# FIITJEE Big Bang Edge Test - 2023

## *for* students presently in **Class XI (going to XII) (Paper 2)**
## SAMPLE PAPER

*Time: 3 Hours (1:45 pm – 4:45 pm)*   **CODE: 1112-2**   *Maximum Marks: 243*

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**Instructions:**

**Caution: Class, Paper, Code as given above MUST be correctly marked on the answer OMR sheet before attempting the paper. Wrong Class, Paper or Code will give wrong results.**

1. **You are advised to devote 45 Minutes on Section-I and 135 Minutes on Section-II.**

2. **This Question paper consists of 2 sections. Marking scheme is given in table below:**

| Section | Subject | | Question no. | Marking Scheme for each question | |
|---------|---------|---|--------------|--------------|--------------|
| | | | | **Correct answer** | **Wrong answer** |
| **SECTION – I** | PHYSICS | (PART-A) | 1 to 7 | **+3** | **–1** |
| | CHEMISTRY | (PART-B) | 8 to 14 | **+3** | **–1** |
| | MATHEMATICS | (PART-C) | 15 to 21 | **+3** | **–1** |
| **SECTION – II** | PHYSICS | (PART-A) | 22 to 35 | **+3** | **–1** |
| | CHEMISTRY | (PART-B) | 36 to 49 | **+3** | **–1** |
| | MATHEMATICS | (PART-C) | 50 to 63 | **+3** | **–1** |
| | PHYSICS | (PART-D) | 64 to 69 | **+3** | **0** |
| | CHEMISTRY | (PART-E) | 70 to 75 | **+3** | **0** |
| | MATHEMATICS | (PART-F) | 76 to 81 | **+3** | **0** |

3. Answers have to be marked on the OMR sheet. The Question Paper contains blank spaces for your rough work. No additional sheets will be provided for rough work.

4. Blank papers, clip boards, log tables, slide rule, calculator, cellular phones, pagers and electronic devices, in any form, are not allowed.

5. **Before attempting paper write your OMR Answer Sheet No., Registration Number, Name** and **Test Centre** in the space provided at the bottom of this sheet.

6. **See method of marking of bubbles at the back of cover page for question no. 64 to 81.**

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**Note:** *Please check this Question Paper contains all 81 questions in serial order. If not so, exchange for the correct Question Paper.*

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*OMR Answer Sheet No.* : _____

*Registration Number* : _____

*Name of the Candidate* : _____

*Test Centre* : _____

For questions **64 to 81**

Numerical based questions single digit answer 0 to 9

**Example 1:**

If answer is 6.

Correct method:

$\text{⓪ ① ② ③ ④ ⑤ ❻ ⑦ ⑧ ⑨}$

**Example 2:**

If answer is 2.

Correct method:

$\text{⓪ ① ❷ ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨}$

# Recommended Time: 45 Minutes for Section – I

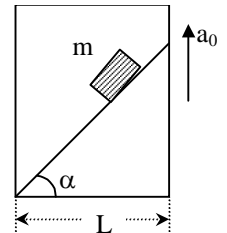## Section – I

# PHYSICS – (PART – A)

*This part contains **7 Multiple Choice Questions** number **1 to 7**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

1.  A swimmer wishes to reach directly opposite point on the other bank of a river, flowing with velocity 8 m/s. The swimmer can swim 10 m/s in still water. The width of the river is 480 m. Time taken by him to do so
    (A) 60 sec                                     (B) 48 sec
    (C) 80 sec                                     (D) 100 sec

2.  A mass m rests on a horizontal surface in equilibrium. The coefficient of friction between the mass and the surface is $\mu$. A force F is acting on the body as shown in the figure. The force of friction on mass m is
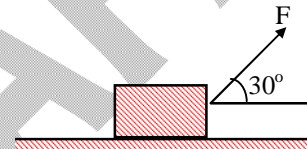
    (A) $\mu mg$                                   (B) $F\dfrac{\sqrt{3}}{2}$

    (C) $\mu\left[mg - \dfrac{\sqrt{3}}{2}F\right)$     (D) $\mu\left[mg + \dfrac{\sqrt{3}}{2}F\right)$

3.  A particle slides down a smooth inclined plane of elevation $\alpha$ fixed in the elevator going up with an acceleration $a_0$ as shown in figure. The base of the incline has a length L. The time taken by the particle to reach the bottom is

    (A) $\left[\dfrac{2L}{(g+a_0)\sin\alpha\cos\alpha}\right]^{1/2}$     (B) $\left[\dfrac{2L}{g\sin\alpha\cos\alpha}\right]^{1/2}$

    (C) $\left[\dfrac{g\sin\alpha\cos\alpha}{2L}\right]^{1/2}$     (D) $\left[\dfrac{2L}{a_0\sin\alpha\cos\alpha}\right]^{1/2}$

*Space for Rough Work*

4.  If $W_1, W_2$ and $W_3$ represent the work done in moving a particle from A to B along three different paths 1, 2 and 3 respectively (as shown) in the gravitational field of a point mass m. Find the correct relation between $W_1, W_2$ and $W_3$ :
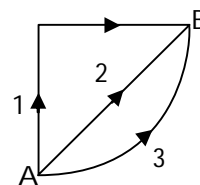
    (A) $W_1 > W_2 > W_3$                    (B) $W_1 = W_2 = W_3$

    (C) $W_1 < W_2 < W_3$                    (D) $W_2 > W_1 > W_3$

5.  A block is at rest on a rough inclined surface inclined at an angle $\theta$ with the horizontal. The coefficient of static friction between the block and the inclined surface is $\mu$. Then we can conclude that

    (A) frictional force = mgsinθ            (B) $\mu = \tan\theta$

    (C) $\mu \le \tan\theta$                  (D) None of these

6.  If vectors $\vec{A}$ and $\vec{B}$ are perpendicular to each other, then which of the following statements is valid?

    (A) $\vec{A} \times \vec{B} = \vec{A} \cdot \vec{B}$                (B) $\vec{A} \times \vec{B} = 0$

    (C) $\vec{A} \cdot \vec{B} = 0$                (D) $\vec{A} \cdot \vec{B} = |\vec{A}||\vec{B}|$

7.  A ball is projected at such an angle that the horizontal range is three times the maximum height the angle of projection of the ball is,

    (A) $\sin^{-1}(3/4)$                      (B) $\sin^{-1}(4/3)$

    (C) $\cos^{-1}(4/3)$                      (D) $\tan^{-1}(4/3)$

**Space for Rough Work**

# CHEMISTRY – (PART – B)

*This part contains **7 Multiple Choice Questions** number **8 to 14**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

8. From 490 mg of $H_2SO_4$, $10^{20}$ molecules are removed. The number of molecules left over are:
   (A) $6.02 \times 10^{21}$
   (B) $4.9 \times 10^{21}$
   (C) $3.01 \times 10^{21}$
   (D) $2.91 \times 10^{21}$

9. A 0.60 g sample consisting of only $CaC_2O_4$ and $MgC_2O_4$ is heated at 500°C, converting the two salts to $CaCO_3$ and $MgCO_3$. The sample then weighed 0.465g. If the sample had been heated to 900°C, where the products are CaO and MgO, what would the mixtures of oxides have weighted?
   (A) 0.12g
   (B) 0.21g
   (C) 0.252g
   (D) 0.3g

10. If an electron, a proton and an $\alpha$-particle have same de Broglie wavelenths, their kinetic energies are related to one another as:
   (A) electron > proton > $\alpha$-particle
   (B) proton > electron > $\alpha$-particle
   (C) $\alpha$-particle > proton > electron
   (D) electron = proton = $\alpha$-particle

11. Lattice energy of $CaCl_2$ is U and that of NaCl is U'. For same crystal structure and same ionic radii of $Ca^{2+}$ and $Na^+$:
   (A) $U = U'$
   (B) $U > U'$
   (C) $U < U'$
   (D) cannot be decided

12. Which is the correct order w.r.t. ionisation energies of Be, B, C, N and O?
   (A) Be<C<N<O<B
   (B) B<N<C<O<Be
   (C) B<Be<C<O<N
   (D) O<N<C<B<Be

13. Which of the following has two nodal planes?
   (A) $\sigma^*_{ns}$
   (B) $\sigma^*_{np_z}$
   (C) $\pi^*_{2p_x}$
   (D) $\pi_{2p_x}$

14. Electromagnetic radiations of wavelength 242 nm is just sufficient to ionise sodium atom. Calculate the ionisation energy of sodium in kJ $mol^{-1}$
   (A) 460.5 J $mol^{-1}$
   (B) 494.4 kJ $mol^{-1}$
   (C) 450.5 cal $mol^{-1}$
   (D) 600.5 kJ $mol^{-1}$

*Space for Rough Work*

# MATHEMATICS – (PART – C)

*This part contains **7 Multiple Choice Questions** number **15 to 21**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

15. If $(\log_e 2)(\log_b 625) = (\log_{10} 16)(\log_e 10)$ then the value of b is
    (A) 2                                          (B) 4
    (C) 5                                          (D) none of these

16. If $R = \{(x, y) \mid x, y \in Z, x^2 + y^2 \le 4\}$ is a relation in Z, then domain of R is (Z is set of all integer)
    (A) {0, 1, 2}                                   (B) {0, –1, –2}
    (C) {–2, –1, 0, 1, 2}                           (D) None of these

17. $\lim\limits_{x \to 4} \dfrac{3 - \sqrt{5 + x}}{x - 4}$ is equal to
    (A) 1/6                                         (B) –1/6
    (C) 0                                           (D) 1

18. Two finite sets have m and n elements. The number of subsets of the set having m element is 112 more than that of subsets of set having n elements. The values of m and n are, respectively.
    (A) 4, 7                                        (B) 7, 4
    (C) 4, 4                                        (D) 7, 7

19. If $x^3 + ax + 1 = 0$ and $x^4 + ax^2 + 1 = 0$ have a common root, then complete set of values of a is
    (A) $(-\infty, -2)$                             (B) {–2}
    (C) $(-2, \infty)$                              (D) none of these

20. The number of values of m for which the point of intersection of the lines $3x + 4y = 11$ and $y = mx + 1$ will have integral coordinates is
    (A) 0                                           (B) 1
    (C) 2                                           (D) 3

21. If A = {1, 3, 5, 7, 9, 11, 13, 15, 17}, B = {2, 4, …., 18} and N the set of natural numbers is the universal set, then $\left(A' \cup (A \cup B) \cap B'\right)$
    (A) $\phi$                                       (B) N
    (C) A                                           (D) B

*Space for Rough Work*

# Recommended Time: 135 Minutes for Section – II

## Section – II

# PHYSICS – (PART – A)

*This part contains **14 Multiple Choice Questions** number **22 to 35.** Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

22. For the system shown in the figure, the pulleys are light and frictionless. Assume wedge to be fixed and smooth. The tension in the string will be

    (A) $\dfrac{2}{3}$ mgsin θ             (B) $\dfrac{3}{4}$ mgsin θ

    (C) $\dfrac{1}{2}$ mgsin θ             (D) mgsin θ
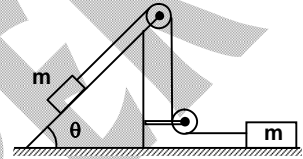
23. A particle has an initial velocity of $3\hat{i} + 4\hat{j}$ and an acceleration of $0.4\hat{i} + 0.3\hat{j}$. Its speed after 10 s is
    (A) 10 units             (B) 7 units
    (C) 7√2 units             (D) 8.5 units

24. A block of mass $\sqrt{3}$ kg is resting on a horizontal plane (coefficient of static friction $\mu = 1/2\sqrt{3}$). A force $\vec{F}$ is applied to the block as shown in the figure. The minimum magnitude of $\vec{F}$ for which the block begins to slide is (g = 10 m/s²)
    (A) 20 N             (B) 5 N
    (C) (20/3) N             (D) 10 N
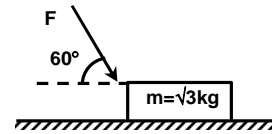
25. An airplane is flying horizontally at a height of 490 m with a velocity of 150 m/s. A bag containing food is to be dropped to the Jawans on the ground. How far from them should the bag be dropped so that it directly reaches them?
    (A) 1000 m             (B) 1500 m
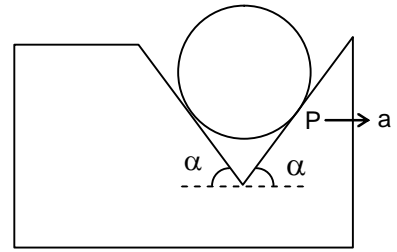    (C) 750 m             (D) 2000 m

26. A car accelerates from rest to a speed of 10 m/s. Let the energy spent be E. If we accelerate the car from 10 m/s to 20 m/s, then the energy spent will be
    (A) E             (B) 2E
    (C) 3E             (D) 4E

*Space for Rough Work*

27. Assuming all surfaces to be smooth. Minimum value of 'a' so that sphere looses contact at P is
    (A) g sin $\alpha$
    (B) g tan $\alpha$
    (C) g cot $\alpha$
    (D) g cosec $\alpha$



28. The work done on a particle of mass m by a force $K\left[\dfrac{x}{(x^2+y^2)^{3/2}}\hat{i}+\dfrac{y}{(x^2+y^2)^{3/2}}\hat{j}\right]$ (K being a constant of appropriate dimensions, when the particle is taken from the point (a, 0) to the point (0, a) along a circular path of radius a about the origin in the x-y plane is

    (A) $\dfrac{2K\pi}{a}$    (B) $\dfrac{K\pi}{a}$

    (C) $\dfrac{K\pi}{2a}$    (D) 0

29. A projectile is given an initial velocity of $\left(\hat{i}+2\hat{j}\right)$ m/s, where $\hat{i}$ is along the ground and $\hat{j}$ is along the vertical. If g = 10 m/s², the equation of its trajectory is:
    (A) $y=2x-5x^2$    (B) $4y=2x-5x^2$
    (C) $4y=2x-25x^2$    (D) $y=x-5x^2$

30. A body is moved along a straight line by a machine delivering constant power. The distance moved by the body in time t is proportional to
    (A) $t^{1/2}$    (B) $t^{3/4}$
    (C) $t^{3/2}$    (D) $t^2$

31. In the figure, the blocks A, B and C of mass m each have accelerations $a_1$, $a_2$ and $a_3$ respectively. $F_1$ and $F_2$ are external forces of magnitudes 2mg and mg respectively.
    (A) $a_1=a_2=a_3$    (B) $a_1>a_2>a_3$
    (C) $a_1>a_3>a_2$    (D) $a_1>a_2, a_2=a_3$
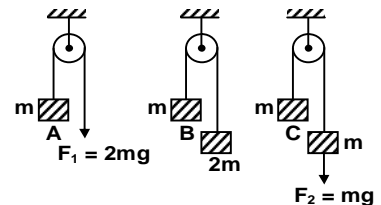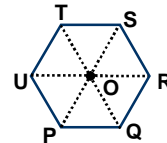


*Space for Rough Work*

32.	A car accelerates from rest at a constant rate of 2 m/s$^2$ for some time. Then, its retards at a constant rate of 4 m/s$^2$ and comes to rest.  What is the maximum speed attained by the car if it remains in motion for 3 seconds?
	(A) 2 m/s	(B) 3 m/s
	(C) 4 m/s	(D) 6 m/s

33.	A stone is projected at time t = 0 with a speed $v_0$ at an angle $\theta$ with the horizontal in a uniform gravitational field. The rate of work done (P) by the gravitational force plotted against time (t) will be as

	(A)

	(B)

	(C)

	(D)
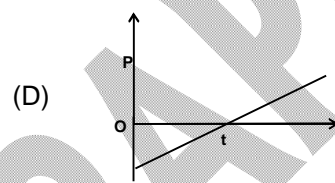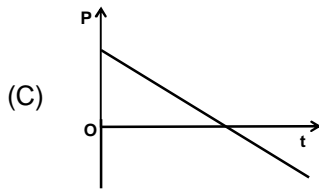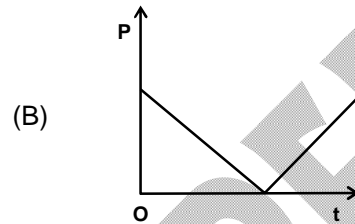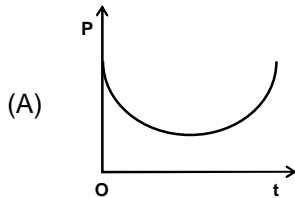
34.	A projectile is projected at an angle $\alpha$ (>45°) with an initial velocity u. The time t, at which its horizontal velocity will equal the vertical velocity, is

	(A) $t = \dfrac{u}{g}(\cos\alpha - \sin\alpha)$	(B) $t = \dfrac{u}{g}(\cos\alpha + \sin\alpha)$

	(C) $t = \dfrac{u}{g}(\sin\alpha - \cos\alpha)$	(D) $t = \dfrac{u}{g}(\sin^2\alpha - \cos^2\alpha)$

35.	Figure shows regular hexagon PQRSTU. Find the value of $\overrightarrow{PQ} + \overrightarrow{PR} + \overrightarrow{PS} + \overrightarrow{PT} + \overrightarrow{PU}$.
	(A) $\overrightarrow{PO}$	(B) $2\overrightarrow{PO}$
	(C) $4\overrightarrow{PO}$	(D) $6\overrightarrow{PO}$

*Space for Rough Work*

# CHEMISTRY – (PART – B)

*This part contains **14 Multiple Choice Questions** number **36 to 49**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

36.  Mixture of one mole each of ethyne and propyne on reaction with Na will form $H_2$ gas at S.T.P. vol. of $H_2$ gas produced will be?
(A) 22.4 L  (B) 11.2 L
(C) 33.6 L  (D) 44.8 L

37.  1.0g of a sample of brass, on reacting with excess of HCl produces 120 mL of $H_2$ gas at STP. The percentage of Zn in the sample of brass is:
(A) 32%  (B) 35%
(C) 38%  (D) 40%

38.  A 124 W bulb converts only 15% of the energy supplied to it into visible light of wavelength 640 nm. How many photons are emitted by the light bulb in one second?
(A) $4 \times 10^{19}$  (B) $6 \times 10^{19}$
(C) $8 \times 10^{18}$  (D) $3 \times 10^{19}$

39.  An object absorbs energy corresponding to wavelength $2400 \overset{\circ}{A}$ and emits two different radiations. The wavelength of one radiation is $6000 \overset{\circ}{A}$. What is the wavelength of the other radiation?
(A) $2000 \overset{\circ}{A}$  (B) $3600 \overset{\circ}{A}$
(C) $4000 \overset{\circ}{A}$  (D) $5000 \overset{\circ}{A}$

40.  If H-atom is supplied with 12.1 eV energy and electron returns to the ground state after excitation then number of spectral line in Balmer series would be: (use energy of ground state of H-atom = 13.6 eV)
(A) 1  (B) 2
(C) 3  (D) 4

41.  The ions $O^{2-}$, $F^-$, $Na^+$, $Mg^{2+}$, $Al^{3+}$ are isoelectronic. Their ionic radii show:
(A) A significant decrease from $O^{2-}$ to $Al^{3+}$
(B) an increase from $O^{2-}$ to $F^-$ and then decrease from $Na^+$ to $Al^{3+}$
(C) a decrease from $O^{2-}$ to $F^-$ and then increase from $Na^+$ to $Al^{3+}$
(D) a significant increase from $O^{2-}$ to $Al^{3+}$

***Space for Rough Work***

42. The energy required to ionise 0.7mg of Li will be (IE of Li = 520 kJ mol$^{-1}$ and At. Wt. = 7):
    (A) 52.0 J (B) 520 J
    (C) 52 kJ (D) 5.2 J

43. Which of the following is expected to have highest hydration energy?
    (A) $Li^+$ (B) $Be^{2+}$
    (C) $H^+$ (D) All have same value

44. Which of the following order is correct w.r.t. the radius?
    (A) $O^{2-} > F^- > Na^+ > Mg^{2+}$ (B) $Mg^{2+} > Na^+ > F^- > O^{2-}$
    (C) $F^- > O^{2-} > Mg^{2+} > Na^+$ (D) $Na^+ > Mg^{2+} > O^{2-} > F^-$

45. On the basis of MOT which is correct?
    (A) The bond order for $C_2$ molecule is two and both bonds are $\pi$-bonds
    (B) The bond order for $C_2$ molecule is two with one $\sigma$ bond and one $\pi$-bond
    (C) The HOMO in this molecule are $\pi$ type of antibonding molecular orbital containing total 3 electrons
    (D) None of the above is correct

46. In which one of the following molecules the central atom said to adopt sp$^2$ hybridization?
    (A) $BeF_2$ (B) $BF_3$
    (C) $C_2H_2$ (D) $NH_3$

47. Ratio of wavelength of series limit of Paschen and Brackett series for a single electronic species is:
    (A) $\dfrac{4}{9}$ (B) $\dfrac{12}{7}$
    (C) $\dfrac{9}{16}$ (D) $\dfrac{16}{25}$

48. Which of the following concentration terms is temperature dependent?
    (A) % by mass (B) Mole fraction
    (C) Mass/volume ratio (D) Molality

49. What is the molality of a solution made by dissolving 36.0 g of glucose ($C_6H_{12}O_6$, M = 180.0) in 64.0 g of $H_2O$?
    (A) 0.0533 (B) 0.200
    (C) 0.360 (D) 3.12

*Space for Rough Work*

# MATHEMATICS – (PART – C)

*This part contains **14 Multiple Choice Questions** number **50 to 63**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

50. Value of the expression 2sinx – cos2x is always
    (A) greater than or equal to -3/2
    (B) less than or equal to 3/2
    (C) greater than or equal to -1/2
    (D) none of these

51. The solution of the equation $\cos^2\theta + \sin\theta + 1 = 0$ lies in the interval
    (A) $\left(-\dfrac{\pi}{4}, \dfrac{\pi}{4}\right)$
    (B) $\left(\dfrac{\pi}{4}, \dfrac{3\pi}{4}\right)$
    (C) $\left(\dfrac{3\pi}{4}, \dfrac{5\pi}{7}\right)$
    (D) $\left(\dfrac{5\pi}{4}, \dfrac{7\pi}{4}\right)$

52. If $\cos 25° + \sin 25° = k$, then $\cos 20°$ is equal to
    (A) $\dfrac{k}{\sqrt{2}}$
    (B) $-\dfrac{k}{\sqrt{2}}$
    (C) $\pm\dfrac{k}{\sqrt{2}}$
    (D) None of these

53. If $3\sin^2 A + 2\sin^2 B = 1$ and $3\sin 2A - 2\sin 2B = 0$, where A and B are acute angles, then A + 2B is equal to
    (A) $\pi/3$
    (B) $\pi/4$
    (C) $\pi/2$
    (D) none of these

54. If $\tan\theta = n\tan\phi$, then maximum value of $\tan^2(\theta - \phi)$ is equal to
    (A) $\dfrac{(n-1)^2}{4n}$
    (B) $\dfrac{(n+1)^2}{4n}$
    (C) $\dfrac{(n+1)}{2n}$
    (D) $\dfrac{(n-1)}{2n}$

55. If the mid-points P, Q and R of the sides of the $\triangle ABC$ are (3, 3), (3, 4) and (2, 4) respectively, then $\triangle ABC$ is
    (A) right angled
    (B) acute angled
    (C) obtuse angled
    (D) none of these

*Space for Rough Work*

56. If $x_1, x_2, x_3$ are in A.P. and $y_1, y_2, y_3$ are also in A.P., then the points $(x_1, y_1), (x_2, y_2), (x_3, y_3)$ are
    (A) collinear
    (B) form a $\Delta$ with Area 1 sq. units
    (C) form a $\Delta$ with Area 2 sq. units
    (D) None of these

57. If A and B are two sets defined as
    $$A = \left\{ (x, y) \mid y = \frac{1}{x}; \ x \in R - \{0\} \right\}$$
    $$B = \{(x, y) \mid x + y = 0, \ x \in R\}, \text{ then}$$
    (A) $A \cap B = \phi$
    (B) $A \cap B = A$
    (C) $A \cap B = B$
    (D) $A \cup B = A$

58. Number of values of $\theta$ in $[0, 2\pi]$ that satisfy $\sin\theta + \cos\theta = 1$
    (A) 0
    (B) 1
    (C) 2
    (D) More than 2

59. If $\alpha$ and $\beta$ are roots of $x^2 - 7x + 1 = 0$ and $T_n = \alpha^n + \beta^n$. Find $\dfrac{T_{2021} + T_{2019}}{T_{2020}}$ ?

    (A) $\dfrac{1}{7}$
    (B) 1
    (C) 2021
    (D) 7

60. Find distance between lines $3x + 4y + 7 = 0$ and $6x + 8y + 11 = 0$ ?
    (A) $\dfrac{3}{10}$
    (B) $\dfrac{13}{10}$
    (C) $\dfrac{7}{10}$
    (D) $\dfrac{11}{10}$

61. If $\lim\limits_{x \to \infty} \left( \dfrac{x^2 + 1}{x + 1} - ax - b \right) = 4$, Find $a^2 + b^2$ ?

    (A) 25
    (B) 27
    (C) 26
    (D) 17

62. The number of elements in set $\{(a, b): 2a^2 + 3b^2 = 35, a, b \in z\}$, where z is set of all integers is
    (A) 6
    (B) 8
    (C) 10
    (D) 12

63. Find value of $\lim\limits_{n \to \infty} \dfrac{1^3 + 2^3 + 3^3 + .... + n^3}{n^4 + 2}$
    (A) 4
    (B) 2
    (C) $\dfrac{1}{2}$
    (D) $\dfrac{1}{4}$

*Space for Rough Work*

# PHYSICS – (PART – D)

*This part contains **6 Numerical Based Questions** number **64 to 69**. Each question has **Single Digit Answer 0 to 9**.*

64. During measurement of kinetic energy T, the percentage error in measurement of mass of particle and momentum of particle are 2% and 3%., respectively. The percentage error in measurement of kinetic energy is n%. Find the value of n.

65. A particle is projected from point A perpendicular to inclined plane with a velocity 50 m/s as shown in the figure. Particle strikes a vertical plane perpendicularly at point B. Find the time (in sec) taken by particle is going from point A to point B.
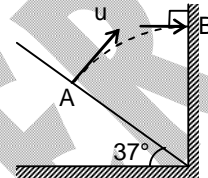
66. A stone is lying at rest in a river. The minimum mass of stone, $m = k\rho v^x g^{-3}$ is needed for remaining at rest. Here, k = constant having no unit, g = acceleration due to gravity v = river flow velocity, $\rho$ = density of water. Find the value of x.

67. In the figure shown, $a_3 = 6\,m/s^2$ (downwards) and $a_2 = 4\,m/s^2$ (upwards). Find acceleration of box 1 (in m/s²)
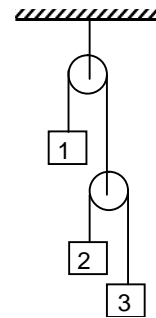
68. A ball of mass 0.5 kg is dropped from a tower the power of gravitational force at t = 2s, is $100\alpha$ Watt.
    (take g = 10 m/s²). Find the value of $\alpha$.

69 Two blocks A and B each of mass m are placed on a smooth horizontal surface. Two horizontal force F and 2F are applied on both the blocks A and B, respectively, as shown in the figure. If the block A does not slide on block B, then the normal reaction acting between the two blocks is found to be $n \times F$. Then n is
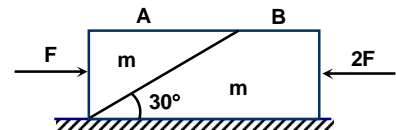
***Space for Rough Work***

# CHEMISTRY – (PART – E)

*This part contains **6 Numerical Based Questions** number **70 to 75**. Each question has **Single Digit Answer 0 to 9**.*

70. Total number of H-bonding sites available in $H_2O$ are.............

71. How many of the following radius orders are incorrect?
    (i) $N^{3-} > P^{3-}$
    (ii) $O^{2-} > F^-$
    (iii) $Ca^{2+} > Sr^{2+}$
    (iv) $S^- > S^{2-}$
    (v) $S^{2-} > O^-$

72. Number of electrons with m = 0 value in phosphorous atom are

73. How many millilitres of 0.5 M $KMnO_4$ are needed to react with 3.04 gms of iron (II) sulphate, $FeSO_4$?
    The reaction is as follows:
    $$10FeSO_4(aq) + 2KMnO_4(aq) + 8H_2SO_4(aq)$$
    $$\longrightarrow 5Fe_2(SO_4)_3(aq) + 2MnSO_4(aq) + K_2SO_4(aq) + 8H_2O(\ell)$$

74. How many moles of $KMnO_4$ are required in acidic medium to oxidise 10 mole of $Sn^{2+}$ to $Sn^{4+}$?

75. The velocity of an electron in a certain Bohr orbit of H-atom bears the ratio 1 : 275 to the velocity of light. The shell number is :

***Space for Rough Work***

# MATHEMATICS – (PART – F)

**This part contains 6 Numerical Based Questions number 76 to 81. Each question has Single Digit Answer 0 to 9.**

76. Find the value of $\dfrac{\tan 70^0 - \tan 20^0}{\tan 50^0}$

77. Find the exact value of the expression $\dfrac{\sin^2 34^0 - \sin^2 11^0}{\sin 34^0 \cos 34^0 - \sin 11^0 \cos 11^0}$.

78. If $\displaystyle\sum_{r=1}^{88} \tan r^0 \tan(r+1)^0 = \cot^2 1^0 - k,$ where k is a prime number, then find the absolute difference of the digits in k.

79. If value of limit $\displaystyle\lim_{x \to \infty}\left(\sqrt{x^2 + x + 1} - \sqrt{x^2 + 1}\right)$ is k, find 4k.

80. If $\alpha, \beta, \gamma$ are roots of $x^3 - 2x^2 - x + 3 = 0$, then value of $\dfrac{(\alpha^3 + \alpha^2 + 3)(\beta^3 + \beta^2 + 3)(\gamma^3 + \gamma^2 + 3)}{\alpha\beta\gamma}$ is

81. Find the value of $\dfrac{\log_5 9 . \log_7 5 . \log_3 7}{\log_2 \sqrt{6}} + \dfrac{1}{\log_9 \sqrt{6}}$

*Space for Rough Work*

# FIITJEE Big Bang Edge Test - 2023

## *for* students presently in Class XI (going to XII) (Paper 2)

# SAMPLE PAPER ANSWER KEY

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. | **C** | 2. | **B** | 3. | **A** | 4. | **B** |
| 5. | **A** | 6. | **C** | 7. | **D** | 8. | **D** |
| 9. | **C** | 10. | **A** | 11. | **B** | 12. | **C** |
| 13. | **C** | 14. | **B** | 15. | **C** | 16. | **C** |
| 17. | **B** | 18. | **B** | 19. | **B** | 20. | **C** |
| 21. | **B** | 22. | **C** | 23. | **C** | 24. | **A** |
| 25. | **B** | 26. | **C** | 27. | **B** | 28. | **D** |
| 29. | **A** | 30. | **C** | 31. | **C** | 32. | **C** |
| 33. | **D** | 34. | **C** | 35. | **D** | 36. | **C** |
| 37. | **B** | 38. | **B** | 39. | **C** | 40. | **A** |
| 41. | **A** | 42. | **A** | 43. | **C** | 44. | **A** |
| 45. | **A** | 46. | **B** | 47. | **C** | 48. | **C** |
| 49. | **D** | 50. | **A** | 51. | **D** | 52. | **A** |
| 53. | **C** | 54. | **A** | 55. | **A** | 56. | **A** |
| 57. | **A** | 58. | **D** | 59. | **D** | 60. | **A** |
| 61. | **C** | 62. | **B** | 63. | **D** | 64. | **7** |
| 65. | **4** | 66. | **6** | 67. | **1** | 68. | **1** |
| 69. | **3** | 70. | **4** | 71. | **3** | 72. | **9** |
| 73. | **8** | 74. | **4** | 75. | **2** | 76. | **2** |
| 77. | **1** | 78. | **1** | 79. | **2** | 80. | **5** |
| 81. | **4** | | | | | | |