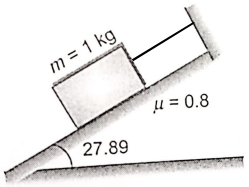
NEW STANDARD ACADEMY

Marks: 90

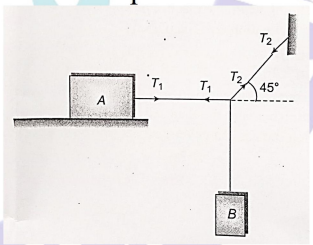
Date : 12-08-24 **CLASS : 11TH JEE** **Time: 3 HRS**

PHYSICS

1. The coefficient of friction between two surfaces is 0.2. The angle of friction is
   (a) $\sin^{-1}(0.2)$
   (b) $\cos^{-1}(0.2)$
   (c) $\tan^{-1}(0.1)$
   (d) $\cot^{-1}(5)$
2. A block of mass 4 kg rests on an inclined plane. The inclination of the plane is gradually increased. It is found that when the inclination is 3 in 5, the block just begins to slide down the plane. The coefficient of friction between the block and the plane is
   (a) 0.4 (b) 0.6
   (c) 0.8 (d) 0.75
3. A block of mass m is kept on the floor of a freely falling lift. During the free fall of the lift, the block is pulled horizontally with a force of 2 N, μ= 0.1 The frictional force on the block will be
   (a) zero (b) 2 N
   (c) 1 N (d) 10 N
4. A rectangular wooden block 5cm×10cm× 10 cm in size is kept on a horizontal surface with its face of largest area on the surface. A minimum force of 1.5 N applied parallel to the surface sets the block in sliding motion along the surface. If the block is now kept with its face of smaller area in contact with the surface, the minimum force applied parallel to the surface, to set the block in motion, is
   (a) greater than 1.5 N
   (b) less than 1.5 N
   (c) equal to 1.5 N
   (d) may be greater or less than 1.5 N
5. A block of mass 3 kg is placed on a rough horizontal surface μ = 0.4 A force of 8.7 N is applied on the block. If g = $10ms^{-2}$ then the force of friction between the block and floor is
   (a) 8.7 N (b) 12 N
   (c) 10 N (d) zero
6. For the arrangement shown in the figure, the tension in the string is [Given: $\tan^{1}$ (0.8) = 39 deg]

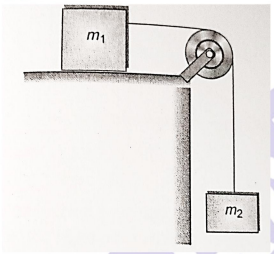


   a) 6 N (c) 0.4 N
   (b) 6.4 N (d) zero
7. A truck moving at 250/9 m/s carries a steel girder which rests on its wooden floor. The minimum time in which the truck can come to a stop without the girder moving forward is (Given:μ_s = 0.5)
   (a) 3 s (b) 4 s
   (c) 5 s (d) 5.7 s
8. The block A in the figure weighs 100 N. The coefficient of static friction between the block and the table is 0.25. The weight of the block B is maximum for the system to be in equilibrium. The value of T_1 is



   (a) 0.25 N (b) 25 N
   (c) 100 N (d) 10.25 N
9. A car starts from rest to cover a distance x. The coefficient of friction between the road and tyres is the minimum time in which the car can cover distance x is proportional to
   (a) μ
   (b) $1/\mu$
   (c) $\sqrt{\mu}$
   (d) $1/\sqrt{\mu}$

10. A block of mass m_1 kg is resting on a rough horizontal plane, coefficient of kinetic friction between block and surface is μ. If m_1 is connected to another mass m_2 with the help of string and pulley as shown in the diagram, then the common acceleration when released from rest will be



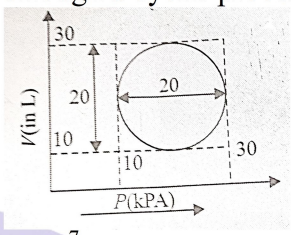
a) $\frac{m_2 g}{m_1+m_2}$ b) $\left[\frac{m_2-m_1}{m_1+\mu m_2}\right] g$

c) $\frac{\mu m_2+m_1}{m_1+m_2} g$ d) $\left[\frac{m_2-\mu m_1}{m_1+m_2}\right] g$

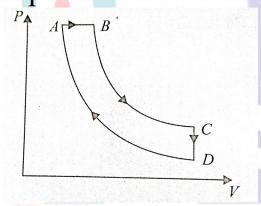
11. A force of 98 N is required to just start moving a body of mass 100 kg over ice. The coefficient of static friction is
(a) 0.6 (b) 0.4
(c) 0.2 (d) 0.1
12. A heavy uniform chain lies on a horizontal table-top. If the coefficient of friction between the chain and table surface is 0.25, then the maximum fraction of length of the chain, that can hang over one edge of the table is
(a) 20% (b) 25%
(c) 35% (d) 15%
13. A box is lying on an inclined plane. What is the coefficient of static friction if the box starts sliding when an angle of inclination is 60°?
(a) 1.173 (b) 1.732
(c) 2.732 (d) 1.677
14. Work done by a frictional force is
(a) Negative (b) Positive
(c) Zero (d) All of the above
15. The maximum speed that can be achieved without skidding by a car on a circular unbanked road of radius R and coefficient of static friction μ, is
a) μRg b) $Rg\sqrt{\mu}$
c) $\mu\sqrt{Rg}$ d) $\sqrt{\mu Rg}$

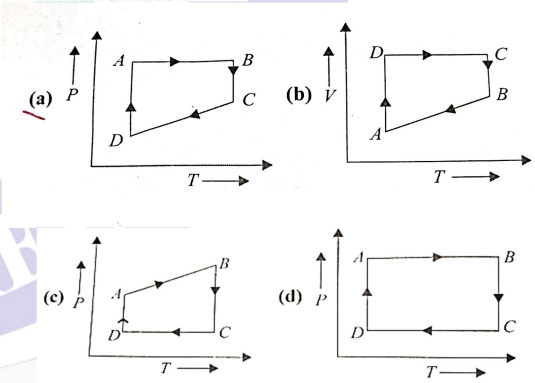
CHEMISTRY

1. If temperature of the system remains constant during the course of change, the change is
a) Isothermal b) Adiabatic
c) Isobaric c) Iso choric
2. Heat energy absorbed by a system in going through a cyclic process shown in figure is



a) $10^7 \pi J$ b) $10^4 \pi J$
c) $10^2 \pi J$ d) $10^{-3} \pi J$
3. 10 mol of an ideal gas confined to a volume of 10 L is released into atmosphere at 300 K where the pressure is 1 bar. The work done by the gas is(Given R= 0.033 Lbar $K^{-1}mol^{-1}$)
(a) 249 L bar
(b) 259 L bar
(c) 239 L bar
(d) 220 L bar
4. A cyclic process ABCD is shown in the P-V diagram. Which of the following curves represents the same process?





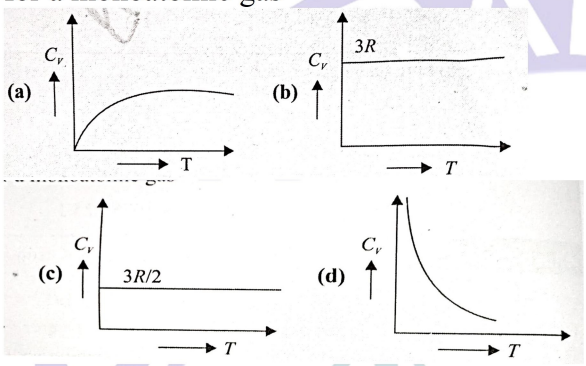
5. The density of ice at 0°C is 0.915gcm^{-3} and that of liquid water at 0°C is 1gcm^{-3} Work done for melting 1 mole of ice at 1.00 bar is
(a) 0.167 J (b)-0167 J
(c) 0.00J (d)- 1.67 J
6. Heat of combustion of $H^2(g)$ is - 58 kcal mol^{-1} at 298 K and constant pressure

$$H_2(g)+\frac{1}{2}O_2(g)\rightarrow H_2O(g)$$

Temperature of a hydrogen-oxygen flame of $H_2(g)$ is used as fuel is
(a) 8638 K (b) 1298 K

c) 8583 K (d) 1722 K

7. Select the correct alternative(s).
   (a) If $C_p = 3+ (2 \times 10^{-2})T$ cal mol^{-1} K^{-1} then $C_v = 1 + (2\times10^{-2}) T$ cal mol^{-1} K^{-1}
   (b) $\Delta H = C_p(T_2 - T_1)$
   (c) $\Delta H = (C_V + R)(T_2 - T_1)$
   (d) $\Delta E = (Cp-R)(T2 - T_1)$
8. Graph for specific heat at constant volume for a monoatomic gas



9. Specific heat at constant pressure of a diatomic gas having molar mass M is approximately equal to
   a) $\frac{\gamma R}{M(\gamma-1)}$ b) $\frac{\gamma}{RM}$
   c) $\frac{M}{R(\gamma-1)}$ d) $\frac{\gamma RM}{\gamma+1}$
10. Determine the enthalpy of formation for $H_2O_2(l)$, using the listed enthalpies of reactions:

$$N_2H_4(l) + 2H_2O_2(l) \longrightarrow N_2(g) + 4H_2O(l); \quad \Delta_r H^o_1 = -818 \text{ kJ/mol}$$
$$N_2H_2(l) + O_2(g) \longrightarrow N_2(g) + 2H_2O(l); \quad \Delta_r H^o_2 = -622 \text{ kJ/mol}$$
$$H_2(g) + \frac{1}{2}O_2(g) \longrightarrow H_2O(l); \quad \Delta_r H^o_3 = -285 \text{ kJ/mol}$$

   (a) - 383kJ / mol (b) - 187kJ / mol
   (c) - 498kJ / mol (d) None of these
11. Hess's law deals with
   a) Changes in heat of reaction
   b) Rate of reaction
   c) Equilibrium constant
   d) Influence of pressure on volume of a gas
12. When a certain amount of ethylene underwent combustion, 6226 kJ heat was evolved. If heat of combustion of 1 mole of ethylene is 1411 kJ, the volume of O_2 (at NTP) that entered into the reaction is

   a) 296.5 mL (b) 296.5 Litres
   (c) 6226x22.4 Litres (d) 22.4 Litres

13. The enthalpy of neutralisation of a weak acid in 1 M solution with a strong base is -56.1 kJ mol^{-1}. If the enthalpy of ionization of the acid is 1.5 kJ mol^{-1} and enthalpy of neutralization of the strong acid with a strong base is -57 3 kJ $equiv^{-1}$, what is the % ionization of the weak acid in molar solution (assume the acid to be monobasic)?
   (a) 10 (b) 15
   (c) 20 (d) 25
14. The heat of combustion of yellow phosphorus and red phosphorus are - 9.91 kJ/mol and - 8.78 kJ/mol respectively. The heat of transition from yellow phosphorus to red phosphorus is

   (a)-1.13 kJ b) - 18.69k
   (c) + 18.69kJ (d) +1.13kJ
15. One mole each of CaC_2, Al_4C_3 and Mg_2C_3 reacts with H_2O in separate open flasks at 25°C. Numerical value of the work done by the system is in the order
   a) $CaC_2<Al_4C_3=Mg_2C_3$
   b) $CaC_2<Al_4C_3<Mg_2C_3$
   c) $CaC_2=Mg_2C_3<Al_4C_3$
   d) $CaC_2=Mg_2C_3=Al_4C_3$

MATHS

1. Three numbers are in G.P. whose sum is 70. If the extremes be each multiplied by 4 and the mean by 5, then they will form an A.P. The product of numbers is
   (a) 600 (b) 500
   (c) 800 (d) none of these
2. IF x =1 +a +a^2+…∞ and y= 1+b+b^2+…∞, where a and b are proper fractions then 1+ab+a^2b^2…∞ =
   a) $\frac{xy}{x+y-1}$ b) $\frac{xy}{x-y-1}$
   c) $\frac{xy}{x-y+1}$ d) none of these
3. If x,y and Z are are in HP., Then the value of expression $\log_e(x+z)+\log_e(x-2y+z)$ will be
   a) $\log_e(x-z)$ b) 2 $\log_e(x-z)$
   c)3 $\log_e(x-z)$ d) 4 $\log_e(x-z)$
4. The harmonic mean between two numbers is 21/5. Their arithmetic mean A and geometric mean G satisfy the relation 3A + G^2 = 36 The sum of squares of numbers is

a) 48
b) 52
c) 58
d) none of these

5. Solve the following equations:
$x(x-2)(x^2-1) = -1$
a) $\frac{-1\mp\sqrt{5}}{2}$ b) $\frac{-1\mp\sqrt{5}}{3}$
c) $\frac{-1\mp\sqrt{7}}{2}$ d) none of these
6. Solve for x: $(5+2\sqrt{6})^{x^2-3} + (5-2\sqrt{6})^{x^2-3} = 10$
a) $\mp 2, \mp\sqrt{2}$ b) $\mp 2, \mp\sqrt{3}$
c) $\mp 2, \mp\sqrt{5}$ d) $\mp 2, \mp\sqrt{7}$
7. If α and β; α and γ, α and δ are the roots of the roots of the equation $ax^2+2bx+c = 0$, $2bx^2+cx+a=0$ and $cx^2+ax+2b=0$respectivly where a,b abd c are positive real numbers then $\alpha + \alpha^2 is$
a) 0 b) 2
c) 3 d) 4
8. Letα, β be the root of the equation $x^2+x+p=0$ are γ δ be the roots of the equation $x^2-4x+q=0$ If α, β, γ and δ are in GP,the integral values of p and q respectively are
a) -2,-32 b) -2,3
c) -6,3 d) -6,-32
9. If the product of the roots of the quadratic equation $mx^2-2x+(2m-1)=0$ is 3 then the value of m
a) 1 b) 2
c) -1 d) 3
10. The roots of the quadratic equation $x^2-2(a+b)x+ 2(a^2+b^2) =-0$ are
a) Rational and different
b) Rational and equation
c) Irrational and different
d) Imaginary and different
11. If $\cos^4\theta+p, \sin^4\theta+ p$ are the roots of the equation $x^2+a(2x+1)=0$ and $\cos^2\theta+q, \sin^2\theta + q$ are the roots of the equation $x^2+4x+2=0$ then a is equal to
12. If $x^2+3x+5 =0$ and $ax^2+bx+c=0$ have a common root and a,b,c ∈ N, the minimum value of a+b+c is
13. If the roots of the equation $10x^3-cx^2-54x-27= 0$ are in harmonic progression the value of c is
14. Let sum of first three terms of G.P. with real terms is 13/12 and their product is 1. If the absolute value of the sum of their infinite terms is S then the value of 7S is
15. Number of positive integral ordered pairs (a, b) such that 6, a and b are in harmonic progression, is