NEW STANDARD ACADEMY

Marks: 60

Date : 02-09-24 **CLASS : 11TH JEE** **Time: 3 HRS**

PHYSICS

1. In a uniform circular motion, the direction of linear velocity is along the
   a) Tangent to the curve path
   b) Radius vector towards the centre
   c) Perpendicular to the plane of the circular motion
   d) Radius vector
2. For a particle performing UCM, the physical quantities are constant
   a) Speed and angular velocity
   b) Kinetic energy and radius vector
   c) Angular velocity and Kinetic energy
   d) 'a' and 'c'
3. A particle describes a circular path of diameter 20 m every 2s. the average angular speed of the particle during 4s is
   a) 20 π rad/ s
   b) 10 π rad /s
   c) 5π rad/ s
   d) $\pi\ rad/s$
4. A particles moves in a circular path of radius 10 cm with a constant speed of 10 cm/s. its acceleration is
   a) 100cm/s^2
   b) 10 cm/s^2
   c) 1 cm/s^2
   d) Zero
5. A sprit level is placed at the edge of a turn table along its radius. The bubble will be
   a) At the centre of the container
   b) At the outer edge of the container
   c) At the inner edge of the container
   d) Will oscillate about the centre of the container
6. A body of mass 0.4 kg is revolved in a horizontal circle of radius 5m. If it performs 120 rev/min, the centripetal force acting on it is.
   a) 2 π^2 N
   b) 4 π^2 N
   c) 16π^2 N
   d) 32π^2 N
7. The maximum safe speed of a vehicle on a circular track is 15 km/h. When the track becomes wet, the maximum safe speed is 10 km/h. the ratio of coefficient of friction of dry track to that of the wet track is
   a) 2:3 b) 3:2
   c) 9:4 d) 1:1
8. A car takes a circular turn at an optimum speed on a road which is banked at an angle $\theta = \sin^{-1} 0.1$. If the required centripetal force is 400 N, the normal reaction on the car is
   a) 400 N, vertically upward
   b) 40N, normal to the road surface
   c) 4000 N, normal to the road surface
   d) 4000 N, vertically downward
9. A bucket of water, tied to a rope is to be rotated without spilling in a vertical circle of radius 5 m. The minimum speed of the bucket at the highest position should be
   a) 0.7 m/s b) 2 m/s
   c) 4 m/s d) 7 m/s
10. The angular acceleration of a rotating body which slows down from 500 rpm to rest in 10 seconds is about
    a) 5 rad/s^2
    b) – 2.5 rad/s^2
    c) – 5 rad/s^2
    d) – 10 rad/s^2
11. A bob of mass 30 g suspended by a string is able to complete a vertical circular loop at a place where g = 10 m/s^2. If the maximum change in its PE during the motion is 0.6 J, the radius of the path is
    a) 10 m b) 2m
    c) 1 m d) 0.5 m
12. Initial angular velocity of a wheel is 2 rad/s. It rotates with a constant angular acceleration of 3.5 rad/s^2. Its angular displacement in 2 s is

a) 4 rad b) 7 rad
c) 8 rad d) 11 rad

13. A bicycle is moving with a constant velocity $\vec{v}$ the graph of angular speed ω,of its wheels against the distance travelled s is
a) A hyperbola
b) A straight line parallel to the ωaxis
c) A straight line parallel to the s axis
d) A parabola
14. When a body moves with a constant speed along a circle ,
a) Its linear velocity remains constant
b) No force acts on it
c) No work is done on it
d) No acceleration is produced is in it
15. Two particles, whose masses are in the ratio 7:3, go around two concentric tracks whose radii are in the ratio 1:2 If their linear speeds are in the ratio 1:2, their centripetal accelerations are in the ratio
a) 7:6 b) 1:1
c) 1:2 d) 1:4

CHEMISTRY

1. Conversion factor for converting partial pressures (in K_P) to active masses (in Kc) is
(a) 1/RT
(b) RT
(c) $(RT)^2$
(d) $1/((RT)^2$
2. For the reaction, $C(s) + CO_2(g) \rightleftharpoons 2CO_{(g)}$, the partial pressures of CO_2, and CO are 2.0 and 4.0 atm respectively at equilibrium. The Kp, for the reaction is
(a) 2.0 atm
(b) 0.5 atm
(c) 4.0 atm
(d) 8.0 atm
3. The decomposition of N_2O_4, to NO_2 is carried out at 280°C in chloroform. When equilibrium is reached, 0.2 mol of N_2O_4, and $2x10^{-3}$ mol of NO_2, are present in a 2L solution, the equilibrium constant for the reaction $N_2O_4 \rightleftharpoons 2NO_2$, is
(a 1×10^{-2}
(b 12×10^{-3}
(c) 1×10^{-5}
(d) 2×10^{-5}
4. A sample of pure $PCI_5(g)$ was introduced into an evacuated vessel at 473 K. After equilibrium was attained, concentration of PCI_5, was found to be 0.05 mol L^{-1}
For $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$. K = 8.0×10^{-3} mol L^{-1}

Thus, $[PCl_3]$ and $[Cl_2]$ m are

$[PCl_3]$	$[Cl_2]$	$[PCl_3]$	$[Cl_2]$
(a) 0.02	0.02	(b) 0.05	0.05
(c) 0.05	0.02	(d) 0.02	0.05

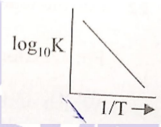
5. For the following gaseous phase equilibrium,
$PCl_{5(g)} \rightleftharpoons PCI_{3(g)} + Cl_{2(g)}$
K, is found to be equal to K_x (K_x is equilibrium constant when concentration are taken in terms of mole fraction). This is attained when pressure is
(a) 1 atm (b) 0.5 atm
(c) 2 atm (d) 4 atm
6. For the following equilibrium,
$N_2O_{4(g)} \rightleftharpoons 2NO_2(g)$, Kp = Kc. This is attained when
(a) T = 1.0K
(b T = 12.18K
(c) T = 27.3K
(d) T = 273K
7. $Ag^+_{(aq)} + NH_{3(aq)} \rightleftharpoons [Ag(NH_3)(aq)]^+$;
$K_1 = 3.5 \times 10^{-3}$
$[Ag(NH_3)]^+ (aq) + NH_3(aq) \rightleftharpoons [Ag(NH_3)_2]^+(aq)$;
$K_2 = 1.7 \times 10^{-3}$
Formation constant of $[Ag(NH_3)_2]^+$ (aq) is
(a) 2.06
(b 5.2×10^{-3}
(d) 5.95×10^{-6}
(d) None of these
8. Given that for the equilibrium constants of two reactions,
(1) $XeF_6(g) + H_2O_{(g)} \rightleftharpoons XeOF_{4(g)} + 2HF_{(g)}$
(II) $XeO_{(g)} + XeF_{6(g)} \rightleftharpoons XeOF_{4(g)} + XeO_3F_{2(g)}$
are K_1 and K_2 Equilibrium constant K_3, of the following reaction in terms of K_1, and K_2
$XeO_4(g) + 2HF(g) \rightleftharpoons XeO_3F_2(g) + H_2O_{(g)}$
(a) K_1K_2
(b) K_1/K_2
(c) K_2/K_1
(d) $\sqrt{K_1K_2}$
9. Consider the following equilibria,
(1) $C(s) + O_2(g \rightleftharpoons) CO_{2(g)}$

(II) $H_2(g) + 1_2(g) \rightleftharpoons 2HI(g)$
(III) $PCI_5(g) \rightleftharpoons PC1_3(g) + Cl_2(g)$
(IV) $2SO_2(s) + O_2(g) \rightleftharpoons 2S0_3(g)$
Kp/Kc = 1 in the following:
(a) I and II
(b) III and IV
(c) Only II
(d) Only I

10. The equilibrium constant of the following reactions are
(1) $CH_4(g) + H_2O(g) \rightleftharpoons CO(g) + 3H_2(g)$ K_1
(II) $CO(g) + H_2O(g) \rightleftharpoons CO2(g) + H_2(g)$ K_2
(III) $CO_2(g) + 4H_2(g) \rightleftharpoons CH_4(g) + 2H_2O(g)$ K_3
Which of the following is true?
(a) $\log K_3 = \log K_1 + \log K_2$
(b) $\log K_1 + \log K_2 + \log K_3 = 0$
(c) $\log K_3 = \log K_1 - \log K_2$
(d) $\log K_3 = 1/2 (\log K_1 + \log K_2)$

11. Equilibrium constant for the following equilibrium,
$3ClO^-(aq) \rightleftharpoons 2Cl^-(aq) + ClO_3^-(aq)$
is 1.0×10^{28} at a temperature at which RT = 2500 J mol^{-1} Gibbs free energy change (ΔG^0) is
(a)-161.21 kJ mol^{-1}
(b) +30.395 kJ mol^{-1}
(c)-70.0 kJ mol^{-1}
(d) +371.24 kJ mol^{-1}

12. A plot of $\log_{10} K$ and $\frac{1}{T}$ is linear with a slope, -6720 K and intercept + 9.72 for
$H_2O(l) \rightleftharpoons H^+ + OH^-$



Thus, at 300 K, $\log_{10} K$ is
(a) 12.08
(b) 2.96
(c) -2.68
(d) -2.96

13. For the following equilibrium at 373K,
$H_2O(l) \rightleftharpoons H_2O(g)$ $\Delta G°$ is ?
(a) -2.303RT (b) 0.00
(c) +2.303 RT (d) 1.00

14. Given, $COCl_{2(g)} \rightleftharpoons CO_{(g)} + Cl_{2(g)}$
Kp = 8 x 10^{-9} atm
$\Delta S° = 30$ cal K^{-1} at 373 K.
Temperature at which phosgene will be 0.1% dissociated at 2 atm (R = 2 cal mol^{-1} K^{-1}) is
(a) 446 K
(b) 413 K
(c) 373 K
(d) 512 K

15. The equilibrium constant ,K for the reaction $2HI(g) \rightleftharpoons H_{2(g)} + I_2(g)$ at room temperature is 2.85 and that at 698 K is 1.4×10^{-2}. This implies that
(a) HI is exothermic compound
(b) HI is very stable at room temperature
(c) HI is relatively less stable than H_2 and I_2
(d) HI is resonance stabilised

Maths

1. Domain of the function defined by $F(x) = \frac{x^2+2x+1}{x^2-x-6}$ is given by
a) R-{3,-2} b) R-{-3,-2}
c) R-[3,-2] d) R-(3,2)

2. Range of (x) = $\frac{3}{2-x^2}$
a) $(-\infty \frac{3}{2}]$ b)$(-\infty, 0) \cup [\frac{3}{2}, \infty)$
c) $(-\infty, 0] \cup [\frac{3}{2}, \infty)$ d) $(-\infty \frac{2}{3}]$

3. The domain of definition of the function $F(x) = log_{3/2} log_{1/2} log_{\pi} log_{\pi/4} x$ is
a) $(0, \infty)$ b) $\left(0, \left(\frac{\pi}{4}\right)^{\pi}\right)$
c) $\left(\left(\frac{\pi}{4}\right)^{\pi} \frac{\pi}{4}\right)$ c)$\left(\left(\frac{\pi}{2}\right)^{\pi}, \infty\right)$

4. If A ={2,4,6} then domain of the relation R ={(a,b): a,b∈ A,|a| - |b| is even number} defined on A is
a) {2,4} b) {4,6}
c) {(2.6) d) {2,4,6}

5. An investigator interviewed 100 students to determine their preferences for the three drinks; milk (M), coffee (C) and tea (T). He reported the following: 10 students has all the three drinks M, C, T; 20 had M and C; 30 had C and T. 25 had M and T; 12 had M only: 5 had C only and 8 had T only. Using a Venn diagram, find how many did not take any of the three drinks?
a) 20 b) 30
c) -20 d) -30

6. In a class of 60 students 30 students like mathematics 25 like science and 15 like both. Then the number of students who like either mathematics or Science is
a) 30 b) 40
c) 45 d) 50

7. $\left[\frac{4}{5}\right]+\left[\frac{4}{5}+\frac{1}{1000}\right]+\left[\frac{4}{5}+\frac{2}{1000}\right]+\ldots+\left[\frac{4}{5}+\frac{999}{1000}\right]$ = Where [.] denotes greatest integer function
   a) 998 b)980
   c) 800 c) 801
8. Let f(x) = ||x-1| +a|-4,if f(x) =0 has three real solution, then the values of a lies in
   a) a∈ $\{-4\}$ b) a∈ $(-\infty,-4)$
   c) a∈ $[4,\infty)$ d) a∈ $[4,10)$
9. Let Z be the set of all integers,
   A= $\{(x,y)\in Z\times Z;(x-2)^2+y^2\leq 4\}$
   B = $\{(x,y)\in Z\times Z;x^2+y^2\leq 4\}$ and
   C = $\{(x,y)\in Z\times Z;(x-2)^2+(y-2)^2\leq 4\}$
   If the total number of relation from A∩B to A∩C is 2^p ,then the value ofp is
   a) 16 b) 25
   c) 49 d) 9
10. If A = $\{x\in R:|x-2|>1\}$,B = $\{x\in R:\sqrt{x^2-3}>1\}$, C = $\{x\in R:|x-4|\geq 2\}$ and Z is the set of all integers, then the number of subsets of the set $(A\cap B\cap C)^c\cap Z$ is_____
    a) 32 b)144
    c) 256 d) 289
11. How many 5- digit telephone number can be constructed using the digits 0 to 9 if each number starts with 67 and no digit appears more than once?
12. Four buses run between Bhopal and Gwalior. If a man goes form Gwalior to Bhopal by a bus cames back to Gwalior by another bus , then find the total possible ways to do so.
13. How many words with or without meaning , can be made from the letters of the word Monday , assuming that no letter is repeated ,if
    i) 4 letters are used at a time?
    ii) all letters are used at a time?
    iii) All letters are used but first letter is a vowel?
14. The letters of word ZENITH are writing in all possible ways .If all these words are written out as in a dictionary then find the rank of the word ZENITH.
15. In how many of the distinct permutation of the letters in MISSISSIPPI do the four I's not come together?by