

SAMPLE PAPERS

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Vidyamandir Intellect Quest

Analysis of Individual's Subject Wise Performance and Accuracy % Across Various Difficulty Levels

FOR STUDENTS CURRENTLY IN CLASS



JEE (MAIN & ADVANCED)

Head Office: Aggarwal Corporate Heights, 3rd Floor, Netaji Subhash Place, Opp. Wazirpur Depot, Pitampura, Delhi.



Sample Paper – 1 Year JEE Program

Vidyamandir Intellect Quest Test

Duration: 2.5 Hrs

Maximum Marks: 240

CODE A

PAPER SCHEME:

- The paper contains 60 Objective Type Questions divided into three sections: Section I (Chemistry), Section II (Physics) and Section III (Mathematics).
- Each section contains **25 Multiple Choice Questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE CHOICE is correct**.

MARKING SCHEME:

• For each question in Section-I, II and III, **4 marks** will be awarded for correct answer and **-1 negative marking** for incorrect answer.

GENERAL INSTRUCTIONS:

- For answering a question, an **ANSWER SHEET (OMR SHEET)** is provided separately. Please fill your **Name**, **Roll Number**, **Seat ID**, **Date of Birth** and the **PAPER CODE** properly in the space provided in the **ANSWER SHEET.** IT IS YOUR OWN RESPONSIBILITY TO FILL THE OMR SHEET CORRECTLY.
- The use of log tables, calculator and any other electronic device is strictly prohibited.
- Violating the examination room discipline will immediately lead to the cancellation of your paper and no excuses will be entertained.
- No one will be permitted to leave the examination hall before the end of the test.
- Please submit both the question paper and the answer sheet to the invigilator before leaving the examination hall.

SUGGESTIONS:

- Before starting the paper, spend 2-2.5 minutes to check whether all the pages are in order and report any issue to the invigilator immediately.
- Try to attempt the Sections in their respective order.
- Do not get stuck on a particular question for more than 2-2.5 minutes. Move on to a new question as there are 60 questions to solve.

SECTION - I [CHEMISTRY]

1. Which of the following gas will have molar volume greater than the molar volume of an ideal gas at 4 atm and 273 K? (A) H_2 **(B)** CH_4 **(C)** CO_2 **(D)** NH₃ 2. Which of the following contains ionic bond, covalent bond and a co-ordinate bond ? Na₂O₂ NH₄Cl **(C)** NaCl **(D)** CH₃COOH **(A) (B)** 3. The compressibility factor for a real gas at high pressure is : Pb $1 + \frac{RT}{Pb}$ Pb **(A) (B)** 1 **(D) (C)** RT ŔТ Ionization energy of hydrogen like species Be^{3+} is : 4. **(B)** $9R_{\rm H} \cdot hc$ **(C)** $4R_{H} \cdot hc$ **(D) (A)** $16R_{H} \cdot hc$ $2R_{\rm H} \cdot hc$ 5. The elements X (atomic mass = 75) and Y (atomic mass = 16) combine to give a compound having 75.75% of X. The formula of the compound is : **(A)** XY **(B)** X_2Y **(C)** X_2Y_2 **(D)** X_2Y_3 Which of the following orbital is represented by quantum number $\ell = 2$ and m = 0? 6. d_{xy} (A) **(B) (C)** d_2 **(D)** d_{zx} $d_{x^2-y^2}$ 7. Which of the following statements regarding kinetic theory of gases is INCORRECT? (A) All gas particles are in a state of continuous motion **(B)** The molecular interactions are not present **(C)** Intermolecular collisions are responsible for pressure **(D)** Volume of gas particles is negligible 8. If a balloon filled with CO is pierced and kept in a tank filled with N₂ gas at same P and T, the volume of balloon will : **(A)** Increase **(B)** Decrease **(C)** Remain same **(D)** Can't say 9. 0.1 M HCl and 0.2 M H₂SO₄ solutions are mixed in equal volume. This solution is diluted to double the volume. 20 ml of this diluted solution can neutralise x ml of 0.1 M NaOH solution. Find x. **(A)** 20 ml **(B)** 40 ml **(C)** 50 ml **(D)** 25 ml 10. At Boyle's temperature: **(A)** Ratio of molar volume of a real gas and an ideal gas is unity **(B)** Intermolecular forces are negligible **(C)** Gas can't be liquefied All of the above **(D)**

11.	O_2 is oxidised to O_2^{\oplus} . The change in bond order of $O-O$ bond is equal to :							
	(A)	2.5	(B)	0.5	(C)	1	(D)	2
12.	Norma (A)	lity of 0.2M Ca ₃ 0.2 N	(PO ₄) ₂ s (B)	olution is : 0.6 N	(C)	0.8 N	(D)	1.2 N
13.	In whi	ch of the follow	ing case	, would the prob	ability o	of finding an ele	ctron re	siding in a d _{xv} orbital
	be zero ?							
	(A) (C)	xy and yz plane xz and yz plane	e es		(B) (D)	xy and xz plan z-direction, yz	es and xz j	planes
14.	Suppose 10^{-17} J of energy is needed by interior of human eye to see an object. How many photons green light ($\lambda = 550$ nm) are needed to generate this minimum amount of energy ?							
	(A)	14	(B)	28	(C)	39	(D)	42
15.	Of the frequent	following trans	sition in	hydrogen aton	n the or	ne which gives	an abso	orption line of lowest
	(A)	n = 1 to $n = 2$	(B)	n = 3 to $n = 8$	(C)	n = 2 to $n = 1$	(D)	n = 8 to $n = 3$
16.	Orbital	l angular momen	tum for	an electron in 2s	orbital	is :	SINC	, L.
	(A)	0	(B)	$\frac{h}{2\pi}$	(C)	$\sqrt{6} \frac{h}{2\pi}$	(D)	$\sqrt{2} \frac{h}{2\pi}$
17.	Which	set is expected t	to show t	he smallest diffe	erence ir	n first ionisation	energy ?	
	(A)	He, Ne, Ar			(B)	B, N, O		
	(C)	Mg, Mg^+ , Mg	2+		(D)	Fe, Co, Ni		
18.	Alkali metals are powerful reducing agents because :							
	(A) (C)	These are mon	lls ovalent	ED!	(B)	Their ionic rad	11 are lai n potent	ge
19.	The sh	ape of XeOE ₂ is	:	/ MI	(2)	Then following	n potent	
	(A)	Trigonal plana	r		(B)	Trigonal pyran	nidal	
	(C)	T-shaped			(D)	Square planar		
20.	Which	of the following	graphs	represent Boyle'	s law ?			
	v _		PV		v		V	
		(A)		(B)		(C)		г (D)

SECTION - II [PHYSICS]



- 31. In the figure shown, the wedge is fixed and the masses are released from rest. The coefficient of friction between 4 kg and wedge is 0.8 and between 2 kg and wedge is 0.6. Which of the following statement is(are) correct ?
 - \vec{a} of blocks must be same **(A)**
 - **(B)** Friction force on 4 kg is 24 N
 - Friction force on 2 kg is 12 N **(C)**

 $1.5kx^{2}$

(A)

(D) Normal reactions between block is non-zero

(B)

- 32. Consider the following statement. When jumping from a height, you should bend your knees as you come to rest on ground, instead of keeping your legs stiff. Which of the following relations can be best used in explaining this statement?
 - $\Delta E = -\Delta (PE + KE) = 0$ **(A)** $\Delta p_1 = -\Delta p_2$ **(B)** $\Lambda x \propto \Lambda F$ **(C)** $F \Delta t = m \Delta v$ **(D)**

 $2.5kx^2$

Natural length of a massless spring (of spring constant k) is x. It is slowly stretched by applying an 33. external force. What is the work done in slowly stretching it from length 3x to 4x?

(C)

- 34. A block of negligible size and mass 2kg is placed above a plank 2 kgof mass 4kg and length 16m as shown in figure. A force of 44N 44 N 4 kgis applied on the lower block as shown in the figure. The ground is smooth, coefficient of friction between upper and lower block 16m is 0.2. Find the time after which the upper block will fall over. **(B)** (**C**) 3*s* **(D)** 4s**(A)** 15 2sKinetic energy of a particle moving in a straight line varies with time t as $K = 4t^2$. The force acting 35. on the particle: (A) is constant **(B)** is increasing **(C)**
- 36. A block is placed in an elevator moving down with a constant speed. Work done by normal force on the block is:
 - (A) Zero Negative
- 37. A block of mass 4kg at rest falls, on a spring from a height of 15cm. If
 - **(A)** 14cm
 - 18.2cm **(B)**
 - **(C)** 12.6cm
 - **(D)** 10cm
- 38. A bullet when fired at a target has its velocity decreased to 50% after penetrating 30cm into it. Additional thickness it will penetrate, before coming to rest is : (Assume target applies constant resistive force on bullet)

30cm (A) 10cm **(B) (C)** 40cm **(D)** 60cm



 $4.5kx^{2}$

(D)

is decreasing **(D)** first increases and then decreases **(B)** Positive **(C) (D)** Cannot say spring constant is 2000 N/m, maximum compression in spring will be : 15cm

 $3.5kx^2$

39. A block of mass m is connected to a spring of force constant K. Initially the block is at rest and the spring is in its natural state. A constant force F is applied horizontally towards right. The maximum speed of the block will be : (All surfaces are frictionless)

(A)
$$\frac{F}{\sqrt{mK}}$$
 (B) $\frac{\sqrt{2}F}{\sqrt{mK}}$
(C) $\frac{F}{\sqrt{2mK}}$ (D) $\frac{2F}{\sqrt{mK}}$

40. Two blocks *A* and *B* each of mass *m* are placed on a smooth horizontal surface. Two horizontal forces *F* and 2*F* are applied on the blocks *A* and *B* respectively as shown in figure. The block *A* does not slide on block *B*. Then the normal reaction acting between the two blocks is : (Assume no friction between the blocks)



SECTION - III [MATHEMATICS]

If $Z_1 \neq 0$ and Z_2 be two complex numbers such that $\frac{Z_2}{Z_1}$ is a purely imaginary number, then 41. $\left|\frac{2Z_1 + 3Z_2}{2Z_1 - 3Z_2}\right|$ is equal to : (**B**) 5 (A) (**C**) 3 **(D)** 1 If $z_r = \cos \frac{r\alpha}{n^2} + i \sin \frac{r\alpha}{n^2}$, where $r = 1, 2, 3, \ldots, n$, then $\lim_{n \to \infty} z_1 \cdot z_2 \cdot \ldots \cdot z_n$ is equal to : 42. **(B)** $cos\left(\frac{\alpha}{2}\right) - i sin\left(\frac{\alpha}{2}\right)$ $\cos \alpha + i \sin \alpha$ (A) $3\sqrt{e^{i\alpha}}$ $\rho^{i\alpha/2}$ **(C) (D**) Given that, $(1 + \tan 1^{\circ})(1 + \tan 2^{\circ}) \dots (1 + \tan 45^{\circ}) = 2^{\lambda}$, then $(\lambda + 1)$ is divisible by : (A) 2 (B) 5 (C) 7 (D) 9 43. Let α , β be the roots of the quadratic equation $ax^2 + bx + c = 0$, then the roots of the equation 44. $a(x+1)^{2} + b(x+1)(x-2) + c(x-2)^{2} = 0$ are: (A) $\frac{2\alpha+1}{\alpha-1}, \frac{2\beta+1}{\beta-1}$ (B) $\frac{2\alpha-1}{\alpha+1}, \frac{2\beta-1}{\beta+1}$ (C) $\frac{\alpha+1}{\alpha-2}, \frac{\beta+1}{\beta-2}$ (D) $\frac{2\alpha+3}{\alpha-1}, \frac{2\beta+3}{\beta-1}$ The value of $x^{1/2}$. $x^{1/4}$. $x^{1/8}$ upto infinity is : 45. x^2 x^{-1} x^3 **(A) (B) (C)** x **(D)** $\sum_{i=1}^{\infty} \sum_{k=1}^{\infty} \sum_{k=1}^{\infty} \frac{1}{a^{i+j+k}}$ is equal to, where |a| > 1: 46. (A) $(a-1)^{-3}$ (B) $\frac{3}{a-1}$ (C) $\frac{1}{a^3 - 1}$ **(D)** None of these

47. If A and G are arithmetic mean (AM) and geometric mean (GM) between two numbers a and b, then roots of the equation : $x^2 - 2Ax + G^2 = 0$ are : a. 2b (B) 2a, b(A) **(C)** a.b**(D**) 2a, 2b The sum of the series $\frac{1}{14} + \frac{1}{47} + \frac{1}{710} + \dots$ to *n* terms is : 48. (B) $\frac{n}{3n+1}$ (C) $\frac{n}{3n-1}$ $\frac{1}{3n-1}$ **(A) (D)** 49. The number of solutions of $\cos x + \cos 2x + \cos 4x = 0$, where $0 \le x \le \pi$ are : **(A) (B)** 3 **(C)** 4 **(D)** 5 Let *P* be the relation defined on the set of all real numbers such that : 50. $P = \{(a, b): sec^2 a - tan^2 b = 1\}$. Then P is : reflexive and symmetric but not transitive **(A)** reflexive and transitive but not symmetric **(B)** symmetric and transitive but not reflective **(C) (D)** an equivalence relation A relation on the set $A = \{x : |x| < 3, x \in Z\}$, where Z is the set of integers is defined by 51. $R = \{(x, y) : y = |x|, x \neq -1\}$. Then the number of elements in the power set of R is : **(B)** 8 (**C**) 16 **(D**) (A) 64 32 Let $A = \{1, 2, 3, 4\}$ and $R: A \to A$ be the relation defined by : $R = \{(1, 1), (2, 3), (3, 4), (4, 2)\}$. 52. The correct statement is : **(B)** *R* does not have an inverse NEDIC **(A)** *R* is not a one to one function R is not a function **(C)** *R* is an onto function **(D)** Let $R = \{(3, 3), (5, 5), (9, 9), (12, 12), (5, 12), (3, 9), (3, 12), (3, 5)\}$ be a relation on the set 53. $A = \{3, 5, 9, 12\}$. Then, R is : (A) reflexive, symmetric but not transitive **(B)** symmetric, transitive but not reflexive **(D)** reflexive, transitive but not symmetric **(C)** an equivalence relation If $X = \{(4^n - 3n - 1 : n \in N)\}$ and $Y = \{9(n-1) : n \in N\}$, when N is the set of natural numbers, then 54. $X \cup Y$ is equal to : **(A)** Y - X**(B)** X **(C)** Y **(D)** Ν 55. If sum of an infinite GP is S1 and sum of the squares of the infinite terms of same G.P. is S2 then common ratio is given by : (A) $\frac{S_1 - S_2}{S_1 + S_2}$ (B) $\frac{S_1^2 + S_2}{S_1^2 - S_2}$ (C) $\frac{S_1^2 - S_2}{S_1^2 + S_2}$ (D) $\frac{S_1^2 - S_2^2}{S_1^2 + S_2^2}$ $2+5x+10x^2+17x^3+26x^4+...$ upto infinite terms is $(-1 < x < 1, x \neq 0)$ 56. (A) $\frac{1-x+x^2}{(1-x)^3}$ (B) $\frac{2+x+x^2}{(1-x)^3}$ (C) $\frac{2-x-x^2}{(1-x)^3}$ (D) $\frac{2-x+x^2}{(1-x)^3}$

57.	If $\frac{\sin^4}{2}$	$\frac{x}{3} + \frac{\cos^4 x}{3} = \frac{1}{5}$	then whic	h of the followi	ng is not	t true :
	(A)	$\tan^2 x = \frac{2}{3}$			(B)	$\frac{\sin^8 x}{8} + \frac{\cos^8 x}{27} = \frac{1}{125}$
	(C)	$\cos 2x = \frac{5}{13}$			(D)	$\sin^2 3x = \frac{98}{125}$
58.	Let f_k ($(x) = \frac{1}{k} \left(\sin^k x + \right)$	$\cos^k x$	where $x \in R$, $k \in R$	≥ 1 then	$f_4(x) - f_6(x) =$
	(A)	$\frac{1}{4}$	(B)	$\frac{1}{12}$	(C)	$\frac{1}{6}$ (D) $\frac{1}{3}$
59.	Comple	ete general solut	ion of the	equation sin(2	2x). sec((3x) = 1 is :
	(A)	$\frac{2n\pi}{5} + \frac{\pi}{10} \text{ or } ($	$4n-1\Big)\frac{\pi}{2}$, $n \in I$	(B)	$\frac{2n\pi}{5} + \frac{\pi}{10}, n \in I$
	(C)	$\frac{2n\pi}{5} + \frac{\pi}{10}, n \in$	$I - \{5k+1\}$	$1: k \in I \big\}$	(D)	$\frac{2n\pi}{5} + \frac{\pi}{10} \text{ or } 2n\pi, n \in I$
60.	Sum of	values of <i>p</i> such	h that $3x^2$	$x^2 - 2x + p = 0$ and	nd $6x^2$ –	-17x + 12 = 0 have a common root is :
	(A)	$\frac{77}{12}$	(B)	$-\frac{77}{12}$	(C)	$\frac{13}{12}$ (D) $-\frac{13}{12}$
						FOUN
					AL	
				MED		
			JEE			

(A)
$$\frac{77}{12}$$
 (B) $-\frac{77}{12}$ (C) $\frac{13}{12}$ (D) $-\frac{13}{12}$

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1 Year JEE Sample Paper Answer Key										
Code - A	Code - A_Answer Key Code A difficulty		Code-A subject	Code-A Topic	Code-A Skill	Code-A +ve marks	Code-A -ve marks			
1	A	Medium	Chemistry	States of Matter	Conceptual	4	1			
2	В	Easy	Chemistry	Chemical Bonding	Conceptual	4	1			
3	С	Medium	Chemistry	States of Matter	Calculation	4	1			
4	A	Medium	Chemistry	Atomic Structure	Calculation	4	1			
5	D	Easy	Chemistry	Stoichiometry	Calculation	4	1			
6	С	Easy	Chemistry	Atomic Structure	Memory	4	1			
7	С	Easy	Chemistry	States of Matter	Memory	4	1			
8	С	Easy	Chemistry	States of Matter	Conceptual	4	1			
9	D	Easy	Chemistry	Stoichiometry	Calculation	4	1			
10	D	Difficult	Chemistry	States of Matter	Conceptual	4	1			
11	В	Easy	Chemistry	Chemical Bonding	Calculation	4	1			
12	D	Easy	Chemistry	Stoichiometry	Calculation	4	1			
13	С	Medium	Chemistry	Atomic Structure	Application	4	1			
14	В	Medium	Chemistry	Atomic Structure	Calculation	4	1			
15	В	Easy	Chemistry	Atomic Structure	Application	4	1			
16	A	Easy	Chemistry	Atomic Structure	Calculation	4	1			
17	D	Medium	Chemistry	Periodic Classification	Memory	4	1			
18	D	Easy	Chemistry	Periodic Classification	Application	4	1			
19	С	Easy	Chemistry	Chemical Bonding	Memory	4	1			
20	В	Easy	Chemistry	States of Matter	Conceptual	4	1			
21	D	Medium	Physics	Introduction to Vectors and Forces	Conceptual	4	1			
22	С	Easy	Physics	Vectors	Application	4	1			
23	A	Easy	Physics	Kinematics	Conceptual	4	1			
24	С	Medium	Physics	Kinematics	Calculation	4	1			
25	В	Easy	Physics	Kinematics	Calculation	4	1			
26	С	Easy	Physics	Motion in 2D	Conceptual	4	1			
27	D	Easy	Physics	Motion in 2D	Conceptual	4	1			
28	A	Easy	Physics	Motion in 2D	Conceptual	4	1			
29	С	Medium	Physics	Introduction to Vectors and Forces	Calculation	4	1			
30	A	Difficult	Physics	Introduction to Vectors and Forces	Conceptual	4	1			
31	В	Medium	Physics	Dynamics	Conceptual	4	1			
32	С	Easy	Physics	Dynamics	Memory	4	1			
33	С	Easy	Physics	Energy and Momentum	Conceptual	4	1			
34	В	Medium	Physics	Dynamics	Calculation	4	1			
35	A	Medium	Physics	Energy and Momentum	Conceptual	4	1			
36	С	Easy	Physics	Energy and Momentum	Memory	4	1			
37	D	Easy	Physics	Energy and Momentum	Conceptual	4	1			
38	А	Easy	Physics	Energy and Momentum	Calculation	4	1			
39	А	Difficult	Physics	Dynamics	Conceptual	4	1			
40	D	Easy	Physics	Dynamics	Conceptual	4	1			
41	D	Easy	Mathematics	Complex Number	Conceptual	4	1			
42	С	Easy	Mathematics	Complex Number	Conceptual	4	1			
43	А	Medium	Mathematics	Trigonometry	Application	4	1			
44	А	Medium	Mathematics	Quadratic Equation	Application	4	1			
45	С	Easy	Mathematics	Sequence and Series	Conceptual	4	1			

46	А	Easy	Mathematics	Sequence and Series	Conceptual	4	1
47	С	Easy	Mathematics	Sequence and Series	Conceptual	4	1
48	В	Easy	Mathematics	Sequence and Series	Application	4	1
49	С	Easy	Mathematics	Trigonometry	Conceptual	4	1
50	D	Medium	Mathematics	Trigonometry	Application	4	1
51	С	Easy	Mathematics	Sets	Conceptual	4	1
52	С	Easy	Mathematics	Sets	Conceptual	4	1
53	D	Easy	Mathematics	Sets	Conceptual	4	1
54	С	Easy	Mathematics	Sets	Conceptual	4	1
55	С	Easy	Mathematics	Sequence and Series	Application	4	1
56	D	Medium	Mathematics	Sequence and Series	Application	4	1
57	С	Medium	Mathematics	Trigonometry	Application	4	1
58	В	Medium	Mathematics	Trigonometry	Application	4	1
59	С	Medium	Mathematics	Trigonometry	Application	4	1
60	В	Easy	Mathematics	Quadratic Equation	Application	4	1

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