

CLAT Community

daily
QT

SECTIONAL TEST

45

DAYS TO GO FOR
CLAT 2027



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OUR RANKERS

1 in every 4 of CLAT Community's students
are now placed in Top 5 NLU's.



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RIYA CHAUHAN



SHEIKH EHSAN KHALEELULLAH



HRISHIT PODDAR



ROHAN YADAV



TEJAS ROY



ANIRUDDH BAJAJ



KABIR WADHWANI



CANCHI SISTLA AKSHARA



SHIVAM TRIPATHI



HARDIK GAUTAM



MANYA BHASKAR



NAMASHRITA GOPINATH



RONIL DHASAL



VEDA RAO



SAMANDAR SINGH



GANJI HAINDAVI



SAHISHNA



PRANAV. S

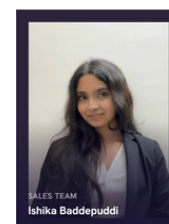
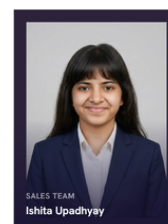
AND
MANY
MORE.

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OUR COURSES



OUR MENTORS



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MENTORS' NOTE

Good morning everyone,

If you're reading this, you're already doing something that thousands of CLAT aspirants never do—you've shown up today. That might sound like a small thing, but over the next few months you'll realise that success in CLAT is rarely decided by one brilliant mock or one 12-hour study session. It's decided by the hundreds of ordinary days where you choose to sit down and study even when you don't feel like it.

The entire CLAT Community team is rooting for you. Whenever you're stuck, ask doubts, discuss questions, and make use of the people around you. You don't have to prepare alone. We hope today's material helps you take one more step towards your dream.

Now stop reading this note and get to work. Your future self will thank you for the effort you put in today.

All the best.

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DAILY QT

PASSAGE 1 — CARTOBRIDGE ENGINEERING: HARMONIC PROGRESSIONS & HARMONIC MEANS

CartoBridge Engineering designs load-bearing frames for footbridges, and its structural team has adopted a rule that the lengths of successive support beams must form a harmonic progression. A sequence is harmonic when the reciprocals of its terms form an arithmetic progression. The engineers prefer this design because the stiffness of each beam varies in a regular way with its reciprocal length, which keeps the load evenly distributed across the frame.

For the prototype bridge, the team uses five beams of lengths 12 m, 15 m, 20 m, 30 m and 60 m, in that order. The reciprocals of these lengths are $1/12$, $1/15$, $1/20$, $1/30$ and $1/60$. These reciprocals decrease by the same amount at each step, so the lengths form a harmonic progression. Two standard measures are used in the design report. The harmonic mean of a set of n beams is n divided by the sum of their reciprocals, and it describes the effective stiffness of the whole frame. For any two beams, the harmonic mean is twice their product divided by their sum.

The design team also checks whether an extra beam can be inserted between two existing beams while keeping the harmonic pattern. Such a check requires solving for a missing length so that three consecutive lengths remain in harmonic progression. A separate question concerns the total of all reciprocals, which the team uses to estimate the combined bending resistance. Unless stated otherwise, all lengths are in metres, and each beam is treated as an ideal rod with no material loss.

1. The length of the fifth beam in the prototype is:

- (A) 45 m
- (B) 60 m
- (C) 30 m
- (D) 90 m

2. The common difference between consecutive reciprocals of the beam lengths is:

- (A) $1/60$

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(B) $-1/30$

(C) $-1/60$

(D) $-1/12$

3. The harmonic mean of the beams of length 12 m and 60 m is:

(A) 20 m

(B) 18 m

(C) 24 m

(D) 16 m

4. The sum of the reciprocals of all five beam lengths is:

(A) $1/3$

(B) $1/5$

(C) $1/2$

(D) $1/4$

5. The harmonic mean of all five beams is:

(A) 15 m

(B) 18 m

(C) 20 m

(D) 24 m

6. A new beam of length x m is placed so that 12, x and 30 form a harmonic progression. The value of x is:

(A) 18

(B) $120/7$

(C) 16

(D) 20

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PASSAGE 2 — VERTEX ANALYTICS: POLYNOMIAL REMAINDERS & CALIBRATION

Vertex Analytics uses polynomial models to predict the output of a chemical reactor, and its engineers rely on the remainder theorem to test those models quickly without carrying out full division. The remainder theorem states that when a polynomial $P(x)$ is divided by a linear factor $x - a$, the remainder equals $P(a)$. The same idea extends to divisors of higher degree: dividing by a quadratic leaves a remainder of degree at most one.

The team's current model is $P(x) = 2x^3 - 5x^2 + 4x - 7$, where x is the temperature setting in a standard unit. The engineers test this polynomial at several settings. They also study what happens when a constant is added to the model, since a fixed offset in the sensor reading changes the value of the function at each setting. A zero of a polynomial is a value at which the function equals zero, and a value that makes $P(x) + k$ equal zero at a chosen point gives the offset needed to calibrate the instrument.

The analytics group also explores products of linear factors. When a polynomial is divided by a product of two distinct linear factors, the remainder is a linear expression whose coefficients are fixed by the values of the polynomial at the two roots. Unless stated otherwise, all coefficients are integers, and all remainders are polynomials written in standard form with the highest power of x first.

7. The value of $P(1)$, where $P(x) = 2x^3 - 5x^2 + 4x - 7$, is:

- (A) -6
- (B) 6
- (C) -2
- (D) 4

8. The remainder when $P(x)$ is divided by $x + 2$ is:

- (A) -47
- (B) 51
- (C) -51
- (D) -55

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9. When $P(x)$ is divided by $x^2 - 1$, the remainder is $6x - 12$. The value of this remainder at $x = 3$ is:

- (A) 12
- (B) 6
- (C) 0
- (D) 18

10. The constant k for which $P(x) + k$ is exactly divisible by $x - 2$ is:

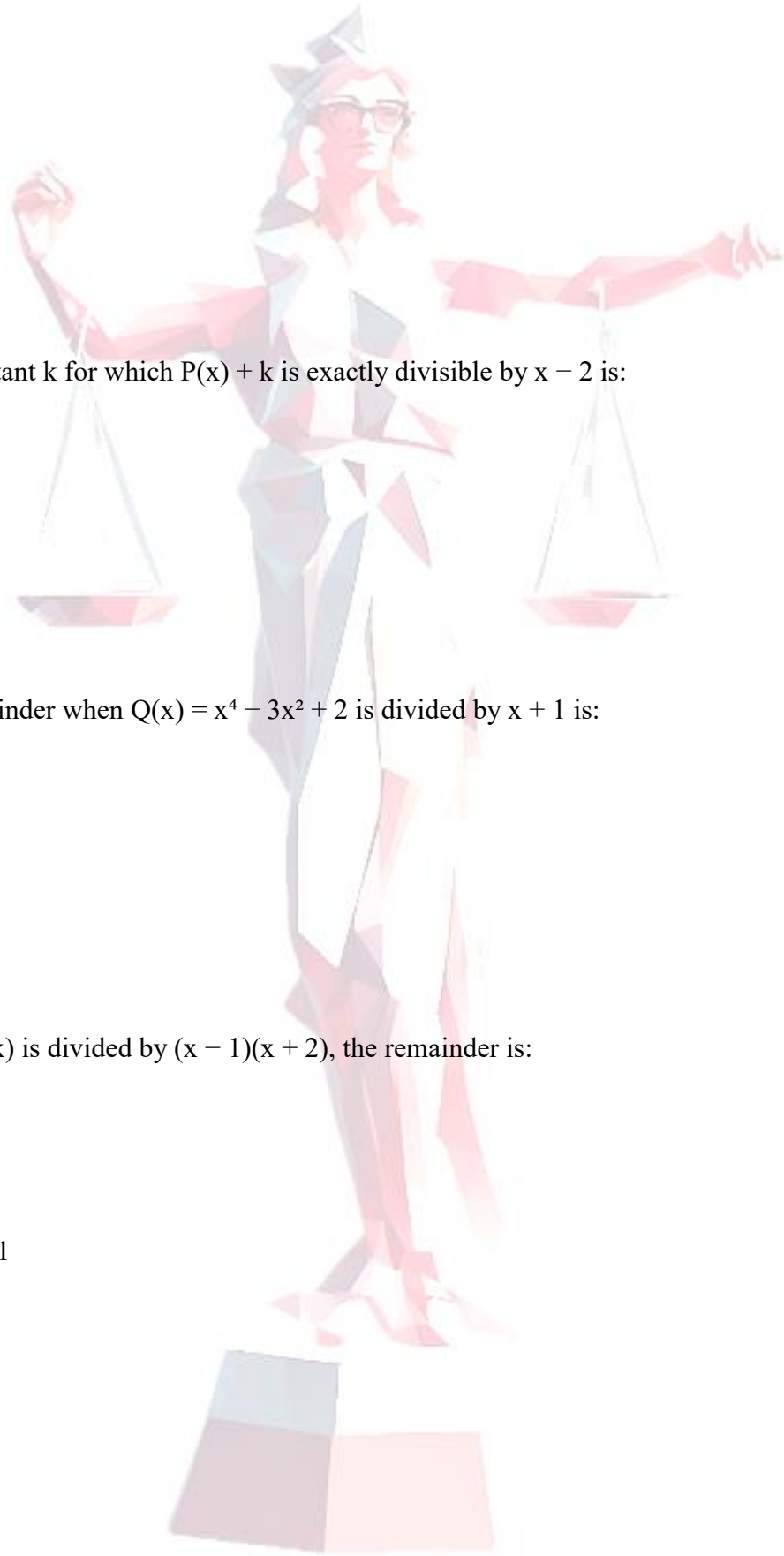
- (A) -3
- (B) 1
- (C) 2
- (D) 3

11. The remainder when $Q(x) = x^4 - 3x^2 + 2$ is divided by $x + 1$ is:

- (A) 0
- (B) 1
- (C) -1
- (D) 2

12. When $P(x)$ is divided by $(x - 1)(x + 2)$, the remainder is:

- (A) $21x - 15$
- (B) $15x - 21$
- (C) $-15x + 21$
- (D) $6x - 12$



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ANSWER KEY**PASSAGE 1 — CARTOBRIDGE ENGINEERING (HARMONIC PROGRESSIONS)**

Q1: (B) 60 m — The reciprocals $1/12$, $1/15$, $1/20$, $1/30$ and $1/60$ are the fifth term in the given list.

Q2: (C) $-1/60$ — Each step changes the reciprocal by $-1/60$, for example $1/15 - 1/12 = -1/60$.

Q3: (A) 20 m — Harmonic mean $= 2 \times 12 \times 60 / (12 + 60) = 1440/72 = 20$.

Q4: (D) $1/4$ — $5/60 + 4/60 + 3/60 + 2/60 + 1/60 = 15/60 = 1/4$.

Q5: (C) 20 m — Harmonic mean $= 5 / (1/4) = 20$.

Q6: (B) $120/7$ — Harmonic condition: $2/x = 1/12 + 1/30 = 7/60$, so $x = 120/7 \approx 17.14$.

PASSAGE 2 — VERTEX ANALYTICS (POLYNOMIAL REMAINDERS)

Q7: (A) -6 — $P(1) = 2 - 5 + 4 - 7 = -6$.

Q8: (C) -51 — By the remainder theorem, the remainder is $P(-2) = -16 - 20 - 8 - 7 = -51$.

Q9: (B) 6 — Substitute $x = 3$ into $6x - 12$, giving $18 - 12 = 6$.

Q10: (D) 3 — $P(2) = 16 - 20 + 8 - 7 = -3$, so $k = 3$ makes $P(2) + k = 0$.

Q11: (A) 0 — $Q(-1) = 1 - 3 + 2 = 0$, so the remainder is zero.

Q12: (B) $15x - 21$ — Remainder $R(x) = ax + b$ with $R(1) = P(1) = -6$ and $R(-2) = P(-2) = -51$. Solving gives $a = 15$ and $b = -21$.

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