



# VIBRANT ACADEMY

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### SAMPLE PAPER

#### XI TO XII MOVING (MEGA COURSE)

Time : 1 Hours

Maximum Marks : 200

Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.

#### INSTRUCTIONS

##### A. General :

1. This booklet is your Question Paper containing **50** questions. The booklet has **24** pages.
2. The **question paper CODE** is printed on the right hand top corner of this sheet and on the back page (page no. **24**) of this booklet.
3. The question paper contains **2** blank pages for your rough work. No additional sheets will be provided for rough work.
4. Blank papers, clipboards, log tables, slide rules, calculators, cellular phones, pagers and electronic gadgets in any form are not allowed to be carried inside the examination hall.
5. Fill in the boxes provided below on this page and also write your **Name** and **Regn. No.** in the space provided on the back page (page no. **24**) of this booklet.
6. The answer sheet, a machine-readable Objective Response Sheet (**ORS**), is provided separately.
7. DO NOT TAMPER WITH / MUTILATE THE ORS OR THE BOOKLET.
8. Do not open the question-paper booklet before being instructed to do so by the invigilators.

##### B. Question paper format

Read the instructions printed on the back page

##### C. Marking scheme

(page no. **24**) of this booklet.

Name of the candidate

UID Number

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I have read all the instructions and shall abide by them.

.....  
Signature of the Candidate

I have verified all the information filled in by the candidate.

.....  
Signature of the invigilator

#### USEFUL DATA

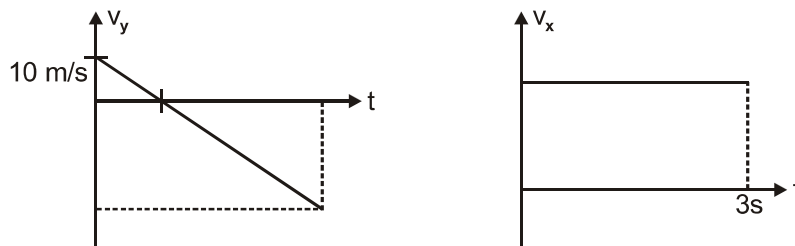
Atomic weights: Al = 27, Mg = 24, Cu = 63.5, Mn = 55, Cl = 35.5, O = 16, H = 1, P = 31, Ag = 108, N = 14, Li = 7, I = 127, Cr = 52, K=39, S = 32, Na = 23, C = 12, Br = 80, Fe = 56, Ca = 40, Zn = 65.5, Ti = 48, Ba = 137, U = 238, Co= 59, B =11, F = 19, He = 4, Ne = 20, Ar = 40 , Mo = 96, g = 10 m/s<sup>2</sup>

**PART I : PHYSICS**  
**Single Correct Choice Type**

This section contains 15 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **ONLY ONE** is correct.

1. Two balls of equal mass are shot upward simultaneously from the same point on the ground with the same initial speed, but at different angles to the horizontal. Which of the following statements must be true?  
 (A) The ball launched at the larger angle hits the ground first.  
 (B) The two balls hit the ground at the same time.  
 (C) The ball launched at the larger angle always has more total mechanical energy.  
 (D) The ball launched at the smaller angle hits the ground first.
2. On a straight road, a stationary police motor-cyclist is passed by a stolen car travelling at a speed of  $15 \text{ ms}^{-1}$ . At time  $t = 0$ , when the car is level with him, the motor-cyclist accelerates at  $4.0 \text{ m s}^{-2}$  for  $5.0 \text{ s}$  and then travels at a constant speed.  
 Find the distance the car has travelled during the period from  $t = 0$  to the moment when it is caught by the motorist.  
 (A) 300 m                      (B) 150 m                      (C) 450 m                      (D) None of these

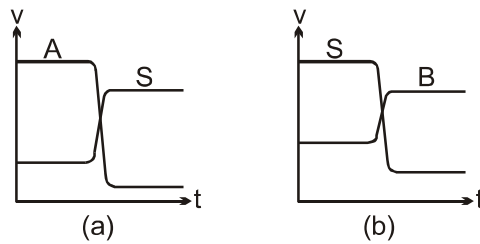
3. A projectile is thrown from a tower of height 'h'. It lands on the horizontal ground at the base of tower. Its v-t graph in X-axis & Y-axis are shown for the entire motion. [Take  $g = 10 \text{ m/s}^2$ ]



- (A) 10 m                      (B) 15 m                      (C) 20 m                      (D) 25 m

4. Two particles are dropped from the same point, one after another after some interval of time. While they are both in air.  
 (A) Distance between them keeps on increasing  
 (B) Distance between them keeps on decreasing  
 (C) The distance between them remains constant  
 (D) The distance between them first increases and then decreases.
5. If the angle  $\alpha$  between two forces of equal magnitude is reduced to  $(\alpha - \pi/3)$ , then the magnitude of their resultant becomes  $\sqrt{3}$  times of the earlier one. The angle  $\alpha$  is :  
 (A)  $\pi/2$                       (B)  $2\pi/3$                       (C)  $\pi/4$                       (D)  $4\pi/5$
6. A body starts from rest with uniform acceleration. Its velocity after  $2n$  seconds is  $v_0$ . The displacement of the body in last  $n$  seconds is :  
 (A)  $\frac{v_0(2n-3)}{6}$                       (B)  $\frac{v_0 n}{2}$                       (C)  $\frac{3v_0 n}{4}$                       (D)  $\frac{3v_0 n}{2}$
7. A body is projected vertically upwards from ground at  $t = 0$ . If  $t = t_1$  and  $t = t_2$  be the time instants at which it is at a height  $h$  above the point of projection while ascending and descending respectively, then :  
 (A)  $h = gt_1 t_2$                       (B)  $h = 2gt_1 t_2$                       (C)  $h = \frac{1}{2} gt_1 t_2$                       (D)  $h = \frac{1}{4} gt_1 t_2$

8. Graphs (a) and (b) show the effect of carts A and B colliding (separately) with a standard cart S. List the three carts in order of increasing mass.



- (A)  $m_A = m_B < m_S$       (B)  $m_A < m_S < m_B$       (C)  $m_B < m_A < m_S$       (D)  $m_A > m_B > m_S$
9. Three small balls each of mass 100 gm are attached at distances of 1m, 2m and 3m from the end D of a 3m length of string. The string is rotated with uniform angular velocity in a horizontal plane about D. If the outermost ball is moving at a speed of 6 m/s, the ratio of the tensions in the three parts of the string, innermost to outermost, will be :
- (A) 6 : 5 : 4      (B) 3 : 2 : 1      (C) 3 : 5 : 6      (D) 6 : 5 : 3
10. A golf ball and bowling ball each has the same momentum. A constant force is used to stop them. Which of the following statements is true ?
- (A) The golf ball stops in a shorter time      (B) The bowling ball stops in a shorter time  
(C) They both will stop in the same time      (D) Can not conclude with the available information
11. A body travelling along a straight line traversed one third of the total distance with a velocity 4 m/s. The remaining part of the distance was covered with a velocity 2 m/s for half the time and with velocity 6 m/s for the other half of time. The mean velocity averaged over the whole time of motion is :
- (A) 5 m/s      (B) 4 m/s      (C) 4.5 m/s      (D) 3.5 m/s
12. A particle moves such that power P supplied to it varies with time t according as equation  $P = ct$  where c is a constant. At time  $t = 0$  its velocity was zero, then velocity v at time t is proportional to :
- (A) t      (B)  $(t)^{1/2}$       (C)  $t^{3/2}$       (D) None of these
13. A vertically hanging spring is elongated by  $x_0$  (in equilibrium) when mass m is hanged from it. What is the work done by a man in slowly lowering the mass by a distance y further?
- (A)  $\frac{1}{2} \left( \frac{mg}{x_0} \right) y^2$       (B)  $\left( \frac{mg}{x_0} \right) y^2$       (C)  $\frac{mg x_0^2}{y}$       (D)  $\frac{1}{2} \frac{mg x_0^2}{y}$
14. The distance traveled by an object is given by  $x = at + \frac{bt^2}{(c+a)}$  where t is time and a, b, c are constants. The dimensions of b and c respectively are :
- (A)  $[LT^{-2}]$ ,  $[LT^{-1}]$       (B)  $[L^2T^{-3}]$ ,  $[LT^{-1}]$       (C)  $[LT^{-1}]$ ,  $[L^2T^{-1}]$       (D)  $[LT^{-1}]$ ,  $[LT^{-2}]$
15. If  $\vec{a} = 2\hat{i} + 3\hat{j} + 6\hat{k}$  and  $\vec{b} = 3\hat{i} + 4\hat{j}$ , then  $\frac{\text{projection of } \vec{a} \text{ on } \vec{b}}{\text{projection of } \vec{b} \text{ on } \vec{a}} =$
- (A) 7/5      (B) 5/7      (C) 4/9      (D) none

**PART II : CHEMISTRY**  
**Single Correct Choice Type**

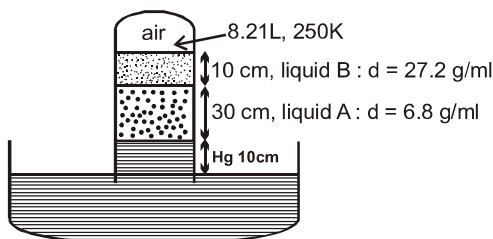
This section contains 15 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **ONLY ONE** is correct.

16. For the gaseous reaction  $P + Q \rightleftharpoons R + S$ ,  $K_p = 0.25$  at 300 K.  
If we take 1 mole of each of the for gases in a 5 L vessel, what would be the equilibrium concentration ratio of P & R ( $[P] / [R]$ ) ?  
(A) 1 : 2                      (B) 2 : 1                      (C) 1 : 3                      (D) None of these

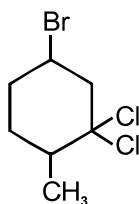
17. Match the list I with list II and select the correct answer :

<b>List I</b>				<b>List II</b>
(a)	Most electronegative element			(1) Chlorine
(b)	The element having highest electron gain enthalpy			(2) Hydrogen
(c)	Most abundant element in the universe			(3) Nitrogen
(d)	Most abundant gas in atmosphere			(4) Fluorine
	(a)    (b)    (c)    (d)			
(A)	1    2    3    4			
(B)	4    3    2    1			
(C)	4    1    2    3			
(D)	2    3    4    1			

18. What is the pressure of air in given digram.  
(Given : Barometric pressure = 76 cm Hg)



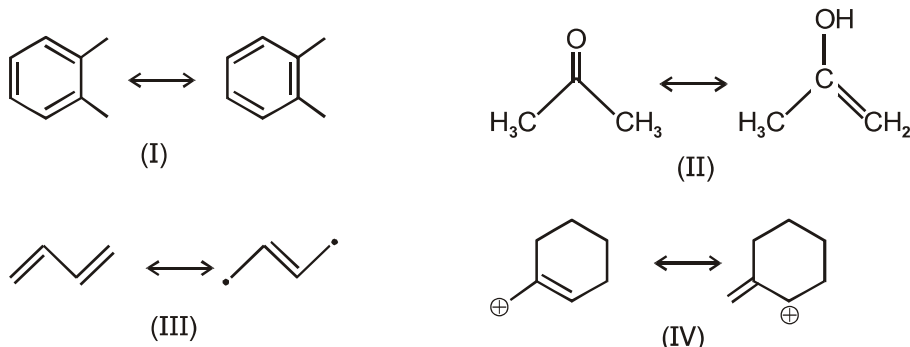
- (A) 41                      (B) 31                      (C) 20                      (D) None of these
19. What is IUPAC name of the compound shown below?



- (A) 1-bromo-3, 3-dichloro-4-methyl cyclohexane    (B) 3-bromo-1, 1-dichloro-6-methyl cyclohexane  
(C) 5-bromo-1, 1-dichloro-2-methyl cyclohexane    (D) 4-bromo-2, 2-dichloro-1-methyl cyclohexane
20. An electron in  $\text{He}^+$  has an energy of  $-6.04$  eV in a certain orbit. What is the velocity of electron in that orbit?  
(A)  $0.729 \times 10^6$  m/sec                      (B)  $1.45 \times 10^6$  m/sec  
(C)  $2.188 \times 10^6$  m/sec                      (D) None of these
21. In which of the following pair, both the species have same hybridisation.  
(I)  $\text{SF}_4$ ,  $\text{XeF}_4$                       (II)  $\text{I}_3^-$ ,  $\text{XeF}_2$                       (III)  $\text{ICl}_4^+$ ,  $\text{SiCl}_4$                       (IV)  $\text{ClO}_3^-$ ,  $\text{PO}_4^{3-}$   
(A) I, II                      (B) II, III                      (C) II, IV                      (D) I, II, III

22. An impure sample of  $\text{Ba}(\text{OH})_2$  (mol. wt. = 171) of mass 1.5 g was allowed to react with 80 ml of 0.20 M HCl (aq). When the excess acid was titrated against NaOH, 20 ml of NaOH (aq) was required. 10 ml of the same NaOH (aq) required 30 ml of the 0.1 M HCl (aq) in a separate titration. What is the percentage purity of the  $\text{Ba}(\text{OH})_2$  sample?  
 (A) 85.5 (B) 57 (C) 42.75 (D) None of these

23. Which of the following pairs are resonance structures of each other?



- (A) I, II, III (B) I, IV (C) II, III (D) I, III, IV

24. The van der Waals' constant 'b' of a gas is  $4\pi \times 10^{-4}$  L/mol. The radius of gas atom can be expressed in scientific notation as  $x \times 10^{-9}$  cm. Calculate the value of x. (Given :  $N_A = 6 \times 10^{23}$ ).  
 (A) 2 (B) 3 (C) 5 (D) None of these

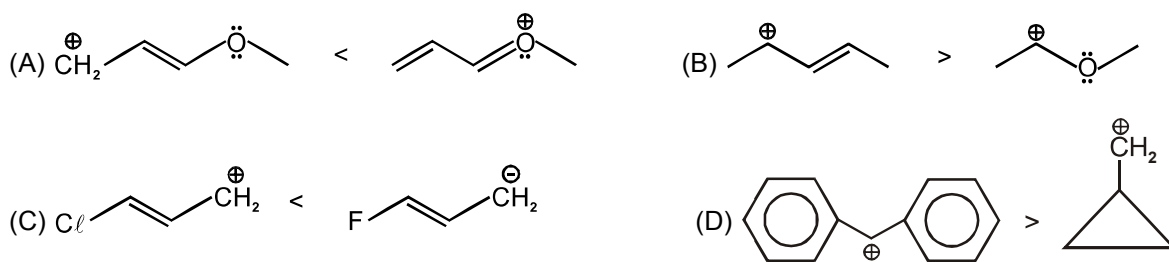
25. Which of them follows octet rule and also act as lewis acid :

- (A)  $\text{BCl}_3$  (B)  $\text{XeF}_2$  (C)  $\text{SiCl}_4$  (D)  $\text{PCl}_5$

26. A solution of sulfuric acid in water that is 24.5% by weight  $\text{H}_2\text{SO}_4$  has a density of 1.2 g/ml. The molarity of  $\text{H}_2\text{SO}_4$  (aq.) solution is :

- (A) 1M (B) 2 M (C) 3 M (D) None of these

27. Which of the following stability order is correct



28. 0.5 mol of a diatomic gas present in 10 litre vessel at certain temperature exert a pressure of 0.96 atm. Under similar conditions an ideal gas exerted 1.0 atm pressure. If volume of gas molecules is negligible then, the value of vander waals constant 'a' (in atm.  $\text{L}^2/\text{mol}^2$ ) is :

- (A) 4 (B) 16 (C) 32 (D) None of these

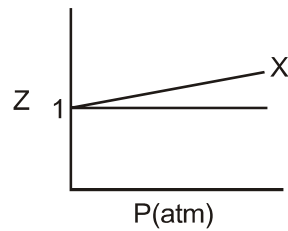
29. Consider the following reactions :



Then according to given information the incorrect order will be :

- (A)  $\Delta H_1 > \Delta H_2$  (B)  $\Delta H_2 > \Delta H_4$  (C)  $\Delta H_3 > \Delta H_2$  (D)  $\Delta H_1 > \Delta H_3$

30. Compressibility factor Z vs P plot for a real gas X is shown at 300 K



- If the slope of curve for X is  $0.005 \text{ atm}^{-1}$  then calculate Vander Waals Constant b (in L/mol) for gas X.  
 (A) 0.123 (B) 0.112 (C) 12.47 (D) None of these

**PART III : MATHEMATICS**  
**Single Correct Choice Type**

This section contains 15 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **ONLY ONE** is correct.

31. The number of real solutions of the equation  $\log_{10}(6|x|^2 + |x| - 1) = 0$  are  
 (A) 4 (B) 2 (C) 0 (D) None of these
32. While solving the quadratic equation  $ax^2 + bx + c = 0$ , Hari wrongly taken the co-efficient of x as 19 in place of 17 and found the roots to be  $-4$  and  $-15$ . The actual roots of the equation are :  
 (A)  $-5$  and  $-12$  (B) 5 and 12 (C) 4 and 15 (D) None of these
33. If m, n are the roots of the equation  $27x^2 - 10x + 125 = 0$  then the value of  $\left[ \left( \frac{m^2}{n} \right)^{1/3} + \left( \frac{n^2}{m} \right)^{1/3} \right]$  is : \_\_\_\_  
 (A)  $\frac{1}{3}$  (B)  $\frac{2}{9}$  (C)  $\frac{5}{9}$  (D) None of these
34. For  $x \in \mathbb{R}$ , the equation  $|x + 4|^{\log_{(x+4)}(x^2 + 3x + 2)} = (x + 2) \cdot |3x|$  has  
 (A) No solution (B) Unique solution  
 (C) Two solutions (D) More than two solutions
35. The number of ordered triplets  $(\alpha, \beta, \gamma)$  which satisfy the inequality  $3^{\sin^2 \alpha} \cdot 5^{\cos^2 \beta} \cdot 7^{\sin^2 \gamma} > 105$  is : .....  
 ( $\alpha, \beta, \gamma \in [-2\pi, 2\pi]$ )  
 (A) 0 (B) 80 (C) 105 (D) infinite
36. If  $\frac{\ell n x}{25} = \frac{\ell n y}{49} = \frac{\ell n z}{81}$  and  $x^{1/5} \cdot y^{1/7} \cdot z^p = 1$  then  $p = \underline{\hspace{2cm}}$ . (x, y, z are positive numbers different from 1)  
 (A)  $4/27$  (B)  $-4/27$  (C)  $1/9$  (D) None of these
37. The complete set of values of x for which the inequality  $3^{5 \cdot \frac{1}{\log_3 x}} \geq x^{\frac{1}{7 \cdot \log_3 x}}$  is satisfied is :  
 (A)  $(0, \infty) - \{1\}$  (B)  $(1, \infty)$  (C)  $(0, 1)$  (D)  $(0, \infty)$
38. If  $\cos \theta + \cos \phi = \sin \theta + \sin \phi = 0$ , then  $\sin 2\theta + \sin 2\phi =$   
 (A)  $2\sin(\theta + \phi)$  (B)  $-2\sin(\theta + \phi)$  (C)  $-2\cos(\theta - \phi)$  (D)  $2\cos(\theta - \phi)$
39. Minimum value of  $9x^2 - 6x \cdot |\tan \theta| + \sec^2 \theta$  is  
 (A) 9 (B) 2 (C) 0 (D) 1

40.  $f(x) = \frac{a(x+b)(x+c)}{(b-a)(a-c)} + \frac{b(x+c)(x+a)}{(c-b)(b-a)} + \frac{c(x+a)(x+b)}{(a-c)(c-b)}$ , then the value of  $f(a-b+c)$  is  
 (A) 1 (B)  $a-b+c$  (C)  $-1$  (D)  $-a+b-c$
41. Two sides of a triangle are of length  $\sin\theta, \cos\theta$ ; where  $\theta \in \left(0, \frac{\pi}{2}\right)$ . The third side is chosen such that area of triangle is maximum, then the value of that maximum area of triangle is  
 (A)  $\frac{1}{\sqrt{2}}$  (B)  $\frac{1}{2}$  (C)  $\frac{1}{2\sqrt{2}}$  (D)  $\frac{1}{4}$
42. Which of the following is a factor of the expression  $3x^3 - 2x^2y - 13xy^2 + 10y^3$   
 (A)  $x+y$  (B)  $x-y$  (C)  $x+2y$  (D)  $x-2y$
43. Number of integral values of  $x$  which satisfy the equation  $\sqrt{x+3-4\sqrt{x-1}} + \sqrt{x+8-6\sqrt{x-1}} = 1$  are :  
 (A) 4 (B) 5 (C) 6 (D) None of these
44. The value of the expression  $\frac{1}{\cos 290^\circ} + \frac{1}{\sqrt{3} \sin 250^\circ}$  is equal to  
 (A)  $\frac{\sqrt{3}}{4}$  (B)  $\frac{4}{\sqrt{3}}$  (C)  $\frac{2}{\sqrt{3}}$  (D)  $\frac{\sqrt{3}}{2}$
45. The ratio of the sides of the  $\triangle ABC$  is  $19 : 16 : 5$ , then  $\cot \frac{A}{2} : \cot \frac{B}{2} : \cot \frac{C}{2}$  equals :  
 (A)  $1 : 15 : 4$  (B)  $15 : 1 : 4$  (C)  $4 : 1 : 15$  (D)  $1 : 4 : 15$

### PART IV : MENTAL ABILITY

#### Single Correct Choice Type

This section contains 5 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **ONLY ONE** is correct.

46. Water is related to Ocean in the same way as Snow is related to .....  
 (A) Peaks (B) Hail (C) Glacier (D) Mountain
47. If  $P = 18$ ,  $FROG = 54$ , then what is  $VIBRANT$  equal to?  
 (A) 120 (B) 110 (C) 105 (D) 100
48. Which of the following is associated with Kargil War?  
 (A) Operation Vijay (B) Operation Blue Star  
 (C) Operation Polo (D) Mission Impossible
49. P.V. Sindhu is related to which sport ?  
 (A) Badminton (B) Table Tennis (C) Cricket (D) Shooting
50. When was Article 370 and 35A removed from Kashmir ?  
 (A) September 2019 (B) August 2019 (C) July 2019 (D) June 2019

Name of the candidate

UID Number

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**B. Question paper format :**

9. The question paper consists of 4 parts (Physics, Chemistry, Mathematics and Mental).
10. Section-I , II & III in **15** multiple choice questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **only one is correct**.
11. Section-IV in **5** multiple choice questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **only one is correct**.

**C. Marking Scheme :**

12. For each question, you will be **awarded 4 marks** if you darken the bubble corresponding to the correct answer and **zero mark** if no bubble is darkened. In case of bubbling of incorrect answer, **minus one (-1) mark** will be awarded.

## ANSWER KEY

1.	D	2.	B	3.	B	4.	A	5.	B	6.	C	7.	C
8.	B	9.	D	10.	C	11.	B	12.	A	13.	A	14.	B
15.	A	16.	B	17.	C	18.	B	19.	C	20.	B	21.	C
22.	B	23.	B	24.	C	25.	C	26.	C	27.	A	28.	B
29.	D	30.	A	31.	B	32.	A	33.	B	34.	C	35.	A
36.	B	37.	D	38.	B	39.	D	40.	B	41.	D	42.	D
43.	C	44.	B	45.	D	46.	C	47.	D	48.	A	49.	A
50.	B												