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## IIT-JEE PHYSICS

### DYNAMICS

9. The static frictional force between two surfaces is  $f \leq \mu_s N$
10.  $\mu_s$  between two given surfaces is independent of the normal force between the two surfaces.
11.  $\mu_s > 0$ , it can also be greater than one, but in most of the cases it is less than one.
12. If  $\theta_s$  is the angle of limiting friction between two surfaces  $\tan \theta_s = \mu$
13.  $\mu_k < \mu_s$  for a given pair of surfaces.
14. The angle of kinetic friction between two surfaces  $\theta_k$  is given by  
$$\tan \theta_k = \mu_k$$
15.  $\theta_k < \theta_s$  for a given pair of surfaces
16. Rolling friction arises out of the deformation of the two surfaces in contact with each other.
17. Greater the deformation, greater is the rolling frictional force.
18. The rolling frictional force is inversely proportional to the radius of the rolling body.
19. If  $\mu_R$  is the coefficient of rolling friction  
$$\mu_R < \mu_k < \mu_s$$
 for a given pair of surfaces.
20. **Excess polishing increases friction** rather than reducing it, because surface adhesion is increased.
21. Streamlining the shape of a body for minimizing air friction.
- 22. Block on a rough fixed horizontal surface**
23. If applied force  $F = 0$ , the force of friction is zero.
24. If applied force  $F < f_s$ , the block does not move and the force of friction is  $f = F$
25. A chain of uniform length 'L' is placed on a rough horizontal table. The coefficient of friction between the chain and table is  $\mu$  then the maximum fractional length of chain  $\frac{\mu}{1 + \mu}$  can be hung freely from the edge of the table is
26. Minimum fraction of length of chain that can be on the table is  $\frac{X}{L} = \frac{1}{\mu + 1}$
27. A body of mass 'm' is pressed against a vertical wall with a horizontal force 'F'. The normal force is F. If the coefficient of static friction is  $\mu_s$ , then block will be about to slide down if  
$$\mu_s F = mg$$
28. A vehicle is moving on a horizontal surface. A block of mass 'm' is stuck on the front part of the vehicle. The coefficient of friction between the truck and the block is ' $\mu$ '. The minimum acceleration with which the truck should travel, so that the body may not slide down is  
$$\frac{g}{\mu}$$

**PRACTICE QUESTIONS**

5. A box of mass 8 kg is placed on a rough inclined plane of inclination  $\theta$ . Its downward motion can be prevented by applying an upward pull  $F$  and it can be made to slide upwards by applying a force  $2F$ . The coefficient of friction between the box and the inclined plane is
- 1)  $\frac{1}{3} \tan \theta$                       2)  $3 \tan \theta$                       3)  $\frac{1}{2} \tan \theta$                       4)  $2 \tan \theta$

**KEY**

- 1) 1      2) 4      3) 4      4) 3      5) 1

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