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For 5th to 12th Class Students

STAGE - 1 & STAGE - 2

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3 Regular Tests Online and Offline

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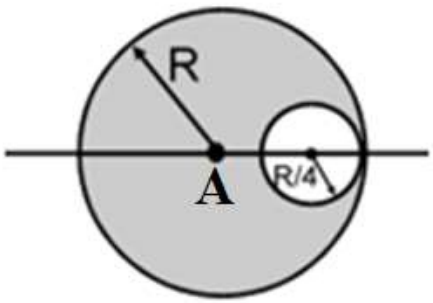
Engineering — JEE Main & Adv.
Medical — NEET
Foundation — VI, VII, VIII, IX, X, NTSE Olympiad
Subjective — Boards

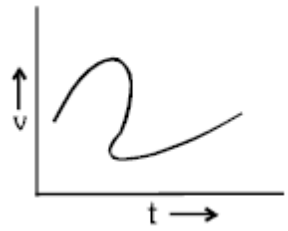
Section – A
Physics

This section contains **20 Multiple Choice Questions**. Each question has four options out of which **ONLY ONE** is correct.

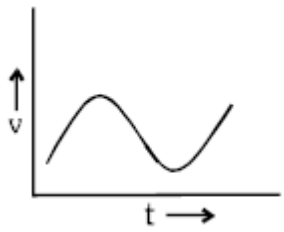
1. The centre of mass of a body:
   (a) Lies always at the geometrical centre
   (b) Lies always inside the body
   (c) Lies always outside the body
   (d) Lies within or outside the body
2. The centre of mass of the shaded portion of the disc is:
   (The mass is uniformly distributed in the shaded portion)



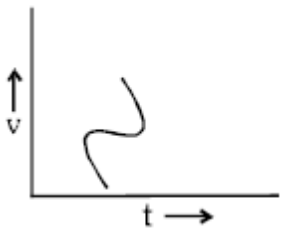
   (a) $\frac{R}{20}$ to the left of A
   (b) $\frac{R}{12}$ to the left of A
   (c) $\frac{R}{20}$ to the right of A
   (d) $\frac{R}{12}$ to the right of A
3. A thin uniform wire is bent to form the two equal sides AB and AC of triangle ABC, where AB = AC = 5 cm. The third side BC, of length 6cm, is made from uniform wire of twice the density of the first. The distance of centre of mass from A is:
   (a) $\frac{34}{11}$ cm
   (b) $\frac{11}{34}$ cm
   (c) $\frac{34}{9}$ cm
   (d) $\frac{11}{45}$ cm
4. body starts from rest and is uniformlyaccelerated for 30 s. The distance travelled inthe first 10 s is x_1, next 10 s is x_2 and the last 10 s is x_3. Then $x_1 : x_2 : x_3$ is the same as:
   (a) 1 : 2 : 4
   (b) 1 : 2 : 5
   (c) 1 : 3 : 5
   (d) 1 : 3 : 9
5. Which of the following velocity–time graphshows a realistic situation for a body in motion



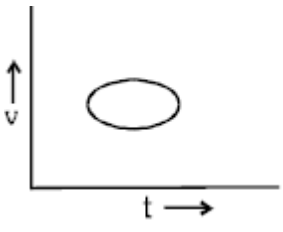
   (a)



   (b)

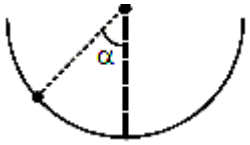


   (c)

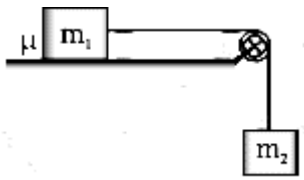


   (d)
6. If a body loses half of its velocity on penetrating3 cm in a wooden block, then how much willit penetrate more before coming to rest?
   (a) 1 cm
   (b) 2 cm
   (c) 3 cm
   (d) 4 cm

7. To cross the river in shortest distance, a swimmer should swim making angle θ with the upstream. What is the ratio of the time taken to swim across in the shortest time to that in swimming across over shortest distance? [Assume speed of swimmer in still water is greater than the speed of river flow]
   (a) cos θ
   (b) sin θ
   (c) tan θ
   (d) cot θ
8. A swimmer crosses the river along the line making an angle of 45° with the direction of flow. Velocity of the river water is 5 m/s. Swimmer takes 6 seconds to cross the river of width 60 m. The velocity of the swimmer with respect to water will be:
   (a) 10 m/s
   (b) 12 m/s
   (c) $5\sqrt{5}$ m/s
   (d) $10\sqrt{2}$ m/s
9. It is raining vertically downwards with a velocity of 3 km h^{-1}. A man walks in the rain with a velocity of 4 kmh^{-1}. The rain drops will fall on the man with a relative velocity of ;
   (a) 1 km h^{-1}
   (b) 3 km h^{-1}
   (c) 4 km h^{-1}
   (d) 5 km h^{-1}
10. A cyclist is moving on a circular track of radius 80 m with a velocity of 72 km/hr. Minimum coefficient of friction between horizontal circular track and tyres of cycle is
    (a) 0.5
    (b) 0.4
    (c) 0.6
    (d) 0.2
11. A car of mass m is taking circular turn of radius r on a rough horizontal road with a speed v. In order that the car does not skid
    (a) $\frac{mv^2}{r}$ mg
    (b) $\frac{mv^2}{r}$ mg
    (c) $\frac{mv^2}{r}$ mg
    (d) $\frac{v}{r}$ mg
12. An insect crawls up hemispherical surface very slowly as shown in figure. The coefficient of friction between the insect and the surface is 1/3. If the line joining the centre of the hemispherical surface to the insect makes an angle with the vertical, the max. possible value of is given by

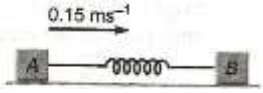


    (a) cot 3
    (b) sec 3
    (c) cosec 3
    (d) None
13. A block of mass m_1 kg is resting on a rough horizontal plane, coefficient of kinetic friction between block and surface is μ. If m_1 is connected to another mass m_2 with the help of string and pulley as shown in diagram, the common acceleration when released from rest will be:



    (a) $\frac{m_2}{m_1 \quad m_2}\ g$
    (b) $\frac{(m_1 \quad m_2)}{m_1 \quad m_2}\ g$
    (c) $\frac{(m_1 \quad m_2)}{m_1 \quad m_2}\ g$
    (d) $\frac{(m_2 \quad m_1)}{m_1 \quad m_2}\ g$
14. A body of mass 2 is projected at 20 / at an angle of 60° above the horizontal. Power on the block due to the gravitational force at its highest point is
    (a) 200 W
    (b) $100\sqrt{3}$
    (c) 50 W
    (d) Zero
15. Two rectangular blocks and of masses 2kg and 3 kg respectively are connected by spring of spring constant 10.8 Nm^{-1} and are placed on a frictionless horizontal surface. The block was given an initial velocity of 0.15 $^{-1}$ in the

direction shown in the figure. The maximum compression of the spring during the motion is



(a) 0.01 m
(b) 0.02 m
(c) 0.05 m
(d) 0.03 m

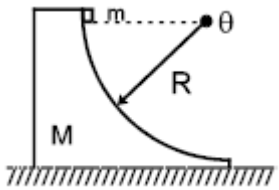
16. A uniform chain of length and mass is lying on a smooth table and one third of its length is hanging vertically down over the edge of the table. If is acceleration due to gravity, the work required to pull the hanging part on to the table is
(a)
(b) /3
(c) /9
(d) /18

17. Two springs have force constants $_1$ and $_2$. There are extended through the same distance . If their elastic energies are $_1$ and $_2$, then $\frac{1}{2}$ is equal to
(a) $_1$: $_2$
(b) $_2$: $_1$
(c) $\sqrt{\ }_1$:$\sqrt{\ }_2$
(d) $^2_1$: $^2_2$

18. A particle is projected at 60° to the horizontal with a kinetic energy . The kinetic energy at the highest point is
(a) K
(b) Zero
(c) $\frac{}{4}$
(d) $\frac{}{2}$

19. A stationary body explodes into two fragments of masses m_1 and m_2. If momentum of one fragment is p, the energy of explosion is
(a) $\frac{p^2}{2(m_1+m_2)}$
(b) $\frac{p^2}{2\sqrt{m_1m_2}}$
(c) $\frac{p^2(m_1+m_2)}{2m_1m_2}$
(d) $\frac{p^2}{2(m_1-m_2)}$

20. A small cube of mass 'm' slides down a circular path of radius 'R' cut into a large block of mass 'M'. 'M' rests on a table and both blocks move without friction. The blocks initially are at rest and 'm' starts from the top of the path. The velocity 'v' of the cube as it leaves the block is : (Initially the line joining m and the centre is horizontal)



(a) $\sqrt{\frac{2gR}{M+m}}$
(b) $\sqrt{\frac{3gR}{1+(M/m)}}$
(c) $\sqrt{\frac{3gR}{1+(m/M)}}$
(d) $\sqrt{\frac{2gR}{1+(m/M)}}$

Section – B
Chemistry

This section contains **20 Multiple Choice Questions**. Each question has four options out of which **ONLY ONE** is correct.

21. NaBr, used to produce AgBr for use in photography can be self prepared as follows

$Fe + Br_2 \rightarrow FeBr_2$ ....(1)

$3FeBr_2 + Br_2 \rightarrow Fe_3Br_8$ ....(2)

$Fe_3Br_8 + 4Na_2CO_3 \rightarrow 8NaBr + 4CO_2 + Fe_3O_4$ ....(3)

If the yield of 2nd reactions 60% & 3rd reaction is 70% then mass of Fe required to produce 2.06×10^3 kg NaBr is
(a) 10^5 kg
(b) 10^7 kg
(c) 10^3 kg
(d) None of these

22. The empirical formula of an organic compound containing carbon & hydrogen is CH_2. The mass of 1 litre of this organic gas is exactly equal to that of 1 litre of N_2 at STP. So, molecular formula of this gas:-
(a) C_2H_4
(b) C_3H_6
(c) C_6H_{12}
(d) C_4H_8

23. 3 litre of mixture of propane (C_3H_8) & butane (C_4H_{10}) on complete combustion gives 10 litre CO_2. Find the composition of mixture
(a) 2L propane, 1L butane
(b) 1L propane, 2L butane
(c) 1.5L propane, 1.5L butane
(d) 2.5L propane, 0.5L butan

24. Density of a 2.05M solution of acetic acid in water is 1.02 g/ml. The molality of the solution is:
(a) 1.14 mol kg^{-1}
(b) 3.28 mol kg^{-1}
(c) 2.28 mol kg^{-1}
(d) 0.44 mol kg^{-1}

25. 25.4 g of iodine and 14.2g of chlorine are made to react completely to yield a mixture of ICl and ICl_3. Calculate the number of moles of ICl and ICl_3 formed.
(a) 0.1 mole, 0.1 mole
(b) 0.1 mole, 0.2 mole
(c) 0.5 mole, 0.5 mole
(d) 0.2 mole, 0.2 mole

26. Among the elements from atomic number 1 to 36 the number of elements which have an unpaired electron in the s-subshell is
(a) 4
(b) 7
(c) 6
(d) 9

27. The number of d-electrons in Fe^{2+} (Z=26) is not equal to the number of electrons in which one of the following?
(a) d-electrons in Fe (Z= 26)
(b) p-electrons in Ne (Z=10)
(c) s-electrons in Mg(Z=12)
(d) p-electrons in Cl (Z=17)

28. Among the elements Ca, Mg, P and Cl, the order of increasing atomic radii is
(a) Mg<Ca<Cl<P
(b) Cl<P<Mg<Ca
(c) P<Cl<Ca<Mg
(d) Ca<Mg<P<Cl

29. The correct sequence which shows decreasing order of the ionic radii of the element is
(a) $O^{2-} > F^- > Na^+ > Mg^{2+} > Al^{3+}$
(b) $Al^{3+} > Mg^{2+} > Na^+ > F^- > O^{2-}$
(c) $Na^+ > Mg^{2+} > Al^{3+} > O^{2-} > F^-$
(d) $Na^+ > F^- > Mg^{2+} > O^{2-} > Al^{3+}$

30. A bonded molecule MX_3 is T – shaped. The number of non – bonding pairs of electrons is
(a) 0
(b) 2
(c) 1
(d) Can be predicted only if atomic number of M is known.

31. A molecule XY_2 contains two , two bonds and one lone pair of electron in the valence shell of X. The arrangement of lone pair as well as bond pairs is
(a) Square pyramidal
(b) Linear
(c) Trigonal planar
(d) Unpredictable

32. Both NH_3 and H_2O molecules possess distorted tetrahedral geometries but the bond angle in water is less than that of ammonia. This is because

(a) NH_3 contains only one lone pair on N – atom to repel the bond pairs whereas in H_2O, there are two lone pairs on O – atom to repel the bond pairs.
(b) NH_3 contains there bond pairs whereas H_2O contains only two bond pairs
(c) NH_3 is pyramidal whereas H_2O has V – shape.
(d) N in NH_3 is less electronegative than O in H_2O

33. Which one of the following does not match with respect to the shape of the molecule?
(a) NH_3 – Trigonal pyramidal
(b) SF_4 – Tetrahedral
(c) H_2S – Bent
(d) XeF_4 – Square planar

34. Which is the following is the correct order of bond order?
(a) $N_2 > N_2^+ > N_2^- > N_2^{2-}$
(b) $N_2 > N_2^+ = N_2^- > N_2^{2-}$
(c) $N_2 > N_2^{2-} > N_2^- > N_2^+$
(d) $N_2 > N_2^{2-} = N_2 > N_2$

35. For species H_2^+, H_2, He_2^+, He_2, which of the following statement is correct : -
(a) He_2^+ is more stable than H_2^+
(b) Bond dissociation energy of H_2^+ is more than bond dissociation energy of He_2^+
(c) Since bond orders of He_2^+ and H_2^+ are equal hence both will have equal bond dissociation energy
(d) Bond length of H_2^+ is less than bond length H_2

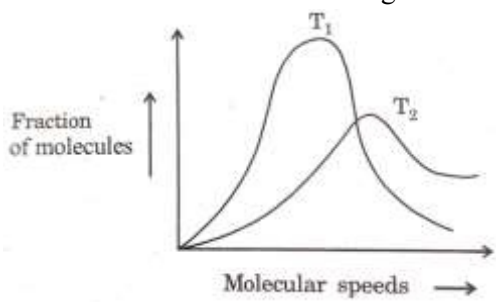
36. When gases are heated from 20^0C to 40^0C at constant pressure, then the volume:
(a) Increase by the same magnitude
(b) Become double
(c) Increase in the ratio of their molecular masses
(d) Increase but to different extent

37. Oxygen gas is collected by downward displacement of water in a jar. The level of water inside the jar is adjusted to the height of water outside the jar. When the adjustment is made, the pressure exerted by the oxygen is:
(a) Equal to the atmospheric pressure
(b) Equal to the vapour pressure of oxygen at that temperature
(c) Equal to atmospheric pressure plus aqueous tension at that temperature
(d) Equal to atmospheric pressure minus aqueous tension at that temperature

38. An open vessel containing air is heated from 300 K to 400 K. The fraction of air originally present which goes out of it is:
(a) $\frac{3}{4}$
(b) $\frac{1}{4}$
(c) $\frac{2}{3}$
(d) $\frac{1}{8}$

39. 0.44 g of a colourless oxide of nitrogen occupies 224 mL, at STP. The compound is
(a) N_2O
(b) NO
(c) N_2O_2
(d) NO_2

40. Following graph, also called the Maxwell – Boltzmann distribution curve is given

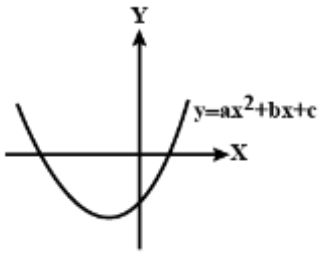


Then, which statement is/are correct wrt above graph
(a) $T_2 > T_1$
(b) The fraction of molecules with very low or very high speeds is small.
(c) At higher temperature, the most probable speed increases but the fraction of molecule having most probable speed decreases.
(d) All are correct

Section – C
Mathematics

This section contains **20 Multiple Choice Questions**. Each question has four options out of which **ONLY ONE** is correct.

41. Let $f(x) = ax^2 + bx + c$. Consider the following diagram. Then the incorrect statement is : -



(a) $c < 0$
(b) $b > 0$
(c) $a + b - c > 0$
(d) None

42. If the equation $x^3+ax^2+bx-4 = 0$ has two roots equal to 2, then the ordered pair (a, b) is
(a) (-4,8)
(b) (5,-8)
(c) (1,1)
(d) (2,2)

43. If $f(x) = ax^2 + bx + c$, $g(x) = -ax^2+bx+c$ where $ac \neq 0$, then $f(x)g(x) = 0$ has:
(a) at least three real roots
(b) no real solution
(c) at least two real roots
(d) two real roots and two imaginary roots

44. If the equation $\frac{}{} + \frac{}{} = 1$ has roots equal in magnitude but opposite in sign, then the value of a +b is:
(a) – 1
(b) 0
(c) 1
(d) None of these

45. If the expression $x^2+2(a + b + c)x+3(bc + ab +ac)$ is a perfect square, then
(a) a=b=c
(b) a= -b = c
(c) a= -b = -c
(d) None of these

46. If $I(r) = r(r^2 - 1)$, then $\sum_{=2} \frac{1}{(\ )}$ is equal to:
(a) $\frac{1}{4}(1 - \frac{1}{(\ +1)})$
(b) $\frac{1}{4}(2 - \frac{1}{(\ +1)})$
(c) $\frac{1}{4}(1 - \frac{2}{(\ +1)})$
(d) $\frac{1}{4}(2 + \frac{1}{(\ +1)})$

47. $\sum_{=1} (\ - \ +1)$ is equal to:
(a) $\frac{(\ ^2-1)}{6}$
(b) $\frac{(\ +1)(\ +2)}{6}$
(c) $\frac{(\ ^2-1)}{2}$
(d) $\frac{(\ +1)(\ +2)}{2}$

48. The sum of n terms of the series
$1^2+2.2^2+3^2+2.4^2+5^2+2.6^2+....$
Is $\frac{n^2(n+1)}{2}$ when n is odd, when n is even, sum of n terms will be
(a) $\frac{n(n+1)^2}{2}$
(b) $\frac{n(n^2+1)}{2}$
(c) $2(n\ \ 1)^2.(2n\ \ 1)$
(d) None of these

49. If $\frac{\tan}{1} = \frac{\tan}{2} = \frac{\tan}{3} : (\neq 0)$ and x + y +z = π then:
(a) Maximum value of tanx + tany + tanz is 6
(b) Maximum value of tanx+ tany + tanz is 8
(c) tanx + tany + tanz = 0 ∀ x, y, z ∈ R
(d) none of these

50. The ratio of greatest value of $2 - \cos x + \sin^2 x$ to its least value, is
(a) 13 : 4
(b) 1 : 4
(c) 9 : 4
(d) None of these

51. If $\ < 2\ < \frac{3}{2}$, then $\sqrt{2\ \ \sqrt{2\ \ 2\cos 4}}$ equals to
(a) –2cos
(b) –2sin
(c) 2cos

(d) 2sin

52. If $\cos 6\theta + \cos 4\theta + \cos 2\theta + 1 = 0$ for $0 \le \theta \le \pi$ then $\theta =$
(a) $\frac{}{7}, \frac{5}{7},$
(b) $\frac{}{2}, \frac{}{4}, \frac{3}{4}, \frac{}{6}, \frac{5}{6}$
(c) $\frac{}{8}, \frac{3}{8}, \frac{5}{8}, \frac{7}{8}, \frac{}{3}, \frac{2}{3}$
(d) $\frac{}{6}, \frac{}{4}, \frac{}{3}, \frac{}{2}$

53. The coefficient of x^4 in the expansion of $(1 + x + x^2 + x^3)^{11}$ is
(a) 900
(b) 909
(c) 990
(d) 999

54. The coefficient of x_n in the polynomial
$x \;{}^{n}C_0 \;\; x \;\; 3.{}^{n}C_1 \;\; x \;\; 5.{}^{n}C_2 \;\; x \;\; 7.{}^{n}C_3 \;\; ....(x \;\; (2n \;\; 1)^{n}C_n)$
is
(a) $n.2^{n-1}$
(b) $n.2^{n}$
(c) $n.2^{n+1}$
(d) $(n+1)2^{n}$

55. If a = 16, b = 24 and c = 20, then the value of $\cos \frac{B}{2}$ is
(a) $\frac{3}{4}$
(b) $\frac{1}{4}$
(c) $\frac{1}{2}$
(d) $\frac{1}{3}$

56. If $\frac{a}{\cos A} \;\; \frac{b}{\cos B} \;\; \frac{c}{\cos C}$, then ΔABC is
(a) Isosceles
(b) Equilateral
(c) Right angled
(d) Scalene

57. If the point (a, a) falls between the lines $|x + y| = 2$ then
(a) $|a| = 2$
(b) $|a| = 1$
(c) $|a| < 1$
(d) $|a| \;\; \frac{1}{2}$

58. The point P(2, 1) is shifted by $3\sqrt{2}$ parallel to the line $x + y = 1$, in the direction of increasing ordinate, to reach Q. The image of Q by the line $x + y = 1$ is
(a) (5, - 2)
(b) (-1, 4)
(c) (3, - 4)
(d) (-3, 2)

59. C_1 is a circle of radius 1 touching the x – axis and the y – axis. C_2 is another circle of radius > 1 and touching the axes as well as the circle C_1. Then the radius of C_2 is
(a) $3 - 2\sqrt{2}$
(b) $3 + 2\sqrt{2}$
(c) $3 + 2\sqrt{3}$
(d) None of these

60. A ray of light coming from the point (1, 2) is reflected at point A on the x – axis and then passes through the point (5, 3). The coordinates of the point A are
(a) $\frac{13}{5}, 0$
(b) $\frac{5}{13}, 0$
(c) (- 7, 0)
(d) None of these

SPACE FOR ROUGH WORK

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Answer Key					
1	**d**	21	**c**	41	**c**
2	**a**	22	**a**	42	**a**
3	**a**	23	**a**	43	**d**
4	**c**	24	**c**	44	**b**
5	**b**	25	**a**	45	**a**
6	**a**	26	**c**	46	**c**
7	**b**	27	**d**	47	**b**
8	**c**	28	**b**	48	**a**
9	**d**	29	**a**	49	**a**
10	**a**	30	**b**	50	**a**
11	**b**	31	**c**	51	**d**
12	**a**	32	**a**	52	**b**
13	**d**	33	**b**	53	**c**
14	**d**	34	**b**	54	**d**
15	**c**	35	**b**	55	**a**
16	**d**	36	**b**	56	**b**
17	**a**	37	**d**	57	**c**
18	**c**	38	**b**	58	**d**
19	**c**	39	**a**	59	**b**
20	**d**	40	**d**	60	**a**