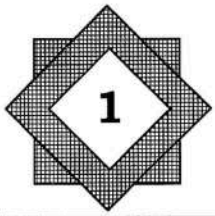


RATIO PROPORTION, INDICES & LOGARITHM

RATIO

1) Definition :-

Comparison of sizes of two or more quantities of same kind.

we write it as

a : b

(antecedent) (consequent)

* Ratio is a fraction. we can write it as $\frac{a}{b}$

where a = numerator

b = denominator

2) Types of Ratio :-

1) Compound Ratio $\Rightarrow$

The compounded ratio of the ratios (a : b), (c : d), (e : f) is (ace : bdf)

2) duplicate ratio of (a : b) is $(a^2 : b^2)$

3) Sub-duplicate Ratio of (a : b) is $(\sqrt{a} : \sqrt{b})$

4) Triplicate Ratio of (a: b) is $(a^3 : b^3)$

5) Sub-triplicate Ratio of (a : b) is $(a^{1/3} : b^{1/3})$

6) Inverse Ratio of (a : b) is (b : a)

7) Continued Ratio -

If a : b, b : c then a : b : c is called continued Ratio.

PROPORTION

1) Definition :-

Equality of two ratios is called a proportion.

If a : b = c : d we write a : b : : c : d and we say that a, b, c, d are in proportion

Means

a : b = c : d

Extremes

We can write it as

$\frac{a}{b} \times \frac{c}{d} \Rightarrow ad = bc$

Product of extremes = Product of means

Where a, b, c, d are first, second, third and fourth proportion respectively.

LEVEL - III

1. **In what ratio should tea worth Rs. 10 per kg to mixed with tea worth Rs. 14 per kg, so that the average price of the mixture may be Rs. 11 per kg? [J-08]**
   (a) 2 : 1 (b) 3 : 1 (c) 3 : 2 (d) 4 : 3.

2. **Two numbers are in the ratio 2 : 3 and the difference of their squares is 320. The numbers are: [N-06]**
   (a) 12, 18 (b) 16, 24 (c) 14, 21 (d) None

3. **Ratio of earnings of A and B is 4 : 7. If the earnings of A increase by 50% and those of B decrease by 25%, the new ratio of their earning becomes 8 : 7. What is A's earning? [A-07]**
   (a) Rs. 21,000 (b) Rs. 26,000 (c) Rs. 28,000 (d) Data inadequate.

4. **The incomes of A and B are in the ratio 3 : 2 and their expenditures in the ratio 5 : 3. If each saves Rs. 1,500, then B's income is : [N-07]**
   (a) Rs. 6,000 (b) Rs. 4,500 (c) Rs. 3,000 (d) Rs. 7,500

5. **If A:B = 2:5, then (10A+3B):(5A+2B) is equal to [D-10]**
   (a) 7:4 (b) 7:3 (c) 6:5 (d) 7:9

6. **In a film shooting, A and B received money in a certain ratio and B and C also received the money in the same ratio. If A gets Rs. 1,60,000 and C gets Rs. 2,50,000. Find the amount received by B? [J-11]**
   (a) Rs. 2,00,000 (b) Rs. 2,50,000 (c) Rs. 1,00,000 (d) Rs. 1,50,000

7. **Find three numbers in the ratio 1 : 2 : 3, so that the sum of their squares is equal to 504 [D-13]**
   (a) 6, 12, 18 (b) 3, 6, 9 (c) 4, 8, 12 (d) 5, 10, 15

8. **P, Q and Rare three cities. The ratio of average temperature between P and Q is 11 : l2andthatbetweenP and R is 9 : 8. The ratio between the average temperature of Q and R is:[SM] [A-07]**
   (a) 22 : 27 (b) 27 : 22 (c) 32 : 33 (d) None.

9. **Rs. 407 are to be divided among A, B and C so that their shares are in the ratio $\frac{1}{4}:\frac{1}{5}:\frac{1}{6}$.The respective shares of A, B, C are: [N-07]**
   (a) Rs.165, Rs.132, Rs.110 (b) Rs.165, Rs.110, Rs.132
   (c) Rs.l32, Rs.110, Rs.165 (d) Rs.110, Rs.132, Rs.165.

10. **If A, B and C started a business by investing Rs.1,26,000, Rs.84,000 and Rs.2,10,000. It at the end of the year profit is Rs.2,42,000 then the share of each is: [D-08]**
    (a) 72,600, 48,400, 1,21,000 (b) 48,400, 1,21,000, 72,600
    (c) 72,000, 49,000, 1,21,000 (d) 48,000, 1,21400, 72,600

11. **The ratio compounded of 4 : 5 and sub-duplicate of "a": 9 is 8 : 15. then value of "a" is [D-11]**
    (a) 2 (b) 3 (c) 4 (d) 5

12. **If P is 25% less than Q and R is 20% higher than Q the Ratio of R and P :[J-14]**
    (a) 5:8 (b) 8:5 (c) 5:3 (d) 3:5

13. **A person has assets worth Rs. 1,48,200. He wish to divide it amongst his wife, son and daughter in the ratio 3:2:1 respectively. From this assets the share of his son will be:[J-14]**
    (a) Rs. 74,100 (b) Rs. 37,050 (c) Rs. 49,400 (d) Rs. 24,700

14. **If (5x—3y)/(5y—3x) = 3/4, the value of x : y is [SM] [J-11]**
    (a) 2 : 9 (b) 7 : 2 (c) 7 : 9 (d) none of these

15. If $\frac{p}{q}=\frac{-2}{3}$ then the value of $\frac{2p+q}{2p-q}$ is : [J-09]
(a) 1 (b) -1/7 (c) 1/7 (d) 7.

16. An alloy is to contain copper and zinc in the ratio 9 : 4. The zinc required to melt with 24kg of copper is: [N-06]
(a) $10\frac{2}{3}$ kg (b) $10\frac{1}{3}$ kg (c) $9\frac{2}{3}$ kg (d) 9 kg.

17. In 40 litres mixture of glycerine and water, the ratio of glycerine and water is 3 : 1. The quantity of water added in the mixrure in order to make this ratio 2 : 1 is :[F-08]
(a) 15 litres (b) 10 litres (c) 8 litres (d) 5 liters

18. Two numbers are in the ratio 7 : 8. If 3 is added to each of them, their ratio becomes 8 : 9. The numbes are : [F-07]
(a) 14, 16 (b) 24, 27 (c) 21, 24 (d) 16, 18.

19. The ages of two persons are in the ratio 5 : 7. Eighteen years ago their ages were in the ratio of 8 : 13, their persent ages (in years) are : [J-08]
(a) 50, 70 (b) 70, 50 (c) 40, 56 (d) None.

20. The students of two classes are in the ratio 5 : 7, if 10 students left from each class, the remaining students are in the ratio of 4 : 6 then the number of students in each class is:[J-10]
(a) 30, 40 (b) 25, 24 (c) 40, 60 (d) 50, 70.

21. What must be added to each term of the ratio 49 : 68, so that it becomes 3 : 4.[J-10]
(a) 3 (b) 5 (c) 8 (d) 9.

22. A box contains Rs. 56 in the form of coins of one rupee, 50 paise and 25 paise. The number of 50 paise coin is double the number of 25 paise coin and four times the numbers of one rupee coins. The numbers of 50 paise coins in the box is :[F-07]
(a) 64 (b) 32 (c) 16 (d) 14.

23. Eight people are planning to share equally the cost of a rental car. If one person withdraws from the arrangement and the others share equally entire cost of the car, then the share of each of the remaining persons increased by: [M-07]
(a) 1/9 (b) 1/8 (c) 1/7 (d) 7/8.

24. A bag contains Rs. 187 in the form of 1 rupees. 50 paise and 10 paise coins in the ratio 3:4:5. Find the numbers of each type of coins : [M-07]
(a) 102, 136, 170 (b) 136, 102, 170 (c) 170, 102, 136 (d) None.

25. The mean proportional between 1.4 gms and 5.6 gms is[SM]
(a) 28 gms (b) 2.8 gms (c) 3.2 gms (d) none of these

26. The third proportional between $(a^2 - b^2)$ and $(a + b)^2$ is : [F-08]
(a) $\frac{a+b}{a-b}$ (b) $\frac{a-b}{a+b}$ (c) $\frac{(a-b)^2}{a+b}$ (d) $\frac{(a+b)^3}{a-b}$.

27. Fourth proportional to x, 2x, (x + 1) is : [J-09]
(a) (x + 2) (b) (x - 2) (c) (2x + 2) (d) (2x - 2).

28. The incomes of A and B are is the ratio 3 : 2 and their expenditure are in the ratios 5 : 3. if each saves Rs. 2000, what is their income? [N-07]
(a) 12000, 8000 (b) 8,000, 10000 (c) 8000, 7000 (d) 10000, 12000

29. Which of the numbers are not in proportion? [J-12]
(a) 6, 8, 5, 7 (b) 7, 14, 6,12 (c) 18, 27, 12, 18 (d) 8, 6, 12, 9

30. Divide 80 into two parts so that their product is maximum, then the numbers are [D-13]
(a) 25, 55 (b) 35, 45 (c) 40, 40 (d) 15, 65

31. If p :q is the sub-duplicate ratio of $p - x^2 : q - x^2$ then x^2 is:[SM] [N-06]
(a) $\frac{p}{p+q}$ (b) $\frac{q}{p+q}$ (c) $\frac{qp}{p-q}$ (d) None.

32. There are total 23 coins of Rs. 1, Rs.2 and Rs. 5 in a bag. If their value is Rs. 43 and the ratio of coins of rs. 1 and Rs. 2 is 3:2. Then the number of coins of Rs. 1 is : (D-16)
(a) 12 (b) 5 (c) 10 (d) 14

33. $15(2p^2 - q^2) = 7pq$ where p, q are positive then p : q (J-15)
(a) 5 : 6 (b) 5 : 7 (c) 3 : 5 (d) 3 : 7

34. If one type of rice of cost Rs.13.84 is mixed with another type of rice of cost Rs.15.54. the mixture is sold at Rs.17.60 with a profit of 14.6% on selling price then in which proportion the two types of rice mixed? (J-15)
(a) 3 : 7 (b) 5 : 7 (c) 7 : 9 (d) 9 : 1

35. Find the ratio of third proportional of 12,30 and mean proportional of 9,25 : (D-15)
(a) 7 : 2 (b) 5 :1 (c) 9 :4 (d) None of these

36. What must be added to each of the numbers 10,18 , 22, 38 to make them proportional: (D-15)
(a) 5 (b) 2 (c) 3 (d) 9

37. X, Y, Z together starts a business If X invests 3 times as much as Y invests and Y invests two third of what Z invests, then the ratio of capitals of X, Y, Z is (J-16)
(a) 3:9:2 (b) 6:3:2 (c) 3:6:2 (d) 6:2:3

38. If a:b = 2:3, b:c = 4:5, c:d = 6:7 then a:d is _____ (J-17)
(a) 24:35 (b) 8:15 (c) 16:35 (d) 7:15

39. The ratio of the number of five rupee coins to number of ten rupee coins is 8 : 15. If the total value of five rupee coins is 360, then the no. of ten rupee coins is _____.
(a) 72 (b) 60 (c) 150 (d) 135

40. If $\frac{1}{2}, \frac{1}{3}, \frac{1}{5}, \frac{1}{x}$ are in proportion then x = (D-17)
(a) $\frac{15}{2}$ (b) $\frac{3}{15}$ (c) $\frac{2}{15}$ (d) $\frac{1}{15}$

41. If $p^x = q$, $q^y = r$, $r^z = p^6$ then the value of xyz is (J-15)
(a) 0 (b) 1 (c) 3 (d) 6

42. On simplification $\frac{1}{1+z^{a-b}+z^{a-c}} + \frac{1}{1+z^{b-c}+z^{b-a}} + \frac{1}{1+z^{c-a}+z^{c-b}}$ reduces to :[A-07][SM]
(a) $\frac{1}{z^{2(a+b+c)}}$ (b) $\frac{1}{z^{(a+b+c)}}$ (c) 1 (d) 0.

43. If $x = y^a$, $y = z^b$ and $z = x^c$ then abc is :[SM] [J-08]
(a) 2 (b) 1 (c) 3 (d) 4.

44. If $2^x - 2^{x-1} = 4$, then the value of x^x is : [F-08, J-10]
(a) 2 (b) 1 (c) 64 (d) 27.

45. $\frac{2^n + 2^{n-1}}{2^{n+1} - 2^n}$ [D-09]
(a) 1/2 (b) 3/2 (c) 2/3 (d) 1/3.

46. If $2^x \times 3^y \times 5^z = 360$. Then what is valueof x, y, z.? [D-09]
(a) 3, 2, 1 (b) 1, 2, 3 (c) 2, 3, 1 (d) 1, 3, 2.

47. The value of $\frac{(3^{n+1} + 3^n)}{(3^{n+3} - 3^{n+1})}$ is equal to [J-12]
(a) 1/5 (b) 1/6 (c) 1/4 (d)1/9

48. If $\sqrt[3]{a} + \sqrt[3]{b} + \sqrt[3]{c} = 0$ then the value of $\left(\frac{a+b+c}{3}\right)^3$ [D-13]
(a) abc (b) 9abc (c) $\frac{1}{abc}$ (d) $\frac{1}{9abc}$

49. Find the value of x, if $x^{(x^{1/3})} = (x^{1/3})^x$: [D-12]
(a) 3 (b) 4 (c) 2 (d) 6

50. $\left(\frac{\sqrt{3}}{9}\right)^{5/2} \left(\frac{9}{3\sqrt{3}}\right)^{7/2} \times 9$ is equal to : [N-07]
(a) 1 (b) $\sqrt{3}$ (c) $3\sqrt{3}$ (d) $\frac{3}{9\sqrt{3}}$.

51. If $4^x = 5^y = 20^z$ then z is equal to : [N-07]
(a) xy (b) $\frac{x+y}{xy}$ (c) $\frac{1}{xy}$ (d) $\frac{xy}{x+y}$.

52. $\sqrt{12+\sqrt{12+\sqrt{12+}}}.....\infty$ [A-07]
(a) 5 (b) 3 (c) 4 (d) 7

53. Value of $(a^{1/8} + a^{-1/8})(a^{1/8} - a^{-1/8})(a^{1/4} + a^{-1/4})(a^{1/2} + a^{-1/2})$ is : [F-07]
(a) $a + \frac{1}{a}$ (b) $a - \frac{1}{a}$ (c) $a^2 + \frac{1}{a^2}$ (d) $a^2 - \frac{1}{a^2}$.

54. If $x = 4^{1/3} + 4^{-1/3}$ then $4x^3 - 12x$ is given by[SM] [J-09]
(a) 12 (b) 13 (c) 15 (d) 17

55. Show that $\left(\frac{x^a}{x^{-b}}\right)^{a^2-ab+b^2} \times \left(\frac{x^b}{x^{-c}}\right)^{b^2-bc+c^2} \times \left(\frac{x^c}{x^{-a}}\right)^{c^2-ca+a^2}$ reduces to [SM] [J-14]
(a) 1 (b) $x^{-2(a^2+b^2+c^2)}$ (c) $x^{2(a^3+b^3+c^3)}$ (d) $x^{-2(a^3+b^3+c^3)}$

56. Simplifaction of $\frac{x^{m+3n}.x^{4m-9n}}{x^{6m-6n}}$ is : [M-07]

(a) x^m (b) x^{-m} (c) x^n (d) x^{-n}.

57. The recurring decimal 2.7777 ..... can be expressed as. [D-10]

(a) 24/9 (b) 22/9 (c) 26/9 (d) 25/9.

58. $[1 - \{1 - (1 - x^2)^{-1}\}^{-1}]^{-1/2}$ is equal to x.[SM] [J-09]

59. The value of $\left[\frac{x^2-(y-z)^2}{(x+z)^2-y^2}+\frac{y^2-(x-z)^2}{(x+y)^2-z^2}+\frac{z^2-(x-y)^2}{(y+z)^2-x^2}\right]$ [J-16]

(a) 0 (b) 1 (c) -1 (d) ∞

60. If abc = 2, then the value of $\frac{1}{1+a+2b^{-1}}+\frac{1}{1+\frac{1}{2}b+c^{-1}}+\frac{1}{1+c+a^{-1}}$ [D-16]

(a) 1 (b) 2 (c) 3 (4) 1/2

61. If $\log_{10000} x = \frac{-1}{4}$, then x is given by : [F-07]

(a) $\frac{1}{100}$ (b) $\frac{1}{10}$ (c) $\frac{1}{20}$ (d) None of these.

62. If log (2a - 3b) = log a - log b, then a [M-07]

(a) $\frac{3b^2}{2b-1}$ (b) $\frac{3b}{2b-1}$ (c) $\frac{b^2}{2b+1}$ (d) $\frac{3b^2}{2b+1}$

63. Log (m + n) = log m + log n,m can be expressed as : [J-09]

(a) $m = \frac{n}{n-1}$ (b) $m = \frac{n}{n+1}$ (c) $m = \frac{n+1}{n}$ (d) $m = \frac{n+1}{n-1}$

64. Find the value of $\left[\log_{10}\sqrt{25} - \log_{10}(2^3) + \log_{10}(4)^2\right]^x$ [D-09]

(a) x (b) 10 (c) 1 (d) None

65. $7 \log\left(\frac{16}{15}\right) + 5 \log\left(\frac{25}{24}\right) + 3 \log\left(\frac{81}{80}\right)$ is equal to : [N-06]

(a) 0 (b) 1 (c) log 2 (d) log 3.

66. Log 144 is equal to : [F-08]

(a) 2 log 4 + 2 log 2 (b) 4 log 2+ 2 log 3

(c) 3 log 2 + 4 log 3 (d) 3 log 2 - 4 log 3.

67. The value of the expression : $a^{\log_a b.\log_b c.\log_c d.\log_d t}$ [F-07]

(a) t (b) abcdt (c) (a+b+c+d+t) (d) None.

68. If $\log_2 [\log_3(\log_2 x)] = 1$, then x equals : [J-08]

(a) 128 (b) 256 (c) 512 (d) none.

69. If $a^2 + b^2 = 7ab$ then the value of $\log\frac{a+b}{3} - \frac{\log a}{2} - \frac{\log b}{2}$ [SM].I [J-14]
(a) 0 (b) 1 (c) -1 (d) 7

70. The value of [D-10]
$2\log x + 2\log x^2 + 2\log x^3 + \ldots\ldots + 2\log x^n$ will be :-
(a) $\frac{n(n+1)\log x}{2}$ (b) $n(n+1)\log x$ (c) $n^2 \log x$ (d) None of these.

71. Solve : $\left[\frac{\log_{10}x - 3}{2}\right] + \left[\frac{11 - \log_{10}x}{3}\right] = 2$ [D-10]
(a) 10^{-1} (b) 10^2 (c) 10 (d) 10^3.

72. If $\log\left(\frac{a+b}{4}\right) = \frac{1}{2}(\log a + \log b)$ then : $\frac{a}{b} + \frac{b}{a}$ [D-08]
(a) 12 (b) 14 (c) 16 (d) 8.

73. If $\log_a b + \log_a c = 0$ then [J-10]
(a) b = c (b) b = - c
(c) b = c = 1 (d) b and c are reciprocals.

74. Number of digits in the numeral for 2^{64}. [Given log 2 = 0.30103] : [A-07]
(a) 18 digits (b) 19 digits (c) 20 digits (d) 21 digits.

75. If $x = \frac{e^n - e^{-n}}{e^n + e^{-n}}$, then the value of n is : [F-08]
(a) $\frac{1}{2}\log_e\frac{1+x}{1-x}$ (b) $\log_e\frac{1+x}{1-x}$ (c) $\log_e\frac{1-x}{1+x}$ (d) $\log_c\frac{1+x}{1+x}$.

76. $\log_4 (x^2+x) - \log_4 (x+1) = 2$. Find x [J-09]
(a) 16 (b) 0 (c) -1 (d) None of these.

77. If n = m! where ('m' is a positive integer $\geq$ 2) then the value of: [J-11]
$$\frac{1}{\log_2 n} + \frac{1}{\log_3 n} + \frac{1}{\log_4 n} + \text{------} + \frac{1}{\log_m n}$$
(a) 1 (b) 0 (c) -1 (d)2

78. If $\log_2 x + \log_4 x = 6$, then the Value of x is [J-11]
(a) 16 (b) 32 (c) 64 (d) 128.

79. If $\log_x y = 100$ and $\log_2 x = 10$, then the value of 'y'is: [J-12]
(a) 2^{10} (b) 2^{100} (c) $2^{1,000}$ (d) $2^{10,000}$

80. For what valueof x, the equation $(\log_{\sqrt{x}}2)^2 = (\log_x 2)$ is true ? [J-13]
(a) 16 (b) 32 (c) 8 (d) 4

81. The value of $\log_4 9 \cdot \log_3 2$ is [D-13]
(a) 3 (b) 9 (c) 2 (d) 1

82. The value of $(\log_y X \cdot \log_z Y \cdot \log_x Z)^3$ is [D-13]
(a) 0 (b) -1 (c) 1 (d) 3

83. The value $\frac{\log_3 8}{\log_9 16.\log_4 10}$ is:[SM] [N-07]

(a) $3\log_{10} 2$ (b) $7\log_{10} 3$ (c) 3logz (d) None.

84. Which of the following is true. If $\frac{1}{ab}+\frac{1}{bc}+\frac{1}{ca}=\frac{1}{abc}$ [D-12]

(a) log (ab + bc + ca) = abc (b) $\log\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)$ = abc

(c) log (abc) = 0 (d) log (a + b + c) = 0

85. If $x=\log_{24}12$; $y=\log_{36}24$; $z=\log_{48}36$ then xyz + 1 = ?[SM] [J-14]

(a) 2xy (b) 2zx (c) 2yz (d) 2

86. If log x = m + n, log y = m — n then log $\left(\frac{10x}{y^2}\right)$ = [SM] (J-15)

(a) 1 - m + 3n (b) m - 1 + 3n (c) m + 3n +1 (d) None

87. log $(1^3 + 2^3 + 3^3 + \ldots\ldots + n^3)$ = _____ (J-17)

(a) 2 log n + 2log (n+1) -2log2 (b) log n + 2 log (n+1) -2log2

(c) 2log n + log(n + 1) - 2log2 (d) None

88. If $u^{5x} = v^{5y} = w^{5z}$ and $u^2 = vw$ then xy + zx - 2yz =_____. (D-17)

(a) 0 (b) 1 (c) 2 (d) None of these

89. If $\log_3 [\log_4 (\log_2 x)] = 0$ then X = (D-17)

(a) 4 (b) 8 (c) 16 (d) 32

90. If log $\left(\frac{x-y}{2}\right)=\frac{1}{2}$(logx + logy) then $x^2 + y^2$ = _____ (D-17)

(a) 6xy (b) 2xy (c) $3x^2y^2$ (d) $4x^2y^2$

91. $\log_3 5 \log_5 4 \log_2 3$ (D-15)

(a) 2 (b) 5 (c) -2 (d) None of these

92. The integral part of a logarithm is called _____ and the decimal part of a logarithm is called _____ (J-16)

(a) Mantissa, Characteristic (b) Characteristic, Mantissa

(c) Whole, Decimal (d) None of these.

93. If $\log_4(x^2 + x) - \log_4(x + 1) = 2$, then the value of X is (J-16)

(a) 2 (b) 3

(c) 16 (d) 8

94. Value of $\frac{1}{\log_3 60}+\frac{1}{\log_4 60}+\frac{1}{\log_5 60}$ is: (J-16)

(a) 0 (b) 1 (c) 5 (d) 60

95. If $3^x = 5^y = 75^z$ then (D-16)

(a) x + y - z = 0 (b) 2/x + 1/y = 1/z (c) 1/x +2/y = 1/z (d) 2/x + 1/z = 1/y

96. If log 2 = 0.3010 and log 3 = 0.4771, then the value of log 24 is : (D-16)

(a) 1.0791 (b) 1.7323 (c) 1.3801 (d) 1.8301

97. If (a+b) : (b + c) : (c + a) = 7 : 8 : 9 and a + b + c = 18 then a : b : c = [J-18]

(a) 5 : 4 : 3 (b) 3 : 4 : 5 (c) 4 : 3 : 5 (d) 5 : 4 : 3

98. If the ratio of two numbers is 7:11. If 7 is added to each number then the new ratio will be 2:3 then the numbers are.[J-19]

(a) 49,77 (b) 42,45 (c)43,42 (d) 39,40

99. $\log_{2\sqrt{2}}(512):\log_{3\sqrt{2}}324=$ [J-19]

(a) 128:81 (b) 2:3 (c) 3:2 (d) None

100. If $2^{x^2}=3^{y^2}=12^{z^2}$ then [J-19]

(a) $\frac{1}{x^2}+\frac{1}{y^2}=\frac{1}{z^2}$ (b) $\frac{1}{x^2}+\frac{2}{y^2}=\frac{1}{z^2}$ (c) $\frac{2}{x^2}+\frac{1}{y^2}=\frac{1}{z^2}$ (d) None

101. Then value of [J-19]

$$\log_5\left(1+\frac{1}{5}\right)+\log_5\left(1+\frac{1}{6}\right)+.....+\log_5\left(1+\frac{1}{624}\right)=$$

(a) 2 (b) 3 (c) 5 (d) 0

102. The two numbers are in ratio 3 : 4. The difference between their squares is 28. Find the greater number. [N-19]

(a) 12 (b) 8 (c) 16 (d) 10

103. If $\left[\frac{9^{n+1/4}.\sqrt{3.3^n}}{3\sqrt{3^{-n}}}\right]^{\frac{1}{n}}$ [N-19]

(a) 1 (b) 3 (c) 9 (d) 27

104. If x = $\sqrt{3}+\frac{1}{\sqrt{3}}$ then $\left(x-\frac{\sqrt{126}}{\sqrt{42}}\right)\left(x-\frac{1}{x-\frac{2\sqrt{3}}{3}}\right)=$ [N-19]

(a) $\frac{5}{6}$ (b) $\frac{6}{5}$ (c) $\frac{2}{3}$ (d) $-\frac{3}{5}$

105. If $x=\frac{1}{5+2\sqrt{6}}$ then the value of the expression x^2 - 10x + 1 is [N-19]

(a) 0 (b) 10 (c) $26-12\sqrt{2}$ (d) $\sqrt{15}+\sqrt{3}$

106. $\log_{0.01}$ (10,000) = x; Find the value of x? [N-19]

(a) 1 (b) -2 (c) -4 (d) 2

107. $\log xy^2 - \log y = \log(x+y)$ Find the value of y in term of x [N-19]

(a) x - 1 (b) $\frac{x}{x+1}$ (c) $\frac{x}{x-1}$ (d) x + 1

108. **If a : b = 3 : 7, then 3a + 2b: 4a + 5b = ? [N-20]**

(a) 23 : 47 (b) 27 : 43 (c) 24 : 51 (d) 29 : 53

109. **If $\log_a \sqrt{3} = 1/6$, find the value of a [N-20]**

(a) 9 (b) 81 (c) 27 (d) 3

110. **log 9 + log 5 is expressed is - [N-20]**

(a) log 4 (b) log 9/5 (c) log 5/9 (d) log 45

111. **If a : = 9 : 4, then $\sqrt{\frac{a}{b}} + \sqrt{\frac{b}{a}}$ = ? [N-20]**

(a) $\frac{3}{2}$ (b) $\frac{2}{3}$ (c) $\frac{6}{13}$ (d) $\frac{13}{6}$

112. **The ratio of number of boys and the number of girls in a school is found to be 15 : 32. How many boys and equal number of girls should be added to bring the ratio to 2/3 ? [N-20]**

(a) 19 (b) 20 (c) 23 (d) 27

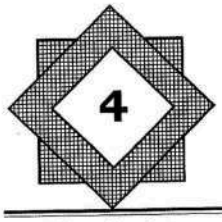
113. **Find the value of a from the following : [N-20]**

$(\sqrt{9})^{-5} \times (\sqrt{3})^{-7} = (\sqrt{3})^{-a}$

(a) 11 (b) 13 (c) 15 (d) 17

LEVEL - III									
QUS.	ANS.	QUS.	ANS.	QUS.	ANS.	QUS.	ANS.	QUS.	ANS.
1	b	26	d	51	d	76	a	101	b
2	b	27	c	52	c	77	a	102	b
3	d	28	a	53	b	78	a	103	d
4	a	29	a	54	d	79	c	104	a
5	a	30	c	55	c	80	a	105	a
6	a	31	d	56	b	81	d	106	b
7	a	32	a	57	d	82	c	107	c
8	b	33	a	58		83	a	108	a
9	a	34	a	59	b	84	d	109	c
10	a	35	b	60	a	85	c	110	d
11	c	36	b	61	b	86	a	111	d
12	b	37	d	62	a	87	a	112	a
13	c	38	c	63	a	88	a	113	d
14	d	39	d	64	c	89	c		
15	c	40	a	65	c	90	a		
16	a	41	d	66	b	91	a		
17	d	42	c	67	a	92	b		
18	c	43	b	68	c	93	c		
19	a	44	d	69	a	94	b		
20	d	45	b	70	b	95	c		
21	c	46	a	71	a	96	c		
22	a	47	b	72	b	97	c		
23	c	48	a	73	d	98	a		
24	a	49	b	74	c	99	c		
25	b	50	a	75	a	100	c		


COMMERCIANS
Legends
CA FOUNDATION
Let's Crack Our Goal



TIME VALUE OF MONEY

I Simple Interest

- **Principal:** The money borrowed or lent out for a certain period is called the principal or the sum.
- **Interest:** Extra money paid for using other's money is called interest.
- **Simple Interest:** If the interest on a sum borrowed for a certain period is reckoned uniformly, then it is called simple interest.

- **Simple Interest** $= \frac{P \times R \times T}{100}$

P = Principal R = Rate T = Time

I Compound Interest

When the interest at the end of a specified period is added to the principal, and the interest for the next period is calculated on the new principal, the interest payable is called compound interest.

I. When interest is compound Annually:-

Amount = $P\left[1+\frac{R}{100}\right]^{n}$

II. When interest is compounded Half-yearly:-

Amount = $P\left[1+\frac{(R/2)}{100}\right]^{2n}$

III. When interest is compounded quarterly:-

Amount = $P\left[1+\frac{(R/4)}{100}\right]^{4n}$

IV. When interest is compounded Annualy but time is in fraction, say $3\frac{2}{5}$ years

Amount = $P\left[1+\frac{R}{100}\right]^{3}\left[1+\frac{\frac{2}{5}R}{100}\right]$

I Effective rate of interest:-

If interest is compounded more than once a year. The effective interest rate for a year exceed the per annum interest rate $E = (I + i)^n - 1$

LEVEL - III

1. ` 8,000 becomes ` 10,000 in two years at simple interest. The amount that will become ` 6,875 in 3 years at the same rate of interest is : (N-6)
   (a) ` 4,850 (b) ` 5,000 (c) ` 5,500 (d) ` 5,275
2. The rate of simple interest on a sum of money is 6% p.a. for first 3 years, 8% p.a. for the next five years and 10% p.a. for the period beyond 8 years. If the simple interest accured by the sum for a period for 10 years is ` 1560. The sum is (F-7)
   (a) ` 1,500 (b) ` 2,000 (c) ` 3,000 (d) ` 5,000
3. A sum of money doubles itself in 10 years. The number of yeras it would treble itself is : (F-7)
   (a) 25 years (b) 15 years (c) 20 years (d) None
4. A certain sum of money amounts to ` 6,300 in two years and ` 7,875 in three years nine months at simple interest. Find the rate of interest per annum: (M-7)
   (a) 20% (b) 18% (c) 15% (d) 10%
5. A person borrows ` 5,000 for 2 years at 4% p.a. simple interest. He immediately lends to another person at $6\frac{1}{4}\%$ p.a. for 2 years. Find his gain in the transaction per year : (N-7)
   (a) ` 112.50 (b) ` 125 (c) ` 225 (d) ` 167.50
6. Two equal sums of money were lent at simple interest at 11% p.a. for $3\frac{1}{2}$ years and $4\frac{1}{2}$ years respectively. If the difference in interests for two periods was ` 412.50, then each sum is: (F-8)
   (a) ` 3,250 (b) ` 3,500 (c) ` 3,750 (d) ` 4,350
7. In how much time would the simple interest on a certain sum be 0.125 times the principal at 10% per annum?(J-8)
   (a) $1\frac{1}{4}$ years (b) $1\frac{3}{4}$ years (c) $2\frac{1}{4}$ years (d) $2\frac{3}{4}$ years
8. What is the rate of simple interest if a sum of money amounts to ` 2,784 in 4 years and ` 2,688 in 3 years?(J-9)
   (a) 1% p.a. (b) 4% p.a. (c) 5% p.a. (d) 8% p.a.
9. If a simple interest on a sum of money at 6% p.a. for 7 years is equal to twice of simple interest on another sum for 9 years at 5% p.a.. The ratio will be : (J-11)
   (a) 2 : 15 (b) 7 : 15 (c) 15 : 7 (d) 1 : 7
10. By mistake a clerk, calculated the simple interest on principal for 5 months at 6.5% p.a. Instead of 6 months at 5.5% p.a. If the error in calculation was ` 25.40. The original sum of principal was (J-11)
    (a) ` 60,690 (b) ` 60,960 (c) ` 90,660 (d) ` 90,690
11. If the Simple Interest on ` 1,400 for 3 years is less than the simple interest on ` 1,800 for the same period by ` 80, then the rate of interest is (D-11)
    (a) 5.67% (b) 6.67% (c) 7.20% (d) 5.00%

12. The S.I. on a sum of money is $\frac{4}{9}$ of the principal and the no. of years is equal to the rate of interest per annum? (J-12)
(a) 5% (b) 20/3% (c) 22/7% (d) 6%

13. Simple interest on ` 2,000 for 5 months at 16% p.a. is _____ . (J-12)
(a) ` 133.33 (b) ` 133.26 (c) ` 134.00 (d) ` 132.09

14. How much investment is required to yield an Annual income of ` 420 at 7% p.a. Simple interest. (D-12)
(a) ` 6,000 (b) ` 6,420 (c) ` 5,580 (d) ` 5,000

15. Mr. X invests ` 90,500 in post office at 7.5% p.a. simple interest. While calculating the rate was wrongly taken as 5.7% p.a. The difference in amounts maturity is ` 9,774. Find the period for which the sum was invested (D-12)
(a) 7 years (b) 5.8 years (c) 6 years (d) 8 years

16. In what time will a sum of money double itself at 6.25% p.a. simple interest? (D-13)
(a) 5 years (b) 8 years (c) 12 years (d) 16 years

17. What principal will amount to ` 370 in 6 years at 8% p.a. at simple interest? (D-13)
(a) ` 210 (b) ` 250 (c) ` 310 (d) ` 350

18. If a sum triples in 15 years at simple rate of interest, the rate of interest per annum will be: (J-14)
(a) 13.0% (b) 13.3% (c) 13.5% (d) 18.0%

19. A certain sum of money was invested at simple rate of interest for three years. If the same has been invested at a rate that was seven percent higher, the interest amountwould have been ` 882 more. The amount of sum invested is :(D-14)
(a) ` 12,600 (b) ` 6,800 (c) ` 4,200 (d) ` 2,800

20. A sum of money doubles itself in 8 years at simple interest. The number of years it would triple itself is _____. (J-15)
(a) 20 years (b) 12 years (c) 16 years (d) None of these

21. A sum of ` 44,000 is divided into three parts such that the corresponding interest earned after 2 years, 3 years and 6 years may be equal. If the rates of simple interest are 6% p.a., 8% p.a. and 6% p.a. respectively, then the smallest part of the sum will be (J-15)
(a) ` 4,000 (b) ` 8,000 (c) ` 10,000 (d) ` 12,000

22. In how many years will a sum of money become four times at 12% p.a. simple interest? (D-15)
(a) 18 years (b) 21 years (c) 25 years (d) 28 years

23. The simple interest for a certain sum for 2 years at 10% per annum is ` 90. The corresponding compound interest is (In `): (D-15)
(a) 99 (b) 95.60 (c) 94.50 (d) 108

24. A person lends ` 6,000 for 4 years and ` 8,000 for 3 years at simple interest. If he gets ` 2,400 as total interest, the rate of interest is (D-16)
(a) 5% (b) 4% (c) 6% (d) 7%

25. The difference between the simple and compound interest on a certain sum for 3 year at 5% p.a. is ` 228.75. The compound interest on the sum for 2 years at 5% p.a. is : (N-6)
(a) ` 3,175 (b) ` 3,075 (c) ` 3,275 (d) ` 2,975

26. It what time will ` 3,90,625 amount to ` 4,56,976 at 8% per annum, when the interest is compounded semi-annually? (Given : $(1.04)^4 = 1.16986$) (F-7)
(a) 2 years (b) 4 years (c) 5 years (d) 7 years

27. How long will ` 12,000 take to amount to ` 14,000 at 5% p.a. converted quarterly? [Given : $(1.0125)^{12.4} = 1.1666$] (M-7)
(a) 3 years (b) 3.1 years (c) 13.5 years (d) 12.4 years

28. If ` 1,000 be invested at interest rate of 5% and the interest be added to the principal every 10 years, then the number of years in which it will amount to ` 2,000 is :(A-7)
(a) $16\frac{2}{3}$ years (b) $16\frac{1}{4}$ years (c) 16 years (d) $6\frac{2}{3}$ years

29. 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-7)
(a) 35 years (b) 30 years (c) 25 years (d) None of these

30. The effective rate equivalent to nominal rate of 6% compounded monthly is : (A-7)
(a) 6.05 (b) 6.16 (c) 6.26 (d) 6.07

31. A person deposited ` 5,000 in a bank. The deposit was left to accumulate at 6% compounded quarterly for the first five years and at 8% compounded semi-annually for the next eight years. The compound amount at the end of 13 years is : (N-7)
(a) ` 12621.50 (b) ` 12613.10 (c) ` 13613.10 (d) None

32. Raja aged 40 wishes his wife Rani to have ` 40 lakhs at his death. If his expectation of life is another 30 years and he starts making equal annual investments commencing now at 3% compound interest p.a. How much should he invest annually? (N-7)
(a) ` 84,077 (b) ` 81,628 (c) ` 84,449 (d) ` 84,247

33. Anshul's father wishes to have ` 75,000 in a bank account when his first college expenses begin. How much amount his father should deposit now at 6.5% compounded annually if Anshul is to start college in 8 years hence from now? (F-8)
(a) ` 45,317 (b) ` 46,360 (c) ` 55,360 (d) ` 48,360

34. The difference between compound interest and simple interest on a certain sum for 2 years @ 10% p.a. is ` 10. Find the sum : (J-8)
(a) ` 1,010 (b) ` 1,095 (c) ` 1,000 (d) ` 990

35. A machine worth ` 4,90,740 is depreciated at 15% on its opening value each year. When its value would reduce to ` 2,00,000 : (J-8)
(a) 5 years 6 months (b) 5 years 7 months (c) 5 years 5 months (d) None

36. If the difference between simple interest and compound interest is ` 11 at rate of 10% for two years, then find the sum. (D-8)
(a) ` 1,200 (b) ` 1,100 (c) ` 1,000 (d) None of these

37. Find the numbers of years in which a sum doubles itself at the rate of 8% per annum. (D-8)

(a) $11\frac{1}{2}$ (b) $12\frac{1}{2}$ (c) $9\frac{1}{2}$ (d) $13\frac{1}{2}$

38. In how many years, a sum will become double at 5% p.a. compound interest. (J-9)

(a) 14.0 years (b) 14.1 years (c) 14.2 years (d) 14.3 years

39. The time by which a sum of money is 8 times of itself if it doubles itself in 15 years. (J-9)

(a) 42 years (b) 43 years (c) 45 years (d) 46 years

40. A sum amount to ` 1,331 at a principal of ` 1,000 at 10% compounded annually. Find the time. (J-9)

(a) 3.31 years (b) 4 years (c) 3 years (d) 2 years

41. In how many years, a sum of ` 1000 compounded annually @ 10%, will amount to ` 1331?(D-9)

(a) 6 years (b) 5 years (c) 4 years (d) 3 years

42. The compounded interest for a certain sum @ 5% p.a. for first year is ` 25. The SI for the same money @ 5% p.a. for 2 years will be. (D-9)

(a) ` 40 (b) ` 50 (c) ` 60 (d) ` 70

43. At what % rate of compound interest (C.I) will a sum of money become 16 times in four years, if interest is being calculated compounding annually: (J-10)

(a) r = 100% (b) r = 10% (c) r = 200% (d) r = 20%

44. If the simple interest on a sum of money at 12% p.a. for two years is ` 3,600. The compound interest on the same sum for two years at the same rate is : (J-10)

(a) ` 3,816 (b) ` 3,806 (c) ` 3,861 (d) ` 3,860

45. The effective annual rate of interest corresponding nominal rate 6% p.a. payable half yearly is (D-10)

(a) 6.06% (b) 6.07% (c) 6.08% (d) 6.09%

46. The cost of Machinery is ` 1,25,000/- If its useful life is estimated to be 20 years and the rate of depreciation of its cost is 10% p.a., then the scrap value of the Machinery is (D-10) [Given that $(0.9)^{20} = 0.1215$]

(a) 15,187 (b) 15,400 (c) 15,300 (d) 15,250

47. Mr. X invests 'P' amount at Simple Interest rate 10% and Mr. Y invests 'Q' amount at Compound Interest rate 5% compounded annually. At the end of two years both get the same amount of interest, then the relation between two amounts P and Q is given by : (D-10)

(a) $P = \frac{41Q}{80}$ (b) $P = \frac{41Q}{40}$ (c) $P = \frac{41Q}{100}$ (d) $P = \frac{41Q}{200}$

48. If the difference of S.I and C.I is ` 72 at 12% for 2 years. Calculate the amount. (J-11)

(a) 8,000 (b) 6,000 (c) 5,000 (d) 7,750

49. **Nominal rate of interest is 9.9% p.a. If interest is Compounded monthly, What will be effective rate of interest (given $\left(\frac{4033}{4000}\right)^{12}$ = 1.1036 (approx))? (D-11)**

(a) 10.36% (b) 9.36% (c) 11.36% (d) 9.9%

50. **The difference between compound and simple interest on a certain sum of money for 2 years at 4% p.a. is ` 1. The sum (in `) is : (J-13)**

(a) 625 (b) 630 (c) 640 (d) 635

51. **A sum of money compounded annually becomes ` 1,140 in two years and ` 1,710 in three years. Find the rate of interest per annum. (J-13)**

(a) 30% (b) 40% (c) 50% (d) 60%

52. **On what sum difference between compound interest and simple interest for two years at 7% p.a. interest is ` 29.4. (D-13)**

(a) ` 5000 (b) ` 5500 (c) ` 6000 (d) ` 6500

53. **The partners A and B together lent ` 3,903 at 4% per annum interest compounded annually. After a span of 7 years, A gets the same amount as B gets after 9 years. The share of A in the sum of ` 3,903 would have been : (J-14)**

(a) ` 1,875 (b) ` 2,280 (c) ` 2,028 (d) ` 2,820

54. **How much amount is required to be invested every year as to accumulate ` 6,00,000 at the end of 10 years, if interest is compounded annually at 10% rate of interest (J-14)**

[Given : $(1.1)^{10}$ = 2.59374].

(a) ` 37,467 (b) ` 37,476 (c) ` 37,647 (d) ` 37,674

55. **A sum of money invested of compound interest doubles itself in four yers. It becomes 32 times of itself at the same rate of compound interest in (D-14)**

(a) 12 years (b) 16 years (c) 20 years (d) 24 years

56. **Suppose your parent decided to open a PPF (Public Provident Fund) account in a bank towrds your name with ` 10,000 every year starting from today for next 16 years. When you receive and get 8.5% per annum interest rate compounded annually. What is the present value of this annuity? (Give answer in ` without any fraction.) (D-15)**

(Given P (15,0.085) = 8.304236576)

(a) 83,042 (b) 1,66,084 (c) 93,042 (d) 8,30,423

57. **Mr. X bought an electronic item for ` 1,000. What would be the future value of the same item after 2 years, if the value is compounded semi annually at 22% per annum? (J-16)**

(a) ` 1488.40 (b) ` 1518.07 (c) ` 2008.07 (d) ` 2200.00

58. **If the compound interest on a sum for two year at the rate 5% p.a. is ` 512.50, then the principle is _____. (D-17)**

(a) 4,000 (b) 3,000 (c) 5,000 (d) None of these

59. **Find effective rate of interest corresponding to the nominal rate of interest 7% compounded monthly is _____. (D-17)**
(a) 7.26% (b) 7.22% (c) 7.02% (d) 7.20

60. **If an amount is kept at simple interest, it earns an interest of ` 600 in first two years but when kept at compound interest it earns an interest of ` 660 for the same period, then the rate of interest and principal amount respectively are : (J-16)**
(a) 20%, ` 1,200 (b) 10%, ` 1,200 (c) 20%, ` 1,500 (d) 10%, ` 1,500

61. **The sum invested at 4% per annum compounded Semi-annually amounts to ` 7,803 at the end of one year, is (D-16)**
(a) ` 7,000 (b) ` 7,500 (c) ` 7,225 (d) ` 8,000

62. **A compound interest on a sum for 2 years is ` 30 more than the simple interest at the rate of 5% per annum then the sum is (D-16)**
(a) ` 11,000 (b) ` 13,000 (c) ` 12,000 (d) ` 15,000

63. **The difference between simple and compound interest on a sum of Rs. 10000 for 4 years at the rate of interest 10% per annum is _____ (J-17)**
(a) 650 (b) 640 (c) 641 (d) 600

64. **Mr. X Invests ` 10,000 every year starting from today for next 10 years suppose interest rate is 8% per annum compounded annually. Calculate future value of annuity: (N-6) (Given that $(1 + 0.08)^{10} = 2.15892500$]**
(a) ` 156454.88 (b) ` 144865.625 (c) ` 156554.88 (d) ` None of these

65. **The present value of an annuity of ` 3,000 for 15 years at 4.5% p.a. C.I. is :(N-6) [Given that $(1.045)^{15} = 1.935282$]**
(a) ` 23,809.67 (b) ` 32,218.67 (c) ` 32,908.67 (d) None of these

66. **A machine can be purchased for ` 50,000. Machine will contribute ` 12,000 per year for the next five yeras. Assume borrowing cost is 10% per annum. Determine whether ma chine should be purchased or not: (F-7)**
(a) Should be purchased (b) Should not be purchased
(c) Can't say about purchase (d) None of these

67. **How much amount is required to be invested every year so as to accumulate ` 3,00,000 at the end of 10 years, if interest is compounded annually at 10%? [Give $(1.1)^{10} = 2.5937$] (F-7)**
(a) ` 18,823.65 (b) ` 18,828.65 (c) ` 18,832.65 (d) ` 18.882.65

68. **A company is considering proposal of purchasing a machine either by making full payment of ` 1,250. Which course of action is preferable, if the company can borrow money at 14% compounded annually? [Given : $(1.14)^4 = 1.68896$] (M-7)**
(a) Leasing is preferable (b) Should be purchased (c) No difference (d) None of these

69. **Vipul purchases a car for ` 5,50,000. He gets a loan of ` 5,00,000 at 15% p.a. from a Bank and balance ` 50,000 he pays at the time of purchase. He has to pay the whole amount of loan in 12 equal monthly instalments with interest starting from the end of the first month. The money he has to pay at the end of every month is : (M-7)**
[Given $(1.0125)^{12} = 1.16075452$]
(a) ` 45, 130.43 (b) ` ` 45,230.43 (c) ` 45,330.43 (d) None of these

70. **A company establishes a sinking fund to provide for the payment of ` 2,00,000 debt maturing in 20 years. Contributions to the fund are to be made at the end of every year. Find the amount of each annual deposit if interest is 5% per annum : (A-7)**
(a) ` 6,142 (b) ` 6,049 (c) ` 6,052 (d) ` 6,159

71. **A company may obtain a machine either by leasing it for 5 years (useful life) at an annual rent of ` 2,000 or by purchasing the machine of ` 8,100. If the company can borrow money at 18% per annum, which alternative is preferable? (F-8)**
(a) Leasing (b) Purchasing (c) Can't say (d) None of these

72. **A sinking fund is created for redeeming debentures worth ` 5 lacs at the end of 25 years. How much provision needs to be made out of profits each year provided sinking fund investments can earn interest at 4% p.a.? (J-8)**
(a) 12,006 (b) 12,040 (c) 12,039 (d) 12,035

73. **Future value of an ordinary annuity : (D-8)**
(a) A (n, i) = $A\left[\frac{(1+i)^n - 1}{i}\right]$ (b) A (n, i) = $A\left[\frac{(1+i)^n + 1}{i}\right]$
(c) A (n, i) = $A\left[\frac{1-(1+i)^n}{i}\right]$ (d) A (n, i) = $A\left[\frac{(1+i)^n - 1}{i(1+i)^n}\right]$

74. **Paul borrows ` 20,000 on condition to repay it with compound interest at 5% p.a. in annual instalment of ` 2,000 each. Find the number of years in which the debt would be paid of. (J-9)**
(a) 10 years (b) 12 years (c) 14 years (d) 15 years

75. **Find the present value of an annuity of ` 1,000 payable at the end of each year for 10 years. If rate of interest is 6% compounding per annum (given $(1.06)^{-10} = 0.5584$) :(J-10)**
(a) ` 7,360 (b) ` 8,360 (c) ` 12,000 (d) None of these

76. **The future value of an annuity of Rs. 5,000 is made annually for 8 years at interest rate of 9% compounded annually [Given than $(1.09)^8=1.99256$] is _____(D-10)**
(a) ` 55,142.22 (b) ` 65,142.22 (c) ` 65,532.22 (d) ` 57,425.22

77. **The future value of an annuity of ` 1,000 made annually for 5 years at the interest of 14% compounded annually is : [Given $(1.14)^5 = 1.92541$] (D-14)**
(a) ` 5,610 (b) ` 6,610 (c) ` 6,160 (d) ` 5,160

78. **The future value of an annuity of Rs. 1500 made anually for 5 years at an interest rate of 10% compounded annually is _____ (Given that $(1.1)^5 = 1.61051$ (J-17)**
(a) 9517.56 (b) 9157.65 (c) 9715.56 (d) 9175.65

79. **What sum should be invested at the end of every year so as to accumulate an amount of Rs. 796870 at the end of 10 years at the rate of interest 10% compounded annually, given that A(10,0.1) = 15.9374 (J-17)**
(a) 40,000 (b) 4,50,000 (c) 4,80,000 (d) 50,000

80. **In Simple interest, a certain sum becomes Rs. 97,920 in 3 years, and Rs. 1,15,200 in 5 years, then the rate of interest is:(J-18)**
(a) 10% (b) 11.2% (c) 12% (d) 13.6%

81. **In Compound interest, if the amount is 9 times to its principle in two years then the rate of interest is?(J-18)**
(a) 300% (b) 200% (c) 150% (d) 100%

82. **If the difference between compound interest and simple interest for 3 years is 912 at the rate of 4% p.a. then principle is:(J-18)**
(a) Rs. 1,87,500 (b) Rs. 1,87,000 (c) Rs. 1,87,550 (d) Rs. 1,85,700

83. **A person invests Rs. 2,000 at the end of each month @ of interest 6% compounding monthly, find the amount of annuity after the 10th payment is:(J-18)**
(a) Rs. 20,456 (b) Rs. 20,156 (c) Rs. 20,256 (d) Rs. 20,356

84. **If Rs. 10,000 is invested at 8% per year compound quarterly, then the value of the investment after 2 year is [given $(1+0.2)^8 = 1.171659$] (N-18)**
(a) Rs. 11,716.59 (b) Rs. 10,716.59 (c) Rs. 117.1659 (d) None of these

85. **A bank pays 10% rate of interest, interest being calculated half yearly. A sum of Rs. 400 is deposited in the bank. The amount at the end of 1 year will be(N-18)**
(a) Rs. 440 (b) Rs. 439 (c) Rs. 441 (d) Rs. 442

86. **A Certain money doubles itself in 10 years when deposited on simple interest. It would triple itself in(N-18)**
(a) 20 years (b) 15 years (c) 25 years (d) 30 years

87. **A man deposited Rs. 8,000 in a bank for 3 years at 5% per annum compound interest, after 3 years he will get(N-18)**
(a) Rs. 8,800 (b) Rs. 9,261 (c) Rs. 9,200 (d) Rs. 9,000

88. **If in two years time a principal of Rs. 100 amounts to Rs. 121 when the interest at the rate of r% is compounded annually, then the value of r will be(N-18)**
(a) 10.5 (b) 10 (c) 15 (d) 14

89. **A certain sum of money Q was deposited for 5 year and 4 months at 4.5% simple interest and amounted to Rs. 248, then the value of Q is(N-18)**
(a) Rs. 200 (b) Rs. 210 (c) Rs. 220 (d) Rs. 240

90. **If the difference between the compund interest compounded annually and simple inter est on a certain amount at 10% per annum for two years is Rs. 372, then the Principal amount is (N-18)**
(a) Rs. 37,200 (b) Rs. 37,000 (c) Rs. 37,500 (d) None of these

91. **What is the net present value of piece of property which would be valued at Rs. 2 lakh at the end of 2 years? (Annual rate of increase = 5%)(N-18)**
(a) Rs. 1.81 lakh (b) Rs. 2.01 lakh (c) Rs. 2.00 lakh (d) None of these

92. **The effective rate of interst for one year deposit corrosponding to a nominal 7% rate of interest per annum quarterly is.(N-18)**
(a) 7% (b) 7.5% (c) 7.4% (d) 7.18%

93. **How much will Rs. 25,000 amount to be in 2 years at compund interst if the rates for the succes sive years are 4% and 5% per year.(N-18)**
(a) Rs. 27,300 (b) Rs. 27,000 (c) Rs. 27,500 (d) Rs. 27,900

94. **Rs. 8,000/- at 10% per annum interest compunded half yearly will become at the end of one year (N-18)**
(a) Rs. 8,800/- (b) Rs. 8,820/- (c) Rs. 8,900/- (d) Rs. 9,600/-

95. **The value of furniture depreciates by 10% a years, if the present value of the furniture in an office is Rs. 21,870, calculate the value of furniture 3 years ago (N-18)**
(a) Rs. 30,000 (b) Rs 35,000 (c) Rs. 40,000 (d) Rs. 50,000

96. **If Compound interest on a sum for 2 years at 4% per anuum is Rs. 102, then the simple interest on the same sum for the same period at the same rate will be (N-18)**
(a) Rs 29 (b) Rs. 101 (c) 100 (d) Rs. 95

97. **A man invests an amount of Rs. 15,860 in the names of his three sons A,B and C in such a way that they get the same amount after 2,3 and 4 years respectively if the rate of inter est is 5% then the ratio of amount invested in the name of A,B and C is (N-18)**
(a) 6 : 4 : 3 (b) 3 : 4 : 6
(c) 30 : 12 : 5 (d) None of the above

98. **If pi^2 = Rs. 96 and R= 8% compounded annually then P=_____ [J-19]**
(a) Rs. 14,000 (b) Rs. 15,000 (c) Rs. 16,000 (d) Rs. 17,000

99. **P= Rs. 5,000 R=15% T= $4\frac{1}{2}$ using I = $\frac{PTR}{100}$ then I will be_____. [J-19]**
(a) Rs. 3,375 (b) Rs. 3300 (c) Rs. 3735 (d) None of these

100. **A sum of money amounts to Rs. 6200 in 2 years and Rs. 7400 in 3 years as per S.I. then the Principal is. [J-19]**
(a) Rs. 3000 (b) Rs. 3500 (c) Rs. 3800 (d) None of these

101. **The effective rate of interest does not depend upon [J-19]**
(a) Amount of Principal (b) Amount of Interest
(c) Number of conversion periods (d) None of these

102. **In simple Interest if the principal is Rs. 2,000 and the Rate and time are the Roots of the equation**
$x^2 - 11x + 30 = 0$ **then the simple interest is [J-19]**
(a) Rs. 500 (b) Rs. 600 (c) Rs. 700 (d) Rs. 800

103. **The certain sum of money became Rs. 692/- in 2yrs and Rs. 800/- in 5yrs then the prin ciple Amount is [J-19]**
(a) Rs. 520 (b) Rs. 620 (c) Rs. 720 (d) Rs. 820

104. **Determine the present value of perpetuity of Rs. 50,000 per month @ Rate of Interest 12% p.a. is [J-19]**
(a) Rs. 45,00,000 (b) Rs. 50,00,000 (c) Rs. 55,00,000 (d) Rs. 60,00,000

105. **A person wants to lease out a machine costing Rs. 5,00,000 for a 10 year period. It has fixed a rental of Rs. 51,272 per annum payable annually starting from the end of first year. Suppose rate of interest is 10% per annum compounded annually on which money can be invested To whom this agreement is favourable? [J-19]**
(a) Favour for lessees (b) Favour for lessor
(c) Not for both (d) Can't be determined

106. **Let a person invest a fixed sum at the end of each month in an account paying interest 12% per year compounded monthly. It the future value of this annuity after the 12th payment is Rs. 55,000 then the amount invested every month is? [J-19]**
(a) Rs. 4,837 (b) Rs. 4,637 (c) Rs. 4337 (d) Rs. 3337

107. **The present value of a scooter is Rs. 7290. The rate of depreciaton is 10%. What was its value 3 years ago? [N-19]**
(a) 10,000 (b) 10010 (c) 9990 (d) 12000

108. **The difference between compound interest, compounded semi annually and simple interest on Rs. 400 at 10% p.a. for one year. [N-19]**
(a) Rs. 1 (b) Rs. 28 (c) Rs. 35 (d) Rs. 40

109. **If the interest of a money is equal to its one by nine, the rate of interest and time are equal then find rate of interest is. [N-19]**
(a) $3\frac{1}{3}\%$ (b) $4\frac{1}{2}\%$ (c) 3% (d) 3.5%

110. **1/7 of a money is deposited at 4% per annum, 1/2 of a money deposited at 5% per annum and the remaining at the rate of 6%, then total interest gained Rs. 730 find deposit amount is.**
[N-19]
(a) Rs. 14,000 (b) Rs. 15,500 (c) Rs. 12,800 (d) Rs. 14,500

111. **Ram deposited Rs. 12,000 in a bank at 10% per annum and remaining amount deposit in other bank at 20% per annum. if he received interest according to 14% per annum find the Ram's amount. [N-19]**
(a) Rs. 20,000 (b) Rs. 22,000 (c) Rs. 30,000 (d) Rs. 25,000

112. **In how much time the S.I. on a certain sum becomes 0.125 times to its principle at 10% p.a. is [N-19]**
(a) 1.00 yrs (b) 1.25 yrs (c) 1.50 yrs (d) 2.00 yrs

113. **If the difference between interest received by two persons A and B on the same sum of RS. 1500 for 3 years RS. 18. Then what is the difference between the two rates of interest. [N-19]**
(a) 1% (b) 2.5% (c) 4% (d) 0.4%

114. **In what time will a sum Rs. 800 amounts to Rs. 882 at 5% p.a. compounded annually [N-19]**
(a) 1 yrs (b) 2 yrs (c) 3 yrs (d) 4 yrs

115. **If the compund interest on a certain sum for 2 years at 3% p.a. is RS. 1015. What would be the simple interest on the sum at the same rate and same time is [N-19]**
(a) 1005 (b) 1010 (c) 1000 (d) 1003

116. **The useful life of a machine whose cost is Rs. 10,000 is 10 years. It if depreciates at 10% p.a. then the scrap value of the machine is. [N-19]**
(a) 3486.70 (b) 3158.30 (c) 3500 (d) 7033

117. **Find the effective rate of interest if an amount of Rs. 30,000 deposited in a bank. For 1 year at the rate of 10% p.a. compounded semi annually. [N-19]**
(a) 10.05% (b) 10.10% (c) 10.20% (d) 10.25%

118. **The present population of a town is 25,000. If it grows at the rate of 4%, 5%, 8% during 1st year, 2nd year, 3rd year respectively. Then find the population after 3 years. [N-19]**
(a) 29,484 (b) 29,844 (c) 29,448 (d) 28,944

119. **An amount 35000 with the rate of interest is 7% per annum, it is compounded on a monthly basis, then tell the effective rate of interest. [N-19]**

(a) 7.22% (b) 7.64% (c) 7.0% (d) 7.5%

120. **Find the future value of annuity of Rs. 500 is made annually for 7 years interest rate of 14% compound at annually. Given that $(1.14)^7 = 2.5023$ [N-19]**

(a) 5635.35 (b) 5365.35 (c) 6535.35 (d) 6355.35

121. **A sum was invested for 3 years as per C.I and the rate of interest for first year is 9%, 2nd year is 6% and 3rd Year is 3% p.a. respectively. Find the sum if the amount in three years is Rs. 550? [J-19]**

(a) Rs. 250 (b) Rs. 300 (c) Rs.462.16 (d) Rs. 350

122. **The ratio of principal and the compound interest value for three (compounded annu ally) is 216 :127, The rate of interest is [N-20]**

(a) 0.1777 (b) 0.1567 (c) 0.1666 (d) 0.1588

123. **An amount P becomes Rs. 5,100.5 and Rs. 5,203 after second and fourth years respec tively, at r % of interest per anum compounded annually. Thus values of P and r are [N-20]**

(a) Rs. 4,000and 1.5 (b) Rs. 5,000 and 1
(c) Rs. 6,000 and 2 (d) Rs. 5,500 and 3

124. **A certain sum invested at 4% per annum compounded semi - annually amounts to Rs. 1,20,000 at the end of one year. Find the sum. [N-20]**

(a) 1,15,340 (b) 1,10,120 (c) 1,12,812 (d) 1,13,113

125. **Find the value of annuity of Rs. 1,000 made annually for 7 years at interest rate of 14% compounded annually. Given that $1.14^7 = 2.503$ [N-20]**

(a) 10,730.7 (b) 5,365.35 (c) 8,756 (d) 9,892.34

126. **Find the present value of Rs. 1,00,000 to be required after 5 years if the interest rate be 9% Given that $1.09^5 = 1.5386$ [N-20]**

(a) 78,995.98 (b) 64,994.20 (c) 88,992.43 (d) 93,902.12

127. **A five year annuity due has periodic cash flow of Rs. 100 each year. If the interest rate is 8%, the future value of this annuity is given by [N-20]**

(a) (Rs.100) × (Future value at rate 8% for 5 years) × (0.08)
(b) (Rs.100) × (Future value at rate 8% for 5 years) × (1 - 08)
(c) (Rs.100) × (Future value at rate 8% for 5 years) × (1+.08)
(d) (Rs.100) × (Future value at rate 8% for 5 years) × (1/0.08)

128. **A person decides to invest Rs. 1,25,000 per year for the next five years in an annuity which gives 5% per annum compounded annually. What is the approx. future value ? [N-20]**

(a) 1,59,535 (b) 6,90,704 (c) 5,90,704 (d) 3,59,535

129. **Find the compound interest if an amount of Rs. 50,000 is deposited in a bank for one year at the rate of 8% per annum compounded semi annually [N-20]**

(a) Rs.3080 (b) Rs.4080 (c) Rs.5456 (d) Rs.7856

130. **Which of the following statement is TRUE ? (Assume that the yearly cash flows are identical for both annuities) [N-20]**

(a) The present value of an annuity due is greater than the present value of an ordinary annuity.
(b) The present value of an ordinary annuity is greater than the persent value of an annuity due.
(c) The future value of an ordinary annuity is greater than the future value of an annuity due.
(d) The future value of an annuity due is equal to future value of an ordinary annuity.

131. **Rs. 2,500 is paid every year for 10 years to pay off a loan. What is the loan amount if interest rate be 14% per annum compounded annually ? [N-20]**

(a) 15,847.90 (b) 13040.27 (c) 14,674.21 (d) 16,345.11

132. **Suppose you deposit Rs. 900 per month into an account that pays 4.8% interest, com pounded monthly. How much money (rounded to nearest Rupee) will you get after 9 months ?**

(Use, if needed : $1.0004^4 = 1.0008$**) [N-20]**

(a) Rs.9,000 (b) Rs.8,113 (c) Rs.9,200 (d) None of these

133. **An amount is lent at a nominal rate of 4.5% per annum compounded quarterly. What would he the gain in rupees over when compounded annually ? [N-20]**

(a) 0.56 (b) 0.45 (c) 0.76 (d) None of these

134. **A stock pays annually an amount of Rs. 10 from 6th year onwards. What is the present value of the perpetuity, if the rate of return is 20% ? [N-20]**

(a) 20.1 (b) 19.1 (c) 21.1 (d) 22.1

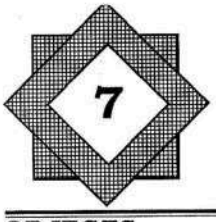
135. **On what sum will the compound intertest at 5% per annum for 2 years compounded annually be Rs. 3,280? [N-20]**

(a) Rs. 32,000 (b) Rs. 16,000 (c) Rs. 48,000 (d) Rs. 64,000

136. **What sum of money will produce Rs. 42,800 as interest in 3 years and 3 months at 2.5% p.a. simple interest ? [N-20]**

(a) Rs. 5,26,769 (b) Rs. 3,78,000 (c) Rs. 4,22,000 (d) Rs. 2,24,000

LEVEL - III									
QUS.	ANS.	QUS.	ANS.	QUS.	ANS.	QUS.	ANS.	QUS.	ANS.
1	b	29	a	57	b	85	c	113	d
2	b	30	b	58	c	86	a	114	b
3	c	31	b	59	b	87	b	115	c
4	a	32	b	60	c	88	b	116	a
5	a	33	a	61	b	89	a	117	d
6	c	34	c	62	c	90	a	118	a
7	a	35	a	63	c	91	a	119	a
8	b	36	b	64	a	92	d	120	b
9	c	37	b	65	b	93	a	121	c
10	b	38	c	66	b	94	b	122	c
11	b	39	c	67	a	95	a	123	b
12	b	40	c	68	a	96	c	124	a
13	a	41	d	69	a	97	a	125	a
14	a	42	b	70	b	98	b	126	b
15	c	43	a	71	a	99	a	127	c
16	d	44	a	72	a	100	c	128	b
17	b	45	d	73	a	101	a	129	b
18	b	46	a	74	d	102	b	130	a
19	c	47	a	75	a	103	b	131	b
20	c	48	c	76	a	104	b	132	d
21	b	49	a	77	b	105	a	133	d
22	c	50	a	78	b	106	c	134	a
23	c	51	c	79	d	107	a	135	a
24	a	52	c	80	c	108	a	136	a
25	b	53	c	81	b	109	a		
26	a	54	c	82	a	110	a		
27	b	55	c	83	a	111	a		
28	a	56	c	84	a	112	b		



SET, RELATION & FUNCTION

OBJECTS

In our mathematical language everything in this universe, whether living or non living called an object.

SET

Set is a well defined collection of object.

Well defined means we are sure that a particular object come to our collection or not.

1) Method of representing a set :-

(i) Roster form (Tabular form) :-

In this method all the elements are listed i.e. The set of vowels.

A = {a, e, i, o, u}

(ii) Set builder form (Rule method) :-

In this method a set is descibed by charactrising property P(x) of its element.

A = Set of vowels = {x : x is a vowel}

2) Types of sets :-

1) Unit set (singleton set) : Only one element A = {a}

2) Null set (empty set) : no element ϕ or {}

3) Subset : If every element of set A also an element of set B. then A is known as subset of set B and are written as :-

$A \subseteq B$ if $x \in A \Rightarrow x \in B$

Note : (i) $A \subseteq B$ is to be read as A is contained in B.

(ii) $B \supseteq A$ to be read as B contains A.

4) Proper subset : Any set A is said to be proper subset of set B if $A \subset B$ and $A \neq B$.

Notes:-

(i) Every set is a subset of itself.

(ii) Null set is a subset of evey set.

(iii) A set having n elements have 2^n subsets.

(iv) A set having n elements have 2^n-1 proper subsets. (except A).

5) Power Set : The set of all the subset of a set is known as power set denoted by P(A).

Notes :- Power set has one element if $A = \phi$

i.e, If $A = \phi$ $P(A) = \{\phi\}$

because ϕ is a subset of every set.

6) Cardinal number or order of a set : The number of elements in a set is known as cardinal number of set denoted by n(A).

7) Equivalent Set : Any two sets are said to be equivalent set if their cardinal number are same.

8) Equal Set : Any two sets are said to be equal if their cardinal number as well as their element are same.

$A = B \Leftrightarrow A \subseteq B$ and $B \subseteq A$.

LEVEL - III

1. If A = {p, q, r, s}, B = {q, s, t}, C = (m, q, n} Find C - (A ∧ B) [D-08]
   (a) {m, n} (b) {p, q} (c) {r, s} (d) {p, r}
2. If A = {x : x^2 - 3x + 2 = 0}, B = {x : x^2 + 4x - 12 = 0}, then B - A is Equal to [J-10]
   (a) {-6} (b) {1} (c) {1, 2} (d) {2, -6}
3. For any two sets A and B, A∩(A'∪B) = _, where A' represent the compliment of the set A [D-10]
   (a) A∩B (b) A∪B (c) A'∪B (d) None of these.
4. If A⊂B, then which one of the following is true. [D-10]
   (a) A∩B = B (b) A∪B = B (c) A∩B = A (d) A∩B = Φ.
5. In a town of 20,000 families it was found that 40% families buy newspaper A, 20% families buy newspaper B and 10% families buy newspaper C, 5% families buy A and B, 3% buy B and C and 4% buy A and C. If 2% families buy all the three newspapers, then the number of families which buy A only is: [N-07]
   (a) 6600 (b) 6300 (c) 5600 (d) 600.
6. There are 40 students, 30 of them passed. in English, 25 of them passed in Maths and 15 of them passed in both. Assuming that every Student has passed at least in one subject. How many student's passed in English only but not in Maths.[J-11]
   (a) 15 (b) 20 (c) 10 (d)25
7. For any two sets A and B the set (AUB')' is Equal to (where' denotes compliment of the set)[D-11]
   (a) B - A (b) A - B (c) A' - B' (d) B' - A'
8. The number of proper sub set of the set {3,4,5,6,7} is [J-12]
   (a) 32 (b) 31 (c) 30 (d) 25
9. Of the 200 candidates who were interviewed for a position at call centre, 100 had a two-wheeler, 70 had a credit card and 140 had a mobile phone, 40 of them had both a two-wheeler and a credit card, 30 had both a credit card and a mobile phone, 60 had both a two-wheeler and a mobile phone, and 10 had all three. How many candidates had none of the three? [D-13]
   (a) 0 (b) 20 (c) 10 (d) 18
10. Out of 20 members in a family, 11 like to take tea and 14 like coffee. Assume that each one likes at least one of the two drinks. Find how many like both coffee and tea: [N-06, D-17]
    (a) 2 (b) 3 (c) 4 (d) 5
11. In a group of 70 people, 45 speak Hindi, 33 speak English and 10 speak neither Hindi nor English. Find how many can speak both English as well as Hindi [F-07]
    (a) 13 (b) 19 (c) 18 (d) 28.
12. In a survey of 300 companies, the number of companies using different media - Newspapers (N), Radio (R.) and Television (T) are as follows: n(N) = 200, n(R) = 100, n(T) = 40, n(N∩R) = 50, n(R∩T) = 20, n(N∩T) = 25 and n(N∩R∩T) = 5. Find the numbers of companies using none of these media: [M-07]
    (a) 20 companies (b) 250 companies (c) 30 companies (d)50 companies.
13. In a town of 20,000 families it was found that 40% families buy newspaper A, 20% families buy newspaper B and 10% families buy newspaper C, 5% families buy A and B, 3% buy B andCand 4% buy A and C. If 2% families buy all the three newspapers, then the number ot families which buy A only is: [N-07]
    (a) 6600 (b) 6300 (c) 5600 (d) 600.

14. Out of total 150 students, 45 passed in Accounts, 30 in Economics and 50 in Maths, 30 in both Accounts and Maths, 32 in both Maths and Economics, 35 in both Accounts and Economics, 25 students passed in all the three subjects. Find the numbers who passed at least in any one of the subjects: [F-08]
(a) 63 (b) 53 (c) 73 (d) None.

15. For a group of 200 persons, 100 are interested in music, 70 in photography and 40 in swimming, Further more 40 are interested in both music and photography, 30 in both music and swimming, 20 in photography and swimming and 10 in all the three. How many are interested in photography but not in music and swimming? [D-12]
(a) 30 (b) 15 (c) 25 (d) 20

16. In a class of 80 students, 35% play only cricket, 45% only Tennis, How many play Cricket ? [D-15]
(a) 86 (b) 54 (c) 36 (d) 44

17. If set A = $\left\{x : \frac{x}{2} \in z, \quad 0 \le x \le 10\right\}$, B = {x : x is one digit prime number}
and C = $\left\{x : \frac{x}{3} \in N, \quad x \le 12\right\}$ then A ∩ (B ∩ C) is equal to - [J-16]
(a) ϕ (b) Set A (c) Set B (d) Set C

18. Let A be the set of squares of natural numbers and let x ∈ A, y ∈ A then [J-16]
(a) X + Y ∈ A (b) X - Y ∈ A (c) $\frac{x}{Y} \in A$ (d) xy ∈ A

19. The number of subsets of the set formed by the word Allahabad is : [D-16]
(a) 128 (b) 16 (c) 32 (d) 64

20. In a class, 80 students speak Hindi, 60 students speak English and 40 students speak both Hindi and English then the number of students in the class is _____. [J-17]
(a) 100 (b) 120 (c) 140 (d) 180

21. If A={1, 2, 3, 4, 5},B={2, 4} and C={1,3,5} then (A-C) x B is [D-11]
(a) {(2, 2), (2, 4), (4, 2), (4, 4), (5, 2), (5, 4)} (b) {(1,2), (1,4), (3,2), (3,4), (5, 2), (5, 4)}
(c) {(2, 2), (4, 2), (4, 4), (4, 5)} (d) {(2,2), (2,4), (4, 2), (4, 4)}.

22. "is perpendicular to" over the set of straight lines in a given plane is [J-12]
(a) R (b) S (c) T (d) E

23. In the set N of all natural numbers the relation R defined by a R b "if and only if, a divide b", then the relation R is : [J-10]
(a) Partial order relation (b) Equivalence relation
(c) Symmetric relation (d) None of these.

24. On the set of lines, being perpendicular is a _____ relation. [J-12]
(a) Reflexive (b) Symmetric
(c) Transitive (d) None of these

25. Let A = {1 , 2 , 3} , then the relation R = {(1 , 1) , (2 , 3) , (2 , 2) , (3 , 3) , (1 , 2)} is :[J-13]
(a) Symmetric (b) Transitive (c) Reflexive (d) Equivalence

26. **Let R is the set of real numbers, such that the function f: R → R and g : R → R are defined by f(x) = x^2+3x + 1 and g(x) = 2x - 3. Find (fog):** [F-07]

(a) $4x^2 + 6x + 1$ (b) $x^2 + 6x + 1$ (c) $4x^2 - 6x + 1$ (d) $x^2 - 6x + 1$.

27. **If R is the set of real numbers such that the function f: R → R is defined by f(x) = $(x + 1)^2$, then find (fof):** [M-07]

(a) $(x+1)^2+1$ (b) x^2+1 (c) $\{(x + 1)^2 + 1\}^2$ (d) None

28. **X = { x, y, w, z}, y = {1,2,3,4}, H = {(x, 1),(y,2),(y,3),(z,4),(x,4)}** [D-09]

(a) H is a function from X to Y (b) H is not a function from X to Y

(c) H is a relation from Y to X (d) None of the above

29. **If f:R → R is a function, defined by f(x) = 10x - 7, if g(x) = f^{-1}(x), then g(x) is equal to**[D-12]

(a) $\frac{1}{10x - 7}$ (b) $\frac{1}{10x + 7}$ (c) $\frac{x + 7}{10}$ (d) $\frac{x - 7}{10}$

30. **The number of elements in range of constant function is** [D-12]

(a) One (b) Zero (c) Infinite (d) Indetermined

31. **The range of the relation {(1,0) (2,0) (3,0) (4,0) (0,0)} is** [J-14]

(a) {1,2,3,4,0} (b) {0} (c) {1,2,3,4} (d) None

32. **If *f*(x) = log $\frac{1+x}{1-x}$, Then $f\left(\frac{2x}{1+x^2}\right)$** [J-13]

(a) f(x) (b) 2 f(x) (c) 2x (d) None of these.

33. **If F: A → R is a real valued function defined by f(x) = $\frac{1}{x}$ then A = _____.** [J-10]

(a) R (b) R-{1} (c) R - {0} (d) R - N

34. **IfA={±2, ±3}, B={1, 4, 9}and F= {(2, 4), (-2, 4),(3, 9), (-3, 4)} then 'F' is defined as :**[J-11]

(a) One to one function from A into B.(b) One to one function from A onto B. (c)

Many to one function from A onto B. (d) Many to one function from A into B.

35. **If f(x) = $\frac{x}{\sqrt{1+x^2}}$ and g(x) = $\frac{x}{\sqrt{1-x^2}}$ find fog** [J-11]

(a) x (b) $\frac{1}{x}$ (c) $\frac{x}{\sqrt{1-x^2}}$ (d) $x\sqrt{1-x^2}$.

36. **f(x) = 3+x, for - 3< x <0 and 3 - 2x for 0< x <3, then Value of f(2) will be** [D-11]

(a) -1 (b) 1 (c) 3 (d) 5

37. **The range of the function f : Z → Z : f(x) = $(-1)^{x-1}$ is** [J-12]

(a) {0, -1) (b) {1, -1} (c) 1, 0} (d) {1,0,-1}

38. **If f(x) = x+2 , g(x) = 7^x , than g∘f(x) = ...** [J-13]

(a) $7^x.x+2.7^x$ (b) 7^{x+2} (c) $49(7^x)$ (d) none of these

39. **If f(x) = $\frac{x^2-25}{x-5}$, then f(5) is** [D-13]

(a) 0 (b) 1 (c) 10 (d)not defined

40. If $f(x) = \frac{x}{x-1}$, then $\frac{f(x/y)}{f(y/x)}$ = _____ [D-14]

(a) x/y (b) y/x (c) -x/y (d) -y/x

41. N is the set of all natural numbers and E is the set of all even numbers. If $f: N \to E$ defined by $f(x) = 2x$, for all $x \in N$ is [J-15]

(a) One one and onto (b) One one into (c) Many one onto (d) Can't say

42. Which of these is a function from A to B. A = {x,y,z} B = {a,b,c,d} [D-15]

(a) {(x,a) (x,b) (y,c)} (b) {(x,a) (x,b) (y,c) (z,d)}

(c) {(x,a) (y,b) (z,d)} (d) {(a,x) (b,z) (c,y)}

43. $f(x) = 2x+2$, $g(x) = x^2$, fog (4) ? [D-15]

(a) 100 (b) 10 (c) 34 (d) None of these

44. The domain (D) and range (R) of the function $f(x) = 2 - |x+1|$ is [J-16]

(a) D = Real numbers, R = (2, ∞) (b) D = Integers, R = (0, 2)

(c) D = Integers, A (−∞, ∞) (d) D = Real numbers, R = (−∞, 2]

45. If R is the set of all real numbers, then the function $f: R \to R$ defined by $f(x) = 2^x$ then f is [D-16]

(a) one-one onto (b) one-one into (c) many-one into (d) many-one onto

46. The inverse function = 100x is : [D-16]

(a) x/100 (b) 1/100x (c) 1/x (d) None of these

47. If $f(x) = \frac{x-1}{x}$ and $g(x) = \frac{1}{1-x}$ then fog (x) = [J-17]

(a) x - 1 (b) x (c) 1-x (d) -x

48. The Range of the function is defined by $f(x) = \frac{x}{x^2+1}$ is [J-17]

(a) $\left\{x: \frac{-1}{2} < x < \frac{1}{2}\right\}$ (b) $\left\{x: \frac{-1}{2} \le x < \frac{1}{2}\right\}$

(c) $\left\{x: \frac{-1}{2} \le x \le \frac{1}{2}\right\}$ (d) $\left\{x: x > \frac{1}{2} \text{ or } x < x\frac{-1}{2}\right\}$

49. If $f(x) = \frac{x+1}{x+2}$ then $f\left[f\left(\frac{1}{x}\right)\right]$ = _____: [D-17]

(a) $\frac{2+3x}{3+5x}$ (b) $\frac{2x+5}{3x+2}$ (c) $\frac{3x+5}{5x+3}$ (d) $\frac{5x+2}{2x+3}$

50. If $A = \{\Phi, \{\Phi\}\}$ then the power set of A: (J-18)

(a) $\{\Phi\}$ {0} (b) $\{\Phi, \{\Phi\}, \{\{\Phi\}\}, A\}$

(c) A (d) $\{A\}\{\Phi\}$

51. If $a = \{x/x = 3^n - 2n - 1$, where $n \in N\}$, $b = \{x/x = 4(n-1)$ where $n \in N\}$. Then (J-18)

(a) $A \subset B$ (b) $B \subset A$ (c) $A = B$ (d) None the above

52. The range of the function $\frac{x^6}{X^{12}+1}$ is:(J-18)

(a) $(0, \infty)$ (b) $\left[0, \frac{1}{2}\right]$ (c) $(-\infty, 0) \cup [2, \infty)$ (d) $\left(0, \frac{1}{2}\right)$

53. If A = {1,2,3,4,5,6,7,8,9,}
B = {1,3,4,5,7,8}; C = {2,6,8} then find (A-B) UC = [J-19]
(a) {2,6} (b) {2,6,8} (c) {2,6,8,9} (d) None of these

54. If $f(x)$ = x² and g(x) = $\sqrt{x}$ then [J-19]
(a) $go\, f(3) = 3$ (b) $go, f(-3) = 3$ (c) $go, f(-9) = 3$ (d) $go, f(-9) = 3$

55. A = {1,2,3,4,..... 10} a relation on A,R = {(x,y)/x+y = 10, x∈ A,y ∈A,X ≥Y} then Domain of R^{-1} is [J-19]
(a) {1,2,3,4,5} (b) {0,3,5,7,9} (c) {1,2,4,5,6,7} (d) None of these

56. If A = {a,b,c,d} ; B = {p,q,r,s} which of the following relation is a function from A to B [J-19]

(a) R_1 = {(a,p), (b,q), (c,s)}

(b) R_2 = {(p,a}, (b,r), (d,s)}

(c) R_3 = {(b,p), (c,s), (b,r)}

(d) R_4 = {(a,p) (b,r), (c,q), (d,s)}

57. f(x) = $\begin{Bmatrix} x, x<0 \\ 0, x=0 \\ x^2, x>0 \end{Bmatrix}$ then find $\lim_{x \to 0} f(x)$ [N-19]

(a) 1 (b) 0 (c) -2 (d) 2

58. f(x) = f(x-1) + f(x-2) if f(0)=0, f(1)= 1,x=2,3,4,_____ then what is f(7) [N-19]
(a) 8 (b) 13 (c) 3 (d) 5

59. f(x)= 2x³ +1 then what is f⁻¹ (x) [N-19]

(a) 1/2 (x-1)$^{1/3}$ (b) $\left(\frac{x-1}{2}\right)^{1/3}$ (c) $\left(\frac{x-1}{2}\right)^{1/2}$ (d) None of these

60. The set of cubes of the natural number is- [N-20]
(a) a null set (b) a finite set (c) an infinite set (d) a finite set of three numbers

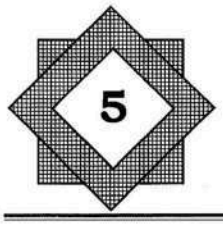
61. The inverse function f^{-1} of f(y) = 3y is - [N-20]

(a) $y/3$ (b) $1/3y$ (c) - 3y (d) $1/y$

62. Two finite sets respectively have x and y number of elements. The total number of subsets of the first is 56 more than the total number of subsets of the second. The values of x and y are respectively : [N-20]
(a) 6 and 3 (b) 4and 3 (c) 2 and 4 (d) 3 and 6

63. The number of items in the set A is 40; in the set B is 32; in the set C is 50 ; in both A and B is 4; in both A and C is 5; in both B and C is 7; in all the sets is 2. How many are in only one set ? [N-20]
(a) 110 (b) 65 (c) 106 (d) None of these

LEVEL - III									
QUS.	ANS.	QUS.	ANS.	QUS.	ANS.	QUS.	ANS.	QUS.	ANS.
1	a	14	b	27	c	40	c	53	c
2	a	15	d	28	b	41	a	54	a
3	a	16	d	29	c	42	c	55	a
4	b	17	a	30	a	43	c	56	d
5	a	18	d	31	b	44	d	57	b
6	a	19	c	32	b	45	b	58	b
7	a	20	a	33	c	46	a	59	b
8	b	21	d	34	d	47	b	60	c
9	c	22	b	35	a	48	c	61	a
10	d	23	a	36	a	49	a	62	a
11	c	24	b	37	b	50	b	63	d
12	d	25	c	38	b	51	a		
13	a	26	c	39	d	52	b		



PERMUTATION & COMBINATION

Factorial

The product of first n natural numbers is denoted by n! or $\lfloor n$ and is read as factorial n.

$n! = 1.2.3 \ldots\ldots (n-1).n$

Note :- $0! = 1 = 1!$

$n! = n(n-1)!$

Fundamental Principle of counting

Multiplication Rule (And) (mn) Addition Rule (or) (m + n)

Permutation - Arrangement

Combination - Selection

Permutation

Each of the different arrangement which can be made by taking some or all of a number of thing is called a permutation.

1. No. of permutation of n different things taken all at a time =

$$^nP_n = n! = \frac{n!}{(n-n)!} = \frac{n!}{0!} = n!$$

2. No. of permutation of n different things taken r at a time

$$^nP_r = \frac{n!}{(n-r)!}$$

3. If out of n things P are exactly alike of one kind q exactly alike of second kind and r exactly alike of third kind and the rest all different. Then the number of permutations of n things taken all at a time

$$= \frac{n!}{p!\,q!\,r!}$$

4. Number of permutations of n different things taken r at a time when each thing can be repeated once, twice ..... upto r times = n^r.

Restricted Permutation

1. Number of permutations of n different things taken r at a time when a particular thing always occur. $r \cdot {}^{n-1}p_{r-1}$
2. Number of permutations of n different things taken r at a time when a particular thing never occur. $^{n-1}p_r$
3. Number of permutations of n different thing taken all at a time when m specified things always come together. $m! \times (n-m+1)!$
4. Number of permutations of n different thing taken all at a time when m specified thing never come together. $n! - m!\,(n-m+1)!$

LEVEL - III

1. If six times the number permutations of n things taken 3 at a time is equal to seven times the number of permutations of (n - 1) things chosen 3 at a time, find n. [J-14][SM]

   (a) 24 (b) 21 (c) 64 (d) 36

2. Prove that the number of ways in which n books can be arranged on a shelf so that two particular books will not be together is (n-2). (n-1) ! It is true or not. [F-07][SM]

   (a) Not true (b) True (c) Not concluded (d) None of these.

3. A code word is to consist of two distinct English alphabets followed by two distinct numbers from 1 to 9. How many such code words are there? [N-06]

   (a) 6,15,800 (b) 46,800 (c) 7,19,500 (d) 4,10,800

4. Given : P (7, K) = 60 P(7, k - 3). Then: [F-07, J-12]

   (a) k = 9 (b) k = 8 (c) k = 5 (d) k = 0

5. How many six digit telephone numbers can be formed by using 10 distinct digits? [D-08][SM]

   (a) 10^6 (b) 6^{10} (c) ${}^{10}C_6$ (d) ${}^{10}P_6$.

6. In how many ways can 17 billiard balls be arranged if 7 of them are black, 6 red and 4 white? [J-09]

   (a) 4084080 (b) 1 (c) 8048040 (d) None of these

7. (n + 1) ! = 20 (n - 1)!, find n [D-09]

   (a) 6 (b) 5 (c) 4 (d) 10.

8. How many numbers higher than a million can be formed with the digits 0445553? [N-07][SM]

   a) 420 b) 360 c) 7! d) None

9. How many arrangements can be made out of the letters of the word DRAUGHT, the vowels never beings separated? [D-12][SM]

   (a) 720 (b) 2880 (c) 1440 (d) 120

10. If the letters word 'Daughter' are to be arranged so that vowels occupy the odd places, then number of different words are [J-12, J-13]

    a) 2880 (b) 1,050 c) 625 d) 524

11. The number of ways of arranging 6 boys and 4 girls in a row so that all 4 girls are together is: [J-10]

    (a) 6!. 4! (b) 2(7!. 4!) (c) 7!. 4! (d) 2. (6!. 4!).

12. A garden having 6 tall trees in a row. In how many ways 5 children stand, one in a gap between the trees in order to post for a photograph? [D-10]

    (a) 24 (b) 120 (c) 720 (d) 30.

13. How many words can be formed from the letters of the word 'ORIENTAL' so that A and R always ocupy odd places? [A-07]

    (a) $4p_2$.6!=8640 (b) $4p_2$.6!=0468 (c) $4p_2$.6!=6480 (d) None of these.

14. In how many ways can the letters of the word FAILURE be arranged so that the consonants may 'occupy only odd positions? [M-07]

    (a) 576 (b) 476 (c) 376 (d) 276.

15. Find 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'. [SM][J-09]

    (a) 720 (b) 120 (c) 96 (d) None.

16. In how many ways can the letters of 'REGULATION' be arranged so that the vowels come at odd places?[D-09]
(a) 1/252 (b) 1/144 (c) 144/252 (d) None of these.

17. Six persons A, B, C, D, E and F are to be seated at a circular table. In how many ways can this be done, if A must always have either B or C on his right and B must always have either C or D on his right? [J-08]
a) 3 b) 6 c) 12 d) 18

18. 7 books are to be arranged in such a way so that two particular books are always at first and last place. Find number of arrangements. [J-09]
a) 60 b) 120 c) 240 d) 480

19. In how many ways 3 prizes out of 5 can be distributed amongst 3 brothers equally?[D-11]
(a)10 (b) 45 (c) 60 (d) 120

20. In how many ways can a party of 4 men and 4 women be seated at a circular table, so that no two woman are adjacent? [M-07]
(a) 164 (b) 174 (c) 144 (d) 154.

21. The letters of the word "VIOLENT" are arranged so that the vowels occupy even place only. The number of permutations is _____. [J-12]
(a) 144 (b) 120 (c) 24 (d) 72

22. If ${}^{n}P_4 = 20\,({}^{n}P_2)$ then the value of 'n' is _____. [J-12]
(a) -2 (b) 7 (c) -2 and 7 both (d) None of these

23. The number of words that can be formed out of the letters of the word "ARTICLE" so that vowels occupy even place is : [J-13]
(a) 36 (b) 144 (c) 574 (d) 754

24. In how many ways can a family consist of three children having different birthdays in a leap year [D-13]
(a) ${}^{365}C_3$ (b) ${}^{365}C_3 - 3$ (c) 366 x 365 x 364 (d) ${}^{366}C_3$

25. A man has 3 sons and 6 schools within his reach. In how many ways, he can send them to school, if no two of his sons are to read in the same school? [D-12]
(a) ${}^{6}P_2$ (b) ${}^{6}P_3$ (c) 6^3 (d) 3^6

26. How many permutations can be formed from the letters of the word "DRAUGHT", if both vowels may not be separated? [D-12]
(a) 720 (b) 1,440 (c) 140 (d) 1,000

27. A person has 10 friends of which 6 of them are relatives. He wishes to invite 5 persons so that 3 of them are relatives. In how many ways he can invites? [SM][J-15]
(a) 450 (b) 600 (c) 120 (d) 810

28. A student has 3 books on computer, 3 books on Economics, 5 on Commerce. If these books are to be arranged subject wise then these can be placed on a shelf in the _____ number of ways. [J-15]
(a) 25,290 (b) 25,920 (c) 4,230 (d) 4,320

29. The number of 4 digit numbers that can be formed from seven digits 1,2,3,5,7,8,9 such that no digit being repeated in any number, Which are greater than 3000 are[J-15]
(a) 120 (b) 480 (c) 600 (d) 840

30. There are 10 students in a class including 3 girls. The number of ways to arrange them in a row when any two girls out of three never comes together: [J-16]
(a) ${}^{8}P_3 \lfloor 7$ (b) ${}^{3}P_3 \lfloor 7$ (c) ${}^{8}P_3 \lfloor 10$ (d) None of these.

31. The number of numbers between 1,000 and 10,000 , which can be formed by the digit 1,2,3,4,5,6 without repetition is [D-16]
(a) 720 (b) 180 (c) 360 (d) 540

32. The number of ways in which 4 persons can occupy 9 vacant seats is : [D-16]
(a) 6048 (b) 3024 (c) 1512 (d) 4536

33. The number of arrangements that can be formed from the letter of the word "ALLAHABAD" [J-17]
(a) 7560 (b) 3780 (c) 30240 (d) 15320

34. In how many ways that 3 commerce books, 3 computer books and 5 economics books be arranged along a row, so that books of same subject are come together is _____:[D-17]
(a) 29,950 (b) 25,940 (c) 25,920 (d) None of these

35. If ${}^{n}P_{13} : {}^{(n+1)}P_{12} = 3 : 4$ then 'n' is _____. [D-17]
(a) 13 (b) 15 (c) 18 (d) 31

36. Find x if ${}^{12}C_5 + 2\,{}^{12}C_4 + {}^{12}C_3 = {}^{14}C_x$[SM] [D-12]
(a) 4, 8 (b) 5, 9 (c) 4, 3 (d) 7, 4

37. If ${}^{n}C_{10} = {}^{n}C_{14}$, then ${}^{25}C_n$ is[SM] [D-13]
a) 24 b) 25 c) 1 d) none of these

38. Find : $\sum_{r=1}^{5} {}^{5}C_r = .$ [M-07]
(a) 31 (b) 32 (c) 16 (d) None of these

39. How many ways a team of 11 players can be made out of 15 players if one particular player is not to be selected in the team. [D-10]
(a) 364 (b) 728 (c) 1,001 (d) 1,234.

40. If ${}^{1000}C_{98} = {}^{999}C_{97} + {}^{x}C_{901}$, find x :[SM] [N-07, J-14]
(a) 999 (b) 998 (c) 997 (d) 1000.

41. A building contractor needs three helpers and ten men apply, In how many ways can these selections take place? [F-08]
(a) 36 (b) 15 (c) 150 (d) 120.

42. If C(n, r) : C(n, r+1) = 1 : 2 and C(n, r + 1): C (n, r + 2) = 2:3, determine the value of n and r :[F-08]
(a) (14, 4) (b) (12, 4) (c) (14, 6) (d) None.

43. Six seat of articled clerks are vacant in a 'Chartered Accountant Firm'. how many different batches of candidates can be chosen out of ten candidates?[J-08]
(a) 216 (b) 210 (c) 220 (d) None.

44. If ${}^{n}P_r = {}^{n}P_{r+1}$ and ${}^{n}C_r = {}^{n}C_{r-1}$ then find the value of 'n' [D-08]
(a) 2 (b) 3 (c) 4 (d) 5.

45. Number of ways of painting a face of a cube by 6 colours is _____. [J-09]
(a) 36 (b) 6 (c) 24 (d) 1.

46. A committee of 7 is to be formed from 9 boys and 5 girls. In how many ways can this be done if it contains (i) 2 girls (ii) at least 2 girls. [D-08]
(a) 2976, 1260 (b) 6012, 2976 (c) 7629, 1260 (d) 1260, 2976.

47. An examination paper consists of 12 questions divided into two parts A and B. Part A contains 7 questions and part B contains 5 questions. A candidate is required to attempt 8 questions selecting at least 3 from each part. In how many maximum ways can the candidate select the questions? [F-07]
(a) 35 (b) 175 (c) 210 (d) 420.

48. Out of 4 gents and 6 ladies, a committee is to be formed find the number of ways the committee can be formed such that it comprises of at least 2gents and at least the number of ladies should be double of gents. [J-09]
(a) 94 (b) 132 (c) 136 (d) 104.

49. The number of diagonals in a decagon is [J-13]
a) 30 b) 35 c) 45 d) none of these

50. The number of triangles that can be formed by choosing the vertices from a set of 12 points, seven of which lie on the same straight line, is: [N-06]
(a) 185 (b) 175 (c) 115 (d) 105

51. Six points are on a circle. The number of quadrilaterals that can be formed are: [J-10]
(a) 30 (b) 360 (c) 15 (d) None of the above

52. Find the number of combinations of the word COLLEGE taken four together: [A-07]
(a) 18 (b) 16 (c) 20 (d) 26.

53. Twelve persons meet in a room and each shake hands with all the others. Find the number of hand-shakes. [J-13]
(a) 67 (b) 64 (c) 66 (d) 65.

54. A boys has 3 library tickets and 8 books of his interest in the library. Of these 8, he does not want to borrow Chemistry part II; unless Chemistry part I is also borrowed. In how many ways can he choose the three books to be borrowed ? [N-06]
(a) 41 (b) 5 (c) 2 (d) 4.

55. Five bulbs of which three are defective are to be tried in two lights - points in a dark-room. In how many trials the room shall be lighted? [M-07]
a) 10 b) 7 c) 3 d) None of these

56. Exactly 3 girls are to be selected from 5 Girls and 3 Boys. The probability of selecting 3 Girls will be_____. [J-11]
(a) $\frac{5}{28}$ (b) $\frac{1}{56}$ (c) $\frac{15}{28}$ (d) None.

57. There are 12 question to be answered to be Yes or No. How many ways can these be Answered? [D-11]
(a) 1024 (b) 2048 (c) 4096 (d) None

58. A team of 5 is to be selected from 8 boys and three girls. Find the probability that it includes two particular girls. [D-11]
(a) 2/30 (b) 1/5 (c) 2/11 (d) 8/9

59. A polygon has 44 diagonals then the number of its sides are : [J-13]
(a) 8 (b) 9 (c) 10 (d) 11

60. Number of ways of shaking hands in a group of 10 persons shaking hands to each other are : [J-13]
(a) 45 (b) 54 (c) 90 (d) 10

61. If ${}^{15}C_{3r} = {}^{15}C_{r+3}$, then 'r' is equal is [D-13]
(a) 2 (b) 3 (c) 4 (d) 5

62. A Supreme Court Bench consists of 5 judges. In how many ways, the bench can give a majority division? [F-07]
(a) 10 (b) 5 (c) 15 (d) 16

63. If ${}^{6}P_{r} = 24\ {}^{6}C_{r}$, then find r: [A-07]
(a) 4 (b) 6 (c) 2 (d) 1

64. ${}^{15}C_{2} + {}^{15}C_{3}$ is equal to : [D-10]
(a) 16_{C_3} (b) $30_{C_{16}}$ (c) $15_{C_{16}}$ (d) $15_{C_{15}}$

65. If $^{13}C_6 + 2\,^{13}C_5 + {}^{13}C_4 = {}^{15}C_x$ then, x = _____ [D-12]
(a) 6 (b) 7 (c) 8 (d) 9

66. A question paper consist 10 questions , 6 in math and 4 in stats. Find out number of ways to solve question paper if at least one question is to be attempted from each section. [D-15]
(a) 1024 (b) 950 (c) 945 (d) 1022

67. There are 6 gents and 4 ladies. A committee of 5 is to be formed if it include at lease two ladies. [D-15]
(a) 64 (b) 162 (c) 102 (d) 186

68. $^nP_r = 720$ and $^nC_r = 120$. Find r [D-15]
(a) 6 (b) 4 (c) 3 (d) 2

69. In how many ways can a selection of 6 out of 4 teachers and 8 students be done so as to include at least two teachers? [J-16]
(a) 220 (b) 672 (c) 596 (d) 968

70. The maximum number of points of intersection of 10 circles will be [J-16]
(a) 2 (b) 20 (c) 90 (d) 180

71. If $^{n+1}C_{r+1} : {}^nC_r : {}^{n-1}C_{r-1} = 8:3:1$ then n is equal to : [D-16]
(a) 20 (b) 16 (c) 10 (d) 15

72. If $10_{c_3} + 2.10_{c_4} + 10_{c_5} = n_{c_5}$ then the value of n = _____
(a) 10 (b) 11 (c) 12 (d) 13

73. The number of parallelograms that can be formed by a set of 6 parallel lines intersected by the another set of 4 parallel lines is _____ [J-17]
(a) 360 (b) 90 (c) 180 (d) 45

74. If $^nP_r = 720$ and $^nC_r = 120$, then r is (N-18)
(a) 3 (b) 4 (c) 5 (d) 6

75. A bag contains 4 red, 3 black and 2 white balls. In how many ways 3 balls can be drawn form this bag they include at least one black ball? (N-18)
(a) 64 (b) 46 (c) 85 (d) None of these

76. The number of words from the letters of the word BHARAT, in which B and H will never come together, is (N-18)
(a) 360 (b) 240 (c) 120 (d) None of these

77. The value of N in $\frac{1}{7!}+\frac{1}{8!}=\frac{N}{9!}$ is (N-18)
(a) 81 (b) 78 (c) 89 (d) 64

78. If $11_{c_x} = 11_{c_{2x-4}}$ *and* $x \neq 4$ then the value of 7_{c_x} = [J-19]
(a) 20 (b) 21 (c) 22 (d) 23

79. Which of the following is not a correct statement [J-19]
(a) $n_{p_n} = n_{p_{n-1}}$ (b) $^n p_n = 2.^n p_{n-2}$ (c) $n_{p_n} = 3.^n p_{n-3}$ (d) $n_{p_n} = n.(n-1)\,p_{n-1}$

80. How many number divisible by 5 of 6 digit can be made from the digit 2,3,4,5,6,7 [N-19]
(a) 120 (b) 600 (c) 240 (d) None

81. 5 boys and 3 girls are to be seated together such that no two girls are together. [N-19]
(a) 14,400 (b) 2400 (c) 720 (d) None of these

82. **Out of 6 boys and 4 girls, Find the number of ways for selecting 5 member committe in which there is exactly two girls? [N-19]**

(a) 120 (b) 1440 (c) 720 (d) 71

83. **If ${}^{n}p_5 : {}^{n}p_3$ is 2:1 than value of n is [N-19]**

(a) 2 (b) -5 (c)-2 (d) 5

84. **A fruit basket contains 7 apples, 6 bananas and 4 mangoes. How many selections of 3 fruits can be made so that all 3 are apples ? [N-20]**

(a) 35 ways (b) 120 ways (c) 168 ways (d) 70 ways

85. **Out of 7 boys and 4 girls a team of a debate club of 5 is to be chosen, The number of teams such that each team includes at least one girl is- [N-20]**

(a) 439 (b) 429 (c) 419 (d) 441

86. **If ${}^{n}P_4 = 20\,{}^{n}P_2$ where P denotes the number of permutations n = _____ [N-20]**

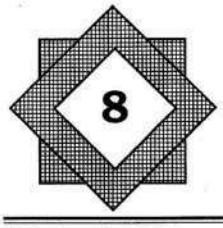
(a) 2 (b) 4 (c) 5 (d) 7

87. **From a group of 8 men and 4 women, 4 persons are to be selected to from a committee so that at least 2 women are there on the committee. In how many ways can it be done? [N-20]**

(a) 168 (b) 201 (c) 202 (d) 220

LEVEL - III									
QUS.	ANS.	QUS.	ANS.	QUS.	ANS.	QUS.	ANS.	QUS.	ANS.
1	b	19	c	37	b	55	b	73	b
2	b	20	c	38	a	56	a	74	a
3	b	21	a	39	a	57	c	75	a
4	c	22	b	40	a	58	c	76	b
5	d	23	b	41	d	59	d	77	a
6	a	24	c	42	a	60	a	78	b
7	c	25	b	43	b	61	b	79	c
8	b	26	b	44	b	62	d	80	a
9	c	27	c	45	b	63	a	81	a
10	a	28	b	46	d	64	a	82	a
11	c	29	c	47	d	65	a&d	83	d
12	b	30	a	48	c	66	c	84	a
13	a	31	c	49	b	67	d	85	d
14	a	32	b	50	a	68	c	86	d
15	c	33	a	51	c	69	b	87	b
16	d	34	c	52	a	70	c		
17	d	35	b	53	c	71	d		
18	c	36	b	54	a	72	c		


COMMERCIANS
Legends
CA FOUNDATION
Let's Crack Our Goal



BASIC CONCEPT OF DIFFERENTIAL & INTEGRAL CALCULUS

*** Derivative :-**

Rate of change of y w.r.t x is called derivative and is denoted by $\frac{dy}{dx}$ and read as dee y by dee x.

*** Important derivatives :-**

1) (i) $\frac{d}{dx} x^n = n x^{n-1}$ (ii) $\frac{d}{dx} [f(x)]^n = n[f(x)]^{n-1} f'(x)$

2) (i) $\frac{d}{dx} (c) = 0$ (ii) $\frac{d}{dx} c f(x) = c \frac{d}{dx} f(x)$

3) (i) $\frac{d}{dx} e^x = e^x$ (ii) $\frac{d}{dx} e^{f(x)} = e^{f(x)} \frac{d}{dx} f(x)$

4) (i) $\frac{d}{dx} a^x = a^x \log a$ (ii) $\frac{d}{dx} a^{f(x)} = a^{f(x)} \log a \frac{d}{dx} f(x)$

5) (i) $\frac{d}{dx} \log x = \frac{1}{x}$ (ii) $\frac{d}{dx} \log f(x) = \frac{1}{f(x)} \frac{d}{dx} f(x)$

6) (i) $\frac{d}{dx} \sqrt{x} = \frac{1}{2\sqrt{x}}$ (ii) $\frac{d}{dx} \sqrt{f(x)} = \frac{1}{2\sqrt{f(x)}} \frac{d}{dx} f(x)$

*** Basic Law of differentiation :-**

1) $\frac{d}{dx} [f(x) \pm g(x)] = \frac{d}{dx} f(x) \pm \frac{d}{dx} g(x)$

2) $\frac{d}{dx} (u \cdot v) = u\frac{dv}{dx} + v\frac{du}{dx}$

3) $\frac{d}{dx} \left(\frac{u}{v}\right) = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}$

*** Chain Rule :-**

If y = f(t) and t = g(x) then $\frac{dy}{dx} = \frac{dy}{dt} \times \frac{dt}{dx}$

*** Implicit Function :-**

Any function f(x, y) = 0

In which y can not be expressed directly in terms of x is known as Implicit Function. **ie.** $x^2 + y^2 + xy = 0$

LEVEL - III

1. The slope of the tangent at the point (2, -2) to the curve $x^2 + xy + y^2 - 4 = 0$ is given by :[SM] [N-06]
   (a) 0 (b) 1 (c) -1 (d) None.

2. The derivative of $x^2 \log x$ is:[SM] [N-06]
   (a) $1 + 2 \log x$ (b) $2 \log x$ (c) $x(1 + 2 \log x)$ (d) None of these.

3. If $x = y \log (xy)$, then $\frac{dy}{dx}$ is equal to : [F-07]
   (a) $\frac{x+y}{x(1+\log xy)}$ (b) $\frac{x-y}{x(1+\log xy)}$ (c) $\frac{x+y}{x(\log x+\log y)}$ (d) $\frac{x-y}{x(\log x+\log y)}$.

4. If $y = 2x + \frac{4}{x}$, then $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx}$ - y yields [F-07]
   (a) 3 (b) 1 (c) 0 (d) 4

5. If $f(x) = x^k$ and $f'(1) = 10$, then the value of k is : [SM] [M-07]
   (a) 10 (b) -10 (c) 1/10 (d) None.

6. Given $x = 2t + 5$; $y = t^2 - 2$, then $\frac{dy}{dx}$ is calculated as :[SM] [M-07]
   (a) t (b) 1/t (c) -1/t (d) None.

7. If $x^y = y^x$, then $\frac{dy}{dx}$ gives : [A-07]
   (a) $\frac{x(x \log y - y)}{y(y \log x - x)}$ (b) $\frac{x(y \log x - x)}{y(x \log y - y)}$ (c) $\frac{y(x \log y - y)}{x(y \log x - x)}$ (d) None of these.

8. If $x^3 - 2x^2y^2 + 5x + y = 5$, then $\frac{dy}{dx}$ at x = 1 and y = 1 is: [A-07][SM]
   (a) 4 / 3 (b) -5 / 4 (c) 4 / 5 (d) -4 / 3

9. $x = 2t + 5$ and $y = t^2 - 5$, then $\frac{dy}{dx}$ = ? [D-09]
   (a) t (b) -1/t (c) 1/t (d) 0

10. $x = at^2$ $y = 2at$, $\frac{dy}{dx}$ = ? [D-09, D-17]
    (a) 1/t (b) -1/t (c) t (d) None of the above.

11. Find the second derivative of $y = \sqrt{x+1}$ [D-09]
    (a) $1/2 (x + 1)^{-1/2}$ (b) $-1/4 (x + 1)^{-3/2}$ (c) $1/4 (x + 1)^{-1/2}$ (d) None of these.

12. If $y = (x + \sqrt{x^2+m^2})^n$ then $\frac{dy}{dx}$ = :[SM] [N-07]

(a) $\frac{ny}{\sqrt{x^2+m^2}}$ (b) ny (c) $-\frac{ny}{\sqrt{x^2+m^2}}$ (d) None.

13. If xy (x - y) = 0, find $\frac{dy}{dx}$: [N-07]

(a) $\frac{y(2x-y)}{x(2y-x)}$ (b) $\frac{x(2x-y)}{y(2y-x)}$ (c) $\frac{y(2y-x)}{x(2x-y)}$ (d) None of these.

14. If $y = \sqrt{x}^{\sqrt{x}^{\cdots\cdots\infty}}$ then $\frac{dy}{dx}$ is equal to _____. [N-07]

(a) $\frac{y^2}{\log x}$ (b) $\frac{y^2}{2 - y\log x}$ (c) $\frac{y^2}{x(2 - y\log x)}$ (d) None.

15. If $y = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \ldots\ldots + \frac{x^n}{n!} + \ldots\ldots\infty$ [N-07, D-17][SM]

then $\frac{dy}{dx}$ - y is equal to :

(a) 1 (b) -1 (c) 0 (d) None.

16. If $x^2 + y^2 = 4$ then [J-10]

(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) $y\frac{d^2y}{dx^2} + 2\left(\frac{dy}{dx}\right)^2 + 1 = 0$.

17. If $f'(x) = 3x^2 - \frac{2}{x^3}$, $f(1) = 0$ and $f(x)$ = _____. [J-11]

(a) $\frac{x^3}{3} - x^{-2} - 2$ (b) $x^3 + x^2 + 2$ (c) $x^3 + x^{-2} - 2$ (d)None of these

18. $\frac{d}{dx}\left[2^{\log_2 x}\right]$ = _____ [D-11]

(a) 1 (b) 0 (c) 1/2 (d) $2^x \log x$

19. The points on the curve $y = x^3 - x^2 - x + 1$, where the tangent is parallel to x^{-2} axis are[D-12]

(a) (-1/3 , 32/27) and (1 , 0) (b) (0, 0) and (1, 0)
(c) (1, 0)and(1, 1) (d) (0, 1) and (1, 1)

20. The cost function for the production x units of a commodity is given by $C(x) = 2x^3 - 15x^2 + 36x + 15$. The cost will be minimum when 'x' equal to [D-10]

(a) 3 (b) 2 (c) 1 (d) 4

21. If $f(x) = a^x x^a$ then find f ' (x). [D-08]

(a) f(x) [a + log a] (b) $f(x)\left[\frac{a}{x} - \log a\right]$

(c) $f(x)\left[\frac{a}{x} + \log a\right]$ (d) f(x) [a + x log a]

22. If $x^3 y^2 = (x - y)^5$. Find $\frac{dy}{dx}$ at (1, 2). [J-09]

(a) - 7 / 9 (b) 7 / 9 (c) 9 / 7 (d) - 9 / 7

23. 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 :[SM] [F-08]

(a) -1 (b) 1 (c) 0 (d) None.

24. Differentiate $e^{(x^x)}$ [J-08]

(a) (1 + log x) (b) x^x (1 + log x) (c) e^{x^x} (1 + log x)x^x (d) e^{x^x} (1 + log x).

25. If $x^m y^n = (x + y)^{m+n}$, then find $\frac{dy}{dx}$: [J-08, J-15][SM]

(a) $\frac{x}{y}$ (b) $\frac{y}{x}$ (c) xy (d) None.

26. If $Y = X^x$ then $\frac{d^2y}{dx^2}$ = _____ [D-11]

(a) $\frac{dY}{dx}$ (1 + log x) + Y $\frac{d}{dx}$ (1 + log x) (b) $\frac{dY}{dx}$ (1 + log x) + $\frac{d}{dx}$ (1 + log x)

(c) $\frac{dY}{dx}$ (1 + log x) - Y $\frac{d}{dx}$ (1 + log x) (d) $\frac{dY}{dx}$ (1 + log x) - $\frac{d}{dx}$ (1 + log x)

27. If $g(x) = -\sqrt{25-x^2}$, then $\lim_{x\to 1}\frac{g(x)-g(1)}{x-1}$ is equal to _____. [J-12]

(a) 0 (b) $1/\sqrt{24}$ (c) $\sqrt{24}$ (d) None of these.

28. If x = c t, y = c/t, then $\frac{dy}{dx}$ is equal to : [J-12]

(a) 1/t (b) $t.e^t$ (c) $-1/t^2$ (d) None of these.

29. If $y = e^{a \log x} + e^{x \log a}$, then $\frac{dy}{dx}$ = [J-12]

(a) $x^a + a^x$ (b) $a\,x^{a-1} + a^x \log a$ (c) $a\,x^{a-1} + x\,a^{x-1}$ (d) $x^x + a^a$

30. For the functions $y = x^3 - 3x$, the value of $\frac{d^2y}{dx^2}$ at which $\frac{dy}{dx}$ is zero, is [D-12]

(a) ± 1 (b) ± 3 (c) ± 6 (d) None of these.

31. The equation of the tangent to the curve, $f = x^2 - 3x + 2$, at the point (2, 7) is - [D-12]

(a) y = 2x - 13 (b) y = 10x (c) y = x + 5 (d) y = 10

32. If $y = \log\left(\frac{5-4x^2}{3+5x^2}\right)$, then $\frac{dy}{dx}$ = _____ [D-12]

(a) $\frac{8x}{4x-5} - \frac{10x}{3+5x}$ (b) $(4x^2 - 5) - (3 + 5x^2)$ (c) $\left(\frac{8}{4x^2-5} - \frac{10}{3+5x^2}\right)$. x (d) 8x - 10

33. If x = log t, $y = e^t$, then $\frac{dy}{dx}$ = [J-13]

(a) 1/t (b) $t.e^t$ (c) $-1/t^2$ (d) none

34. If $y = \sqrt{\frac{1-x}{1+x}}$, then $\frac{dy}{dx}$ is equal to - [J-16]

(a) $\frac{y}{X^2-1}$ (b) $\frac{y}{1-X^2}$ (c) $\frac{y}{1+X^2}$ (d) $\frac{y}{y^2-1}$

35. If $f(x) = \log_e\left(\frac{x-1}{x+1}\right)$, then the value of x at which f' (X) = 1, is [D-16]

(a) 0 (b) 1

(c) $\pm\sqrt{3}$ (d) $\pm\sqrt{2}$

36. If $x = at^3 + bt^2 - t$ and $y = at^2 - 2bt$ then $\frac{dy}{dx}$ at t = 0 = _____ [J-17]

(a) -2b (b) 2b (c) $\frac{1}{2b}$ (d) $\frac{-1}{2b}$

37. If $x^y = e^{x-y}$ then $\frac{dy}{dx}$ = _____: [D-17][SM]

(a) $\frac{2\log x}{(1+\log x)^2}$ (b) $\frac{\log x}{1+\log x}$ (c) $\frac{\log x}{(1+\log x)^2}$ (d) None of these

38. If $y = \log x^x$ then $\frac{dy}{dx}$ =_____: [D-17]

(a) log (ex) (b) log (e/x) (c) log (x/e) (d) 1

39. $\int_0^1 (e^x + e^{-x})\,dx$ is: [N-06]

(a) $e - e^{-1}$ (b) $e^{-1} - e$ (c) $e + e^{-1}$ (d) None.

40. $\int \frac{8x^2}{(x^3+2)^3}\,dx$ is equal to : [N-06][SM]

(a) $-\frac{4}{3}(x^3 + 2)^2 + C$ (b) $-\frac{4}{3}(x^3 + 2)^{-2} + C$ (c) $\frac{4}{3}(x^3 + 2)^2 + C$ (d) None of these.

41. Evaluate : $\int \frac{dx}{\sqrt{x^2+a^2}}$ [F-07]

(a) $\frac{1}{2}\log(x + \sqrt{x^2+a^2}) + C$ (b) $\log(x + \sqrt{x^2+a^2}) + C$

(c) $\log(x\sqrt{x^2+a^2}) + C$ (d) $\frac{1}{2}\log(x\sqrt{x^2+a^2}) + C$.

42. The value of $\int_0^2 \frac{\sqrt{x}}{\sqrt{x}+\sqrt{2-x}}\,dx$ is [F-07, J-14]

(a) 0 (b) 3 (c) 2 (d) 1

43. The integral of $(e^{3x} + e^{-3x}) / e^x$ is : [M-07]

(a) $\frac{e^{2x}}{2} + \frac{e^{-4x}}{4} + C$ (b) $\frac{e^{2x}}{2} - \frac{e^{-4x}}{4} + C$ (c) $e^{2x} - e^{-4x} + C$ (d) None of these.

44. $\int x^2 e^{3x}\,dx$ is :[SM] [M-07]

(a) $x^2 . e^{3x} - 2xe^{3x} + 2e^{3x} + C$ (b) $\frac{e^{3x}}{3} - \frac{x . e^{3x}}{9} + 2e^{3x} + C$

(c) $\frac{x^2 . e^{3x}}{3} - \frac{2x . e^{3x}}{9} + \frac{2}{27}e^{3x} + C$ (d) None of these.

45. $\int_1^2 \frac{2x}{1+x^2}\,dx$: [M-07, J-17]

(a) $\log_e \frac{5}{2}$ (b) $\log_e 5 - \log_e 2 + 1$ (c) $\log_e \frac{2}{5}$ (d) None of these.

46. The value of $\int_1^e \frac{(1+\log x)}{x}\,dx$ is : [Given log e = 1] [A-07]

(a) 1 / 2 (b) 3 / 2 (c) 1 (d) 5 / 2

47. Find $\int \frac{x^3}{(x^2+1)^3}\,dx$: [A-07]

(a) $\frac{1}{4}\left[\frac{2x^2+1}{(x^2+1)^2}\right]$ (b) $-\frac{1}{4}\left[\frac{2x^2+1}{(x^2+1)^2}\right]$ (c) $\frac{1}{2}\left[\frac{2x^2+1}{(x^2+1)^2}\right]$ (d) $-\frac{1}{2}\left[\frac{2x^2+1}{(x^2+1)^2}\right]$

48. $\int \frac{1}{x^2-a^2}\,dx$ is : [N-07]

(a) log (x - a) - log (x + a) + C (b) log x - $\frac{a}{x+a}$ + C

(c) $\frac{1}{2a}\log\left(\frac{x-a}{x+a}\right)$ + C (d) None of these.

49. The value of $\int_0^1 \frac{dx}{(1+x)(2+x)}$ is : [N-07]

(a) $\log\frac{3}{4}$ (b) $\log\frac{4}{3}$ (c) log 12 (d) None.

50. The value of $\int_2^3 f(5-x)dx - \int_2^3 f(x)\,dx$ is : [F-08][SM]

(a) 1 (b) 0 (c) -1 (d) None.

51. $\int \frac{e^{\log_e x}}{x}\,dx$ is : [F-08]

(a) x^{-1} + C (b) x + C (c) x^2 + C (d) None.

52. Evaluate $\int \frac{1}{(x-1)(x-2)}\,dx$: [J-08]

(a) $\log\left(\frac{x-2}{x-1}\right)$ + C (b) log [(x - 2) (x - 1)] + C (c) $\log\left(\frac{x-1}{x-2}\right)$ + C (d) None.

53. $\int_1^4 (2x+5)dx$ and the value is : [J-08]

(a) 10 (b) 3 (c) 30 (d) None.

54. $\int \frac{1}{x(x^5+1)}dx$ [D-08]

(a) $\log\left(\frac{x^5}{x^5-1}\right)$ + C (b) $\frac{1}{5}\log\left(\frac{x^5}{x^5+1}\right)$ + C

(c) $\frac{1}{3}\log\left(\frac{x^5}{x^5+1}\right)$ + C (d) $\frac{1}{3}\log\left(\frac{x^5+1}{x^5}\right)$ + C

55. Find the value of $\int_{-3}^{3} x\sqrt{8 - x^2}\ dx$ **[J-09]**

(a) 1 (b) -1 (c) 0 (d) None of these.

56. Evaluate $\int x.e^x\ dx$ **[J-09]**

(a) $e^x (x + 1) + c$ (b) $e^x (x - 1) + c$ (c) $e^x + c$ (d) $x - e^x + c$

57. Find $\int \frac{x^3}{(x^2+1)^3}\ dx$ **[J-09]**

(a) $1/4 (x^2 + 1)^{-2} + 1/2 (x^2 + 1)^{-1} + C$ (b) $1/4 (x^2 + 1)^{-1} - 1/2 (x^2 + 1) + C$
(c) $1/4 (x^2 + 1)^{-2} - 1/2 (x^2 + 1)^{-1} + C$ (d) None of these.

58. $\int\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right) dx$ **[D-09]**

(a) $2x^{1/2}\left(\frac{1}{3}x - 1\right)$ (b) $2x^{1/2}\left(\frac{1}{3}x + 1\right)$ (c) $2\left(\frac{1}{3}x + x^{1/2}\right)$ (d) None of these.

59. $\int_0^1 \left(\frac{1-x}{1+x}\right) dx$ **[D-09]**

(a) 2 log 2 - 1 (b) 4 log 2 - 1 (c) 2 log 2 (d) None of these.

60. $\int \frac{dx}{\sqrt{3x+4} - \sqrt{3x+1}}$ Equal to **[J-10]**

(a) $\frac{2}{27}[(3x + 4)^{3/2} - (3x + 1)^{3/2}] + c$ (b) $\frac{2}{27}[(3x + 4)^{3/2} + (3x + 1)^{3/2}] + c$

(c) $\frac{2}{3}[(3x + 4)^{3/2} - (3x + 1)^{3/2}] + c$ (d) None of these.

61. $\int_1^2 \frac{x\,dx}{x^2+2} =$ _____ **[J-10]**

(a) $\log \sqrt{2}$ (b) $\log \sqrt{3}$ (c) $\log \frac{1}{\sqrt{2}}$ (d) $\log \frac{1}{\sqrt{3}}$.

62. $\int \frac{6x+4}{(x-2)(x-3)} dx$ is equal to [D-10]

(a) 22 log (x - 3) - 16 (x + 2) (b) 11 log (x - 3) - 8 (x - 2)
(c) 22 log (x - 3) - 16 log (x - 2) (d) 22 log (x - 3) + 16 (x - 2).

63. $\int \frac{1}{x(1+\log x)^2} dx$ **is equal to** **[D-10]**

(a) $-\frac{1}{2(1+\log x)^2} + c$ (b) $\frac{1}{(1+\log x)} + c$ (c) $-\frac{1}{(1+\log x)} + c$ (d) None of these.

64. **Solve :** $\int_{-1}^{1} (e^x - e^{-x})\,dx$ **[J-11]**

(a) 0 (b) 1 (c) 12 (d) None of the above.

65. Solve : $\int \frac{(\log x)^2}{x} dx$ [J-11]

(a) $\frac{3}{2}(\log x)^3 + C$ (b) $\frac{1}{3}(\log x)^3 + C$ (c) $\frac{1}{6}(\log x)^3 + C$ (d) $\frac{3}{7}(\log x)^3 + C$.

66. Given, $y = \int e^{a \log x} + e^{x \log a}$ dx; then $\frac{dy}{dx}$ [J-11]

(a) $x^a a^x$ (b) $x^a + a^x$
(c) $ax^{x-1} + a^x \log a$ (d) None of above

(a) -1 (b) 0 (c) 1 (d) 2

67. $\int_{-1}^{1} \frac{|x|}{x} dx$ _____ [D-11]

(a) -1 (b) 0 (c) 1 (d) 2

68. $\int 2^{3x} \cdot 3^{2x} \cdot 5^x dx =$ ..... [D-12, J-13]

(a) $\frac{2^{3x} \cdot 3^{2x} \cdot 5^x}{\log(270)} + C$ (b) $\frac{2^{3x} \cdot 3^{2x} \cdot 5^x}{\log(360)} + C$ (c) $\frac{2^{3x} \cdot 3^{2x} \cdot 5^x}{\log(180)} + C$ (d) $\frac{2^{3x} \cdot 3^{2x} \cdot 5^x}{\log(90)} + C$

69. $\int a^{2x} dx$ ..... [D-13]

(a) $\frac{a^{2x}}{2\log a} + c$ (b) $\frac{2.a^{2x}}{\log a} + c$ (c) $\frac{a^{2x} \log a}{2} + c$ (d) None of these

70. $\int \frac{e^x}{(1+x)^3} dx - \int \frac{e^x}{2(1+x)^2} dx =$ _____ [D-11]

(a) 0 (b) $\frac{e^x}{2(1+x)^2} + C$ (c) $-\frac{e^x}{2(1+x)^2} + C$ (d) $\frac{e^x}{(1+x)^2} + C$

71. $\int_0^1 \frac{dx}{[ax + b(1-x)]^2} =$ _____ [J-12, J-15]

(a) a/b (b) b/a (c) ab (d) 1/ab

72. $\int_1^2 \frac{(\log_e(ex))^n}{x} dx$ is equal to: [J-13]

(a) $\left|\frac{(\log_e(2e))^{n+1} - 1}{n+1}\right|$ (b) $[\log_e (2e)]^{(n+1)} + 1]$ (c) $\frac{(\log_e(2e))^{n+1}}{n+1} - \frac{(\log_e 2)^{n+1}}{n+1}$ (d) None of these.

73. $\int_0^1 x e^{x^2} dx =$ [J-15]

(a) 1 (b) e - 1 (c) $\frac{e}{2} - 1$ (d) $\frac{1}{2}(e-1)$

74. $\int_0^2 \frac{3^{\sqrt{x}}}{\sqrt{x}} dx$ is equal to ____. [J-16]

(a) $\frac{2\sqrt{2}}{\log_e 3}$ (b) 0 (c) $\frac{2}{\log_e 3}(3^{\sqrt{2}} - 1)$ (d) $\frac{3^{\sqrt{2}}}{\sqrt{2}}$

75. $\int \frac{x}{(x^2+1)(x^2+2)}dx$ is equal to _____. [J-16]

(a) $\log\left(\frac{x^2+1}{x^2+2}\right)+c$ (b) $\frac{1}{2}\log\left(\frac{x^2+1}{x^2+2}\right)+c$ (c) $\frac{1}{2}\log\left(\frac{x^2+2}{x^2+1}\right)+c$ (d) $-\log\left(\frac{x^2+1}{x^2+2}\right)+c$

76. $\int e^x[f(x)+f'(x)]dx =:$ [D-17]

(a) e^x. f(x) + c (b) e^x. f' (x) + c (c) $\frac{f'(x)}{f(x)}+c$ (d) $e^x.\frac{f(x)}{f'(x)}+c$

77. $\int x.e^{x^2}.dx =$ _____ [D-17]

(a) 2. e^{x^2} + c (b) $\frac{1}{3}e^{x^2}$ + c (c) $\frac{1}{2}e^{x^2}$ + c (d) None of these

78. If $f(x)=\frac{x}{x+\sqrt{1+x^2}}$ then $\int_0^1 f(x)dx$: (J-18)

(a) $\frac{2}{3}(\sqrt{2}-1)$ (b) $\frac{2}{3}(\sqrt{2}-1)$ (c) $\frac{2}{3}(1-\sqrt{2})$ (d) $\frac{3}{2}(1-\sqrt{2})$

79. $\int_0^5 \frac{x^2}{x^2+(5-x)^2}dx$ is equal to : (J-18)

(a) 0 (b) 5/2 (c) 1 (d) -1

80. Let $x = at^3$, $y = \frac{a}{t^2}$. Then $\frac{dy}{dx}$ = (N-18)

(a) $\frac{-1}{t^6}$ (b) $\frac{-3a}{t^6}$ (c) $\frac{+1}{3at^2}$ (d) None of these

81. $\int x(x^2+4)^5 dx$ is equal to(N-18)

(a) $(x^2+4)^6$ + c (b) $\frac{1}{12}(x^2+4)^6$ + c (c) $\frac{1}{6}(x^2+4)^6$ + c (d) None of these

82. $\int_{-1}^{3}(1+3x-x^3)dx$ is equal to (N-18)

(a) -4 (b) 4 (c) 3 (d) -3

83. If $2^x-2^y=2^{x-y}$ then $\frac{dy}{dx}$ at $x=y=2$ [J-19]

(a) 1 (b) 2 (c) 4 (d) 5

84. If the Cost of function of a commodity is given by $C=150x-5x^2+\frac{x^3}{6}$, where C stands for cost and x stands for output, If the average cost is equal to marginal cost then the output x = ___ [J-19]

(a) 5 (b) 10 (c) 15 (d) 20

85. $\int_2^3 \frac{\sqrt{x}}{\sqrt{5-x}+\sqrt{x}}dx =$ **[J-19]**

(a) 1 (b) $1/2$ (c) 2 (d) 3/2

86. $\int \log_e(a^x)dx =$ **[J-19]**

(a) $\log_e a^{\frac{(x^2)}{2}}+c$ (b) $\log_e a^{\frac{(x)}{2}}+c$ (c) x log $a^x - x + c$ (d) x log $a^x + c$

87. **Find the value of dy/dx if $y=x^x$ [N-19]**

(a) x^xlogex (b) 1+logx (c) ylogx (d) None of these

88. **Find the value of** $\int xe^x dx$ **[N-19]**

(a) e^x (x-1)+c (b) e^x (2x-1)+c (c) e^x (x-1) (d) None of these

89. **If $f(x) = a(x^2+x+1)^2$ and f ' (-1)= -6 then the value of a= [N-19]**

(a) 1 (b) 2 (c) 3 (d) 4

90. **Find the value of** $\int(4x+5)^6$ **dx is equal to [N-19]**

(a) (1/7) $(4x+5)^7$ +c (b) (1/28) $(4x+5)^7$ +c (c) (1/4) $(4x+5)^7$ +c (d) None of these

91. $\int_{-1}^{1} \left(2x^2 - x^3\right)dx$ = **[N-19]**

(a) 14 (b) 104 (c) $\frac{2x^5}{3} - \frac{x^4}{4}$ (d) $\frac{4}{3}$

92. **The average cost function of a good is $2Q + 6 + \frac{13}{Q}$, where Q is the quantity produced.**

The approx average cost at Q = 15 is _____ [N-20]

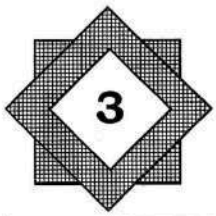
(a) 36 (b) 42 (c) 66 (d) 130

93. **If y - x (x - 1) (x - 2) then dy/dx is [N-20]**

(a) $3x^2 - 6x + 2$ (b) -6x (c) 6x+2 (d) 3x-6

LEVEL - III									
QUS.	ANS.	QUS.	ANS.	QUS.	ANS.	QUS.	ANS.	QUS.	ANS.
1	b	20	a	39	a	58	b	77	c
2	c	21	c	40	b	59	a	78	a
3	b	22	a	41	b	60	b	79	b
4	c	23	a	42	d	61	a	80	d
5	a	24	c	43	b	62	c	81	b
6	a	25	b	44	c	63	c	82	a
7	c	26	a	45	a	64	a	83	a
8	a	27	b	46	b	65	b	84	c
9	a	28	c	47	b	66	b	85	b
10	a	29	b	48	c	67	b	86	a
11	b	30	c	49	b	68	b	87	a
12	a	31	c	50	b	69	a	88	a
13	a	32	c	51	b	70	c	89	c
14	c	33	b	52	a	71	d	90	b
15	c	34	a	53	c	72	a	91	d
16	b	35	c	54	b	73	d	92	d
17	c	36	b	55	c	74	c	93	a
18	a	37	c	56	b	75	b		
19	a	38	a	57	c	76	a		


COMMERCIANS
Legends
CA FOUNDATION
Let's Crack Our Goal



LINEAR INEQUALITIES

INEQUALITIES

Inequalities are statement where two quantities are unequal but a relationship exists between them. These types of inequalities occur is Business. whenever there is a limit on supply, demand, sales etc. It may be one variable or more than one variable.

* **Linear Inequalities in one variable**

$ax + b \leq 0$

$ax + b \geq 0$

$\left.\begin{matrix} ax + b > 0 \\ ax + b < 0 \end{matrix}\right\}$ Strict **Inequalities**

* **Linear Inequalities in two variables**

$ax + by + c \leq 0$

$ax + by + c \geq 0$

$\left.\begin{matrix} ax + by + c > 0 \\ ax + by + c < 0 \end{matrix}\right\}$ Strict Inequalities

LINEAR INEQUALITIES

1. A manufacturer produces two products A and B, and has his machines in operation for24 hours a day. Production of A requires 2 hours of processing in machine M_1 and 6 hours in machine M_2. Production of B requires 6 hours of processing in machine M_1 and 2 hours in machine M_2. The manufacturer earns a profit of ` 5 on each unit of A and ` 2 on each unit of B. How many units of each product should be produced in a day in order to achieve maximum profit? [SM]

(a) (0, 4) (b) (0, 0) (c) (3, 3) (d) (4, 0)

2. A company produces two products A and B, each of which requires processing in two machines. The first machine can be used at most for 60 hours, the second machine can be used at most for 40 hours. The product A requires 2 hours on machine one and one hour on machine two. The product B requires one hour on machine one and two hours on machine two. Express above situation using linear inequalities.[SM]

(a) $2x + y \geq 60$, $x + 2y \geq 40$, $x \geq 0, y \geq 0$

(b) $2x + y < 60$, $x + 2y \geq 40$, $x \geq 0, y \geq 0$

(c) $2x + y \leq 60$, $x + 2y \leq 40$, $x \geq 0, y \geq 0$

(d) None of these

LEVEL - III

1. **A car manufacturing company manufactures cars of two types A and B. Model A requires 150 man-hours for assembling, 50 man-hours for painting and 10 man-hours for checking and testing, Model B requires 60 man-hours for assembling, 40 man-hours for painting and 20 man-hours for checking and testing. There are available 30 thousand man-hours for assembling, 13 thousand man-hours for painting and 5 thousand man-hours for checking and testing. Express the above situation using linear inequalities. Let the company manufacture x unitsof type A model of car and y units of type B model of car. Then, the inequalities are: [M-07]**

(a) $5x + 2y \geq 1000$; $5x + 4y \geq 1300$; $x + 2y \leq 500$; $x \geq 0$, $y \geq 0$,

(b) $5x + 2y \leq 1000$; $5x + 4y \leq 1300$; $x + 2y \geq 500$; $x \geq 0$, $y \geq 0$.

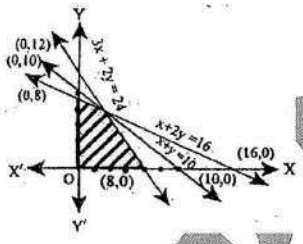
(c) $5x + 2y \leq 1000$; $5x + 4y \leq 1300$; $x + 2y \leq 500$; $x \geq 0$, $y \geq 0$.

(d) $5x + 2y = 1000$; $5x + 4y \geq 1300$; $x + 2y = 500$; $x \geq 0$, $y \geq 0$.

2. **The rules and reglations demand that, the employer should employ not more than 5 experienced hands to 1 fresh one and this fact is represented by : (Taking experienced person as x and fresh person as y) [SM][A-07]**

(a) $y \geq \frac{x}{5}$ (b) $5y \leq x$ (c) $5y \geq x$ (d) None.

3. **The shaded region represents: [A-07]**



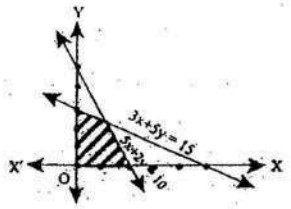
(a) $3x + 2y \leq 24$, $x + 2y \geq 16$, $x + y \leq 10x$, $x \geq 0$, $y \geq 0$

(b) $3x + 2y \leq 24$, $x + 2y \leq 16$, $x + y \geq 10$, $x \geq 0$, $y \geq 0$

(c) $3x + 2y \leq 24$, $x + 2y \leq 16$, $x + y \leq 10$, $x \geq 0$, $y \geq 0$

(d) None of these.

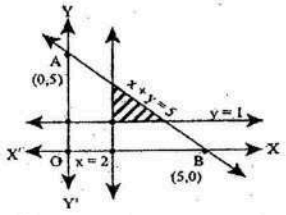
4. **The shaded region represents: [N-07]**



(a) $3x + 5y \leq 15$, $5x + 2y \geq 10$, $x, y \geq 0$ (b) $3x + 5y \leq 15$, $5x + 2y \leq 10$, $x, y \geq 0$

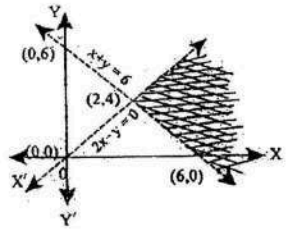
(c) $3x + 5y \geq 15$, $5x + 2y \geq 10$, $x, y, \geq 0$ (d) None of these.

5. **The shaded region represents :** [F-08]



(a) $x + y \le 5, x \ge 2, y \le 1$ (b) $x + y \le 5, x \ge 2, y \ge 1$
(c) $x + y \ge 5, x \ge 2, y \ge 1$ (d) None of these.

6. **The shaded region represents :** [J-08]



(a) $x + y > 6, 2x - y > 0$ (b) $x + y < 6, 2x - y > 0$
(c) $x + y > 6, 2x - y < 0$ (d) None of these.

7. **If a > 0 and b < 0, it follows that :** [J-08]

(a) $\frac{1}{a} > \frac{1}{b}$ (b) $\frac{1}{a} < \frac{1}{b}$ (c) $\frac{1}{a} = \frac{1}{b}$ (d) None of these.

8. **The linear relationship between two variables in an inequality:** [D-08]

(a) $ax + by \le c$ (b) $ax\ by \le c$ (c) $axy + by \le c$ (d) $ax + bxy \le c$.

9. **The solution of the inequality $\frac{(5 - 2x)}{3} \le \frac{x}{6} - 5$ is** [J-10]

(a) $x \ge 8$ (b) $x \le 8$ (c) $x = 8$ (d) None of these.

10. **Solution space of the inequalities $2x + y \le 10$ and $x - y \le 5$:** [J-11]
(i) includes the origin. (ii) includes the point (4,3) which one is correct?
(a) Only (i) (b) Only (ii) (c) Both (i) and (ii) (d) None of the above.

11. **Find the range of real values of x satisfying the inequalities $3x - 2 > 7$ and $4x - 13 > 15$[J - 12]**
(a) $x > 3$ (b) $x > 7$ (c) $x < 7$ (d) $x < 3$

12. **The union forbids employer to employ less than two experienced person (x) to each fresh person (y). This situation can be expressed as :[SM]** [J-13]
(a) $x \le y/2$ (b) $y \le x/2$ (c) $y \ge x/2$ (d) None

13. **If $\left|x+\frac{1}{4}\right| > \frac{7}{4}$, then :** [N-06]

(a) $x < \frac{-3}{2}$ or $x > 2$ (b) $x < -2$ or $x > \frac{3}{2}$ (c) $-2 < x < \frac{3}{2}$ (d) None

14. **If $\left|\frac{3x - 4}{4}\right| \le \frac{5}{12}$, the solution set is :** [F-07]

(a) $\left\{x : \frac{19}{18} \le x \le \frac{29}{18}\right\}$ (b) $\left\{x : \frac{7}{9} \le x \le \frac{17}{9}\right\}$ (c) $\left\{x : \frac{-29}{18} \le x \le \frac{-19}{18}\right\}$ (d) None

15. On solving the inequalities $6x+y \geq 18, x+4y \geq 12, 2x+y \geq 10$, we get the following situation: [SM][F-07]

(a) (0, 18), (12, 0), (4, 2) & (2, 6) (b) (3, 0), (0, 3), (4, 2) & (7, 6)
(c) (5, 0), (0, 10), (4, 2) & (7, 6) (d) (0,18), (12, 0), (4, 2), (0, 0) and (7, 6)

16. On an average, experienced person does 5 units of work while a fresh person does 3 units of work daily but the employer has to maintain the output of atleast 30 units of work per day. The situation can be expressed as. [SM] [D-11, D-12]

(a) $5x + 3y \leq 30$ (b) $5x + 3y \geq 30$ (c) $5x + 3y > 30$ (d) $5x + 3y = 30$

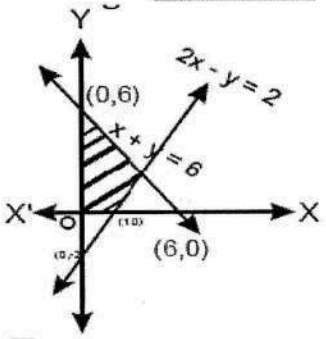
17. The solution of the inequality $8x + 6 < 12x + 14$ is [D-13]

(a) (- 2, 2) (b) (0, - 2) (c) (2, ∞) (d) (- 2, ∞)

18. The common region represented by the in equalities $2x+y \geq 8, x+y \geq 12, 3x+2y \leq 34$ is [J-15]

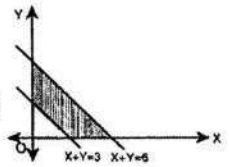
(a) Unbounded (b) In feasible
(c) Feasible and bounded (d) Feasible and unbounded

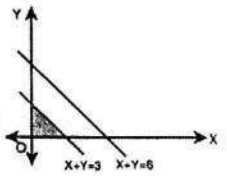
19. By lines $x + y = 6, 2x - y = 2$, the common region shown in the diagram refers to (D-15)

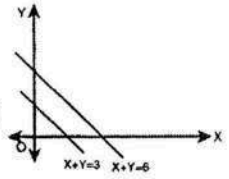


(a) $x + y >, 2x - y < 2, x > 0, y > 0$ (b) $x + y < 6, 2x - y < 2, x > 0, y > 0$
(c) $x + y < 6, 2x - y > 2, x > 0, y > 0$ (d) none of these

20. The common region of $x+y \geq 3; x+y \leq 6$ $x \geq 0; y \geq 0$, is (as shown by shaded region): (J-16)

(a)


(b)


(c)


(d) None of these.

21. A dietitian wishes to mix together two kinds of food so that the vitamin content of the mixture is at least 9 units of vitamin A, 7 units of vitamin B, 10 units of vitamin C and 12 units of vitamin D. The vitamin content per kg. of each food is shown below:

	A	B	C	D
Food I:	2	1	1	2
Food II:	1	1	2	3

Assuming x kgs of food I is to be mixed with y kgs of food II the situation can be expressed as (J-17)

(a) $2x + y \le 9$, $x + y \le 7$, $x + 2y \le 10$, $2x + 3y \le 12$, $x > 0, y > 0$

(b) $2x + y \ge 30$, $x + y \le 7$, $x + 2y \ge 10$, $x + 3y \ge 12$, $x \ge 0;\ y \ge 0$

(c) $2x + y \ge 9$, $x + y \le 7$, $x + 2y \le 10$, $x + 3y \ge 12$, $x \ge 0, y \ge 0$

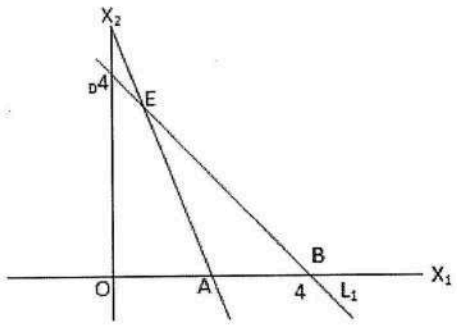
(d) $2x + y \ge 9$, $x + y \ge 7$, $x + 2y \ge 10$, $2x + 3y \ge 12$, $x \ge 0;\ y \ge 0$

22. The solution set of the in equation $x+2>0$ and $2x-6>0$ is **[J-19]**

(a) $(-2, \infty)$ (b) $(3, \infty)$ (c) $(-\infty, -2)$ (d) $(-\infty, -3)$

23. The common region represented by the following in equalities [J-19]

$l_1 = x_1 + x_2 \le 4;\ l_2 = 2x_1 + x_2 \ge 6$



(a) OABC (b) Outside of OAB (c) Δ BCE (d) Δ ABE

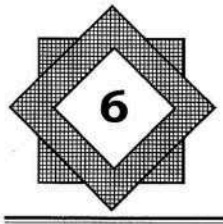
24. The solutions of the set of inequations $2x + y \ge 12, 5x + 8y \ge 74, x + 6y \ge 24, x \ge 0, y \ge 0$ are [N-19]

(a) $(24, 0), \left(\frac{126}{11}, \frac{23}{11}\right) (2, 8) (0, 12)$ (b) $(0, 24), (2, 8), (0, 12), \left(\frac{126}{11}, \frac{23}{11}\right)$

(c) $(8, 4), (2, 8), (0, 12), (0, 24)$ (d) $(8, 4), (0, 0), (0, 6), (2, 0)$

[CH.-3] [LINEAR INEQUALITIES]									
QUS.	ANS.	QUS.	ANS.	QUS.	ANS.	QUS.	ANS.	QUS.	ANS.
1	c	3	a	5	a				
2	c	4	b	6	a				

LEVEL - III									
QUS.	ANS.	QUS.	ANS.	QUS.	ANS.	QUS.	ANS.	QUS.	ANS.
1	c	6	a	11	b	16	b	21	d
2	a	7	a	12	b	17	d	22	b
3	c	8	a	13	b	18	c	23	d
4	b	9	a	14	b	19	b	24	a
5	b	10	a	15	a	20	a		



SEQUENCE & SERIES

SEQUENCE

An arrangement of numbers in a definite order according to some rule is called a sequence.

SERIES

A series is obtained by adding all the terms of a sequence.

ARITHMETIC PROGRESSION (A.P.)

A sequence of number $\{a_n\}$ is called arithmetic progression, if there is a number d, such that $d = a_n - a_{n-1}$ for all n and is called as common difference.

1) Formulae based on A.P. :-

If a = first term d = common difference and n is the number of terms, then

(a) $a_n = a + (n-1)\,d$ [n^{th} term]

(b) $S_n = \frac{n}{2}[2a + (n-1)\,d]$ [sum of first n terms]

or $S_n = \frac{n}{2}(a + \ell)$ ℓ = last term

(c) Sum of natural numbers ($\sum n$)

$$\sum n = \frac{n(n+1)}{2} \text{ where } n \in N$$

(d) Sum of first n odd numbers $\sum(2n-1)$

$\sum(2n-1) = 1 + 3 + 5 + \ldots\ldots + (2n-1) = n^2$

(e) Sum of first n even number.[SM]

$\sum 2n = 2 + 4 + 6 + \ldots\ldots + 2n = n(n+1)$

(f) Sum of squares of natural numbers ($\sum n^2$) **[J-09, F-07][D-14]**

$$\sum n^2 = \frac{n(n+1)(2n+1)}{6}$$

(g) Sum of cubes of natural numbers ($\sum n^3$) **[J-14]**

$$\sum n^3 = \left[\frac{n(n+1)}{2}\right]^2$$

LEVEL -III

1. What is the sum of all natural number from 100 & 300 which are divisible by 4. [N-06] [SM]
   (a) 10200 (b) 12200 (c) 10201 (d) None
2. Divide 12.50 into five parts in A.P. such that the first part and the last part are in the ratio of 2 : 3.[F-07]
   (a) 2, 2.25, 2.5, 2.75, 3 (b) -2, -2.25, -2.5, -2.75, -3
   (c) 4, 4.5, 5, 5.5, 6 (d) -4, -4.5, -5, -5.5, -6
3. Divide 144 into three parts which are in AP and such that the largest is twice the smallest, the smallest of three numbers will be: [J-10]
   (a) 48 (b) 36 (c) 13 (d) 32.
4. The Ist and the last term of an AP are -4 and 146. The sum of the terms is 7171. The number of terms is [N-06,D-09][SM]
   (a) 101 (b) 100 (c) 99 (d) none of these
5. Find the sum of all natural numbers between 250 and 1,000 which are exactly divisible by 3:[M-07]
   (a) 1,56,375 (b) 1,56,357 (c) 1,65,375 (d) 1,65,357
6. If a_1 ,a_2 ,a_3 represents first, second and third terms of an AP respectively, the first term is 2 and $(a_1 + a_2)a_3$ is minimum, then the common difference is equal to [J-10]
   a) 5/2 b) -5/2 c) 2/15 d) -2/5
7. If Sum (S_n) of 'n'- terms of an Arithmetic Progression is ($2n^2 + n$). What is the difference of its 10th and 1st term? [J-11]
   (a) 207 (b) 36 (c) 90 (d) 63.
8. Insert two Arithmetic means between 68 and 260 [J-11]
   (a) 132,196 (b) 130,194 (c) 70,258 (d) None
9. If sum of 3 arithmetic means between "a and 22 is 42 then "a" = _____.[D-11]
   (a)14 (b) 11 (c)10 (d) 6
10. The sum of the third and ninth term of an A.P. is 8. Find the sum of the first 11 terms of the progression. [J-11, J-15]
    (a) 44 (b) 22 (c) 19 (d) 11
11. If 8th term of an A.P is 15, then sum of its 15 terms is [J-12]
    (a) 15 (b) 0 (c) 225 (d) 225/2
12. The 4th term of an A.P is three times the first and the 7th term exceeds twice the third term by 1. Find the first term 'a' and common difference 'd'. [J-12]
    (a) a=3, d=2 (b) a = 4, d =3 (c) a=5, d=4 (d) a=6, d=5
13. Find the sum of the series: 2+7+12+ .....297. [A-07]
    (a) 8970 (b) 8870 (c) 7630 (d) 9875
14. A man employed in a company is promised a salary of Rs.3000 every month for the first year and an increment of Rs.1,000 in his monthly salary every succeeding year. How much does the man earn from the company in 20 years? [F-08][SM]
    (a) Rs.30,00,000 (b) Rs.27,50,000 (c) Rs.19,10,000 (d) Rs.7,90,000
15. Find the ninth term of the series: $\sqrt{2}, 5\sqrt{2}, 9\sqrt{2}, \ldots\ldots\ldots\ldots$ [D-08]
    (a) $25\sqrt{2}$ (b) $31\sqrt{2}$ (c) $33\sqrt{2}$ (d) $52\sqrt{2}$
16. (x+ 1), 3x, (4x+2)are in A.P. Find the value of x [D-08][SM]
    (a) 2 (b) 3 (c) 4 (d) 5

17. In the sum of n terms of an A.P. be $3n^2 - n$ and its common difference is 6 , then its first term is : [J-13]

(a) 2 (b) 3 (c) 4 (d) 5

18. If the sum of the 4th term and the 12th term of an A.P. is 8 , what is the sum of the first 15 terms of the progression ? [J-13]

(a) 60 (b) 120 (c) 110 (d) 150

19. If 'n' arithmetic means are inserted between 7 & 71 and 5th arithmetic mean is 27, then 'n' is equal to : [J-13]

(a) 15 (b) 16 (c) 17 (d) 18

20. An Arithmetic progression has 13 terms whose sum is 143. The third term is 5 so the first term is [D-13]

(a) 4 (b) 7 (c) 9 (d) 2

21. Divide 30 into five parts in A.P., such that the first and last parts are in the ratio2 : 3:[F-07]

(a) $\frac{24}{5}, \frac{27}{5}, 6, \frac{33}{5}, \frac{36}{5}$ (b) $6, \frac{36}{5}, \frac{33}{5}, \frac{24}{5}, \frac{27}{5}$

(c) $\frac{27}{5}, \frac{24}{4}, \frac{36}{5}, \frac{33}{5}, 6$ (d) $6, \frac{24}{5}, \frac{27}{5}, \frac{33}{5}, \frac{36}{5}$

22. Find the sum of all natural numbers between 250 and 1,000 which are exactly divisible by 3 [M-07]

(a) 1,56,375 (b) 1,56,357 (c) 1,65,375 (d) 1,65,357

23. If each month Rs. 100 increases in any sum then find out the total sum after 10 months, if the sum of first month is 2,000. [D-11]

(a) Rs 24,500 (b) Rs 24,000 (c) Rs 50,000 (d) Rs 60 000.

24. The sum of all two Digit odd numbers is [J-11]

(a) 2475 (b) 2575 (c) 4950 (d) 5049

25. If in an A.P., Tn represents nth term. If $t_7 : t_{10} = 5:7$ then $t_8 : t_{11} =$ _____ [J-09]

(a) 13:16 (b) 17:23 (c) 14:17 (d) 15:19

26. The sum of an A P, whose first term is -4 and last term is 146 is 7171. Find the value of n. [D-09] [SM]

(a) 99 (b) 100 (c) 101 (d) 102

27. In an A.P., if common difference is 2, Sum of n terms is 49,7th term is 13 then n = [D-12]

(a) 0 (b) 5 (c) 7 (d) 13

28. Three No's a,b,c are in A.P. find a+b+c [D-15]

(a) a (b) -b (c) 3b (d) c

29. The sum of n terms of the series log x + log $\frac{x^2}{y}$ + log $\frac{x^3}{y^2}$ + ... is [J-16]

(a) $\frac{n}{2}\left[2n\log\left(\frac{x}{y}\right) + \log xy\right]$ (b) $\frac{n}{2}\left[n\log xy + \log\left(\frac{x}{y}\right)\right]$

(c) $\frac{n}{2}\left[n\log\left(\frac{x}{y}\right) - \log xy\right]$ (d) $\frac{n}{2}\left[n\log\left(\frac{x}{y}\right) + \log xy\right]$.

30. If are in arithmetic $\frac{1}{b+c}, \frac{1}{c+a}, \frac{1}{a+b}$ progression then a^2, b^2, c^2, are in [J-16][SM]

(a) A.P. (b) G.P. (c) Both A.P. & G.P (d) None of these.

31. If the Sum 50 + 45 +40 + 35 + _____ is zero, then the number of terms is : [D-16]

(a) 22 (b) 20 (c) 21 (d) 25

32. The number of 2.353535 _____ in p/q form is : [D-16]

(a) 235/99 (b) 234/99 (c) 230/99 (d) 233/99

33. If a, -3, b, 5, c are in A.P then the value of c is [J-17]

(a) -7 (b) 1 (c) 9 (d) 13

34. The sum n terms of the series 1+(1+3)+(1+3+5)+..... [J-17]

(a) $\frac{n(n+1)(2n+1)}{6}$ (b) $\frac{n(n+1)(2n+1)}{3}$ (c) $\frac{n(n+1)(n+2)}{6}$ (d) None

35. Sum of series $1+\frac{4}{5}+\frac{7}{5^2}+\frac{10}{5^3}+.....\infty$ is: [J-10]

a) 15/36 b) 35/36 c) 35/16 d) 15/16

36. If G be Geometric Mean between two numbers a and b, then the value of $\frac{1}{G^2-a^2}+\frac{1}{G^2-b^2}$ is equal to [D-10]

(a) G^2 (b) $3G^2$ (c) $1/G^2$ (d) $2/G^2$

37. Find the product of : [J-11]

(243), $(243)^{1/5}$, $(243)^{1/36}$, ...

(a) 1,024 (b) 27 (c) 729 (d) 246

38. Geometric Mean of P, P^2, P^3 ....., P^n will be: [J-11]

(a) P^{n+1} (b) $P^{\frac{1+n}{2}}$ (c) $P^{\frac{n(n+1)}{2}}$ (d) None of the above.

39. If 5th term of a G.P. is $3\sqrt{3}$ then the product of first nine terms is [J-11]

(a) 3^{27} (b) $3^{27/2}$ (c) $\sqrt[3]{3^{\frac{27}{2}}}$ (d) None of these

40. Find the sum of the infinite terms 2, $\frac{4}{y}, \frac{8}{y^2}, \frac{16}{y^3}$ ..... if y > 2 [J-12]

(a) $\frac{2y}{y-2}$ (b) $\frac{4y}{y-2}$ (c) $\frac{3y}{y-2}$ (d) None of these

41. In a G.P. the sixth term is 729 and the common ratio is 3 , then the first term of G.P. is : [J-13]

(a) 2 (b) 3 (c) 4 (d) 7

42. If Geometric mean (G.M.) Of a, b, c, d is 3, then G.M. of $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}, \frac{1}{d}$ will be [D-13]

(a) 1/3 (b) 3 (c) 81 (d) 1/81

43. If the first term of a G.P exceeds the second term by 2 and the sum to infinity is 50, the series is [N-06][SM]

(a) 10, 8, $\frac{32}{5}$,..... (b) 10, 8, $\frac{5}{2}$,..... (c) l0, $\frac{10}{3}, \frac{10}{9}$, ... (d) None

44. The product of 3 numbers in G. P. is 729 and the sum of squares is 819. The numbers are[J-08]

(a) 9, 3, 27 (b) 27, 3, 9 (c) 3, 9, 27 (d) none of these

45. The sum of $1 + 1/3 + 1/3^2 + 1/3^3 + ... + 1/3^{n-1}$ is [J-14][SM]

(a) 2/3 (b) 3/2 (c) 4/5 (d) none of these

46. The second term of an infinite geometric series is (3/2) and its sum is 8. Find the series. [D-12]

(a) $2, \frac{3}{2}, \frac{9}{8}$ or $\frac{3}{2}, 6, \frac{3}{8}$ (b) $2, \frac{9}{8}, \frac{3}{2}$ (c) $6, \frac{3}{2}, \frac{8}{3}$ (d) $2, \frac{3}{2}, \frac{9}{8}$ or $6, \frac{3}{2}, \frac{3}{8}$

47. In a G.P. the sum of infinite terms is 15, the sum of the squares of these infinite terms is 45. Find the G.P. [J-09]

(a) $\frac{20}{9}, \frac{19}{3}, 5$ (b) $5, \frac{10}{3}, \frac{20}{9}$ (c) $\frac{10}{3}, \frac{20}{9}, 5$ (d) $\frac{10}{2}, \frac{9}{20}, 5$.

48. Find the sum to infinity of the following series : 1 - 1 + 1 - 1 + 1 - 1 + ...∞ [D-09]

(a) 1 (b) ∞ (c) ½ (d) Does not exist

49. A certain ball when dropped to the ground rebounds to of $\frac{4}{5}$th of the height from which it falls; it is dropped from a height of 100 metres find the total distance it travels before finally coming to rest: [A-07]

(a) 600m (b) 700m (c) 900m (d) 200m

50. The first, second and seventh term of A.P. are in G.P. and the common difference is 2, the 2nd term of A.P. is: [N-07]

(a)5/2 (b) 2 (c) 3/2 (d) 1/2

51. If $x = 1 + \frac{1}{3} + \frac{1}{3^2} + ...\infty$, $y = 1 + \frac{1}{4} + \frac{1}{4^2} + ...\infty$

Find xy. [J-08]

(a) 2 (b) 1 (c) 8/9 (d) 1/2

52. Find three numbers in G.P. such that their sum is 21, and the sum of their squares is 189: [J-08]

(a) 5,7,9 (b) 3,7,11 (c) 3,6,12 (d) 4,8,9

53. The sum of how many terms of the seqence 256, 128, 64 is..... 511.[D-08]

(a) 8 (b) 9 (c) 7 (d) None of these.

54. Find two numbers whose A.M is 10 and G.M. is 8. [D-08]

(a) [10,10] (b) [16,4] (c) [18,2] (d) [14,6]

55. The first term of a G.P. where second term is 2 and sum of infinite term is 8 will be[D-12]

(a) 6 (b) 3 (c) 4 (d) 1

56. The A.M. of two positive numbers is 40 and their G. M. is 24. The numbers are [D-08, D-11]

(a) (72, 8) (b) (70, 10) (c) (60, 20) (d) none of these

57. Find the numbers whose arithmetic mean is 12.5 and geometric mean is 10.[D-11]
(a) 20 and 5 (b) l0 and 5 (c) 5 and 4 (d) None of these.

58. A G. P. (Geometric Progression) consists of 2n terms. If the sum of the terms occupying the odd places is S_1 and that of terms in the even places is S_2 the common ratio of the progression is: [J-16]
(a) n (b) $2S_1$ (c) $\frac{S_2}{S_1}$ (d) $\frac{S_1}{S_2}$

59. The sum of first 20 terms of a G.P is 1025 times the sum of first 10 terms then the common ratio is _____. [J-17]
(a) 2 (b) $2\sqrt{2}$ (c) $\frac{1}{2}$ (d) $\sqrt{2}$

60. If the p^{th} term of an A.P is 'q' and he q^{th} term is 'p', then its r^{th} term is (N-18)
(a) p + q - r (b) p + q + r (c) p - q - r (d) p + q

61. The 3rd term of a G.P. is $\frac{2}{3}$ and the 6th term is $\frac{2}{81}$, then the 1st term is(N-18)
(a) 6 (b) 1/3 (c) 9 (d) 2

62. The sum of the series -8, -6, -4,....n terms is 52. The number of terms n is(N-18)
(a) 11 (b) 12 (c) 13 (d) 10

63. The value of K, for which the terms 7K + 3, 4K - 5, 2K + 10 are in A.P., is(N-18)
(a) 13 (b) -13 (c) 23 (d) -23

64. If the pth, qth & rth term of a G.P. are x,y,z then (q - r). log x + (r - p) log y + (p - q)log z = (J-18)
(a) 0 (b) 1 (c) 2 (d) None of these

65. If a,b,c,d are in GP then $(b-c)^2 + (c-a)^2 + (d-b)^2$ = ? = (J-18)
(a) $(a-b)^2$ (b) $(a-d)^2$ (c) $(c-d)^2$ (d) 0

66. If the nth term of a series, $a_n = 3^n - 2n$ then S_n = (J-18)
(a) $\frac{3}{2}(3^n-1) + 1(n+1)$ (b) $\frac{3}{2}(3^n+1) - 1(n+1)$
(c) $\frac{3}{2}(3^n-1) - n(n+1)$ (d) $\frac{3}{2}(3^n+1) - 1(n-1)$

67. If Y= $1+x+x^2+\ldots\ldots\ldots\infty$ *then* x= [J-19]
(a) $\frac{y-1}{y}$ (b) $\frac{y+1}{y}$ (c) $\frac{y}{y+1}$ (d) $\frac{y}{y-1}$

68. If 2+6+10+14+18+_____+x= 882 then the value of x [J-19]
(a) 78 (b) 80 (c) 82 (d) 86

69. In a G.P., if the fourth term is '3' then the product of first seven terms is [J-19]
(a) 3^5 (b) 3^7 (c) 3^6 (d) 3^8

70. The Ratio of sum of n terms of the two AP's is (n+1) : (n-1) then the Ratio of their m^{th} terms is [J-19]
(a) (m+1) : 2m (b) (m+1) : (m-1) (c) (2m-1 : (m+1) (d) m : (m-1)

71. If the series 25,5,1_____ 1/3125 which term is 1/3125? [N-19]
(a) 8^{th} term (b) 9^{th} term (c) 15^{th} term (d) None of these

72. **The sum of five terms of AP is 75 find the 3rd term is. [N-19]**

(a) 20 (b) 30 (c) 15 (d) None of these

73. **Find two numbers whose A.M is 10 and G.M. is 8. [N-19]**

(a) AP (b) GP (c) HP (d) None of these

74. **The sum of series $1/2+1/3^2+1/2^3+1/3^4$_____ up to infinity is [N-19]**

(a) 25/24 (b) 19/24 (c) 1/12 (d) None of these

75. **Three numbers in G.P with their sum 130 and their product 27,000 are- [N-20]**

(a) 10,30,90 (b) 90,30,10 (c) (a) & (b) both (d) 10,20,30

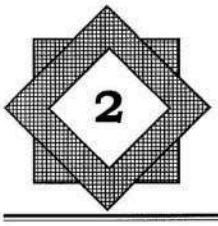
76. **Divide 69 into three parts which are in A.P and are such that the product of the first two parts is 460. [N-20]**

(a) 21,23,25 (b) 20,23,26 (c) 19,23,27 (d) 22,23,24

77. **The 20^{th} term of arithmetic progression whose 6^{th} term is 38 and 10^{th} term is 66 is ------ [N-20]**

(a) 118 (b) 136 (c) 178 (d) 210

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



EQUATION

EQUATION

1) Defination:-

An equation is a statement of equality of two algebraic expressions involving one or more quantities (variables).

ie. equation is satisfied for certain values.

2) Polynomial :-

Any equation

$f(x) = a_0x^n + a_1x^{n-1} + a_2x^{n-2} + ...+a_{n-1}x + a_n$ is known as polynomial of degree n.

(1) Linear equation : If n = 1

(2) Quadratic equation : If n = 2

(3) Cubic equation : If n = 3.

(4) Constant : If n = 0

3) Linear equation in one variable :-

The equation involving only one variable (Degree 1) is called linear Equation.

4) Simultaneous linear Equations in two unknowns:-

Two equations $a_1x + b_1y + c_1 = 0$

and $a_2x + b_2y + c_2 = 0$ in two variables is known as simultaneous equations is two variables.

5) Method of solving simultaneous equations:-

1. Elimination method
2. Cross Multiplication method

6) Types of Lines

If $a_1x + b_1y + c_1 = 0$

$a_2x + b_2y + c_2 = 0$ then

$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ (Intersecting lines)

$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ (Parallel lines)

$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ (Coincident lines)

7) Quadratic Equation :-

An equation which is of the form $ax^2 + bx + c = 0$ is called a quadratic equation. Here a, b and c are called coefficient of the equation. This equation always has two roots. Let the root be α and β.

LEVEL - III

1. A man went to the Reserve Bank of India with Rs.1,000. He asked the cashier to give him Rs.5 and Rs.10 notes only in return. The man got 175 notes in all. Find how many notes of Rs.5 and Rs.10 did he receive? [F-08]
(a) (25, 150) (b) (40,110) (c) (150, 25) (d) None

2. A man rowing at the rate of 5 km in an hour in still water takes thrice as much time in going 40 km up the river as in going 40 km down. Find the rate at which the river flows: [J-08]
(a) 9 km/hr (b) 2.5 km/hr (c) l2km/hr (d) None

3. If $\log_{10} 5 + \log_{10}(5x+1) = \log_{10}(x+5) + 1$ then, the value of x = _____. [D-12]
(a) 7 (b) 3 (c) 5 (d) 10

4. If $|x-2| + |x-3| = 7$ then, 'x'will be equal to [D-12]
(a) 6 (b) -1
(c) 6 and - 1 (d) None of the above.

5. Roots of equation $2x^2 + 3x + 7 = 0$ are α and β. The value of $\alpha\beta^{-1} + \beta\alpha^{-1}$ is [D-12]
(a) 2 (b) 3/7 (c) 7/2 (d) -19/14

6. The quadratic equation $x^2 - 2kx + 16 = 0$ will have equal roots when the value of 'k' is _____ [D-12]
(a) ±1 (b) ±2 (c) ±3 (d) ±4

7. If kx - 4 = (k - 1)x, then which of the following is true? [D-13]
(a) x = -5 (b) x = -4 (c) x = -3 (d) x = +4

8. The value of 'K' for which the system of equations kx + 2y = 5 and 3x + y = 1 has no solution is [D-13]
(a) 5 (b) 2/3 (c) 6 (d) 3/2

9. On solving $\sqrt{\frac{x}{1-x}} + \sqrt{\frac{1-x}{x}} = 2\frac{1}{6}$ we get one value of x as : [N-06]
(a) $\frac{4}{13}$ (b) $\frac{1}{13}$ (c) $\frac{2}{13}$ (d) $\frac{3}{13}$

10. A man sells 6 radios and 4 televisions for Rs.18,480. If 14 radios and 2 televisions are sold for the same amount, what is the price of a televisions? [F-07]
(a) Rs.1,848 (b) Rs.840 (c) Rs.1,680 (d) Rs.3,360

11. If one root of a equation is $2 + \sqrt{5}$, then the quadratic equation is: [F-07][SM]
(a) $x^2 + 4x - 1 = 0$ (b) $x^2 - 4x - 1 = 0$ (c) $x^2 + 4x - 1 = 0$ (d) $x^2 - 4x + 1 = 0$

12. A man starts his job with a certain monthly salary and earns a fixed increment every year. If his salary was Rs.1,500 after 4 years of service and Rs.1,800 after 10 years of service, what was his starting salary and what is the annual increment in rupees?[M-07][SM]
(a) Rs.1,300, Rs.50 (b) Rs.1,100, Rs.50 (c) Rs.1,500, Rs.30 (d) None

13. The sides of an equilateral triangle are shortened by 12 units, 13 units and 14 units respectively and a right angled triangle is formed. The side of the equilateral triangle is: [SM][A-07
(a) 17 units (b) 16 units (c) 15 units (d) 18 units

14. If α and β are the roots of the equation $x^2+7x+12=0$, then the equation whose roots $(\alpha+\beta)^2$ and $(\alpha-\beta)^2$ will be : [J-12][SM]
(a) $x^2 - 14x + 49 = 0$ (b) $x^2 - 24x + 144 = 0$
(c) $x^2 - 50x + 49 = 0$ (d) $x^2 - 19x + 144 = 0$

15. Roots of the equation $3x^2 - 14x + k = 0$ will be reciprocal of each other if: [J-10]
(a) k = -3 (b) k = 0 (c) k = 3 (d) k = 14.

16. If roots of equation $x^2 + x + r = 0$ are 'α' and 'β' and $\alpha^3 + \beta^3 = -6$. Find the value 'r' ? [J-11]

(a) $\frac{-5}{3}$ (b) $\frac{7}{3}$ (c) $\frac{-4}{3}$ (d) 1.

17. If one root of the equation $px^2 + qx + r = 0$ is r then other root of the equation will be [D-11]

(a) l/q (b) 1/r (c) 1/p (d) $\frac{1}{p+q}$

18. If the ratio of the roots of the equation $4x^2 - 6x + p = 0$ is 1:2 then the value of p is [D-11]

(a) 1 (b) 2 (c) -2 (d) -1

19. If p & q are the roots of the equation $x^2 - bx + C = 0$, then what is the equation whose roots are (pq + p + q) and (pq −p -q)? [D-11]

(a) $x^2 - 2bx + C^2 + b^2 = 0$ (b) $x^2 - 2Cx + (C^2 - b^2) = 0$

(c) $8cx^2 - 2(b + C)x + c^2 = 0$ (d) $x^2 + 2bx - (C^2 - b^2) = 0$

20. If arithmetic mean between roots of a quadratic equation is 8 and the geometric mean between them is 5, the equation is _____. [J-12]

(a) $x^2 - 16x - 25 = 0$ (b) $x^2 - 16x + 25 = 0$

(c) $x^2 - 16x + 5 = 0$ (d) None of these

21. The minimum value of the function is $x^2 - 6x + 10$ is ..... [J-12]

(a) 1 (b) 2 (c) 3 (d) 10

22. The area of a rectangular field is 2000 sq. m and its perimeter is 180m. Form a quadratic equation by taking the length of the field as x and solve it to find the length and breadth of the field. The length and breadth are [D-08][SM]

a) (205m, 80m) b) (50m, 40m) c) (40m, 50m) d) none

23. The value of $2+\cfrac{1}{2+\cfrac{1}{2+\cfrac{1}{2+.....\infty}}}$ is [J-08]

(a) $1 + \sqrt{2}$ (b) $1 - \sqrt{2}$ (c) 1 (d) 2.

24. If the product of the roots of $x^2 - 3x + k = 10$ is 2, the value of k is : [D-10]

(a) -2 (b) 8 (c) -8 (d) 12.

25. The positive value of m for which the roots of the equation $12x^2 + mx + 5 = 0$ are in the ratio 3 : 2 is [D-10]

(a) $5\sqrt{10}$ (b) $\frac{5}{2}\sqrt{10}$ (c) $\frac{5}{12}$ (d) $\frac{12}{5}$.

26. Find the positive value of k for which the equations : $x^2 + kx + 64 = 0$ and $x^2 - 8x + k = 0$ will have real roots: [N-06]

(a) 12 (b) 16 (c) 18 (d) 22.

27. The value of is $\sqrt{6+\sqrt{6+\sqrt{6+.....\infty}}}$: [A-07]

(a) -3 (b) 2 (c) 3 (d) 4.

28. Area of a rectangular garden is 8000 square metres. Ratio in length and breadth is 5:4. A path of uniform width, runs all round the inside of the garden. If the path occupies 3200 m^2, what is its width? [N-07]

(a) 12m (b) 6m (c) 10m (d) 4m.

29. If $(2 + \sqrt{3})$ is a root of a quadratic equation $x^2 + px + q = 0$ then find the value of p and q.[D-08, J-12]

(a) (4, -1) (b) (4, 1) (c) (-4, 1) (d) (2, 3).

30. One root of the equation : $x^2 - 2(5 + m)x + 3(7 + m) = 0$ is reciprocal of the other. Find the value of m. [J-09]
(a) -20/3 (b) 7 (c) 1/7 (d) -1/7.

31. If the length of a rectangle is 5cm more than the breadth and if the perimeter of the rectangle is 40cm, then the length & breadth of the rectangle will be[D-09]
(a) 7.5 cm, 2.5 cm (b) 10 cm, 5cm
(c) 12.5 cm, 7.5 cm (d) 15.5 cm, 10.5 cm.

32. If $x^3 - 6x^2 + 11x - 6 = 0$ then find the value of (3x - 4). [D-08, J-14]
(a) (1, 2, 3) (b) (-1, 2, 5) (c) (-1, 3, 5) (d) (2, 3, 5)

33. If α, β are the roots of the quadratic equation $2x^2-4x = 1$, then the value of $\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha} =$
(a) -11 (b) 22 (c) - 22 (d) 11

34. The age of a person is 8 years more than thrice the age of the sum of his two grandsons who were twins. After 8 years his age will be 10 years more than twice the sum of the ages of his grandsons. Then the age of the person when the twins were born is _____[SM] (J-15)
(a) 86 yrs (b) 73 yrs (c) 68 yrs (d) 63 yrs

35. Roots of the cubic equation $x^3 - 7x + 6 = 0$ are _____ (J-15)
(a) 1, 2, 3 (b) 1, -2, 3 (c) 1, 2, -3 (d) 1, -2, -3

36. In a school number of students in each section is 36. If 12 new students are added, then the number of sections are increased by 4, and the number of students in each section becomes 30. The original number of sections at first is (J - 15)
(a) 6 (b) 10 (c) 14 (d) 18

37. A person on a tour has Rs.9600 for his expenses. But the tour was extended for another 16 days, so he has to cut down his daily expenses by Rs.20. The original duration of the tour had been? (J-15)
(a) 48 days (b) 64 days (c) 80 days (d) 96 days

38. If a, b be the roots of a quadratic equation if a+b = -2, ab = -3 . Find quadratic equation :(D-15)
(a) $x^2 + 2x - 7 = 0$ (b) $x^2 + 2x - 3 = 0$ (c) $x^2 - 2x - 3 = 0$ (d) $x^2 - 2x + 7 = 0$

39. Value of k for which roots are equal of given equation $4x^2 - 12x + k = 0$ (D-15)
(a) 144 (b) 9 (c) 5 (d) None of these

40. If difference between the roots of the equation $x^2 - kx + 8 = 0$ is 4, then the value of K is: (J-16)
(a) 0 (b) ± 4 (c) $\pm 8\sqrt{3}$ (d) $\pm 4\sqrt{3}$

41. It $2^{x+y} = 2^{2x-y}\sqrt{8}$, then the respective values of X and Y are — (J-16)
(a) $1, \frac{1}{2}$ (b) $\frac{1}{2}, 1$ (c) $\frac{1}{2}, \frac{1}{2}$ (d) None of these.

42. A cottage industry produces a certain number of pottery articles in a day . It was observed on a particular day that the cost of each article (in Rs.) was 2 more than thrice the number of articles produced on that day. If the total cost of production on that day was Rs. 800, the number of articles produced was (D-16)
(a) 14 (b) 16 (c) 12 (d) 18

43. If $a = \frac{\sqrt{6}+\sqrt{5}}{\sqrt{6}-\sqrt{5}}$, $b = \frac{\sqrt{6}-\sqrt{5}}{\sqrt{6}+\sqrt{5}}$ then the value of $\frac{1}{a^2}+\frac{1}{b^2}$ is (J-17)

(a) 486 (b) 484 (c) 482 (d) 500

44. If a, b be the roots of $x^2 + x + 5 = 0$ then $\frac{\alpha^2}{\beta}+\frac{\beta^2}{\alpha}=$ _____ (J-17)

(a) $\frac{16}{5}$ (b) 2 (c) 3 (d) $\frac{14}{5}$

45. The sides of equilateral triangle are shortened by 3 units, 4 units, 5 units respectively then a right angle triangle is formed. The side of the equilateral triangle was (J-17)

(a) 5 (b) 6 (c) 8 (d) 10

46. If $\frac{3}{x+y}+\frac{2}{x-y}=-1$ and $\frac{1}{x+y}-\frac{1}{x-y}=\frac{4}{3}$ then (x, y) is (J-17)

(a) (2, 1) (b) (1, 2) (c) (-1, 2) (d) (-2, 1)

47. If the sum of two numbers is 13 and the sum of their squares is 85 then the numbers are: (D-17)

(a) 6, 7 (b) 4, 9 (c) 10, 3 (d) 5, 8

48. The difference between the roots of the equation $x^2 - 7x - 9 = 0$ is _____. (D-17)

(a) 7 (b) $\sqrt{85}$ (c) 9 (d) $2\sqrt{85}$

49. The roots of the cubic equations $x^3 + 7x^2 - 21x - 27 = 0$: (D-17)[SM]

(a) -1, 3, 9 (b) 1, -3, 9 (c) -1, 3, -9 (d) -1, -3, 9

50. If the roots of the equation $kx^2-3x-1 = 0$ are the reciprocal of the roots of the equation $x^2+3x-4=0$ then K = ? (J-18)

(a) 4 (b) -4 (c) 3 (d) -3

51. If the roots of the equation $x^3-15x^2+kx-45 = 0$ are in A.P., Find Value of k: (J-18)

(a) 56 (b) 59 (c) -56 (d) -59

52. Let α and β be the roots of $x^2 + 7x + 12 = 0$. Then the value of $\left(\frac{\alpha^2}{\beta}+\frac{\beta^2}{\alpha}\right)$ will be (N-18)

(a) $\frac{7}{12}+\frac{12}{7}$ (b) $\frac{49}{144}+\frac{144}{49}$ (c) $-\frac{91}{12}$ (d) None of these

53. If $A = \begin{bmatrix} -5 & 2 \\ 1 & -3 \end{bmatrix}$, then adj A is(N-18)

(a) $\begin{bmatrix} -3 & -2 \\ -1 & -5 \end{bmatrix}$ (b) $\begin{bmatrix} 3 & -2 \\ -1 & 5 \end{bmatrix}$ (c) $\begin{bmatrix} 5 & 1 \\ 2 & 3 \end{bmatrix}$ (d) $\begin{bmatrix} 3 & 2 \\ 1 & 5 \end{bmatrix}$

54. If $A = \begin{bmatrix} 5 & x \\ y & 0 \end{bmatrix}$ and $A = A^T$, then(N-18)

(a) x = 0, y = 5 (b) x + y = 5 (c) x = y (d) None of these

55. Let A^T be the transpose of matrix A having order $m \times n$, then $A^T A$ is a matrix of order (N-18)

(a) $m \times m$ (b) $n \times n$ (c) $m \times n$ (d) $n \times m$

56. Find the condition that one roots is double the other of $ax^2+bx+c=0$ [J-19]

(a) $2b^2 = 3ac$ (b) $b^2 = 3ac$ (c) $2b^2 = 9ac$ (d) $2b^2 > 9ac$

57. $\begin{bmatrix}1 & 2 & 3\end{bmatrix}\begin{bmatrix}\log_{10}2\\ \log_{10}3\\ \log_{10}4\end{bmatrix}=$ **[J-19]**

(a) $\log_{10}(1521)$ (b) $\log_{10}(1152)$ (c) $\log_{10}(5211)$ (d) $\log_{10}(2151)$

58. **If** $\begin{pmatrix}x+y & 1\\ 1 & x-y\end{pmatrix}+\begin{pmatrix}2 & 3\\ 2 & -4\end{pmatrix}=\begin{pmatrix}12 & 4\\ 3 & 0\end{pmatrix}$ *then* **[J-19]**

(a) $x=7,\ y=-3$ (b) $x=-7,\ y=-3$ (c) $x=-7,\ y=3$ (d) $x=7,\ y=3$

59. **Find the root of the equations. if $4^x \cdot 8^y = 128$ and $3^x / 27^y = 1/3$ [N-19]**

(a) 2, 1 (b) -2, 1 (c) 2, -1 (d) 1, 2

60. **The three roots of equations is. $x^3 + 9x^2 - x - 9 = 0$ [N-19]**

(a) 1, - 1, -9 (b) 1, -1, 9 (c) 1, 1, 9 (d) -1, -1, -9

61. **Find the value of K so that x = 2 is a root of the equation $3x^2 - 2kx + 5 = 0$ [N-19]**

(a) 17/4 (b) 4/17 (c) -17/4 (d) -4/17

62. **The rational root of the equation 0 =** $2p^3 - p^2 - 4p + 2$ **is [N-20]**

(a) 2 (b) -2 (c) 1/2 (d) -1/2

63. **Transpose of a row matrix is [N-20]**

(a) Column matrix (b) Zero matrix
(c) Row matrix (d) Diagonal matrix

64. **If** $2x^2 - (a+6)2x + 12a = 0$**, then the roots are [N-20]**

(a) 6 and a (b) 4 and a^2 (c) 3 and 2a (d) 6and 3a

65. **If** $A^3 = \begin{bmatrix}0 & -i\\ -i & 0\end{bmatrix}$ **and** $A^4 = \begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$**, where i^2 = -1, then A^2 = _____ [N-20]**

(a) $\begin{bmatrix}-1 & 0\\ 0 & -1\end{bmatrix}$ (b) $\begin{bmatrix}-i & 0\\ 0 & -i\end{bmatrix}$ (c) $\begin{bmatrix}-i & 0\\ 0 & -i\end{bmatrix}$ (d) $\begin{bmatrix}0 & i\\ i & 0\end{bmatrix}$

66. **Solving equation m +** $\sqrt{m}$ **= 6/25 the value of m works out to [N-20]**

(a) 1/25 (b) 2/25 (c) 3/25 (d) 1

67. **Solving equation** $3g^2$ **- 14g + 16 = 0, we get roots as- [N-20]**

(a) ± 5 (b) 0 (c) 8 and 2/3 (d) 2 and 8/3

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