefficient of friction is 0.2 . When a force $\mathrm{F}=40 \mathrm{~N}$ is applied as shown, the acceleration of the block will be then $\left(\mathrm{g}=10 \mathrm{~m} / \mathrm{s}^{2}\right)$.



Q 5. The rear side of a truck is open and a box of 40 kg mass is placed 5 m away from the open end as shown in figure. The coefficient of friction between the box and the surface below it is 0.15 . On a straight road, the truck starts from rest and accelerates with 2 $\mathrm{m} / \mathrm{s}^{2}$. At what distance from its starting point does the box fall off the truck? (Ignore the size of the box)

(a) 25 m
(b) 15 m
(c) 20 m
(d) 10 m

Q 6. A 500 kg horse pulls a block of mass 100 kg along a horizontal rough road with an acceleration of $1 \mathrm{~m} / \operatorname{Sec}^{2}, \mu=0.8$. The forward force on the horse is [Take $\mathrm{g}=10$ $m / S e c{ }^{2}$ ]
(a) zero
(b) 2000 N
(c) 1400 N
(d) 600 N

Q 7. Block A has a mass of 2 kg and block B has 20 kg . If the coefficient of kinetic friction between block $B$ and the horizontal surface is 0.1 , and $B$ is accelerating towards the right with $\mathrm{a}=2 \mathrm{~m} / \mathrm{s}^{2}$, then the mass of the block C will be-
(a) 15 kg
(c) 5.7 kg
(b) 12.5 kg
(d) 10.5 kg


Q 8. An object is placed on the surface of a smooth inclined plane of inclination $\theta$. It takes time $t$ to reach to bottom. If the same object is allowed to slide down a rough inclined plane of same inclination $\theta$, it takes time nt to reach the bottom where n is a number greater than 1 . The coefficient of friction $\mu$ is given by
(a) $\mu=\tan \theta\left(1-1 / \mathrm{n}^{2}\right)$
(b) $\mu=\cot \theta\left(1-1 / n^{2}\right)$
(c) $\mu=\tan \theta\left(1-1 / n^{2}\right)^{1 / 2}$
(d) $\mu=\cot \theta\left(1-1 / n^{2}\right)^{1 / 2}$

Q 9. Two blocks A and B attached to each other by a massless spring, are kept on a rough horizontal surface ( $\mu=0.1$ ) and pulled by a force $\mathrm{F}=200 \mathrm{~N}$ as shown in figure. If at some instant the 10 kg mass has acceleration of $12 \mathrm{~m} / \mathrm{s}^{2}$, what is the acceleration of 20 kg mass?

(a) $2.5 \mathrm{~m} / \mathrm{s}^{2}$
(b) $4.0 \mathrm{~m} / \mathrm{s}^{2}$
(c) $3.6 \mathrm{~m} / \mathrm{s}^{2}$
(d) $1.2 \mathrm{~m} / \mathrm{s}^{2}$


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Q 10. A flat car is given an acceleration $\mathrm{a}_{0}=2 \mathrm{~m} / \mathrm{s}^{2}$ starting from rest. A cable is connected to a crate A of weight 50 kg as shown. Neglect friction between the floor and the car wheels and also the mass of the pulley. Calculate corresponding tension in the cable if $\mu=0.30$ between the crate and the floor of the car -

(a) 350
(b) 250
(c) 300
(d) 400

Q 11. Statement-1 : While drawing a line on a paper, friction force acts on paper in the same direction along which line is drawn on the paper.
Statement-2 : Friction always opposes motion.
(a) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
(b) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1
(c) Statement-1 is True, Statement-2 is False
(d) Statement-1 is False, Statement-2 is True

Q 12. A man is running on ground with increasing speed. Friction acting on man is
(a) Static
(b) Kinetic
(c) No friction acts on man
(d) None of these


## Answer Key

| Q. 1 | a | Q. 2 | a | Q. 3 d |  | Q. 4 | a | Q. 5 | b |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Q. 6 | c | Q. 7 | d | Q. 8 |  | Q. 9 | a | Q. 10 | a |
| Q. 11 | c | Q. 12 | a |  |  |  |  |  |  |

