

ONE DAY REVISION

MINDMAP NOTES

AMAN KHEDIA

LOGARITHMS

BASIC LEVEL 1

20. $\log 6 + \log 5$ is expressed as
 (a) $\log 11$ (b) $\log 30$
 (c) $\log 5/6$ (d) none of these
21. $\log_2 8$ is equal to
 (a) 2 (b) 8
 (c) 3 (d) none of these
22. $\log 32/4$ is equal to
 (a) $\log 32/\log 4$ (b) 8
 (c) 3 (d) None
23. $\log (1 \times 2 \times 3)$ is equal to
 (a) $\log 1 + \log 2 + \log 3$
 (b) $\log 3$
 (c) $\log 2$
 (d) none of these
24. $\log_{2\sqrt{3}} 1728$ is equal to
 (a) $2\sqrt{3}$ (b) 2
 (c) 6 (d) none of these

BASIC LEVEL 2

29. If $\log x + \log y = \log (x+y)$, y can be expressed as
 (a) $x - 1$ (b) x
 (c) $x/x-1$ (d) none of these
30. If $\log_2 x + \log_4 x + \log_{16} x = 21/4$, then x is equal to
 (a) 8 (b) 4
 (c) 16 (d) none of these
31. The simplified value of $2 \log_{10} 5 + \log_{10} 4$ is
 (a) $1/2$ (b) 4
 (c) 2 (d) none of these
32. If $2 \log x = 4 \log 3$, the x is equal to
 (a) -4 (b) 9
 (c) 2 (d) none of these
33. $\log 0.0625$ to the base 2 is equal to
 (a) 4 (b) 5
 (c) 1 (d) none of these

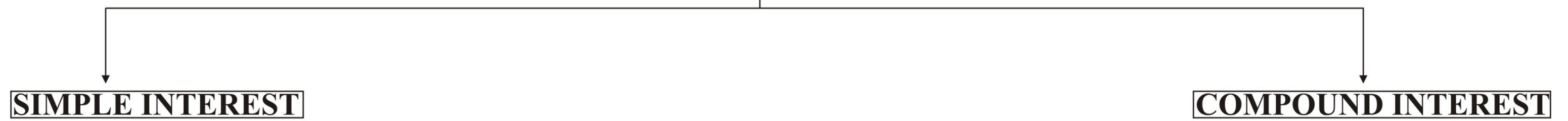
FINDING VALUE PROBLEM

16. Given $\log 2 = 0.3010$ and $\log 3 = 0.4771$ the value of $\log 6$ is
 (a) 0.9030 (b) 0.9542
 (c) 0.7781 (d) none of these
17. Given that $\log_{10} 2 = x$ and $\log_{10} 3 = y$, the value of $\log_{10} 60$ is expressed as
 (a) $x - y + 1$ (b) $x + y + 1$
 (c) $x - y - 1$ (d) none of these
18. Given that $\log_{10} 2 = x$, $\log_{10} 3 = y$, then $\log_{10} 1.2$ is expressed in terms of x and y as
 (a) $x + 2y + 1$ (b) $x + y - 1$
 (c) $2x + y - 1$ (d) none of these
19. Given that $\log x = m + n$ and $\log y = m - n$, the value of $\log 10x/y^2$ is expressed in terms of m and n as
 (a) $1 - m + 3n$ (b) $m - 1 + 3n$
 (c) $m + 3n + 1$ (d) none of these

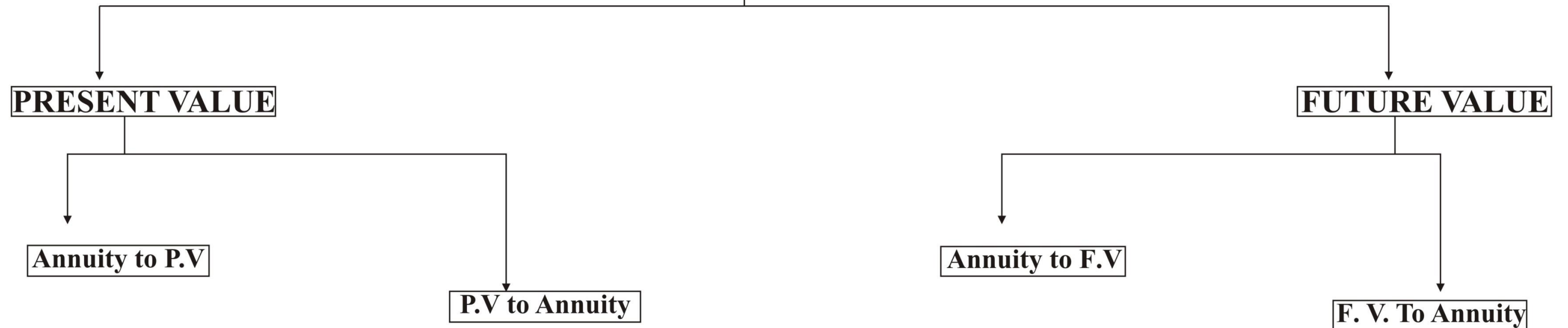
CHAIN PROBLEM

25. The value of $\log_2 \log_2 16$
 (a) 0 (b) 2
 (c) 1 (d) none of these
26. The value of $\log_2 [\log_2 \{\log_3 (\log_3 27_3)\}]$ is equal to
 (a) 1 (b) 2
 (c) 0 (d) none of these
27. On solving the equation $\log_3 [\log_2 (\log_3 t)] = 1$ we get the value of t as
 (a) 8 (b) 18
 (c) 81 (d) 6561
28. On solving the equation $\log_{1/2} [\log_t (\log_4 32)] = 2$ we get the value of t as
 (a) $5/2$ (b) $25/4$
 (c) $625/16$ (d) None

INTEREST



ANNUITY



1. If $P = \text{Rs. } 1000$, $R = 5\%$ p.a., $n = 4$; What is Amount and C.I. is
 (a) Rs. 1215.50, Rs. 215.50 (b) Rs. 1125, Rs. 125
 (c) Rs. 2115, Rs. 115 (d) none of these
2. Rs. 100 will become after 20 years at 5% p.a. compound interest amount
 (a) Rs. 250 (b) Rs. 205 (c) Rs. 265.50 (d) none of these
3. If $A = \text{Rs. } 1000$, $n = 2$ years, $R = 6\%$ p.a. compound interest payable half-yearly, then principal (P) is
 (a) Rs. 888.80 (b) Rs. 885 (c) 800 (d) none of these
4. The population of a town increases every year by 2% of the population at the beginning of that year. The number of years by which the total increase of population be 40% is
 (a) 7 years (b) 10 years (c) 17 years (d) none of these
5. The difference between C.I. and S.I. on a certain sum of money invested for 3 years at 6% p.a. is Rs. 110.16. The sum is?
 (a) Rs. 3000 (b) Rs. 3700 (c) Rs. 12000 (d) Rs. 10000
6. The C.I. on Rs. 16000 for $1\frac{1}{2}$ years at 10% p.a. payable half yearly is
 (a) Rs. 2222 (b) Rs. 2522 (c) Rs. 2500 (d) none of these
7. The C.I. on Rs. 40000 at 10% p.a. for 1 year when the interest is payable quarterly is
 (a) Rs. 4000 (b) Rs. 4100 (c) Rs. 4152.51 (d) none of these
8. The compound interest is charged on a sum of Rs. 15,000 is 10% p.a. for the 1st year, 12% p.a. for the 2nd year & 15% p.a. for the 3rd year, interest being compounded annually in all the cases. What is the total interest payable at the end of 3 years?
 (a) Rs. 7,273 (b) Rs. 6,067 (c) Rs. 6252 (d) Rs. 5,268
9. Mohan borrows Rs. 50,000 from a bank at 10% per annum. He repays Rs. 25,000 at the end of each year. What amount does he owe to the bank after the second repayment?
 (a) Rs. 10,000 (b) Rs. 8,000 (c) Rs. 12,000 (d) Rs. 18,000
9. A sum at C.I. becomes Rs. 1,020 after 3 yrs & Rs. 1,088 after 4 yrs. The rate of interest is -
 (a) 5.60% (b) 6.66% (c) 7.66% (d) 8.66%
10. The effective rate of interest corresponding to a nominal rate 3% p.a. payable half yearly is
 (a) 3.2% (b) 3.25% p.a.
 (c) 3.0225% p.a. (d) None of these
11. The effective rate of interest corresponding to a nominal rate of 7% p.a. convertible quarterly is
 (a) 7% (b) 7.5% (c) 5% (d) 7.18%
12. A machine is depreciated at the rate of 20% on reducing balance. The original cost of the machine was Rs. 100000 and its ultimate scrap value was Rs. 3000. The effective life of the machine is
 (a) 4.5 years (appx.) (b) 5.4 years (appx.)
 (c) 5 years (appx.) (d) None of these
13. The useful life of a machine is estimated to be 10 years and cost Rs. 10000. Rate of depreciation is 10% p.a. The scrap value at the end of its life is
 (a) Rs. 3486 (b) Rs. 4383 (c) Rs. 3400 (d) Rs. 10000
14. In how many years will a sum become 27 times when it trebles itself in 2 years at C.I.?
 (a) 9 years (b) 6 years (c) 12 years (d) $13\frac{1}{2}$ years
15. The compound interest on a sum for two years is Rs. 1,575 and the corresponding simple interest is Rs. 1,500. Find the compound interest on the same sum at the same rate of interest at the end of third year.
 (a) Rs. 2,428.50 (b) Rs. 2,482.50
 (c) Rs. 2,284.50 (d) Rs. 2,382.50
16. A certain sum was lent at compound interest, compounded annually for three years. The rate of interest for each of the three years was 20%, 15% and 10% p.a. respectively. If the same sum was lent at a constant rate of simple interest for the same period, then what would have been the interest rate for obtaining the same amount of interest?
 (a) 17.27% (b) 17% (c) 18% (d) 18.27%
16. The present value of an annuity of Rs. 3000 for 15 years at 4.5% p.a. CI is
 (a) Rs. 23809.41 (b) Rs. 32218.63
 (c) Rs. 32908.41 (d) none of these
17. The amount of an annuity certain of Rs. 150 for 12 years at 3.5% p.a. C.I. is
 (a) Rs. 2190.28 (b) Rs. 1290.28
 (c) Rs. 2180.28 (d) none of these
18. A loan of Rs. 10,000 is to be paid back in 30 equal installments. The amount of each installment to cover the principal and at 4% p.a. CI is
 (a) Rs. 587.87 (b) Rs. 587
 (c) Rs. 578.87 (d) none of these
19. A person invests Rs. 500 at the end of each year with a bank which pays interest at 10% p.a. C.I. annually. The amount standing to his credit one year after he has made his yearly investment for the 12th time is.
 (a) Rs. 11764.50 (b) Rs. 10000
 (c) Rs. 12000 (d) none of these
20. $A = \text{Rs. } 1200$, $n = 12$ yrs, $i = 0.08$, $v = ?$
 Using the formula $V = \frac{A}{i} \left[1 - \frac{1}{(1+i)^n} \right]$ value of v will be
 (a) Rs. 3039 (b) Rs. 3990
 (c) Rs. 9930 (d) none of these
21. $a = \text{Rs. } 100$, $n = 10$, $i = 5\%$ find the FV of annuity
 Using the formula $FV = a / \{(1+i)^n - 1\}$, FV is equal to
 (a) Rs. 1258 (b) Rs. 2581
 (c) Rs. 1528 (d) none of these
22. A company borrows Rs. 10000 on condition to repay it with compound interest at 5% p.a. by annual installments of Rs. 1000 each. The number of years by which the debt will be clear is
 (a) 14.2 yrs. (b) 10 yrs.
 (c) 12 yrs. (d) None of these

Permutation & Combination

Permutation

- Permutation = Selectionx (Arrangement)
- $n_{p_r} = \frac{n!}{(n-r)!}$
- NOTE :- $n_{p_r} = n!$

Combination

- Combination = only selection
- $n_{c_r} = \frac{n!}{(n-r)!r!}$

Problem based on words

- In how many ways letter of word.
 - HEXAGON
 - PENCIL
 - CAPTAIN can be arranged.
- In how many ways can a letter of the word MOBILE can be arranged so that.
 - Vowels come together.
 - "It never come."
 - Vowels occupy odd places.
- In how many ways letter of the word SUNDAY can be arranged so that it begin's with "s" and never ends with "N"?
- In how many way's letter of the word Triangle. Can be arranged

Problem based on number

- How many numbers greater than 2000 can be formed with 1, 2, 3, 4, 5
- How many numbers greater than a million can be formed with the digits 4, 5, 5, 0, 4, 5, 3?
- How many telephone connection may be allotted with 8 digit from the number 0,1,2, 9?
- How many 4 digit number greater than 4000 can be formed out of digits, 3, 5, 7, 8, 9?
- The number of numbers using between 100 and 1000 with the digits 1, 2, 3, 4, 5, 6, 7 is.
- The number of numbers lying between 10 and 1000 can be formed with the digits 2, 3, 4, 0, 8, 9 is.
- The total number of 9 digit number of different digits is?

Problem based on geometry

- No. of diagonals in decagons ?
- The number of straight lines obtained by joining 16 points on the plain is?
- There are 12 points in a plain of which 5 are collinear. The number of triangle is.
- 8 points are marked on the circumference of a circle. The number of words obtained is?

Miscellanies Problem

- There are 5 speaker A, B, C, D and E. the number of ways in which A will speak always before B is?
- Out of 7 gents and 4 ladies a committee of 5 is to be formed. The number of committees such that each committee includes at last one lady is?
- Every two person shakes hand with each other in a party and total no of hand snakes is 66. The no. guest is a party is. (A) 6, (B) 12, (C) 13. (D) 14.
- A person has 8 friends. The number of ways in which he may into one or more of them to a dinner is.

Sequence and Series

ARITHMETIC PROGRESSION

If common difference is same, then AP

eg. 2, 3, 4, 5-----

CD = 1

$$n^{\text{th}} \text{ term} = a + (n - 1)d$$

$$sm = \frac{n}{2}[2a + (n - 1)d]$$

$$sm = \frac{n}{2}(a + l)$$

Q. 1. Which term of the progression -1, -3, -5, ... is -39

- (a) 21st (b) 20th (c) 19th (d) none of these

Q. 2. The 20th term of the progression 1, 4, 7, 10 is

- (a) 58 (b) 52 (c) 52 (d) none of these

Q. 3. The last term of the series 5, 7, 9, To 21 terms is

- (a) 44 (b) 43 (c) 45 (d) none of these

Q. 4. The last term of the A. P. 0.6, 1.2, 1.8, ... to 13 terms is

- (a) 8.7 (b) 7.8 (c) 7.7 (d) none of these

Q. 5. The sum of the series 9, 5, 1, To 100 terms is

- (a) -18900 (b) 18900
(c) 19900 (d) none of these

GEOMETRIC PROGRESSION

If common ratio is same, then its gp

eg. 2, 4, 8, 16 -----

CR = 2

$$r^{\text{th}} = ar^{n-1}$$

$$sm = \frac{a(1 - r^n)}{r - 1} \quad r < 1$$

$$sm = \frac{a(r^n - 1)}{r - 1} \quad r > 1$$

Q. 6. The 7th term of the series 6, 12, 24 Is

- (a) 384 (b) 834 (c) 438 (d) none of these

Q. 7. t_n of the series 6, 12, 24, ... is

- (a) 786 (b) 768 (c) 867 (d) none of these

Q. 8. t_{12} of the series -128, 64, -32, ... is

- (a) -1/16 (b) 16 (c) 1/16 (d) none of these

Q. 6. The last term of the series t, -3, 9, -27 up to terms is

- (a) 297 (b) 729 (c) 927 (d) none of these

Q.7 The last term of the series x^2, x_1, \dots to 31 terms is

- (a) X^{28} (b) $1/x$ (c) $1/X^{28}$ (d) none of these

Q.8 The sum of the infinite G. P. $1 - 1/3 + 1/9 - 1/27 + \dots$ is

- (a) 0.33 (b) 0.57 (c) 0.75 (d) none of these

Q.9 Four geometric means between 4 and 972 are

- (a) 12, 36, 108, 324 (b) 12, 24, 108, 320
(c) 10, 36, 108, 320 (d) none of these

Q. 10. The nth element of the sequence 1, 3, 5, 7 ... is

- (a) n (b) $2n-1$ (c) $2n+1$ (d) none of these

Q. 11. The nth element of the sequence -1, 2, -4, 8 ... is

- (a) $(-1)^n 2^{n-1}$ (b) 2^{n-1} (c) 2^n (d) none of these

Q. 12. The first three terms of sequence when nth term t_n is $n^2 - 2n$ are

- (a) -1, 0, 3 (b) 1, 0, 2 (c) -1, 0, -3 (d) none of these

Q. 13. The nth term of the series whose sum to n terms is $5n^2 + 2n$ is

- (a) $31 - 10$ (b) $10n - 2$ (c) $10n - 3$ (d) none of these

Q. 14. The sum of n terms of an AP is $3n^2 + 5n$. The series is

- (a) 8, 14, 20, 26 (b) 8, 22, 42, 68 (c) 22, 68, 114 (d) none of these

Q.15. Sum of n terms of the series $4 + 44 + 444 + \dots$ is

- (a) $4/9 [10/9 (10^n - 1) - n]$ (b) $10/9 (10^n - 1) - n$
(c) $4/9 (10^n - 1) - n$ (d) none of these

Q.16. Sum of n terms of the series $0.1 + 0.11 + 0.111 + \dots$ is

- (a) $1/9 [n - (1 - (0.1)^n)]$ (b) $1/9 [n - (1 - (0.1)^n)/9]$
(c) $n - 1 - n/9$ (d) none of these

Q.17. The sum of the series $1 + 2 + 4 + 8 + \dots$ to n term

- (a) $2^n - 1$ (b) $2n - 1$ (c) $1/2^{n-1}$ (d) none of these

Q.18. If p, q and r are in and x, y, z are in G.P. then $X^{q-r} \cdot y^{p-q}$ is equal to

- (a) 0 (b) -1 (c) 1 (d) none of these

Q.19. The sum of $1.03 + (1.03)^2 + (1.03)^3 + \dots$ to n terms is

- (a) $103 [(1.03)^n - 1]$ (b) $103/3 [(1.03)^n - 1]$
(c) $(1.03)^n - 1$ (d) none of these

Q.20. If X, Y, Z are in A.P. and X, Y, (z + 1) are in G.P. Then

- (a) $(x - z)^2 = 4x$ (b) $z^2 = (x - y)$
(c) $z = x - y$ (d) none of these

(a) $f(x)^n = n f(x)^{n-1} \times f' / x$

(b) $\log f(x) = \frac{1}{f(x)} \times f' / (x)$

(c) $e^{f(x)} = e^{f(x)} x f'(x)$

Differentiation

(Formula)

Cont = 0

$a^{f(x)} =$

$a^{f/w} \text{Log}^a \cdot f'(x)$

Find $\frac{dy}{dx} = ?$

B

Eg. 1.

1. $y = e^{\sqrt{2x}}$
2. $y = e^{3x^2-6x+2}$
3. $y^2 = 4ax$
4. $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$
5. $x^5 + y^5 = 5xy$
6. $y = e^x + e^{-x}$
7. $y = \sqrt{2x} + 3^{2x}$
8. $y = \frac{2}{\sqrt{x}}$

D

eg. 1 $y = \frac{3-5x}{3+5x}$

eg. 2 $y = \frac{e^x + 1}{e^x - 1}$

eg. 3 $y = \frac{e^x}{(1+x)}$

eg. 4 $y = \frac{x^2}{e^x}$ then $f'(1) = ?$

eg. 5 $y = \frac{x^2 - 1}{x}$

M

eg. 1 $y = x^2 \cdot \log x$

2. $y = a^x \cdot \log x$

3. $y = x \cdot e^x$

4. $y = e^x \cdot \log x$

eg. 5 $y = \frac{x^2 - 1}{x}$

A/S

eg. $y = 7x^4 + 3x^3 - 9x + 5$

eg. $y = x(x-1)(x-2)$

eg. $y = 2x^3 - 3x^2 - 12x + 8$

at $x = 0$ is.

eg. 5 $y = \frac{x^2 - 1}{x}$

Part

1. if $x = 3t^2 - 1, y = t^3 - t$. then $\frac{dy}{dx} = ?$

2. if $x = 2t + 5, y = t^2 - 2$ $\frac{dy}{dx} = ?$

3. if $x = \frac{3at}{1+t^3}, y = \frac{3at^2}{1+t^3}$. then $\frac{dy}{dx} = ?$

Q. 1. The gradient of the curve $y = 2x^3 - 5x^2 - 3x$ at $x = 0$

Q. 2. The slope of the tangent to the curve $y = \sqrt{4-x^2}$ at the point where the ordinate and the abscissa are equal is.

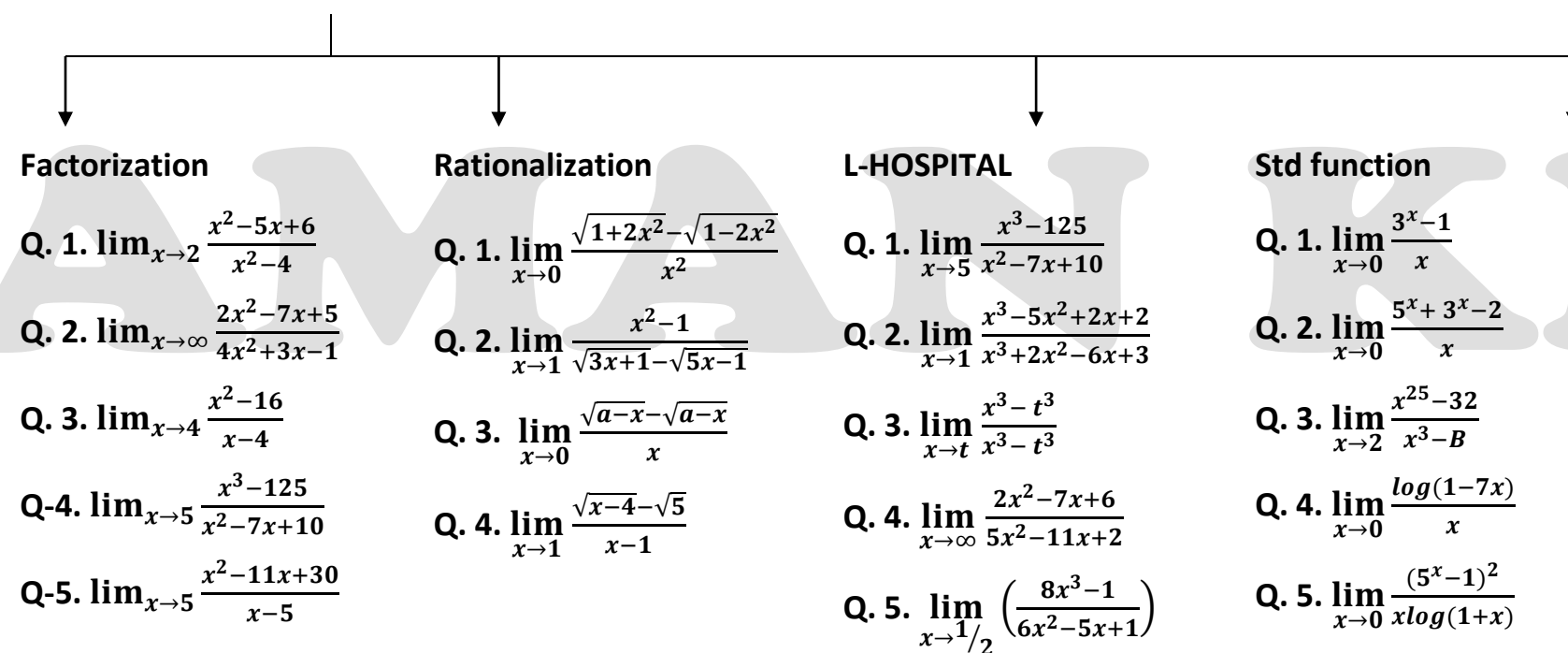
Limits & Continuity

Limits

- If $f(a^+) = f(a^-)$. Then the limit exist.
- Types of undetermined form

$$\frac{0}{0}, \frac{\infty}{\infty}, \frac{\text{number}}{0}$$

- Methods to remove indeterminacy



Continuity

To Check Continuity :-

$$f(a) = f(a^+) = f(a^-)$$

Problems

Category-1

“Conditions are given”

Q. 1. if $f(x) = x^2 + 1$ for $0 \leq x \leq 2$
 $= x + 1$ for $2 \leq x \leq 4$

Then at $x = 2$

Ans :-

Q. 2. The Function

$$f(x) = x^2 + x + 2 \text{ For } 2 \leq x \leq 4$$

$$= 3x + 4 \text{ for } 4 < x \leq 6$$

Then at $x = 4$

Ans :-

Category-2

“Condition not given”

Q. 1. $f(x) = 2x - |x|$ is at $x = 0$?

Q. 2. if $f(x) = 2x - |x|$ is at $x = 0$?

Then at $x = 4$?

$$\int X^n dx = \frac{x^{n+1}}{n+1}$$

$$\int \frac{1}{x} dx = \log x$$

$$\int e^{ax} = \frac{e^{ax}}{a}$$

INTEGRATION

Integrating Standard Function

$$\int (const) dx = (const)x$$

$$\int a^x \cdot dx = \frac{a^x}{\log a}$$

$$\int f(x) \cdot dx \rightarrow \text{Possible}$$

$$\int f(x) \cdot dt \rightarrow \text{Not Possible}$$

$$\int f(t) \cdot d \rightarrow \text{Possible}$$

Methods of Integration :-

Substitution method

"In this method we replace the whole function with another variable say 't.'"

Q. 1. $\int (x^2 + 3x)^5 (2x + 3) dx$

Q. 2. $\int \frac{4x^3+2}{x^4+2x} dx$

Q. 3. $\int \frac{e^x}{\sqrt{e^x+12}} dx$

Q. 4. $\int (4x + 5)^6 \cdot dx$

Q. 5. $\int (e^x + e^{-x})^2 (e^x - e^{-x}) \cdot dx$

By Parts

$$\int I \cdot II + I \int II - \int I' \int II$$

Q. 1. $\int x \cdot e^x \cdot dx.$

Q. 2. $\int \log x \cdot dx.$

Q. 3. $\int x \cdot \log x \cdot dx.$

Q. 4. $\int x^3 \cdot \log x \cdot dx.$

Partial Fraction

Type-1

$$\int \frac{L}{L \cdot L}$$

eg.

$$\int \frac{5x + 2}{x^2 - 3x + 2}$$

Type-2

$$\int \frac{L}{(L)^2}$$

eg.

$$\int \frac{5x + 2}{(x + 3)^2}$$

Type-3

$$\int \frac{L}{L \cdot Q}$$

Formula Based