

GATE 2021

GENERAL APTITUDE

धमाकेदार ट्रिक के साथ 🔥🔥

{ **NUMBER SYSTEM -9,
BASES & BASE CONVERSION** }



26

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AVINASH SIR



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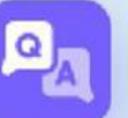


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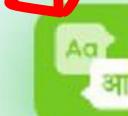
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Doubt Solving



English & Hindi



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~~Analytical Aptitude~~

- Venn Diagram
- Syllogism
- Series
- Coding & Decoding
- Clock & Calendar
- Distance & Direction
- Blood Relation
- Seating Arrangements
- Odd Man out
- Puzzle

Free

~~Quantitative Aptitude~~

- Time & Work
- Pipes & Cisterns
- Ratio & Proportion
- Number System
- Sequence & Series
- Time, Speed & Distance
- Percentage
- Profit, Loss & Discount
- Average
- Allegation & Mixture
- Powers, exponents and logarithms
- Algebra
- Permutation & Combination
- Probability
- Data Interpretation
- Mensuration and geometry

~~Spatial Aptitude~~

- Shape Matching - Two Dimensional
- Visual Comparison – Two Dimensional
- Group Rotation – Two Dimensional
- Combining Two Dimensional Shapes
- Cube Views in Three Dimensions
- Cubes in Two and Three Dimensions
- Other Solids in Two and Three Dimensions
- Block Counting in Three Dimensions
- Two-Dimensional Mirror Reflections
- Paper folding and Cutting

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Home Work Question

$$4! \rightarrow 4 \times 3 \times 2 \times 1$$

Find the unit digit of $1! + 2! + 3! + 4! + 5! + \dots + 100!$?

$$\begin{array}{cccccc} & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ 1 & + & 2 & + & 6 & + 4 & + 0 \\ & \textcircled{3} & & & & & + 0 \end{array}$$

$$5! = 5 \times 4 \times 3 \times 2 \times 1$$

↳ Unit Digit $\rightarrow 0$

$6! \rightarrow$ Unit Digit $\rightarrow 0$

$7! \rightarrow$ " $\rightarrow 0$

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Home Work Question

The highest power of 3^2 which exactly divides $20!$ is

- (A) 3 (B) 2 (C) 5 (D) 4

[DRDO-2009]

$$\begin{array}{c} 3 \mid 20 \\ \hline 3 \mid 6 \\ \hline 2 \end{array} \quad \left. \begin{array}{l} 3 \\ 3 \end{array} \right\} 3^8 \Rightarrow (3^2)^4$$

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Number System

Lecture-9

What will study in
Number System?



CF

- Classification of number
- Sum of series
- Concept of LCM & HCF
- Concept of Unit digit
- Reminder theorem
- Divisibility Rule
- Factorization
- Factorial
- Bases & Base conversion

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Today's Class Agenda

➤ Bases & Base conversion

➤ Previous Year Questions Discussion

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Bases \rightarrow Hindu Arabic System \rightarrow Decimal Number System

$(N)_10$

$(N)_x \rightarrow \textcircled{N} \rightarrow \text{digit} \rightarrow 0, 1, 2, \dots, (x-1)$

~~$(N)_x$~~ $(N)_10 \rightarrow 0, 1, 2, 3, \dots, 9$

$(N)_8 \rightarrow 0, 1, 2, 3, \dots, 7$

$(N)_2 \rightarrow 0, 1$

$(N)_4 \rightarrow 0, 1, 2, 3$

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Base Conversion

① Decimal to other

$$(\underline{124})_{10} \rightarrow (\underline{174})_8$$

8	124	
8	15	4
8	1	7

$$(\underline{34})_{10} \rightarrow (\underline{100010})_2$$

2	34	
2	17	0
2	8	1
2	4	0
2	2	0
2	1	0

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Base Conversion

② Other to Decimal

$$(174)_8 \rightarrow (124)_{10}$$

$$1 \times 8^2 + 7 \times 8^1 + 4 \times 8^0 \\ = 64 + 56 + 4$$

$$(x_0 x_1 x_2 x_3 x_4)_r \rightarrow ()_{10}$$

$$x_1 \times r^3 + x_2 \times r^2 + x_3 \times r^1 + x_4 \times r^0$$

$$(123)_4 \rightarrow (27)_{10}$$

$$1 \times 4^2 + 2 \times 4^1 + 3 \times 4^0 \\ 16 + 8 + 3 = 27$$

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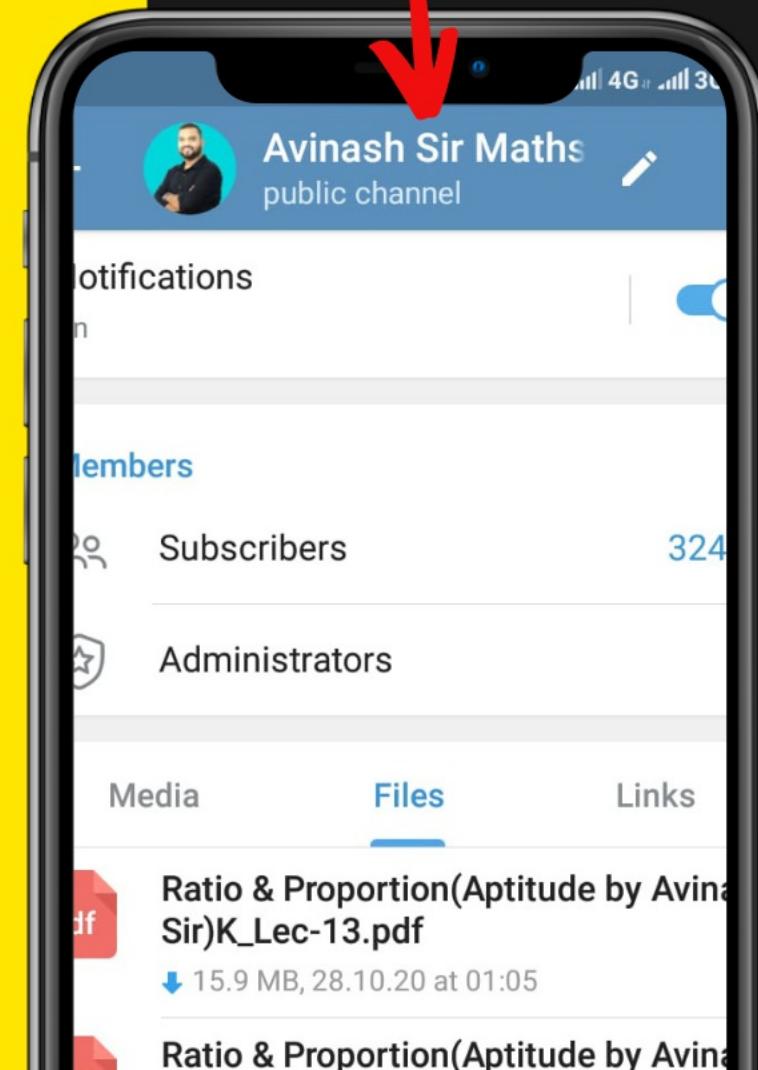


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Addition & Subtraction

$10 \rightarrow 0, 1, 2, \dots, 8, 9$

$$+1 (9 \overset{+1}{2} 7)_{10}$$

$$+ (3 \ 4 \ 5)_{10}$$

$$\overline{(1272)_{10}}$$

$$12 - \textcircled{1} - \textcircled{2}$$

$$12 - \textcircled{10} = 2$$

$8 \rightarrow 0, 1, 2, \dots, 7$

$$+1 (\overset{+1}{7} \overset{+1}{2} 5)_8$$

$$(\overset{+1}{4} 3 6)_8$$

$$\overline{(1363)_8}$$

$4 \rightarrow 0, 1, 2, 3$

$$+1 (\overset{+1}{1} \overset{+1}{2} 3)_4$$

$$+ (3 \ 2 \ 1)_4$$

$$\overline{(1110)_4}$$

$$4-4=0$$

$$5-4=1$$

$$5-4=1$$

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Addition & Subtraction

$$\begin{array}{r} \overset{+1}{\cancel{(7 \ 2 \ 3)}} \\ \underline{(3 \ 8 \ 9)} \\ \hline (3 \ 3 \ 4)_{10} \end{array}$$

$$3 + 10 = \underline{\underline{13}}$$

$$\begin{array}{r} \overset{-1}{\cancel{(7 \ 2 \ 3)}} \\ - \underline{(3 \ 2 \ 5)} \\ \hline (3 \ 7 \ 6)_8 \end{array}$$

$$\begin{array}{r} 8 + 3 = 11 \\ 8 + 1 = 9 \end{array}$$

$$\begin{array}{r} \overset{-1}{\cancel{(3 \ 2 \ 1)_9}} \\ - (1 \ 2 \ 3)_4 \\ \hline (1 \ 3 \ 2)_4 \end{array}$$

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~~Q~~ (11100)₂ = (1001)_x. X can be?

(A) 4

(B) 5

~~(C)~~ 3

(D) 10

$$(1\underline{11}00)_2 = (\underline{1}001)_x$$

$$1 \times 2^4 + 1 \times 2^3 + (\cancel{1} \times 2^2 + 0 \times 2^1 + 0 \times 2^0) = 1 \times x^3 + 0 \times x^2 + 0 \times x^1 + 1 \times x^0$$

$$16 + 8 + 4 = x^3 + 1 \Rightarrow x^3 = 27$$

~~x = 3~~

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2) If $137 + 276 = 435$, how much is $731 + 672 = ?$ [GATE-2010, 2 MARKS]

A) 534

B) 1403

C) 1623 ✓

D) 151

$$137 + 276 = 435, \quad 731 + 672 = \underline{\hspace{2cm}}$$

$$\begin{array}{r} 137 \\ 276 \\ \hline 435 \end{array} \quad 13-5=8 \quad |$$

$$\begin{array}{r} (731)8 \\ +(672)8 \\ \hline (1623) \end{array}$$

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3) Consider the equation: $(7526)_8 - (Y)_8 = (4364)_8$, where $(X)_N$ stands for X to the base N.

Find Y?

(A) ~~1634~~

(B) ~~1737~~

[GATE-2014, 2 MARKS (EE)]

(C) 3142

(D) 3162

$$(7526)_8 - (Y)_8 = (4364)_8$$

$$(7526)_8 - (4364)_8 = (Y)_8$$

$$\begin{array}{r} (7526)_8 \\ - (4364)_8 \\ \hline 3142 \end{array}$$

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Aptitude for GATE/ESE/PSUs/AE/JE/College Placement, Topic- ~~Fractionation~~



- 4) The sum and product of two integers are 26 and 165 respectively. The difference between these two integers is _____. [GATE 2019]
- A) 2 B) 3 C) 4 D) 6

$$a + b = 26$$

$$a \cdot b = 165$$

(A)

$$a - b = 2$$

$$a + b = 26$$

$$\begin{array}{r} -14 \\ \hline 12 \end{array}$$

(B)

$$a - b = 3$$

$$a + b = 26$$

$$a = b \Rightarrow \cancel{\text{Integer}}$$

(C)

$$a - b = 4$$

$$a + b = 26$$

$$a = 15, b = 11$$

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Aptitude for GATE/ESE/PSUs/AE/JE/College Placement, Topic- Factorization



5) Three hundred passengers are traveling in white, silver and black cars; each of these cars is carrying 6, 5 and 3 passengers, respectively. If the number of white and silver cars is equal and there is only one black car, what is the total number of cars?

A) 52

B) 53

C) 54

D) 55

[ESE 2017, 2 MARKS]

300

No of
Car

white

$$x = 26$$

silver

$$x = 26$$

Black

1

odd

$$= 2x + 1$$

$$6x + 5x + 3 = 300$$

(B) 53

$$\frac{16 \times 6}{6} + \frac{26 \times 5}{5} + \frac{1 \times 3}{3} = 9$$

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~~Home Work Question~~



A number consists of two digits. The sum of the digits is 9. If 45 is subtracted from the number, its digits are interchanged. What is the number? [GATE 2018, 1 MARK (ME)]

- A) 63
- B) 72
- C) 81
- D) 90

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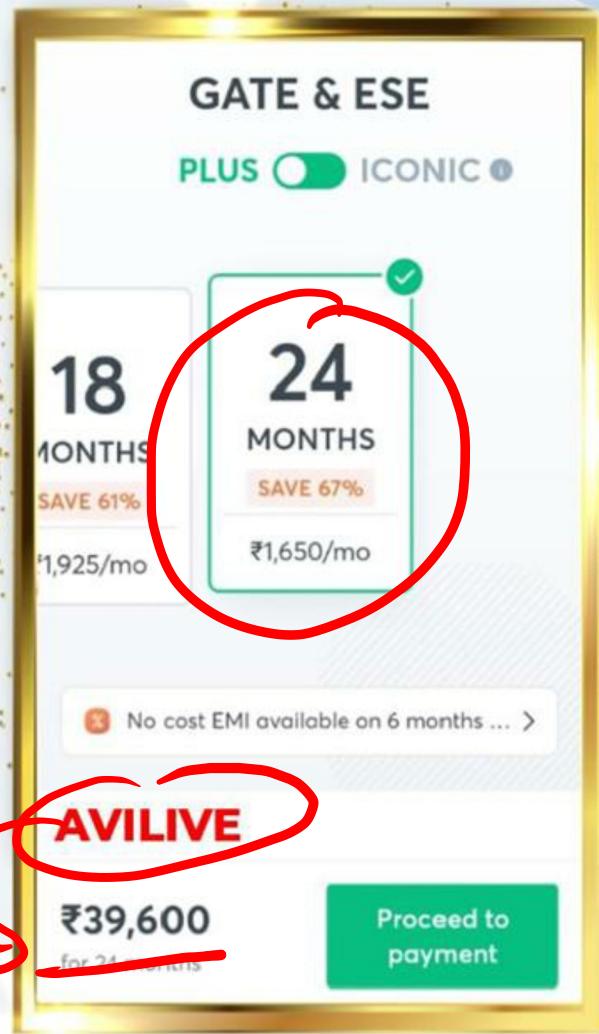
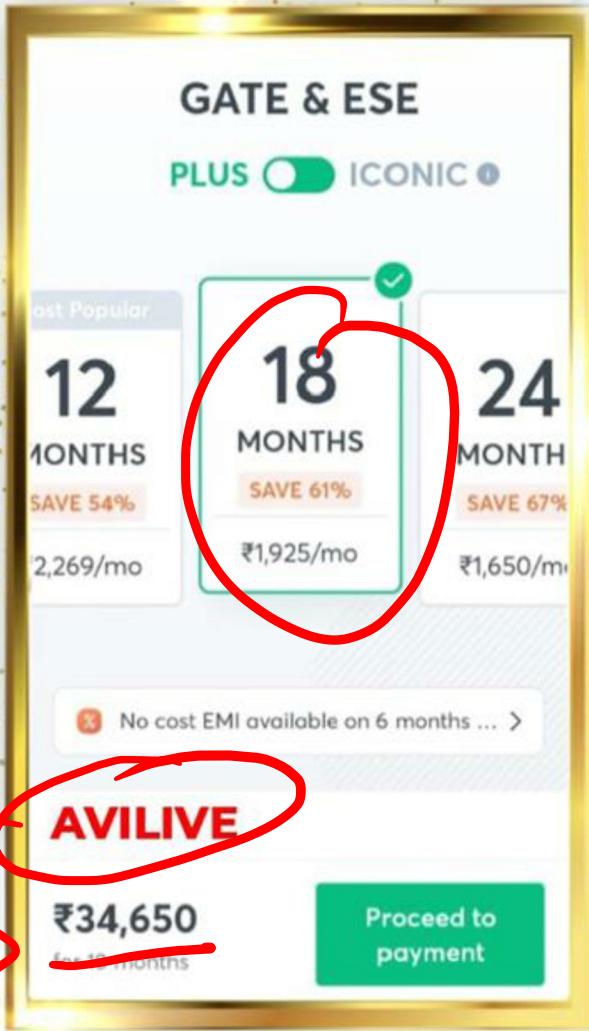
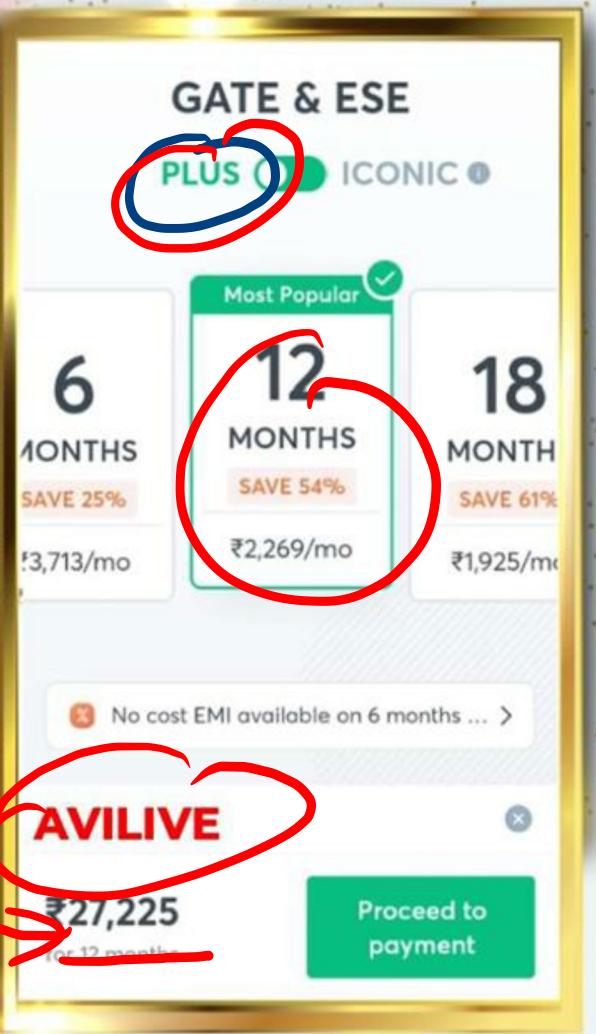
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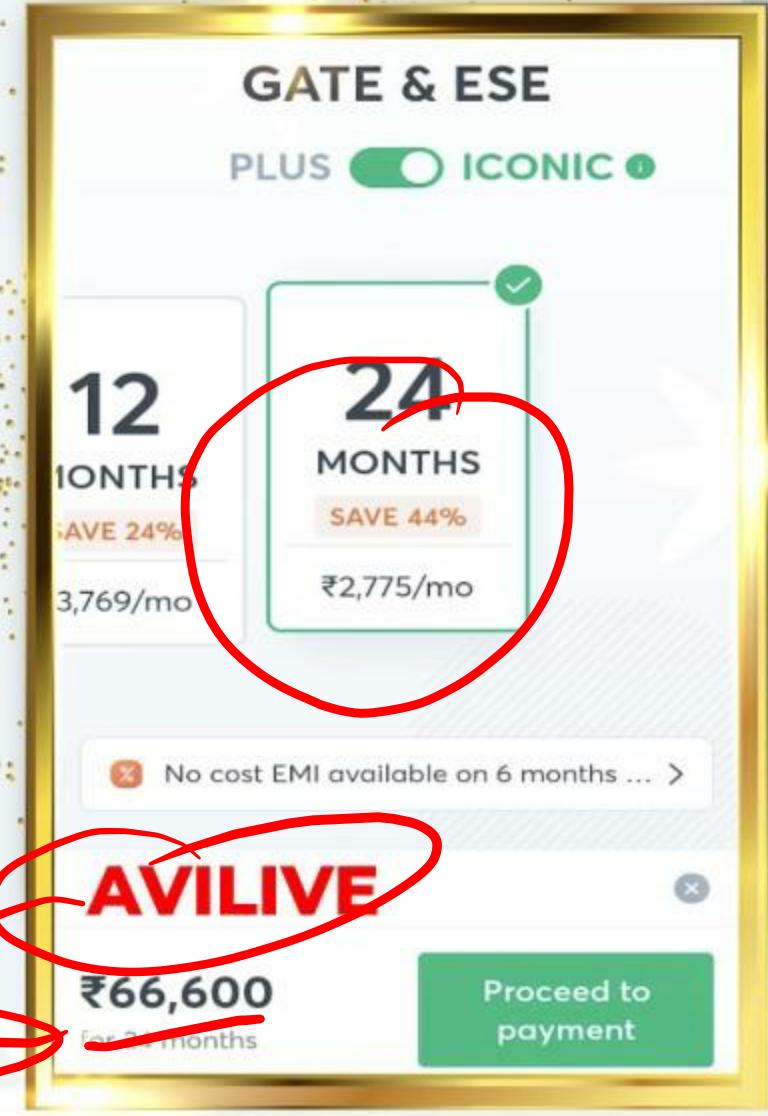
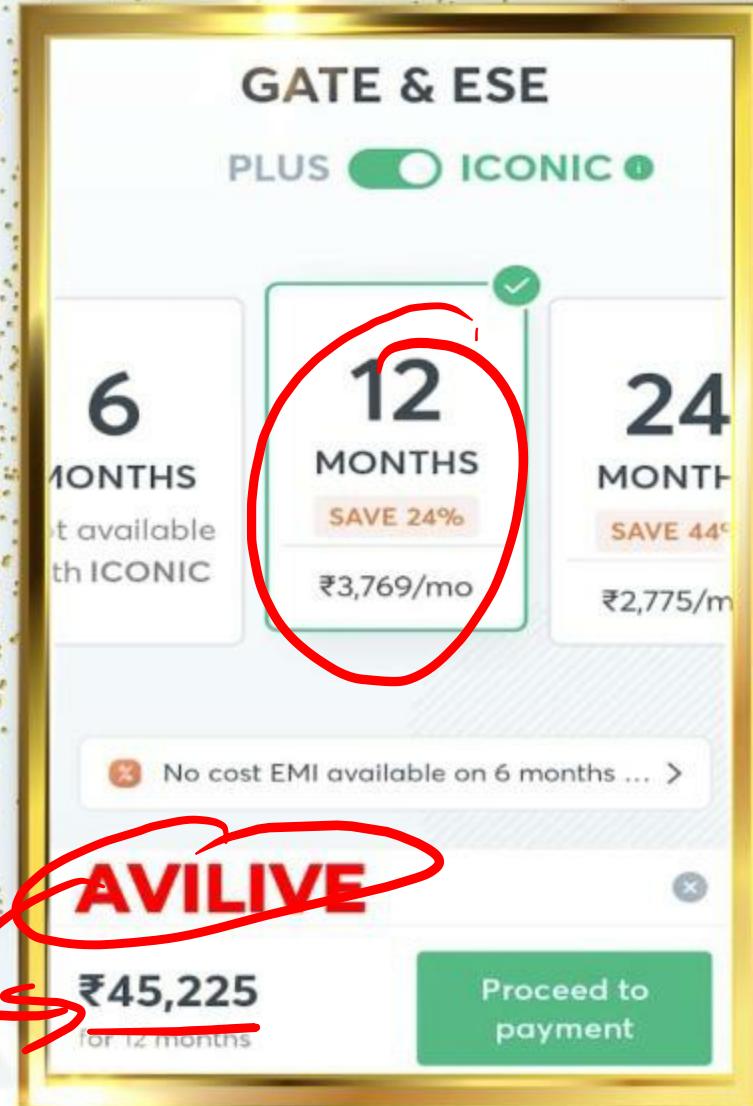
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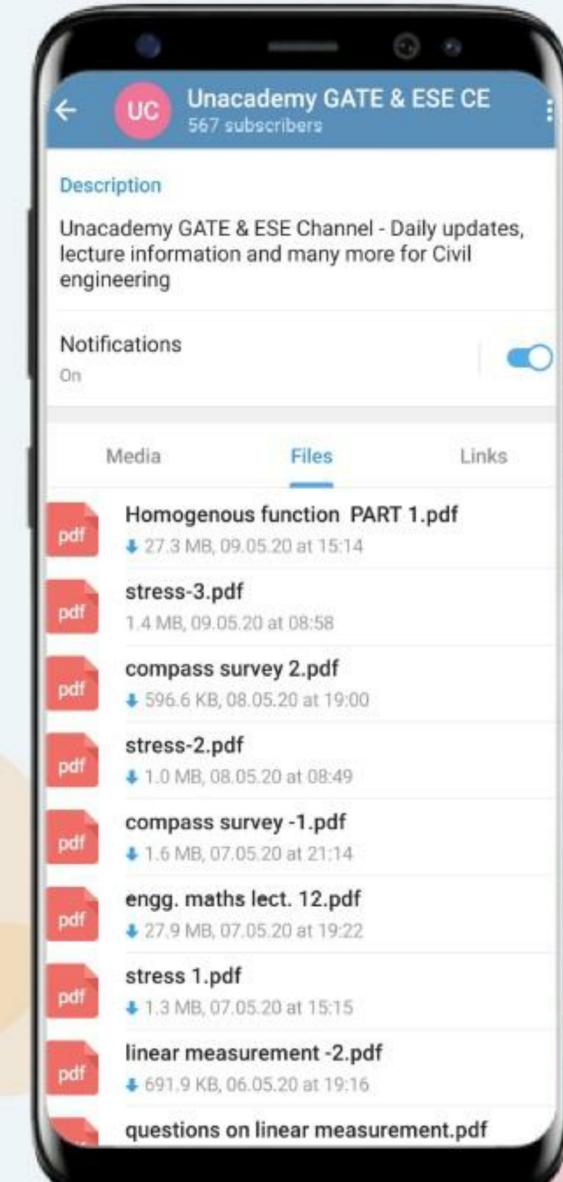








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