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MATHEMATICS

RATIO PROPORTION, INDICES SURD & LOGARITHM

1. 10 % of A = 20% of B then A : B is equal to
 (a) 1 : 2 (b) 5 : 1 (c) 2 : 3 (d) 2 : 1

2. Mixture of 35 litres ratio of milk to water is 4 :1, If 7 litre of water is added then new ratio of milk to water is
 (a) 2 :1 (b) 1 : 2 (c) 3 : 2 (d) 2 : 3

3. If $A = B/2 = C /5$, then A : B : C is
 (a) 3 : 5 : 2 (b) 2 : 5 : 3 (c) 1 : 2 : 5 (d) none of these

4. A fraction bears the same ratio to $\frac{1}{27}$ as $\frac{3}{7}$ does to $\frac{5}{9}$. The fraction is :
 (a) $\frac{7}{45}$ (b) $\frac{1}{35}$ (c) $\frac{45}{7}$ (d) $\frac{5}{21}$

5. If $\sqrt{5+\sqrt[3]{x}}=3$, then x is equal to :
 (a) 125 (b) 64 (c) 27 (d) 9

6. If $2^x = 3^y = 6^{-z}$, then $\left(\frac{1}{x} + \frac{1}{y} + \frac{1}{z}\right)$ is equal to :
 (a) 0 (b) 1 (c) $\frac{3}{2}$ (d) $-\frac{1}{2}$

7. If $a^b = b^a$ then the value of $\left(\frac{a}{b}\right)^{\frac{a}{b}} - a^{\frac{a}{b}-1}$ reduces to
 (a) a (b) b (c) 0 (d) None

8. The value of $\log_2(\log_5 625)$ is
 (a) 2 (b) 5 (c) 10 (d) 15

9. $a^{\log b - \log c} \times b^{\log c - \log a} \times c^{\log a - \log b}$ has a value of
 (a) 1 (b) 0 (c) -1 (d) None

10. $\log a + \log a^2 + \log a^3 + \dots \log a^n$
 (a) $\log a + \frac{n(n+1)}{2}$ (b) $\frac{n^2}{2}$ (c) $\log a + \frac{n(n+1)(2n+1)}{6}$ (d) n

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

12. 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 :
- (a) $a + \frac{1}{a}$ (c) $a - \frac{1}{a}$
 (c) $a^2 + \frac{1}{a^2}$ (d) $a^2 - \frac{1}{a^2}$
13. If $\log_{10000}x = \frac{-1}{4}$, then x is given by:
- (a) $\frac{1}{100}$ (b) $\frac{1}{10}$ (c) $\frac{1}{20}$ (d) None of these.
14. A bag contains 187 in the form of 1 rupee, 50 paise and 10 paise coins in the ratio 3:4:5. Find the number of each type of coins:
- (a) 102, 136, 170 (b) 136, 102, 170
 (c) 170, 102, 136 (d) None
15. Ratio 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? Becomes 8:7. What is A's earning?
- (a) ₹ 21,000 (b) ₹ 26,000 (c) ₹ 28,000 (d) Data inadequate
16. Number of digits in the numeral for 2^{64} . [Given $\log 2 = 0.30103$]:
- (a) 18 digits (b) 19 digits (c) 20 digits (d) 21 digits
17. If $x = y^a$, $y = z^b$ and $z = x^c$ then abc is :
- (a) 2 (b) 1 (c) 3 (d) 4
18. Fourth proportional to x, 2x, (x+1) is:
- (a) (x + 2) (b) (x - 2) (c) (2x + 2) (d) (2x - 2)
19. Find the value of
 $[\log_{10}\sqrt{25} - \log_{10}(2^3) + \log_{10}(4)^2]^x$
- (a) x (b) 10 (c) 1 (d) None
20. The recurring decimal 2.7777 :.....
 Can be expressed as
- (a) $\frac{24}{9}$ (b) $\frac{22}{9}$ (c) $\frac{26}{9}$ (d) $\frac{25}{9}$

21. Solve:

$$\left[\frac{\log_{10} x - 3}{2} + \frac{11 - \log_{10} x}{2} \right] = 2$$
 (a) 10^1 (b) 10^2 (c) 10 (d) 10^3
22. If $\log_2 x + \log_4 x = 6$, then the Value of x is
 (a) 16 (b) 32 (c) 64 (d) 128
23. For what value of x, the equation $\left[\log_{\sqrt{x}} \right]^2 = \log_x^2$ is true?
 (a) 16 (b) 32 (c) 8 (d) 4
24. The mean proportional between 24 and 54 is :
 (a) 33 (b) 34 (c) 35 (d) 36
25. A dealer mixes rice costing ₹ 13.84 per Kg. with rice costing 15.54 and sells the mixture at 17.60 per Kg. So, he earns a profit of 14.6% on his sale price. The proportion in which he mixes the two qualities of rice is
 (a) 3 : 7 (b) 5 : 7 (c) 7 : 9 (d) 9 : 11
26. If $\log x = m + n$ and $\log y = m - n$, then $\log (10x/y^2) =$
 (a) $3n - m + 1$ (b) $3m - n + 1$ (c) $3n + n + 1$ (d) $3m + n + 1$
27. If $15(2p^2 - q^2) = 7pq$, where p and q are positive, then p : q will be :
 (a) 5 : 6 (b) 5 : 7 (c) 3 : 5 (d) 8 : 3
28. The value of $\frac{2^n + 2^{n-1}}{2^{n+1} - 2^n}$ is :
 (a) $\frac{1}{2}$ (b) $\frac{3}{2}$ (c) $\frac{2}{3}$ (d) 2
29. The integral part of a logarithm is called _____ and the decimal part of logarithm is called _____.
 (a) Mantissa, Characteristic (b) Characteristic, Mantissa
 (c) Whole, Decimal (d) None of these
30. Value of $\frac{1}{\log_3 60} + \frac{1}{\log_4 60} + \frac{1}{\log_5 60}$ is :
 (a) 0 (b) 1 (c) 5 (d) 60

EQUATION

1. Factorise the left hand side of the equation $x^3 + 7x^2 - 21x - 27 = 0$ and the roots are as
 (a) $(-3, -9, -1)$ (b) $(3, -9, -1)$ (c) $(3, 9, 1)$ (d) $(-3, 9, 1)$
2. The value of p for which graphs of $2x + py = 7$ and $4x + 2y = 14$ are coincident
 (a) 1 (b) 2 (c) 7 (d) none
3. The positive value of m for $6x^2 - mx + 5 = 0$ have roots in the ratio 1 : 2 is
 (a) $15\sqrt{3}$ (b) $3\sqrt{15}$ (c) $\sqrt{15}$ (d) none
4. The quadratic equation whose one of the roots is $6 + \sqrt{11}$
 (a) $x^2 - 12x + 25 = 0$ (b) $x^2 - 25x + 12 = 0$
 (c) $x^2 - 18x + 15 = 0$ (d) none
5. Value of x in $\sqrt{x} + 2x = 1$ is
 (a) 4 (b) $\frac{1}{4}$ (c) 2 (d) none
6. The equation $x^2 + 4x + k = 0$ has real roots. Then :
 (a) $k \geq 4$ (b) $k \leq 4$ (c) $k \leq 0$ (d) $k \geq 0$
7. Roots of $ax^2 + b = 0$ are real and distinct if
 (a) $ab > 0$ (b) $ab < 0$ (c) $a, b > 0$ (d) $a, b < 0$
8. The sum of a number and its reciprocal is $2\frac{1}{20}$. The number is :
 (a) $\frac{5}{4}$ (b) $\frac{3}{4}$ (c) $\frac{4}{3}$ (d) $\frac{1}{6}$
9. 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:
 (a) 12 (b) 16 (c) 18 (d) 22
10. A man sells 6 radios and 4 televisions for ₹ 18,480. If 14 radios and 2 televisions are sold for the same amount, what is the price of a television?
 (a) ₹ 1,848 (b) ₹ 840 (c) ₹ 1,680 (d) ₹ 3,360
11. The area of a triangle with vertices $(1,3)$ $(5,6)$ and $(-3, 4)$ in terms of square units is :
 (a) 5 (b) 3 (c) 8 (d) 13
12. The line joining $(-1, 1)$ and $(2, -2)$ and the line joining $(1, 2)$ and $(2, k)$ are perpendicular to each other for the following value of k :
 (a) 1 (b) 0 (c) -1 (d) 3

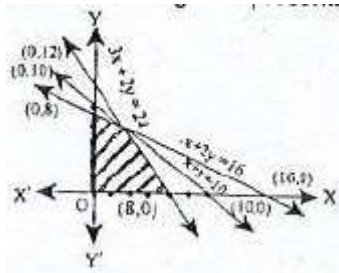
13. The value of $\sqrt{6 + \sqrt{6 + \sqrt{6 + \dots \infty}}}$ is:
 (a) -3 (b) 2 (c) 3 (d) 4
14. The centroid of the triangle ABC is at the point (2,3). A and B are the points (5, 6) and (-1, 4) respectively. The coordinates of C are:
 (a) (1, -2) (b) (2, -1) (c) (1, 2) (d) (2, 3)
15. The value of $2 + \frac{1}{2 + \frac{1}{2 + \frac{1}{2 + \frac{1}{2 + \dots \infty}}}}$ is :
 (a) $1 \pm \sqrt{2}$ (b) $2 \pm \sqrt{5}$ (c) $2 + \pm \sqrt{3}$ (d) None
16. If area and perimeter of a rectangle is 6000 cm^2 and 340 cm respectively, then the length of rectangle is :
 (a) 140 (b) 120 (c) 170 (d) 200
17. The graph of straight line $x = 5$ will be :
 (a) Intersecting both the axis (b) Parallel to y – axis
 (c) Parallel to x – axis (d) None of these
18. Roots of the equation $3x^2 - 14x + k = 0$ will be reciprocal of each other if:
 (a) $k = -3$ (b) $k = 0$ (c) $k = 3$ (d) $k = 14$
19. If the ratio of $(5x - 3y)$ and $(5y - 3x)$ is 3:4, then the value of $x : y$ is
 (a) 27 : 29 (b) 29 : 27 (c) 3 : 4 (d) 4 : 3
20. If one root of the equation $px^2 + qx + r = 0$ is r then other root of the equation will be
 (a) $1/q$ (b) $1/r$ (c) $1/p$ (d) $\frac{1}{p+q}$
21. If arithmetic mean between roots of a quadratic equation is 8 and the geometric mean between them is 5, the equation is _____.
 (a) $x^2 - 16x - 25 = 0$ (b) $x^2 - 16x + 25 = 0$
 (c) $x^2 - 16x + 5 = 0$ (d) None of these
22. If $|x - 2| + |x - 3| = 7$ then, 'x' will be equal to
 (a) 6 (b) -1 (c) 6 and -1 (d) None of the above

23. If $kx - 4 = (k - 1)x$, then which of the following is true?
(a) $x = -5$ (b) $x = -4$ (c) $x = -3$ (d) $x = +4$
24. If $3x - y = 2$, $5x + ay = 3$ and $2x + y = 3$ are concurrent lines, then the value of 'a' is:
(a) -1 (b) -2 (c) 2 (d) None of these
25. If a line passes through the mid point of the line segment joining the points $(-3, -4)$ and $(-5, 6)$ and its slope is $\frac{4}{5}$, then the equation of the line is :
(a) $4X - 5Y + 21 = 0$ (b) $4X - 5Y + 11 = 0$
(c) $5X - 4Y + 21 = 0$ (d) $5X + 4Y + 11 = 0$
26. If difference between the roots of the equation $x^2 - kx + 8 = 0$ is 4, then the value of K is:
(a) 0 (b) ± 4 (c) $\pm 8\sqrt{3}$ (d) $\pm 4\sqrt{3}$
27. The triangle formed by lines $x + 2y = 3$, $2x - y = 1$ and $y = 0$ is
(a) Right angled (b) Equilateral
(c) Isosceles (d) None of these

CO-ORDINATE AND LINEAR INEQUALITIES

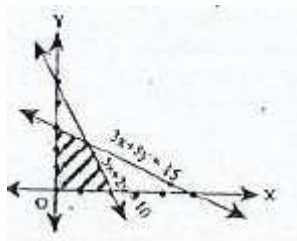
- The total cost curve of the number of copies of a particular photograph is linear. The total cost of 5 and 8 copies of a photograph are ₹ 80 and ₹ 116 respectively. The total cost for 10 copies of the photograph will be
 (a) ₹ 100 (b) ₹ 120 (c) ₹ 120 (d) ₹ 140
- A right angled triangle is formed by the straight line $4x + 2y = 12$ with the axes. The length of perpendicular from the origin to the hypotenuse is
 (a) 3.5 units (b) 2.4 units (c) 4.2 units (d) None of these
- Points $(p, 0)$ $(0, q)$ and $(1, 1)$ are collinear if
 (a) $\frac{1}{p} + \frac{1}{q} = 1$ (b) $\frac{1}{p} - \frac{1}{q} = 1$
 (c) $\frac{1}{p} + \frac{1}{q} = 0$ (d) $\frac{1}{p} - \frac{1}{q} = 0$
- The lines $x-y-6=0$, $6x+5y+8=0$ and $4x-3y-20=0$ are
 (a) Concurrent (b) Non Concurrent
 (c) Perpendicular to each other (d) Parallel to each other
- The line joining $(-1, 1)$ and $(2, -2)$ and the line joining $(1, 2)$ and $(2, k)$ are perpendicular to each other for the following value of k
 (a) 1 (b) 0 (c) -1 (d) 3
- Mr. A Plans to invest upto Rs. 30000 in two stocks x and y . Stock ' x ' is priced at Rs.175 & y at Rs. 95 per share. This is shown as
 (a) $175x + 95y \leq 30000$ (b) $175x + 95y \geq 30000$
 (c) $175x + 95y = 30000$ (d) None
- if $\left| \frac{3x-4}{4} \right| \leq \frac{5}{12}$ then solution set
 a) $\frac{19}{18} \leq x \leq \frac{29}{18}$ b) $\frac{7}{9} \leq x \leq \frac{17}{9}$ c) $\frac{-29}{18} \leq x \leq \frac{-19}{18}$ d) None
- If $\left| x + \frac{1}{4} \right| > \frac{7}{4}$, then :
 (a) $x < \frac{-3}{2}$ or $x > 2$ (b) $x < -2$ or $x > \frac{3}{2}$
 (c) $-2 < x < \frac{3}{2}$ (d) None of these

9. The shaded region represents :



- (a) $3x + 2y \leq 24, x + 2y \geq 16, x + y \leq 10, x \geq 0, y \geq 0$
- (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

10. The shaded region represents:



- (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

11. The solution of the inequality $\frac{(5-2x)}{3} \leq \frac{x}{6} - 5$ is

- (a) $x \geq 8$
- (b) $x \leq 8$
- (c) $x = 8$
- (d) None of these

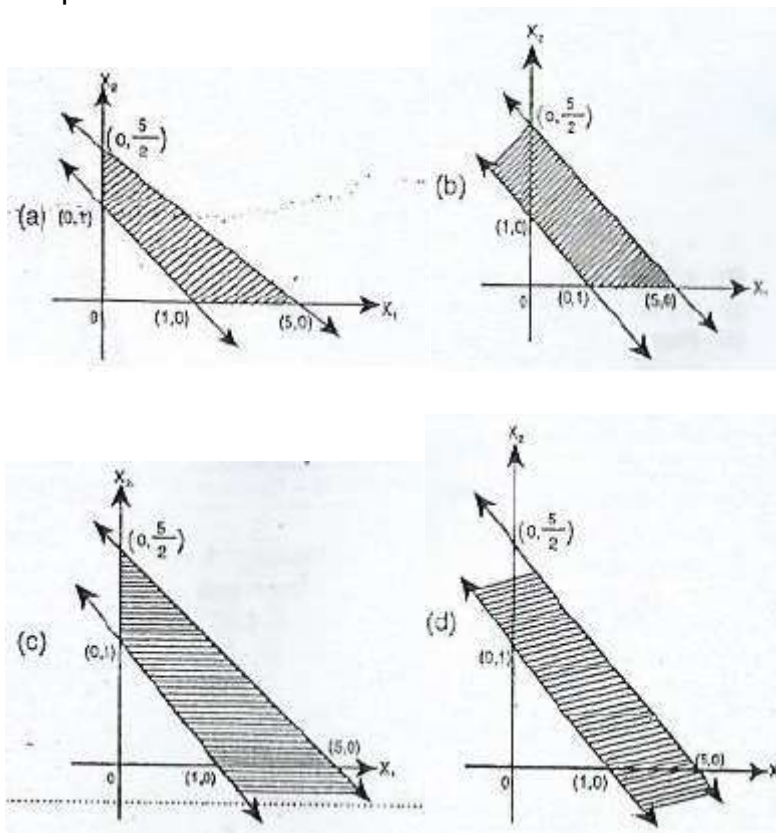
12. The linear relationship between two variables in an inequality:

- (a) $ax + by \leq c$
- (b) $ax by \leq c$
- (c) $axy + by \leq c$
- (d) $ax + bxy \leq c$

13. On the average an experienced person does 7 units of work while a fresh one work 5 units of work daily but the employer has to maintain an output of atleast 35 units of work per day. The situation can be expressed as :

- (a) $7x + 5y < 35$
- (b) $7x + 5y \leq 35$
- (c) $7x + 5y > 35$
- (d) $7x + 5y \geq 35$

14. The common region by the inequalities $x_1 + 2x_2 \leq 5$, $x_1 + x_2 \geq 1$, $x_1 \geq 0$, $x_2 \geq 0$ is given as shaded portion in:



SEQUENCES AND SERIES

1. Which term of the series 75, 72, 69,is – 75?
a) 50 b) 51 c) 49 d) 52
2. A class consists of a number of boys whose ages are in AP, the common difference being 4 months. If the youngest boy is just 8 years old and if the sum of the ages is 168 years, then how many boys are there?
a) 16 b) 23 c) 26 d) 42
3. Find the sum till n terms of the following series: $(1^2 + 1), (2^2 + 2), \dots, (n^2 + n)$.
a) $n(n+1)(n+2)$ b) $[n(n+1)(n+2)]/6$
c) $[n(n+1)(n+2)]/3$ d) $n(n+1)(n-2)/6$
4. The 5th and 12th terms of an AP are 14 and 35 respectively. Which of the following represents this AP?
a) 2, 5, 8, 11, 14, b) 2, 6, 10, 14, 18,
c) 3, 7, 11, 15, d) None of the above
5. If A is the AM and B is the GM between 2 positive numbers, then which of the following is TRUE?
a) $A = B$ b) $A < B$
c) $A > B$ d) None of the above
6. The sum of the first 20 terms of a GP is 244 times the sum of its first 10 terms. What is its common ratio?
a) ± 3 b) $\sqrt{3}$ c) $\pm\sqrt{3}$ d) None of the above
7. The numbers x, 8, y are in GP and the numbers x, y, - 8 are in AP. The values of x and y are:
a) 8, 8 b) - 8, - 8 c) 16, 4 d) 4, 16
8. If a, b, c, d are in GP, then find the value of $b(ab - cd) - (c + a)(b^2 - c^2)$.
a) 0 b) 1 c) - 1 d) None of the above
9. The sum of all natural numbers between 100 and 1000 which are multiple of 5 is:
(a) 98,450 (b) 96,450 (c) 97,450 (d) 95,450
10. Find n such that $\frac{a^{n+1} + b^{n+1}}{a^n + b^n}$ may be the geometric mean between a and b:
(a) 1/2 (b) 1 (c) - 1/2 (d) 0

11. Σn^2 defines :
- (a) $\frac{n(n+1)(2n+1)}{6}$
- (b) $\frac{n(n+1)}{2}$
- (c) $\left[\frac{n(n+1)}{2}\right]^2$
- (d) None of these
12. Find the sum to n terms of the series :7 + 77 +777+ to n terms:
- (a) $\frac{7}{9} (10^{n+1} - 10) - \frac{7n}{9}$
- (b) $\frac{7}{9} (10^{n+1} - 10) - \frac{7n}{9}$
- (c) $\frac{7}{81} (10^{n+1} - 10) - \frac{7n}{9}$
- (d) None of these
13. A person pays ₹ 975 in monthly instalments, each instalment is less than former by ₹ 5. The amount of first instalment is ₹ 100. In what time will the entire amount be paid?
- (a) 26 months (b) 15 months
- (c) Both (a) & (b) (d) 18 months
14. A certain ball when dropped to the ground rebounds to $\frac{4^{th}}{5}$ 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) 600m (b) 700m (c) 900m (d) 200m
15. If a, b, c are in A.P. and x, y, z are in G.P., then the value of x(b-c), y(c-a), z(a-d) is :
- (a) 1 (b) 0Q (c) b(c-a) (d) None
16. Find the ninth term of the series:
- $\sqrt{2}, 5\sqrt{2}, 9\sqrt{2}$
- (a) $25\sqrt{2}$ (b) $31\sqrt{2}$ (c) $33\sqrt{2}$ (d) $52\sqrt{2}$
17. (x +1), 3x, (4x +2) are in A.P. Find the value of x
- (a) 2 (b) 3 (c) 4 (d) 5

18. If in an A.P., T_n represents n th term.
If $t_7 : t_{10} = 5:7$ then $t_8 : t_{11} =$ _____
(a) 13 : 16 (b) 17 : 23 (c) 14 : 17 (d) 15 : 19
19. 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?
(a) 60 (b) 120 (c) 110 (d) 150
20. If third term and seventh term of an A.P are 18 and 30 respectively, then sum of first 20 terms will be :
(a) 540 (b) 610 (c) 740 (d) 810
21. If a, b, c are in Arithmetic Progression (A.P.), then the value of $a+b-c$ is
(a) a (b) -b (c) b (d) c
22. If $\frac{1}{b+c}, \frac{1}{c+a}, \frac{1}{a+b}$ are in arithmetic progression then a^2, b^2, c^2 , are in
(a) Arithmetic Progression.
(b) Geometric Progression.
(c) Both in arithmetic and geometric Progression
(d) None of these.
23. If the Sum $50 + 45 + 40 + 35$ _____ is zero, then the number of terms is :
(a) 22 (b) 20 (c) 21 (d) 25

MATHEMATICS OF FINANCE

1. The population of a town increases every year by 2% of the population at the beginning of that year. The number of years by which the total increase of population be 40% is
(a) 7 years (b) 10 years
(c) 17 years (app) (d) none of these
2. The annual birth and death rates per 1000 are 39.4 and 19.4 respectively. The number of years in which the population will be doubled assuming there is no immigration or emigration is
(a) 35 yrs. (b) 30 yrs. (c) 25 yrs (d) none of these
3. A loan of ₹10,000 is to be paid back in 30 equal instalments. The amount of each installment to cover the principal and at 4% p.a CI is
(a) ₹587.87 (b) ₹ 587 (c) ₹ 578.87 (d) none of these
4. The present value of ₹10000 due in 2 years at 5% p.a. compound interest when the interest is paid on half-yearly basis is ₹_____.
(a) 9070 (b) 9069 (c) 9061 (d) None
5. A person invests ₹500 at the end of each year with a bank which pays interest at 10% p.a C.I. annually. The amount standing to his credit one year after he has made his yearly investment for the 12th time is.
(a) ₹11764.50 (b) ₹ 10000 (c) ₹12000 (d) none of these
6. The difference between compound and simple interest at 5% per annum for 4 years on ₹20000 is ₹_____
(a) 250 (b) 277 (c) 300 (d) 310
7. A machine depreciates at 10% of its value at the beginning of a year. The cost and scrap value realized at the time of sale being ₹23240 and ₹9000 respectively. For how many years the machine was put to use?
(a) 7 years (b) 8 years (c) 9 years (d) 10 years
8. ₹ 8,000 become ₹ 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 :
(a) ₹ 4,850 (b) ₹5,000 (c) ₹ 5,500 (d) ₹5,275

9. The present value of an annuity of ₹ 3,000 for 15 years at 4.5% p.a. C.I. is :
 [Given that $(1.045)^{15} = 1.935282$]
 (a) ₹ 23,809.67 (b) ₹ 32,218.67
 (c) ₹ 32,908.67 (d) None of these
10. A machine can be purchased to ₹ 50,000. Machine will contribute ₹ 12,000 per year for the next five years. Assume borrowing cost 10% per annum. Determine whether machine should be purchased not :
 (a) Should be purchased (b) Should not be purchased
 (c) Can't say about purchased (d) None of the above
11. How long will ₹ 12,000 take to amount to ₹ 14,000 at 5% p.a. converted quarterly ?
 [Given : $(1.0125)^{12.4} = 1.1666$]
 (a) 3 years (b) 3.1 years (c) 13.5 years (d) 12.4 years
12. The effective rate equivalent to nominal rate of 6% compounded monthly is :
 (a) 6.05 (b) 6.16 (c) 6.26 (d) 6.07
13. 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:
 (a) ₹ 112.50 (b) ₹ 125 (c) ₹ 225 (d) ₹ 167.50
14. 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:
 (a) ₹ 3,250 (b) ₹ 3,500 (c) ₹ 3,750 (d) ₹ 4,350
15. In how many years, a sum will become double at 5% p.a. compound interest.
 (a) 14.0 years (b) 14.1 years (c) 14.2 years (d) 14.3 years
16. 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 $(1.06)^{-10} = 0.5584$) :
 (a) ₹7,360 (b) ₹ 8,360 (c) ₹ 12,000 (d) None of these
17. 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:
 (a) $P = \frac{41Q}{80}$ (b) $P = \frac{41Q}{40}$
 (c) $P = \frac{41Q}{100}$ (d) $P = \frac{41Q}{200}$

18. If the difference of S.I and C. I is ₹ 72 at 12% for 4 years. Calculate the amount.
(a) 8,000 (b) 6,000 (c) 5,000 (d) None of these
19. 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.
(a) 2 : 15 (b) 7 : 15 (c) 15 : 7 (d) 1 : 7
20. 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.
(a) 30% (b) 40% (c) 50% (d) 60%
21. The future value of an annuity of ₹ 1,000 made annually for 5 years at the interest of 14% compounded annually is:
(Given $(1.14)^5 = 1.92541$)
(a) ₹5,610 (b) ₹ 6,610 (c) ₹ 6,110 (d) None of these
22. 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?
(a) ₹ 1488.40 (b) ₹ 1518.07 (c) ₹ 2008.07 (d) ₹ 2200.00
23. The sum invested at 4% per annum compounded Semi-annually amounts to 7,803 at the end of one year, is
(a) ₹ 7,000 (b) ₹ 7,500 (c) ₹ 7,225 (d) ₹ 8,000
24. 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
(a) ₹11,000 (b) ₹13,000 (c) ₹12,000 (d) ₹15,000
25. 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
(a) 5% (b) 4% (c) 6% (d) 7%

PERMUTATION AND COMBINATION

1. A publisher printed 3 types of calendars and 2 types of diaries. The number of ways that a customer can select one calendar and on diary is:
(a) 4 (b) 5 (c) 6 (d) 7
2. $(m+n)_{p_2} = 56$; $(m-n)_{p_2} = 30$, then what is the value of m and n?
(a) 7, 4 (b) 4, 4 (c) 7, 1 (d) 6, 2
3. The number of ways in which the letters of the word HOSTEL be arranged so that the words start with H and ends with L is:
(a) 6! (b) 4! 2! (c) 4! (d) 8!
4. Three dice are rolled simultaneously. In how many of the out comes will there be at least one "3"?
(a) 90 (b) 91 (c) 95 (d) 81
5. The sum of all the numbers formed by taking all digits from 2, 3, 4, 5 is:
(a) 666000 (b) 93324 (c) 956784 (d) 9338564
6. In how many ways can 5 boys and 4 girls be arranged on a row so that they should stand alternatively?
(a) 2880 (b) 60480 (c) 28800 (d) 14400
7. How many 5 digits numbers can be formed with 0, 1, 2, 3 and 4?
(a) 48 (b) 96 (c) 24 (d) 120
8. $15_{c_8} + 15_{c_9} - 15_{c_6} - 15_{c_7} = ?$
(a) 0 (b) 4 (c) 6 (d) 8
9. The number of ways can 8 students sit round the table are:
(a) 8! (b) 7! (c) 4! (d) 8!/2!
10. A code word is to consist of two English alphabets followed by two distinct numbers between 1 and 9. How many such code words are there?
(a) 6,15,800 (b) 46,800 (c) 7,19,500 (d) 4,10,800
11. Given : $P(7, k) = 60 P(7, k - 3)$, Then :
(a) $k = 9$ (b) $k = 8$ (c) $k = 5$ (d) $k = 0$

12. Five bulbs of which three are defective are to be tried in two lights – points in dark-room. In how many trials the room shall be lighted?
(a) 10 (b) 7 (c) 3 (d) None of these
13. The value of $\sum_{r=1}^5 {}^5C_r$ is :
(a) 29 (b) 31 (c) 35 (d) 26
14. How many words can be formed with the letters of the word 'ORIENTAL' so that A and E always occupy odd places:
(a) 540 (b) 8640 (c) 8460 (d) 8450
15. A building contractor needs three helpers out of ten men supply. In how many ways can these selections take place?
(a) 36 (b) 15 (c) 150 (d) 120
16. If ${}^nP_r = {}^nP_{r+1}$ and ${}^nC_{r-1} = {}^nC_r$ then find the value of 'n'
(a) 2 (b) 3 (c) 4 (d) 5
17. In how many ways a committee of 6 members can be formed from a group of 7 boys and 4 girls having at least 2 girls in the committee.
(a) 731 (b) 137 (c) 371 (d) 351
18. Six points are on a circle. The number of quadrilaterals that can be formed are:
(a) 30 (b) 360 (c) 15 (d) None of the above
19. 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 pose for a photograph?
(a) 24 (b) 120 (c) 720 (d) 30
20. There are 12 questions to be Answered to be Yes or No. How many ways can these be Answered?
(a) 1024 (b) 2048 (c) 4096 (d) None
21. The number of words that can be formed out of the letters of the word "ARTICLE" so that vowels occupy even place is:
(a) 36 (b) 144 (c) 574 (d) 754
22. Number of ways of shaking hands in a group of 10 persons shaking hands to each other are:
(a) 45 (b) 54 (c) 90 (d) 10

23. In how many ways can a family consist of three children here different birthdays in a leap year
(a) ${}^{365}C_3$ (b) ${}^{366}C_{-3}$ (c) $366 \times 365 \times 364$ (d) ${}^{366}C_3$
24. If ${}^{1000}C_{98} = {}^{999}C_{97} + {}^x C_{901}$, then the value of x will be:
(a) 999 (b) 998 (c) 997 (d) None of these
25. There are 5 books on English, 4 Books on Tamil and 3 books on Hindi. In how many ways can these books be placed on a shelf if the books on the same subjects are to be together?
(a) 1,36,800 (b) 1,83,600 (c) 1,03,680 (d) 1,63,800
26. If ${}^n P_r = 720$ and ${}^n C_r = 120$, then value of 'r' is :
(a) 4 (b) 5 (c) 6 (d) 3
27. 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?
(a) 220 (b) 672 (c) 596 (d) 968

SET THEORY AND RELATION FUNCTION

1. "Is smaller than" over the set of eggs in a box is
 (a) Transitive (T) (b) Symmetric
 (c) Reflexive (R) (d) Equivalence (E)

2. "Is equal to" over the set of all rational numbers is
 (a) (T) (b) (S) (c) (R) (d) E

3. "is perpendicular to" over the set of straight lines in a given plane is
 (a) R (b) S (c) T (d) E

4. If the set P has 3 elements, Q four and R two then the set $P \times Q \times R$ contains
 (a) 9 elements (b) 20 elements
 (c) 12 ~elements (d) none of these

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

6. If $g(x) = 3-x^2$ then $g(x)$ is
 (a) an odd function (b) a periodic function
 (c) an even function (d) none of these

7. If $f(x) = \frac{1-x}{1+x}$ then $f(f(1/x))$ is equal to
 (a) $1/x$ (b) x (c) $-1/x$ (d) none of these

8. $(A' \cup B')$ is equal to _____
 (a) $(A \cap B)'$ (b) $A \cup B'$ (c) $A' \cap B'$ (d) none of these

9. In a group of 20 children, 8 drink tea but not coffee and 13 like tea. The number of children drinking coffee but not tea is
 (a) 6 (b) 7 (c) 1 (d) none of these

10. In a class test of 45 students, 23 students passed in paper first, 15 passed in paper first but not pass in paper second. Using set theory, find the no. of students who passed in both the papers and who passed in paper second but did not pass in the paper first. (Assume that each student passed at least one of the paper)
 (a) 8,22 (b) 8, 20 (c) 10, 8 (d) None of these

11. The domain of $\{(1,7), (2,6)\}$ is
 (a) (1, 6) (b) (7, 6) (c) (1, 2) (d) {6, 7}

12. The function $f(x) = 2^x$ is
 (a) one-one mapping (b) one-many
 (c) many-one (d) none of these
13. For the function $h(x) = 10^{1+x}$ the domain of real values of x where $0 \leq x \leq 9$, the range is
 (a) $10 \leq h(x) \leq 10^{10}$ (b) $0 \leq h(x) \leq 10^{10}$
 (c) $0 < h(x) < 10$ (d) none of these
14. 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:
 (a) 2 (b) 3 (c) 4 (d) 5
15. In a survey of 300 companies, the number of companies using different media – Newspapers (N), Radio (R) and Television (T) are as follows:
 $n(N) = 200, n(R) = 1,00, n(T) = 40,$
 $n(N \cap R) = 50, n(R \cap T) = 20, n(N \cap T) =$
 25 and $n(N \cap R \cap T) = 5$
 Find the numbers of companies using none of these media:
 (a) 20 companies (b) 250 companies
 (c) 30 companies (d) 50 companies
16. If $A = \{p, q, r, s\}$
 $B = \{q, s, t\}$
 $C = \{m, q, n\}$
 Find $C - (A \cup B)$
 (a) $\{m, n\}$ (b) $\{p, q\}$ (c) $\{r, s\}$ (d) $\{p, r\}$
17. If $A = \{x : x^2 - 3x + 2 = 0\},$
 $B = \{x : x^2 + 4x - 12 = 0\},$ then
 $B - A$ is Equal to
 (a) $\{-6\}$ (b) $\{1\}$ (c) $\{1, 2\}$ (d) $\{2, -6\}$
18. Let $A = \{1, 2, 3\},$ then the relation $R = \{(1, 1), (2, 3), (2, 2), (3, 3), (1, 2)\}$ is :
 (a) Symmetric (b) Transitive
 (c) Reflexive (d) Equivalence
19. If $f(x) = \log \left(\frac{1+x}{1-x} \right),$ then
 $f\left(\frac{2x}{1+x^2} \right)$ is equal to :
 (a) $f(x)$ (b) $2f(x)$ (c) $3f(x)$ (d) $-f(x)$

20. If $f(x) = (a - x^n)^{1/n}$, $a > 0$ and 'n' is a positive integer, then $f(f(x)) =$ _____.
(a) x (b) a (c) $x^{1/n}$ (d) $a^{1/n}$
21. If $f(x) = \frac{x^2 - 25}{x - 5}$, then $f(5)$ is
(a) 0 (b) 1 (c) 10 (d) not defined
22. In a class of 50 students, 35 opted for Mathematics and 37 opted for Commerce. The number of such students who opted for both Mathematics and Commerce are :
(a) 13 (b) 15 (c) 22 (d) 28
23. If $A = \{2, 3\}$, $B = \{4, 5\}$, $C = \{5, 6\}$, then $A \times (B \cap C) =$ _____.
(a) $\{(5, 2), (5, 3)\}$ (b) $\{(2, 5), (3, 5)\}$
(c) $\{(2, 4), (3, 5)\}$ (d) $\{(3, 5), (2, 6)\}$
24. If $f(x) = 2x + 2$ and $g(x) = x^2$, then the value of $f \circ g(4)$ is:
(a) 18 (b) 22 (c) 34 (d) 128
25. The inverse function of $f(x) = 100x$ is:
(a) $\frac{x}{100}$
(b) $\frac{1x}{100x}$
(c) $\frac{1}{x}$
(d) None of these

LIMITS & CONTINUITY / DIFFERENTIAL & INTEGRAL

1. If $f(x) = 3$, when $x < 2$
 $f(x) = Kx^2$, when $x \geq 2$ is continuous at $x = 2$, then the value of k is
 (a) $\frac{3}{4}$ (b) $\frac{4}{3}$ (c) $\frac{1}{3}$ (d) none of these

2. $\lim_{x \rightarrow 1} \left(\frac{1}{x^2+x-2} - \frac{x}{x^3-1} \right)$ is evaluated to be
 (a) $\frac{1}{9}$ (b) 9 (c) $-\frac{1}{9}$ (d) none of these

3. If $f(x) = x$ when $x < 1$
 $= 1 + x$, when $x > 1$
 $= \frac{3}{2}$, when $x = 1$
 Then the function $f(x)$ is
 (a) Continuous at $x = \frac{1}{2}$ (b) Discontinuous at $x = \frac{1}{2}$
 (c) undefined at $x = \frac{1}{2}$ (d) none of these

4. If $f(x) = ax^2 + bx + c$ then
 $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ is :
 (a) $ax + 2b$ (b) $2ax + b$ (c) $2ax - b$ (d) None

5. $\lim_{x \rightarrow 1} \frac{e^{-x} - e^{-1}}{x-1}$ is equal to :
 (a) e (b) $\frac{1}{e}$ (c) $\frac{1}{e}$ (d) 0

6. $f(x) = \begin{cases} 5 - \frac{x^2}{5}, & 0 < x < 5 \\ 0 & x = 5 \\ 5 - \frac{5^3}{x^2} & x > 5 \end{cases}$
 Then $f(x)$ is :
 (a) Continuous at $x = 5$ (b) Discontinuous at $x = 5$
 (c) Undefined at $x = 5$ (d) None of the above

7. Value of $\lim_{x \rightarrow 0} \frac{\sqrt{4+3x} - \sqrt{4-3x}}{x}$ is
 (a) $\frac{3}{4}$ (b) $\frac{5}{2}$ (c) 0 (d) $\frac{3}{2}$

8. If $\lim_{y \rightarrow 2} \frac{(x^2-4)}{(x^2+2x-8)} = k,$

Find $\lim_{x \rightarrow k} (3x + 4)$

- (a) 5 (b) 6 (c) 8 (d) None of the above.

9. If $f(x) = \frac{x-|x|}{x}, x \neq 0$ and $f(0) = 2,$

then $f(x)$ is

- (a) undefined (b) continuous at $x = 0$
 (c) continuous at $x = 2$ (d) not continuous.

10. $\lim_{x \rightarrow 0} \frac{\log_e(1+x)}{e^{2x}-1}$ is equal to :

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

11. If $f(x) = x^2 - 6x + 8,$ then $f'(5) - f'(8) =$

- (a) $f'(2)$ (b) $3f'(2)$ (c) $2f'(2)$ (d) none of these

12. If $x^3 + y^3 - 3axy = 0,$ then: $\frac{dy}{dx} =$

- (a) $\frac{ay - x^2}{y^2 + ax}$ (b) $\frac{ay - x^2}{y^2 - ax}$ (c) $\frac{ay + x^2}{y^2 + ax}$ (d) none of these

13. The derivative of $\log \left[e^x \left(\frac{x-2}{x+2} \right)^{3/4} \right]$ w.r.t. x is

- (a) $\frac{x^2 + 1}{x^2 + 4}$ (b) $\frac{x^2 - 1}{x^2 - 4}$ (c) $\frac{1}{x^2 - 4}$ (d) none of these

14. The slope of the tangent to the curve $y = x^2 - x,$ at the point where the line $y = 2$ cuts the curve in the first quadrant is

- (a) -2 (b) 2 (c) -3 (d) 3

15. $\int e^x(x^4 - 12x^2) dx =$

- (a) $e^x \cdot x^4 + c$ (b) $e^x \cdot (x^4 - 4x^3) + c$
 (c) $e^x \cdot x^2 + c$ (d) $e^x(x^4 + 4x^3) + c$

16. $\int_{-2}^2 |x| dx =$
 (a) 0 (b) 2 (c) -4 (d) 4

17. $\int \frac{1}{\sqrt{x} + x} dx =$
 (a) $\log\left(\frac{\sqrt{x}}{1 + \sqrt{x}}\right)$ (b) $\log(1 + \sqrt{x}) + c$
 (c) $2\log(1 + \sqrt{x})$ (d) none of these

18. The derivative of $x^2 \log x$ is
 (a) $1 + 2 \log x$ (b) $2 \log x$
 (c) $x(1 + 2 \log x)$ (d) None of these

19. if $x = y \log(xy)$, then $\frac{dy}{dx}$ is equal to :
 (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) $\frac{x - y}{x(\log x + \log y)}$

20. If $y = \sqrt{x}^{\sqrt{x}}$ then $\frac{dy}{dx}$ is equal to :
 (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

21. The slope of the tangent to the curve $y = \sqrt{4 - x^2}$ at the point, where the ordinate and the abscissa are equal, is :
 (a) -1 (b) 1 (c) 0 (d) None
22. $X = 2t + 5$ and $y = t^2 - 5$, then $\frac{dy}{dx} = ?$
 (a) t (b) -1/t (c) 1/t (d) 0
23. $\int \frac{6x+4}{(x-2)(x-3)} dx$ is equal to
 (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) $22 \log (x-3) + 16 \log (x-2)$
24. $\frac{d}{dx} [2^{\log_x x}] =$ _____
 (a) 1 (b) 0 (c) $\frac{1}{2}$ (d) $2^x \log_2 x$
25. If $g(x) = -\sqrt{25 - x^2}$, then
 $\lim_{x \rightarrow 1} \frac{g(x) - g(1)}{x - 1}$ is equal to _____.
 (a) 0 (b) $1/\sqrt{24}$ (c) $\sqrt{24}$ (d) None of these.
26. If $y = \log_y x$, then $\frac{dy}{dx}$ is equal to :
 (a) $\frac{1}{x + \log y}$ (b) $\frac{1}{x + x \log y}$
 (c) $\frac{1}{1 + x \log y}$ (d) $\frac{1}{y + \log x}$
27. If $y = 1 + \frac{x}{|1|} + \frac{x^2}{|2|} + \dots + \frac{x^n}{|n|}$
 +, then –
 The value of $\frac{dy}{dx} - y =$ _____
 (a) 1 (b) 0 (c) 2 (d) -1
28. The value of $\int_0^{1/2} \frac{dx}{\sqrt{3-2x}}$ is
 (a) 1 (b) $1 - \sqrt{3/2}$
 (c) $\sqrt{3} - \sqrt{2}$ (d) $\sqrt{2} - \sqrt{3}$

29. The slope of the tangent to the curve $y = \frac{x-1}{x+2}$ at $x = 2$ is :

- (a) $\frac{3}{16}$
- (b) $-\frac{3}{16}$
- (c) $\frac{1}{4}$
- (b) $-\frac{1}{4}$

30. $\int_0^{2\sqrt{2}} \frac{3\sqrt{x}}{\sqrt{x}} dx$ is equal to _____

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

31. $\int \frac{x}{(x^2+1)(x^2+2)} dx$ is equal to _____

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

STATISTICS

INTRODUCTION OF STATISTICS

1. Following is not attribute:
(a) Driving Habit (b) Weight
(c) Honesty in a person (d) Nationality of a student
2. A representative value of the class interval for the calculation of mean, SD, MDetc is:
(a) Class limit (b) Income of a person
(c) Class boundaries (d) class Mark
3. In which curve the frequency is maximum at the extremes and minimum at the central part:
(a) Bell shaped (b) J Shaped (c) U Shaped (d) Mixed
4. (Class frequency)/(Width of the class) is defined as
(a) Frequency density (b) Frequency distribution
(c) both (d) none
5. An area diagram is
(a) Histogram (b) Frequency Polygon (c) Ogive (d) none
6. An approximate idea of the shape of frequency curve is given by
(a) Ogive (b) Frequency Polygon
(c) both (d) none
7. The curve obtained by joining the points, whose x- coordinates are the upper limits of the class-intervals and y coordinates are corresponding cumulative frequencies is called
(a) Ogive (b) Histogram
(c) Frequency Polygon (d) Frequency Curve
8. In Histogram, the classes are taken
(a) overlapping (b) non-overlapping (c) both (d) none
9. Relative frequency for a particular class lies between :
(a) 0 and 1 (b) 0 and 1, both inclusive
(c) -1 and 0 (d) -1 and 1
10. When the width of all classes is same, frequency polygon has not the same area as the Histogram:
(a) False (b) True (c) Both (d) None
11. The graphical representation of a cumulative frequency distribution is called:
(a) Histogram (b) Ogive (c) Both (d) None

12. Circular diagrams are always :
(a) One – dimensional (b) Two – dimensional
(c) Three – dimensional (d) Cartograms
13. Which of the following is not a two – dimensional figure?
(a) Line Diagram (b) Pie Diagram
(c) Square Diagram (d) Rectangle Diagram
14. When the two curves Ogive intersect, the point of intersection provides:
(a) First Quartile (b) Second Quartile
(c) Third Quartile (d) Mode.
15. What is a exclusive series ?
(a) In which both upper and lower limit are not included in class frequency:
(b) In which lower limit is not included in class frequency.
(c) In which upper limit is not included in class frequency.
(d) None of the above
16. Difference between the maximum and minimum value of given data is called
(a) Width (b) Size (c) Range (d) Class
17. There were 200 employees in an office in which 150 were married. Total male employees were 160 out of which 120 were married. What was the number of female unmarried employees?
(a) 30 (b) 10 (c) 40 (d) 50
18. The less than Ogive” is a :
(a) U-Shaped Curve (b) J-Shaped Curve
(c) S-Shaped (d) Bell Shaped Curve
19. Data collected on religion from the census reports are :
(a) Primary data (b) Secondary data
(c) Sample data (d) (a) or (b)
20. Profits made by XYZ Bank in different years refer to:
(a) An attribute (b) A discrete variable
(c) A continuous variable (d) None of these.
21. Mean of the distribution is calculated graphically by _____
(a) Histogram (b) Ogive (c) Both (d) None of these
22. A statistical measure computed from sample observation is known as _____
(a) Parameter (b) Attribute (c) Statistics (d) None of these

MEASURES OF CENTRAL TENDENCY & DISPERSION

1. G.M. is useful in construction of index number
(A) True (B) False (C) Both (D) None of these.
2. When the distribution is symmetrical, mean, median and mode
(A) Coincide (B) Do not coincide (C) Both (D) None of these.
3. For open-end classification, which of the following is the best measure of central tendency
(A) A.M. (B) G.M. (C) Median (D) Mode.
4. For grouped frequency distribution is equal to the value corresponding to cumulative frequency $kN/10$
(A) median (B) kth percentile
(C) kthdecile (D) none of these
5. If $y = 3x - 100$ and $\bar{x} = 50$, then the value of \bar{y} is :
(A) 60 (B) 30 (C) 100 (D) 50.
6. What is the H.M. of $1, \frac{1}{2}, \frac{1}{3}, \dots, \frac{1}{n}$?
(A) n (B) $2n$ (C) $\frac{2}{(n+1)}$ (D) $\frac{n(n+1)}{2}$
7. The weighted mean of first n natural numbers, whose weights are proportional to their corresponding numbers is :
(A) $\frac{n+1}{2}$ (B) $\frac{(n+1)(2n+1)}{6}$
(C) $\frac{n(n+1)}{2}$ (D) $\frac{2n+1}{3}$
8. Mean of the first n terms of the A.P. $a + (a + d) + (a + 2d) + \dots$ is
(A) $a + \frac{nd}{2}$ (B) $a + \frac{(n-1)d}{2}$ (C) $a + (n-1)d$ (D) $a + nd$
9. A boy goes to school from his home at a speed of x km/hr and comes back at a speed of y k/hr, then the average speed of the boy is given by :
(A) $\frac{x+y}{2}$ km/hr (B) \sqrt{xy} km/hr
(C) $\frac{2xy}{x+y}$ km/hr (D) Any of these

10. The mean of the series x_1, x_2, \dots, x_n is \bar{x} . If x_2 is replaced by λ , then the new mean is
 (A) $\bar{X} - x_2 + \lambda$ (B) $(\bar{X} - x_2 - \lambda)/n$
 (C) $[(n - 1)\bar{X} + \lambda]/n$ (D) $[n\bar{X} - x_2 + \lambda]/n$
11. The A.M. of the series $a, ar, ar^2, \dots, ar^{(n-1)}$ is :
 (A) $\frac{a(r^n - 1)}{n(r - 1)}$ (B) $\frac{a(1 - r^n)}{1 - r}$ (C) $\frac{a(1 - r^n)}{n(r - 1)}$ (D) $\frac{na(1 - r^n)}{1 - r}$
12. _____ is the most stable of all the measures of central tendency.
 (a) G.M (b) H.M (c) A.M (d) none.
13. In a symmetrical distribution when the 3rd quartile plus 1st quartile is halved, the value would give
 (a) mean (b) mode (c) median (d) none
14. Semi Inter Quartile Range means
 (a) Mean Deviation (b) Quartile deviation
 (c) Range (d) Standard deviation
15. Mean Deviation from _____ is the least.
 (a) Mode (b) Arithmetic Mean (c) Mean (d) Median
16. Following Statements are true Group 1: $\bar{x}50, \bar{\sigma}5$
 Group 2: $\bar{x}60, \bar{\sigma}5$
 (a) Both show same variation
 (b) Group 1 shows more variation
 (c) Group 2 shows more variation
 (d) Data is insufficient
17. If x and y are two related variables such that $0.5x + 0.4y + 2 = 0$ then find the relation between R_x (range of x) & R_y (range of y)
 (a) $5R_x = 4R_y$ (b) $4R_x = 5R_y$
 (c) $0.4R_x = 0.5R_y$ (d) $R_x = R_y$
18. If $v = \frac{y - 5}{2}$, $\bar{v} = 10$ and $\sigma_v = 2$ then values of \bar{y} and σ_y are
 (a) 4 and 25 (b) 2.5 and 1 (c) 25 and 4 (d) 1 and 2.5
19. A student obtained the mean and standard deviation of 100 observations as 40 and 5.1 respectively. It was later discovered that he had wrongly copied down an observation as 50 instead of 40. The correct standard deviation is :
 (a) 5 (b) 6 (c) 3 (d) 7

20. For a moderately skewed distribution, quartile deviation and the standard deviation are related by :
- (a) $S.D = \frac{2}{3} Q.D$ (b) $S.D = \frac{3}{4} Q.D$
 (c) $S.D = \frac{4}{3} Q.D$ (d) $S.D = \frac{3}{2} Q.D$
21. The sum of the squares of deviations of a set of observations has the smallest value, when the deviations are taken from their:
- (a) A.M. (b) H.M. (c) G.M. (d) None
22. If the mean and S.D. of x are a and b respectively, then the S.D of $\frac{x-a}{b}$ is :
- (a) a/b (b) -1 (c) 1 (d) ab
23. If there are two groups with 75 and 65 as harmonic means and containing 15 and 13 observations then the combined H.M. is given by:
- (a) 70 (b) 80 (c) 70.35 (d) 69.48
24. The quartile deviation for the data is :
- | | | | | | |
|----|----|---|---|---|---|
| x: | -2 | 3 | 4 | 5 | 6 |
| f: | 3 | 4 | 8 | 4 | 1 |
- (a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) 1 (d) 0
25. Inter Quartile Range is _____ of Quartile Deviation.
- (a) Half (b) Double (c) Triple (d) Equal
26. The average age of a group of 10 students was 20 years. The average age increase by two years when two new students joined the group. What is the average age of two new students who joined the group?
- (a) 22 years (b) 30 years (c) 44 years (d) 32 years
27. Geometric Mean of three observations 40, 50 and X is 10. The value of X is
- (a) 2 (b) 4 (c) $\frac{1}{2}$ (d) None of the above.
28. If Standard deviation of x is σ , then Standard deviation of $y = ax + b$, where a, b and c ($c \neq 0$) are arbitrary constants, will be
- (a) σ (b) $\frac{a\sigma+b}{c}$
 (c) $\frac{a}{c} \sigma$ (d) $\left| \frac{a}{c} \right| \sigma$
29. If sum of squares of the values = - 3390, N =30 and standard deviation =7, find out the mean.
- (a) -113 (b) 210 (c) 8 (d) - None of these

30. The quartile deviation is :
- (a) $\frac{2}{3}$ of S.D. (b) $\frac{4}{5}$ of S.D.
(c) $\frac{5}{6}$ of S.D. (d) None of these
31. The harmonic mean H of two numbers is 4 and their arithmetic mean A and the geometric mean G satisfy the equation $2A + G^2 = 27$, then the numbers are
- (a) (1, 3) (b) (9, 5) (c) (6, 3) (d) (12, 7)
32. If Variance = 148.6 and mean = 40, then the coefficient of variation is :
- (a) 37.15 (b) 30.48
(c) 33.75 (d) None of the above
33. In a class of 50 students, 10 have failed and their average marks in 2.5. The total marks secured by the entire class were 281. The average marks who have passes is:
- (a) 5.32 (b) 7.25 (c) 6.40 (d) None of the above.
34. If the difference between mean and mode is 63, then the difference between mean and median will be :
- (a) 63 (b) 31.5 (c) 21 (d) None of these
35. Measures of dispersion are called measure of _____ order.
- (a) 1st order (b) 2nd order (c) 3rd order (d) None

CORRELATION AND REGRESSION

1. Number of claims and profits of an insurance company
(a) Positive (b) Negative (c) Zero (d) None of these
2. Covariance is
(a) Absolute measure (b) Relative measure
(c) Both (a) and (b) (d) Either (a) or (b)
3. r' is affected by shifted of origin
(a) True (b) False (c) Partly False (d) None of these
4. When two regression lines are coincident then
(a) $r = \pm 1$ (b) $r = 1$ (c) $r = -1$ (d) None of these
5. The residue in case of regression analysis can be
(a) Positive (b) Negative (c) zero (d) All of these
6. $r = -0.4$ the value of unexplained variation is
(a) -0.4 (b) 0.16 (c) 0.84 (d) 0.4
7. In rank correlation if $\sum d^2 = 0$ then the 2 judges
(a) Completely agree (b) Completely disagree
(c) Partly agree (d) None
8. Following data are available in respect of two bivariate distributions :
 $\Sigma(x - \bar{x})(y - \bar{y}) = 122$, $\Sigma(x - \bar{x})^2 = 136$, $\Sigma(y - \bar{y})^2 = 138$.
Find r .
(a) $r = 0.8095$ (b) $r = 0.587$
(c) $r = 0.0587$ (d) $r = 0.8905$
9. The sum of squares of differences between rank is found to be 60. The Spearman's coefficient of rank correlation is 0.5. What is the number of pairs in the data?
(a) $n = 9$ (b) $n = 9$ (c) $n = 0.9$ (d) $n = 0.09$
10. Regression equations for certain bivariate data are found to be
 $45y = 14x + 490$ and $18y = 35x - 2744$, find \bar{x} and \bar{y}
(a) $\bar{x} = 100$, $\bar{y} = 42$ (b) $\bar{x} = 42$, $\bar{y} = 100$
(c) $\bar{x} = 48$, $\bar{y} = 100$ (d) $\bar{x} = 100$, $\bar{y} = 30$

11. The regression lines are $3x + 2y = 6$ and $5x - 3y = 44$. Find the correlation co-efficient between x and y.
 (a) $r = 3/4$ (b) $r = 4/3$ (c) $r = 1/3$ (d) None of these
12. Take 200 and 150 respectively as the assumed mean for X and Y series of 11 values, then $dx = X - 200$, $dy = Y - 150$, $\sum dx = 13$, $\sum dx^2 = 2667$, $\sum dy = 42$, $\sum dy^2 = 6964$, $\sum dx dy = 3943$. The value of r is :
 (a) 0.77 (b) 0.98 (c) 0.92 (d) 0.82
13. For some bivariate data, the following results were obtained for the two variables x and y :
 $\bar{x} = 53.2$, $\bar{y} = 27.9$, $b_{yx} = -1.5$, $b_{xy} = -0.2$
 The most probable value of y when x = 60 is
 (a) 15.6 (b) 13.4 (c) 19.7 (d) 17.7
14. If the covariance between two variables is 20 and the variance of one of the variables is 16, what would be the variance of the other variable?
 (a) More than 10 (b) More than 100
 (c) More than 1.25 (d) Less than 10
15. The lines of regression are as follows : $5x - 145 = -10y$; $14y - 208 = -8x$.
 The mean values (x, y) is :
 (a) (12, 5) (b) (5, 7) (c) (7, 12) (d) (5, 12)
16. Given the following data :
 $b_{xy} = 0.4$ & $b_{yx} = 1.6$. The coefficient of determination is :
 (a) 0.74 (b) 0.42 (c) 0.58 (d) 0.64
17. The method applied for deriving regression equations is known as :
 (a) Concurrent deviation (b) Product moment
 (c) Least squares (d) Normal equation
18. If the correlation coefficient between two variables is 1, then the two lines of regressions are:
 (a) Parallel (b) At right angles
 (c) Coincident (d) None of these
19. If coefficient of correlation between x and y is 0.46. Find coefficient of correlation between x and $\frac{y}{2}$
 (a) 0.46 (b) 0.92 (c) -0.46 (d) -0.92
20. Ranks of two _____ characteristics by two judges are in reverse order then find the value of Spearman rank correlation co-efficient.
 (a) -1 (b) 0 (c) 1 (d) 0.75

21. If the rank correlation co-efficient between marks in Management and Mathematics for a group of students is 0.6 and the sum of the squares of the difference in ranks is 66. Then what is the number of students in the group?
 (a) 9 (b) 10 (c) 11 (d) 12
22. If the two lines of regression are $x + 2y - 5 = 0$ and $2x + 3y - 8 = 0$ The regression line of y on x is
 (a) $x + 2y - 5 = 0$ (b) $2x + 3y - 8 = 0$
 (c) Any of the two line (d) None of the two lines.
23. The ranks of five participants given by two judges are
- | | | Participants | | | | |
|-------|---|--------------|---|---|---|---|
| | | A | B | C | D | E |
| Judge | 1 | 1 | 2 | 3 | 4 | 5 |
| Judge | 2 | 5 | 4 | 3 | 2 | 1 |
- Rank correlation coefficient between ranks will be
 (a) 1 (b) 0 (c) -1 (d) $\frac{1}{2}$
24. Give : $\bar{x} = 16, \sigma_x = 4.8$
 $\bar{y} = 20, \sigma_y = 9.6$
 The coefficient of correlation between x and y is 0.6. What will be the regression coefficient of 'x' on 'y'?
 (a) 0.03 (b) 0.3 (c) 0.2 (d) 0.05
25. If \bar{x}, \bar{y} denote the arithmetic means, σ_x, σ_y denotes the standard deviations. b_{xy}, b_{yx} denote the regression coefficients of the variables 'x' and 'y' respectively, the point of intersection of regression lines x on y & y on x is _____.
 (a) (\bar{x}, \bar{y}) (b) (σ_x, σ_y) (c) (b_{xy}, b_{yx}) (d) (σ_x^2, σ_y^2)
26. If 'r' be the Karl's Pearson's coefficient of correlation in a bivariate distribution then the two regression lines are at right angle if :
 (a) $r = \pm 1$ (b) $r = 0$
 (c) $r = \pm$ any finite value whose numerical value is less than 1
 (d) None of these
27. Two variables x and y are related according to $4x + 3y = 7$. Then x and y are:
 (a) Positively correlated. (b) Negatively correlated.
 (c) Correlation is zero (d) None of these
28. When each individual gets the exactly opposite rank by the two Judges, then the rank correlation will be _____.
 (a) 0 (b) -1 (c) +1 (d) $\frac{1}{2}$
29. The equation of two lines of regression for 'x' and 'y' are $5x = 22 + y$ and $64x = 24 + 45y$ then the value of regression coefficient of 'y' on 'x' will be _____.
 (a) 5 (b) $\frac{1}{5}$ (c) $\frac{64}{45}$ (d) $\frac{45}{64}$
30. When the correlation coefficient r is equal to +1, all the points in a scatter diagram would be
 (a) On a straight line directed from upper left to lower right
 (b) On a straight line directed from lower left to upper right
 (c) On a straight line
 (d) Both (a) and (b)

INDEX NUMBER

1. If the index number of prices at a place in 1994 is 250 with 1984 as base year, then the prices have increased on average by
 (a) 250% (b) 150% (c) 350% (d) None of these.
2. With the base year 1960 the C. L. I. in 1972 stood at 250. X was getting a monthly Salary of ₹ 500 in 1960 and ₹ 750 in 1972. In 1972 to maintain his standard of living in 1960 x has to receive as extra allowances of
 (a) ₹ 600/- (b) ₹ 500/- (c) ₹ 300/- (d) none of these.
3. The value index is equal to :
 (a) The total sum of the values of a given year multiplied by the sum of the values of the base year.
 (b) The total sum of the values of a given year Divided by the sum of the values of the base year.
 (c) The total sum of the values of a given year plus by the sum of the values of the base year.
 (d) None of these.
4. Circular test, an index constructed for the year 'x' on the base year 'y' and for the year 'y' on the base year 'z' should yield the same result as an index constructed for 'x' on base year 'z' i.e. $I_{01} \times I_{12} \times I_{20}$ equal is :
 (a) 3 (b) 2 (c) 1 (d) None of these.
5. For combining two index number series with different base year the concept of _____ is used.
 (a) Shifting (b) Splicing
 (c) Deflation (d) Merging
6. The cost of entertainment increased by 60%, the person who maintained his former lifestyle experienced a 5% increase in his cost of living. Before the change in price, the percentage of his cost of living due to entertainment is
 (a) 10 (b) 8.333 (c) 12 (d) 15
7. Chain index no. of first year is taken as
 (a) $\frac{\text{Link relative of current year} \times \text{Chain index of previous year}}{100}$
 (b) $\frac{\text{Link relative of previous year} \times \text{Chain index of current year}}{100}$

- (c) $\frac{\text{Link relative of current year}}{\text{Chain index of previous year}} \times 100$
 (d) None

8. Shifted Price Index =

- (a) $\frac{\text{Original price index of the current year}}{\text{Price index of the new base year}} \times 100$
 (b) $\frac{\text{Original price index of the new base year}}{\text{Price index of the year}} \times 100$
 (c) $\frac{\text{Original price index of the year}}{\text{Price index of the old base year}} \times 100$
 (d) None

9. The Circular Test is known as :

- (a) $P_{01} \times P_{12} \times P_{20} = 1$ (b) $P_{12} \times P_{01} \times P_{20} = 1$
 (c) $P_{20} \times P_{12} \times P_{01} = 1$ (d) *None of these*

10. Fisher's Index is based on :-

- (a) Arithmetic Mean of Laspeyre and Paasche
 (b) Geometric Mean of Laspeyre and Paasche
 (c) Harmonic Mean of Laspeyre and Paasche
 (d) Median of Laspeyre and Paasche.

11. Time reversal & factor reversal are :

- (a) Quantity Index (b) Ideal Index
 (c) Price Index (d) Test of Consistency

12. Consumer price index is commonly known as

- (a) Chain Based index (b) Ideal index
 (c) Wholesale price index (d) Fixed Base index.

13. The index number of prices at a place in the year 2008 is 225 with 2004 as the base year then there is :

- (a) average 125% increase in prices.
 (b) average 225% increase in prices.
 (c) average 100% increase in prices.
 (d) None of the above.

14. If $\sum P_0 Q_0 = 116$, $\sum P_0 Q_1 = 140$
 $\sum P_1 Q_0 = 97$, $\sum P_1 Q_1 = 117$

- The Fisher's ideal index number is _____.
- (a) 184 (b) 83.59 (c) 119.66 (d) 120
15. If Fisher's index = 150 and Paasche's Index = 144, then Laspeyre's index is _____.
- (a) 147 (b) 156.25 (c) 104.17 (d) 138
16. An index time series is a list of _____ number of two or more period of time, where each index number employs the same base y can
- (a) Index (b) Absolute (c) Relative (d) Sample
17. Circular test is satisfied by which index number?
- (a) Laspeyre's (b) Marshall - Edgeworth
(c) Fisher's (d) None of the above.
18. Fisher's Index Number is _____ of Laspeyre's and Paasche's Index Number.
- (a) A.M (b) G.M (c) H.M (d) None of the above.
19. If with an increase of 10% in prices, the rise in wages is 20% then the real wage has increased by
- (a) 20% (b) 10%
(c) Less than 10% (d) More than 10%
20. If $\sum P_0 Q_0 = 1360$, $\sum P_n Q_0 = 1900$,
 $\sum P_0 Q_n = 1344$, $\sum P_n Q_n = 1880$, then the Laspeyre's Index Number is
- (a) 0.71 (b) 1.39 (c) 1.76 (d) none.

PROBABILITY & RANDOM VARIABLE – EXPECTED VALUE

1. The probability of getting a doublet when 2 dice are thrown is:
(a) $1/3$ (b) $1/6$ (c) $5/32$ (d) $1/5$
2. Two letters are drawn from the letters of the word HOME. Find the probability that one of the letters chosen is H.
(a) $1/6$ (b) $2/4$ (c) $1/3$ (d) $4/6$
3. The letters of the word DANGER are arranged in all possible ways and a word is drawn at random. What is the probability that the relative positions of the vowels and consonants are unaltered?
(a) $1/18$ (b) $1/19$ (c) $1/15$ (d) $1/25$
4. Following are the wages of 8 workers in Rs: 50, 62, 40, 70, 45, 56, 32, 45. If one of the workers is selected at random, what is the probability that his wage would be lower than the average wage?
(a) 0.500 (b) 0.625 (c) 0.375 (d) 0.450
5. Two persons A, B have to speak at a function with 10 persons. If the person speak at random, what is the probability that A speaks after B?
(a) $\frac{1}{2}$ (b) $1/3$ (c) $3/8$ (d) $5/6$
6. A number is selected from the first 25 natural numbers. What is the probability that it would be divisible by 4 or 7?
(a) $8/25$ (b) $9/25$ (c) $16/25$ (d) $1/25$
7. There are two boxes containing 5 white, 6 blue balls and 3 white, 7 blue balls respectively. One of the boxes is selected at random and a ball is drawn from it. What is the probability that the ball is blue?
(a) $115/227$ (b) $137/220$ (c) $127/250$ (d) $83/250$
8. Mr. A applied for 3 separate posts. For the first post, there are 3 candidates, for the second, there are 5 candidates and for the third, there are ten candidates. What is the probability that Mr. A would be selected?
(a) $12/25$ (b) $13/25$ (c) $7/12$ (d) $9/25$
9. If $P(A) = 1/5$, $P(B) = \frac{1}{2}$ and A and B are mutually exclusive events, then what is the value of $P(A/B)$?
(a) $7/10$ (b) $1/5$ (c) $3/10$ (d) None of the above

10. If $P(A \cap B) = 1/4$, $P(A' \cap B') = 1/5$ and $P(A) = P(B) = X$. Then what can be the value of X ?
 (a) $11/40$ (b) $20/40$ (c) $21/40$ (d) $19/40$
11. Following table gives the distribution of wages of 100 workers:
- | Wages (Rs) | No. of workers |
|------------|----------------|
| 120 – 140 | 09 |
| 140 – 160 | 20 |
| 160 – 180 | 00 |
| 180 – 200 | 10 |
| 200 – 220 | 08 |
| 220 – 240 | 35 |
| 240 – 260 | 18 |
- A worker is selected at random. What is the probability that his wage is under Rs. 140?
 (a) $20/100$ (b) $29/100$ (c) $9/100$ (d) None of the above
12. In discrete case the probability of the entire space is:
 (a) 1 (b) 0 (c) -1 (d) None of the above
13. $f(x)$, the probability mass function of a random variable x satisfies:
 (a) $f(x) > 0$ (b) $\sum f(x) = 1$
 (c) $f(x) \geq 0$ and $\sum f(x) = 1$ (d) Both a) and b) above
14. Let x and y are random variables having variance of 2 and V respectively. If the variance of $z = 3y - x$ is 29, what can be the value of V ?
 (a) 3 (b) 9 (c) 18 (d) 27
15. For what value of 'a' will the function $f(x) = ax$, $x = 1, 2, 3, \dots, n$ be the probability mass function of a discrete random variable x ?
 (a) $1 / n(n + 1)$ (b) $3 / n(n + 1)$
 (c) $n / n(n + 1)$ (d) $2 / n(n + 1)$
16. There are 5 white and 3 black balls in a box. 3 balls are taken at random from the box. What is the expected number of black balls?
 (a) $9/8$ (b) $10/8$ (c) $11/8$ (d) None of the above
17. A number is selected at random from a set containing the first 100 natural numbers and another number is selected at random from another set containing the first 200 natural numbers. What is the expected value of the product?
 (a) 5000.25 (b) 5075.25 (c) 1050.75 (d) 5750.75

18. The probability distribution of random variable X is given:

X =	1	2	3	4
P(X = X)	2k	4k	3k	k

 What is the value of k?
 (a) 0.4 (b) 0.3 (c) 0.2 (d) 0.1
19. Three coins whose faces are marked 1, 2 are tossed. What is the expectation of the total value of number on their faces?
 (a) 2.5 (b) 3.5 (c) 4.5 (d) 5.5
20. A letter is taken out at random from the word RANGE and another is taken out from the word PAGE. The probability that they are the same letters is :
 (a) 1/20 (b) 3/20 (c) 3/5 (d) 3/4
21. A card is drawn from a well shuffled pack of 52 cards. Let E_1 "a king or a queen is drawn" & E_2 "a queen or a jack is drawn", then :
 (a) E_1 and E_2 are not independent
 (b) E_1 and E_2 are mutually exclusive
 (c) E_1 and E_2 are independent
 (d) None of these
22. In a non – leap year, the probability of getting 53 Sundays or 53 Tuesdays or 53 Thursdays is:
 (a) $\frac{4}{7}$ (b) $\frac{2}{7}$ (c) $\frac{3}{7}$ (d) $\frac{1}{7}$
23. The probability of getting qualified in IIT – JEE and AIEEE by a student are respectively $\frac{1}{5}$ and $\frac{3}{5}$. The probability that the student gets qualified for one of the these tests is :
 (a) $\frac{17}{25}$ (b) $\frac{22}{25}$ (c) $\frac{8}{25}$ (d) $\frac{3}{25}$
24. Amitabh plays a game of tossing a dice.. If the number less than 3 appears, he is getting ₹ a, otherwise he has to pay ₹10. If the game is fair, find a:
 (a) 25 (b) 20 (c) 22 (d) 18
25. If $P(A) = p$ and $P(B) = q$, then :
 (a) $P(A/B) \leq q/p$ (b) $P(A/B) \geq q/p$
 (c) $P(A/B) \leq q/p$ (d) $P(A/B) \geq q/p$
26. A random variable X has the following probability distribution:

X :	-2	3	1
P (X=x) :	1/3	1/2	1/6

 Find $E(x^2)$ and $E(2x + 5)$.
 (a) 6 and 7 respectively (b) 5 and 7 respectively
 (b) 7 and 5 respectively (b) 7 and 6 respectively

27. $E(XY)$ is also known as:
(a) $E(X) + E(Y)$ (b) $E(X)E(Y)$
(c) $E(X) - E(Y)$ (d) $E(X) \div E(Y)$
28. $E(13x + 9) =$ _____.
(a) $13x$ (b) $13E(x)$ (c) $13E(x) + 9$ (d) 9
29. A bag contains 3 white and 5 black balls and second bag contains 4 white and 2 black balls. If one ball is taken from each bag, the probability that both the balls are white is _____.
(a) $1/3$ (b) $1/4$ (c) $1/2$ (d) None of these
30. The odds in favour of A solving a problem is 5:7 and odds against B solving the same problem is 9:6. What is the probability that if both of them try, the problem will be solved?
(a) $117/180$ (b) $181/200$ (c) $147/180$ (d) $119/180$
31. Let A and B two events in a sample space S such that $P(A) = \frac{1}{2}$, $P(\bar{B}) = \frac{5}{8}$, $P(A \cup B) = \frac{3}{4}$; Find $P(\bar{A} \cup \bar{B})$
(a) $3/4$ (b) $1/4$ (c) $3/16$ (d) None of these.
32. Arun & Tarun appear for an interview for two vacancies: The probability of Arun's selection is $1/3$ and that of Tarun's selection is $1/5$ Find the probability that only one of them will be selected:
(a) $2/5$ (b) $4/5$ (c) $6/5$ (d) $8/5$

BINOMIAL/ POISSON / NORMAL DISTRIBUTION

1. When $p = 0.1$, the binomial distribution is skewed to:
(a) Right (b) Left (c) Both a) & b) (d) Neither a) nor b)
2. The mean and variance of a discrete random variable X are 6 and 2 respectively. Assuming X follows binomial distribution, find $P(5 \leq X \leq 7)$.
(a) 0.271 (b) 0.712 (c) 0.721 (d) 0.217
3. For a binomial distribution, $2p + 3q = 8/3$, then the type of skewness in the distribution is:
(a) Positive (b) Negative (c) Zero (d) None of the above
4. 2 cards are drawn successively with replacement. The mean of number of Aces is:
(a) $1/13$ (b) $2/13$ (c) $4/13$ (d) $3/13$
5. Find the probability of guessing correctly at least 6 of the 10 answers in a True-False objective test.
(a) $139/512$ (b) $193/512$
(c) $391/512$ (d) None of the above
6. Find the probability that in a family of 4 children, there will be at least one boy.
(a) $1/16$ (b) $15/16$ (c) $2/16$ (d) $14/16$
7. X follow binomial distribution $(4, 1/3)$ and Y with parameters $(6, 1/3)$. What is $P(X+Y \geq 1)$?
(a) 0.02 (b) 1 (c) 0.98 (d) None of the above
8. 90% ships safely reach to the destination. If 400 ships enters the journey, find the mean and variance of number of ships safely reaching the destination.
(a) 360, 6 (b) 360, 36 (c) 400, 40 (d) 225, 36
10. The number of methods of fitting the normal curve is :
(a) 4 (b) 3 (c) 2 (d) 1
11. A sample of 100 dry battery cells tested to find the length of life produced the following results : $\bar{x} = 12$ hours. $\sigma = 3$ hours. What percentage of battery cells are expected to have life less than 6 hours?
[Are under the normal curve from $z = 0$ to $z = 2$ is 0.4772]
(a) 2.28% (b) 2.56% (c) 4.56% (d) 1.93%
12. In a poisson distribution $P(x = 0) = P(X = 2)$. Find $E(x)$.
(a) $\sqrt{2}$ (b) 2 (c) -1 (d) 0

13. For a Binomial distribution $B(6, p)$, $P(x=2) = 9 P(x=4)$, then P is
 (a) $1/2$ (b) $1/3$ (c) $10/13$ (d) $1/4$
14. In a Binomial Distribution, if mean is k -times the variance, then the value of ' k ' will be _____.
 (a) p
 (b) $\frac{1}{p}$
 (c) $1 - p$
 (d) $\frac{1}{1-p}$
15. If $X \sim N(3, 6)$ and $Y \sim N(5, 8)$ are two independent Normal variate with their standard parameters of distribution, then if $(x + y) \sim N(8, A)$ also follows normal distribution. The value of A will be _____.
 (a) 100 (b) 10 (c) 64 (d) 36
16. A company has two cars which it hires out during the day. The number of Cars demanded in a day has poisson distribution with mean 1.5. Then percentage of days on which only car was in demand is equal to $(e^{-1.5})$
 (a) 23.26 (b) 33.47 (c) 44.62 (d) None of these
17. An approximate relation between quartile deviation (QD) and standard deviation (S.D) of normal distribution is:
 (a) $5 \text{ QD} = 4 \text{ SD}$ (b) $4 \text{ QD} = 4 \text{ SD}$
 (c) $2 \text{ QD} = 3 \text{ SD}$ (d) $3 \text{ QD} = 2 \text{ SD}$
18. Mean and Variance of a binomial variance are 4 and $\frac{4}{3}$ respectively then $P(x \geq 1)$ will be _____.
 (a) $\frac{728}{729}$ (b) $\frac{1}{729}$ (c) $\frac{723}{729}$ (d) None of the above.
19. If six coins are tossed simultaneously. The probability of obtaining exactly two head are:
 (a) $1/64$ (b) $63/64$ (c) $15/64$ (d) None of these
20. In _____ distribution mean = variance
 (a) Normal (b) Binomial (c) Poisson (d) None
21. In a discrete random variable x follows uniform distribution and assumes only the values 8,9,11, 15,18,20. Then $P(X \leq 15)$
 (a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{2}{3}$ (d) $\frac{2}{5}$

22. If x and y are Independent normal variates with Mean and Standard Derivatively as μ_1 and μ_2 and σ_1 and σ_2 respectively, then $z = x + y$ also follows normal distribution with
- (a) Mean = $\mu_1 + \mu_2$ and S.D = 0 respectively
 (b) Mean = 0 and S.D. = $\sigma_1^2 + \sigma_2^2$
 (c) Mean = $\mu_1 + \mu_2$ and S.D = $\sqrt{\sigma_1^2 + \sigma_2^2}$
 (d) None of these.
23. For a poissonvariate X is $P(X = 2) = 3P(X = 3)$, then what is the mean of X ?
 (a) $\frac{1}{4}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) 1
24. The standard deviation of a poissonvariate is 1.732. What is the probability that the variate will lie between -2.3 to 3.68 ? [$e^{-3} = 0.04979$]
 (a) 0.55 (b) 0.65 (c) 0.75 (d) 0.45
25. A random variable X follows poisson distribution. The value of $P(X > 1.5)$ is: [$E(X) = 2$]
 (a) $2/e$ (b) $1 - (3/e^2)$ (c) $3/e^2$ (d) $1 - (3/e)$
26. The incident of an occupational disease to the workers of a factory is found to be $1/5000$. If there are 10000 workers in a factory, then the probability that none of them will get the disease is:
 (a) e^4 (b) e^{-2} (c) e^1 (d) e^{-1}
27. If X follows poisson distribution with coefficient of variation 50, what is the probability that X would assume only non zero values?
 (a) 0.018 (b) 0.989 (c) 0.982 (d) 0.976
28. The probability that X assumes a specified value in continuous probability distribution is:
 (a) 1 (b) 0 (c) -1 (d) None of the above
29. Assume the mean height of soldiers to be 68.22 inches with a variance of 10.8 inches. How many soldiers in a regiment of 1000 would you expect to be over 72 inches tall?
 (a) 124 (b) 125 (c) 126 (d) 127
30. The average weekly food expenditure of a group of families has a normal distribution with mean Rs. 1500 and SD Rs. 300. What is the probability that out of 5 families belonging to this group, at least one family has weekly food expenditure in excess of Rs. 1800? [Given $\Phi(1) = 0.84$]
 (a) 0.481 (b) 0.582 (c) 0.528 (d) 0.368
31. The weekly wages of 1000 workers are normally distributed around a mean of Rs. 70 and a SD of Rs. 5. Estimate the lowest weekly wages of the 100 highest paid workers. [area under normal curve between $z = 0$ and $z = 1.28$ is 0.4]
 (a) Rs. 86.40 (b) Rs. 40.76 (c) Rs. 76.40 (d) Rs. 40.86

SAMPLING & THEORY OF ESTIMATION

1. The population consists of 5 members. The probability of all possible samples of size 2 that can be drawn from without replacement is:
a) $1/25$ b) $1/32$ c) $1/10$ d) $1/8$
2. Find the sample size such that the probability of the sample mean differing from the population mean by not more than $1/10$ th of the standard deviation is 0.95.
a) 354 b) 384 c) 304 d) 404
3. If $SD = 20$ and sample size is 100, then what is the standard error of mean?
a) 0.5 b) 5 c) 0.2 d) 2
4. A die was thrown 400 times and "six" resulted 80 times. What is the observed value of proportion?
a) 0.4 b) 3 c) 0.2 d) 5
5. A random sample of size 10 from a normal population gives the values 64, 72, 65, 70, 68, 71, 65, 62, 66 and 67. If the standard error of the sample mean is $\sqrt{0.7}$, find the population variance.
a) 5 b) 6 c) 7 d) None of the above
6. A random sample of 160 people is taken and 120 were in favor of liberalizing licensing regulations. With 95% confidence, what percentage of all people are in favor?
a) 68.3%, 92.5% b) 68.3%, 81.7%
c) 69.2%, 81.7% d) None of the above
7. The measure of divergence is _____ as the size of the sample approaches that of the population.
a) More b) Less
c) Same d) None of the above
8. In n units are selected in a sample from N population units, the sampling fraction is given by:
a) $1/n$ b) $1/N$ c) N/n d) n/N
9. A population is perfectly homogenous in respect of a characteristics. What size of sample would you prefer?
a) A large sample b) A small sample
c) A single item d) No item

10. A random sample of size 17 has 52 as mean. The variance is 160. The 99% confidence for the mean are:
 (a) [42.77, 61.23] (b) [44.58] (c) [49, 51] (d) [37, 18]
11. The criteria for an ideal estimator are:
 (a) unbiasedness, expectation, estimation and sampling
 (b) estimation, efficiency, expectation and sufficiency
 (c) consistency, efficiency, sufficiency and unbiasedness
 (d) estimation, consistency, efficiency and sufficiency.
12. A researcher wishes to estimate the mean of a population by using sufficiently large sample. The probability is 0.95 that the sample mean will not differ from the true mean by more than 25% of the standard deviation. How large sample should be taken?
 (a) 72 (b) 62 (c) 42 (d) 32
13. When we have an idea that the error might be involved, we use:
 (a) Point Estimate (b) Interval Estimate
 (c) both (a) & (b) (d) None of these
14. A sample of size 3 is taken from a population of 10 members with replacement. If the sample observation are. 1,3 and 5 what is the estimate of the standard error of sample mean?
 (a) 1.02 (b) 1.92 (c) 2.37 (d) 3.01
15. The sample mean is:
 (a) An MVUE for population mean
 (b) A sufficient estimator for population mean
 (c) A consistent and efficient estimator for population mean
 (d) All of these
16. If n numbers are drawn at random without replacement from the set {1, 2,m} then $\text{var}(\bar{x})$ would be :
 (a) $\frac{(m-1)(m+n)}{12}$
 (b) $\frac{(m-1)(m+n)}{12m}$
 (c) $\frac{(m+1)(m-n)}{12n}$
 (d) $\frac{(m-1)(m+n)}{12n}$

17. For any unknown parameter, how many interval estimates exist?
(a) 1 (b) 2 (c) Many (d) 3
18. A population comprises of 20 members. The number of all possible samples if size 2 that can be drawn from it without replacement.
(a) 210 (b) 380 (c) 190 (d) 400
19. In sampling, standard error is _____ of the sampling distribution:
(a) Standard deviation (b) Quartile deviation
(c) Mean deviation (d) Coefficient of variation
20. If every 9th unit is selected from universal set then this type of sampling is known as:
(a) Quota Sampling (b) Systematic Sampling
(c) Stratified Sampling (d) None of these
21. The method of sampling in which each unit of the population has an equal chance of being selected in the sample is
(a) Random Sampling (b) Stratified sampling
(c) Systematic sampling (d) None of the above.
22. A selection procedure of a sample, having so involvement of Probability is known as:
(a) Purposive Sampling. (b) Judgement Sampling
(c) Subjective Sampling (d) All of the above.
23. The statistic T is said to be a consistent estimator of the population parameter 'Q' if
(a) $E(T) = Q$ (b) $V(T) \rightarrow 0$ as $n \rightarrow \infty$
(c) Both (A) and (B) (d) None of the above.
24. If N, n denote sizes of the population and its factor of finite population, correction is given by
(a) $\sqrt{(N - n) / (N - 1)}$ (b) $\sqrt{(N - 1) / (N - n)}$
(c) $\sqrt{(1 - N) / (N - n)}$ (d) $\sqrt{(N + n) / (N - 1)}$
25. 99% confidence limits for population mean are :
(a) $\bar{x} \pm 1.96$ S.E (b) $\bar{x} \pm 2.58$ S.E
(c) $\bar{x} \pm 3.00$ S.E (d) None of these

26. If it is known that the 95% LCL and UCL to population mean are 48.04 and 51.96 respectively. If the sample size is 100, what will be the value of the population S.D.
(a) 8 (b) 10 (c) 12 (d) 12.50
27. A parameter is a characteristic of
(a) Population (b) Sample
(c) Both (a) and (b) (d) None of the above.
28. According to Neyman's allocation in stratified sampling
(a) Sample size is proportional to the population size
(b) Sample size is proportional to the sample standard deviation
(c) Sample size is proportional to the sample variance
(d) Population size is proportional to the sample variance.
29. Measure of precision obtain by sampling is given by
(a) Standard error (b) $1 / \text{Standard error}$
(c) Both (d) None of these
30. In quality control of star engine the best suitable method is :
(a) Census survey (b) Simple random sampling
(c) Both (d) None of these