Friction

1. When a body is moving on a surface, the force of friction is called

(a) Static friction (b) Dynamic friction (c) Limiting friction (d) Rolling friction

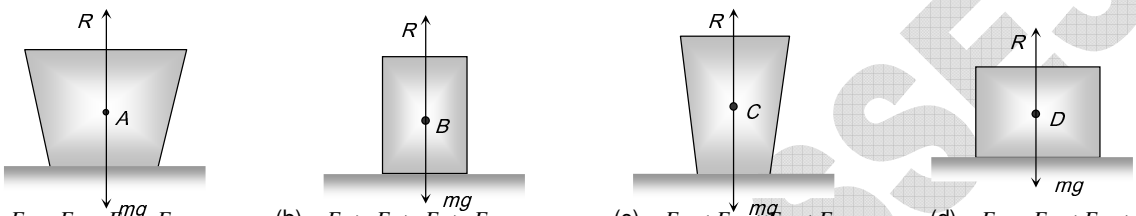
2. Which one of the following is not used to reduce friction

(a) Oil (b) Ball bearings (c) Sand (d) Graphite

3. A block of mass 10 *kg* is placed on an inclined plane. When the angle of inclination is 30°, the block just begins to slide down the plane. The force of static friction is

(a) 10 *kg wt* (b) 89 *kg wt* (c) 49 *kg wt* (d) 5 *kg wt*

4. What can be inferred regarding the limiting frictional force in the following four figures



(a) $F_A = F_B = F_C = F_D$ (b) $F_A > F_B > F_C > F_D$ (c) $F_A < F_B < F_C < F_D$ (d) $F_A = F_B < F_C < F_D$

5. A force of 98 Newton is required to drag a body of mass 100 *kg* on ice. The coefficient of friction will be

(a) 0.98 (b) 0.89 (c) 0.49 (d) 0.1

6. A 60 *kg* body is pushed with just enough force to start it moving across a floor and the same force continues to act afterwards. The coefficients of static and sliding friction are 0.5 and 0.4 respectively. The acceleration of the body is

(a) $6\ m/\sec^2$ (b) $4.9\ m/\sec^2$ (c) $3.92\ m/\sec^2$ (d) $1\ m/\sec^2$

7. Consider the following statements

Assertion (*A*) : It is difficult to move a cycle along the road with its brakes on.

Reason (*R*) : Sliding friction is greater than rolling friction.

Of these statements

(a) Both *A* and *R* are true and the *R* is a correct explanation of the *A*

(b) Both *A* and *R* are true but the *R* is not a correct explanation of the *A*

(c) *A* is true but the *R* is false

(d) Both *A* and *R* are false

(e) *A* is false but the *R* is true

8. A body is sliding down an inclined plane having coefficient of friction 0.5. If the normal reaction is twice that of the resultant downward force along the incline, the angle between the inclined plane and the horizontal is

(a) 15° (b) 30° (c) 45° (d) 60°

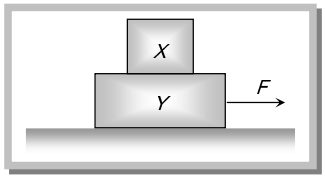
9. A block *X* of mass 4 *kg* is lying on another block *Y* of mass 8 *kg*. As shown in the figure. When the force acting on *X* is 12*N*, block *X* is on the verge of slipping on *Y*. The force *F* in Newton necessary to make both *X* and *Y* move simultaneously will be

(a) 36

(b) 3.6

(c) 0.36

(d) 3.6



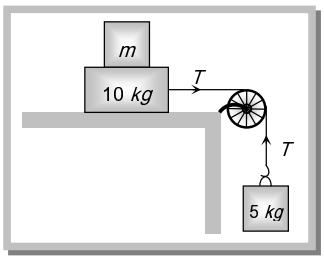
10. Two masses $10\ kg$ and $5\ kg$ are connected by a string passing over a pulley as shown. If the coefficient of friction be 0.15, then the minimum weight that may be placed on 10 *kg* to stop motion is

(a) 18.7 *kg*

(b) 23.3 *kg*

(c) 32.5 *kg*

(d) 44.3 *kg*



11. The force required to just move a body up an inclined plane is double the force required to just prevent it from sliding down. If ϕ is angle of friction and θ is the angle which incline makes with the horizontal then

(a) $\tan\theta = \tan\phi$ (b) $\tan\theta = 2\tan\phi$ (c) $\tan\theta = 3\tan\phi$ (d) $\tan\phi = 3\tan\theta$

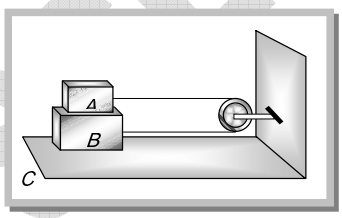
12. A body is on a rough horizontal plane. A force is applied to the body direct towards the plane at an angle ϕ with the vertical. If θ is the angle of friction then for the body to move along the plane

(a) $\phi > \theta$ (b) $\phi < \theta$ (c) $\phi = \theta$ (d) ϕ can take up any value

13. A body slides over an inclined plane forming an angle of 45° with the horizontal. The distance *x* travelled by the body in time *t* is described by the equation $x = kt^2$, where $k = 1.732$. The coefficient of friction between the body and the plane has a value

(a) $\mu = 0.5$ (b) $\mu = 1$ (c) $\mu = 0.25$ (d) $\mu = 0.75$

14. Two blocks *A* and *B* of masses *m* and *M* respectively are placed on each other and their combination rests on a fixed horizontal surface *C*. A light string passing over the smooth light pulley is used to connect *A* and *B* as shown. The coefficient of sliding friction between all surfaces in contact is μ. If *A* is dragged with a force *F* then for both *A* and *B* to move with a uniform speed we have



(a) $F = \mu(M+m)g$

(b) $F = \mu mg$

(c) $F = \mu(3M+m)g$

(d) $F = \mu(3m+M)g$