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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	XII & XIII	COURSE NAME	SAMPOORN + SAFAL	COURSE CODE	MD, MR
PHASE CODE(S)	05 MD + 01MR	TOTAL PAGES	1	BATCH CODE(S)	05 MD + 01MR

Target Examination & Year:

NEET 2025

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

DATE & DAY:
10TH September 2023 | Sunday

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

Contents:

- Weightage Sheet (WS) ✓
- Answer Key (AK) ✓
- Standard Hints (SH)
- Text Solutions (TS) ✓
- Resonance Student's Critical Analysis of Learning for Excellence (ResoSCALE)
- Student Self Assessment Sheet (SAS)
- Video Solutions (VS)

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

STUDENT'S SPACE

TEXT SOLUTIONS (TS)

PAPER

PART-A: CHEMISTRY

1. (1) 4 p (2) 4 s (3) 3 d (4) 3 p

Acc. to (n + ℓ) rule, increasing order of energy (4) < (2) < (3) < (1)

(1) 4 p (2) 4 s (3) 3 d (4) 3 p

(n + ℓ) नियम के अनुसार, ऊर्जा का बढ़ता हुआ क्रम (4) < (2) < (3) < (1)

2. According to formula, (सूत्र के अनुसार) $E = \frac{hc}{\lambda}$

$3.03 \times 10^{-19} = \frac{hc}{\lambda}$

$\lambda = \frac{6.63\times10^{-34}\times3.00\times10^{8}}{3.03\times10^{-19}}$

$= 6.56 \times 10^{-7}$ m

$= 6.56 \times 10^{-7} \times 10^{9}$ nm

$= 6.56 \times 10^{2}$ nm = 256 nm

3. Cu : $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^1$.

$\therefore$ Cu^{2+} : $1s^2 2s^2 2p^6 3s^2 3p^6 3d^9$ or $[Ar]3d^9$.

4. $r \propto \frac{p}{\sqrt{M}} \Rightarrow \frac{r_A}{r_B} = \frac{p_A}{p_B}\sqrt{\frac{M_B}{M_A}}$

5. $K.E._{O_2} = \frac{\frac{3}{2}\times\frac{N}{32}\times R\times150}{\frac{3}{2}\times\frac{N'}{32}\times R\times300} = \frac{x}{2x}$

$\Rightarrow$ $K.E._{O_2} = \frac{N\times1}{N'\times2} = \frac{1}{2}$

$\boxed{N = N'}$ Therefore, (1) option is correct.

6. 2(+2) + 2x + 7 (–2) = 0

$\therefore$ x = +5

7. $\lambda \propto \frac{n}{Z}$ $\therefore$ $\frac{n_1}{Z_1} = \frac{n_2}{Z_2}$

or $\frac{2}{3} = \frac{4}{6}$ (n = 4 of C^{5+} ion)

8. S oxidises from +2 to + 2·5 and I reduces from 0 to – 1. Hence 3rd reaction is a redox reaction.

S, +2 से + 2·5 में ऑक्सीकृत होता है तथा I, 0 से – 1 में अपचयित होता है। अतः तृतीय अभिक्रिया रेडोक्स अभिक्रिया है।

9. (1) Energy of ground state of He^+

$= -13.6 \times 2^2 = -54.4$ eV (iv)

(2) Potential energy of I orbit of H-atom

$= -27.2 \times 1^2 = -27.2$ eV (ii)

(3) Kinetic energy of II excited state of He^+

$= 13.6 \times \frac{2^2}{3^2} = 6.04$ eV (i)

(4) Ionisation potential of He^+

$= 13.6 \times 2^2 = 54.4$ V (iii)

(1) He^+ की आद्य अवस्था की ऊर्जा

$= -13.6 \times 2^2 = -54.4$ eV (iv)

(2) H-परमाणु के प्रथम कक्षा की स्थितिज ऊर्जा

$= -27.2 \times 1^2 = -27.2$ eV (ii)

(3) He^+ के II उत्तेजित अवस्था की गतिज ऊर्जा

$= 13.6 \times \frac{2^2}{3^2} = 6.04$ eV (i)

(4) He^+ का आयनन विभव

$= 13.6 \times 2^2 = 54.4$ V (iii)

10. $X^- + XO_3^- + H^+ \longrightarrow X_2 + H_2O$

V.f. = 1 V.f. = 5

$\therefore$ Molar ratio = 5 : 1

$X^- + XO_3^- + H^+ \longrightarrow X_2 + H_2O$

V.f. = 1 V.f.= 5

$\therefore$ मोलर अनुपात = 5 : 1

11. Magnetic moment = $\sqrt{n(n+2)} = \sqrt{24}$ B.M.

$\therefore$ No. of unpaired electron = 4.

X_{26} : $1s^2\ 2s^2 2p^6 3s^2 3p^6 3d^6 4s^2$.

To get 4 unpaired electrons, outermost configuration will be $3d^6$.

$\therefore$ No. of electrons lost = 2 (from $4s^2$).

$\therefore$ n = 2.

चुम्बकीय आघूर्ण = $\sqrt{n(n+2)} = \sqrt{24}$ B.M.

$\therefore$ अयुग्मित इलेक्ट्रॉन की संख्या = 4.

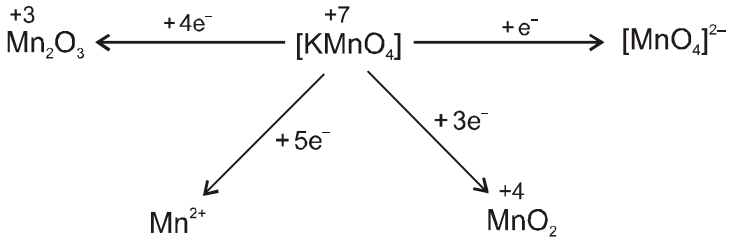
X_{26} : $1s^2\ 2s^2 2p^6 3s^2 3p^6 3d^6 4s^2$.

चार अयुग्मित इलेक्ट्रॉन प्राप्त होते है बाह्यतम कोश विन्यास $3d^6$ है।

$\therefore$ गायब हुये e^- की संख्या = 2 ($4s^2$ से).

$\therefore$ n = 2.

12.



13. For photoelectric effect to take place, $E_{light} \geq W$ $\therefore \frac{hc}{\lambda} \geq \frac{hc}{\lambda_0}$ or $\lambda \leq \lambda_0$.

प्रकाश वैद्युतीय प्रभाव घटित होता है, $E_{प्रकाश} \geq W$

$\therefore \frac{hc}{\lambda} \geq \frac{hc}{\lambda_0}$ या $\lambda \leq \lambda_0$.

14. $V = 2.188 \times 10^6 \frac{Z}{n}$ m/s

Now, $V \propto \frac{Z}{n}$ so,

$\frac{V_{Li^{2+}}}{V_H} = -\frac{Z_1/n_1}{Z_2/n_2} = \frac{3/3}{1/1} = 1$ or,

$V_{Li^{2+}} = V_H$

$V = 2.188 \times 10^6 \frac{Z}{n}$ m/s

अब, $V \propto \frac{Z}{n}$ इसलिए, $\frac{V_{Li^{2+}}}{V_H}$

$= -\frac{Z_1/n_1}{Z_2/n_2} = \frac{3/3}{1/1} = 1$ या, $V_{Li^{2+}} = V_H$

15. $C = \nu\lambda$

$\lambda = \frac{C}{\nu} = \frac{3\times10^{17}}{6\times10^{15}} = 50$ nm

16. In combined system volume of all gases is 400 ml

Before any reaction occurs

partial pressure of $O_2 = \frac{1}{4} = 0.25$ atm

partial pressure of NO = $1.5 \times \frac{3}{4} = 1.125$ atm

	$2NO(g)$	+ $O_2(g)$	$\longrightarrow$	$2NO_2(g)$
initial p	1.125	0.25		–
final p	0.625	–		0.5

$P_T = 0.625 + 0.5 = 1.125$ atm

पूर्ण संकाय में गैसों का आयतन 400 ml

अभिक्रिया के पूर्व

आंशिक दाब $O_2 = \frac{1}{4} = 0.25$ atm

आंशिक दाब NO = $1.5 \times \frac{3}{4} = 1.125$ atm

	$2NO(g)$	+ $O_2(g)$	$\longrightarrow$	$2NO_2(g)$
प्रारम्भ में p	1.125	0.25		–
अन्त में p	0.625	–		0.5

$P_T = 0.625 + 0.5 = 1.125$ atm

17. $E = E_1 + E_2$

$\frac{hc}{\lambda} = \frac{hc}{\lambda_1} + \frac{hc}{\lambda_2}$

$\frac{1}{\lambda} = \frac{1}{\lambda_1} + \frac{1}{\lambda_2}$

$\frac{1}{355} = \frac{1}{680} + \frac{1}{\lambda_2}$

$\lambda_2 = 742.76$ nm.

18. $\frac{1}{6} = \sqrt{\frac{2}{x}}$ (Where X is molecular weight of gas) (यहाँ X गैस का अणुभार है)

$\frac{1}{36} = \frac{2}{x}$

$x = 72$

19. Volume fraction = $\frac{\text{Volume of nucleus}}{\text{Total vol. of atom}}$

$= \frac{(4/3)\pi\ (10^{-13})^3}{(4/3)\pi\ (10^{-8})^3} = 10^{-15}$

आयतन प्रभाज्य = $\frac{\text{नाभिक का आयतन}}{\text{परमाणु का कुल आयतन}}$

$= \frac{(4/3)\pi\ (10^{-13})^3}{(4/3)\pi\ (10^{-8})^3} = 10^{-15}$

20. Weight of H_2 = 20 g in 100 g mixture; Weight of O_2 = 80 g

$\therefore$ Moles of $H_2 = \frac{20}{2} = 10$; $\therefore$ Moles of $O_2 = \frac{80}{32} = \frac{5}{2}$

$\therefore$ Total moles = $10 + \frac{5}{2} = \frac{25}{2}$

$\therefore$ $P'_{H_2} = P_T \times$ mole fraction of $H_2 = 1 \times \frac{10}{25/2} = 0.8$ bar

H_2 का भार = 20 ग्राम (100 ग्राम मिश्रण में) O_2 का भार = 80 g

$\therefore$ H_2 का मोल = $\frac{20}{2} = 10$;

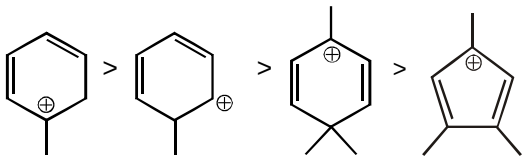
$\therefore$ O_2 के मोल = $\frac{80}{32} = \frac{5}{2}$

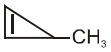
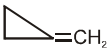
$\therefore$ कुल मोल = $10 + \frac{5}{2} = \frac{25}{2}$

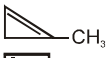
$\therefore$ $P'_{H_2} = P_T \times H_2$ का मोल भिन्न = $1 \times \frac{10}{25/2} = 0.8$ bar

21. Refer to answer key

22. Stability of carbocation (कार्बधनायन का स्थायीत्व) :



23. (1)  (2) 

(3)  (4) 

(5) 

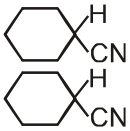
(6) $CH_3–CH=C=CH_2$

(7) $CH_2=CH–CH=CH_2$ (8) $CH_3C\equiv C–CH_3$

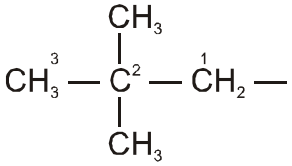
(9) $CH\equiv C–CH_2–CH_3$

24. Refer to answer key

25. Refer to answer key

26.  is a homocyclic compound.

समचक्रीय यौगिक है।

27. 

28. Stability of carbocation

29. Refer to answer key

30. Stability of carbanions α electron with drawing electronic effect

कार्बऋणायनों के स्थायित्व α इलेक्ट्रॉन ग्राही इलेक्ट्रॉनिक प्रभाव

31. IUPAC naming of functional group

32. Stability Rules

33. Calculation Number of G.I.

34. Refer to answer key

35. Stability Rules

36. Refer to answer key

37. In acidic medium $KMnO_4$ shows following reaction –

$\overset{+7}{Mn}O_4^- + 8H^+ + e^- \rightarrow Mn^{2+} + 4H_2O$

V.f. = +5

Equivalent weight = $\frac{\text{molecular wt.}}{\text{v.f.}} = \frac{M}{5}$

38. Refer to answer key

39. Equivalent wt. = $\frac{M}{2}$ I.e., valency factor = 2

$MnSO_4$ has valence factor 2 in the following reaction.

$\therefore \quad \overset{+2}{Mn}SO_4 \longrightarrow \overset{+4}{Mn}O_2$

v.f. = 2

40. For NH_3 a is high so it is most easily liquefied.

NH_3 के लिए a का मान उच्च है अतः यह अधिकतम सरलता से द्रविकृत होती है।

41. $E_{MCl_2} = E_{M^{+2}} + E_{Cl^-}$

= 32.7 + 35.5 = 68.2

$\therefore$ Molecular mass = 2 × 68.2 = 136.4

अतः अणुभार = 2 × 68.2 = 136.4

42. $4A + 2B + 3C \longrightarrow A_4B_2C_3$

Initial mole 2 1.2 1.44 0

final mole 0 0.48

C is limiting reagent.

$\therefore$ moles of $A_4B_2C_3$ is 0.48.

$4A + 2B + 3C \longrightarrow A_4B_2C_3$

प्रारम्भिक मोल 2 1.2 1.44 0

अन्तिम मोल 0 0.48

C सीमान्तकारी अभिकर्मक है।

$\therefore$ $A_4B_2C_3$ के मोल 0.48 है।

43. (P) $2e^- + 2H^+ + P_2H_4 \longrightarrow 2PH_3 \quad \times 3$

$2P_2H_4 \longrightarrow P_4H_2 + 6H^+ + 6e^-$

$5P_2H_4 \longrightarrow 6PH_3 + P_4H_2$

v.f. = $\frac{6}{5}$

$E_{P_2H_5} = \frac{5M}{6}$.

(Q) $2e^- + I_2 \longrightarrow 2I^- \quad \times 5$

$6H_2O + I_2 \longrightarrow 2IO_3^- + 10^- + 12H^+$

$6H_2O + 6I_2 \longrightarrow 2IO_3^- + 10\ I^- + 12H^+$

v.f. = $\frac{10}{6} = \frac{5}{3}$

$E_{I_2} = \frac{3M}{5}$

(R) $16H^+ + 3MnO_4^- + Be^- \longrightarrow Mn_3O_4 + 8H_2O \quad \times 2$

$4H_2O + 3Mn^{2+} \longrightarrow Mn_3O_4 + 8H^+ + 2e^- \quad \times 13$

$36H_2O + 6MnO_4^- + 39Mn^{2+} \xrightarrow{26e^-} 15Mn_3O_4 + 72H^+$

v.f. = $\frac{26}{15}$

$E_{Mn_3O_4} = \frac{15M}{26}$

(S) $4e^- + 4H^+ + H_3PO_2 \longrightarrow PH_3 + 2H_2O$

$H_2O + H_3PO_2 \longrightarrow H_3PO_3 + 2H^+ + 2e^-$ × 2

$3H_2PO_2 \xrightarrow{4e^-} PH_3 + 2H_3PO_3$

v.f. = $\frac{4}{3}$

$E_{H_3PO_2} = \frac{3M}{4}$.

44. $\frac{r_{element}}{r_{He}} = \sqrt{\frac{M_{He}}{M_{element}}}$

$\frac{1}{4} = \sqrt{\frac{4}{M_{element}}}$

$M_{element} = 64.$

$\frac{r_{तत्व}}{r_{He}} = \sqrt{\frac{M_{He}}{M_{तत्व}}}$

$\frac{1}{4} = \sqrt{\frac{4}{M_{तत्व}}}$

$M_{तत्व} = 64.$

45. $Cu^+ \longrightarrow Cu^{2+}$ (Oxidation)
$Cu^+ \longrightarrow Cu$ (Oxidation)
$Cu^+ \longrightarrow Cu^{2+}$ (ऑक्सीकरण)
$Cu^+ \longrightarrow Cu$ (ऑक्सीकरण)

46. stereoisomers

47. Hyper conjugation

48. stereoisomers

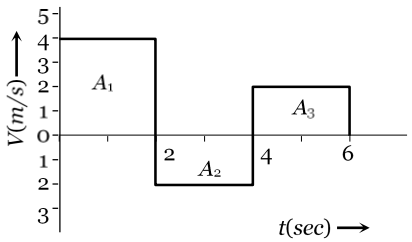
49. On the basis of electronic effect. (इलेक्ट्रॉनीक प्रभाव के आधार पर)

50. Hyper conjugation

PART-B: PHYSICS

51. $\sqrt{2^2 + 3^2 + 2\times2\times3\times\cos\theta} = 1$
By solving we get
हल करने पर $\theta = 180° \therefore \vec{A}\times\vec{B} = 0$

52. Displacement = Summation of all the area with sign
विस्थापन = सभी क्षेत्रफलों का योग (चिन्ह सहित)
$= (A_1) + (-A_2) + (A_3) = (2\times4) + (-2\times2) + (2\times2)$



$\therefore$ Displacement विस्थापन = 8 m
Distance
=Summation of all the areas without sign
दूरी = सभी क्षेत्रफलों का योग (बिना चिन्ह के)
$= |A_1| + |-A_2| + |A_3| = |8| + |-4| + |4|$
$= 8 + 4 + 4 \therefore$ Distance दूरी = 16 m.

53. Kinetic energy $E = \frac{1}{2}mv^2 \Rightarrow E \propto v^2$
graph will be parabola symmetric to E-axis.
गतिज ऊर्जा $E = \frac{1}{2}mv^2 \Rightarrow E \propto v^2$
ग्राफ E-अक्ष के सममित परवलय होगा।

54. The last number is most accurate because it has greatest significant figure (3).
अंतिम संख्या अधिक परिशुद्ध है, क्योंकि इसमें सार्थक अंकों की संख्या अधिक (3) है।

55. Standard equation of projectile motion

$y = x\tan\theta - \frac{gx^2}{2u^2\cos^2\theta}$

Comparing with given equation

$A = \tan\theta$ and $B = \frac{g}{2u^2\cos^2\theta}$

So $\frac{A}{B} = \frac{\tan\theta\times2u^2\cos^2\theta}{g} = 40$

(As $\theta = 45°, u = 20m/s, g = 10m/s^2$)

मानक समीकरण प्रक्षेप्य गति

$y = x\tan\theta - \frac{gx^2}{2u^2\cos^2\theta}$

दिए गए समीकरण से तुलना

z $A = \tan\theta$ and $B = \frac{g}{2u^2\cos^2\theta}$

So $\frac{A}{B} = \frac{\tan\theta\times2u^2\cos^2\theta}{g} = 40$

(As $\theta = 45°, u = 20m/s, g = 10m/s^2$)

56. Effective speed of the bullet
= speed of bullet + speed of police jeep

$= 180\,m/s + 45\,km/h = (180 + 12.5)\,m/s = 192.5\,m/s$

Speed of thief 's jeep
$= 153 km/h = 42.5 m/s$
Velocity of bullet w.r.t thief 's car $= 192.5 - 42.5 = 150 m/s$
गोली की प्रभावी चाल
= गोली की चाल + पुलिस जीप की चाल
$= 180\,m/s + 45\,km/h = (180 + 12.5)\,m/s = 192.5\,m/s$
चोर की जीप की चाल $= 153 km/h = 42.5 m/s$
चोर की जीप के सापेक्ष गोली की चाल $= 192.5 - 42.5 = 150 m/s$

57. $R = m(g + a) = m(g + 4g) = 5mg$

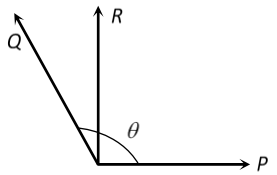
58. $v = \sqrt{2gh} = \sqrt{2 \times 9.8 \times 0.1} = \sqrt{1.96} = 1.4 m/s$

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

60. $U \propto x^2$

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

61.



$$\Rightarrow \tan 90° = \frac{Q\sin\theta}{P + Q\cos\theta} \Rightarrow P + Q\cos\theta = 0$$

$$\cos\theta = \frac{-P}{Q} \therefore \theta = \cos^{-1}\left(\frac{-P}{Q}\right)$$

62. $$v = \frac{P}{2l}\left[\frac{F}{m}\right]^{1/2} \Rightarrow v^2 = \frac{P^2}{4l^2}\left[\frac{F}{m}\right] \therefore m \propto \frac{F}{l^2 v^2}$$

$$\Rightarrow [m] = \left[\frac{MLT^{-2}}{L^2T^{-2}}\right] = [ML^{-1}T^0]$$

63. Percentage error in g = (%error in l) + 2(% error in T) = 1% + 2(2%) = 5%
g में प्रतिशत त्रुटि =(l में प्रतिशत त्रुटि)+ 2(T में प्रतिशत त्रुटि) = 1% + 2(2%) = 5%

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

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.

65. momentum acquired = Area of force-time graph $= \frac{1}{2} \times (2) \times (10) + 2 \times 10 = 10 + 40 = 30$ N-S
कण द्वारा प्राप्त संवेग = F - t ग्राफ का क्षेत्रफल
$= \frac{1}{2} \times (2) \times (10) + 2 \times 10 = 10 + 40 = 30$ N-S

66. As the mass of 10 kg has acceleration 12 m/s^2 therefore it apply 120N force on mass 20kg in a backward direction.
$\therefore$ Net forward force on 20 kg mass = 200 – 120 = 80N $\therefore$ Acceleration $= \frac{80}{20} = 4 m/s^2$.
चूँकि 10 kg द्रव्यमान का त्वरण 12 m/s^2 है, अतः यह 20kg द्रव्यमान पर पीछे की ओर 120N का बल आरोपित करेगा।
$\therefore$ 20 kg द्रव्यमान पर आगे की ओर परिणामी बल = 200 – 120 = 80N
$\therefore$ त्वरण $= \frac{80}{20} = 4 m/s^2$.

67. $\Delta\ell$ = 0.5 mm
N = 100 divisions अंश
zero correction शून्य संशोधन
= 2 divisions अंश
Reading पाठ्यांक
= Measured valueमापित मान
+ zero correction शून्य संशोधन
$= (8 \times 0.5)\ mm + (43 - 2) \times \frac{0.5}{100}$.
$= 4\ mm + 43 \times \frac{0.5}{100}\ mm$
= 4.205 mm

68. Kinetic energy for first condition प्रथम स्थिति में गतिज ऊर्जा
$= \frac{1}{2}m\left(v_2^2 - v_1^2\right) = \frac{1}{2}m\left(20^2 - 10^2\right) = 150\ mJ$
K.E. for second condition द्वितीय स्थिति में गतिज ऊर्जा $= \frac{1}{2}m\left(10^2 - 0^2\right) = 50 mJ$

$$\therefore \frac{(K.E.)_I}{(K.E.)_{II}} = \frac{150m}{50m} = 3$$

$$\frac{(\text{गतिज ऊर्जा})_I}{(\text{गतिज ऊर्जा})_{II}} = \frac{150m}{50m} = 3$$

69. 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
एक पूर्ण चक्कर लगाने में किया गया कार्य केवल तभी शून्य होता है, जबकि बल की प्रकृति संरक्षी होती है।

किसी वस्तु के संरक्षी अथवा असंरक्षी क्षेत्र में गति करने के लिए हमेशा बल की आवश्यकता होती है।

70. $a = \dfrac{\text{Applied force} - \text{Kinetic friction}}{\text{mass}}$

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

$a = \dfrac{\text{आरोपित बल} \;\; \text{गतिक घर्षण बल}}{\text{द्रव्यमान}}$

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

71. $\dfrac{\vec{A}\times\vec{B}}{\vec{A}.\vec{B}} = \dfrac{AB\sin\theta\,\hat{n}}{AB\cos\theta} = \tan\theta\,\hat{n}$

where $\hat{n}$ is unit vector perpendicular to both $\vec{A}$ and $\vec{B}$.

यहाँ $\hat{n}$, $\vec{A}$ तथा $\vec{B}$ दोनों के लम्बवत् एकांक सदिश है,

However जबकि $\dfrac{|\vec{A}\times\vec{B}|}{\vec{A}.\vec{B}} = \tan\theta$

72. $U = A - Bx^2 \Rightarrow F = -\dfrac{dU}{dx} = 2Bx \;\Rightarrow\; F \propto x$

73. For the round trip he should cross perpendicular to the river $\therefore$ Time for trip to that side $= \dfrac{2\text{km}}{4\text{km/hr}} = 0.5\text{hr}$

To come back, again he take 0.5 hr to cross the river.

Total time is 60 min, he goes to the other bank and come back at the same point.

कम से कम समय में पूरा चक्कर करने के लिये व्यक्ति को नदी को लम्बवत् पार करना होगा।

$\therefore$ उस पार जाने में लगा समय $= \dfrac{2\text{km}}{4\text{km/hr}} = 0.5\text{hr}$

वापस आने के लिये, उसे फिर से नदी पार करने में 0.5 घंटे लगेगें।

अतः व्यक्ति को नदी के उस पार जाने तथा फिर उसी बिन्दु पर लौटने में कुल 1 घण्टा अर्थात् 60 मिनट का समय लगेगा।

74. $W = Fs = F\times\dfrac{1}{2}at^2 \;\left[\text{from } s = ut + \dfrac{1}{2}at^2\right]$

$\Rightarrow$

$W = F\left[\dfrac{1}{2}\left(\dfrac{F}{m}\right)t^2\right]$

$= \dfrac{F^2t^2}{2m} = \dfrac{25\times(1)^2}{2\times15} = \dfrac{25}{30} = \dfrac{5}{6}\,\text{J}$

75. Range is given by $R = \dfrac{u^2\sin2\theta}{g}$

On moon $g_m = \dfrac{g}{6}$. Hence $R_m = 6R$

परास $R = \dfrac{u^2\sin2\theta}{g}$

चूँकि चन्द्रमा पर $g_m = \dfrac{g}{6}$, अतः $R_m = 6R$

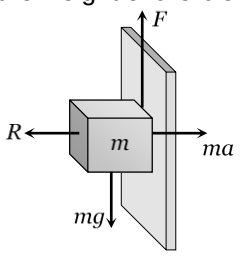
76. $N = f_c$

$\Rightarrow \quad m r\omega^2$

$\Rightarrow \quad 0.2 \times 0.2 \times (\pi/20)^2$

$\Rightarrow \quad 4\times10^{-2}\times\dfrac{\pi^2}{400} \;\Rightarrow 9.859 \times 10^{-4}\,\text{N}$

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



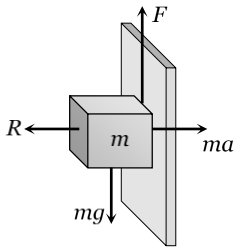
i.e. $F > mg$

$\Rightarrow \mu(R) > mg$

$\Rightarrow \mu(ma) > mg$

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

सीमान्त स्थिति में बोर्ड (पट) तथा गुटके के बीच ऊपर की ओर लगने वाला घर्षण बल गुटके के भार को संतुलित करेगा



अर्थात् $F > mg$

$\Rightarrow \mu(R) > mg$

$\Rightarrow \mu(ma) > mg$

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

78. The instantaneous acceleration of tip is given by

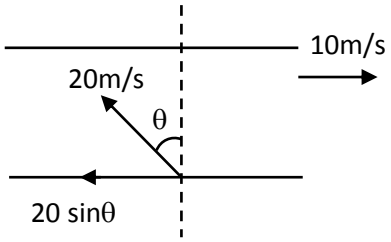
$a_c = \omega^2 R = \left(\dfrac{2\pi}{60}\right)^2 \times 0.1 = \dfrac{1}{900} \approx 10^{-3}$

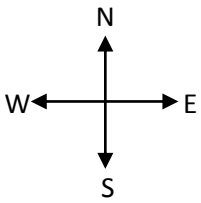
79. $a = \dfrac{v^2}{r} = v\omega \;\Rightarrow\; a' = (2v)\left(\dfrac{\omega}{2}\right) = a$ i.e. remains constant.

$a = \dfrac{v^2}{r} = v\omega \;\Rightarrow\; a' = (2v)\left(\dfrac{\omega}{2}\right) = a$ अर्थात् नियत रहेगा।

80. Refer to answer key

81.





For shortest path, velocity along river flow is zero.

$20 \sin\theta = 10 \quad \Rightarrow \sin\theta = \frac{10}{20} = \frac{1}{2}$

$\theta = 30^\circ$ West

82. Net acceleration in nonuniform circular motion,

$a = \sqrt{a_t^2 + a_c^2} = \sqrt{(2)^2 + \left(\frac{900}{500}\right)^2} = 2.7 m/s^2$

$a_t =$ tangential acceleration

$a_c =$ centripetal acceleration $= \frac{v^2}{r}$

असमान वृत्तीय गति में कुल त्वरण,

$a = \sqrt{a_t^2 + a_c^2} = \sqrt{(2)^2 + \left(\frac{900}{500}\right)^2} = 2.7 m/s^2$

$a_t =$ स्पर्श रेखीय त्वरण

$a_c =$ अभिकेन्द्रीय त्वरण $= \frac{v^2}{r}$

83. $0^2 = V^2 - 2\mu g s$

$\Rightarrow s = \frac{V^2}{2\mu g}$.

84. $\omega^2 = \omega_0^2 - 2\alpha\theta \Rightarrow 0 = 4\pi^2 n^2 - 2\alpha\theta$

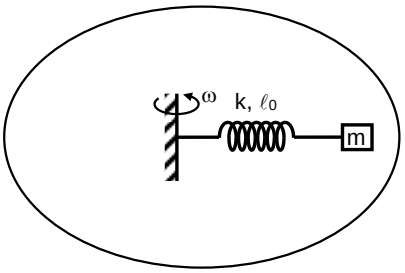
$\theta = \frac{4\pi^2\left(\frac{1200}{60}\right)^2}{2 \times 4} = 200\pi^2$ rad

$\therefore 2\pi n = 200\pi^2 \Rightarrow n = 100\pi = 314$ चक्कर

85. $a = \frac{mg - 2\mu mg}{3m}$

$a = \frac{g - 2\mu mg}{3} = g\left(\frac{1 - 2\mu}{3}\right)$

86. $m\omega^2(\ell_0 + x) = kx$



$\left(\frac{\ell_0}{x} + 1\right) = \frac{k}{m\omega^2}$

$x = \frac{\ell_0 m\omega^2}{k - m\omega^2}$

$k >> m\omega^2$

So, $\frac{x}{\ell_0}$ is equal to $\frac{m\omega^2}{k}$.

अतः $\frac{x}{\ell_0}$, $\frac{m\omega^2}{k}$ के बराबर है

87. From the principle of dimensional homogenity $[v] = [at] \Rightarrow [a] = [LT^{-2}]$. Similarly $[b] = [L]$ and $[c] = [T]$

विमीय ऐक्यता के सिद्धान्त से $[v] = [at] \Rightarrow [a] = [LT^{-2}]$

इसी प्रकार $[b] = [L]$ तथा $[c] = [T]$

88. Instantaneous velocity of rising mass after t sec will be $v_t = \sqrt{v_x^2 + v_y^2}$

where $v_x = v\cos\theta =$ Horizontal component of velocity

$v_y = v\sin\theta - gt =$ Vertical component of velocity

$v_t = \sqrt{(v\cos\theta)^2 + (v\sin\theta - gt)^2}$

$v_t = \sqrt{v^2 + g^2t^2 - 2v\sin\theta gt}$

t सैकण्ड पश्चात् द्रव्यमान का तात्क्षणिक वेग होगा

$v_t = \sqrt{v_x^2 + v_y^2}$

जहाँ $v_x = v\cos\theta =$ वेग का क्षैतिज घटक

$v_y = v\sin\theta - gt =$ वेग का ऊर्ध्वाधर घटक

$v_t = \sqrt{(v\cos\theta)^2 + (v\sin\theta - gt)^2}$

$v_t = \sqrt{v^2 + g^2t^2 - 2v\sin\theta gt}$

89. $a = ?$

$\mu = 0.05$

$2g - \mu \times 10g = 12a$

$a = \frac{10(2 - 0.05 \times 10)}{12}$

$= \frac{20-5}{12} = \frac{15}{12}$

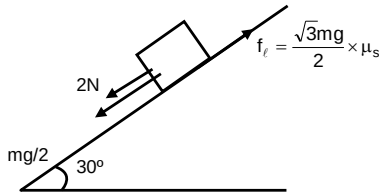
$= \frac{5}{4} = 1.25$

90. $T = \frac{mv^2}{r} \Rightarrow 25 = \frac{0.25 \times v^2}{1.96} \Rightarrow v = 14 m/s$

91. $T = \frac{2 \times m_B m_C}{m_A + m_B + m_C} \times g = \frac{2 \times 2 \times 5}{3+2+5} \times g$

$= \frac{20}{10} g = 2g$

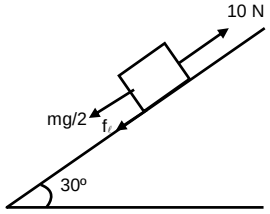
92. For just equilibrium साम्यवास्था के लिए:



$2 = \frac{\sqrt{3}mg}{2}\mu_s - \frac{mg}{2}$ .....(1)

In the other case दुसरी स्थिति में :

$\frac{\sqrt{3}mg}{2}\mu_s + \frac{mg}{2} = 10$ .....(2)



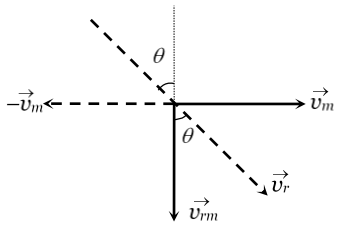
equation (1) / equation (2)
समीकरण (1) / समीरकण (2)

$\frac{1}{5} = \frac{\sqrt{3}\mu_s - 1}{\sqrt{3}\mu_s + 1}$

$\mu_s = \frac{\sqrt{3}}{2}$

93. $T_2 = (m_1 + m_2) \times \frac{T_3}{m_1 + m_2 + m_3} = \frac{(10+6) \times 40}{20} = 32 N$

94. A man is sitting in a bus and travelling from west to east, and the rain drops are appears falling vertically down.



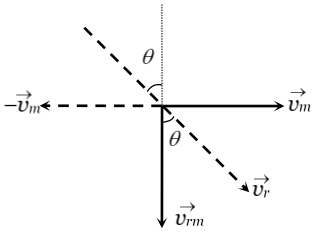
v_m = velocity of man

v_r = Actual velocity of rain which is falling at an angle θ with vertical

v_{rm} = velocity of rain w.r.t. to moving man

If the another man observe the rain then he will find that actually rain falling with velocity v_r at an angle going from west to east.

व्यक्ति बस में बैठा है जो कि पश्चिम से पूर्व की तरफ जा रही है तब उसे पानी की बूँदें ऊर्ध्वाधरतः गिरती हुयी प्रतीत हो रहीं है।



v_m = मनुष्य का वेग

v_r = पानी की बूँदों का वास्तविक वेग जो कि ऊर्ध्वाधर से θ कोण पर गिर रही हैं

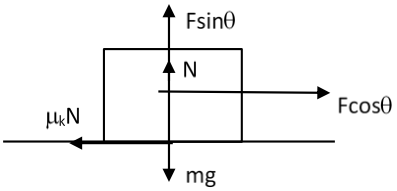
v_{rm} = पानी की बूँदों का गतिमान मनुष्य के सापेक्ष वेग

यदि कोई दूसरा व्यक्ति वर्षा की बूँदों को देखता है तो वह पाता है कि वास्तव में पानी की बूँदें v_r वेग से पश्चिम से पूर्व की तरफ बनने वाले कोण पर गिर रही हैं।

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

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

96.



N + Fsinθ = mg

a =

$\frac{F\cos\theta - \mu_k N}{m} = \frac{F\cos\theta - \mu_k(mg - F\sin\theta)}{m}$

$= \frac{F(\cos\theta + \mu_k \sin\theta) - \mu_k mg}{m}$

97. Tension in the string $T_0 = mR\omega_0^2$

In the second

case $T = m(2R)(4\omega_0^2) = 8mR\omega_0^2 = 8T_0$

डोरी में तनाव $T_0 = mR\omega_0^2$

दूसरी स्थिति में $T = m(2R)(4\omega_0^2) = 8mR\omega_0^2 = 8T_0$

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

किया गया कार्य = F – x ग्राफ से घिरा क्षेत्रफल

$= \frac{1}{2} \times (3+6) \times 3 = 13.5 \text{ J}$

99. 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 $\theta = 45^o$.

नत तल के अनुदिश नीचे की ओर परिणामी बल

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

अभिलम्ब प्रतिक्रिया $= mg\cos\theta$

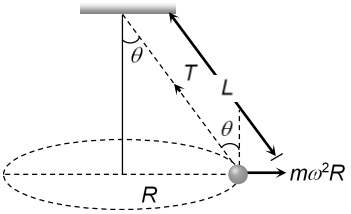
दिया है : $mg\cos\theta = 2mg(\sin\theta - \mu\cos\theta)$

हल करने पर $\theta = 45^o$

100. $T\sin\theta = M\omega^2 R$ …(i)

$T\sin\theta = M\omega^2 L\sin\theta$ …(ii)

From (i) and (ii)



$T = M\omega^2 L$

$= M4\pi^2 n^2 L$

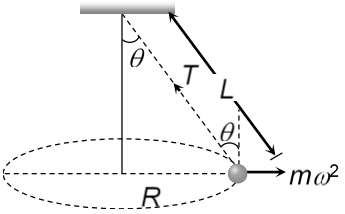
$= M4\pi^2\left(\frac{2}{\pi}\right)^2 L$

$= 16ML$

$T\sin\theta = M\omega^2 R$ …(i)

$T\sin\theta = M\omega^2 L\sin\theta$ …(ii)

समीकरण (i) तथा (ii) से



$T = M\omega^2 L$

$= M4\pi^2 n^2 L$

$= M4\pi^2\left(\frac{2}{\pi}\right)^2 L$

$= 16ML$

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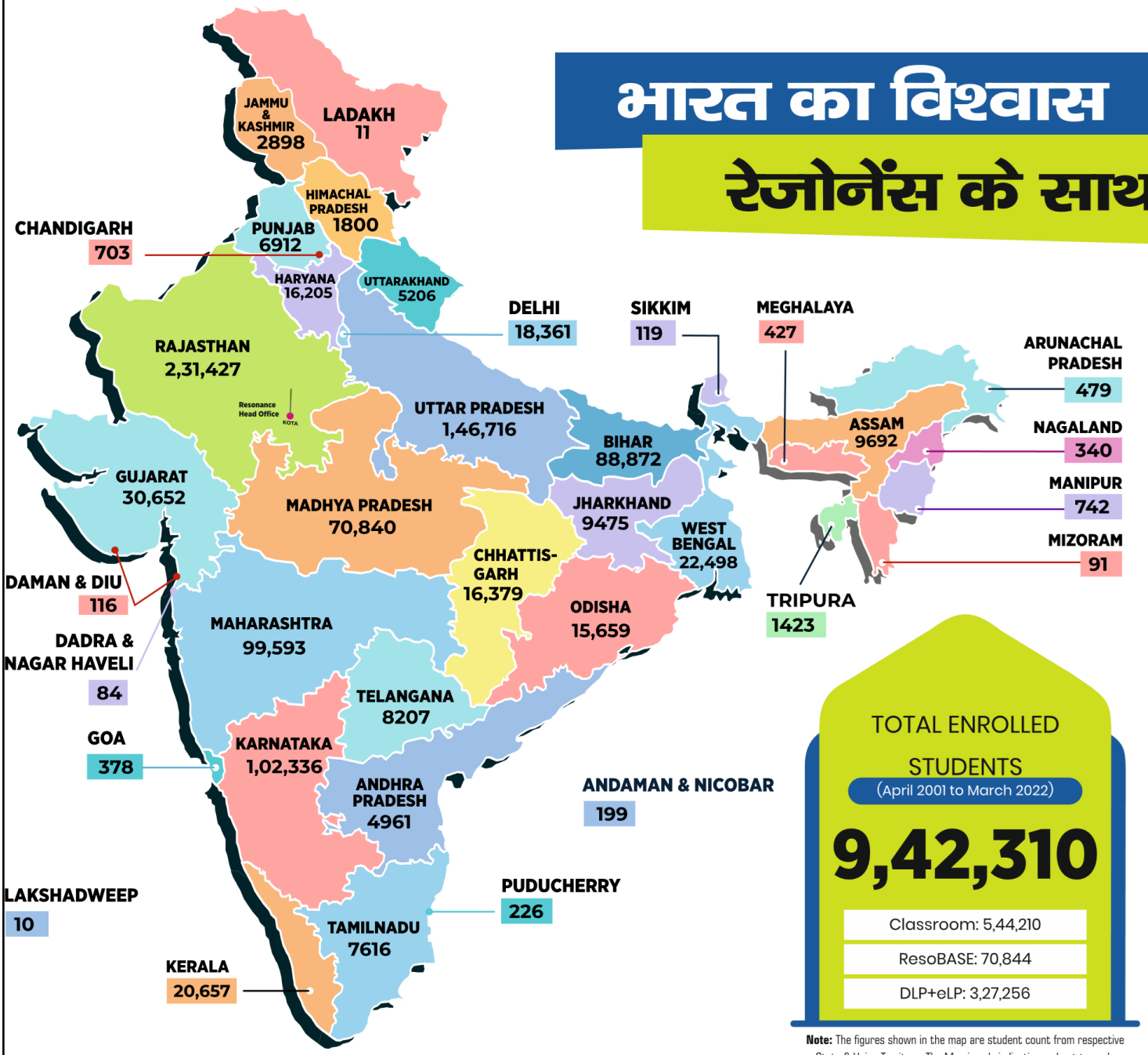
भारत का विश्वास
रेजोनेंस के साथ



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