

RAISE 2020
(Reynott Academics and Intelligence Scholarship Examination)
SAMPLE PAPER
Class - 12th (IIT-JEE)

Syllabus of the Test : Physics, Chemistry & Mathematics of Class 11th

Time : 2 Hrs.

MM : 240

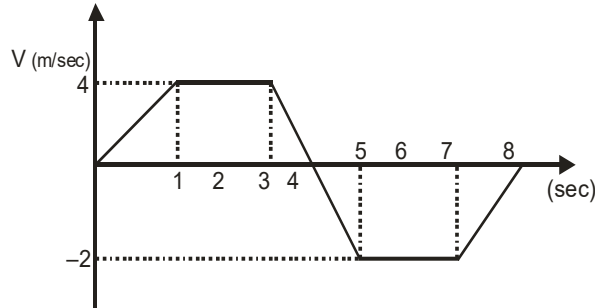
GENERAL INSTRUCTIONS :

- All questions are compulsory.
- Blank paper, clipboard, log tables, calculators, cellular phones and electronic gadgets in any form are not allowed inside the examination hall.
- Use only Black/Blue Ball Pen for filling the OMR. Do not use Gel/ Ink/ Felt pen as it might smudge the OMR.
- For each right answer you will be **awarded 4 marks** if you darken the bubble corresponding to the correct answer and zero marks if no bubble is darkened. In case of bubbling of incorrect answer, **NO NEGATIVE MARK** will be awarded.
- This Question Paper consists of 90 questions. Please check before starting to attempt. The question paper consists of five Sections, Section-A (Physics: 1 to 20), Section-B (Chemistry: 21 to 40), Section-C (Mathematics: 41 to 60).

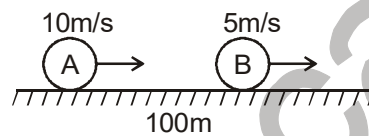
SECTION-A (PHYSICS)

- Unit of pressure in S.I. system is
(A) atmosphere (B) dynes per square cm
(C) pascal (D) bar
- A physical quantity is measured and the result is expressed as nu where u is the unit used and n is the numerical value. If the result is expressed in various units then
(A) $n \propto \text{size of } u$ (B) $n \propto u^2$
(C) $n \propto \sqrt{u}$ (D) $n \propto 1/u$
- Given : $\vec{C} = \vec{A} + \vec{B}$. Also, the magnitude of \vec{A} , \vec{B} and \vec{C} are 12, 5 and 13 units respectively. The angle between \vec{A} and \vec{B} is
(A) 0° (B) $\frac{\pi}{4}$
(C) $\frac{\pi}{2}$ (D) π
- Statement-1** : If three vectors \vec{A} , \vec{B} and \vec{C} satisfy the relation $\vec{A} \cdot \vec{B} = 0$ & $\vec{A} \cdot \vec{C} = 0$ then the vector \vec{A} is parallel to $\vec{B} \times \vec{C}$.
Statement-2 : $\vec{A} \perp \vec{B}$ and $\vec{A} \perp \vec{C}$ hence A is perpendicular to plane formed by \vec{B} and \vec{C}
(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1
(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1
(C) Statement-1 is True, Statement-2 is False
(D) Statement-1 is False, Statement-2 is True

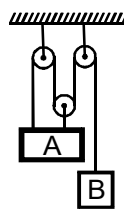
5. At an instant t , the co-ordinates of a particle are $x = at^2$, $y = bt^2$ and $z = 0$, then its velocity at the instant t will be
- (A) $t\sqrt{a^2 + b^2}$ (B) $2t\sqrt{a^2 + b^2}$
- (C) $\sqrt{a^2 + b^2}$ (D) $2t^2\sqrt{a^2 + b^2}$
6. The v-t graph of a linear motion is shown in adjoining figure. The distance from origin after 8 seconds is -



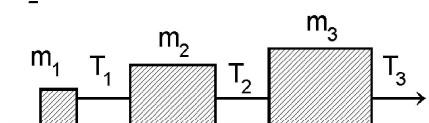
- (A) 18 meters (B) 16 meters
- (C) 8 meters (D) 6 meters
7. An object A is moving with 10 m/s and B is moving with 5 m/s in the same direction of positive x-axis. A is 100 m behind B as shown. Find time taken by A to Meet B



- (A) 18 sec (B) 16 sec
- (C) 20 sec (D) 17 sec
8. The equation of projectile is $y = 16x - \frac{5x^2}{4}$. The horizontal range is-
- (A) 16 m (B) 8 m
- (C) 3.2 m (D) 12.8 m
9. At a given instant, A is moving with velocity of 5 m/s upwards. What is velocity of B at the time

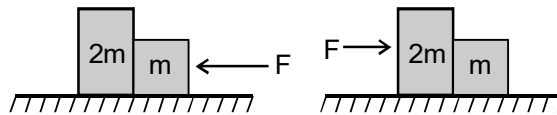


- (A) 15 m/s ↓ (B) 15 m/s ↑
- (C) 5 m/s ↓ (D) 5 m/s ↑
10. Three block are connected as shown, on a horizontal frictionless table and pulled to the right with a force $T_3 = 60$ N. If $m_1 = 10$ kg, $m_2 = 20$ kg and $m_3 = 30$ kg, the tension T_2 is

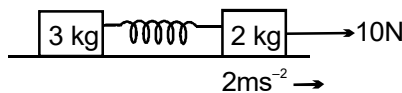


- (A) 10 N (B) 20 N
- (C) 30 N (D) 60 N

11. Two blocks are in contact on a frictionless table. One has mass m and the other $2m$. A force F is applied on $2m$ as shown in the figure. Now the same force F is applied from the right on m . In the two cases respectively, the ratio force of contact between the two block will be:



- (A) same
(B) 1 : 2
(C) 2 : 1(D) 1 : 3
12. Find the acceleration of 3 kg mass when acceleration of 2 kg mass is 2 ms^{-2} as shown in figure.

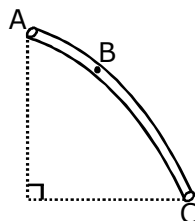


- (A) 3 ms^{-2}
(B) 2 ms^{-2}
(C) 0.5 ms^{-2}
(D) zero
13. A wheel is at rest. Its angular velocity increases uniformly and becomes 80 radian per second after 5 second. The total angular displacement is :
- (A) 800 rad
(B) 400 rad
(C) 200 rad
(D) 100 rad
14. The ratio of angular speed of hours hand and seconds hand of a clock is-
- (A) 1 : 1
(B) 1 : 60
(C) 1 : 720
(D) 3600 : 1
15. A rigid body of mass m is moving in a circle of radius r with a constant speed v . The force on the body is $\frac{mv^2}{r}$ and is directed towards the centre. What is the work done by this force in moving the body over half the circumference of the circle.

- (A) $\frac{mv^2}{\pi r^2}$
(B) Zero
(C) $\frac{mv^2}{r^2}$
(D) $\frac{\pi r^2}{mv^2}$

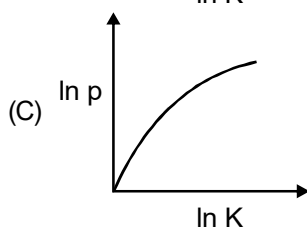
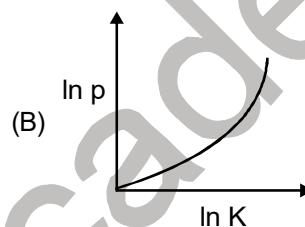
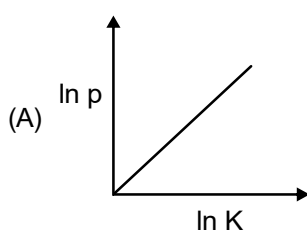
16. The work done in joules in increasing the extension of a spring of stiffness 10 N/cm from 4 cm to 6 cm is :
- (A) 1
(B) 10
(C) 50
(D) 100

17. The tube AC forms a quarter circle in a vertical plane. The ball B has an area of cross-section slightly smaller than that of the tube, and can move without friction through it. B is placed at A and displaced slightly. It will



- (A) always be in contact with the inner wall of the tube
(B) always be in contact with the outer wall of the tube
(C) initially be in contact with the inner wall and later with the outer wall
(D) initially be in contact with the outer wall and later with the inner wall

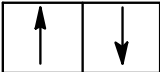


18. A man of mass M stands at one end of a plank of length L which lies at rest on a frictionless surface. The man walks to other end of the plank. If the mass of the plank is $\frac{M}{3}$, then the distance that the man moves relative to ground is :
- (A) $\frac{3L}{4}$ (B) $\frac{L}{4}$
 (C) $\frac{4L}{5}$ (D) $\frac{L}{3}$
19. A man weighing 80 kg is standing at the centre of a flat boat and he is 20 m from the shore. He walks 8 m on the boat towards the shore and then halts. The boat weight 200 kg. How far is he from the shore at the end of this time?
 (A) 11.2 m (B) 13.8 m
 (C) 14.3 m (D) 15.4 m
20. Which of the following graphs represents the graphical relation between momentum (p) and kinetic energy (K) for a body in motion?

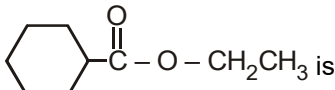
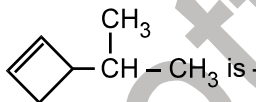
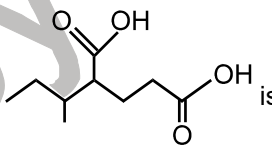


(D) None of the above

SECTION-B (CHEMISTRY)

21. Calcium carbonate reacts with aqueous HCl to give CaCl_2 and CO_2 according to the reaction, $\text{CaCO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{CaCl}_2(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$.
 The mass of CaCO_3 is required to react completely with 25 mL of 0.75 M HCl is
 (A) 0.1g (B) 0.5 g
 (C) 1.5 g (D) 0.94 g
22. Chlorine is prepared in the laboratory by treating manganese dioxide (MnO_2) with aqueous hydrochloric acid according to the reaction
 $4\text{HCl}(\text{aq}) + \text{MnO}_2(\text{s}) \rightarrow 2\text{H}_2\text{O}(\text{l}) + \text{MnCl}_2(\text{aq}) + \text{Cl}_2(\text{g})$
 The grams of HCl react with 5.0 g of manganese dioxide will be [at.mass of Mn = 55]
 (A) 84 g (B) 0.84 g
 (C) 8.4 g (D) 4.2 g
23. 25.4 g of iodine and 12.2 g of chlorine are made to react completely to yield a mixture of ICl and ICl_3 . Calculate the ratio of moles of ICl and ICl_3 .
 (A) 1 : 1 (B) 1 : 2
 (C) 1 : 3 (D) 2 : 3

24. The ratio of the radii of the first three Bohr orbits is:
- (A) 1 : 0.5 : 0.33 (B) 1 : 2 : 3
(C) 1 : 4 : 9 (D) 1 : 8 : 27
25. Lattice energy of an ionic compound depends upon
- (A) Charge on the ion and size of the ion (B) Packing of ions only
(C) Size of the ion only (D) Charge on the ion only
26. Which of the following arrangement of two electrons in two degenerated orbitals is not possible at all
- (A)  (B) 
- (C)  (D) All of these
27. If x , y and z are electronegativity, ionisation potential and electron-affinity respectively. Then the electron affinity (z) in the terms of electronegativity (x) and ionisation potential (y) will be
- (A) $z = \frac{x+y}{z}$ (B) $z = \frac{x-y}{z}$
(C) $z = \frac{x^2 - y^2}{z}$ (D) $z = 2x - y$
28. The set representing the correct order of first ionization potential is
- (A) $K > Na > Li$ (B) $Be > Mg > Ca$
(C) $B > C > N$ (D) $Ge > Si > C$
29. Ionic radii of
- (A) $Ti^{4+} < Mn^{7+}$ (B) $^{35}Cl^+ < ^{37}Cl^-$
(C) $K^+ > Cl^-$ (D) $P^{3+} > P^{5+}$
30. The states of hybridization of boron and oxygen atoms in boric acid (H_3BO_3) are respectively
- (A) sp^3 and sp^2 (B) sp^2 and sp^3
(C) sp^2 and sp^2 (D) sp^3 and sp^3
31. KE per unit volume of an ideal gas is
- (A) $\frac{3P}{2}$ (B) $\frac{3}{2}(RT)$
(C) $\frac{3}{2}\left(\frac{RN}{N_0}\right)$ (D) $\frac{3}{2}\left(\frac{RT}{N}\right)$
32. The bond order in NO is 2.5 while that in NO^+ is 3. Which of the following statements is true for these two species?
- (A) Bond length in NO^+ is equal to that in NO (B) Bond length in NO is greater than in NO^+
(C) Bond length in NO^+ is greater than in NO (D) Bond length is unpredictable

33. Which of the following molecules/ions does not contain unpaired electrons?
- (A) N_2^+ (B) O_2
(C) O_2^{2-} (D) B_2
34. The vapour pressure of water at $80^\circ C$ is 355 mm of Hg. A 100 mL vessel contains water saturated with O_2 at $80^\circ C$, the total pressure being 760 mm of Hg. The contents of the vessel were pumped into 50 mL vessel at the same temperature. What is the partial pressure of O_2 ?
- (A) 1115 mm (B) 810 mm
(C) 405 mm (D) 355 mm
35. A flask of capacity one litre contains NH_3 at 1 atm & $25^\circ C$. A spark is passed through until all the NH_3 is decomposed into N_2 & H_2 . Calculate the pressure of gases left at $25^\circ C$.
- (A) 2 atm (B) 0.5 atm
(C) 1.5 atm (D) 1 atm
36. The temperature of an ideal gas is increased from 140 K to 560 K. If at 140 K the root mean square velocity of the gas molecules is u , at 560 K it becomes
- (A) $5u$ (B) $2u$
(C) $u/2$ (D) $u/4$
37. The IUPAC name of  is
- (A) ethyl cyclohexanoate (B) cyclohexyl propanoate
(C) ethoxycyclohexyl ketone (D) ethyl cyclohexanecarboxylate
38. The IUPAC name of  is -
- (A) 2-cyclobutenylpropane (B) 2-(2-cyclobutenyl) propane
(C) 1-(1-methylethyl) cyclobutene (D) 3-(1-methylethyl) cyclobutene
39. The IUPAC name of  is
- (A) 4-carboxy-5-methylheptanoic acid (B) 1,3-dicarboxy-4methylhexane
(C) 4-(1-methylpropyl)-1,5-pentanedioic acid (D) 2-(1-methylpropyl)-1,5-pentanedioic acid
40. The law of conservation of mass holds good for all of the following except
- (A) All chemical reactions
(B) Nuclear reactions
(C) Endothermic reactions.
(D) Exothermic reactions.

SECTION-C (MATHEMATICS)

41. For the circle $x^2 + y^2 - 6x + 8y = 0$, which of the following is false
- (A) Center is $(3, -4)$ (B) Radius is 5 units
(C) Origin lies on the circle (D) y-axis is tangent
42. The sum of $(n - 1)$ terms of $1 + (1 + 3) + (1 + 3 + 5) + (1 + 3 + 5 + 7) + \dots$ is:
- (A) $\frac{n(n+1)(2n+1)}{6}$ (B) $\frac{n(n-1)(2n-1)}{6}$
(C) $\left[\frac{n(n+1)}{2}\right]^2$ (D) $\frac{n(n+1)}{2}$
43. The first term of an AP of consecutive integers is $(p^2 + 1)$. The sum of $(2p + 1)$ terms of this series can be expressed as :
- (A) $(p + 1)^2$ (B) $(2p + 1)(p + 1)^2$
(C) $(p + 1)^3$ (D) $p^3 + (p + 1)^3$
44. If α, β are the roots of the equation $ax^2 + bx + c = 0$, then the roots of the equation $ax^2 + bx(x + 1) + c(x + 1)^2 = 0$ are:
- (A) $\alpha - 1, \beta - 1$ (B) $\alpha + 1, \beta + 1$
(C) $\frac{\alpha}{\alpha - 1}, \frac{\beta}{\beta - 1}$ (D) $\frac{\alpha}{1 - \alpha}, \frac{\beta}{1 - \beta}$
45. There are 10 bags B_1, B_2, \dots, B_{10} ; which contain 21, 22, $\dots, 30$ different articles respectively. The total number of ways to bring out 10 articles from a bag is:
- (A) ${}^{31}C_{20} - {}^{21}C_{10}$ (B) ${}^{31}C_{21}$
(C) ${}^{31}C_{20}$ (D) None of these
46. Let W denotes the words in the English dictionary. Define the relation R by $R = \{(x, y) \in W \times W : \text{the words } x \text{ and } y \text{ have at least one letter in common}\}$. Then R is:
- (A) reflexive, symmetric and not transitive (B) reflexive, symmetric and transitive
(C) reflexive, not symmetric and transitive (D) not reflexive, symmetric and transitive
47. In the expansion of $(1 + x)^{101} (1 - x + x^2)^{100}$ coefficient of x^{50} is
- (A) 459 (B) 101
(C) 0 (D) 157
48. In the expansion of $(\sqrt[4]{9} + \sqrt[6]{8})^{500}$ the number of integral term is
- (A) 42 (B) 251
(C) 501 (D) None of these
49. A line passing through the point $(2, 2)$ and the axes enclose an area α . The intercepts on the axes made by the line are given by the roots of
- (A) $x^2 - 2\alpha x + \alpha = 0$ (B) $x^2 + \alpha x + 2\alpha = 0$
(C) $x^2 - \alpha x + 2\alpha = 0$ (D) None of these
50. One root of the equation $\cos \theta - \theta + \frac{1}{2} = 0$ lies in the interval
- (A) $(0, \pi/2)$ (B) $(-\pi/2, 0)$
(C) $(\pi/2, \pi)$ (D) $(\pi, 3\pi/2)$

51. If $[y] = [\sin x]$ and $y = \cos x$ are two given equation then the number of solutions are
- (A) 2 (B) 3
(C) 4 (D) infinite
52. If $\tan^2 \theta = 1 + 2 \tan^2 \phi$ then $\cos 2\phi$ is equal to
- (A) $\cos 2\theta$ (B) $2 \cos 2\theta$
(C) $1 + 2 \cos 2\theta$ (D) None of these
53. If $x + y = \frac{2\pi}{3}$ and $\cos x + \cos y = \frac{3}{2}$ then
- (A) $x = \frac{\pi}{3} - n\pi$ and $y = n\pi, n \in \mathbb{Z}$ (B) $x = n\pi$ and $y = \frac{\pi}{3} - n\pi, n \in \mathbb{Z}$
(C) $x = n\pi + \frac{2\pi}{3}$ and $y = n\pi, n \in \mathbb{Z}$ (D) None of these
54. Let $\lambda \in \mathbb{R}$, the origin and the non-real roots of $2z^2 + 2z + \lambda = 0$ form the three vertices of an equilateral triangle in the argand plane then λ is
- (A) 1 (B) $\frac{2}{3}$
(C) 2 (D) -1
55. For the three real numbers a, b, c following inequality holds.
- $$a^2 + b^2 + c^2 - ab - bc - ca \leq 0$$
- Then which of the following is true
- (A) a, b, c must be negative numbers (B) $a = b, b = 2c$
(C) $a = b = c = 0$ (D) $a \neq b \neq c$
56. The range of $f(x) = \sin^6 x + \cos^6 x$ is
- (A) $[1/4, 1]$ (B) $[1/4, 3/4]$
(C) $[3/4, 1]$ (D) None of these
57. If coordinates of orthocenter and centroid of a triangle are $(4, -1)$ and $(2, 1)$, then coordinates of a point which is equidistant from the vertices of the triangle is:
- (A) $(2, 2)$ (B) $(3, 2)$
(C) $(2, 3)$ (D) None of these
58. **Statement-I** : Area formed by $|x| + |y| = 4$
Statement-II : Graph of $|x| + |y| = a$ is a square
- (A) If both statement-I and statement-II are true but statement-II is not the correct explanation of statement-I.
(B) If both statement-I and statement-II are true, and statement-II is correct explanation of Statement-I.
(C) If statement-I is true but statement-II is false.
(D) If statement-I is false but statement-II is true

59. **Statement-I:** There are 6 roads leading to a town from a village. The number of ways, in which a villager can go to town & return back is 36
- Statement-II :** If a work A can be done in 'm' ways & another work B can be done in 'n' ways & C is a work which can be done only when both A & B are done then number of ways of doing work C is $m \times n$
- (A) If both statement-I and statement-II are true but statement-II is not the correct explanation of statement-I.
- (B) If both statement-I and statement- II are true, and statement-II is correct explanation of Statement-I.
- (C) If statement-I is true but statement-II is false.
- (D) If statement-I is false but statement-II is true
60. The equation of the line parallel to the lines: $L_1 : x + 2y - 5 = 0$ and $L_2 : x + 2y + 9 = 0$ and dividing the distance between L_1 and L_2 in the ratio 1 : 6 (internally) is
- (A) $x + 2y - 3 = 0$ (B) $x + 2y + 4 = 0$
- (C) $x + 2y - 5 = 0$ (D) None of these



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RAISE 2020

(Reynott Academics and Intelligence Scholarship Examination)

SAMPLE PAPER

Class - 12th (IIT-JEE)

ANSWER KEY

- | | | | | |
|---------|---------|---------|---------|---------|
| 1. (C) | 13. (C) | 25. (A) | 37. (D) | 49. (C) |
| 2. (D) | 14. (C) | 26. (B) | 38. (D) | 50. (A) |
| 3. (C) | 15. (B) | 27. (D) | 39. (D) | 51. (D) |
| 4. (A) | 16. (A) | 28. (B) | 40. (B) | 52. (C) |
| 5. (B) | 17. (C) | 29. (B) | 41. (D) | 53. (D) |
| 6. (A) | 18. (B) | 30. (B) | 42. (A) | 54. (B) |
| 7. (C) | 19. (C) | 31. (A) | 43. (D) | 55. (A) |
| 8. (D) | 20. (D) | 32. (B) | 44. (D) | 56. (A) |
| 9. (A) | 21. (D) | 33. (C) | 45. (A) | 57. (D) |
| 10. (C) | 22. (C) | 34. (B) | 46. (A) | 58. (A) |
| 11. (D) | 23. (A) | 35. (A) | 47. (C) | 59. (B) |
| 12. (B) | 24. (C) | 36. (B) | 48. (B) | 60. (A) |

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