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DIVISION: PRE-MEDICAL
Academic session: 2023-24

PERIODIC ASSESSMENT TEST (PAT)

STUDENT SUPPORT BOOKLET (SSB)

Answer Key (AK) | Standard Hints (SH) | Text Solutions (TS) | Weightage Sheet (WS)

CLASS	XI	COURSE NAME	SAKSHAM	COURSE CODE	MA
PHASE CODE(S)	02 MA & 03MA	TOTAL PAGES	1	BATCH CODE(S)	02 MA & 03MA

Target Examination & Year:

NEET 2025

TEST PATTERN	TEST TYPE	TEST CODE & SEQUENCE
NEET	CUMULATIVE TEST (CT)	CT-3

DATE & DAY:
24th September 2023 | Sunday

Duration & Time:
200 Minutes | 11:30 PM to 02:50 PM

Contents:

Scan QR Code for Video Solutions

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APPLY ONLINE

ANSWER KEY (AK)

PAPER											
PART-A : CHEMISTRY	Q.No.	1	2	3	4	5	6	7	8	9	10
	Ans.	4	2	3	2	2	4	1	3	4	3
	Q.No.	11	12	13	14	15	16	17	18	19	20
	Ans.	1	2	4	1	3	2	1	3	2	1
	Q.No.	21	22	23	24	25	26	27	28	29	30
	Ans.	1	1	2	2	2	1	2	4	2	4
	Q.No.	31	32	33	34	35	36	37	38	39	40
	Ans.	3	2	2	2	2	1	3	3	2	2
	Q.No.	41	42	43	44	45	46	47	48	49	50
	Ans.	3	3	4	2	4	1	2	2	2	3
PART-B : PHYSICS	Q.No.	51	52	53	54	55	56	57	58	59	60
	Ans.	2	1	3	1	2	4	2	4	3	1
	Q.No.	61	62	63	64	65	66	67	68	69	70
	Ans.	3	3	3	1	3	4	1	1	2	4
	Q.No.	71	72	73	74	75	76	77	78	79	80
	Ans.	1	3	2	4	2	4	2	3	2	4
	Q.No.	81	82	83	84	85	86	87	88	89	90
	Ans.	4	2	1	2	2	1	2	4	3	4
	Q.No.	91	92	93	94	95	96	97	98	99	100
	Ans.	1	3	1	3	4	1	3	1	1	3
PART-C : BIOLOGY	Q.No.	101	102	103	104	105	106	107	108	109	110
	Ans.	1	2	4	1	1	4	4	2	1	4
	Q.No.	111	112	113	114	115	116	117	118	119	120
	Ans.	3	2	1	1	3	2	2	2	2	4
	Q.No.	121	122	123	124	125	126	127	128	129	130
	Ans.	3	3	4	1	1	2	3	2	3	4
	Q.No.	131	132	133	134	135	136	137	138	139	140
	Ans.	4	1	1	2	1	1	2	3	1	2
	Q.No.	141	142	143	144	145	146	147	148	149	150
	Ans.	2	1	1	3	4	1	3	3	2	2
	Q.No.	151	152	153	154	155	156	157	158	159	160
	Ans.	1	3	2	4	4	2	2	3	3	2
	Q.No.	161	162	163	164	165	166	167	168	169	170
	Ans.	4	1	2	1	4	4	1	3	2	4
	Q.No.	171	172	173	174	175	176	177	178	179	180
	Ans.	2	3	2	2	3	4	2	2	4	3
	Q.No.	181	182	183	184	185	186	187	188	189	190
	Ans.	3	1	2	1	2	3	2	3	2	4
	Q.No.	191	192	193	194	195	196	197	198	199	200
	Ans.	3	3	2	4	2	4	2	4	4	3

STUDENT'S SPACE

TEXT SOLUTIONS (TS)

PAPER

PART-A: CHEMISTRY

1. K.E.= $h\nu - W$

Sol. Photoelectric effect is a random phenomena. So, electron It may come out with a kinetic energy less than ($h\nu - W$), as some energy may be lost while escaping out.

2. Theory Based

3. $K = \frac{K_f}{K_b}$

4. pH = 0 means $[H^+] = 10^0 = 1M$. Hence solution is strongly acidic.

5. $K_p = \frac{p_B \times p_C}{p_A}$

Sol.

$$A(g) \rightleftharpoons B(g) + C(g)$$

P_i	100	0	0
P_{eq}	100–x	x	x

Therefore, $\frac{x}{100+x} = \frac{1}{3}$

$\therefore$ x = 50 mm

$K_p = \frac{p_B \times p_C}{p_A} = \frac{50 \times 50}{50} = 50$ mm

6. According to Lewis concept water act as Base.

7. $K_C = \frac{[HI]^2}{[H_2][I_2]}$

Sol. $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$

$K_C = \frac{[HI]^2}{[H_2][I_2]}$ if $[H_2] = [I_2]$

$K_C = \frac{[HI]^2}{[I_2]^2}$ or $\frac{[HI]}{[I_2]}$

$= \sqrt{K_C} = \sqrt{49} = 7$

8. $P^{OH} = \frac{1}{2}[pk_b - \log C] = \frac{1}{2}[4.76 + 1]$

$= \frac{5.76}{2} = 2.88 \simeq 2.9$

pH = 14 – 2.9 = 11.1

9. $\Delta n_g > 0$

Sol. $K_p > K_c$. So, $\Delta n_g > 0$. So, (A) and (D) are corrects options.

10. $CH_3COOH \rightleftharpoons CH_3COO^- + H^{\oplus}$

C

C(1–α) Cα Cα

$\alpha = \sqrt{\frac{K_a}{C}} = \sqrt{\frac{1.8\times10^{-5}}{0.02}} = 3 \times 10^{-2}$

% dissociation = 3

11. HSO_4^- – can accept and donate a proton. $HSO_4^- + H^+ \rightarrow H_2SO_4$; $HSO_4^- \rightarrow H^+ + SO_4^{2-}$

Note : Answer could also be NH_3 or OH^-.

12. $K_C = \frac{k_f}{k_b}$

Sol. $K_C = \frac{k_f}{k_b} = 60$

$\therefore$ $k_f > k_b$

13. Relative strengths of weak acids = $\sqrt{\left(\frac{K_{a_1}}{K_{a_2}}\right)}$

Assume C_1 and C_2 are same (Although not given).

$\therefore$ Relative strength = $\sqrt{\left(\frac{K_{a_1}}{K_{a_2}}\right)}$

$= \sqrt{\left(\frac{1.8\times10^{-4}}{1.8\times10^{-5}}\right)}$

Relative strength for HCOOH to CH_3COOH = $\sqrt{10}$: 1

14. **Refer to sol.**

Sol. Relation between K_p and K_c is :

15. New concentration of HCl = $\frac{10^{-6}}{100} = 10^{-8}$ M

$[H^+] = 10^{-7} + 10^{-8}$ (approximately)

(Little less than 10^{-7} from water).

16. **Refer to sol.**

Sol. $r_f = K_f[A]$; $r_b = K_b[B]$

At equilibrium initial concentration and rate both get half.

At equilibrium rate of forward reaction = rate of backward reaction = 3×10^{-3}

17. As $V \rightarrow \infty$, effect of water dominates, so pH become **7**.

18. Refer to answer key

19. Ostwald's dilution law is valid only for weak electrolyte.

20. $Ka = \frac{K_w}{[H_2O]} = \frac{10^{-14}}{55.5} = 1.8 \times 10^{-16}$

36. Theory based

37. $P^H = -\log[H^+]$

Sol. $HA \rightleftharpoons H^+ + A^-$

0.1

$0.1\left(1-\frac{1}{100}\right)$ $\quad \frac{1\times 0.1}{100}$

$\frac{1\times 0.1}{100}$

$[H^+] = 10^{-3} \therefore pH = 3$

38. $[H^+] = 0.016$ M

$[H^+]\,[OH^-] = 10^{-14} \quad \Rightarrow \quad [OH^-]$

$= \frac{100\times 10^{-16}}{16\times 10^{-3}} = 6.25 \times 10^{-13}$ M

39. Weak acid has strong conjugate base.

40. $H\overset{7}{\underline{Cl}}O_4$ with highest oxidation number and its conjugate base is resonance stabilised, hence it is most acidic.

41. $CH_3COOH\ (aq) \rightleftharpoons H^+\ (aq) + CH_3COO^-\ (aq)$

t = 0 0.01

t = eq 0.01 – x x x

$[H^+] = x + 0.01 \approx 0.01$ M

$\therefore \quad K_a = \frac{[H^+]\ [CH_3COO^-]}{[CH_3COOH]}$

$\Rightarrow \quad 1.69 \times 10^{-5}$

$= \frac{0.01\ \times [CH_3COO^-]}{0.01}$

$\therefore \quad [CH_3COO^-] = 1.69 \times 10^{-5}$ M

42. Na_2CO_3 is basic due to hydrolysis of CO_3^{2-} ion

$CO_3^{2-} + H_2O \rightleftharpoons HCO_3^- + OH^-$

[sB + wA]

43. Congugate base is formed by the removal of H' from acid

$H_2PO_4^- \rightarrow HPO_4^{2-} + H^+$

44. Conjugate acid-base pair have a difference of $1H^+$.

45. $\therefore$ any H^+ or OH^- ions from an external source will suppress the dissociation of H_2O.

Sol. The degree of dissociation of pure water at 25°C = 1.8×10^{-7}%

$\therefore$ any H^+ or OH^- ions from an external source will suppress the dissociation of H_2O.

PART-B: PHYSICS

51. Apparent weight

$= m(g - a) = 50(9.8 - 9.8) = 0$

52. Kinetic energy $E = \frac{1}{2}mv^2 \Rightarrow E \propto v^2$

graph will be parabola symmetric to E-axis.

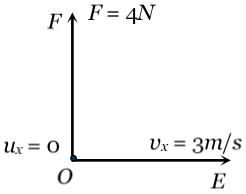
53. $\vec{F} = \frac{d\vec{p}}{dt} = \frac{d}{dt}(a + bt^2) = 2bt$ i.e. $F \propto t$

54. $W = \mu mgS = 0.2\times 50\times 9.8\times 1 = 98$ J

55. $v = \sqrt{2gh} = \sqrt{2\times 9.8\times 0.1} = \sqrt{1.96} = 1.4\,m/s$

57. Displacement of body in 4 sec along OE

$s_x = v_x t = 3\times 4 = 12$ m



Force along OF

(perpendicular to OE) = 4 N

$\therefore \quad a_y = \frac{F}{m} = \frac{4}{2} = 2\ m/s^2$

Displacement of body in 4 sec along OF

$\Rightarrow s_y = u_y t + \frac{1}{2}a_y t^2 = \frac{1}{2}\times 2\times (4)^2 = 16$ m

[As $u_y = 0$]

$\therefore$ Net displacement

$s = \sqrt{s_x^2 + s_y^2} = \sqrt{(12)^2 + (16)^2} = 20$ m

58. $U \propto x^2$

$\Rightarrow \frac{U_2}{U_1} = \left(\frac{x_2}{x_1}\right)^2 = \left(\frac{0.1}{0.02}\right)^2 = 25 \therefore U_2 = 25U$

59. $v = r\omega \Rightarrow \omega = \frac{v}{r}$ = constant

[As v and r are constant]

60. If x is the extension produced in spring.

$F = kx \Rightarrow x = \frac{F}{k} = \frac{mg}{k} = \frac{20\times 9.8}{4000} = 4.9$ cm

62. $W = \frac{F^2}{2k}$

If both springs are stretched by same force then $W \propto \frac{1}{k}$

As $k_1 > k_2$ therefore $W_1 < W_2$

i.e. more work is done in case of second spring.

63. $u_y = 40\,m/s$, $F_y = -5N$, $m = 5kg$.

So $a_y = \frac{F_y}{m} = -1m/s^2$ (As $v = u + at$)

$\therefore\ v_y = 40 - 1\times t = 0 \Rightarrow t = 40\,sec$.

64. Refer to answer key

65. Resultant downward force along the incline

$= mg(\sin\theta - \mu\cos\theta)$

Normal reaction $= mg\cos\theta$

Given : $mg\cos\theta = 2mg(\sin\theta - \mu\cos\theta)$

By solving $\theta = 45^o$.

66. Kinetic energy for first condition

$= \frac{1}{2}m\left(v_2^2 - v_1^2\right) = \frac{1}{2}m\left(20^2 - 10^2\right) =$ 150 mJ

68. When the distance between atoms is large then interatomic force is very weak. When they come closer, force of attraction increases and at a particular distance force becomes zero. When they are further brought closer force becomes repulsive in nature. This can be explained by slope of $U - x$ curve shown in graph (1).

69. $a = \frac{\text{Applied force} - \text{Kinetic friction}}{\text{mass}}$

$= \frac{100 - 0.5\times10\times10}{10} = 5m/s^2$

70. Work done in the motion of a body over a closed loop is zero only when the body is moving under the action of conservative forces (like gravitational or electrostatic forces). i.e. work done depends upon the nature of force.

73. We know $s = \frac{u^2}{2\mu g}$

$\therefore\ \mu = \frac{u^2}{2gs} = \frac{(6)^2}{2\times10\times9} = 0.2$

74. In a round trip work done is zero only when the force is conservative in nature.
Force is always required to move a body in a conservative or non-conservative field

75. $U = A - Bx^2 \Rightarrow F = -\frac{dU}{dx} = 2Bx \Rightarrow F \propto x$

77. $W = Fs = F\times\frac{1}{2}at^2 \quad \left[\text{from } s = ut + \frac{1}{2}at^2\right]$

$\Rightarrow W = F\left[\frac{1}{2}\left(\frac{F}{m}\right)t^2\right] = \frac{F^2t^2}{2m} = \frac{25\times(1)^2}{2\times15} = \frac{25}{30} = \frac{5}{6}$ J

78. $T = m(g + a) = 1000(9.8 + 1) = 10800\,N$

79. Work done on the body = K.E. gained by the body $FS\cos\theta = 1\,Joule$

$\Rightarrow F\cos\theta = \frac{1}{s} = \frac{1}{0.4} = 2.5N$

80. $W = \vec{F}.\vec{s} = (6\hat{i} + 2\hat{j} - 3\hat{k}).(2\hat{i} - 3\hat{j} + x\hat{k}) = 0$

$12 - 6 - 3x = 0 \Rightarrow x = 2$

81. The stopping distance, $S \propto u^2$

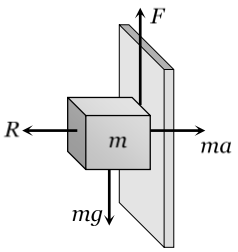
$(\because v^2 = u^2 - 2as)$

$\Rightarrow \frac{S_2}{S_1} = \left(\frac{u_2}{u_1}\right)^2 = \left(\frac{120}{60}\right)^2 = 4$

$\Rightarrow S_2 = 4\times S_1 = 4\times20 = 80\,m$

82. Work done = Area enclosed by F – x graph

83. For the limiting condition upward friction force between board and block will balance the weight of the block.]



i.e. $F > mg$

$\Rightarrow \mu(R) > mg$

$\Rightarrow \mu(ma) > mg$

$\Rightarrow \mu > \frac{g}{a}$

84. $F = ma = \frac{m(u-v)}{t} = \frac{2\times(8-0)}{4} = 4N$

85. Since downward force along the inclined plane= $mg\sin\theta = 5\times10\times\sin30° = 25N$

86. $m = \frac{F}{a} = \frac{\sqrt{6^2+8^2+10^2}}{1} = \sqrt{200} = 10\sqrt{2}\,kg$

88. $\vec{a} = \frac{\vec{F}}{m}$. If $\vec{F} = 0$ then $\vec{a} = 0$.

90. Relative velocity of parrot with respect to train $= 5-(-10) = 5+10 = 15 m/sec$

Time taken by the parrot

$= \frac{d}{v_{rel.}} = \frac{150}{15} = 10 sec.$

91. $W = \vec{F}.\vec{s} = 40\times8\times\cos60° = 160J$

92. Because horizontal velocity is same for coin and the observer. So relative horizontal displacement will be zero.

93. $U = -\int F dx = -\int kx\,dx = -k\frac{x^2}{2}$

This is the equation of parabola symmetric to U axis in negative direction

94. $\omega = \frac{d\theta}{dt} = \frac{d}{dt}(2t^3+0.5) = 6t^2$

at t =2 s, $\omega = 6\times(2)^2 = 24 rad/s$

95. $t = \sqrt{\frac{2h}{g}} = \sqrt{\frac{2\times396.9}{9.8}} \simeq 9 sec$

and $u = 720 km/hr = 200 m/s$

$\therefore R = u\times t = 200\times9 = 1800m$

96. Limiting friction between block and slab $= \mu_s m_A g = 0.6\times10\times9.8 = 58.8N$

But applied force on block A is 100 N. So the block will slip over a slab.

Now kinetic friction works between block and slab $F_k = \mu_k m_A g = 0.4\times10\times9.8 = 39.2\,N$

This kinetic friction helps to move the slab

$\therefore$ Acceleration of slab

$= \frac{39.2}{m_B} = \frac{39.2}{40} = 0.98\,m/s^2$

97. Point J $\longrightarrow$ No equilibrium

K $\longrightarrow$ Unstable equilibrium

L $\longrightarrow$ Stable equilibrium

M $\longrightarrow$ Neutral equilibrium

98. Work done = Area covered in between force displacement curve and displacement axis

= Mass $\times$ Area covered in between acceleration-displacement curve and displacement axis.

$= 10\times\frac{1}{2}(8\times10^{-2}\times20\times10^{-2}) = 8\times10^{-2}\,J$

99. Work done $= \vec{F}.\vec{s}$

$= (6\hat{i}+2\hat{j})\cdot(3\hat{i}-\hat{j}) = 6\times3-2\times1 = 18-2 = 16\,J$

100. The vertical component of velocity of projection $= -50\sin30° = -25 m/s$

If t be the time taken to reach the ground,

$h = ut+\frac{1}{2}gt^2 \Rightarrow 70 = -25t+\frac{1}{2}\times10t^2$

$\Rightarrow 70 = -25t+5t^2 \Rightarrow t^2-5t-14 = 0 \Rightarrow t = -2s$ and 7s

Since, t = – 2 s is not valid $\therefore$ t = 7 s

---- TEXT SOLUTIONS (TS) END ----

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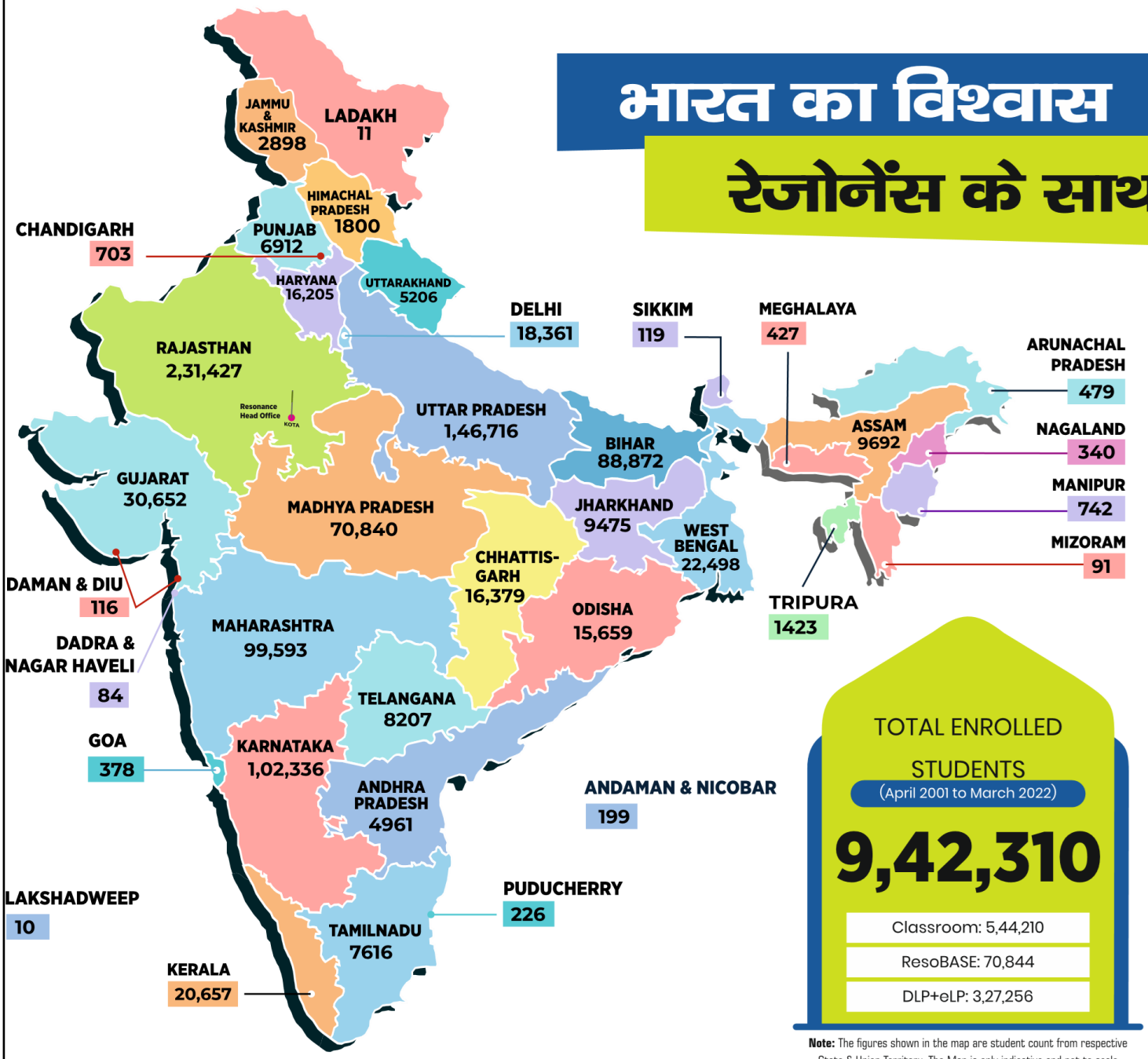
भारत का विश्वास
रेजोनेंस के साथ



TOTAL ENROLLED STUDENTS
(April 2001 to March 2022)

9,42,310

- Classroom: 5,44,210
- ResoBASE: 70,844
- DLP+eLP: 3,27,256

Note: The figures shown in the map are student count from respective State & Union Territory. The Map is only indicative and not to scale

Resonance : The Legacy of 21 Years (2001-2022) of Academic Excellence

JEE (Adv.) / IIT-JEE ▸ **50 हजार +** SELECTIONS SINCE 2002
229 AIRs in TOP-100 (Classroom + DLP)

JEE (Main) / AIEEE ▸ **2.40 लाख+** SELECTIONS SINCE 2009
136 AIRs in TOP-100 (Classroom + DLP)

NEET (UG) / AIPMT ▸ **19 हजार+** SELECTIONS SINCE 2012
19 AIRs in TOP-100 (Classroom + DLP)

NTSE SINCE 2006 ▸ **2440** Scholars

KVPY SINCE 2006 ▸ **2859** Fellowship Winners

OLYMPIADS SINCE 2006 ▸ **52** Medalists (Gold/Silver/ Bronze) in International Olympiads

CA & CS SINCE 2013 ▸ **4179** Selections — 5 Times AIR-1 in CA & CS Exams

CLAT, SET & GPTU SINCE 2014 ▸ **77** Selections — AIR-1 in GPTU