

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)	01JA	TOTAL PAGES	1	BATCH CODE(S)	01JA

## Target Examination & Year:

JEE (MAIN + ADVANCED) 2025

TEST PATTERN	TEST TYPE	TEST CODE & SEQUENCE
JEE (MAIN)	CUMULATIVE TEST (CT)	MCT 03



**DATE & DAY:**

17<sup>th</sup> December 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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**PAT : TOPIC-WISE WEIGHTAGE SHEET (WS)**

	P-1	Total		P-1	Total
Total Qs	90	90	Subject wise Qs.	30	30
Max. Marks	300	300	Subject wise Marks	100	100

Physics								
S.No.	Topic Name	Question Type & Sequencing				Total Qs. (Topic-wise)	Total Marks (Topic-wise)	% Weightage (Topic-wise)
		MCQ		NVQ				
		No. of Qs.	Qs. Sequencing	No. of Qs.	Qs. Sequencing			
	<b>Class-11</b>	<b>20</b>		<b>10</b>		<b>30</b>	<b>120</b>	<b>100.00%</b>
1	Friction	7	1,2,3,10,13,14,17	4	23,24,29,30	11	44	36.67%
2	Work, Power & Energy	5	4,7,15,16,18	1	26	6	24	20.00%
3	Projectile Motion	2	5,12	1	21	3	12	10.00%
4	System of Particles, Centre of Mass, Momentum and Collision	4	6,8,11,19	3	22,25,27	7	28	23.33%
5	Newton's laws of Motion	2	9,20	–	–	2	8	6.67%
6	Rotation (Rigid Body Dynamics)	–	–	1	28	1	4	3.33%
	<b>Total</b>	<b>20</b>		<b>10</b>		<b>30</b>	<b>120</b>	<b>100%</b>

**PAT : TOPIC-WISE WEIGHTAGE SHEET (WS)**

Chemistry								
S.No.	Topic Name	Question Type & Sequencing				Total Qs. (Topic-wise)	Total Marks (Topic-wise)	% Weightage (Topic-wise)
		MCQ		NVQ				
		No. of Qs.	Qs. Sequencing	No. of Qs.	Qs. Sequencing			
<b>Physical Chemistry</b>								
	<b>Class-11</b>	<b>10</b>		<b>5</b>		<b>15</b>	<b>60</b>	<b>50.00%</b>
1	Gaseous State	4	31,35,36,40	3	51,52,55	7	28	23.33%
2	Chemical Equilibrium	3	32,33,34	2	53,54	5	20	16.67%
3	Mole concept	1	37	–	–	1	4	3.33%
4	Atomic Structure	2	38,39	–	–	2	8	6.67%
<b>Inorganic Chemistry</b>								
	<b>Class-11</b>	<b>10</b>		<b>5</b>		<b>15</b>	<b>60</b>	<b>50.00%</b>
5	Periodic Table Periodicity	2	41,42	1	56	3	12	10.00%
6	Chemical Bonding	8	43,44,45,46,47,48,49,50	4	57,58,59,60	12	48	40.00%
	<b>Total</b>	<b>20</b>		<b>10</b>		<b>30</b>	<b>120</b>	<b>100%</b>

**PAT : TOPIC-WISE WEIGHTAGE SHEET (WS)**

Maths								
S.No.	Topic Name	Question Type & Sequencing				Total Qs. (Topic-wise)	Total Marks (Topic-wise)	% Weightage (Topic-wise)
		MCQ		NVQ				
		No. of Qs.	Qs. Sequencing	No. of Qs.	Qs. Sequencing			
	<b>Class-11</b>	<b>20</b>		<b>10</b>		<b>30</b>	<b>120</b>	<b>100.00%</b>
1	Permutation and Combination	5	61,63,64,76,77	5	81,82,83,84,85	10	40	33.33%
2	Quadratic Equation	2	62,75	–	–	2	8	6.67%
3	Basics	1	65	2	89,90	3	12	10.00%
4	Binomial Theorem	5	66,67,68,70,79	3	86,87,88	8	32	26.67%
5	Sequence and Series	3	69,78,80	–	–	3	12	10.00%
6	Trigonometry	4	71,72,73,74	–	–	4	16	13.33%
	<b>Total</b>	<b>20</b>		<b>10</b>		<b>30</b>	<b>120</b>	<b>100%</b>

# ANSWER KEY (AK)

PAPER											
<b>PART-A: PHYSICS</b>	Q.No.	1	2	3	4	5	6	7	8	9	10
	Ans.	4	4	3	2	4	4	1	4	2	2
	Q.No.	11	12	13	14	15	16	17	18	19	20
	Ans.	4	2	3	4	3	3	1	3	3	3
	Q.No.	21	22	23	24	25	26	27	28	29	30
	Ans.	0003	0003	0002	0030	0010	0006	0002	0016	0006	0005
<b>PART-B: CHEMISTRY</b>	Q.No.	31	32	33	34	35	36	37	38	39	40
	Ans.	2	3	3	3	4	3	3	2	4	4
	Q.No.	41	42	43	44	45	46	47	48	49	50
	Ans.	1	3	1	3	3	2	3	2	3	4
	Q.No.	51	52	53	54	55	56	57	58	59	60
	Ans.	0063	0003	0005	0004	0003	0003	0006	0004	0007	0013
<b>PART-C: MATHS</b>	Q.No.	61	62	63	64	65	66	67	68	69	70
	Ans.	1	1	3	1	4	4	3	2	3	2
	Q.No.	71	72	73	74	75	76	77	78	79	80
	Ans.	1	3	2	4	4	3	3	2	3	4
	Q.No.	81	82	83	84	85	86	87	88	89	90
	Ans.	0144	0189	0003	2025	0002	0000	1024	0001	0166	0625

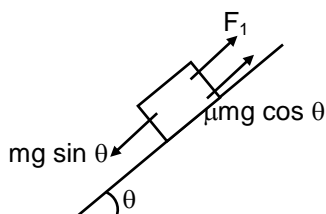
**STUDENT'S SPACE**

# TEXT SOLUTIONS (TS)

## PAPER

### PART-A: PHYSICS

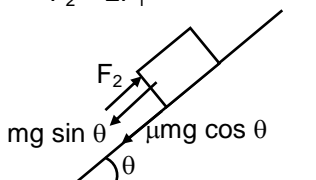
1. Force required to just prevent the body from sliding down the plane is  
 नत तल पर वस्तु को ठीक फिसलने से रोकने के लिए आवश्यक बल



$$F_1 = mg \sin \theta - \mu mg \cos \theta$$

$$F_2 = mg \sin \theta + \mu mg \cos \theta$$

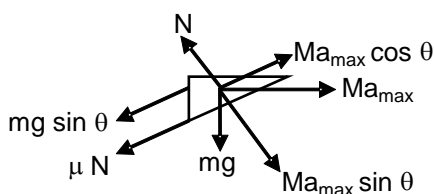
$F_2 =$  force required to just move up the inclined plane  
 $F_2 =$  नत तल पर ऊपर की तरफ वस्तु की ठीक गति के लिए आवश्यक बल  
 $\therefore F_2 = 2F_1$



$$mg \sin \theta + \mu mg \cos \theta = mg \sin \theta - \mu mg \cos \theta$$

On solving we get (हल करने पर)  
 $\theta = \tan^{-1}(3\mu)$

2. net work done by the friction is zero  
 घर्षण बल द्वारा कुल किया गया कार्य शून्य होगा।
3. F.B.D. of block in the frame of wedge (in case of  $a_{\max}$ )  
 वेज के निर्देश तंत्र में ब्लॉक का F.B.D. ( $a_{\max}$  की स्थिति के लिए)



$$N = mg \cos \theta + ma_{\max} \sin \theta$$

$$Ma_{\max} \cos \theta = mg \sin \theta + \mu N$$

Solving हल करने पर

$$a_{\max} = \frac{\tan \theta + \mu}{1 - \mu \tan \theta} = 3 \quad \therefore \frac{a_{\max}}{a_{\min}} = 9$$

Similarly, इसी प्रकार

$$a_{\min} = \frac{\tan \theta - \mu}{1 + \mu \tan \theta} = \frac{1}{3}$$

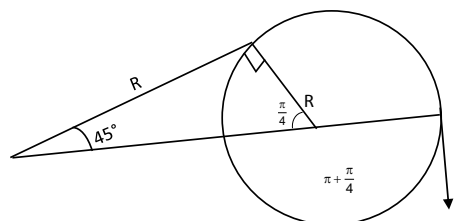
4.  $T = \frac{2 \times 6 \times 3}{6 + 3} g = 40N$

$$a = \frac{6g - 3g}{6 + 3} = \frac{30}{9} = \frac{10}{3}$$

$$S = 0 + \frac{1}{2} \frac{10}{3} 3^2 = 15 \text{ m}$$

$$W_T = -40 \times 15 = -600 \text{ J}$$

5. Projectile  
 प्रक्षेप्य



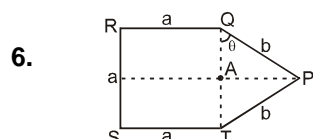
$$\left(\pi + \frac{\pi}{4}\right)R = vt \quad \dots\dots\dots (1)$$

$$R = \frac{v^2 2 \sin \alpha \cos \alpha}{g} \quad \dots\dots\dots (2)$$

$$t = \frac{2v \sin \alpha}{g} \quad \dots\dots\dots (3)$$

On solving 1, 2, 3 we get  
 समीकरण 1, 2, 3 को हल करने पर

$$\cos \alpha = \frac{4}{5\pi}$$



If centre of mass is at A  
 द्रव्यमान केन्द्र A पर है।

$$a^2 \sigma \frac{a}{2} = \sigma \frac{1}{2} ab \sin \theta \frac{1}{3} b \sin \theta$$

$$\text{or } \frac{b}{a} = \sqrt{\frac{13}{4}}$$

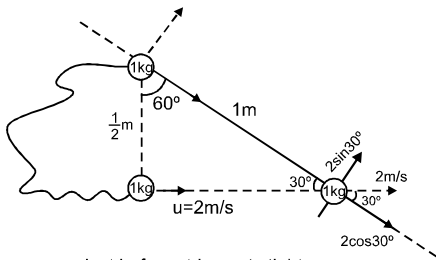
7.  $\int_{(1,2,3)}^{(3,6,1)} (2x\hat{i} + 2\hat{j} + 3z^2\hat{k}) \cdot (dx\hat{i} + dy\hat{j} + dz\hat{k})$

$$W = \left[ x^2 + 2y + z^3 \right]_{(1,2,3)}^{(3,6,1)}$$

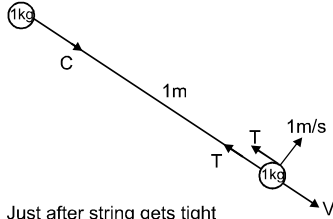
$$= (9 + 12 + 1) - (1 + 4 + 27)$$

$$= 22 - 32 = -10 \text{ J}$$

8.



Just before string gets tight  
(डोरी के ठीक खींच जाने के पहले)

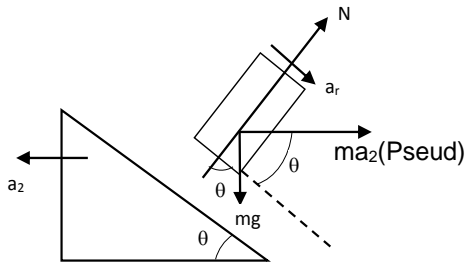


Just after string gets tight  
(डोरी के ठीक खींच जाने के पश्चात्)

$$2T = \frac{mv_{\perp}^2}{l} = \frac{1 \times 1^2}{1} = 1 \text{ N.}$$

$$T = 0.5 \text{ N}$$

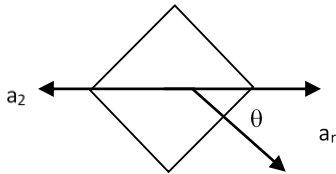
9.



$$N + ma_2 \sin \theta = mg \cos \theta$$

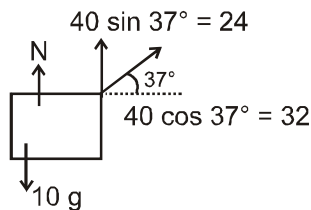
$$N = mg \cos \theta - ma_2 \sin \theta < mg \cos \theta$$

$$a_r = a_2 \cos \theta + g \sin \theta$$



$$a = \sqrt{a_2^2 + a_r^2} - 2a_2 a_r \cos \theta > g \sin \theta$$

10.



$$N + 24 - 100 = 0 \text{ for vertical direction}$$

$$N + 24 - 100 = 0 \text{ लम्बवत् दिशा में}$$

$$\therefore N = 76 \text{ N}$$

$$\text{Now } 0 \leq f_s \leq \mu_s N$$

$$0 \leq f_s \leq 76 \times 0.5$$

$$0 \leq f_s \leq 38 \text{ N}$$

$$\therefore 32 < 38 \text{ Hence } f = 32$$

$\therefore$  acceleration of block is zero.

$\therefore$  ब्लॉक का त्वरण शून्य है।

11. Velocity of centre of mass

द्रव्यमान केन्द्र का वेग

$$V_{cm} = \frac{10 \times 6 + 4 \times (-10)}{10} = \frac{20}{10}$$

$$= 2 \text{ m/s (RHS)}$$

In frame of centre of mass

द्रव्यमान केन्द्र के सन्दर्भ में

$$P_{sym \text{ cm}} = \frac{6 \times 8 + 4 \times (-12)}{10} = 0$$

In ground frame of reference,

पृथ्वी के सन्दर्भ में

For A,  $V_{max} = 14 \text{ m/s}$ ,  $V_{min} = 10 \text{ m/s}$

For B,  $V_{max} = 10 \text{ m/s}$ ,  $V_{min} = 0 \text{ m/s}$

12.  $y = x \tan \theta - \frac{gx^2}{2u^2 \cos^2 \theta}$  ..... (i)

For maxima उच्चिष्ठ के लिए,  $\frac{dy}{d\theta} = 0$  gives

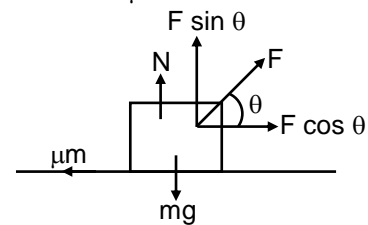
देता है  $\tan \theta = \frac{u^2}{gx}$  ..... (ii)

Put (ii) in (i)

(ii) को (i) में रखने पर

$$y_{max} = \frac{u^4 - g^2 x^2}{2gu^2}$$

13.  $F \cos \theta - \mu N = 0$



$$F \cos \theta = \mu N \text{ .....(1)}$$

$$N = mg - F \sin \theta \text{ .....(2)}$$

From (1) & (2) ((1) तथा (2) से)

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

$$K = \frac{\mu mg}{\cos \theta + \mu \sin \theta}$$

$$F_{min} = \frac{\mu mg}{\sqrt{1 + \mu^2}} (\because y = A \sin \theta + B \cos \theta)$$

$$y_{max} = \sqrt{A^2 + B^2}$$

$$F_{min} = \frac{0.75 \times 10 \times 10}{\sqrt{1 + (0.75)^2}}$$

$$F_{min} = 60 \text{ N}$$

14. Net force कुल बल  $\vec{F} - mg\hat{j} = m(a_0\hat{j} - 2a_0\hat{i})$

$$\vec{F} = m(+a_0\hat{j} - 2a_0\hat{i})$$

$$\Rightarrow \vec{F} = m\sqrt{g^2 + \left(\frac{3g}{2}\right)^2} = \frac{\sqrt{13}}{2} mg$$

15. Work energy theorem.

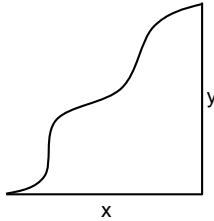
कार्य ऊर्जा प्रमेय

$$mg \cdot 3h - \frac{1}{2} k_A (2h)^2 - \frac{1}{2} k_B h^2 = 0 - 0$$

Put रखने पर  $k_A = \frac{mg}{2h}$

$$k_B = \frac{4mg}{h}$$

- 16.

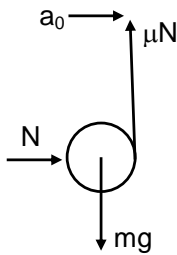


$$W_F + W_{\text{friction}} + W_{mg} = 0$$

$$W_F - \mu mgx - mgy = 0$$

$$W_F = \mu mgx + mgy$$

- 17.



From force diagram of bead.

मोती का FBD

$$N = ma_0 = 4m$$

$$mg - \mu N = ma$$

or या  $mg - \frac{1}{2} 4m = ma$

or या  $10m - 2m = ma \Rightarrow a = 8 \text{ ms}^{-2}$

$$L = \frac{1}{2} at^2 \text{ or } 1 = \frac{1}{2} \times 8 \times t^2 \text{ or } t^2 = \frac{1}{4}$$

$$\therefore t = \frac{1}{2} \text{ s}$$

18.  $W = \Delta KE = \frac{1}{2} m(20)^2 - \frac{1}{2} m(20)^2 = 0$

19.  $\int dp = p_f - p_i = \int F dt = \text{Area under the curve.}$

$$p_i = 0$$

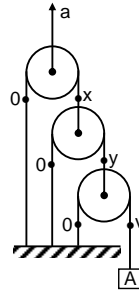
$$\text{Net Area} = 16 - 2 - 1 = 13 \text{ N-s}$$

$$= V_f = \frac{13}{2} = 6.5 \text{ m/s}$$

[As momentum is positive, particle is moving along positive x axis.]

[जब संवेग धनात्मक होगा तो कण धनात्मक x दिशा की बढ़ेगा.]

20.  $a = \frac{0+x}{2}$



$$x = 2a(\uparrow)$$

$$x = \frac{0+y}{2}$$

$$y = 2x = 2(2a)$$

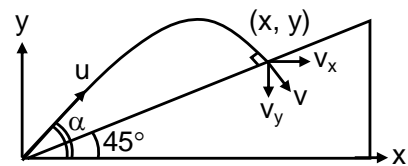
$$y = 4a(\uparrow)$$

$$y = \frac{0+v}{2}$$

$$v = 2y = 2(4a)$$

$$v = 8a \text{ (upward ऊर्ध्वधर ऊपर)}$$

21.  $y = x \quad u \sin \alpha - \frac{1}{2} gt^2 = u \cos \alpha t$



$$\Rightarrow 2u(\sin \alpha - \cos \alpha) = gt$$

$$\dots(1)$$

$$v_y = -v_x$$

$$u \sin \alpha - gt = -u \cos \alpha \dots(2)$$

$$2u(\cos \alpha - \sin \alpha) = u(\sin \alpha - \cos \alpha)$$

$$1 \sin \alpha = 3 \cos \alpha \Rightarrow \tan \alpha = 3$$

$$\alpha = \tan^{-1}(3) \Rightarrow p = 3$$

22. By conservation of linear momentum (Consider man and plank as system) संवेग संरक्षण से (आदमी तथा तख्ते को निकाय मानिए)

$$mv + mv = m(-v) + mv'$$

(v' is the final speed of plank)

(v' तख्ते की अन्तिम चाल है)

$$v' = 3v$$

23.  $a_{\text{common}} = \frac{12}{6} = 2$

Let static friction is f then

$$12 - f = 2(2)$$

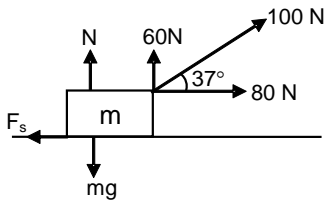
$$f = 8$$

$$f_{\text{limiting}} = 10$$

so the friction is static and  $a = 2$



24. Spring force = tension in string = 100 N in equilibrium F.B.D. of A  
साम्यावस्था में A के F.B.D द्वारा, स्प्रिंग बल = रस्सी में तनाव = 100 N



$$N = mg - 60$$

$$F_s = 80 \leq \mu N$$

$$80 \leq \frac{1}{2}(mg - 60)$$

$$mg \geq 220$$

$$M \geq 22$$

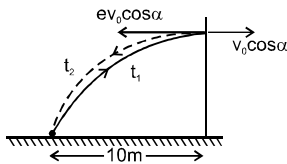
25. Centre of mass are  $r_{cm} = \frac{h}{4} = \frac{40}{4} = 10 \text{ cm}$

द्रव्यमान केन्द्र  $r_{cm} = \frac{h}{4} = \frac{40}{4} = 10 \text{ cm}$

26. at  $t = 0 \Rightarrow x = 0$   
 $t = 0$  पर  $\Rightarrow x = 0$   
 $t = 2 \Rightarrow x = -2$

$\therefore$  displacement विस्थापन  $\vec{s} = -2\hat{i}$   
 $\therefore$  work done किया गया कार्य  $= \vec{F} \cdot \vec{s} = 6\text{J}$

27.



$t_1 + t_2 = \text{time of flight उड़डयन काल}$

$$\frac{10}{v_0 \cos \alpha} + \frac{10}{e v_0 \cos \alpha} = \frac{2v_0 \sin \alpha}{g}$$

$\therefore \frac{1}{e} = 2.$

28. The angular displacement in the first 10 seconds is given by  
प्रथम 10 सैकण्ड में कोणीय विस्थापन

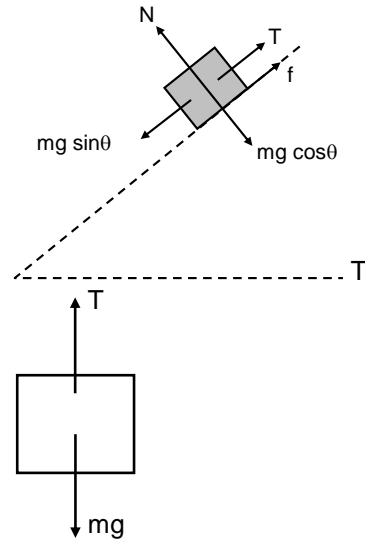
$$\theta = \omega_0 t + \frac{1}{2} \alpha t^2 = \frac{1}{2} (2.0 \text{ rad/s}^2) (10 \text{ s})^2 = 100 \text{ rad.}$$

As the wheel turns by  $2\pi$  radian in each revolution, the number of revolutions in 10 s in

चूंकि प्रत्येक चक्कर में पहिया  $2\pi$  रेडियन से घूमता है इसलिये 10s में चक्करों की संख्या

$$n = \frac{100}{2\pi} = 16.$$

29.



$$F = Mg \sin \theta - T$$

$$T = Mg$$

$$\Rightarrow f = Mg \sin \theta - mg$$

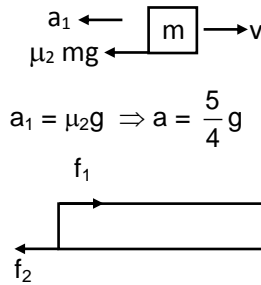
$$f_{\text{static}} < \mu_s N$$

$$Mg \sin \theta - mg < \mu_s (mg \cos \theta)$$

$$m > 6$$

$$m_{\text{min}} = 6 \text{ kg}$$

30.



$$a_1 = \mu_2 g \Rightarrow a = \frac{5}{4} g$$

$$(f_2)_{\text{max}} = \frac{2}{11} \times 11 mg = 2 mg > f_1$$

It will not slide.

$$v^2 > 2as \Rightarrow v^2 > 2 \times \frac{5}{4} g \times 1$$

$$\Rightarrow v > 5 \text{ m/s}$$

## PART-B: CHEMISTRY

32.  $2\text{HI}(\text{g}) \rightleftharpoons \text{H}_2(\text{g}) + \text{I}_2(\text{g})$
- |      |      |      |
|------|------|------|
| 0.2  | 0    | 0    |
| 0.04 | 0.08 | 0.08 |
- $K_p = 4$
33. (3) c, e

34.  $Q_c = \frac{\left(\frac{3}{10}\right)^4 \left(\frac{3}{10}\right)}{\left(\frac{2}{10}\right)\left(\frac{4}{10}\right)^2} = \frac{243}{32} \times 10^{-2}$   
 $= 7.59 \times 10^{-2} > K_c$   
 so, reaction will proceed in backward direction.  
 इसलिए, अभिक्रिया पश्च दिशा में जायेगी।

37. Moles of  $\text{HNO}_3$  required =  $3 \times 3 = 9$   
 Mass of  $\text{HNO}_3 = 9 \times 63 = 567 \text{ gm}$   
 Mass of 30 %  $\text{HNO}_3$  required  
 $= 567 \times \frac{100}{30} = 1890 \text{ gm}$

$$\text{Volume} = \frac{1890}{3} = 630 \text{ mL}$$

- हल.  $\text{HNO}_3$  के आवश्यक मोल =  $3 \times 3 = 9$   
 $\text{HNO}_3$  का द्रव्यमान =  $9 \times 63 = 567 \text{ gm}$   
 30 %  $\text{HNO}_3$  का आवश्यक द्रव्यमान  
 $= 567 \times \frac{100}{30} = 1890 \text{ gm}$   
 आयतन =  $\frac{1890}{3} = 630 \text{ mL}$

38.  $V_n = (2.18 \times 10^6) \times \frac{Z}{n} \text{ m/sec}$ ;  
 $V_n \propto \frac{1}{n}$ ;  $n \uparrow$ ,  $V_n \downarrow$

39. Orbital angular momentum of electron  
 $= \sqrt{\ell(\ell+1)} \frac{h}{2\pi} \Rightarrow \sqrt{\ell(\ell+1)} \frac{h}{2\pi}$   
 $= \sqrt{3} \frac{h}{\pi} \Rightarrow \ell = 3$

$$\text{number of orientations} = 2\ell + 1 = 2 \times 3 + 1 = 7$$

- हल. इलेक्ट्रॉन का कक्षीय कोणीय संवेग  
 $= \sqrt{\ell(\ell+1)} \frac{h}{2\pi} \Rightarrow \sqrt{\ell(\ell+1)} \frac{h}{2\pi}$   
 $= \sqrt{3} \frac{h}{\pi} \Rightarrow \ell = 3$

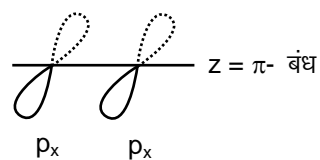
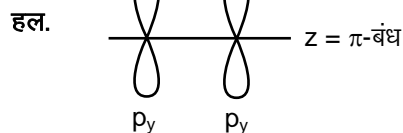
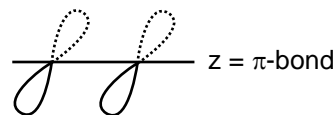
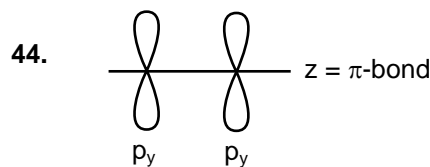
$$\text{विन्यास की संख्या} = 2\ell + 1 = 2 \times 3 + 1 = 7$$

41. 

P	Q	R	S
(1) c	a	b	d

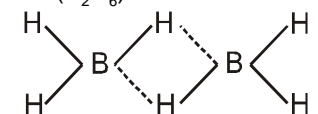
42. Due to inert pair effect.  
 अक्रिय युग्म प्रभाव के कारण।

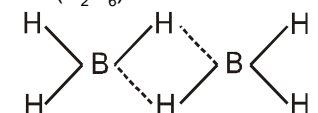
43.  $\text{XeO}_4$  will have normal bond angle of  $sp^3$  hybridization and  $\text{SF}_4$  has no  $\pi$ -bond.  
 $\text{XeO}_4$   $sp^3$  संकरण का सामान्य बंध कोण रखेगा तथा  $\text{SF}_4$   $\pi$ -बंध नहीं रखता है।



45. (3)  $\text{SO}_3$  does not follow octet rule.  
 (3)  $\text{SO}_3$  अष्टक नियम का पालन नहीं करता है।
46.  $sp^3d$  hybridisation in  $\text{XeF}_2$  does not involve  $d_{x^2-y^2}$  orbital.  
 $\text{XeF}_2$  में  $sp^3d$  संकरण में  $d_{x^2-y^2}$  कक्षक सम्मिलित नहीं है।

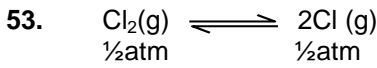
47. – O – H bond is not present in  $\text{CH}_3 - \text{CH}_2 - \text{CH}_3$  but in all other compound it is present – O – H बंध इनमें से  $\text{CH}_3 - \text{CH}_2 - \text{CH}_3$  में नहीं पाया जाता है लेकिन अन्य सभी यौगिकों में पाया जाता है।

48.  $(\text{BH}_3)_2$  or  $(\text{B}_2\text{H}_6)$   
  
 It contains two 3 centre-2 electron bonds.

- हल.  $(\text{BH}_3)_2$  या  $(\text{B}_2\text{H}_6)$   
  
 इसमें दो 3 केन्द्र-2 इलेक्ट्रॉन बंध होते हैं।

49. In  $\text{PH}_3$ , bond angle is  $93^\circ$ , because of drago rule.  
 ड्रेगो नियम के कारण  $\text{PH}_3$  में बंध कोण  $93^\circ$  है।

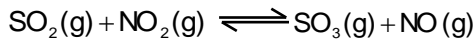
50.  $\pi$ -character in Si–N bond is due to  $3d\pi \leftarrow 2P\pi$  back bonding.  
 $\text{Si-N}$  बन्ध में  $\pi$ -लक्षण,  $3d\pi \leftarrow 2P\pi$  पश्च बन्धन के कारण होता है।



$$K_p = \frac{(1/2)^2}{(1/2)}$$

$$K_p = \frac{1}{2} = 0.5$$

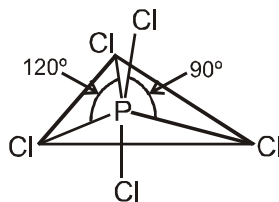
$$K_p = 5 \times 10^{-1}$$



$$K_c = \frac{[\text{SO}_3][\text{NO}]}{[\text{SO}_2][\text{NO}_2]} = \frac{[\text{SO}_3]^2}{[\text{SO}_2]^2} = 16$$

56. The correct definition also includes the terms neutral gaseous atom in ground state. So, (ii), (iii), (iv).

सही परिभाषा में भी आद्य अवस्था में उदासीन गैसीय परमाणु के पद निहित होते हैं। अतः (ii), (iii), (iv).



57.

Number of  $90^\circ$  bond angle in  $\text{PCl}_5$  are 6  
 $\text{PCl}_5$  में  $90^\circ$  के कितने बंध कोण 6 हैं।

58. % of s character in  $sp^3 = 25\%$   
 $sp^3$  में % s लक्षण = 25%

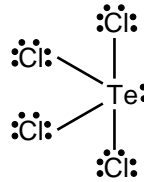
59. (i) Planar molecules :  $\text{XeF}_2, \text{ClF}_3, \text{H}_2\text{O}, [\text{XeF}_5]^-$ ,  $\text{I}_3^-$ ,  $\text{BCl}_3$ ,  $\text{XeF}_4$ .

(ii)  $\text{SF}_4$  – See - Saw shape  
 $\text{PCl}_5$  – Trigonal bipyramidal  
 $\text{SF}_6$  – Square bipyramidal  
 $\text{IF}_7$  – Pentagonal bipyramidal

हल. (i) समतलीय अणु :  $\text{XeF}_2, \text{ClF}_3, \text{H}_2\text{O}, [\text{XeF}_5]^-$ ,  $\text{I}_3^-$ ,  $\text{BCl}_3$ ,  $\text{XeF}_4$ .

(ii)  $\text{SF}_4$  – सी-सॉ आकृति  
 $\text{PCl}_5$  – त्रिकोणीय द्विपिरामिडिय  
 $\text{SF}_6$  – वर्गाकार द्विपिरामिडिय  
 $\text{IF}_7$  – पंचकोणीय द्विपिरामिडिय

60.



## PART-C: MATHEMATICS

61.  $S = \{1, 2, 3, \dots, 100\}$   
 elements of S are of form  $3n : 3, 6, 9, \dots, 99$   
 $\rightarrow 33$  number

$3n + 1 : 1, 4, 7, \dots, 100 \rightarrow 34$  number

$3n + 2 : 2, 5, 8, \dots, 98 \rightarrow 33$  number

If  $ab$  is to be divisible by 3 either  $a$  or  $b$  is divisible by 3 or both  $a$  and  $b$  are to be divisible by 3.

The number of ways  $a$  and  $b$  can be

$$= ({}^{33}C_2 + {}^{33}C_1 \times {}^{34}C_1 + {}^{33}C_1 \times {}^{33}C_1) \times 2$$

$$= 2739 \times 2 = 5478$$

हल.  $S = \{1, 2, 3, \dots, 100\}$

S से अवयवों का प्रकार  $3n : 3, 6, 9, \dots, 99$   
 $\rightarrow 33$  संख्या

$3n + 1 : 1, 4, 7, \dots, 100 \rightarrow 34$  संख्या

$3n + 2 : 2, 5, 8, \dots, 98 \rightarrow 33$  संख्या

यदि  $ab$ , 3 से विभाजित है, तब  $a$  या  $b$  से

3 विभाजित हो या दोनों  $a$  व  $b$ , तीन से विभाजित हो।  $a$  व  $b$  के तरीके

$$= ({}^{33}C_2 + {}^{33}C_1 \times {}^{34}C_1 + {}^{33}C_1 \times {}^{33}C_1) \times 2$$

$$= 2739 \times 2 = 5478$$

62. Let  $f(x) = ax^2 + bx + c = a(x+1)(x-\alpha)$

$$f(-2) = a(-1)(-2-\alpha) = a(2+\alpha)$$

$$f(3) = a(4)(3-\alpha) = 4a(3-\alpha)$$

$$f(-2) + f(3) = 0 \Rightarrow a(2+\alpha+12-4\alpha) = 0$$

$$\Rightarrow a \neq 0, -3\alpha + 14 = 0 \Rightarrow \alpha = \frac{14}{3}$$

$$\text{roots are } = -1, \frac{14}{3}$$

$$\text{sum of roots} = -1 + \frac{14}{3} = \frac{11}{3}$$

63.  $x + y + 3z = 33 \Rightarrow x + y = 33 - 3z$

Let माना  $z = k$ . Then तब,  $x + y = 33 - 3k$ .

The number of non-negative integral solution of  $x + y = 33 - 3z$  is

$${}^{33-3k+2-1}C_{2-1} = {}^{34-3k}C_1 = (34-3k)$$

$x + y = 33 - 3z$  के अऋणात्मक पूर्णांक हलों की संख्या  ${}^{33-3k+2-1}C_{2-1} = {}^{34-3k}C_1 = (34-3k)$  है।

$$\text{But परन्तु } 0 \leq 33 - 3k \leq 33$$

$$\Rightarrow 0 \leq k \leq 11$$

Hence, total number of solution

$$= \sum_{k=0}^{11} (34 - 3k) = 210$$

अतः कुल हलों की संख्या =  $\sum_{k=0}^{11} (34 - 3k) = 210$

64. Refer to answer key

65.  $4^x = 3^{x-1}$

$$\Rightarrow x \log_2 4 = (x-1) \log_2 3$$

$$\Rightarrow 2x - x \log_2 3 = -\log_2 3$$

$$\Rightarrow x = \frac{\log_2 3}{\log_2 3 - 2}$$

66.  $(1-x^3)^{13} (1-x) = (1-x^3)^{13} - x(1-x^3)^{13}$   
 $= {}^{13}C_8$

67.  $({}^nC_1)^2 + 2.({}^nC_2)^2 + 3.({}^nC_3)^2 + \dots + n.({}^nC_n)^2$

$$= \sum_{r=1}^n r \cdot {}^nC_r \cdot {}^nC_r$$

$$= \sum_{r=1}^n r \frac{n!}{r!} \frac{n!}{r!} = \sum_{r=1}^n \frac{n!}{r} \cdot \frac{n!}{r!}$$

$$= n \sum_{r=1}^n \frac{n-1}{r} \cdot {}^nC_r$$

$$= n({}^{n-1}C_0 \cdot {}^nC_1 + {}^{n-1}C_1 \cdot {}^nC_2 + \dots + {}^{n-1}C_{n-1} \cdot {}^nC_n)$$

$$= n \cdot 2^{n-1} C_n$$

68.  $x = 1 \Rightarrow a_0 + a_1 + a_2 + a_3 + a_4 + \dots + a_{2n} = 3^n$   
 $x = -1 \Rightarrow a_0 - a_1 + a_2 - a_3 + a_4 - \dots + a_{2n} = 1$

Hence  $a_0 + a_2 + a_4 + \dots + a_{2n} = \frac{3^n + 1}{2}$

and  $a_1 + a_3 + a_5 + \dots + a_{2n-1} = \frac{3^n - 1}{2}$

69.  $a_0 = a_1 = 0$

$$a_{n+2} = 3a_{n+1} - 2a_n + 1 \quad \forall n \geq 0$$

$$a_{n+2} - a_{n+1} = 2(a_{n+1} - a_n) + 1$$

put  $n = 0$   $a_2 - a_1 = 2(a_1 - a_0) + 1$

$n = 1$   $a_3 - a_2 = 2(a_2 - a_1) + 1$

$n = 2$   $a_4 - a_3 = 2(a_3 - a_2) + 1$

$\vdots$

$n = n-2$   $a_n - a_{n-1} = 2(a_{n-1} - a_{n-2}) + 1$

so  $a_n - a_1 = 2(a_{n-1} - a_0) + (n-1)$

$$\Rightarrow a_n = 2a_{n-1} + n - 1$$

$$\Rightarrow a_n - 2a_{n-1} = (n-1) \dots (1)$$

Now  $a_{27}a_{25} - 2a_{27}a_{24} - 2a_{25}a_{26} + 4a_{24}a_{26}$

$$= a_{27}(a_{25} - 2a_{24}) - 2a_{26}(a_{25} - 2a_{24})$$

$$= (a_{25} - 2a_{24})(a_{27} - 2a_{26})$$

$$= (24)(26) = 624$$

70.  $(1+2x)^{10} + (1+2x)^{11} + \dots + (1+2x)^{20}$

$$= (1+2x)^{10} \frac{[(1+2x)^{11} - 1]}{(1+2x) - 1}$$

$$= \frac{(1+2x)^{21} - (1+2x)^{10}}{2x}$$

coeff. of  $x^{12}$  का गुणांक =  ${}^{21}C_{13} \frac{2^{13}}{2}$

$$= {}^{21}C_{13} 2^{12}$$

71.  $\cos^2 \theta = \frac{1}{6} \sin \theta \cdot \tan \theta$

$$6\cos^3 \theta = 1 - \cos^2 \theta$$

$$6\cos^3 \theta + \cos^2 \theta - 1 = 0$$

$$(2\cos \theta - 1)(3\cos^2 \theta + 2\cos \theta + 1) = 0$$

$$\cos \theta = \frac{1}{2} \Rightarrow \theta = 2n\pi \pm \frac{\pi}{3}, n \in Z$$

72. We have यहाँ,  $f(\theta) = \frac{(\sin \theta)^x}{(\cos \theta)^x + (\sin \theta)^x}$

$$\Rightarrow f(\theta) + f\left(\frac{\pi}{2} - \theta\right) = 1$$

(i)  $\therefore S = \sum_{\theta=1^\circ}^{89^\circ} f(\theta) = f(1^\circ) + f(2^\circ) + \dots$

(ii)

$$= \left( \frac{1+1+1+\dots+1}{44 \text{ times}} \right) + \frac{1}{2} = 44 + \frac{1}{2} = \frac{89}{2}$$

$$\therefore 2S - 8 = 81$$

73.  $\tan x + \tan y = 25$

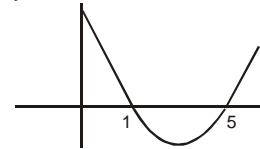
$\cot x + \cot y = 30$  i.e.

$$\frac{25}{\tan x \cdot \tan y} = 30$$

$$\tan x \cdot \tan y = \frac{25}{30} = \frac{5}{6}$$

$$\tan(x+y) = \frac{\tan x + \tan y}{1 - \tan x \cdot \tan y} = \frac{25}{1 - \frac{5}{6}} = 150$$

74.  $y = \cos^4 x - 6 \cos^2 x + 5 \cos^2 x = t$



$$y = t^2 - 6t + 5 \quad 0 \leq t \leq 1$$

for  $t \in [0, 1]$  min occurs at  $t = 1$  ( $t = 1$  पर न्यूनतम मान है)

$$y_{\min} = 0$$

75.  $S = \left\{ \alpha : \log_2(9^{2\alpha-4} + 13) - \log_2\left(\frac{5}{2} \cdot 3^{2\alpha-4} + 1\right) = 2 \right\}$

$$\log_2(9^{2\alpha-4} + 13) - \log_2\left(\frac{5}{2} \cdot 3^{2\alpha-4} + 1\right) = 2$$

$$\Rightarrow \log_2\left(\frac{9^{2\alpha-4} + 13}{\frac{5}{2} \cdot 9^{\alpha-2} + 4}\right) = 2$$

$$\Rightarrow 9^{2\alpha-4} + 13 = 4\left(\frac{5}{2} \cdot 9^{\alpha-2} + 1\right)$$

$$\Rightarrow 9^{2(\alpha-2)} + 13 = 10 \cdot 9^{\alpha-2} + 4$$

$$\Rightarrow 9^2 - 10y + 9 = 0 \quad [\text{where } y = 9^{\alpha-2}]$$

$$\Rightarrow (y-9)(y-1) = 0$$

$$y = 9 \quad \text{or} \quad y = 1$$

$$9^{\alpha-2} = 9 \quad \text{or} \quad 9^{\alpha-2} = 1 \quad \text{so} \quad \alpha = 2, 3$$

$$\Rightarrow S = \{2, 3\}$$

Now

$$2x^2 - 4 \left( \sum_{\alpha \in S} \alpha \right)^2 x + \sum_{\alpha \in S} (\alpha+1)^2 \beta = 0$$

$$2x^2 - 100x + 25\beta = 0$$

for real roots  $D \geq 0$

$$100^2 - 200\beta \geq 0 \quad [D = b^2 - 4ac]$$

$$10000 - 200\beta \geq 0$$

$$50 - \beta \geq 0 \quad \beta \leq 50 \quad \beta_{\max} = 50$$

76. 13 letters (4I, 2N, 7 diff) 9 type  
All different  ${}^9C_5 5! = 15120$

2 alike 3 different  ${}^2C_1 \cdot {}^8C_3 \frac{5!}{2!} = 6720$

2 alike 2 alike 1 different  ${}^2C_2 \cdot {}^7C_1 \frac{5!}{2!2!} = 210$

3 alike 2 different  ${}^1C_1 \cdot {}^8C_2 \frac{5!}{3!} = 560$

3 alike 2 alike  ${}^1C_1 \cdot {}^1C_1 \frac{5!}{3!2!} = 10$

4 alike 1 different  ${}^1C_1 \cdot {}^8C_1 \frac{5!}{4!} = 40$

total = 22660

हल. 13 अक्षर (4I, 2N, 7 भिन्न) 9 type  
सभी भिन्न  ${}^9C_5 5! = 15120$

2 एक समान, 3 भिन्न  ${}^2C_1 \cdot {}^8C_3 \frac{5!}{2!} = 6720$

2 एक समान, 2 एक समान 1 भिन्न  ${}^2C_2 \cdot {}^7C_1 \frac{5!}{2!2!} = 210$

3 एक समान, 2 भिन्न  ${}^1C_1 \cdot {}^8C_2 \frac{5!}{3!} = 560$

3 एक समान, 2 एक समान  ${}^1C_1 \cdot {}^1C_1 \frac{5!}{3!2!} = 10$

4 एक समान, 1 भिन्न  ${}^1C_1 \cdot {}^8C_1 \frac{5!}{4!} = 40$

कुल = 22660

77. For a particular class, the total no. of different tickets from 1<sup>st</sup> intermediate station is 5. Similarly, no. of different tickets from 2<sup>nd</sup> intermediate station is 4. So, the total no. of different tickets is  $5 + 4 + 3 + 2 + 1 = 15$ .

Same no. of tickets are also possible for another class

$\therefore$  Total no. of tickets = 30

No. of selections =  ${}^{30}C_{10}$

हल. विशेष कक्षा के लिए, भिन्न भिन्न टिकटों की संख्या प्रथम आन्तरिक स्टेशन से 5 है। इसी प्रकार टिकटों की संख्या, अन्य श्रेणी के लिए भी है। इसी प्रकार भिन्न भिन्न टिकटों संख्या, दो आन्तरिक स्टेशन के मध्य 4 है इसलिए कुल भिन्न भिन्न टिकटों की संख्या  $5 + 4 + 3 + 2 + 1 = 15$ . टिकट समान संख्या में संभव है।

$\therefore$  टिकटों की संख्या = 30

कुल चयनों की संख्या =  ${}^{30}C_{10}$

78.  $px^2 + qx + r = 0$   $\begin{cases} \alpha \\ \beta \end{cases}$ ; p, q, r  $\rightarrow$  A.P. ;

$$2q = p + r$$

$$\frac{1}{\alpha} + \frac{1}{\beta} = 5 \quad ; \quad \frac{\alpha + \beta}{\alpha\beta} = 5$$

$$\Rightarrow \frac{-q}{r} = 5$$

$$q = -5r \quad \dots (i)$$

$$\therefore -10r = p + r$$

$$p = -11r \quad \dots (ii)$$

$$|\alpha - \beta| = \sqrt{(\alpha + \beta)^2 - 4\alpha\beta} = \sqrt{\frac{q^2}{p^2} - \frac{4r}{p}}$$

by (i) और (ii) से

$$= \frac{\sqrt{q^2 - 4pr}}{|p|} = \frac{\sqrt{25r^2 + 44r^2}}{11r} = \frac{\sqrt{69}}{11}$$

79.  $S = {}^{10}C_0 + {}^{10}C_1 + {}^{10}C_2 + {}^{10}C_3 + {}^{10}C_4 + {}^{10}C_5$

$$\Rightarrow S = {}^{10}C_0 + {}^{10}C_1 + {}^{10}C_2 + {}^{10}C_3 + {}^{10}C_4 + {}^{10}C_5$$

$$\therefore 2S = 2^{10} + {}^{10}C_5 \quad \Rightarrow S = 2^9 + \frac{{}^{10}C_5}{2}$$

$$\Rightarrow S = 512 + 126$$

$$\Rightarrow S = 638$$

80.  $A = \frac{1}{3} + \frac{1}{5^2} + \frac{1}{3^3} + \frac{1}{5^4} + \dots$

$$A = \left( \frac{1}{3} + \frac{1}{3^3} + \frac{1}{3^5} + \dots \right) + \left( \frac{1}{5^2} + \frac{1}{5^4} + \dots \right)$$

$$A = \frac{3}{8} + \frac{1}{24} = \frac{5}{12}$$

$$\text{Similarly } B = \frac{1}{24} - \frac{3}{8} = -\frac{1}{3}$$

$$\text{So, } \frac{A}{B} = -\frac{5}{4}$$

81. Here we can not use 0 at any place  
Required number of ways =  ${}^9C_5 = 126$   
 $\therefore n = 126$   
again  $m = \frac{4!3!}{(2!)^3} = 18$   
hence  $m + n = 144$   
हल. यहाँ हम 0 का किसी भी स्थान पर बले नहीं सकते हैं  
अभीष्ट क्रमचय =  ${}^9C_5 = 126$   
 $\therefore n = 126$   
पुनः  $m = \frac{4!3!}{(2!)^3} = 18$   
अतः  $m + n = 144$
82.  $M_1$  is included but  $W_1$  is excluded  
 $= {}^5C_1 \cdot {}^4C_2 + {}^4C_3 = 34$   
 $M_1$  is excluded and  $W_1$  is included  
 $= {}^4C_3 + {}^4C_2 \cdot {}^5C_1 + {}^4C_1 \cdot {}^5C_2 = 74$   
Both  $M_1$  and  $W_1$  excluded  ${}^4C_4 + {}^4C_3 \times {}^5C_1 + {}^4C_2 \cdot {}^5C_2 = 81$   
 $\therefore$  Total number of such committee  
 $= 34 + 74 + 81 = 189$   
हल.  $M_1$  शामिल है परन्तु  $W_1$  बाहर है  ${}^5C_1 \cdot {}^4C_2 + {}^4C_3$   
 $= 34$   
 $M_1$  बाहर है परन्तु  $W_1$  शामिल है  ${}^4C_3 + {}^4C_2 \cdot {}^5C_1 + {}^4C_1 \cdot {}^5C_2 = 74$   
दोनों  $M_1$  और  $W_1$  बाहर है  ${}^4C_4 + {}^4C_3 \times {}^5C_1 + {}^4C_2 \cdot {}^5C_2 = 81$   
 $\therefore$  इस प्रकार की समितियों की संख्या  
 $= 34 + 74 + 81 = 189$
83. Perfect squares पूर्ण वर्ग =  $x$   
 $1, (2^2, 2^4, 2^6, \dots, 2^{14}), (3^2, 3^4, \dots, 3^{10}),$   
 $(5^2, \dots, 5^6)$   
 $1 + 7 + 5 + 3 + 7 \times 5 + 5 \times 3 + 3 \times 7 + 7 \times 3 \times 5$   
 $= 192$
84. Use fictitious partition  
 $P = {}^{4+10-1}C_{10-1} = {}^{13}C_4 = 715$   
and  ${}^nC_2 - n = 14 \Rightarrow n = 7$
85. First, we select 4 pairs in  ${}^5C_4$  ways = 5 ways  
प्रथम, चार युग्म को चुनने के तरीके  ${}^5C_4$  तरीके  
 $= 5$  तरीके  
Now we select exactly one shoe from each pair in  ${}^2C_1$  ways  
अब ठीक एक युग्म को चुनने के तरीके  ${}^2C_1$  तरीके  
 $\therefore$  Required no. of ways अभीष्ट तरीकों की संख्या  
 $\alpha = 5 \times {}^2C_1 \times {}^2C_1 \times {}^2C_1 \times {}^2C_1 = 80$  ways तरीके  
 $f(n) = \sum_{k=r}^n {}^{n+1}C_{r+1} = 2^{n+1} - 1$   
 $f(11) = 2^{12} - 1 = 4095 = 3^2 \cdot 5 \cdot 7 \cdot 13$   
Hence 24 divisors  $\Rightarrow \beta = 24$

86. Highest power of  $x = \frac{n(n+1)}{2} = m$  (let)  
have to find coefficient of  $x^{m-9}$   
 $x$  की उच्चघात  $x = \frac{n(n+1)}{2} = m$  माना  
 $(x^{m-9})$  का गुणांक है  
 $-9 + (-8 \times -1) + (-7 \times -2) + (-6 \times -3) +$   
 $(-5 \times -4) + (-6 \times -2 \times -1) + (-5 \times -3 \times -1) +$   
 $(-4 \times -3 \times -2) = 0$
87.  $(3^{|x-2|} + (3^{|x-2|-9})^{1/5})^7$   
 $T_6 = {}^7C_5 \cdot (3^{|x-2|})^2 \cdot 3^{|x-2|-9} = 567$   
 $\Rightarrow 3^{3|x-2|-9} = 27 \Rightarrow |x-2| = 4 \Rightarrow x = 6, -2$
88.  $\therefore$  The digit at unit place in each of 5!, 6!, ..., 100! is 0  
and  $0! + 1! + 2! + 3! + 4! = 34$   
 $\therefore$  Digit at unit place in  $\sum_{r=0}^{100} r!$  is 4  
Now,  $2^{2^n} = 2^{4k}$   
( $k \in \mathbb{N}$ ,  $2^n$  is multiple of 4,  $n > 1$ )  
 $\therefore$  The digit at unit place in  $2^{2^n} = 2^{4k}$  is 6  
 $\therefore$  The digit at unit place in  $\sum_{r=0}^{100} r! + 2^{2^n} = 0$
- हल.  $\therefore$  5!, 6!, ..., 100! प्रत्येक में इकाई स्थान पर अंक 0 है।  
और  $0! + 1! + 2! + 3! + 4! = 34$   
 $\therefore \sum_{r=0}^{100} r!$  में इकाई स्थान अंक 4 है  
अब,  $2^{2^n} = 2^{4k}$   
( $k \in \mathbb{N}$ ,  $2^n$ , 4 का गुणज है,  $n > 1$ )  
 $\therefore 2^{2^n} = 2^{4k}$  में इकाई स्थान पर अंक 6 है।  
 $\therefore \sum_{r=0}^{100} r! + 2^{2^n} = 0$  में इकाई स्थान का अंक
89.  $x^2 - 7x + 10 \geq 0$  and  $14x - 20 - 2x^2 \geq 0$   
 $(x-2)(x-5) \geq 0$  and  $(x-2)(x-5) \leq 0$   
 $x = 2, 5$   
 $x = 2$   
 $9 \log_4 \left( \frac{1}{4} \right) \geq -9$  [true]  
Now for  $x = 5$   
 $\frac{9}{2} \log \left( \frac{5}{8} \right) \geq -3$  [not true]  
 $x = 2$  is only solution
- हल.  $x^2 - 7x + 10 \geq 0$  और  $14x - 20 - 2x^2 \geq 0$   
 $(x-2)(x-5) \geq 0$  और  $(x-2)(x-5) \leq 0$   
 $x = 2, 5$   
 $x = 2$

$$9 \log_4 \left( \frac{1}{4} \right) \geq -9 \text{ [सत्य]}$$

$x = 5$  के लिए

$$\frac{9}{2} \log \left( \frac{5}{8} \right) \geq -3 \text{ [सत्य]}$$

$x = 2$  केवल हल है।

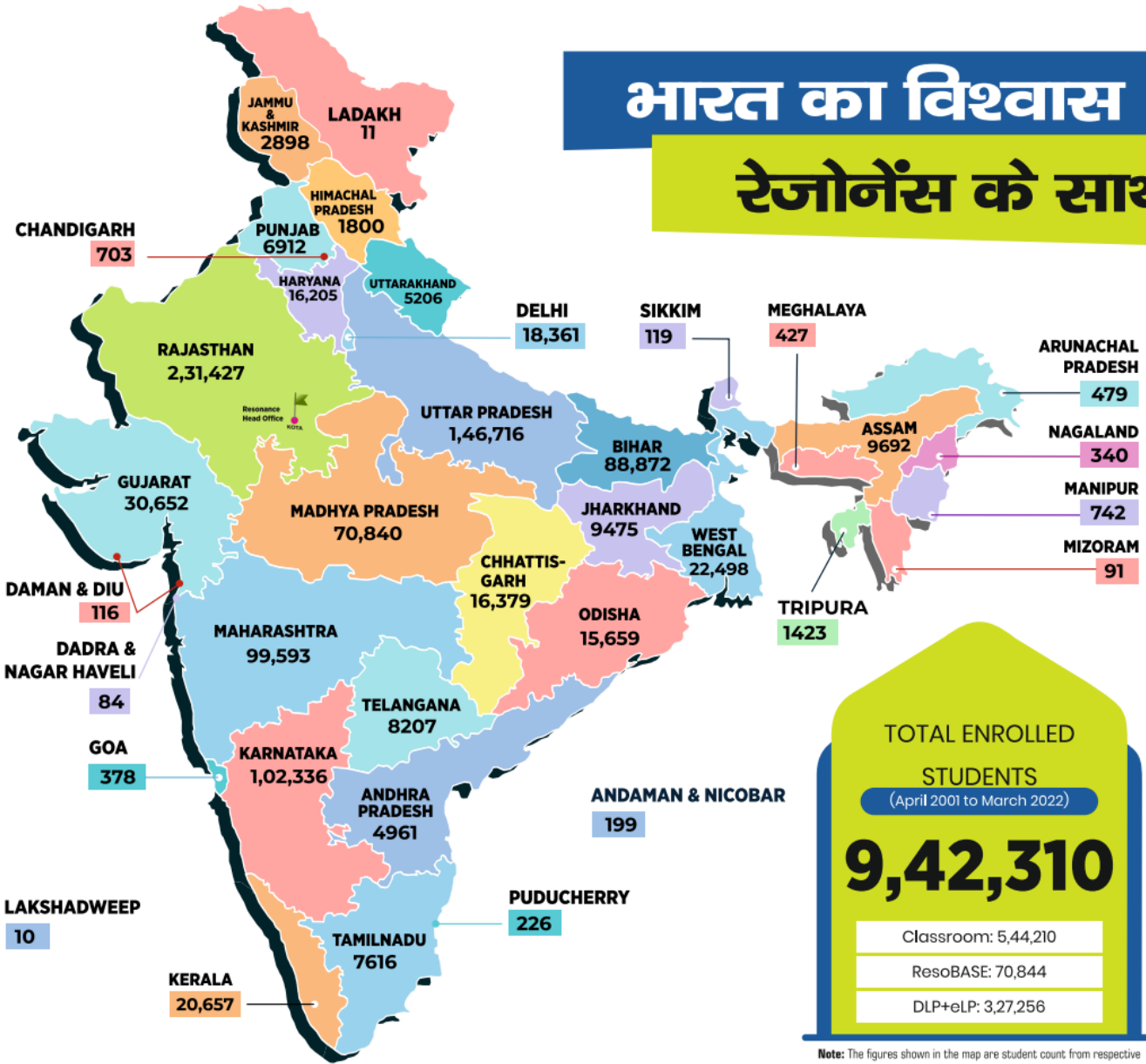
90.  $S = |x - 1| + |x - 2| + \dots + |x - 10|$   
 $S = |10 - x| + |9 - x| + \dots + |1 - x|$   
+ \_\_\_\_\_  
 $2S \geq 9 + 7 + \dots + 7 + 9$   
 $= 2(1 + 3 + 5 + 7 + 9)$   
 $S \geq 25$

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



# भारत का विश्वास

## रेजोनेंस के साथ



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

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

**NTSE** SINCE 2006 ▶ **2440** Scholars

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**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**