

**Business Mathematics
Statistics & Logical Reasoning**

TOOFAN BATCH NOTES
(Charts & Mind maps)

CA Foundation

By
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Preface

While the paper setting pattern and assessment methodology have been revised many times over and newer criteria devised to help develop more aspirant-friendly entrance test, the need to standardize the selection process and their outcome at the national level has been felt.

While the methodology and scope of a CA Entrance Test (CA Foundation) are prone to change there are two basic objectives that any test need to serve:

1. The Objective to test an aspirant's caliber, aptitude and attitude for the CA field and Profession.
2. The need to test an aspirant's grasp and understanding of concept of the subject of study and their applicability at the grassroots level.

Students appearing for CA Foundation Examination cannot bank solely on conventional shortcut measures to crack the exam. Conventional techniques alone are not enough as most of the questions asked in the examination are based on the concept rather than on just formula. Hence, it is necessary for students appearing for CA Foundation examination to not only gain a thorough knowledge and understanding of the concept but also develop problem-solving skills to be able to relate their understanding of the subject to real-life application based on these concepts

Feature of the book

- **This Book Covers Category Wise Questions of Each Chapters**
- **Chart of Each Chapters Covers Important Questions of Each Category**
- **End of Each Chart Consist of Revision Strategy (Blank) – Students Need to Fill it With Questions Need to See One Day Before Exam & Revise Multiple Times**
- **This Book Has Been Designed to Revise Entire Syllabus in **1.5 Days** Before Exam**
- **Stats Portion of This Book Consist of **WORK-BOOK** which is Covered in Lectures Which Will Help Students to Revise Entire Statistics in Very Less Time**

Aman Khedia

Dedicated To

My Mother
Seema Khedia

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Part-A
Business Mathematics

Ratio Proportion & Indices

Ratios

- If $x = p^{1/3} - p^{-1/3}$, then
 (a) $x^3 + 3x = p + (1/p)$ (c) $x^3 + 3x = p + 1$
(b) $x^3 + 3x = p - (1/p)$ (d) none
- If $a : b = 3 : 4$, the value of $(2a + 3b) : (3a + 4b)$ is
 (a) 54:25 **(b) 8:25**
 (c) 17:24 (d) none of these
- If $x : y = 3 : 4$, the value of $x^2y + xy^2 : x^3 + y^3$ is
 (a) 13:12 **(b) 12:13**
 (c) 21:31 (d) none of these
- The ratio compounded of 2:3, 9:4, 5:6 and 8:10 is
(a) 1:1 (b) 1:5
 (c) 3:8 (d) none of these
- The angles of a triangle are in ratio 2:7:11. The angles are
 (a) $(20^\circ, 70^\circ, 90^\circ)$ (b) $(30^\circ, 70^\circ, 80^\circ)$
(c) $(18^\circ, 63^\circ, 99^\circ)$ (d) none of these
- Division of Rs. 324 between X and Y is in the ratio 11:7. X & Y would get Rupees
 (a) (204, 120) (b) (200, 124)
 (c) (180, 144) **(d) none of these**
- Anand earns Rs. 80 in 7 hours and Pramod Rs. 90 in 12 hours. The ratio of their earnings is
 (a) 30:21 (b) 23:12
 (c) 8:9 **(d) none of these**

Proportions

- The mean proportional between 25, 81 is
 (a) 40 (b) 50
(c) 45 (d) none of these
- The fourth proportional to 2a, a², c is
(a) $ac/2$ (b) ac
 (c) $2/ac$ (d) none of these
- If four numbers $\frac{1}{2}, \frac{1}{3}, \frac{1}{5}, \frac{1}{x}$ are proportional then x is
 (a) $6/5$ (b) $5/6$
(c) $15/2$ (d) none of these
- If $\frac{a}{4} = \frac{b}{5} = \frac{c}{9}$ then $\frac{a+b+c}{c}$ is
 (a) 4 **(b) 2**
 (c) 7 (d) none of these
- The sum of the ages of 3 persons is 150 years. 10 years ago, their ages were in the ratio 7:8:9. Their present ages are
(a) (45, 50, 55) (b) (40, 60, 50)
 (c) (35, 45, 70) (d) none of these
- If $a : b = 4 : 1$ then $\sqrt{\frac{a}{b}} + \sqrt{\frac{b}{a}}$ is
(a) $5/2$ (b) 4
 (c) 5 (d) none of these

Indices

- The value of $(8/27)^{1/3}$ is
(a) $2/3$ (b) $3/2$
 (c) $2/9$ (d) none of these
- The value of $(\frac{243}{32})^{-4/5}$ is:
 (a) $18/16$ **(b) $16/81$**
 (c) $4/9$ (d) $9/4$
- The value of $[(10)^{150} \div (10)^{146}]$ is:
 (a) 1000 **(b) 10000**
 (c) 100000 (d) $(10)^6$
- If $(\frac{x^b}{x^c})^{(b+c-a)} \cdot (\frac{x^c}{x^a})^{(c+a-b)} \cdot (\frac{x^a}{x^b})^{(a+b-c)} = x$, then the value of x is:
 (a) x^{abc} **(b) 1**
 (c) $x^{ab+bc+ca}$ (d) x^{b+c+a}
- If $2^x = 4^y = 8^z$ and $(\frac{1}{2x} + \frac{1}{4y} + \frac{1}{6z}) = \frac{24}{7}$, the value of z is:
 (a) $\frac{7}{16}$ (b) $7/32$
(c) $7/48$ (d) $7/64$
- If $2^x = 3^y = 6^{-z}$ then value of $(\frac{1}{x} + \frac{1}{y} + \frac{1}{z})$ is:
(a) 0 (b) 1
 (c) $3/2$ (d) $-(1/2)$

Rule of Alligation

Sugar at rate Rs. 15 per kg is mixed with sugar at rate Rs. 20 per kg in the ratio 2:3.

Find the price per kg of the mixture

- (a) 18** (b) 28
 (c) 20 (d) 15

Miscellaneous Question Bank

Basic Level 1

- If $x = 4^{\frac{1}{3}} + 4^{-\frac{1}{3}}$ prove that $4x^3 - 12x$ is given by
(a) 12 (b) 13 (c) 15 (d) 17
- If $x = 5^{\frac{1}{3}} + 5^{-\frac{1}{3}}$ prove that $5x^3 - 15x$ is given by
(a) 25 (b) 26 (c) 27 (d) 30
- If $a^b = b^a$, then the value of $\left(\frac{a}{b}\right)^{\frac{a}{b}} - a^{\frac{a}{b-1}}$ reduces to
(a) a (b) b (c) 0 (d) None
- If $m = b^x, n = b^y$ and $(m^y n^x) = b^2$ the value of xy is given by
(a) -1 (b) 0 (c) 1 (d) None
- If $a = xy^{m-1}, b = xy^{n-1}, c = xy^{p-1}$ then the value of $a^{n-p} \times b^{p-m} \times c^{m-n}$ reduces to
(a) 1 (b) -1 (c) 0 (d) None

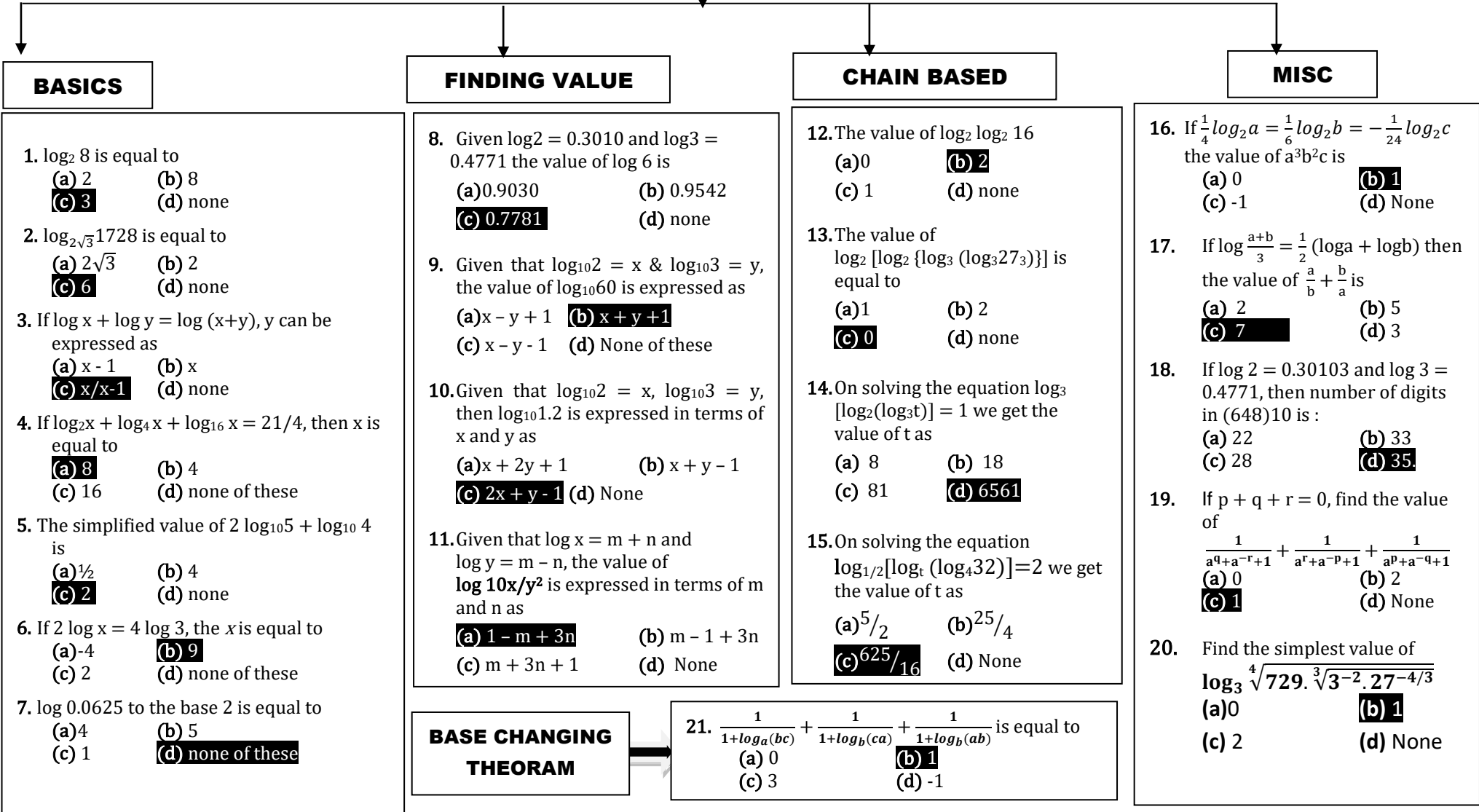
Level 2

- If $x = \sqrt{3} + \frac{1}{\sqrt{3}}$ and $y = \sqrt{3} - \frac{1}{\sqrt{3}}$ then $x^2 - y^2$ is
(a) 5 (b) $\sqrt{3}$ (c) $\frac{1}{\sqrt{3}}$ (d) 4
- If $a = \frac{4\sqrt{6}}{\sqrt{2} + \sqrt{3}}$ then the value of $\frac{a + 2\sqrt{2}}{a - 2\sqrt{2}} + \frac{a + 2\sqrt{3}}{a - 2\sqrt{3}}$ is given by
(a) 1 (b) -1 (c) 2 (d) -2
- If $P + \sqrt{3}Q + \sqrt{5}R + \sqrt{15}S = \frac{1}{1 + \sqrt{3} + \sqrt{5}}$ then the value of P is
(a) $\frac{7}{11}$ (b) $\frac{3}{11}$ (c) $-\frac{1}{11}$ (d) $-\frac{2}{11}$
- If $a = 3 + 2\sqrt{2}$ then the value of $a^{\frac{1}{2}} - a^{-\frac{1}{2}}$ is
(a) $2\sqrt{2}$ (b) 2 (c) $2\sqrt{2}$ (d) $-2\sqrt{2}$

Level 3

- The square root of $3 + \sqrt{5}$
(a) $\sqrt{\frac{5}{2}} + \sqrt{\frac{1}{2}}$ (b) $-(\sqrt{\frac{5}{2}} + \sqrt{\frac{1}{2}})$ (c) Both
- If $x = \sqrt{2 - \sqrt{2 - \sqrt{2}}} \dots \alpha$ the value of x is given by
(a) -2 (b) 1 (c) 2 (d) 0
- If $a = \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}}, b = \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$ then the value of $a + b$ is
(a) 10 (b) 100 (c) 98 (d) 99
- The square root of $11 - \sqrt{120}$ is given by
(a) $\sqrt{6} + \sqrt{5}$ (b) $\sqrt{6} - \sqrt{5}$

LOGARITHM



Equations

Linear Equations

- 8 is the solution of equation
 (a) $\frac{x+4}{4} + \frac{x-5}{3} = 11$
(b) $\frac{x+24}{5} = 4 + \frac{x}{4}$
 (c) $\frac{x+4}{2} + \frac{x+10}{9} = 8$
 (d) $\frac{x-15}{10} + \frac{x+5}{5} = 4$
- The solution of the set of equations $3x + 4y = 7$, $4x - y = 3$ is
 (a) (1, -1) (c) (2, 1)
(b) (1, 1) (d) (1, -2)
- $\frac{x}{p} + \frac{y}{q} = 2$, $x + y = p + q$ are satisfied by the values given by the pair.
(a) (x=p, y=q) (c) (x=1, y=1)
 (b) (x=q, y=p) (d) none of these
- $\frac{x}{4} = \frac{y}{3} = \frac{z}{2}$; $7x + 8y + 5z = 62$
(a) (4, 3, 2) (c) (3, 4, 2)
 (b) (2, 3, 4) (d) (4, 2, 3)
- The age of a person is twice the sum of the ages of his two sons and five years ago his age was thrice the sum of their ages. Find his present age.
 (a) 60 years (c) 51 years
 (b) 52 years **(d) 50 years**
- Of two numbers, $1/5^{\text{th}}$ of the greater is equal to $1/3^{\text{rd}}$ of the smaller and their sum is 16. The numbers are:
(a) (6, 10) (c) (12, 4)
 (b) (9, 7) (d) (11, 5)

Quadratic Equations

- The values of x for the equation $x^2 + 9x + 18 = 6 - 4x$ are
 (a) (1, 12) (c) (1, -12)
(b) (-1, -12) (d) (-1, 12)
- If $x = m$ is one of the solutions of the equation $2x^2 + 5x - m = 0$ the possible values of m are
 (a) (0, 2) (c) (0, 1)
(b) (0, -2) (d) (1, -1)
- The roots of equation $x^2 + (2p-1)x + p^2 = 0$ are real if
 (a) $p \geq 1$ (c) $p \geq 1/4$
 (b) $p \leq 4$ **(d) $p \leq 1/4$**
- If α and β are the roots of $x^2 = x + 1$ then the value of $\frac{\alpha^2 - \beta^2}{\beta - \alpha}$ is
 (a) $2\sqrt{5}$ (c) $3\sqrt{5}$
 (b) $\sqrt{5}$ **(d) $-2\sqrt{5}$**
- If $p \neq q$ and $p^2 = 5p - 3$ and $q^2 = 5q - 3$ the equation having roots as $\frac{p}{q}$ and $\frac{q}{p}$ is
(a) $x^2 - 19x + 3 = 0$ (c) $3x^2 - 19x + 3 = 0$
 (b) $3x^2 - 19x - 3 = 0$ (d) $3x^2 + 19x + 3 = 0$

Cubic Equations

- The roots of the equation $x^3 + 7x^2 - 21x - 27 = 0$ are
 (a) (-3, -9, -1) (c) (3, 9, 1)
(b) (3, -9, -1) (d) (3, 9, 1)
- The roots of $x^3 + x^2 - x - 1 = 0$ are
(a) (-1, -1, 1)
 (b) (-1, -1, -1)
 (c) (1, 1, -1)
 (d) (1, 1, 1)
- Find cubic equation Whose roots are 1, 2, -3?
(a) $x^3 - 7x^2 + 6 = 0$
 (b) $x^3 + 7x^2 + 6 = 0$
 (c) $x^3 + 7x^2 + 6 = 0$
 (d) None of these
- A rational root of the cubic equation $2x^3 - x^2 - 4x + 2 = 0$ is
(a) $\frac{1}{2}$ (b) $-\frac{1}{2}$
 (c) 2 (d) -2

Advance Questions

- If roots of equation $x^2 + x + r = 0$ are ' α ' and ' β ' and $\alpha^3 + \beta^3 = -6$. Find the value of 'r'
(a) $-\frac{5}{3}$ (c) $-\frac{4}{3}$
 (b) $\frac{7}{3}$ (d) 1
- If the ratio of the roots of the equation $4x^2 - 6x + p = 0$ is 1 : 2 then the value of p is:
 (a) 1 (c) -2
(b) 2 (d) -1
- .Solving $9^x = 3^y$ and $5^{x+y+1} = 25^{xy}$ we get the following roots
(a) 1, 2 (b) 0, 1
(c) 0, 3 (d) 1, 3
- Solving $\frac{1}{x^2} + \frac{1}{y^2} - 13 = 0$ and $\frac{1}{x} + \frac{1}{y} - 5 = 0$ we get the roots x y as under
(a) $\frac{1}{8}, \frac{1}{5}$ **(b) $\frac{1}{2}, \frac{1}{3}$**
(c) $\frac{1}{13}, \frac{1}{5}$ (d) $\frac{1}{4}, \frac{1}{5}$

TIME VALUE OF MONEY

SIMPLE INTREST

- S.I on Rs. 3500 for 3 years at 12% per annum is
(a)Rs. 1200 (b) **1260**
(c) 2260 (d) none of these
- A certain sum of money trebles itself in 10 years at a certain rate of S.I. p.a. then the rate of interest is
(a) **20%** (b) 10%
(c) 5% (d) None
- A sum of money amount to Rs. 6200 is 2 years and Rs. 7400 in 3 years. The principal and rate of interest are
(a)**Rs. 3800 31.57%**
(b)Rs. 3000, 20%
(c)Rs. 3500, 15%
(d) none of these
- A sum of Rs. 46,875 was lent out at simple interest and at the end of 1 year 8 months the total amount was Rs. 50,000. Find the rate of interest per cent per annum.
(a) **4%** (b) 5%
(c) 7% (d) None
- If the simple interest on Rs. 20,000 increases by Rs. 4,000 with the increase of time by 4 Yrs. Find the rate per cent per annum.
(a) 0.15% (b) 0.5%
(c) **5%** (d) None

CI-BASIC PROBLEM

- If $P = \text{Rs. } 1000$, $R = 5\% \text{ p.a.}$, $n = 4$; What is Amount and C.I. is
(a)**Rs. 1215.50, Rs. 215.50**
(b)Rs. 1125, Rs. 125
(c)Rs. 2115, Rs. 115
- 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
- If $A = \text{Rs. } 1000$, $n = 2 \text{ years}$, $R = 6\% \text{ p.a.}$ compound interest payable half-yearly, then principal (P) is
(a) **888.80** (b)Rs.885
(c) 800 (d) None
- Find the difference between the S.I. and C.I. on Rs.8000 for 3 years at 5% p.a.
(a) Rs.65 (b)Rs.62
(c) **Rs.61** (d) None
- After Mr. Gupta introduced new norms, turnover of Gupta & sons went up from Rs. 100 million to Rs 300 million in 3 yrs. The compounded growth rate of co. is ($3^{1/2} = 1.4422$)
(a)11.22% (b) **33.22%**
(c) 40% (d) **44.22%**
- 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

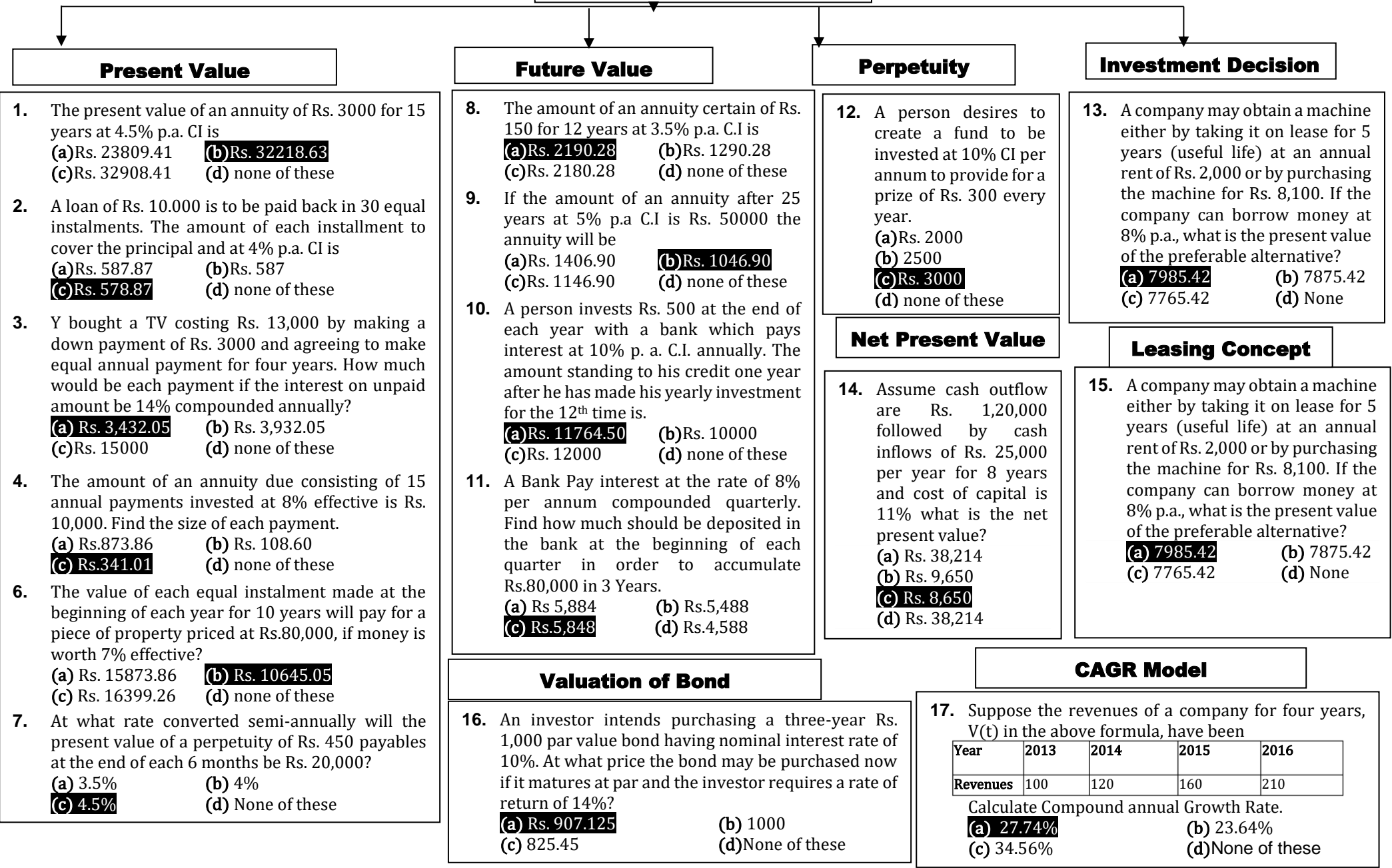
CI-ADVANCE PROBLEM

- How many years it take for investment of Rs. 1,000 to double itself when interest is compounded annually at 6% [Given : $(1.06)^{11.9} = 2.0005$]
(a) 11 years (b) 11.3 years
(c) 11.6 years (d) **11.9 years**
- 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 1/2 years**
- A certain sum of money amounts to Rs.2750 in 2 years and Rs.3125 in 3 years at same rate of compound interest, the sum of money is
(a) **Rs.2129.60** (b) Rs.2210.37
(c) Rs.2531.62 (d)Data inadeq
- The annual birth and death rates per 1000 are 39.4 and 19.4 respectively. The number of years in which the population will be doubled assuming there is no immigration or emigration is
(a) **35 yrs.** (b) 30 yrs.
(c) 25 yrs. (d) none of these

EFFECTIVE RATE & DERP

- The effective rate of interest corresponding to a nominal rate 3% p.a. payable half yearly is
(a) 3.2% (b)3.25
(c) **3.0225% p.a.** (d) None
- The effective rate of interest corresponding a nominal rate of 7% p.a. convertible quarterly is
(a) 7% (b) 7.5%
(c) 5% (d) **7.18%**
- Mr. Natarajan wants to make an investment of Rs. 50,000 in one of the two banks that fetches him the maximum return after 6 years. One bank offers 8% interest compounded annually and the other offers 7.5% interest compounded semi – annually. Which bank should be chosen, so that he gets the maximum return?
(a) **First bank** (b)Second bank
(c) Any of the two bank (d) Both the bank
- 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. 3000The effective life of the machine is
(a) 4.5 yrs. (b) **5.4 yrs.** (c) 5 yrs.
- 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

Annuity And its Application



Permutations & Combination

Problems on Words

- How many different words can be formed with letters of the word HARYANA?
 (a) 240 (b) 360
 (c) 840 (d) 640
- The number of ways in which the letters of the word 'MOBILE' be
 (a) arranged **Ans :720**
 (b) re-arranged **Ans :719**
 (c) vowels come together **Ans :144**
 (d) vowels never come together **Ans :1576**
- The number of ways the letters of the word "TRIANGLE" to be arranged so that the word "ANGLE" will be always present is:
 (a) 20 (b) 60
 (c) 24 (d) 32
- The number of different words that can be formed with 12 consonants and 5 vowels by taking 4 consonants and 3 vowels in each word is
 (a) $12_{c_4} \times 5_{c_3}$ (b) 17_{c_7}
 (c) $4950 \times 7!$ (d) none of these
- The ways of selecting 4 letters from the word 'EXAMINATION' is
 (a) 136 (b) 130
 (c) 125 (d) none of these
- The number of arrangements in which the letters of the word 'MONDAY' be arranged so that the words thus formed begin with M and do not end with N is
 (a) 720 (b) 120
 (c) 96 (d) none of these.

Problems on Number

- How many four-digit number can be formed by using the digit 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 with no digit repeated?
 (a) 4536 (b) 3604
 (c) 3354 (d) 5554
- The number of 4-digit numbers greater than 5,000 can be formed out of the digits 3,4,5,6 and 7 (No Digit is repeated) the number of such is
 (a) 72 (b) 27
 (c) 70 (d) none of these
- The number of numbers lying between 100 and 1000 can be formed with the digits 1,2,3,4, 5,6,7 is
 (a) 210 (b) 200
 (c) 110 (d) none of these
- The number of even numbers greater than 300 can be formed with the digits 1,2,3,4,5 without repetition is
 (a) 110 (b) 112
 (c) 111 (d) none of these
- The sum of all 4-digit number containing the digits 2, 4, 6, 8 without repetitions is
 (a) 1, 33,330 (b) 1, 22,220
 (c) 2, 13,330 (d) none of these

Problems on Geometry

- The number of straight lines obtained by joining 16 points on a plane, on twice of them being on the same line is
 (a) 120 (b) 110
 (c) 210 (d) none of these
- 8 Points are marked on the circumference of a circle. The number of chords obtained by joining these in pairs is
 (a) 25 (b) 27
 (c) 28 (d) none of these
- There are 12 points in a plane of which 5 are collinear. The number of triangles in
 (a) 200 (b) 211
 (c) 210 (d) none of these
- The number of diagonals in a decagon is
 (a) 30 (b) 35
 (c) 45 (d) none of these
- The number of parallelograms that can be formed from a set of four parallel lines intersecting another set of three parallel lines is
 (a) 6 (b) 18
 (c) 12 (d) 9

Miscellaneous

- 5 persons are sitting in a round table in such way that Tallest person is always on the right-side of the shortest person the number of such arrangements is
 (a) 6 (b) 8
 (c) 24 (d) none of these
- The number of ways in which the letters of 10 different things taken 4 at a time in which one particular thing always occurs is
 (a) 2015 (b) 2016
 (c) 2014 (d) none of these
- The number of ways in which 15 mangoes can be equally divided among 3 students is
 (a) $15! / 5!^4$ (b) $15! / 5!^3$
 (c) $15! / 5!^2$ (d) none of these
- 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 least one lady is
 (a) 400 (b) 440
 (c) 441 (d) none of these
- From 5 apples, 4 oranges and 3 mangoes how many selections of fruits can be made?
 (a) 120 (b) 119
 (c) 118 (d) none
- Find the number of divisors of 21600
 (a) 72 (b) 76
 (c) 71 (d) none



- The total number of ways in which six '+' and four '-' signs can be arranged in a line such that no two signs occur together is
 (a) 45 (b) 25 (c) 35

Sequence & Series

Arithmetic Progression

- Which term of the progression -1, -3, -5, ... is-39
 (a) 21st (b) 20th
 (c) 19th (d) none of these
- The value of x such that 8x + 4, 6x - 2, 2x + 7 will form an AP is
 (a) 15 (b) 2
 (c) 15/2 (d) none of these
- The number of numbers between 74 and 2556 divisible by 5 is
 (a) 5090 (b) 5097
 (c) 5095 (d) none of these
- The sum of all positive integral multiples of 3 less than 100 is
 (a) 1584 (b) 1665
 (c) 1683 (d) None of these
- In an A.P. 3rd term is 18 & 7th term is 30, the sum of its 17 terms is
 (a) 600 (b) 612
 (c) 624 (d) None of these
- If the 9th term of an A.P. is zero, $\frac{t_{29}}{t_{19}}$ is
 (a) 1 (b) 2
 (c) 3 (d) 4
- The 4 arithmetic means between -2 and 23 are
 (a) 3, 13, 8, 18 (b) 18, 3, 8, 13
 (c) 3, 8, 13, 18 (d) none of these
- The first and the last term of an AP are -4 and 146. The sum of the terms is 7171. The number of terms is
 (a) 101 (b) 100

Geometric Progression

- The 7th term of the series 6, 12, 24,is
 (a) 384 (b) 834
 (c) 438 (d) none of these
- t_8 of the series 6, 12, 24...is
 (a) 786 (b) 768
 (c) 867 (d) none of these
- The 4th term of the series 0.04, 0.2, 1.....is
 (a) 0.5 (b) 1/2
 (c) 5 (d) none of these
- If you save 1 paise today, 2 paise the next day 4 paise the succeeding day and soon, then your total savings in two weeks will be
 (a)Rs. 163 (b)Rs. 183
 (c) Rs. 163.83 (d) none of these
- The sum of the infinite GP 14, - 2, + 2/7, - 2/49, + ... is
 (a) $4\frac{1}{12}$ (b) $12\frac{1}{4}$
 (c) 12 (d) none of these
- 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

Relationship B/W AM GM & HM

- If AM and HM of two numbers are 32 and 2 respectively then G.M. is
 (a) 8 (b) $4\sqrt{2}$
 (c) 64 (d) None

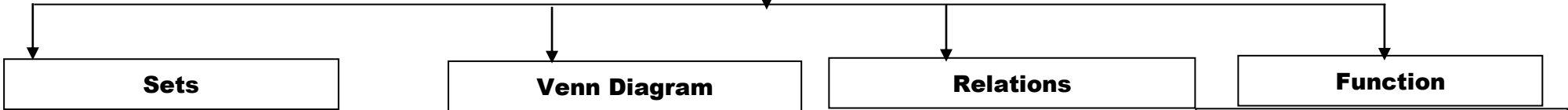
Series & Formula is asked

- The nth element of the sequence 1, 3, 5, 7,is
 (a)n (b) $2n - 1$
 (c) $2n + 1$ (d) none of these
- Sum of n terms of the series 4 + 44 + 444 + ... is
 (a) $\frac{4}{9} \{ \frac{10}{9} (10^n - 1) - n \}$
 (b) $\frac{10}{9} (10^n - 1) - n$
 (c) $\frac{4}{9} (10^n - 1) - n$
 (d) none of these
- The first three terms of sequence when nth term t, is $n^2 - 2n$ are
 (a) -1, 0, 3
 (b) 1, 0, 2
 (c) -1, 0, -3
 (d) none of these
- The nth term of the series whose sum to n terms is $5n^2 + 2n$ is
 (a) $3n - 10$
 (b) $10n - 2$
 (c) $10n - 3$
 (d) none of these

Advanced questions

- If p, q and r are in A. P. and x, y, z are in G.P. then $x^q \cdot r, y^{r-p}, z^{p-q}$ is equal to
 (a) 0 (b) -1
 (c) 1 (d) none of these
- If x, y, z are in G.P., then
 (a) $y^2 = xz$
 (b) $y(z^2 + x^2) = x(z^2 + y^2)$
 (c) $2y = x + z$
 (d) none of these
- If x, y, z are in A.P. and x, y, (z + 1) are in G.P. then
 (a) $(x - z)^2 = 4xz$
 (b) $z^2 = (x - y)$
 (c) $z = x - y$
 (d) none of these
- If $\frac{1}{x+y}, \frac{1}{2y}, \frac{1}{y+z}$ are in A.P., then x,y,z are in
 (a) G.P. (b) A.P.
 (c) Both (a)&(b) (d) None
- Find n such that $\frac{a^{n+1} + b^{n+1}}{a^n + b^n}$ may be the AM between a and b:
 (a) 1/2 (b) 1
 (c) -1/2 (d) 0

Sets Relations & Function



Sets

- If $A = \{1, 2, 3\}$, then $P(A)$ is
 (a) 3
(b) $\{\{1, 2, 3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1\}, \{2\}, \{3\}, \phi\}$
 (c) $\{1, 2, 3\}$
 (d) $\{\{1, 2, 3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1\}, \{2\}, \{3\}\}$
- A set containing 4 elements have –
 (a) 15 subsets (c) 14 subsets
(b) 16 subsets (d) 13 subsets
- $A \cup A$ is equal to
(a) A (c) ϕ
 (b) E (d) none of these
- $A \cup A'$ is equal to
 (a) A (c) ϕ
(b) Sample space (d) none of these
- $A \cup E$ is equal to
 (a) A (c) ϕ
(b) E (d) none of these
- If $A = (1, 2, 3, 5, 7)$ and $B = (1, 3, 6, 10, 15)$ then cardinal number of $A - B$ is
(a) 3 (c) 6
 (b) -4 (d) none of these
- The range set of a constant function is a –
(a) Disjoint set (c) void set
(b) Singleton set (d) infinite set

Venn Diagram

- Out 2000 staff 48% preferred coffee 54% tea and 64% cocoa. Of the total 28% used coffee and tea 32% tea and cocoa and 30% coffee and cocoa. Only 65 did none of these
 - Find the number having all the three
(a) 360 (c) 160
 (b) 280 (d) none
 - Find the number having tea and cocoa but not coffee.
 (a) 360 (c) 160
(b) 280 (d) none
 - Find the number having only coffee.
 (a) 360 **(c) 160**
 (b) 280 (d) none
- At a certain conference of 100 people there are 29 Indian women and 23 Indian men. Out of these Indian people 4 are doctors and 24 either men or doctors. There are no foreign doctors. The number of women doctors attending the conference is
 (a) 4 (b) 3
(c) 1 (d) 6

Inverse Function



19. If $f(x) = 1/1-x$, then $f^{-1}(x)$ is
 (a) $1-x$ (c) $x/x-1$
(b) $(x-1)/x$ (d) none of these

Relations

- "is perpendicular to" over the set of straight lines in a given plane is
(a) Symmetric (c) transitive
 (b) Reflexive (d) equivalence
- 'is the reciprocal of' over the set of non-zero real numbers is
(a) Symmetric (c) transitive
 (b) Reflexive (d) none of these
- "is the squares of" over n set of real numbers is
 (a) Reflexive (c) transitive
 (b) Symmetric **(d) none of these**
- "has the same father as" over the set of children
 (a) Reflexive (c) transitive
 (b) Symmetric **(d) equivalence**
- If $a = \{1, 2, 3\}$ then a relation $\{(1, 1), (2, 2), (3, 3)\}$ is-
 (a) An into relation
(b) An identity relation
 (c) Symmetric relation
 (d) Transitive relation

Function

- $\{(x, y) \mid x = 4\}$ is a
(a) Not a function
 (b) one – one mapping
 (c) Function
 (d) none of these
- If $A = \{1, 2, 3\}$ and $B = \{4, 6, 7\}$ then the relation $R = \{(2, 4), (3, 6)\}$ is
 (a) A function from A to B
 (b) A function from B to A
 (c) both (a) and (b)
(d) not a function
- The domain and range of $\{(x, y) : y = x^2\}$ is
 (a) (reals, natural numbers)
(b) (reals, reals)
 (c) (reals, positive reals)
 (d) none of these
- $\{(x, y) \mid x + y = 5\}$ is
 (a) Not a function
 (b) one – one mapping
(c) A composite function
 (d) none of these
- If $g(x) = 3 - x^2$ then $g(x)$ is
(a) An odd function
 (b) an even function
 (c) A periodic function
 (d) None of these

Differential Calculus

Basic & Chain Based

- If $y = 2x + x^2$ then dy/dx is:
 (a) $2(x+1)$ (b) $2(x-1)$
 (c) $x+1$ (d) $x-1$
- The gradient of the curve $y = 2x^3 - 5x^2 - 3x$ at $x = 0$ is:
 (a) 3 (b) -3
 (c) $1/3$ (d) none
- If $y = x(x-1)(x-2)$ then $\frac{dy}{dx}$ is:
 (a) $3x^2 - 6x + 2$ (b) $-6x + 2$
 (c) $3x^2 + 2$ (d) none
- If $y = \frac{1}{\sqrt{x}}$ then $\frac{dy}{dx}$ is equal to:
 (a) $\frac{1}{2x\sqrt{x}}$ (b) $-\frac{1}{x\sqrt{x}}$
 (c) $-\frac{1}{2x\sqrt{x}}$ (d) none
- If $y = e^{\sqrt{2x}}$ then $\frac{dy}{dx}$ is equal to:
 (a) $\frac{e^{\sqrt{2x}}}{\sqrt{2x}}$ (b) $e^{\sqrt{2x}}$
 (c) $\frac{e^{\sqrt{2x}}}{\sqrt{2x}}$ (d) none
- If $(x) = e^{ax^2+bx+c}$, the $f'(x)$ is:
 (a) e^{ax^2+bx+c}
 (b) $e^{ax^2+bx+c} (2ax+b)$
 (c) $2ax+b$
 (d) none
- If $y = 2^{\log_2 x}$, then dy/dx is:
 (a) $1/x$ (b) $2/x$
 (c) 1 (d) none
- The derivative of $y = \sqrt{x+1}$ is:
 (a) $1/\sqrt{x+1}$ (b) $-1/\sqrt{x+1}$
 (c) $(1/2)\sqrt{x+1}$ (d) None

Addition & Subtraction

- If $y = 5xy$, then dx/dy is:
 (a) $\frac{5y}{1-5x}$ (b) $\frac{4y}{1+x}$
 (c) $\frac{x}{1+5y}$ (d) none
- The derivative of $x^2 \log x$ is:
 (a) $1+2\log x$ (b) $x(1+2\log x)$
 (c) $2\log x$ (d) None
- If $f(x) = \frac{x^2+1}{x^2-1}$ then $f'(x)$ is:
 (a) $-\frac{4x}{(x^2-1)^2}$ (b) $4x(x^2-1)^2$
 (c) $x(x^2-1)^2$ (d) None
- If $f(x) = \frac{x^2}{e^x}$ then $f(-1)$ is equal to:
 (a) $-1/e$ (b) $1/e$
 (c) $-3e$ (d) none

Parametric Equation

- If $x = 3t^2 - 1$, $y = t^3 - t$ then $\frac{dy}{dx}$ is equal to:
 (a) $\frac{3t^2-1}{6t}$ (b) $3t^2-1$
 (c) $\frac{3t-1}{6t}$ (d) none
- Given $x = t + t^{-1}$ and $y = t - t^{-1}$ then the value of $\frac{dy}{dx}$ at $t = 2$ is:
 (a) $3/5$ (b) $-3/5$
 (c) $5/3$ (d) none
- If $x = \log t$, $y = e^t$, then $\frac{dy}{dx} =$
 (a) $1/t$ (b) $t.e^t$
 (c) $-1/t^2$ (d) none

Geometry Based

- The slope of the tangent to the curve $y = x^2 - x$ at the point where the line $y = 2$ cuts the curve in the 1st quadrant is:
 (a) 2 (b) 3
 (c) -3 (d) none
- The slope of the tangent at the point (2, 2) to the curve $x^2 + xy + y^2 - 4 = 0$ is given by:
 (a) 0 (b) 1
 (c) -1 (d) none
- 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:
 (a) -1 (b) 1
 (c) 0 (d) None

Log & Implicit Function

- If $y = \sqrt{x^2 + m^2}$ then y_{y_1} (where $y_1 = dy/dx$) is equal to:
 (a) $-x$ (b) x
 (c) $1/x$ (d) None
- If $y = \sqrt{x}^{\sqrt{x} \dots \infty}$ then $\frac{dy}{dx}$ is equal to:
 (a) $\frac{y^2}{2-y \log x}$ (b) $\frac{y^2}{x(2-y \log x)}$
 (c) $\frac{y^2}{\log x}$ (d) none
- Given $e^{-xy} - 4xy = 0$ then dy/dx can be proved to be equal to:
 (a) $-y/x$ (b) y/x
 (c) x/y (d) none

Application of derivative

- A company charges Rs. 550 for a transistor set on orders of 50 or less sets. The charge is reduced by Rs. 5 per set for each set ordered in excess of 50. Find the largest size order company should allow so as to receive maximum revenue.
 (a) 60 (b) 80
 (c) 70 (d) none
- A manufacturer can sell x items per day at a price p rupee each, where $p = 125 - (5/3)x$. The cost of production for x items is $500 + 13x + 0.2x^2$. Find how much he should produce to have a maximum profit assuming that all items produced can be sold. What's the maximum profit.
 (a) 30 units, Rs.1180
 (b) 40 units, Rs.1280
 (c) 60 units, Rs.1300
 (d) none of these

Higher Order Derivation

- If $x^2 + y^2 + 4$ then
 (a) $y \frac{d^2y}{dx^2} + \left(2 \frac{dy}{dx}\right)^2 + 1 = 0$
 (b) $y \frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2 + 1 = 0$
 (c) $y \frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2 + 1 = 0$
 (d) $y \frac{d^2y}{dx^2} + 2 \left(\frac{dy}{dx}\right)^2 + 1 = 0$

Integral Calculus

Basics + Substitution

- Given $f(x) = 4x^3 + 3x^2 - 2x + 5$ and $\int f(x)dx$ is
 - $x^4 + x^3 - x^2 + 5x + k$
 - $x^4 + x^3 - x^2 + 5x$
 - $12x^2 + 6x - 2x^2$
 - none of these
- $\int (x^4 + \frac{3}{x}) dx$ is equal to
 - $x^5/5 + \log|x|$
 - $1/5x^5 + 3\log|x| + k$
 - $1/5x^5 + k$
 - none of these
- Evaluate $\int (x^2 - 1) dx$
 - $x^5/5 - 2/3x^3 + x + k$
 - $\frac{x^3}{3} - x + k$
 - $2x$
 - none of these
- Use method of substitution to evaluate $\int x(x^2 + 4)^5 dx$ and the answer is
 - $(x^2 + 4)^6 + k$
 - $1/12 (x^2 + 4)^6 + k$
 - $(x^2 + 4)^6 + k$
 - none of these
- $\int x^x(1 + \log x) dx$ is equal to
 - $x^2 \log x + k$
 - $e^{x^2} + k$
 - $\frac{x^2}{2} + k$
 - $x^x + c$
- $\int x^x(1 + \log x) dx$ is equal to
 - $x^2 \log x + k$
 - $e^{x^2} + k$
 - $\frac{x^2}{2} + k$
 - $x^x + c$
- $\int \frac{\log(\log x)}{x} dx$ is
 - $\log(\log x - 1) + k$
 - $\log x - 1 + k$
 - $\log(\log x - 1) \log x + k$
 - none of these
- Evaluate $\int (\frac{e^x - e^{-x}}{e^x + e^{-x}}) dx$ and the value is
 - $\log_e |e^x + e^{-x}|$
 - $\log_e |e^x + e^{-x}| + k$
 - $\log_e |e^{x^2} - e^{-x^2}| + k$
 - none of these

By Parts

- Use integration by parts to evaluate $\int x^2 e^{3x} dx$
 - $\frac{x^2 e^{3x}}{3} - 2x \frac{e^{3x}}{9} + \frac{2}{27} e^{3x} + K$
 - $x^2 e^{3x} - 2x e^{3x} + 2e^{3x} + k$
 - $\frac{e^{3x}}{3} - \frac{x e^{3x}}{9} + 2e^{3x} + k$
 - none of these
- $\int (\log x)^2 x dx$ and the result is
 - $\frac{x^2}{2} [(\log x)^2 - \log x + \frac{1}{2}] + K$
 - $x (\log x)^2 - 2x + k$
 - $2x (\log x - 1) + k$
 - None of these
- $\int \log x^2 dx$ is equal to
 - $x (\log x - 1) + k$
 - $2x (\log x - 1) + k$
 - $2 (\log x - 1) + k$
 - none of these
- Using integration by parts $\int x^3 \log x dx$
 - $x^4 / 16 + k$
 - $x^4 / 16 (4 \log x - 1) + k$
 - $4 \log x - 1 + k$
 - none of these

Exponential Based

- Evaluate $\int \frac{(2-x)e^x}{(1-x)^2} dx$ and the value is
 - $\frac{e^x}{1-x} + k$
 - $e^x + k$
 - $\frac{1}{1-x} + k$
 - none of these

Partial Fraction

- $x(x-1)^{-1}(2x+1)^{-1} dx$ is:
 - $(1/3)[\log|x-1| + \log|2x+1|] + k$
 - $(1/3)[\log|x-1| + (1/6)\log|2x+1|] + k$
 - $(1/3)[\log|x-1| + (1/2)\log|2x+1|] + k$
 - none of these.
- Evaluate using partial fraction $\int (x+5)dx / (x+1)(x+2)^2$ we get
 - $4 \log(x+1) - 4 \log(x+2) + \frac{3}{x} + 2 + K$
 - $1 \log(x+2) - 3/x + 2 + K$
 - $4 \log(x+1) - 4 \log(x+2)$
 - none of these

Definite Integration

- Evaluate $\int_2^4 (3x-2)^2 dx$ and the value is
 - 104
 - 100
 - 10
 - none
- Evaluate $\int_0^1 x e^x dx$ and the value is
 - 1
 - 10
 - 10/9
 - +1
- Evaluate $\int_1^4 (2x+5) dx$ and the value is
 - 3
 - 10
 - 30
 - none
- $\int_1^2 \frac{2x}{1+x^2} dx$ is equal to
 - $\log(5/2)$
 - $\log_e 5 - \log_e 2 + k$
 - $\log_e(2/5)$
 - none of these
- $\int_0^2 \sqrt{3x+4} dx$ is equal to
 - 9/112
 - 112/9
 - 11/9
 - none of these
- The value of $\int_2^3 f(5-x) dx - \int_2^3 f(x) dx$ is
 - 1
 - 0
 - 1
 - none of these

Geometry Based

- The equation of the curve which passes through the point (1,3) and has the slope $4x-3$ at any point (x,y) is
 - $y = 2x^3 - 3x + 4$
 - $y = 2x^2 - 3x + 4$
 - $x = 2y^2 - 3y + 4$
 - none of these

