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DIVISION: JEE (MAIN+ADVANCED)
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	VIKAAS	COURSE CODE	JA
PHASE CODE(S)	02JA	TOTAL PAGES	1	BATCH CODE(S)	02JA

Target Examination & Year:

JEE (MAIN + ADVANCED) 2025

TEST PATTERN	TEST TYPE	TEST CODE & SEQUENCE
JEE (MAIN)	CUMULATIVE TEST (CT)	MCT 01

DATE & DAY:
20th August 2023 | Sunday

Duration & Time:
3 Hrs | 11:30 AM to 02:30 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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ANSWER KEY (AK)

PAPER											
PART-A: PHYSICS	Q.No.	1	2	3	4	5	6	7	8	9	10
	Ans.	2	2	4	2	4	1	1	2	2	1
	Q.No.	11	12	13	14	15	16	17	18	19	20
	Ans.	1	3	2	1	2	1	3	3	2	4
	Q.No.	21	22	23	24	25	26	27	28	29	30
	Ans.	0005	0008	0045	0003	0029	0006	0008	0045	0010	0004
PART-B: CHEMISTRY	Q.No.	31	32	33	34	35	36	37	38	39	40
	Ans.	3	3	4	3	1	2	3	2	1	4
	Q.No.	41	42	43	44	45	46	47	48	49	50
	Ans.	3	3	3	2	3	4	4	3	2	3
	Q.No.	51	52	53	54	55	56	57	58	59	60
	Ans.	0002	0006	0002	0003	0001	0060	0007	0011	0005	0002
PART-C: MATHS	Q.No.	61	62	63	64	65	66	67	68	69	70
	Ans.	2	4	2	2	4	2	4	3	1	4
	Q.No.	71	72	73	74	75	76	77	78	79	80
	Ans.	3	1	3	4	4	3	2	3	2	1
	Q.No.	81	82	83	84	85	86	87	88	89	90
	Ans.	0001	0000	0001	0016	0002	0000	0002	0001	0064	0018

STUDENT'S SPACE

TEXT SOLUTIONS (TS)

PAPER

PART-A: PHYSICS

1. $\int (e^{x^2})xdx$

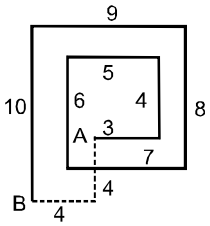
$x^2 = t$

$2x\,dx = dt$

$xdx = \frac{dt}{2}$

$\int e^t \frac{dt}{2} = \frac{e^t}{2} = \frac{e^{x^2}}{2} + c$

2.



AB = $\sqrt{4^2 + 4^2} = 4\sqrt{2}$.

3. All of the above

सभी सही है।

4. $\int \frac{\sin x}{\cos^2 x} dx = \int \left(\frac{1}{\cos x} . \frac{\sin x}{\cos x} \right) dx$

$= \int (\sec x . \tan x) dx = \sec x + c$

5. All of these

उपरोक्त सभी

6. Component of $\vec{A}$ along $\vec{B}$ is

$\vec{B}$ के अनुदिश का $\vec{A}$ घटक है।

$= A\cos\theta = A\frac{\vec{A}.\vec{B}}{|\vec{A}|+|\vec{B}|} = \frac{\vec{A}.\vec{B}}{B}$

$= \frac{(3\hat{i} + 4\hat{j})\ (\hat{i}+\hat{j})}{(\hat{i}+\hat{j})} = \frac{3+4}{\sqrt{1^2 + 1^2}} = \frac{7}{\sqrt{2}}$

7. $y = mx + c$

$y = (-\tan 37^\circ)\, x + 10$

$y = -\frac{3}{4} x + 10 \Rightarrow 3x + 4y = 40$

8. $4x - 3y + 6 = 0$

$3y = 4x + 6$

$y = \frac{4}{3}x + 2$

$y = mx + c$

$m = \frac{4}{3}$, $c = 2$

$\tan\theta = \frac{4}{3} \Rightarrow \theta = 53^\circ$

9. $y = x^2 \sin x^3$

$\int y dx = \int x^2 \sin x^3 dx$

Let माना $u = x^3 \Rightarrow du = 3x^2\,dx$

$\int \frac{\sin x \ \ dx}{3} = \frac{1}{3}(-\cos x) + C$

$= -\frac{1}{3}\cos x^3 + C$

10. Since $\vec{B} = 3\vec{A}$, so both are parallel.

चूंकि $\vec{B} = 3\vec{A}$, अतः दोंनो सदिश समान्तर है।

11. $\frac{dy}{dt} = \frac{d\ell nt}{dt} = \frac{1}{t}$, $\frac{dx}{dt} = \frac{d(t^{-2})}{dt} = \frac{-2}{t^3}$

$\frac{dx}{dy} = \frac{-2}{t^2}$ at $t = 1 \Rightarrow \frac{dx}{dy} = -2$

12. $\cos 300^\circ = \cos(360^\circ - 60^\circ) = \frac{1}{2}$

$\sin (240^\circ) = \frac{-\sqrt{3}}{2}$

$\tan 135^\circ = -1$

13. $\vec{A} = 3\hat{i} - 4\hat{j}$, $\hat{A} = \frac{3\hat{i}}{5} - \frac{4\hat{j}}{5}$, vector of magnitude 10 along $\vec{A}$ is $10\ \hat{A}$

$= 10\left(\frac{3\hat{i}}{5} - \frac{4\hat{j}}{5}\right) = 6\hat{i} - 8\hat{j}$

$\vec{A} = 3\hat{i} - 4\hat{j}$, $\hat{A} = \frac{3\hat{i}}{5} - \frac{4\hat{j}}{5}$,

सदिश $\vec{A}$ की दिशा में 10 परिमाण का सदिश है।

$10\ \hat{A} = 10\left(\frac{3\hat{i}}{5} - \frac{4\hat{j}}{5}\right) = 6\hat{i} - 8\hat{j}$

14. $\frac{d\left(6e^{x^2-4x}\right)}{dx} = 6(2x-4)\ e^{x^2-4x}$

$= 6(2\times 2-4)\ e^{4-8} = 0$

15. $\int\left(x^3-\frac{1}{x}\right)dx \Rightarrow \frac{x^4}{4} - \ln x + c$

16. $\frac{-\sin\sqrt{x}}{4\sqrt{x}\cos\sqrt{x}}$

17. $\frac{dy}{dx}$ is the slope of y = f(x) graph.

at C, slope of the Tangent is negative

y = f(x) के ग्राफ की बिन्दु C पर प्रवणता $\frac{dy}{dx}$ है।

ये ऋणात्मक है

18. $\int x^{-3/2}dx$

$= \frac{x^{-\frac{3}{2}+1}}{\frac{-3}{2}+1} + C$

$= \frac{-2}{\sqrt{x}} + C$

19. $\int_0^{\pi/2} \frac{(2\sin\theta.\cos\theta)d\theta}{2}$

$= \int_0^{\frac{\pi}{2}} \frac{\sin 2\theta}{2}d\theta = -\frac{\cos 2\theta}{4}\Big]_0^{\pi/2}$

$= \frac{-[\cos 2\times\pi/2 - \cos 0°]}{4}$

$= \frac{-[-1-1]}{4} = \frac{1}{2}$

20. $y = \sqrt{3x}+4$

y = mx + c

$\therefore$ m = $\sqrt{3} \rightarrow$ positive

c = 4 $\rightarrow$ positive

$\therefore$ graph '4' is correct

21. f(x) = 3 sinx + 4 cos x

f′(x) = 3 cosx – 4 sin x = 0

tanx = $\Rightarrow$ x = 37º

f′′(x) = –3 sinx – 4 cosx

f′′(x) < 0 for x = 37º

$\Rightarrow$ x = 37º is point of maxima

अधिकतम होगा

Maximum value of f(x) = 3 sin37º + 4 cos37º = $3\times\frac{3}{5} + 4\times\frac{4}{5} = 5$

फलन का अधिकतम मान f(x) = 3 sin37º + 4 cos37º = $3\times\frac{3}{5} + 4\times\frac{4}{5} = 5$

22. $\int_{-1}^{1}\left(3x^2-6x^5+3\right)dx$

$\Rightarrow \frac{3x^3}{3} - \frac{6x^6}{6} + 3x\ \Big]_{-1}^{1}$

$= x^3 - x^6 + 3x$

$= [(1-1+3)-(-1-1-3)] =$ **8 Ans.**

23. $\vec{A} = \hat{i}+\hat{j}$

$\vec{B} = \hat{i}$

$\cos\theta = \frac{\vec{A}.\vec{B}}{|\vec{A}||\vec{B}|} = \frac{1+0}{\sqrt{2}}$

$\theta = 45°$

24.

$\begin{vmatrix}\hat{i} & \hat{j} & \hat{k}\\ 2 & 1 & 0\\ 1 & -1 & 0\end{vmatrix} = \hat{k}(-2-1)$

$= -3\hat{k}$

$|\vec{A}\times\vec{B}| = 3$

25. $\frac{dy}{dx} = 3x^2+6x-9 = 0$

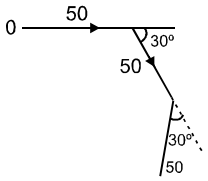
$x^2 + 2x - 3 = 0 \Rightarrow (x+3)(x-1) = 0$

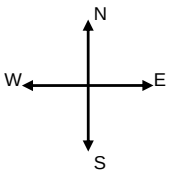
x = –3, x = 1

f(–3) = 29, f(1) = –3

(maximum) (minimum)

26.





No. of vectors added = $\frac{360^o}{30^o} = 12$

जोड़े गये सदिशों की संख्या = $\frac{360^o}{30^o} = 12$

Each of length 50m

प्रत्येक की लम्बाई 50m है।

Total length कुल लम्बाई = 50 × 12 = 600 m.

27. $a = 3t^2$

$\int_0^v dv = 3\int_0^2 t^2 dt$

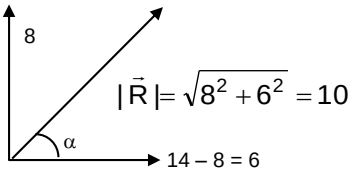
v = 8 m/s.

28. $\int_0^9 ydx$ = area under

y = f(x) from x = 0 to x = 9

$\int_0^9 ydx$ = Area = $\frac{1}{2} \times 6 \times 20 - \frac{1}{2} \times (9-6) \times 10 = 45$ Ans

29.



30. $g(2) = \frac{1}{2-1} = 1$

$f(g(2)) \Rightarrow f(1) = 2+1+1 = 4$

PART-B: CHEMISTRY

31. Moles of O^{2-} = $\frac{8}{16} = \frac{1}{2}$ mole

Number of O^{2-} ions = $\frac{1}{2} \times N_A$

Total Charge on O^{2-}

= $\frac{1}{2} \times N_A \times 2e = N_A e$.

हल. O^{2-} के मोल = $\frac{8}{16} = \frac{1}{2}$ मोल

O^{2-} आयनों की संख्या = $\frac{1}{2} \times N_A$

O^{2-} पर कुल आवेश = $\frac{1}{2} \times N_A \times 2e = N_A e$

32. (ii) 1 pascal < 1 torr < 1 cm of Hg < 1 bar < 1 atm (1 पास्कल < 1 टॉर < Hg का 1 cm < 1 बार < 1 वायुमंडल)

(iv) 10^6 J = 1 MJ = 10^3 KJ.

33. (1) Mole of CO_2 = 2

∴ Mass of CO_2 = 2 × 44 = 88 g

(2) Number of moles of CH_3COOH

= 1.2044×10^{24}

∴ Mass of CH_3COOH

= $\left(\frac{1.2044 \times 10^{24}}{N_A}\right) \times 60 = 120$ g

(3) Moles of NH_2CONH_2 = 3

∴ Mass of NH_2CONH_2

= 3 × 60 = 180 g.

(4) 80 g of $CaCO_3$

Clearly, (4) option has least mass.

हल. (1) CO_2 के मोल = 2

∴ CO_2 का द्रव्यमान = 2 × 44 = 88 g

(2) CH_3COOH के मोलों की संख्या

= 1.2044×10^{24}

∴ CH_3COOH का द्रव्यमान

= $\left(\frac{1.2044 \times 10^{24}}{N_A}\right) \times 60 = 120$ g

(3) NH_2CONH_2 के मोल = 3

∴ NH_2CONH_2 का द्रव्यमान

= 3 × 60 = 180 g.

(4) 80 g $CaCO_3$

स्पष्टतः, (4) विकल्प में द्रव्यमान सबसे कम है।

34. For both SO_2 & O_3, Atomicity

= total number of atoms in 1 molecule = 3.

हल. SO_2 & O_3 दोनों के लिए परमाणुकता

= 1 अणु में परमाणुओं की कुल संख्या = 3.

35. [∵ Molecular weight of $CuSO_4.5H_2O$
= 63.5 + 32 + 64 + 90 = 249.5]
6×10^{23} molecules has weight = 249.5 g
1×10^{22} molecules has weight
$= \frac{249.5 \times 1 \times 10^{22}}{6 \times 10^{23}} = 41.58 \times 10^{-1}$
$= 4.158 \approx 4.1$ g.

हल. [∵ $CuSO_4.5H_2O$ का अणुभार
= 63.5 + 32 + 64 + 90 = 249.5]
6×10^{23} अणुओं का भार = 249.5 g
1×10^{22} अणुओं का भार $= \frac{249.5 \times 1 \times 10^{22}}{6 \times 10^{23}}$
$= 41.58 \times 10^{-1} = 4.158 \approx 4.1$ g.

36. For a photon, (एक फोटोन के लिए)
$E = \frac{hc}{\lambda} = h\nu = hc\bar{\nu}$

37. $34 = M_x + 2 \quad \Rightarrow \quad M_x = 32$ g/mol
$\Rightarrow M_{XO3} = 32 + 3 \times 16 = 32 + 48 = 80$ g/mol.

38. $r_0 = \frac{4KZe^2}{M_0 v_0^2}$ and तथा $\frac{r_0}{2} = \frac{4KZe^2}{M_0 v'^2}$
$\Rightarrow \quad r_0 v_0^2 = \frac{r_0}{2} v'^2$
$\Rightarrow \quad v' = \sqrt{2} v_0$

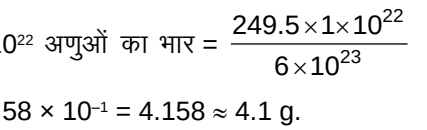
39. Volume fraction = $\frac{\text{Volume of nucleus}}{\text{Total vol. of atom}}$
$= \frac{(4/3)\pi (10^{-13})^3}{(4/3)\pi (10^{-8})^3} = 10^{-15}$

हल. आयतन प्रभाज्य = $\frac{\text{नाभिक का आयतन}}{\text{परमाणु का कुल आयतन}}$
$= \frac{(4/3)\pi (10^{-13})^3}{(4/3)\pi (10^{-8})^3} = 10^{-15}$

40. For photoelectric effect to take place,
$E_{light} \geq W \quad \therefore \quad \frac{h}{\lambda} \geq \frac{hc}{\lambda_0}$ or $\lambda \leq \lambda_0$.
Here $\frac{hc}{\lambda_0} = \frac{2hc}{\lambda_1} \Rightarrow \lambda_0 = \frac{\lambda_1}{2}$

हल. प्रकाश वैद्युतीय प्रभाव घटित होने के लिये,
$E_{light} \geq W \quad \therefore \quad \frac{h}{\lambda} \geq \frac{hc}{\lambda_0}$ or $\lambda \leq \lambda_0$.
जहाँ पर $\frac{hc}{\lambda_0} = \frac{2hc}{\lambda_1} \Rightarrow \lambda_0 = \frac{\lambda_1}{2}$

41. (3) 1-Chloro-3-(dichloromethyl)-5-(trichloromethyl)cyclohexane
(3) 1-क्लोरो-3-(डाईक्लोरोमेथिल)-5-(ट्राईक्लोरोमेथिल)साइक्लोहेक्सेन

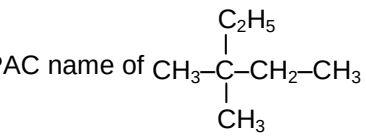
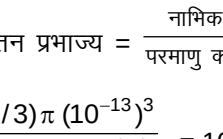
42.

2–Fluorohex–2–en–4–yne
2–फ्लोरोहेक्स–2–ईन–4–आईन

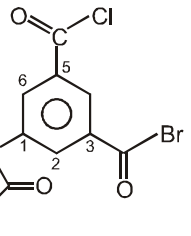
43. (3) 3-Chloro-5-hydroxybenzenecarbonyl chloride.
(3) 3-क्लोरो-5-हाइड्रोक्सीबेन्जीनकार्बोनिल क्लोराइड

44. (2) 3-Mercapto-2-methylpent-4-enoic acid
(2) 3-मरकेप्टो-2-मेथिल पेन्ट-4-इनोइक अम्ल

45. (3) Dimethyl amine
(3) डाईमेथिल एमीन

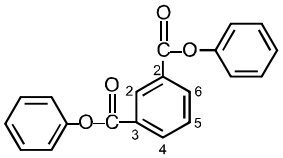
46. (4) Ester (एस्टर)

47. Correct IUPAC name of 
is 3,3-Dimethylpentane.
 का सही IUPAC नाम
3,3-डाईमेथिलपेन्टेन है।

48. 

(3–Bromocarbonyl–5–chlorocarbonyl)phenyl ethanoate.
(3–ब्रोमोकार्बोनिल–5–क्लोरोकार्बोनिल)फेनिल एथेनोएट

49. (2) N, N-Diethyl-2,3-diethylpentanamide
(2) N, N-डाइएथिल-2,3-डाइएथिलपेन्टेनामाइड

50. 

(Diphenylbenzene-1,3-dicarboxylate)
(डाइफेनिलबेन्जीन-1,3-डाइकार्बोक्सिलेट)

51. Moles of $D_2O = \frac{4}{20} = \frac{1}{5}$

No. of neutrons in D = 1 and in oxygen = 8
So, total no. of neutrons in 1 mole D_2O = 10 N_A

Now, in $\frac{1}{5}$ moles D_2O, no. of neutrons = 10

$N_A \times \frac{1}{5} = 2\ N_A$

D_2O के मोल = $\frac{4}{20} = \frac{1}{5}$

D में न्यूट्रॉनों की संख्या = 1 तथा ऑक्सीजन में न्यूट्रॉनों की संख्या = 8
अतः, 1 मोल D_2O में कुल न्यूट्रॉनों की संख्या = 10 N_A

अब, $\frac{1}{5}$ मोल D_2O में न्यूट्रॉनों की संख्या

= 10 $N_A \times \frac{1}{5} = 2\ N_A$

52. N_2, CN^-, Si, CO, O_2^{2+}, C_2^{2-}
(all 6 contain 14 electrons)
N_2, CN^-, Si, CO, O_2^{2+}, C_2^{2-}
(सभी 6, 14 इलैक्ट्रॉन रखते हैं।)

53. $\frac{(e/m)_p}{(e/m)_\alpha} = \frac{e/m}{2e/4m} = \frac{2}{1} = \frac{x}{y}$
So, ratio (अतः, अनुपात) = 2

54. $3.6 = 1.2 \times (A)^{1/3}$
$\Rightarrow 3 = (A)^{1/3}$
$\Rightarrow 27 = A$
$\Rightarrow$ Ans. $\frac{27}{9} = 3$.

55. Let the power be x watts.
No. of photons emitted per second × Energy of 1 photon = Total energy

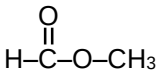
$\therefore 3.125 \times 10^{18} \times \frac{12400}{6200} = \frac{x}{1.6 \times 10^{-19}}$

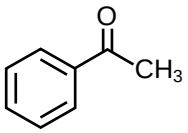
$\therefore x = 1$

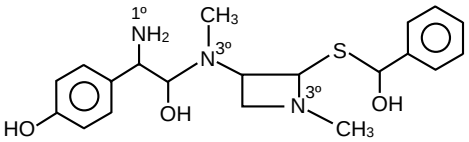
हल. माना कि शक्ति x वॉट है।
प्रति सेकण्ड उत्सर्जित होने वाले फोटोनों की संख्या × 1 फोटोन की ऊर्जा = कुल ऊर्जा

$\therefore 3.125 \times 10^{18} \times \frac{12400}{6200} = \frac{x}{1.6 \times 10^{-19}}$

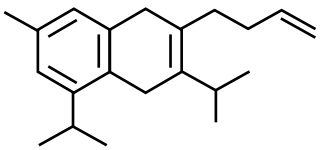
$\therefore x = 1$

56. Methyl format मेथिल फॉर्मेट 

57. 

58. 

x = 2
y = 9
x + y = 11

59. 

60. i & ii
have four DU and general formula is C_nH_{2n-6}.

हल. i & ii
यौगिकों के लिए DU चार है व सामान्य सूत्र C_nH_{2n-6} है।

PART-C: MATHEMATICS

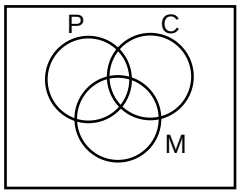
61. $x = 2 + i$
$(x - 2)^2 = i^2 \Rightarrow x^2 - 4x + 5 = 0$
Now अब $x^3 - 5x^2 + 9x + 2$
$= (x - 1)(x^2 - 4x + 5) + 7 = 0 + 7 = 7$

62. $5x^3 - 2x^2 + 3x + 1 = (x - 2)(x + 1)$
$Q(x) + Ax + B$
$x = -1$
$-9 = -A + B$

$x = 2$
$39 = 2A + B$
$\Rightarrow A = 16, B = 7$

63. $n(P) = \left[\frac{40}{3}\right] = 13$

$n(C) = \left[\frac{40}{5}\right] = 8$



$n(M) = \left[\frac{40}{2}\right] = 20$

$n(P \cup C \cup M) = n(P) + n(C) + n(M) - n(P \cap C) - n(C \cap M) - n(M \cap P) + n(P \cap M \cap C)$
$= 13 + 8 + 20 - 2 - 4 - 6 + 1$
$= 30$
so required number of student $= 40 - 30 = 10$
अतः आवश्यक विद्यार्थियों की संख्या $= 40 - 30 = 10$

64. Domain प्रान्त (i) $2^{2x} - 1 > 0 \Rightarrow 2^{2x} > 1$
$\Rightarrow x > 0$ .....(1)
(ii) $2^x + 1 > 0 \Rightarrow x \in R$ .....(2)
(1) $\cap$ (2) $x \in (0, \infty)$

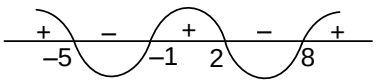
$$\left(\frac{1}{2}\right)^{\log_3(2^{2x}-1)} > \left(\frac{1}{2}\right)^{\log_3(2^x+1)}$$

$\Rightarrow \log_3(2^{2x} - 1) < \log_3(2^x + 1)$
$\Rightarrow 2^{2x} - 1 < 2^x + 1$
$\Rightarrow (2^x)^2 - (2^x) - 2 < 0$
$\Rightarrow (2^x + 1)(2^x - 2) < 0 \Rightarrow 2^x - 2 < 0$
$\Rightarrow 2^x < 2 \Rightarrow x < 1$ .....(3)
(3) $\cap$ domain प्रान्त $x \in (0, 1)$

65. Use $\ell n\, x^n = n \ell n\, x$ and $\log_{(a^b)} c = \frac{1}{b}\log_a c$

66. $x + 1 = \frac{1}{x + (x+1)} \Rightarrow (x + 1)(2x + 1) = 1$
$\Rightarrow 2x^2 + 3x + 1 = 1$
$\Rightarrow x = 0, -\frac{3}{2}$

67.



since चूकि $x \in (-5, -1] \cup [2, 8)$
integral पूर्णांक $x \in \{-4, -3, -2, -1, 2, 3, 4, 5, 6, 7\}$

68. Let माना $2^x = t$

$$\Rightarrow \frac{2}{2-t} - \frac{1}{t-1} < 0 \quad \Rightarrow \frac{3t-4}{(t-2)(t-1)} > 0$$

$\Rightarrow 1 < t < \frac{4}{3}$ or या $t > 2 \quad \Rightarrow 1 < 2^x < \frac{4}{3}$ or
$2^x > 2 \quad \Rightarrow x \in (0, \log_2 4/3) \cup (1, \infty)$

69. $\log_x 2 \cdot \log_{2x} 2 = \log_{4x} 2$
$\log_2 4x = \log_2 x \cdot \log_2 2x$
$\Rightarrow 2 + \log_2 x = \log_2 x (1 + \log_2 x)$
$\Rightarrow \log_2 x = \pm \sqrt{2}$
$x = 2^{\pm\sqrt{2}}$

70. $5x + 2 < 3x + 8$
$\Rightarrow 2x < 6$
$\Rightarrow x < 3$ ...(i)
$\frac{x+2}{x-1} < 4 \quad \Rightarrow \quad \frac{x+2}{x-1} - 4 < 0$
$\Rightarrow \frac{-3x+6}{x-1} < 0 \Rightarrow \frac{x-2}{x-1} > 0$
$\Rightarrow x \in (-\infty, 1) \cup (2, \infty)$ ...(ii)
Taking intersection of (i) and (ii)
(i) $\cap$ (ii) से $x \in (-\infty, 1) \cup (2, 3)$

71. Let A and B are joint sets, draw their venn diagram
Let $A = \{1, 2, 3, 4\}$,
$B = \{3, 4, 5, 6\}$
$\therefore B - A = \{5, 6\}$
$\therefore A - B = \{1, 2\}$
Now $A \cap B \cap A - B = \phi$, $A \cap B \cap B - A = \phi$
and $A - B \cap B - A = \phi$
$\therefore A \cap B$, A–B,B–A are pair wise disjoint set.

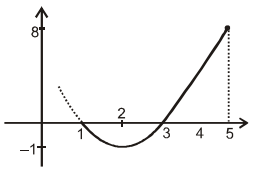
72. Using componed – dividend
योगान्तरानुपात का उपयोग करने पर

$$\frac{x^2 - x}{1} = \frac{3x^2}{x+4}$$

$\Rightarrow x(x - 1)(x + 4) = 3x^2$
$\Rightarrow x[x^2 - 4] = 0$
$\Rightarrow x = 0, -2, 2$

73. $5 < x < 6$ or $-5 > x > -6$

74.



75. as चूंकि $D > 0$, $c < 0$, $a < 0$, As roots are negative so $b > 0$

76. Clearly roots are स्पष्टतया मूल $= -\alpha, -\beta$
Now अब $\alpha^2 + \alpha + 1 = 0 \Rightarrow \alpha + 1 = -\frac{1}{\alpha}$

$$\Rightarrow -\alpha = \frac{1}{\alpha + 1}$$

77. y-co-ordinate of vertex = $13 - p^2 = 4$

शीर्ष का y-निर्देशांक $= 13 - p^2 = 4$

$p^2 = 13 - 4$

$p = \pm 3$

78. $N = \log_6(3 \times 2^2) + \log_6 2 \times \log_3 2 = 1 + \log_6 2 + \log_6 2 \times \log_3 2$

$N = 1 + \log_3 2 = \log_3 6$

$x^3 - (x^2 + x)\log_3 2 - (1 + \log_3 2) = 0$

$\Rightarrow (x^3 - 1) - (x^2 + x + 1)(\log_3 2) = 0$

$x - 1 - \log_3 2 = 0$

79. Check $x = 1$, $x = -1 \Rightarrow (1)(-1)\, r = -\dfrac{(a-b)}{(b-c)}$

$\Rightarrow r = \dfrac{a-b}{b-c}$

80. $A \cap B = \{3, 4, 10\}$

$A \cap C = \{4\}$

$(A \cap B) \cup (A \cap C) = \{3, 4, 10\}$

81. $x^{3\log_{10} x - \frac{1}{\log_{10} x}} = \sqrt[3]{10}$ taking log with base 10 both the sides

$x^{3\log_{10} x - \frac{1}{\log_{10} x}} = \sqrt[3]{10}$ दोनों पक्षो का आधार 10 पर log लेने पर

$\left(3\log_{10} x - \dfrac{1}{\log_{10} x}\right) \log_{10} x = \dfrac{1}{3}$

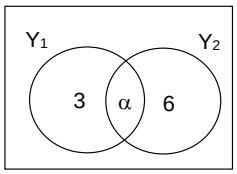
$\left(3t - \dfrac{1}{t}\right) t = \dfrac{1}{3}$ {where जहाँ $\log_{10} x = t$}

$3t^2 = \dfrac{4}{3} \quad \Rightarrow \quad t = \pm \dfrac{2}{3}$

$\log_{10} x = \dfrac{2}{3}$ or या $\log_{10} x = -\dfrac{2}{3}$

$x = 10^{2/3}$ orया$x = 10^{-2/3}$

82. $n(X_1 \cup X_2) = 6 + 6 - 3 = 9$



$3 + \alpha + 6 = 9$

$\alpha = 0$

83. Taking $\log_b$ on both sides

दोनों तरफ लघुगणक लेने पर

$(\log_a b)^x \log_b a = (\log_b a)^x$

$\Rightarrow (\log_b a)^{-x} = (\log_b a)^{x-1}$

$\Rightarrow x - 1 = -x \Rightarrow x = \dfrac{1}{2}$

84. $n(P(A)) = 2^4 = 16$.

85. $x^3 - 2x + 1 = (x^2 - x - 1)(x + 1) + 2$

if $x^2 - x - 1 = 0$,

then $x^3 - 2x + 1 = 2$

हल. $x^3 - 2x + 1 = (x^2 - x - 1)(x + 1) + 2$

यदि $x^2 - x - 1 = 0$ हो,

तो $x^3 - 2x + 1 = 2$

86. Since sum of roots = 2011

(चूंकि मूलों का योग = 2011)

Which is odd and both roots are prime (जो एक विषम है तथा दोनों मूल अभाज्य है।)

$\therefore$ One root must be even and other root must be odd

($\therefore$ एक मूल सम होगा और अन्य मूल विषम होगा।)

even prime is only 2 (सम अभाज्य केवल 2 है।)

other root is 2009 which is not a prime number (एक मूल 2009 है जो अभाज्य नहीं है।)

Hence no value of k possible here. (अतः k का कोई मान संभव नहीं है।)

87. $x^3 + 1 - 9 = (x-5)^2 - 3^2$

$x^3 - 2^3 = (x - 5 - 3)(x - 5 + 3)$

$x = 2$ or $x^2 + x + 12 = 0$

88. 1^{st} term $= \log_{210} a$,

2^{nd} term $= (\log_b 210)^{-1} = \log_{210} b$,

3^{rd} term $= \dfrac{1}{\log_c 420 - \log_c 2} = \log_{210} c$, 4^{th} term $= \dfrac{1}{\log_d 15 + \log_a 14} = \log_{210} d$

89. $N = \dfrac{1}{2-1}(2^{64} - 1) + 1 = 2^{64}$

90. $a = \log_3 16$ given

$= a^{2\log_{a^3} 3} \times 5^{\frac{1}{2}\log_5 4} = 19 \times 2 = 18$

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

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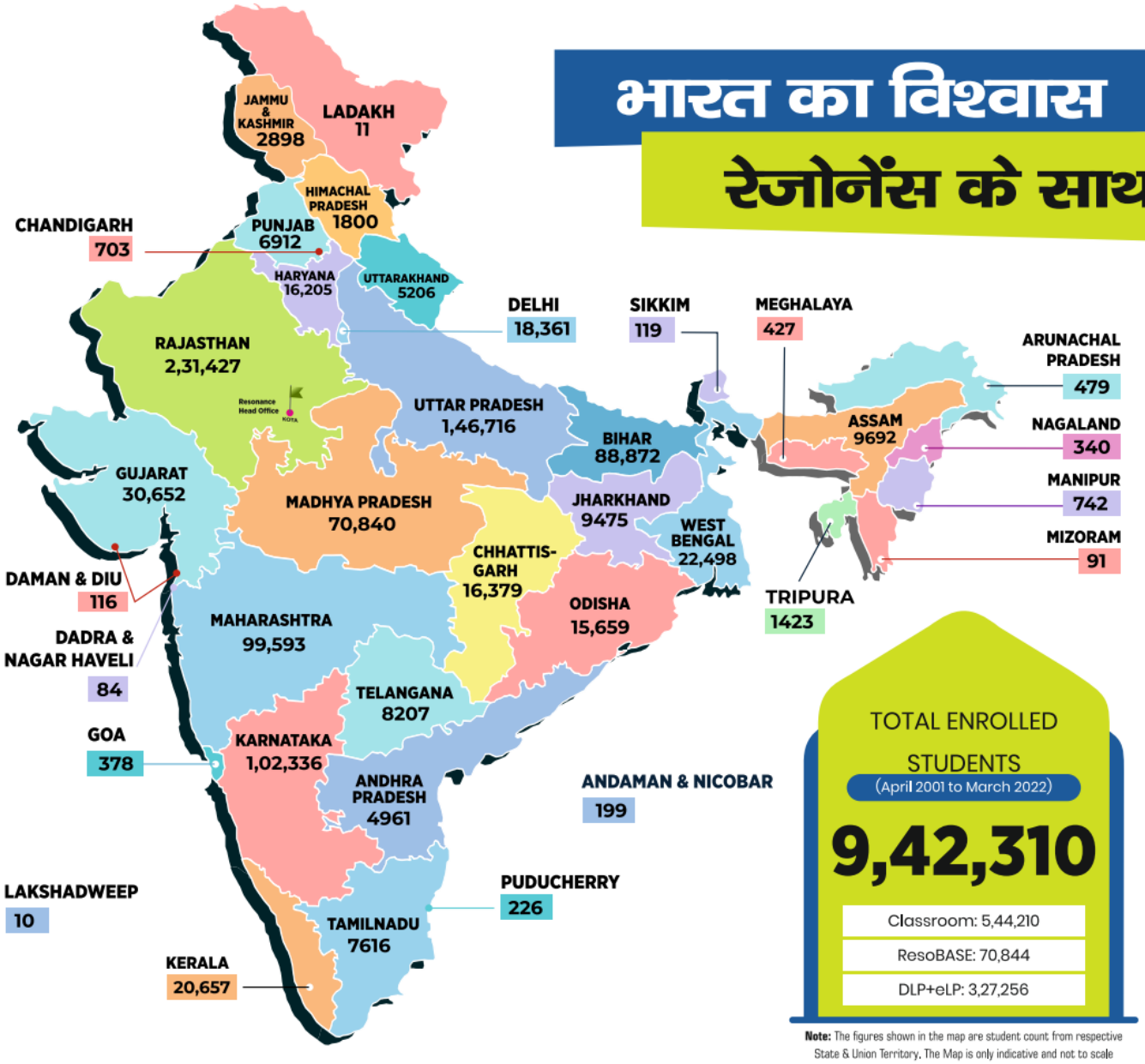
रेजोनेंस के साथ



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