

ACE of PACE

Question Bank
for Engineering Aspirants

(Currently in 10th Grade)



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AIR 69 (JEE Advanced'25)

30+ Students in top 1000 rank
in JEE Advanced 2025

Factorization

1. Which is the greatest number amongst $2^{1/2}$, $3^{1/3}$, $8^{1/8}$ and $9^{1/9}$?
(a) $9^{1/9}$ (b) $8^{1/8}$ (c) $3^{1/3}$ (d) $2^{1/2}$
2. If $a = \sqrt{25 + 4\sqrt{39}}$ and $b = \sqrt{25 - 4\sqrt{39}}$, then find the value of $a^3 + b^3$.
(a) $104\sqrt{13}$ (b) $117\sqrt{13}$ (c) $96\sqrt{13}$ (d) $98\sqrt{13}$
3. Suppose m and n are positive real numbers such that $m\sqrt{m} + n\sqrt{n} = 183$ and $m\sqrt{n} + n\sqrt{m} = 182$. Find the value of $9(m + n)$
(a) 273 (b) 331 (c) 365 (d) 380

Linear Equation in Two Variables

4. 4 boys and 3 girls spent Rs. 120 on the average, of which boys spend Rs. 150 on the average, then the average amount spent by girls is
(a) Rs. 80 (b) Rs. 60 (c) Rs. 90 (d) Rs. 100
5. The sum of the digits of a two digit number is 14. If 18 is subtracted from the number, digits are reversed. Find the number.
(a) 86 (b) 77 (c) 68 (d) 76

Quadratic Equations

6. If $\sqrt{11\sqrt{11\sqrt{11\ldots\infty}}} = 14641^x$, then find x.
(a) 11 (b) 4 (c) $\frac{1}{4}$ (d) None of these
7. If $x^2 - 3x + 1 = 0$, then the value of $x^5 + \frac{1}{x^5}$
(a) 87 (b) 123 (c) 135 (d) 201
8. If any polynomial $f(x)$ is divided by $x^2 - 9$, then remainder is $3x + 2$. If it is divided by $(x - 3)$ the remainder will be:
(a) -7 (b) 7 (c) 11 (d) -11
9. If $2019^x + 2019^{-x} = 3$, then the value of $\sqrt{\frac{2019^{6x} - 2019^{-6x}}{2019^x - 2019^{-x}}}$ is
(a) 3 (b) 6 (c) 9 (d) 12
10. If α and β are the roots of the equation $x^2 + (\sqrt{\alpha})x + \beta = 0$ then the values of α and β are ($\alpha, \beta \neq 0$)
(a) $\alpha = 1, \beta = -2$ (b) $\alpha = 2, \beta = -2$ (c) $\alpha = 1, \beta = -1$ (d) $\alpha = -1, \beta = 1$
11. If $\frac{\alpha}{\beta}$ and $\frac{\beta}{\alpha}$ are the real roots of $px^2 + qx + r = 0$, then
(a) $p = r$ (b) $q^2 = pq$ (c) $q^2 = 2pq$ (d) none of these

12. If one root of the equation $x^2 + px + 12 = 0$ is 4, while the equation $x^2 + px + q = 0$ has equal roots, then the value of 'q' is
 (a) $49/4$ (b) 12 (c) 3 (d) 4
13. Find the maximum or minimum value of the quadratic expression, $x^2 - 3x + 5$ whichever exists
 (a) The minimum value is $\frac{9}{10}$ (b) The minimum value is $\frac{11}{4}$
 (c) The maximum value is $\frac{9}{10}$ (d) The maximum value is $\frac{11}{4}$
14. If x is real, then the maximum value of $3 - 6x - 8x^2$ is
 (a) $\frac{17}{8}$ (b) $\frac{33}{8}$ (c) $\frac{21}{8}$ (d) none of these
15. Find the range of the values of x which satisfy the inequation, $x^2 - 7x + 3 < 2x + 25$.
 (a) $(-2, 11)$ (b) $(2, 11)$ (c) $(-\infty, -1) \cup (2, 11)$ (d) $(-8, -2) \cup [11, \infty)$
16. Roots of $3^x + 3^{-x} = \frac{10}{3}$ are
 (a) 0.1 (b) 1, -1 (c) 0, -1 (d) None of these
17. If $x = \frac{1}{x + \frac{1}{x + \frac{1}{x + \dots \infty}}}$, the x =
 (a) $\pm \frac{1}{\sqrt{2}}$ (b) $\pm \frac{1}{2}$ (c) 0 (d) ± 1
18. The values of x satisfying the equation is $\frac{x-1}{x-2} + \frac{x-3}{x-4} = 3\frac{1}{3}$; $x \neq 2, 4$
 (a) $3, \frac{3}{2}$ (b) $5, \frac{5}{2}$ (c) $7, \frac{7}{2}$ (d) $9, \frac{9}{2}$
19. If $x = \sqrt{1 + \sqrt{1 + \sqrt{1 + \dots \infty}}}$, then x is equal to
 (a) $\frac{1 + \sqrt{5}}{2}$ (b) $\frac{1 - \sqrt{5}}{2}$ (c) $\frac{1 \pm \sqrt{5}}{2}$ (d) $\frac{1 \pm \sqrt{3}}{2}$
20. Positive value of p for which equation $x^2 + px + 64 = 0$ and $x^2 - 8x + p = 0$ will both have real roots will be
 (a) $p \geq 16$ (b) $p \leq 16$ (c) $p = 16$ (d) none of these
21. Two numbers differ by 4 and their product is 192. The numbers are
 (a) 12, 16 (b) 10, 14 (c) 11, 15 (d) 13, 18
22. If -4 is a root of the quadratic equation $x^2 + px - 4 = 0$ and the quadratic equation $x^2 + px + k = 0$ has equal roots, the value of k is
 (a) $\frac{3}{4}$ (b) $\frac{5}{4}$ (c) $\frac{7}{4}$ (d) $\frac{9}{4}$

23. The values of x of which $\frac{x+3}{x^2-3x-54} \geq 0$ are _____.
 (a) $(-6, -3] \cup (-1, 6)$ (b) $[-6, -3] \cup [9, \infty)$ (c) $(-6, -3] \cup (9, \infty)$ (d) $(-6, \infty)$
24. The values of x for which $-2x-4 \leq (x+2)^2 \leq -2x-1$ is satisfied are
 (a) $[-5, -1]$ (b) $[-5, 0]$
 (c) $[-5, -4] \cup [-2, +1]$ (d) $[-5, -4] \cup [-2, -1]$
25. If $\frac{x^2+x-12}{x^2-3x+2} < 0$, then x lies in _____.
 (a) $(-4, 3)$ (b) $(-4, 2)$ (c) $[-4, 1] \cup [2, 3]$ (d) $(-4, 1) \cup (2, 3)$
26. For what value of x : $-3x^2+5x-12$ has maximum value?
 (a) $-\frac{5}{3}$ (b) $\frac{5}{6}$ (c) $-\frac{5}{6}$ (d) $\frac{5}{3}$
27. If $y^2+6y-3m=0$ and $y^2-3y+m=0$ have a common root, then find the possible values of m .
 (a) $0, -\frac{27}{16}$ (b) $0, -\frac{81}{16}$ (c) $0, \frac{81}{16}$ (d) $0, \frac{27}{16}$
28. For what value of a , the sum of roots of the equation $x^2+2(2-a-a^2)x-a^2=0$ is zero
 (a) 1, 2 (b) 1, -2 (c) -1, 2 (d) -1, -2
29. The difference between the roots of the equation $x^2-7x-9=0$ is
 (a) 7 (b) $\sqrt{85}$ (c) 9 (d) $2\sqrt{85}$

Polynomial

30. If $f(x) = x^4 + ax^3 + bx^2 + cx + d$ is a polynomial such that $f(1) = 5$, $f(2) = 10$, $f(3) = 15$, $f(4) = 20$.
 Find the value of $\frac{f(12)+f(-8)}{100}$
 (a) 198 (b) 198.4 (c) 198.2 (d) 199.2
31. If $N = \sqrt[3]{4} + \sqrt[3]{2} + 1$, then the value of $\frac{1}{N^3} + \frac{3}{N^2} + \frac{3}{N}$ is
 (a) 2 (b) 4 (c) 7 (d) 1
32. If $\sqrt{p} - \sqrt{q} = 20$, then the maximum value of $\left(\frac{p-5q}{100}\right)$ is:
 (a) 5 (b) 10 (c) 15 (d) 25
33. How many time, graph of the polynomial $f(x) = x^3 - 1$ will intersect x -axis:
 (a) 0 (b) 1 (c) 2 (d) 4

34. $F(x)$ is a polynomial in x . When $F(x)$ is divided by $(x - 2)$, the remainder obtained is 3, when the same polynomial is divided by $(x - 3)$, the remainder obtained is 2. What is the remainder when $F(x)$ is divided by $(x - 3)(x - 2)$?
- (a) $-x + 5$ (b) $-\frac{5}{3}x + 7$ (c) 0 (d) 5
35. Find the other zero of the polynomial $x^3 + 3x^2 - 2x - 6$, if two of its zeroes are $-\sqrt{2}$ and $\sqrt{2}$
- (a) -3 (b) 3 (c) 2 (d) None of these
36. If $\frac{p}{q} + \frac{q}{p} = 2$, what is the value of $\left(\frac{p}{q}\right)^{23} + \left(\frac{q}{p}\right)^7$
- (a) 0 (b) 2 (c) -2 (d) none of these
37. Value of $x \left[\left(1 + \frac{1}{x}\right) \left(1 + \frac{1}{x+1}\right) \left(1 + \frac{1}{x+2}\right) - 1 \right]$ is
- (a) 3 (b) $2x$ (c) $5x$ (d) 1
38. If $x + y + z = 1$, $x^2 + y^2 + z^2 = 2$ and $x^3 + y^3 + z^3 = 3$ then the value of xyz is _____.
- (a) $1/5$ (b) $1/6$ (c) $1/7$ (d) $1/8$
39. If $pqr = 1$, then the value of $\left(\frac{1}{1+p+q^{-1}} + \frac{1}{1+q+r^{-1}} + \frac{1}{1+r+p^{-1}} \right)$
- (a) 0 (b) pq (c) 1 (d) pqr
40. If $a = \frac{4xy}{x+y}$, the value of $\frac{a+2x}{a-2x} + \frac{a+2y}{a-2y}$ in most simplified form is
- (a) 0 (b) 1 (c) -1 (d) 2
41. If $x + \frac{1}{x} = 5$, then $x^3 - 5x^2 + x + \frac{1}{x^3} - \frac{5}{x^2} + \frac{1}{x} = \dots$
- (a) -5 (b) 0 (c) 5 (d) 10
42. If $x = \frac{1}{1+\sqrt{2}}$, then value of $x^2 + 2x + 3$ is:
- (a) 3 (b) 0 (c) 4 (d) 1

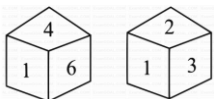
Progression

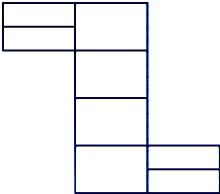
43. In a certain A.P., 5 times the 5th term is equal to 8 times the 8th term, then its 13th term is
- (a) 0 (b) -1 (c) -12 (d) -13
44. If 7th and 13th term of an A.P. be 34 and 64 respectively, then its 18th term is
- (a) 87 (b) 88 (c) 89 (d) 90
45. 7th term of an A.P. is 40, then the sum of first 13 terms is
- (a) 53 (b) 520 (c) 1040 (d) 2080
46. The first term of an A.P. is 2 and common difference is 4. The sum of its 40 terms will be
- (a) 3200 (b) 1600 (c) 200 (d) 2800

47. The sum of the first and third term of an A.P. is 12 and the product of first and second term is 24, the first term is
 (a) 1 (b) 8 (c) 4 (d) 6
48. If the sum of the first $2n$ terms of 2, 5, 8.... is equal to the sum of the first n terms of 57, 59, 61...., then n is equal to
 (a) 10 (b) 12 (c) 11 (d) 13
49. If the sum of the 10 terms of an A.P. is 4 times to the sum of its 5 terms, then the ratio of first term and common difference is
 (a) 1 : 2 (b) 2 : 1 (c) 2 : 3 (d) 3 : 2
50. If the sum of first p terms, first q terms and first r terms of an A.P. be x , y and z respectively, then $\frac{x}{p}(q-r) + \frac{y}{q}(r-p) + \frac{z}{r}(p-q)$ is
 (a) 0 (b) 2 (c) pqr (d) $\frac{8xyz}{pqr}$
51. If $\log 2, \log(2^n - 1)$ and $\log(2^n + 3)$ are in A.P., then $n =$
 (a) $\frac{5}{2}$ (b) $\log_2 5$ (c) $\log_3 5$ (d) $\frac{3}{2}$
52. If m^{th} terms of the sequence $163 + 167 + 169 + \dots$ and $103 + 110 + 117 + 124 + \dots$ be equal, then $m =$
 (a) 11 (b) 12 (c) 13 (d) 15
53. If the numbers a, b, c, d, e form an A.P., then the value of $a - 4b + 6c - 4d + e$ is:
 (a) 0 (b) $2a$ (c) $2c$ (d) $2e$
54. The sum of first four terms of an A.P. is 56 and sum of its last four terms is 112. If its first term is 11 then number of its terms is/are
 (a) 10 (b) 11 (c) 12 (d) None of these
55. The third of an A.P. is 9 and the difference of the seventh and the second term is 20. If the number 2001 is the n^{th} term of the sequence then n is
 (a) equal to 499 (b) equal to 500 (c) equal to 501 (d) can have no value
56. Let T_r be the r^{th} term of an A.P., for $r = 1, 2, 3, \dots$. If the some positive integers m, n we have $T_m = \frac{1}{n}$ and $T_n = \frac{1}{m}$, T_{mn} equals
 (a) $\frac{1}{mn}$ (b) $\frac{1}{m} + \frac{1}{n}$ (c) 1 (d) 0
57. If $\log_3 2, \log_3(2^x - 5)$ and $\log_3\left(2^x - \frac{7}{2}\right)$ are in A.P. then $x =$
 (a) 2 (b) 3 (c) 4 (d) 2 or 3
58. Five distinct positive integers are in arithmetic progression with a positive common difference. If their sum is 10020, then find the smallest possible value of the last term.
 (a) 2002 (b) 2004 (c) 2006 (d) 2008

59. In a right triangle, the lengths of the sides are in arithmetic progression. If the lengths of the sides of the triangle are integers, which of the following could be the length of the shortest side ?
 (a) 2125 (b) 1700 (c) 1275 (d) 1150
60. If $S_1 = 3, 7, 11, 15, \dots$ upto 125 terms and $S_2 = 4, 7, 10, 13, 16, \dots$ upto 125 terms, then how many terms are there in S_1 that are there in S_2 ?
 (a) 29 (b) 30 (c) 31 (d) 32
61. Find the sum of all the multiples of 6 between 200 and 1100.
 (a) 96750 (b) 95760 (c) 97560 (d) 97650
62. The middle term of the progression 4, 9, 14, ..., 104 is
 (a) 44 (b) 49 (c) 59 (d) 54
63. If the 9th term of an A.P. be zero, then the ratio of its 29th and 19th term is :
 (a) 1 : 2 (b) 2 : 1 (c) 1 : 3 (d) 3 : 1
64. If fourth term of an A.P. is thrice its first term and seventh term $- 2$ (third term) = 1, then its common difference is :
 (a) 1 (b) 2 (c) -2 (d) 3
65. If the ratio of sum of n terms of two A.P.'s is $(3n + 8) : (7n + 15)$, then the ratio of 12th terms is
 (a) 16 : 7 (b) 7 : 16 (c) 7 : 12 (d) 12 : 5
66. If we divide 20 into four parts which are in A.P. such that the product of the first and the fourth is to the product of the second and third is 2 : 3, then the smallest part is
 (a) 1 (b) 2 (c) 3 (d) 4

Logical Reasoning

67. Neeraj starts walking towards South. After walking 15 m, he turns towards North. After walking 20 m, he turns towards East and walks 10 m. He then turns towards South and walks 5 m. How far is he from his original position and in which direction?
 (a) 10 m, East (b) 10 m, South-East (c) 10 m, West (d) 10 m, North-East
68. Given below are two different orientations of a die. What will be the number on the face opposite to the face with 4?

 (a) 4 (b) 5 (c) 2 (d) 3
69. In a row of forty children, P is thirteenth from the left end and Q is ninth from the right end. How many children are there between P and R, if R is fourth to the left of Q?
 (a) 12 (b) 13 (c) 14 (d) 15
70. The average marks of 50 students in a class was found to be 64. If the marks of two students were incorrectly entered as 38 and 42 instead of 83 and 24, respectively, then what is the correct average?
 (a) 64.54 (b) 62.32 (c) 61.24 (d) 61.86
71. Which number will replace the question mark (?) in the given series?
 47, 51, 55, 63, 87, ?
 (a) 190 (b) 183 (c) 121 (d) 155

72. Which letter-cluster will replace the question mark (?) in the given series?
KLIMC, JJFIX, IHCES, HFZAN, ?
(a) HEWWI (b) GDUVI (c) GDWWI (d) GDXWJ
73. 'P # Q' means 'P' is the brother of 'Q' 'P @Q' means 'P' is the daughter of 'Q'.
'P % Q' means 'P' is the father of 'Q'.
'P \ & Q' means 'P' is the mother of 'Q'.
If 'A @ B # C \ & E @ F \ % R, then which of the following statement is correct.
(a) C is the brother of B. (b) A is the cousin of E.
(c) F is the brother of R. (d) B is the maternal aunt of E.
74. 'A + B' means 'A is the mother of B'.
'A - B' means 'A is the brother of B'.
'A × B' means 'A is the father of B'.
'A ÷ B' means 'A is the daughter of B'.
If, $P - K \times Y - J \div S + R$, then which of the following statement is not correct?
(a) K is husband of S (b) Y is son of S
(c) J is daughter of P (d) P is paternal uncle of R
75. In the given question below are given some statements followed by two conclusions numbered I and II. You have to take the given statements to be true even if they seem to be at variance from commonly known facts. Read all the conclusions and then decide which of the given conclusions logically follow.
Statements
All facebook are whatsapp.
Some whatsapp are Paytm.
No paytm is Telegram.
Conclusions
Some Telegram is a Facebook.
Some Whatapp is not Telegram.
(a) Only I follows (b) Only II follows
(c) Neither I nor II follows (d) Both I and II follow.
76. The product of the ages of Anil and Bishnu is 240. If twice the age of Bishnu is more than Anil's age by 4 yrs. What was Bishnu's age 2 years ago?
(a) 10 year (b) 15 year (c) 11 year (d) 13 year
77. Among five persons P, Q, R, S and T, T is older than P, Q is younger than T, S is older than R and P is older than S but younger than Q. Who is the oldest among all?
(a) P (b) T (c) S (d) Q
78. How many rectangles are there in the following figure?
- 
- (a) 8 (b) 18 (c) 17 (d) 20

Answer key:

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