UPSC CSE PRELIMS 2025
ANSWER KEYS GS-II

SET A

1.C	11.D	21.A	31D	41.B	51.B	61.A	71.B
2.D	12.A	22.D	32.A	42.A	52.C	62.C	72.D
3.D	13.D	23.A	33.B	43.C	53.D	63.C	73.D
4.D	14.A	24.D	34.B	44.B	54.D	64.C	74.D
5.C	15.C	25.C	35.B	45.D	55.C	65.C	75.D
6.A	16.C	26.D	36.B	46.C	56.A	66.B	76.C
7.C	17.B	27.B	37.C	47.C	57.D	67.A	77.C
8.B	18.C	28.D	38.B	48.D	58.B	68.D	78.A
9.D	19.D	29.B	39.C	49.A	59.B	69.D	79.A
10.A	20.C	30.C	40.B	50.C	60.C	70.D	80.C

SET B

1.D	11.A	21.A	31C	41.B	51.A	61.B	71.B
2.A	12.D	22.A	32.D	42.D	52.C	62.C	72.A
3.B	13.A	23.D	33.D	43.D	53.C	63.D	73.C
4.B	14.D	24.A	34.D	44.D	54.C	64.D	74.B
5.B	15.C	25.C	35.C	45.D	55.C	65.C	75.D
6.B	16.D	26.C	36.A	46.C	56.B	66.A	76.C
7.C	17.B	27.B	37.C	47.C	57.A	67.D	77.C
8.B	18.D	28.C	38.B	48.A	58.D	68.B	78.D
9.C	19.B	29.D	39.D	49.A	59.D	69.B	79.A
10.B	20.C	30.C	40.A	50.C	60.D	70.C	80.C

SET C

1.A	11.C	21.D	31D	41.A	51.B	61.B	71.B
2.D	12.D	22.A	32.A	42.C	52.A	62.D	72.C
3.A	13.D	23.B	33.D	43.C	53.C	63.D	73.D
4.D	14.D	24.B	34.A	44.C	54.B	64.D	74.D
5.C	15.C	25.B	35.C	45.C	55.D	65.D	75.C
6.D	16.A	26.B	36.C	46.B	56.C	66.C	76.A
7.B	17.C	27.C	37.B	47.A	57.C	67.C	77.D
8.D	18.B	28.B	38.C	48.D	58.D	68.A	78.B
9.B	19.D	29.C	39.D	49.D	59.A	69.A	79.B
10.C	20.A	30.B	40.C	50.D	60.C	70.C	80.C

SET D

1.D	11D	21.C	31.A	41.B	51.B	61.B	71.A
2.A	12.A	22.D	32.D	42.C	52.D	62.A	72.C
3.D	13.B	23.D	33.A	43.D	53.D	63.C	73.C
4.A	14.B	24.D	34.D	44.D	54.D	64.B	74.C
5.C	15.B	25.C	35.C	45.C	55.D	65.D	75.C
6.C	16.B	26.A	36.D	46.A	56.C	66.C	76.B
7.B	17.C	27.C	37.B	47.D	57.C	67.C	77.A
8.C	18.B	28.B	38.D	48.B	58.A	68.D	78.D
9.D	19.C	29.D	39.B	49.B	59.A	69.A	79.D
10.C	20.B	30.A	40.C	50.C	60.C	70.C	80.D

EXPLANATION

1) Answer- C)

best captures the central message. It reflects the core issue of how the simultaneous pursuit of livelihood and commercial exploitation leads to ecological degradation and socioeconomic conflict. On the other hand, option (b), which states that "commercial exploitation of forests goes against the fundamental rights of people dependent on forests," is more narrowly focused on human rights, which is not the primary emphasis of the passage. Therefore, (c) is the most comprehensive and accurate choice.

2) Answer- D)

Statement 1 is incorrect: the passage clearly states **commercial exploitation** can **boost national income**, but at an ecological cost)

Although statement II seems appealing, it introduces a new idea (*sharing resources between countries*), which is **not supported or mentioned** in the passage. Hence, **neither** is a valid assumption.

3) Answer- D)

1. **Economies of scale is essential for transition to green growth.**
    - While economies of scale are mentioned as a factor that helps reduce costs as production increases, the passage does not focus solely on this. It is part of the explanation but not the central idea.
2. **Modern technological progress is intensely linked to path-dependent innovations.**
    - The passage discusses path dependence—how firms that innovate more continue to innovate—but this is also part of the explanation, not the main point.
3. **Countries with large economies are in a better position to adopt green technologies.**
    - The passage does not mention the size of economies or countries' comparative advantages explicitly, so this is not supported.
4. **Timing plays a crucial role in the case of green technology development.**
    - This best captures the central idea. The passage stresses that an early and gradual transition allows economies to benefit more and avoid costly disruptions, while a late, chaotic transition is costlier. Timing is presented as the critical factor shaping the success and cost of green technology adoption.

Hence, option 4 is the best reflection of the passage's central idea.

4) Answer- D)

- Assumption I is **not clearly supported** (public finances and India are not mentioned).
- Assumption II is **partially supported** (pattern of solar energy costs could help transition but timing matters).

Therefore, the best choice would be: (d) neither.

5) Answer- C)

Summary of qualifying numbers under 50:

- 6 (1+2+3)
- 12 (2+4+6)
- 18 (3+6+9)
- 24 (4+8+12)
- 30 (5+10+15)
- 36 (6+12+18)
- 42 (7+14+21)
- 48 (8+16+24)

Total = 8 numbers

6) Answer- A)

Given three primes p,q,r<20 with p−q=q−r, the three primes form an arithmetic progression:
p+r=2q
We list all prime triples in arithmetic progression:

- (3, 5, 7) → sum = 15
- (3, 7, 11) → sum = 21
- (5, 11, 17) → sum = 33
- (3, 11, 19) → sum = 33
- (7, 13, 19) → sum = 39

Distinct sums are: 15, 21, 33, 39.
Answer: 4 distinct possible sums.

7) Answer- C)

There are exactly **3** possible values:

- (3, 3, 3) → sum = 9
- (2, 4, 4) → sum = 10
- (2, 3, 6) → sum = 11

Answer: 3

8) Answer- B

From	To	Difference (months forward)	From	To	Difference (months forward)
Jan (1)	Jan (1)	12	July (7)	March (3)	8
Jan (1)	Dec (12)	11	March (3)	Oct (10)	7
Dec (12)	Oct (10)	10	Oct (10)	April (4)	6
Oct (10)	July (7)	9	April (4)	Sep (9)	5

9) Answer- D

The total runs N **cannot be determined uniquely** from the given information because all conditions relate only run rate ratios and overs, not an absolute number.

10) Answer- A

After the four successive changes:

1. First increase by $k\%$:

$$p_1 = p \times \left(1 + \frac{k}{100}\right)$$

2. Then decrease by $k\%$:

$$p_2 = p_1 \times \left(1 - \frac{k}{100}\right) = p \times \left(1 + \frac{k}{100}\right) \times \left(1 - \frac{k}{100}\right)$$

3. Second increase by $k\%$:

$$p_3 = p_2 \times \left(1 + \frac{k}{100}\right) = p \times \left(1 + \frac{k}{100}\right)^2 \times \left(1 - \frac{k}{100}\right)$$

4. Second decrease by $k\%$:

$$q = p_3 \times \left(1 - \frac{k}{100}\right) = p \times \left(1 + \frac{k}{100}\right)^2 \times \left(1 - \frac{k}{100}\right)^2$$

11) Answer- D)

(a) The mitigation and adaptation strategies to address/tackle the climate change is essentially the responsibility of each State.

- The passage says each State faces distinct challenges and opportunities and must consider them.
- But it doesn't explicitly say the responsibility is *only* of each State.
- Also, the passage talks about collaboration and tailoring strategies, not just responsibility.

(b) India is too diverse to implement any effective strategy or programme to address/tackle the climate change.

- This is a negative statement.
- The passage acknowledges diversity but suggests **this diversity requires tailored strategies**, not that effective strategies are impossible.
- So this option is **not aligned** with the passage's tone.

(c) It is basically the responsibility of the Union Government to implement the climate action plans and ensure net zero emissions.

- The passage does not say responsibility lies solely with the Union Government.
- It focuses on States' unique challenges and opportunities.
- So this option is **too narrow and ignores regional diversity**.

(d) India needs to formulate effective climate change mitigation and adaptation strategies at the State/region level.

- This fits perfectly with the passage's message.
- It acknowledges India's diversity.
- Emphasizes State/region-level strategies based on their distinct challenges/opportunities.
- Focuses on effective mitigation and adaptation.

Correct answer: (d)

12) Answer- A

- The passage talks about **opportunities like wind power** to reduce emissions.
- This shows green energy production **can be linked and integrated with climate mitigation/adaptation** strategies.

Assumption II is not valid:

- The passage **mentions challenges** but **does not claim severity is much greater** in coastal and mountainous areas than in others.
- It only states those regions have **unique challenges**, not necessarily more severe effects.
- So, the assumption that effects are **"much more severe"** is **not fully supported**.

13) Answer- D

- **(a)** Mixes social and economic issues, less precise.
- **(b)** Incorrect: poverty is not stated as the main cause of inequality or insecurity.
- **(c)** Not supported: no mention of "unmanageable crisis" or close linkage.
- **(d)** Correct: highlights insecurity as the main economic issue and government's focus.

14) Answer- A

People above the poverty line also are prone to suffer from anxiety about economic insecurity.

- This is explicitly supported by the passage.
- **Assumption I is valid.**

Eradication of poverty can result in peace and social equality in the country.

- The passage does not claim or imply that eradicating poverty alone will bring peace or social equality.
- It separates social inequality and poverty as different issues.
- **Assumption II is not valid.**

15) Answer- C

- To get **60 equal cubes**, the cube must be cut such that the total smaller cubes = 60.
- Since 60 is not a perfect cube, the smaller cubes cannot all be equal-sized cubes arranged in a perfect cube layout.
- This implies the cuts are not equally spaced along all edges.

Factor 60

- $60=3\times4\times5$
- So, if the cube is cut **2 times** along one edge, **3 times** along second edge, and **4 times** along third edge:
  - Number of smaller cubes = $(2+1)\times(3+1)\times(4+1)=3\times4\times5=60$

Minimum number of cuts

- Cuts along edges = 2 + 3 + 4 = 9 cuts total.

Number of smaller cubes not painted on any face

- For each dimension, the cubes that are **not touching any painted face** are those not at the edges:
- So number of inner cubes = $(3-2)\times(4-2)\times(5-2)=1\times2\times3=6$

16) Answer- C

Try sum of squares

- 7^2+24^2=49+576=625
- Square root of 625 = 25

Check second example:

- 12^2+16^2=144+256=400
- Square root of 400 = 20 (matches given result)
- 16^2+63^2=256+3969=4225
- Square root of 4225=65

17) Answer- B

- **Original petrol price:** ₹90 per litre
- **Hike:** 10%
- **New petrol price:**
  90+10% of 90=90+9=₹99
- **Monthly travel:** 2200 km
- **Car mileage:** 16 km per litre
- Fuel used = 2200/16=137.5 litres
- **Previous expenditure:**
  137.5×90=₹12,375

After price hike, how many litres can he afford for ₹12,375?

- Fuel he can now afford =
  12,375/99=125 litres

How many km can he travel with 125 litres?

- Distance = 125×16=2000 km

Reduction in distance

- Reduction = 2200−2000=200 km

18) Answer- C

We are given:

- Remainders when divided by 3 → **1**
- by 5 → **3**
- by 6 → **4**
- by 9 → **7**

Try each option and check if it gives these remainders:

Option (a) 1068
- 1068 ÷ 3 → remainder = 0

Option (b) 1072
- 1072 ÷ 3 → remainder = 2

Option (c) 1078
- 1078 ÷ 3 → remainder = 1
- 1078 ÷ 5 → remainder = 3
- 1078 ÷ 6 → remainder = 4
- 1078 ÷ 9 → remainder = 7

19) Answer- D

Given:

A < B > C < D > E > F > G = H

We need to test:

Is B always greater than E?

Let's simplify and extract the relationships from the chain:
- A < B → B > A
- B > C
- C < D → D > C
- D > E
- E > F
- F > G
- G = H

From this, the chain looks like:

A < B > C < D > E > F > G = H

We cannot tell the exact numerical order between **B and E** without knowing actual values. For example:
- It's possible that B is 20, C is 15, D is 25, E is 22
- Or B is 18, C is 10, D is 12, E is 11

Counter-example:

Let's assign values:
- A = 10
- B = 20
- C = 15
- D = 25
- E = 22

Then B = 20 < E = 22 → **B is not greater than E**

So Statement I is *not always* true

Statement II:

Given:

P > Q = R > S = T ≤ U = V > W

We need to test:

Is S always less than V?

Break it down:
- P > Q = R
- R > S = T
- T ≤ U = V
- V > W

Now look at the key part:

S = T

T ≤ U = V → So **S ≤ V**

But the statement says **"S is always less than V"**

That's **not guaranteed**. S = T, T ≤ V → **S could be equal to V**
So **S is always less than or equal to V**, but **not always strictly less**.
So Statement II is also **not always true**

20) Answer- C

- The sequence is all odd numbers starting from 1 up to 999.
- The number of terms is the count of odd numbers from 1 to 999.

How many odd numbers are there from 1 to 999?
Count=999+1/2=500
So, the product is of 500 odd numbers.
We only care about the unit digit of the product. Unit digits depend only on the unit digits of factors.
The unit digits of odd numbers cycle through:
1,3,5,7,9,then again 1,3,5,7,9,…
Because every 10 numbers, the units digit pattern repeats.
Find the unit digit pattern of the product of one cycle (1,3,5,7,9)
Calculate:
1×3=3 3×5=15→units digit 5 5×7=35→units digit 5 5×9=45→units digit 5
So the product of the digits 1, 3, 5, 7, 9 (units digits only) has a units digit of **5**.
Number of such cycles in 500 odd numbers
Since every 5 odd numbers, the unit digits cycle as above, and there are 500 odd numbers:
Number of cycles=500/5=100
The product's units digit is:
5^100
Recall, powers of 5 always end with 5.
So,
5^100 ends with 5 .

21) Answer- A

Benefit of economic reforms percolates down more slowly to agriculture than other sectors.

- This fits well. Agriculture growth stagnated after the 1980s, while non-agriculture growth rose consistently.
- So reforms and economic growth benefits reached agriculture later or more slowly.

For India, the green revolution was not as useful as it was expected to be.

- The passage does not talk about green revolution directly.
- The 1980s saw the highest growth, which aligns with the green revolution's success period.
- So this statement doesn't fully capture the passage's main point.

India lagged behind other countries in adapting mechanized and modernised farming.

- The passage doesn't compare India to other countries.
- So this is outside the passage scope.

Rural to urban migration resulted in stagnant agriculture sector

- this is outside the passage scope.

22) Answer- D

Why Assumption I is invalid:

- The passage says nothing about corporate farming or large-scale commercial crops reducing the divergence.
- In fact, large-scale corporate farming might face many socio-economic and structural challenges in India (land fragmentation, small farmers).
- So, assuming that just "large-scale commercial/corporate farming" would fix the problem **goes beyond the passage** and is **not necessarily true**.

Why Assumption II is invalid:

- The passage never talks about free insurance or heavy subsidies being the missing factor.
- Simply providing subsidies or free insurance **may not guarantee sustained growth** or reduce divergence.
- The problem is more structural and about how reforms impact agriculture, not only financial inputs.
- Also, heavy subsidies like in developed countries may not be feasible or effective in India's context.

23) Answer- A

1. **"We need to free the handloom industry from the limited narrative linked to preserving cultural heritage."**
   - **Correct.** This aligns exactly with the passage's main idea.
2. **"Continued State Support to the handloom industry ensures preservation of some of our glorious art forms and old traditions."**
   - This is partly true but the passage questions the *limited* traditional narrative and suggests ignoring this narrow view.
   - So this is **not the main point** of the passage.
3. **"Household units of the handloom sector should be modernized and made an economically viable organized industry."**
   - The passage does not mention modernization or industrial organization.
   - So this is **not supported**.
4. **"Handloom products need to be converted to machine-made designer products so as to make them more popular."**
   - This goes against the very idea of *handlooms* being traditional and hand-crafted.
   - No mention of machine-made conversion in the passage.
   - So this is **incorrect**.

24) Answer- D

Assumption I:

"There is no need for the State to be involved in any manner in the handloom sector."

- The passage does not suggest the State should withdraw.
- It only critiques the limited narrative, not the State's role.
- So this assumption is not valid.

Assumption II:

"Handloom products are no longer appealing and attractive in the rapidly changing modern world."

- The passage mentions that many ignore handloom due to the narrow traditional narrative.
- It does not say handloom products are inherently unappealing.
- The issue is more about the framing of handloom's identity, not its appeal.
- So this assumption is also not valid.

25) Answer- C

We want to find how many numbers from 1 to 100 are **not divisible by any** of 2, 3, 5, 7, or 9.

Divisors: 2, 3, 5, 7, 9

multiples of each divisor

- Multiples of 2: $\lfloor 100/2 \rfloor = 50$
- Multiples of 3: $\lfloor 100/3 \rfloor = 33$
- Multiples of 5: $\lfloor 100/5 \rfloor = 20$
- Multiples of 7: $\lfloor 100/7 \rfloor = 14$
- Multiples of 9: $\lfloor 100/9 \rfloor = 11$

multiples of pairwise LCMs

- $\text{lcm}(2,3) = 6 \rightarrow \lfloor 100/6 \rfloor = 16$

- lcm(2,5) = 10 → 10
- lcm(2,7) = 14 → 7
- lcm(2,9) = 18 → 5
- lcm(3,5) = 15 → 6
- lcm(3,7) = 21 → 4
- lcm(3,9) = 9 → 11
- lcm(5,7) = 35 → 2
- lcm(5,9) = 45 → 2
- lcm(7,9) = 63 → 1

multiples of triple LCMs

- lcm(2,3,5) = 30 → 3
- lcm(2,3,7) = 42 → 2
- lcm(2,3,9) = 18 → 5
- lcm(2,5,7) = 70 → 1
- lcm(2,5,9) = 90 → 1
- lcm(2,7,9) = 126 → 0
- lcm(3,5,7) = 105 → 0
- lcm(3,5,9) = 45 → 2
- lcm(3,7,9) = 63 → 1
- lcm(5,7,9) = 315 → 0

multiples of quadruple LCMs

- lcm(2,3,5,7) = 210 → 0
- lcm(2,3,5,9) = 90 → 1
- lcm(2,3,7,9) = 126 → 0
- lcm(2,5,7,9) = 630 → 0
- lcm(3,5,7,9) = 315 → 0

Count multiples of quintuple LCM

- lcm(2,3,5,7,9) = 630 → 0

$$N = \sum |A_i| - \sum |A_i \cap A_j| + \sum |A_i \cap A_j \cap A_k| - \sum |A_i \cap A_j \cap A_k \cap A_l| + |A_1 \cap A_2 \cap A_3 \cap A_4 \cap A_5|$$

Apply Inclusion-Exclusion formula

- Sum singles: 50+33+20+14+11=128
- Sum pairs: 16+10+7+5+6+4+11+2+2+1=64
- Sum triples: 3+2+5+1+1+0+0+2+1+0=15
- Sum quadruples: 0+1+0+0+0=1
- Quintuple: 0

So,

$|A2 \cup A3 \cup A5 \cup A7 \cup A9| = 128 - 64 + 15 - 1 = 78$

numbers not divisible by any of them:

$100 - 78 = 22$

26) Answer- D

Given:

- $4 \le x \le 8$
- $2 \le y \le 7$

Find the maximum value of x+y

To maximize x+y pick the largest possible values of x and y:

max(x+y)=8+7= 15

Find the minimum value of x−y

To minimize x−y pick the smallest possible x and the largest possible y:

min(x−y)=4−7=−3

ratio is -5

27) Answer- B

- p and k are primes.
- P^2+k<30 and is prime.

Since p^2<30 possible p are 2, 3, and 5.

- For p=2 (4): check primes k where 4+k is prime and < 30. Valid k=3,7,13,19
- For p=3 (9): 9+k prime < 30. Valid k=2.
- For p=5 (25): 25+k prime < 30. No valid k.

So possible k values are 2,3,7,13,19.

Number of possible k = 5.

28) Answer- D

We want sets of **3 positive integers** where:

- **LCM = 1001**
- **HCF = 1**

First, factor 1001:

1001=1x7×11×13

So, each number in the set must be made from some combination of these primes.

These are **possible numbers** made from non-empty subsets of these primes:

1, 7, 11, 13, 77, 91, 143, 1001

Now choose sets of **3 different numbers** from these, such that:

- Together, they cover **all three primes (7,11,13)** → so LCM = 1001
- No prime is common to all → so HCF = 1

29) Answer- B

We are given:

- PQR is a 3-digit number (with digits P,Q=3,R)
- PPT is a 3-digit number (with digits P,P,T)
- PS is a 2-digit number (digits P,S)
- All digits are **distinct** and **non-zero**
- PQR−PS=PPT
- Q=3, T<6

Let's express each number:

- $PQR = 100P + 10Q + R = 100P + 30 + R$
- $PS = 10P + S$
- $PPT = 100P + 10P + T = 110P + T$

We are told:

$$PQR - PS = PPT \Rightarrow (100P + 30 + R) - (10P + S) = 110P + T$$

Simplify LHS:

$$(100P - 10P) + 30 + R - S = 110P + T \Rightarrow 90P + 30 + R - S = 110P + T$$

Rearranged:

$$(90P - 110P) + (30 + R - S - T) = 0 \Rightarrow -20P + (30 + R - S - T) = 0 \Rightarrow 30 + R - S - T = 20P$$

So we get the **key equation**:

$$R - S - T = 20P - 30 \quad (1)$$

Try P=1:

R=S+T−10

Try T=4,5 and valid S∈[1,9] such that R∈[1,9] and all digits (P=1, Q=3, R, S, T) are distinct.

Valid (R, S) pairs:

- (2, 8)
- (2, 7)
- (4, 9)

Answer: 3 possible values of (R, S).

30) Answer- C

- The sequence shows groups of repeated Bs and Cs, like:
  - **BB** followed by **CCC**

- Another group of **BCCCBBC**

 The letter**A** appears at the beginning, in the middle, and near the end, acting like a boundary or separator between these groups.

31) Answer- D)

Passage is about how teaching needs to be reinvented. Option d aptly catches the core of the passage

32) Answer- A)

Passage does not talk about funds, thus assumption 2 is invalid. Assumption 1 is valid because passage talks about how higher education should not be limited to one aspect and grow with demands of the society

33) Answer- B)

1. **Only 16%** of the calories fed to chickens are recovered by humans.
2. For large animals, this efficiency drops to **just 5–7%**.
3. Grains and legumes that could **directly feed humans** are being used to feed animals instead.
4. This leads to **greater inequality** in food utilization, especially as **wealthier societies** consume more animal products.

   Yes — **animal-based food is far less efficient** because:
   - Most of the energy from plant-based feed is **lost** in conversion.
   - It takes **more resources** (like grain, water, land) to produce the **same number of calories** via meat.
   - Feeding grains directly to humans would feed **more people** than using them to raise animals.

34) Answer- B)

Statement I — Not supported / Incorrect

- The passage **does not discuss** food industry objectives.
- It talks about **consumption patterns** and **inefficiency**, not **industrial goals**.

Statement II — Correct

- Matches exactly what the passage says:
  Greater wealth → more animal product consumption → inefficient conversion → **calorie loss**.

35) Answer- B

- We want to find the highest power n such that $35^n = (5 \times 7)^n$ divides the product.
- So, we count how many 5's and 7's are in the product.
- Break down each number:
  - $7 = 7^1$ → one 7
  - $343 = 7^3$ → three 7s
  - $385 = 5 \times 7 \times 11$ → one 5 and one 7
  - $1000 = 10^3 = (2 \times 5)^3 = 5^3 \times 2^3$ → three 5s
  - $2401 = 7^4$ → four 7s
  - $77777 = 7 \times 41 \times 271$ → one 7
- Total number of 5s = 1 (from 385) + 3 (from 1000) = 4
- Total number of 7s = 1 + 3 + 1 + 0 + 4 + 1 = 10
- Since 35^n needs n 5s and n 7s, the maximum n is the smaller count → **4**

36) Answer- B

Pattern is divided by 2 then multiplied by 1 then by 1.5 then 2 then 2.5

37) Answer- C

- P speed = 5 rounds/hour
- Q speed = 3 rounds/hour
- They start at the same point at 5:00 a.m. going in opposite directions
- Find number of times they cross **between 5:20 a.m. and 7:00 a.m.**

Since opposite directions,
Relative speed=5+3=8 rounds per hour
So, **they cross each other every 1/8 hour = 7.5 minutes**.
Total crossings from 5:00 to 7:00
Time interval = 2 hours
Number of crossings in 2 hours:
8×2=16
So, 16 crossings from 5:00 to 7:00.
Crossings before 5:20
Time = 20 minutes = 1/3 hour
Number of crossings before 5:20:
8×1/3=8/3=2.666…
Meaning:

- 1st crossing at 5:07:30
- 2nd crossing at 5:15:00
- 3rd crossing at 5:22:30 (after 5:20)

Crossings between 5:20 and 7:00

- Crossings before 5:20 = 2 full crossings (the 3rd crossing is after 5:20)
- Total crossings until 7:00 = 16

Therefore,
16−2=14

38) Answer- B

60-15*3+20/4=60-45+5=20

39) Answer- C)

Step	Calculation / Explanation	Result
1. Convert speeds to m/s	$3\ \text{km/h} = \frac{3\times1000}{3600} = 0.833\ \text{m/s}$ $4\ \text{km/h} = \frac{4\times1000}{3600} = 1.111\ \text{m/s}$	N = 0.833 m/s Y = 1.111 m/s
2. Define variables	Let tram speed = v m/s Tram length = L meters	-
3. Use overtaking formula	$L = (v - \text{person speed}) \times \text{overtaking time}$	For N: $L = (v - 0.833) \times 8$ For Y: $L = (v - 1.111) \times 9$
4. Equate lengths	$8(v - 0.833) = 9(v - 1.111)$	$8v - 6.664 = 9v - 10$
5. Solve for v	Rearranging: $10 - 6.664 = 9v - 8v$	$3.336 = v$ m/s
6. Calculate length L	Using N's formula: $L = (3.336 - 0.833) \times 8$	$L = 2.503 \times 8 = 20.02$ meters
Final Answer	Length of tram = approximately	**20 meters**

40) Answer- B

The number 1234567897654321 has **17 digits**.

- If N has d digits, then N^2 will have either 2d−1 or 2d digits.
- Since N^2 has 17 digits, we check:

2d−1=17 ⟹ 2d=18 ⟹ d=9

41) Answer- B

The best statement reflecting the central idea is:

(b) Low-carbon behaviour in people can be brought about by incentivising them.

- The passage says half the reduction depends on demand-side (people's behavior).
- But this depends on supply-side incentives to make low-carbon options affordable.
- So, changing people's behavior needs incentives, matching option (b).

Other options are less central:

- (a) focuses only on household emission reduction, which is incomplete.
- (c) is true but not the central idea.
- (d) is about subsidies for industries, which the passage doesn't highlight as the main point.

42) Answer- A

Supply-side investments in companies can result in low-carbon behaviour in people.

- The passage says companies and governments need to provide incentives and supply-side investments to make low-carbon options cheaper and accessible.
- This encourages low-carbon behavior in people.
- **So, Assumption I is valid.**

People are not capable of adopting low-carbon behaviour without the involvement of Government and Companies.

- The passage does **not** say people are *incapable* of change without government/companies.
- It says incentives and supply-side investments are **needed** to achieve significant reductions.
- It does **not** claim people *cannot* change on their own.
- **So, Assumption II is not fully valid.**

43) Answer -C

The best statement reflecting the passage's central message is:

(c) Circular economy can be beneficial for sustainable growth.

- The passage highlights reusing materials to recover valuable resources and reduce environmental risks.
- This idea is the essence of a **circular economy**—recycling and reusing materials to support sustainability.
- The passage doesn't say reuse is the only option (d), or demand immediate action (b), or only about green economy (a).

44) Answer- B

Automobile factories are examples of the circular economy.

- The passage mentions old vehicle batteries going back to factories to recover materials.
- But it does **not** explicitly say automobile factories currently practice circular economy.
- So, this is **not necessarily valid**.

Economic growth is compatible with circular use of mineral resources.

- The passage highlights the benefits of reusing materials and recovering resources, which supports sustainability and growth.
- This implies economic growth can go hand-in-hand with circular resource use.
- So, this assumption is **valid**.

45) Answer- D

Set X: 20 pipes fill 70% in 14 min	Rate of 20 pipes	$\frac{0.7}{14} = 0.05$ tanks/min
	Rate per pipe in X	$\frac{0.05}{20} = 0.0025$ tanks/min
Set Y: 10 pipes fill 3/8 in 6 min	Rate of 10 pipes	$\frac{0.375}{6} = 0.0625$ tanks/min
	Rate per pipe in Y	$\frac{0.0625}{10} = 0.00625$ tanks/min
Set Z: 16 pipes empty 0.5 in 20 min	Emptying rate of 16 pipes	$\frac{0.5}{20} = 0.025$ tanks/min
	Rate per pipe in Z	$\frac{0.025}{16} = 0.0015625$ tanks/min
Modified scenario	Pipes open in X: 10	Filling rate from X = $10 \times 0.0025 = 0.025$ tanks/min
	Pipes open in Y: 5	Filling rate from Y = $5 \times 0.00625 = 0.03125$ tanks/min
	Pipes open in Z: 16	Emptying rate from Z = $16 \times 0.0015625 = 0.025$ tanks/min
Net filling rate	Filling rate (X + Y) - Emptying rate (Z)	$(0.025 + 0.03125) - 0.025 = 0.03125$ tanks/min

Time to fill 50%
t=0.5/0.03125
t= 16 minutes

46) Answer- C
For n is 1,2 remainders are 3 and 1 respectively

47) Answer- C

- $P = QQQ = 111 \times Q$
- Find $\gcd(111Q, 481) = \gcd(111, 481) \times \gcd(Q, \text{something})$
- $\gcd(111, 481) = 37$
- Since Q (1 to 9) shares no factors with 13 (because $481/37 = 13$), $\gcd(Q, 13) = 1$
- So, $\gcd(P, 481) = 37 \times 1 = 37$

48) Answer- D
Count digits in groups
- 1-digit numbers: 1 to 9 → 9 numbers × 1 digit = 9 digits
- 2-digit numbers: 10 to 99 → 90 numbers × 2 digits = 180 digits
- 3-digit numbers: 100 to 999 → 900 numbers × 3 digits = 2700 digits

Find where the 489th digit lies
- First 9 digits: digits 1 to 9
- Next 180 digits: digits 10 to 189
- So digits 1 to 189 are covered by 1- and 2-digit numbers.
- 489 > 189, so digit 489 is in the 3-digit numbers.

Find the position inside the 3-digit numbers
Position in 3-digit block = 489 - 189 = 300 (the 300th digit in the 3-digit numbers)
Which number and which digit?
Each 3-digit number has 3 digits, so:
Number index = (300 - 1) // 3 = 99 (0-based)
Digit index in that number = (300 - 1) % 3 = 2 (0-based)
The first 3-digit number is 100, so the 100th number (0-based 99) is:
100 + 99 = 199

The 300th digit in the 3-digit block is the 3rd digit of 199
Digits of 199: '1' (index 0), '9' (index 1), '9' (index 2)
So the digit is '9'.
Answer: The 489th digit is **9**.

49) Answer- A
Let's assume only one person is lying, and that is the guilty one (since the guilty person would lie, and the innocent ones tell the truth).
Case 1: P is guilty
P is lying: So both statements by P are false:
"I did not steal" → False → So P did steal.
"Q stole it" → False → So Q did not steal it.
Q is innocent → Telling the truth:
"R did not steal" → True.
"I did not steal" → True.
R is innocent → Telling the truth:
"I did not steal" → True.
"I do not know who did it" → Possible.
This scenario fits perfectly.
Case 2: Q is guilty
Q is lying:
"R did not steal" → False → R did steal.
"I did not steal" → False → So Q did steal.
This is a contradiction since both R and Q are guilty in this interpretation. So invalid.
Case 3: R is guilty
R is lying:
"I did not steal" → False → So R did steal.
"I do not know who did it" → False → So R does know who did it → Possibly himself.
Let's check consistency with P and Q's statements:
P (innocent): "I did not steal" → True; "Q stole it" → False.
Contradiction: P can't tell the truth and lie simultaneously.
So P must also be lying, which violates the "only one is guilty" rule

50) Answer- C
Given:
- Teams: P, Q, R
- Each team plays each other exactly once → 3 matches total: P vs Q, Q vs R, P vs R
- Points: Win = 2 points, Draw = 1 point each, Loss = 0 points
- Each team scored **exactly 1 goal** in the tournament
- Points earned: P = 3, Q = 2, R = 1

Total goals per team = 1 each
So total goals scored by each team = 1
Analyze possible results and points
Matches:
1. P vs Q
2. Q vs R
3. P vs R

Total points: P(3), Q(2), R(1) → sum = 6 points
Points per match: 2 points for a win or 1+1 for a draw → total points per match = 2 always.
3 matches × 2 points each = 6 total points, consistent.

Find possible match outcomes consistent with the points

- P = 3 points (possible combinations: 1 win + 1 draw, or 1 win + 1 loss, or 3 draws—not possible here because only 2 matches played)
- Q = 2 points (either 1 win or 2 draws)
- R = 1 point (either 1 draw or 1 loss)

Try to assign results

Suppose:

- P beats R → P gets 2 points, R 0 points
- P draws with Q → both get 1 point
- Q beats R → Q gets 2 points, R 0 points

Sum points: P = 2+1=3, Q=1+2=3, R=0+0=0 → Q points don't match (given 2).

Try swapping:

- P beats R → P 2, R 0
- P loses to Q → P 0, Q 2
- Q draws with R → Q 1, R 1

Sum points:

P = 2 + 0 = 2 (doesn't match P=3)
Q = 2 + 1 = 3 (doesn't match Q=2)
R = 0 + 1 = 1 (matches)

Try another arrangement:

- P beats Q → P 2, Q 0
- P draws with R → P 1, R 1
- Q beats R → Q 2, R 0

Sum points:

P = 2 + 1 = 3 (matches)
Q = 0 + 2 = 2 (matches)
R = 1 + 0 = 1 (matches)

This fits!

Analyze goals with this setup

Matches:

- P beats Q (P scores 1 goal, Q scores 0) → since each team scored only 1 goal total, P must have scored 1 goal here.
- P draws with R (draw means score could be 0-0 or 1-1, but each team scored only 1 goal total overall, P already scored 1 goal vs Q, so cannot score any more; so draw must be 0-0)
- Q beats R (Q scores 1 goal, R scores 0)

Goals per team:

- P: 1 goal (vs Q)
- Q: 1 goal (vs R)
- R: 0 goals so far, but problem says each team scored exactly 1 goal → R must have scored 1 goal somewhere. But we assigned R scored 0 goals so far.

Contradiction!

Try different assumption about the draw:

P draws with R: score 1-1

But P already scored 1 goal vs Q, so total goals by P = 2 → not allowed.

So P vs R draw is 0-0

Then where does R get its 1 goal?

Only remaining match involving R is vs Q (Q beats R), so if R loses and scored 1 goal, Q must have scored more than 1 goal (at least 2), but Q only scored 1 goal total → contradiction.

Try P vs R: P loses to R

Matches:

- P loses to R → R 2 pts, P 0 pts (contradicts P=3) → no.

Try P vs R draw with R scoring 1 goal: impossible if P scored 1 goal elsewhere.
Try P vs Q draw with 0-0 score: no goals for either, so P and Q both have 0 goals so far.
P scored 1 goal total → must have scored against R.
Q scored 2 points → can come from a win and a draw.
R scored 1 point → from a draw.

Matches:

- P vs Q draw 0-0 (statement 1)
- P beats R (P scores 1 goal here)
- Q beats R (Q scores 1 goal here)

Points:

- P: draw (1) + win (2) = 3 → matches
- Q: draw (1) + win (2) = 3 → too high (given Q=2)

Try Q draws with R, Q loses to P:

- P vs Q draw 0-0 → both 1 point
- P beats R → 2 points to P
- Q draws R → both 1 point

Points:

- P: 1 + 2 = 3 → matches
- Q: 1 + 1 = 2 → matches
- R: 0 + 1 = 1 → matches

Goals:

- P scored 1 goal total → must be vs R (win) → so P scored 1 goal against R
- Q scored 1 goal total → must be against R (draw) → draw with 1 goal each?
- R scored 1 goal total → must be vs Q (draw)

So draw between Q and R is 1-1.
P vs Q match is 0-0 draw.

Conclusion:

- Statement 1: "The result of the match between P and Q is a draw with the score 0-0" → **Correct**
- Statement 2: "The number of goals scored by R against Q is 1" → **Correct**

51) Answer- B

Our total dependence on genetically honed crops entails possible food insecurity.

Because:

- The passage highlights the vulnerability of genetically uniform crops to new diseases caused by climate change.
- It warns of risks to crop resilience and food security due to lack of genetic variation.

Options (a), (c), and (d) are either too general or suggest solutions not directly supported by the passage.

52) Answer- C

Global climate change can result in the migration of several plant diseases to new areas.

- The passage says: "There is risk such changes will make some plant infections more common in all climatic zones."
- This implies plant diseases could spread or become more common in new areas due to climate change.
- So, Assumption I is **valid**.

Scientific understanding of the wild relatives of our present crops would enable us to strengthen food security.

- The passage talks about loss of genetic variation due to selective breeding and implies that genetic diversity (e.g., in wild relatives) could help cope with changes.

- Although it doesn't explicitly mention scientific understanding, it logically follows that understanding wild relatives can help improve crop resilience.
- So, Assumption II is **also valid**.

53) Answer- D

In a democracy, the opposition is indispensable for the balance of political power and good governance.

- (a) is wrong — it says no opposition leads to more responsible government, opposite of the passage.
- (b) talks about revolutionaries, which the passage says should NOT be allowed.
- (c) is incomplete and less precise than (d).

54) Answer- D

In a democracy, a strong opposition is required only if the Head of Government is indifferent.

- The passage doesn't say opposition is needed *only* when the leader is indifferent.
- It emphasizes opposition is always necessary to keep leaders reasonable and prevent arbitrary rule.
- So, Assumption I is **not valid**.

The more aggressive the opposition, the better is the governance in a democracy.

- The passage says opposition keeps leaders on the path of reason and good sense but warns against opposition becoming "revolutionary and irreconcilable."
- Aggressive (if meaning hostile or extreme) opposition can be harmful, not better.
- So, Assumption II is **not valid**.

55) Answer- C

P is the brother of Q and R → P, Q, R are siblings.
S is R's mother → so S is also mother of P and Q (same mother).
T is P's father → so T is also father of P, Q, R (same father).

1. **S and T are a couple.**

- Since S is mother and T is father of the same children, yes, they are a couple.

Definitely true.

2. **Q is T's son.**

- Q is P's brother, so same father T. If Q is male, Q is T's son. The problem doesn't specify Q's gender.
- We **cannot be sure** Q is son (could be daughter).

Not definitely true.

3. **T is Q's father.**

- Since P, Q, R are siblings and T is P's father, T is also Q's father.

Definitely true.

4. **S is P's mother.**

- S is R's mother, and P is R's sibling → same mother.

Definitely true.

5. **R is T's mother.**

- T is P's father, so T is older generation than R → T cannot be R's child.

False.

6. **P is S's son.**

- Since S is mother of R and siblings, P is S's child. If P is male, P is S's son.
- The problem says P is brother of Q and R → so P is male → P is S's son.

Definitely true.

56) Answer- A

Each code is the product of the alphabetical positions of the letters:

- N(14) × O(15) = 210
- N(14) × O(15) × T(20) = 4200

- N(14) × O(15) × T(20) × E(5) = 21000

So, for NOTES:
N(14) × O(15) × T(20) × E(5) × S(19) = 399000.

57) Answer- D

Common letters have the same code in both words:

- E = 1
- N = 3
- M = 8
- Y = 7

So, YEMEN = Y(7) E(1) M(8) E(1) N(3) = **71813**.

58) Answer- B

- P = 3T, T ≠ 0 → T = 1, 2, or 3
- Q = R + 3, S = Q + 4 = R + 7
- Since digits ≤ 9, R ≤ 2
- Check distinct digits for each (T, R):

Valid combos:

- T=1, R=2 → 3 5 2 9 1
- T=2, R=0 → 6 3 0 7 2
- T=2, R=1 → 6 4 1 8 2
- T=3, R=1 → 9 4 1 8 3

Total numbers possible = 4

59) Answer- B

- X's 1-day work = 1/18
- Y's 1-day work = 1/24
- Z's 1-day work = 1/16

Together per day = 1/18 + 1/24 + 1/16 = 23/144
Y alone finishes remaining work in 26/3 days → work done = (1/24) × (26/3) = 13/36
So,
1 − (23/144) × n = 13/36
Solve: (23/144) × n = 23/36 → n = 4
Answer: n = 4 days

60) Answer- C

Differences are primes: 2, 3, 5, 7, then 11, 13.
X = 18 + 11 = **29**.

61) Answer- A

The passage emphasizes how corporate capitalism is essential for economic growth—modernizing the economy, generating jobs, and increasing state revenue. It also links this economic growth to supporting democracy by enabling welfare and opportunities. Options (b), (c), and (d) are either too broad or do not capture the balanced critical message about growth and democracy conveyed in the passage as well as (a) does.

62) Answer- C

Assumption I: Corporate capitalism promotes labor growth and employment → **Supported** by "It generates jobs..."
Assumption II: Poor benefit due to trickle-down effect → The passage says state uses revenue for welfare, which *can* imply benefits to marginalized, indirectly supporting II.

63) Answer- C

he passage says a **network of voluntary associations** acts as a **buffer** between an individual (who is relatively powerless) and the State (which can be very powerful). This means these associations help individuals **connect, collaborate, and participate** in society rather than feeling isolated or powerless.

- Option (a) talks about State's inability to enforce, which isn't the main point.
- Option (b) is about personal development but doesn't emphasize the protective or participatory role.
- Option (d) mentions multiple loyalties, which is related but not the core idea here.

So, **(c)** captures the main idea: these associations help individuals **escape isolation** and **engage in collective action**, providing a buffer against the State's power.

64) Answer- C

For statement 1:
If n=2, n has 2 factors; 1.5×2=3 also has 2 factors → same number of factors.
For statement 2:
If n=2, 2.5×2=5 also has 2 factors → same number of factors.
Both statements are correct.

65) Answer- C

Coordinates:
B(0,0), A(0,-6), C(10,-6), D(10,-12), F(-9,0)
Path D → C → A → B → F:
Distances: 6 + 10 + 6 + 9 = 31 km
Distance covered = 31 km

66) Answer- B

- 64 → 343
  64=4^3, and 343=7^3
- 216 → 729
  216=6^3 and 729=9^3

The cube root of the given number is increased by 3 and then cubed.
For 512:
512=8^3 Add 3 → 8 + 3 = 11
Cube it → 11^3=1331

67) Answer- A

- 9 divided by 6 leaves a remainder of 3.
- So, 9^3, 9^4, … all leave remainder 3 when divided by 6.
- There are 98 numbers from 9^3 to 9^100.
- Adding all these remainders: 3+3+⋯+3(98 times) = 3×98=294
- Divide 294 by 6, remainder is 0.

So, the answer is 0.

68) Answer- D

To find the smallest 1-digit number with exactly 4 factors, just look at numbers 1 to 9.

- 6 has exactly 4 factors: 1, 2, 3, and 6.
- No number smaller than 6 has 4 factors.

So, you don't need any extra statements to answer

69) Answer- D

- $PP = 11 \times P$, $PQ = 10P + Q$.
- $PP \times PQ = RRSS$ means $11P \times (10P + Q) = 1100R + 11S$.
- Divide by 11: $P \times (10P + Q) = 100R + S$.
- Try $P = 3, Q = 4$: $3 \times 34 = 102 \rightarrow 33 \times 34 = 1122$, which fits $RRSS$.
- So, $Q = 4$.

70) Answer- D

The statements given are about family relations and don't mention anything directly about **Q** being related to **P**.

- Statement I talks about P's sisters R and S.
- Statement II says R's father is the brother of Q.

But neither says how **Q** and **P** are related.

So, from these statements, we cannot determine the relation between Q and P.

71) Answer - B

The passage explains that a single inflation number averages price rises of many different goods and services weighted by consumption or production patterns, but these differ for various social groups and items. So, the overall inflation figure may not reflect price changes accurately for individual items or specific groups.

72) Answer- D

The passage highlights that trust involves vulnerability but is essential for entrepreneurship and global economic behavior. It is a valuable "super-commodity" despite the risk of betrayal.

73) Answer- D

No conclusion even by using both the statements

74) Answer- D

Let's analyze $(P + Q)^2 - 4PQ$ where P, Q are natural numbers (positive integers):

$$(P + Q)^2 - 4PQ = P^2 + 2PQ + Q^2 - 4PQ = P^2 - 2PQ + Q^2 = (P - Q)^2$$

Since $(P - Q)^2 \geq 0$ for all real P, Q, the expression is always **non-negative**.

- It is **zero** when $P = Q$.
- It is **positive** when $P \neq Q$.

So, $(P + Q)^2 - 4PQ$ is always ≥ 0, and positive if $P \neq Q$.

75) Answer- D

Can not be determined with given information

76) Answer- C

Both max products = 25 (at p=5,q=5) in both cases.

So, **Value-I = Value-II**.

77) Answer - C

Find Value-I (minimum average)

- Since the numbers are consecutive integers and each number ≥ -5.
- To minimize the average of 11 consecutive integers, pick the smallest possible starting integer = -5.
- The set is: −5,−4,−3,...,5 (11 numbers).

Sum of these numbers = sum from -5 to 5.

Sum of integers from 1 to 5 = 5×6/2=15 Sum from -5 to -1 = −(1+2+3+4+5)=−15
Sum from -5 to 5 = −15+0+15=0
Average = sum / 11 = 0 / 11 = 0
So, **Value-I = 0**
Find Value-II (minimum product)

- The numbers are 11 consecutive **non-negative integers**.
- The smallest such set is: 0,1,2,...,100,
- The product of these numbers includes 0, so the product = 0.

Is there any other product smaller than 0? No, since product is either positive or zero (numbers are non-negative).
So, **Value-II = 0**

78) Answer- A

- p+q+r=3k.
- "p is as much more than average as q is less than average."
  This means:

p−k=k−q ⟹ p+q=2k
Substitute p+q=2k:
2k+r=3k ⟹ r=3k−2k=k

79) Answer: A

Since x is positive and less than 1, powers of x get smaller as the exponent increases.
So x^2 > x^3 because multiplying by x<1 reduces the value.
For statement 2, for x =1/4.. x is equal to square root of x and hence, statement is wrong

80) Answer- C

If two natural numbers differ by 10, say a and a+10, then the natural numbers divisible by 5 **between** them are:

- All multiples of 5 between a and a+10.

Since 10 is a multiple of 5, **there will be exactly two numbers divisible by 5 in that range** (including possibly the endpoints):

- One divisible by 5 at a (if divisible by 5),
- One divisible by 5 at a+5,
- And one at a+10 (if included).

So, the natural numbers divisible by 5 between two numbers differing by 10 **are consecutive multiples of 5**, spaced by 5 units.