RISE
RECOGNIZING INTELLIGENCE AND SCHOLARSHIP EXAM With SD

SCHOLARS DEN
NEET | IIT | FOUNDATION
Quality Education

घर के पास
सफलता और संस्कार

Sample Paper

XI to XII Moving (JEE)
Time: 2 Hours | Max. Marks: 240

PHYSICS, CHEMISTRY & MATHEMATICS

Do not open this Test Booklet until you are asked to do so.

***Important Instructions*:**

1. Immediately fill in the particulars on this page of the Test Booklet with Blue/ Black Ball Point Pen. Use of pencil is strictly prohibited.
2. The Answer Sheet is kept inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars carefully.
3. The test is of **2 hours** duration.
4. The Test Booklet consists of **75** questions. The maximum marks are **240**.
5. There are **three** parts in the question paper A, B, C consisting of **Physics, Chemistry and Mathematics** having 20 questions in each part.
6. Each subject will have two sections. Section A will be of Multiple - Choice Question (MCQs) in which only one option is correct and Section B will contains questions whose answers are to be filled in as a numerical value. In Section B, candidates have to attempt any 5 questions out of 10.
7. Candidates will be awarded four marks for every correct response. ¼ (one fourth) marks will be deducted for indicating incorrect response for section A whereas there is no negative marking for section B. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.
8. Filling up more than one response in any question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instruction 7 above.
9. Use **Blue/ Black Ball Point Pen only** for writing particulars/ marking responses on the Answer Sheet. **Use of pencil is strictly prohibited.**
10. No candidate is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. except the Admit Card inside the examination room/hall.
11. Rough work is to be done in the space provided for this purpose in the Test Booklet only. This space is given at the bottom of each page and two pages at the end of the booklet.
12. On completion of the test, the candidates must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall. **However, the candidates are allowed to take away this Test Booklet with them.**
13. **Do not fold or make any stray mark on the Answer Sheet.**

SECTION: A
(ONLY ONE OPTION CORRECT TYPE)
PART A: PHYSICS

01. A spherical ball rolls on a table without slipping. Then the fraction of its total energy associated with rotation is
(1) 2/5
(2) 2/7
(3) 3/5
(4) 3/7

02. Two identical piano wires kept under the same tension T have a fundamental frequency of 600 Hz. The fractional increase in the tension of one of the wires which will lead to occurrence of 6 beats/s when both the wires oscillate together would be
(1) 0.02
(2) 0.03
(3) 0.04
(4) 0.01

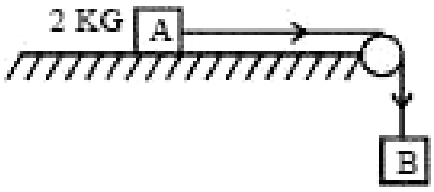
03. The escape velocity on the surface of earth is 11.2 km/s. What would be the escape velocity on the surface of another planet of the same mass but 1/4 times the radius of the earth?
(1) 22.4 km/s
(2) 44.8 km/s
(3) 5.6 km/s
(4) 11.2 km/s

04. Two projectiles are fired from the same point with the same speed at angles of projection 60º and 30º respectively. Which one of the following is true?
(1) Their maximum height will be same
(2) Their range will be same
(3) Their landing velocity will be same
(4) Their time of flight will be same

05. The cylindrical tube of a spray pump has radius, R, one end of which has n fine holes, each of radius r. If the speed of the liquid in the tube is V, the speed of the ejection of the liquid through the holes is:
(1) $\frac{VR^2}{nr^2}$ (2) $\frac{VR^2}{n^3r^2}$
(3) $\frac{V^2R}{nr}$ (4) $\frac{VR^2}{n^2r^2}$

06. A stone is dropped from a height h. It hits the ground with a certain momentum P. If the same stone is dropped from a height 100% more than the previous height, the momentum when it hits the ground will change by:
(1) 68%
(2) 41%
(3) 200%
(4) 100%

07. The coefficient of static friction, μ_s,between block A of mass 2 kg and the table as shown in the figure is 0.2. What would be the maximum mass value of block B so that the two blocks do not move? The string and the pulley are assumed to be smooth and massless. ($g = 10\ m/s^2$)



(1) 0.4 kg (2) 2.0 kg
(3) 4.0 kg (4) 0.2 kg

08. A car of mass 1000 kg negotiates a banked curve of radius 90 m on a frictionless road. If the banking angle is 45°, the speed of the car is:
(1) 20 ms^{-1} (2) 30 ms^{-1}
(3) 5 ms^{-1} (4) 10 ms^{-1}

Space for rough work

09. Two vessels separately contain two ideal gases A and B at the same temperature. The pressure of A being twice that of B. Under such conditions, the density of A is found to be 1.5 times the density of B. The ratio of molecular weight of A and B is:

(1) $\frac{3}{4}$

(2) 2

(3) $\frac{1}{2}$

(4) $\frac{2}{3}$

10. On a frictionless surface a block of mass M moving at speed v collides elastically with another block of same mass M which is initially at rest. After collision the first block moves at an angle θ to its initial direction and has a speed $\frac{v}{3}$. The second block's speed after the collision is:

(1) $\frac{3}{4}v$

(2) $\frac{3}{\sqrt{2}}v$

(3) $\frac{\sqrt{3}}{2}v$

(4) $\frac{2\sqrt{2}}{3}v$

11. The molar specific heat at constant pressure of an ideal gas is (7/2) R. The ratio of specific heat at constant pressure to that at constant volume is

(1) 8/7 (2) 5/7

(3) 9/7 (4) 7/5

12. In India electricity is supplied for domestic use at 220 V. It is supplied at 110 V in USA. If the resistance of a 60 W bulb for use in India is R, the resistance of a 60 W bulb for use in USA will be

(1) R/2 (2) R

(3) 2R (4) R/4

13. A particle starts simple harmonic motion from the mean position. Its amplitude is A and time period is T. What is its displacement when its speed is half of its maximum speed

(1) $\frac{\sqrt{2}}{3}A$

(2) $\frac{\sqrt{3}}{2}A$

(3) $\frac{2}{\sqrt{3}}A$

(4) $\frac{A}{\sqrt{2}}$

14. A physical quantity of the dimension of length that can be formed out of c, G and $\frac{e^2}{4\pi\varepsilon_0}$ is[c is velocity of light, G is universal constant of gravitation and e is charge]

(1) $c^2\left[G\frac{e^2}{4\pi\varepsilon_0}\right]^{\frac{1}{2}}$

(2) $\frac{1}{c^2}\left[\frac{e^2}{G4\pi\varepsilon_0}\right]^{\frac{1}{2}}$

(3) $\frac{1}{c^2}G\frac{e^2}{4\pi\varepsilon_0}$

(4) $\frac{1}{c^2}\left|G\frac{e^2}{4\pi\varepsilon_0}\right|^{\frac{1}{2}}$

Space for rough work

15. Two springs of spring constants k_1 and k_2 are joined in series. The effective spring constant of the combination is given by
(1) $k_1k_2/(k_1 + k_2)$
(2) $k_1\ k_2$
(3) $(k_1 + k_2)/2$
(4) $k_1 + k_2$

PART B: CHEMISTRY

16. Consider the equilibrium

$$AgCl(s) \rightleftharpoons Ag^+(aq) + Cl^-(aq); K_{sp} = 10^{-10}$$

If NH_3 is added, then solubility of AgCl increases, because
(1) K_{sp} of AgCl increase due to addition of NH_3
(2) K_{sp} of AgCl decrease due to addition of NH_3
(3) Ag^+ react with NH_3 and equilibrium shifts in forward direction
(4) Cl^- react with NH_3 and form NH_4Cl so equilibrium shift in backward direction

17. A 100 mL solution of 0.1 M CH_3COOH is titrated with 0.1 M NaOH, calculate the pH at 25% completion and 75% completion of the titration. ($pK_a = 4.74$) (log 3 = 0.48)
(1) 4.26, 5.22
(2) 5.22, 5.26
(3) 4.74, 4.26
(4) 5.00, 4.00

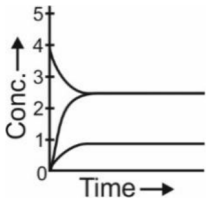
18. Which of the following reaction cannot represent the standard heat of formation?
(1) $H_2(g) + \frac{1}{2}O_2(g) \rightarrow H_2O(l); \Delta H_f^\circ(H_2O(l))$
(2) $\frac{1}{2}N_2(g) + \frac{3}{2}H_2(g) \rightarrow NH_3(g); \Delta H_f^\circ(NH_3)$
(3) $C(\text{graphite}) + \frac{1}{2}O_2(g) \rightarrow CO(g); \Delta H_f^\circ(CO)$
(4) $\frac{1}{2}H_2(g) + \frac{1}{2}I_2(g) \rightarrow HI(g);\ \Delta H_f^\circ(HI)$

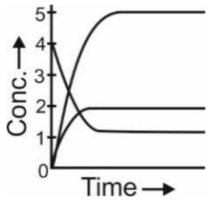
19. The correct order of oxidation number of central atom is
(1) $HNO_3 > NH_3 > NH_2OH$
(2) $HNO_3 > NH_2OH > NH_3$
(3) $NH_2OH > HNO_3 > NH_3$
(4) $NH_3 > NH_2OH > HNO_3$

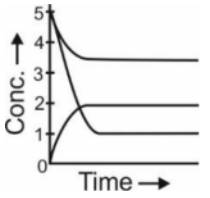
20. Which of the following graph is correctly matched with the given reaction?

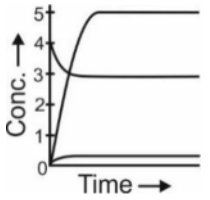
$\{[NH_3]_{initial} = 4\ M,\ \alpha = 0.4\}$

$2NH_3 \rightleftharpoons N_2 + 3H_2$

(1) 

(2) 

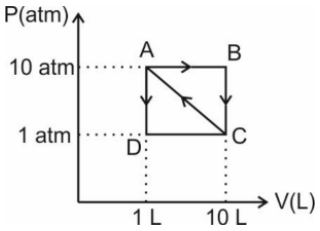
(3) 

(4) 

21. Choose the incorrect statement.
(1) Internal energy change (ΔE) is zero for isothermal process involving ideal gas
(2) Enthalpy is a state function.
(3) Work done (magnitude only) in irreversible contraction is always higher than the work in irreversible expansion.
(4) Work done (only magnitude) in reversible expansion is higher than the work done in reversible contraction

Space for rough work

22. 1 mole of ideal monoatomic gas undergo the following processes



For which path ΔS is positive?

(1) A to B (2) B to C
(3) C to A (4) A to D

23. 'x' g NaOH is added in 1 L of 0.1 M CH_3COOH and pH of resulting solution is 5.74. The value of 'x' is (pK_a of CH_3COOH is 4.74)

(1) 4 g (2) 3.64 g
(3) 2.52 g (4) 1.68 g

24. Which of the following molecules is planar?

(1) NF_3 (2) NCl_3 (3) PH_3 (4) BF_3

25. The molecular shape of SF_4, CF_4, and XeF_4 are:

(1) The same, with 2, 0, and 1 lone pair of electrons, respectively

(2) The same, with 1, 1, and 1 lone pair of electrons, respectively

(3) Different, with 0, 1, and 2 lone pair of electrons, respectively

(4) Different, with 1, 0, and 2 lone pair of electrons, respectively

26. The ionic radii (in Å) of N^{3-}, O^{2-} and F^- are respectively:

(1) 1.36, 1.40 and 1.71
(2) 1.36, 1.71 and 1.40
(3) 1.71, 1.40 and 1.36
(4) 1.71, 1.36 and 1.40

27. The first ionization potential of Na is 5.1 eV. The value of electron gain enthalpy of Na^+ will be:

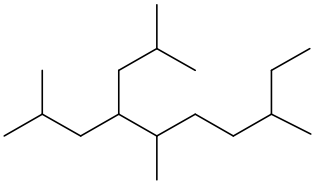
(1) –2.55 eV (2) –5.1 eV
(3) –10.2 eV (4) +2.55 eV

28. The correct order of bond angle is:

(1) $PF_3 = PCl_3 = PBr_3 = PI_3$
(2) $PF_3 < PBr_3 < PCl_3 < PI_3$
(3) $PI_3 < PBr_3 < PCl_3 < PF_3$
(4) $PF_3 < PCl_3 < PBr_3 < PI_3$

29. Which of the following IUPAC name is incorrect

(1) Pent–2–en–3–ol
(2) 3, 4–Dimethyl hex–3–ene
(3) Hept–2–en–5–ol
(4) Hexa–2, 4–diene

30.  The correct IUPAC name of compound is

(1) 8–Ethyl–4–(2–methylpropyl)–2, 5–dimethyl nonane
(2) 8–Ethyl–4–isobutyl–2, 5–dimethyl nonane
(3) 2, 5, 8–Trimethyl–4–(2–methylpropyl) decane
(4) 3, 6, 9–Trimethyl–4–(2–methylpropyl) decane

PART C: MATHEMATICS

31. If $A = \{\phi, \{(\phi)\}\}$, then the power set P(A) of A is

(1) A
(2) $\{\phi, \{\phi\}, A\}$
(3) $\{\phi, \{\phi\}, \{\{\phi\}\}, A\}$
(4) none of these

32. If 100 times the 100th term of an A.P. with non-zero common difference equals the 50 times its 50th term. Then 150th term of this A.P. is

(1) –150
(2) 150 times the 50th term
(3) 150
(4) 0

Space for rough work

33. If $\frac{3+5+7+.....+\text{n terms}}{5+8+11+.....+10\text{ terms}}=7$, the value of n is

(1) 35 (2) 36 (3) 37 (4) 40

34. If x is real, the maximum value of $\frac{3x^2+9x+17}{3x^2+9x+7}$ is:

(1) 41 (2) 1

(3) $\frac{17}{7}$ (4) $\frac{1}{4}$

35. If one root of $5x^2+13x+k=0$ is reciprocal of the other, then

(1) $k=0$ (2) $k=5$

(3) $k=\frac{1}{6}$ (4) $k=6$

36. If $y=(0.64)^{\log_{0.25}\left(\frac{1}{3}+\frac{1}{3^2}+\frac{1}{3^3}+.....\infty\right)}$ then $y=$

(1) 0.25 (2) 0.6

(3) 0.8 (4) 0.9

37. If $\log_2(a+b)+\log_2(c+d)\geq 4$, then the minimum value of a + b + c + d is

(1) 2 (2) 4

(3) 6 (4) 8

38. Six boys and six girls sit along a line alternatively in x ways and along a circle (again alternatively) in y ways, then

(1) $x=y$ (2) $y=12x$

(3) $x=10y$ (4) $x=12y$

39. A polygon has 44 diagonals, then the number of its sides are

(1) 11

(2) 7

(3) 8

(4) None of these

40. How many different words can be formed by jumbling the letters in the word MISSISSIPPI in which no two S are adjacent?

(1) $6\cdot 7\cdot {}^8C_4$

(2) $6\cdot 8\cdot {}^7C_4$

(3) $7\cdot {}^6C_4\cdot {}^8C_4$

(4) $8\cdot {}^6C_4\cdot {}^7C_4$

41. The coefficient of x^8 in the expansion of

$1+(1+x)+(1+x)^2+....+(1+x)^n$ $(n\geq 8)$ is

(1) 1 (2) 2

(3) ${}^{n+1}C_{n-8}$ (4) ${}^nC_{n-8}$

42. If the sum of the coefficients in the expansion of $(1-3x+10x^2)^n$ is A and if the sum of the coefficients in the expansion of $(1+x^2)^n$ is B, then

(1) $A=3B$ (2) $A=B^3$

(3) $B=A^3$ (4) none of these

43. The coefficient of $1/x$ in the expansion of $(1+x)^n(1+1/x)^n$ is

(1) $\frac{n!}{(n-1)!.(n+1)!}$ (2) $\frac{2n!}{(n-1)!.(n+1)!}$

(3) $\frac{n!}{(2n-1)!.(2n+1)!}$ (4) $\frac{2n!}{(2n-1)!.(2n+1)!}$

44. The incentre of the triangle with vertices $(1,\sqrt{3})$, (0, 0) and (2, 0) is

(1) $\left(1,\frac{\sqrt{3}}{2}\right)$ (2) $\left(\frac{2}{3},\frac{1}{\sqrt{3}}\right)$

(3) $\left(\frac{2}{3},\frac{\sqrt{3}}{2}\right)$ (4) $\left(1,\frac{1}{\sqrt{3}}\right)$

45. If P(1, 2), Q(4, 6), R(5, 7) and S(a, b) are the vertices of a parallelogram PQRS, then

(1) $a=2, b=4$ (2) $a=3, b=4$

(3) $a=2, b=3$ (4) $a=3, b=5$

Space for rough work

SECTION - B
(INTEGER TYPE)
PART A: PHYSICS

46. The motion of a particle along a straight line is described by equation:

$$x = 8 + 12t - t^3$$

where x is in metre and t in second. The retardation of the particle when its velocity becomes zero, is: (in ms^{-2})

47. A ball is dropped from a high rise platform at t = 0 starting from rest. After 6 seconds another ball is thrown downwards from the same platform with a speed v. The two balls meet at t = 18s. What is the value of v? (take g = 10 m/s^2) (in ms^{-1})

48. A particle moves with a velocity $\vec{v} = 6\hat{i} - 4\hat{j} + 3\hat{k}$ m/s under the influence of a constant force $\vec{F} = 20\hat{i} + 15\hat{j} - 5\hat{k}$. The instantaneous power applied to the particle is (in J/s)

49. Certain quantity of water cools from 70°C to 60°C in the first 5 minutes and to 54°C in the next 5 minutes. The temperature of the surroundings is: (in °C)

50. A body of mass 1 kg is thrown upwards with a velocity 20 m/s. It momentarily comes to rest after attaining a height of 18 m. How much energy is lost due to air friction? (g = 10 m/s^2) (in J)

51. Two particles which are initially at rest, move towards each other under the action of their internal attraction. If their speeds are v and 2v at any instant, then the speed of centre of mass of the system will be:

52. The instantaneous angular position of a point on a rotating wheel is given by the equation $\theta(t) = 2t^3 - 6t^2$. The torque on the wheel becomes zero at (in second)

53. A body is moving with velocity 30 m/s towards east. After 10 seconds its velocity becomes 40 m/s towards north. The average acceleration of the body is (in ms^{-2})

54. A tuning fork of frequency 512 Hz makes 4 beats per second with the vibrating string of a piano. The beat frequency decreases to 2 beats per sec when the tension in the piano string is slightly increased. The frequency of the piano string before increasing the tension was (in Hz)

(Write your answer multiply by 8/127)

55. An ideal gas follows a polytrophic process $V = K T^{2/3}$ [K is a constant]. If Temp of gas is raised by 90°C, work done by gas is xR. Find x?

PART B: CHEMISTRY

56. Consider the following data.

Ionisation energy of M = 100 kJ/mol

Sublimation energy of M(s) = 50 kJ/mol

Bond energy of $X_2(g)$ = 150 kJ/mol

Electron gain enthalpy of X is = –200 kJ/mol

Lattice energy of MX(s) = – 600 kJ/mol

If enthalpy change in the given reaction is (in kJ/mol of MX) = –a, find $\frac{a}{25}$.

$$M(s) + \frac{1}{2}X_2(g) \longrightarrow MX(s)$$

57. Strength (g/L) of x volume solution of H_2O_2 is 34. Then value of 5x is

58. x mole of A are mixed with x moles of B, and at equilibrium for the reaction

$$\underset{(aq)}{A} + \underset{(aq)}{B} \rightleftharpoons \underset{(aq)}{C} + \underset{(aq)}{D},\ \frac{x}{2} \text{ moles of C are formed.}$$

The equilibrium constant K_c for the reaction will be

Space for rough work

59. Equivalent mass of FeS_2 in the below reaction is $\frac{M}{x}$ (M is molar mass of FeS_2). Find x.

$$FeS_2 + O_2 \rightarrow Fe_2O_3 + SO_2$$

60. The compound MX_6 is octahedral. Find the number of 90° X – M – X angles in compounds

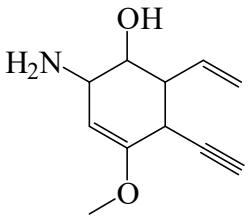
61. How many maximum atoms of IF_7 are present in the same plane?

62. Find the number of molecule(s) having trigonal planar geometry from the following:

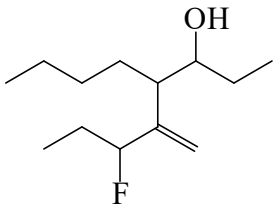
$$OCCl_2, \overset{+}{C}H_3, \overset{-}{C}H_3, ClF_3, I_3^-$$

63. In XeF_5^- and XeF_5^+ find the sum of axial d-orbital which are used in hybridization of both species.

64. Let x be the value of locant (position number on parent chain) of Amino group ($-NH_2$) (as per IUPAC nomenclature rules) and y be the number of different functional groups in the following compound. The value of x + y is



65. How many carbon atoms are present in the parent chain of the molecule shown below?



PART C: MATHEMATICS

66. The number of seven digit integers with sum of the digits equals to 10 and formed by using the digits 1, 2 and 3 only is

67. Given $(1 - 2x + 5x^2 - 10x^3)(1 + x)^n = 1 + a_1x + a_2x^2 + ...$ and that $a_1^2 = 2a_2$ then the value of n is

68. If the lines $3y + 4x = 1$, $y = x + 5$ and $5y + bx = 3$ are concurrent then the value of b is

69. A circle drawn on any focal chord AB of the parabola $y^2 = 4ax$ as diameter cuts the parabola again at C and D. If the parameters of the points A, B, C, D be t_1, t_2, t_3 and t_4 respectively, then the value of t_3t_4 is:

70. Tangents are drawn to the ellipse $3x^2 + 5y^2 = 32$ and $25x^2 + 9y^2 = 450$ passing through the point (3, 5). The number of such tangents are

71. The third term of a G.P. is 4. The product of first five terms is 2^x. Then find the value of x

72. If $p = \log_{245} 175$ and $q = \log_{1715} 875$, then $\frac{1-pq}{p-q} =$

73. If the sum of the series 2, 5, 8, 11, ... is 60100, then $\frac{n}{4}$ is (where n is the number of terms)

74. A survey of 500 television watchers produced the following information; 285 watch foot-ball, 195 watch hockey, 115 watch basketball, 45 watch football and basketball, 70 watch football and hockey, 50 watch hockey and basketball, 50 do not watch any of the three games. How many watch all the three games?

75. The number of values of θ in the interval $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ such that $\theta \neq \frac{n\pi}{5}$ for $n = 0, \pm 1 \pm 2$ and $\tan\theta = \cot 5\theta$ as well as $\sin 2\theta = \cos 4\theta$ is

Space for rough work

RISE
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Batch: XI to XII Moving (JEE)

ANSWER KEY

01.	(2)	02.	(1)	03.	(1)	04.	(2)	05.	(1)	06.	(2)	07.	(1)
08.	(3)	09.	(1)	10.	(4)	11.	(4)	12.	(4)	13.	(2)	14.	(4)
15.	(1)	16.	(3)	17.	(1)	18.	(4)	19.	(2)	20.	(1)	21.	(4)
22.	(1)	23.	(2)	24.	(4)	25.	(4)	26.	(3)	27.	(2)	28.	(4)
29.	(3)	30.	(3)	31.	(3)	32.	(4)	33.	(1)	34.	(1)	35.	(2)
36.	(3)	37.	(4)	38.	(4)	39.	(1)	40.	(3)	41.	(3)	42.	(2)
43.	(2)	44.	(4)	45.	(3)	46.	(12)	47.	(75)	48.	(45)	49.	(45)
50.	(20)	51.	(0)	52.	(1)	53.	(5)	54.	(32)	55.	(60)	56.	(23)
57.	(56)	58.	(01)	59.	(11)	60.	(12)	61.	(6)	62.	(2)	63.	(4)
64.	(7)	65.	(6)	66.	(77)	67.	(6)	68.	(6)	69.	(3)	70.	(3)
71.	(10)	72.	(5)	73.	(50)	74.	(20)	75.	(3)				

सिर्फ तैयारी के लिए ज़िन्दगी नहीं ज़िन्दगी के लिए तैयारी