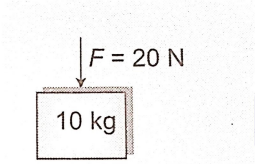
NEW STANDARD ACADEMY

Marks: 60

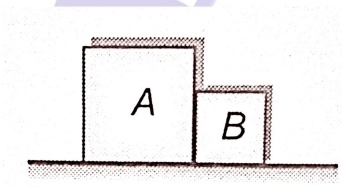
Date : 08-07-24 **CLASS : 11TH JEE** **Time: 3 HRS**

PHYSICS

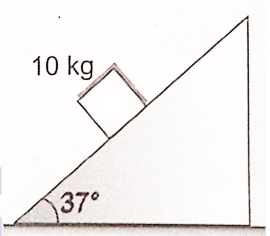
1. Find the normal reaction exerted by the surface on the block



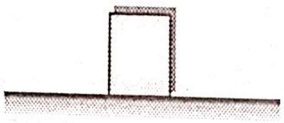
2. Two blocks are kept in contact on a smooth surface as shown in the figure. What is the normal force exerted by A on B? Also draw an FBD.



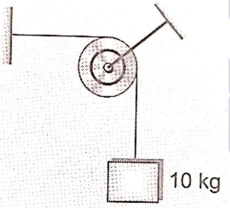
3. A book is at rest on a table top. Diagram the forces acting on the book.
4. A girl is suspended motionless from a bar which hangs from the ceiling by two ropes. Diagram the forces acting on the girl.
5. An egg is free-falling from a nest in a tree. Neglect air resistance. Diagram the forces acting on the egg as it is falling
6. A flying squirrel is gliding (no wing flaps) from a tree to the ground at constant velocity. Consider air resistance. Diagram the forces acting on the squirrel.
7. A rightward force is applied to a book in order to move it across a desk with a rightward acceleration. Consider frictional forces. Neglect air resistance. Diagram the forces acting on the book.
8. Find the normal reaction exerted by the surface on the block



9. A block of mass 'm' is kept on the ground as shown in the figure.
   (i) Draw FBD of block.
   (ii) Are forces acting on block action-reaction pair?
   iii) If answer is no, draw action-reaction pair.



10. Find the magnitude of force exerted by a string on pulley.



CHEMISTRY

1. Find number of σ *and* π –bonds in following:
   a) $CH_2 = CH - COOH$
   b) $C_2(CN)_4$
2. What is the hybridized state of each carbon in carbon suboxide (C_3O_2)?
3. Match each of the following species with one of these hybridisation schemes:

(I)	(II)
(A) sp	(a) SF_6
(B) sp^2	(b) CS_2
(C) sp^3	(c) $SnCl_4$
(D) sp^3d	(d) NO_3^-
(E) sp^3d^2	(e) AsF_5

4. Predict the shapes of the following molecules using the VSEPR model: $BeCl_2$, $SiCl_4$, AsF_5, H_2S, PH_3, XeO_2F_2, CH_4
5. Which of the following molecules are linear? $IC{I_2}^-$, IF_2^+, OF_2, SnI_2,
6. Which of the following molecules has the maximum number of AX bonds of identical bond length when A is the central atom and X is the surrounding atom?
   a) SF_4 b) IF_7
7. The experimental dipole moment of water molecule is 1.84 D. Calculate the bond angle H-O-H in water molecule, if dipole moment of OH bond is 1.5 D.
8. Calculate the percentage of ionic character in Cs-Cl bond in CsCl molecule. The electronegativity values of Cs and Cl are 0.7 and 3.0 respectively.
9. A diatomic molecule has a dipole moment of 1.2 D. If the bond distance is 1.0 Å, what fraction of an electronic charge, e, exists on each atom?
10. The dipole moment of LiH is 1.964×10^{-29} cm and the interatomic distance between Li and H in this molecule is 1.596 Å. What is the percent ionic character in LiH?

MATHS

1. Solve : $\sin^2\theta - \cos\theta = \frac{1}{4}$, $0 \le \theta \le 2\pi$
2. Solve : $\sin 3\theta - \sin\theta = 4\cos^2\theta$-2
3. Let A and B denote the statements
   A: $\cos\alpha + \cos\beta + \cos\gamma = 0$
   B : $\sin\alpha + \sin\beta + \sin\gamma = 0$
   If $\cos(\beta-\gamma) + \cos(\gamma-\alpha) + \cos(\alpha-\beta) = -\frac{3}{2}$,then
4. Let $f_k(x) = \frac{1}{k}(\sin^k x + \cos^k x)$ *where* $x \in R$ *and* $K \ge 1$. *Then* $f_4(x) - f_6(x)$ *equals*
5. *Solve :* $16^{\sin^2 x} + 16^{\cos^2 x} = 10, 0 \le x < 2\pi$
6. *If the equation a sin x +cos 2x =2a* – 7 possesses a solution, then find the values of a.
7. *Find the general solution of (1*-2cos $\theta)^2$ +$(\tan\theta+\sqrt{3})^2$=0.
8. Solve : 3 $\cos^2\theta$-2$\sqrt{3}$ sin $\theta\cos\theta - 3\sin^2\theta = 0$
9. Solve : 2 + tan x cot $\frac{x}{2}$ + cot x tan $\frac{x}{2}$ =0
10. If $\frac{1-\cos 2\theta}{1+\cos} =$ 3 *then the general value of* θ *is*