1. Ratio

A Basic

Que. 1. The monthly incomes of two persons are in the ratio 4 : 5 and their monthly expenditures are in the ratio 7 : 9. If each saves Rs. 50 per month, find their monthly incomes.

a. 600 and 7000 b. 500 and 400

c. 900 and 700 d. 400 and 500

Answer: D

Solution: Let the monthly incomes of two persons be Rs. 4x and Rs. 5x so that the ratio is Rs. 4x : Rs. 5x = 4 : 5. If each saves Rs. 50 per month, then the expenditures of two persons are Rs. (4x – 50) and Rs. (5x – 50).

$\frac{36\times450}{5\times50} = \frac{35\times350}{9}$ or, 36x – 35x = 450 – 350

or, x = 100

Hence, the monthly incomes of the two persons are Rs. 4 × 100 and Rs. 5 × 100 i.e. Rs. 400 and Rs. 500

B. Inverse Ratio

Que.2. The inverse ratio of 11 : 15 is

a. 15:11 b. 11:11

c. 15:15 d. √11: √15

Answer: A

Solution: One ratio is the inverse of another if their product is 1. Thus a: b is the inverse of b : a and vice- versa

C. Duplicate Ratio

Que.3. $\frac{3X-2}{5X++6}$ is the duplicate ratio of $\frac{2}{3}$ then find the value of x:

a. 2 b. 6

c. 5 d. 9

Answer: B

Solution: $\frac{3X-2}{5X++6}$ is the duplicate ratio of $\frac{2}{3}$

i.e., $\frac{3X-2}{5X++6} = \frac{2^2}{3^2}$

$\frac{3X-2}{5X++6} = \frac{4}{9}$

27x- 18= 20x+24

27x-20x= 24+18

7x = 42

x= 6

D. Sub duplicate Ratio

Que.4.If p:q is the sub- duplicate ratio of p-x^2 : q-x^2 , then x^2 is :

a. $\frac{p}{p+q}$ b. $\frac{p}{p+q}$

c. $\frac{pq}{p+q}$ d. none

Answer: C

Solution: Sub duplicate ratio of (p-x^2) : (q-x^2) =

$\sqrt{p-x^2}$:$\sqrt{q-x^2}$

p:q= $\sqrt{p-x^2}$:$\sqrt{q-x^2}$

$\frac{p}{q} = \sqrt{\frac{p-x^2}{q-x^2}}$

An squaring both side

$\frac{p^2}{q^2} = \frac{p-x^2}{q-x^2} = p^2$ (q-x^2) = q^2 (p-x^2)

p^2q – $q^2p = p^2x^2$ – q^2x^2

$pq(p-q) = (p^2\ q^2)x^2$

$$x^2 = \frac{pq(p-q)}{(p+q)(p-q)}$$

$$x^2 = \frac{pq}{(p+q)}$$

E. Triplicate Ratio

Que.5. The Triplicate ratio of 4:7

a. 4:7 b. 64:16

c. 16:343 d. 64:343

Answer: D

Solution: $4^3 : 7^3 = 64:343$

F. Sub- triplicate Ratio

Que.6. The Sub triplicate ratio of 125 : 729

a. 5:9 b. 4:16

c. 16:343 d. 64:343

Answer: A

Solution: 125:729 $\sqrt[3]{125} : \sqrt[3]{729}$ = 64:343

G. Compound Ratio

Que.7. The ratio of the number of boys and girls in a college is 7: 8. If the percentage increase in the number of boys and girls be 20% and 10% respectively, what will be the new ratio?

a. 8:9 b. 17:18

c. 121:22 d. None

Answer: C

Solution: Originally, let the number of boys and girls in the college be 7x and 8x respectively.

$$\left(\frac{120}{100} \times 7x\right) \text{ and } \left(\frac{110}{100} \times 8x\right) = \frac{42x}{5} \text{ and } \frac{44x}{5}$$

∴ The required ratio $= \left(\frac{42x}{5} : \frac{44x}{5}\right) = \mathbf{21:22}$

Their increased number is (120% of 7x) and (110% of 8x).

Que.8. A sum of money is to be distributed among A, B, C, and D in the proportion of 5: 2: 4: 3. If C gets Rs. 1000 more than D, what is B's share?

a. 500 b. 1500

c. 2000 d. None of these

Answer: C

Solution: Let the shares of A, B, C and D be Rs. 5x, Rs. 2x, Rs. 4x and Rs. 3x respectively Then, 4x – 3x = 1000 x = 1000 B's'share = Rs. 2x = Rs. (2 x 1000) = Rs. 2000.

2. Proportions

A. Properties of Proportion

i. Invertendo

Que.9. The ratio of the number of boys and girls in a college is 7: 8. If the percentage increase in the number of boys and girls be 20% and 10% respectively, what will be the new ratio?

a. 3: 5 = 6: 10 b. 10: 6 = 5: 3

c. 6: 10 = 9: 15 d. None

Answer: B

Solution: a : b :: c : d

$$\frac{a}{b} : \frac{c}{d} = \frac{b}{a} = \frac{d}{c}$$

10 : 6 = 5 : 3 = 15 : 9

ii. Alternendo

Que.10. If $a : b = c : d = e : f =$ ...., then each of these ratios is equal

a. $(a + c + e + \ldots\ldots) : (b + d + f + \ldots\ldots)$ is equal to each ratio

b. $(a + c + e + \ldots\ldots) : (b + d + f + \ldots\ldots)$ is greater to each ratio

c. $(a + c + e + \ldots\ldots) : (b + d + f + \ldots\ldots)$ is zero ratio

d. None

Answer: A

Solution: Due to addendo property.

iii. Componendo

Que.11. $4 : 5 = 8 : 10$

a. 1:1

b. 4:5

c. Both

d. None

Answer: A

Solution: $\Rightarrow \frac{a}{b} = \frac{c}{d}$

Adding 1 to both sides, we get

$$\Rightarrow \frac{a}{b} + 1 = \frac{c}{d} + 1$$

$$\Rightarrow \frac{a+b}{b} = \frac{c+d}{d}$$

$\Rightarrow (a + b) : b = (c + d) : d$

Therefore, $(4 + 5) : 5 = 9 : 5 = 18 : 10$

$= (8 + 10) : 10$

iii. Dividendo

Que.12. $5 : 4 = 10 : 8$

a. $(5 - 4) : 4 = 1 : 4 = (10 - 8) : 8$

b. $(5 + 4) : 4 = 1 : 4 = (10 - 8) : 8$

c. Both

d. None

Answer: A

Solution: $\Rightarrow \frac{a}{b} = \frac{c}{d}$

Subtracting 1 from both sides, , we get

$\Rightarrow \frac{a}{b} - 1 = \frac{c}{d} - 1$

$\Rightarrow \frac{a-b}{b} = \frac{c-d}{d}$

$\Rightarrow$ (a - b) : b = (c - d) : d

Therefore, (5 - 4) : 4 = 1 : 4 = (10 - 8) : 8

B. Third Proportion

Que.13. Find the third proportion to 2.4 kg, 9.6 kg.

a. 384 kg b. 38.4 kg

c. 3804 kg d. 3.84 kg

Answer: B

Solution: Let the third proportion to 2.4 kg, 9.6 kg be x kg.

Then 2.4 kg, 9.6 kg and x kg are in continued proportion since b2 = ac

So, 2.4/9.6 =9.6/x or, x = (9.6 X 9.6)/2.4 = 38.4

C. Fourth Proportion

Que.14. The fourth proportional to 5, 8, 15 is:

a.18 b.24

c.19 d.20

Answer: B

Solution: Let the fourth proportional to 5, 8, 15 be x.

Then, 5 : 8 : 15 : x

$\Rightarrow$5x = (8 x 15)

$\Rightarrow$x= ((8X15)/5)= 24

View Answer Discuss in Forum Workspace Report

3. Indices

Que. 15. Find the value of k from $(\sqrt{9})^{-7} \times (\sqrt{3})^{-5}$ 3^k

a. 19/2
b. 19/3
c. -19/3
d. -19/2

Answer: D

Solution: $\Rightarrow (3^{2 \times 1/2})^{-7} \times (3^{1/2})^{-5} = 3^k$

$\Rightarrow 3^{-19/2} = 3^k$ $\Rightarrow k = -19/2$

Que. 16. If x:y:z = 7:4:11 then (x+y+z / 2) is:

a. 2
b. 4
c. 3
d. 5

Answer: A

Solution: ⇒If x:y:z = 7:4:11 , Let x=7k, y=4k, z=11k

$\frac{x+y+z}{2} = \frac{7k+4k+11k}{11k} = \frac{22k}{11k} = 2$

3. Logarithms

Que.17. $\log_2 \log_2 \log_2 16$ =?

a. 0
b. 3
c. 1
d. 2

Answer: C

Solution: $\log_2 \log_2 \log_2 16$

$\Rightarrow log_2 log_2 \left(log_2^{2^4}\right)$

$\Rightarrow log_2 log_2^4 log_2^2$

$\Rightarrow log_2 log_2^4$

$\Rightarrow log_2^2 log_2^2$

$\Rightarrow 1 \times 1$ $\Rightarrow 1$

Que.18. The value of the expression: $a^{\log_a^b.\log_b^c.\log_c^d.\log_d^t}$

a. t

b. abcdt

c. (a+b+c+d+t)

d. None

Answer: A

Solution:

$$\Rightarrow a^{\log_a^b.\log_b^c.\log_c^d.\log_d^t}$$

$$\Rightarrow a^{\frac{\log^b}{\log^a}.\frac{\log^c}{\log^b}.\frac{\log^t}{\log^d}}$$

$$\Rightarrow a^{\frac{\log^t}{\log^a}}$$

$$\Rightarrow a^{\log_a^t}$$

$\Rightarrow$ t

EQUATION

1. Simultaneous Linear Equations:

A. Properties of Proportion

Que.1.A man went to the Reserve Bank of India with • 1,000. He asked the cashier to give him .5 and 10 notes only in return. The man got 175 notes in all. Find how many notes of 5 and f 10 did he receive?

a. (2 ,150) b. (40,110)

c (150,25) d. None

Answer: C

Solution:

Let the number of notes of, 5 be x and notes of 10 be y.

Then, $x + y = 175$ ………….....(1)

$5x + 10y = 1000$ ………………(2)

Solving (1) and (2) simultaneously. we get

$x + 5y = 875$

$5x + 10y = 1000$

(-) (-) (-)

$-5y = -125$

$y = 25$

B. Cross Multiplication Method

Que.2. Find the value of x and y by using the using cross-multiplication method:

$3x + 4y - 17 = 0$ $4x - 3y - 6 = 0$

a. $x = 3, y = 2.$ b. $x = 2, y = 2$

c. $x = 5, y = 2.$ d. None

Answer: A

.

Solution:

Two given equations are:

$3x + 4y - 17 = 0$

$4x - 3y - 6 = 0$

By cross-multiplication, we get:

$$\frac{x/(4)\,(-6) - (-3)\,(-17)}{(-17)\,(4) - (-6)\,(3) = 1/(3)\,(-3) - (4)\,(4)} = y$$

or, $x/(-24 - 51) = y/(-68 + 18) = 1/(-9 - 16)$

or, $x/-75 = y/-50 = 1/-25$

or, $x/3 = y/2 = 1$ (multiplying by -25)

or, $x = 3$, $y = 2$

Therefore, required solution: $x = 3$, $y = 2$.

C. QUADRATIC EQUATION METHOD

Que.3. Which of the following is correct ?

i. If $b^2 - 4ac = 0$ the roots are real and equal;

ii. If $b^2 - 4ac > 0$ then the roots are imaginary;

iii. If $b^2 - 4ac < 0$ then the roots are equal;

iv. If $b^2 - 4ac$ is a perfect square (0) the roots are real, rational and unequal

v. If $b^2 - 4ac > 0$ but not a perfect square the rots are real, irrational and unequal.

a. All are correct
b. ii & iii
c. all are correct except ii & iii
d. i & iii & iv is correct

Answer: C

Solution:

i. If $b^2 - 4ac = 0$ the roots are real and equal;

ii. If $b^2 - 4ac > 0$ then the roots are real and unequal (or distinct);

iii. If $b^2-4ac < 0$ then the roots are imaginary;

iv. If b^2-4ac is a perfect square (0) the roots are real, rational and unequal (distinct);

v. If $b^2-4ac > 0$ but not a perfect square the rots are real, irrational and unequal

Since b2 – 4ac discriminates the roots b2 – 4ac is called the discriminant in the equation ax2 + bx + c = 0 as it actually discriminates between the roots.

Que.4. Find the roots of the quadratic equation: $x2 + 2x - 15 = 0$?

a. 5, 3
b. 3, -5
c. -3, 5
d. -3, -5

Answer: B

Solution:

$x^2 + 5x - 3x - 15 = 0$

$x(x + 5) - 3(x + 5) = 0$

$(x - 3)(x + 5) = 0$

=> $x = 3$ or $x = -5$.

D. CUBIC EQUATION METHOD

Que.5. $x^3+x^2-16x = 16$

a. 4
b. +1
c. 1
d. -4

Answer: D

Solution:

$x^3+x^2-16x = 16$

$x^3+x^2-16x - 16 = 0$

Let $a(x) = x^3+x^2-16x-16$

$a(-1) = (-1)3+(-1)2-16(-1)-16$

$= -1+1+16-16 = 0$

$\therefore a(x) = (x+1)\ (x^2-16)$

$= (x+1)\ (x-4)\ (x+4)$

$\therefore 0 = (x+1)(x-4)(x+4)$

$\therefore x = -1$ or $x=4$ or $x= -4$

MATRICES

A. COLLINEAR

Que.1. The value of K for which the points (k,1).,(5,5) and (10,7) may be collinear is:

a. k-5 b. k=7

c. k=9 d. k=1

Answer: A

Solution:

Points are (k,1) (5,5) and (10,7)

$x_1=k,\ x_2=5,\ x_3=7\ y_1= 1,\ y_2=5,\ y_3=7$

Points are collinear then area of $\Delta=0$

Area of $\Delta=\frac{1}{2}[x_1(y_2-y_3)+x_2=(y_3-y_1)+x_3=(y_1-y_2)$

$0= -2k+30-40$

$0=-2k-10$

$-2k=10$

$K=-5$

B. ROOTS OF EQUATION

Que.2. If $\alpha+\beta=-2$ and $\alpha\beta= -3$, then α,β are two roots of the equation, which is:

a. $x^2-2x-3=0$ b. $x^2+2x-3=0$

c. $x^2+2x+3=0$ d. $x^2-2x+3=0$

Answer: B

Solution:

If $\alpha+\beta = -2$

Q.E. is $x^2-(\alpha+\beta)x+\alpha.\beta=0$

$x^2-(-2)x+(-3)=0$

$x^2+2x-3=0$

C. TYPES OF MATRICES

Ques3. If $A=\begin{bmatrix}-5 & 2\\ 1 & -3\end{bmatrix}$, then adj A is:

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. $\begin{bmatrix}3 & 2\\ 1 & 5\end{bmatrix}$

Answer: A

Solution:

Given $A=\begin{bmatrix}-5 & 2\\ 1 & -3\end{bmatrix}$

The co-factor of A

$A_{11}=(-1)^{1+1}.(-3)=(-1)^2.(-3)=-3$

$A_{12}=(-1)^{1+2}.(1)=(-1)^3.(-1)=-1$

$A_{21}=(-1)^{2+1}.(2)=(-1)^3.(-2)=-2$

$A_{22}=(-1)^{1+2}.(5)=(-1)^4.(-5)=-5$

Matrix made by co- factor of A

$B=\begin{bmatrix}A_{11} & A_{12}\\ A_{21} & A_{22}\end{bmatrix} = \begin{bmatrix}-3 & -1\\ -2 & -5\end{bmatrix}$

Adj $A=B^T$

$$\begin{bmatrix} -3 & -1 \\ -2 & -5 \end{bmatrix}^T$$

$$\begin{bmatrix} -3 & -2 \\ -1 & -5 \end{bmatrix}$$

Que4.If A If $A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$, then $\mathbf{A}^5 =$

a. 5A
b. 10A
c. 16A
d. 32A

Answer: C

Solution:

$$A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$$

$$\mathbf{A}^5 = \begin{bmatrix} 2^5 & 0 & 0 \\ 0 & 2^5 & 0 \\ 0 & 0 & 2^5 \end{bmatrix} 2^4 \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$$

$= 16A$

1. LINEAR INEQUALITIES IN ONE VARIABLE:

Que.1. Solve $\frac{x}{2}>8$

a. x<8

b. x>16

c. x=8

d. x=4

Answer: C

Solution:

$\frac{x}{2}>8$

=x>8X2

= x>16

2. LINEAR INEQUALITIES IN TWO VARIABLE:

Que.2. The Linear relationship between two variables in an inequality

a. x + by .5. c

b. axby.c

c. axy + by .5..c

d. ax+bxy.c

Answer: A

Solution:

The linear relationship between two variables in an inequality is given by ax+by.5.c

Any linear function that involves an inequality sign is a linear inequality. It may be of one variable, or, of more than one variable

Ex: 3x + y < 6, x -y - 2, etc

Que.3. Solve $-1 < 2x + 3 < 6$

a. −2<x<3/2

b. 2<x<23/2

c. 2<x<3/2

d. -3<x<23/3

Answer: A

Solution:

$= -1<2x+3<6$

Subtract 3 from all 3 sides

$= -1-3<2x+3-3<6-3$

$= -4<2x<3$

Divide all sides by 2

$= -2<x<23$

Que.4. The inequalities $5x1 + 4x2 \geq 9$, $x1 + x2 \geq 3$, $x1 \geq 0$ and $x2 \geq 0$ is correct?

a. True
b. False
c. Not sure
d. None

Answer: A

Solution:

We draw the straight lines $5x1 + 4x2 = 9$ and $x1 + x2 = 3$.

Table for $5x1 + 4x2 = 9$

x_1	0	9/5
x_2	9/4	0

Table for $x1 + x2 = 3$

x_1	0	3
x_2	3	0

Now, if we take the point (4, 4), we find

$5x1 + 4x2 * 9$ or, $36 * 9$ (True)

$x1 + x2 * 3$

i.e., $4 + 4 * 3$

$8 * 3$ (True)

Hence (4, 4) is in the region which satisfies the inequalities

3. ABSOLUTE INEQUALITY:

Que.5. Solve the absolute value inequality 2|3x+9|<36

a. −9<x>3 b. −9<x<3

c. 9<x>3 d. 9<x<3

Answer: B

Solution:

2|3x+9|2<3622|3x+9|2<362

|3x+9|<18|3x+9|<18

−18<3x+9<18−18<3x+9<18

−18−9<3x+9−9<18−9−18−9<3x+9−9<18−9

−27<3x<9−27<3x<9

−273<3x3<93−273<3x3<93

−9<x<3.

Que.6. On solving the inequalities 5x+y≤100, x+y≤60, x≥0, y≥, we get the following solution:

a. (0,0), (20,0), (10,50) & (0,60)

b. (0,0), (60,0), (10,50) & (0,60)

c. (0,0), (20,0), (0,100) & (10,50)

d. None

Answer: B

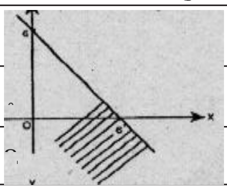
Solution:

On Solving the inequalities 5x+y≤100, x+y≤60, x≥0, y≥, we get (0,0), (20,0), (10,50) & (0,60) all satisfies above inequalities

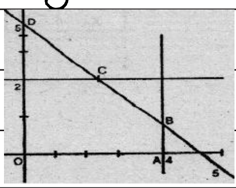
4. GRAPHICAL METHOD

Que.7. The graph to express the inequality x + y 5 6 is:

a.



b.

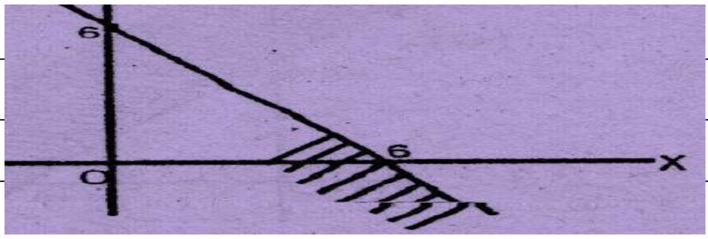


c. Either a or b d. None of these

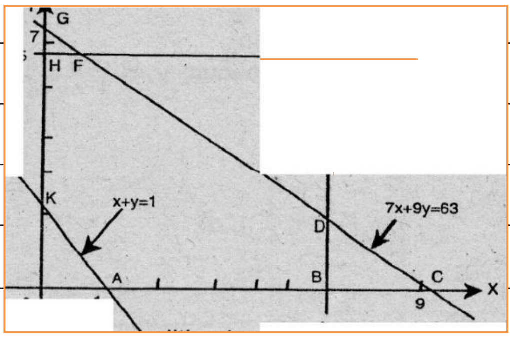
Answer: A

Solution:

x + y = 56 is graphically represent by



Que. 8. Common region of the inequalities is:



a. BCDB and DEFD

b. Unbounded

c. HFGH

d. ABDFHKA

Answer: A

Solution: Common Region of the inequalities is ABDFHKA

1. SIMPLE INTEREST

Que. 1. Rohika invested ` 70,000 in a bank at the rate of 6.5% p.a. simple interest rate. He received ` 85,925 after the end of term. Find out the period for which sum was invested by Rahul.

a. 3.5 years
b. 35 years
c. 0.35 years
d. 36 years

Answer: A

Solution:

We know A = P (1+it)

$i.e. 85925 = 70000(1 + \frac{6.5}{100} \times t)$

$\frac{85925}{70000} = \frac{100 + 6.5t}{100}$

$\frac{85925 X100}{70000} - 100 = 6.5t$

22.75 = 6.5t ,

=> t = 3.5

time = 3.5 years

Que. 2. Sonia deposited ` 50,000 in a bank for two years with the interest rate of 5.5% p.a. How much interest would she earn?

a. 550
b. 55000
c. 55
d. 5500

Answer: D

Solution:

Required interest amount is given by

I = P X i X t

$50000 \times \frac{5.5}{100} \times 2$ = 5500

=> Interest = 5500

Que. 3. Shila has a sum of ` 46,875 was lent out at simple interest and at the end of 1 year 8 months the total amount was ` 50,000. Find the rate of interest percent per annum.

a. 0.4% b. 4%

c. 40% d. 0.04%

Answer: B

Solution:

We know A = P (1 + it)

i.e. 50,000=46875(1+i X (8)/12)

(1.067 – 1) X 3/5 = i

i = 0.04 => rate = 4%

2. COMPOUND INTEREST

Que. 4. Ascertain the compound value and compound interest of an amount of ` 75,000 at 8 percent compounded semiannually for 5 years.

a. 30615 b. 36051

c. 36501 d. 36015

Answer: D

Solution:

Computation of Compound Value and Compound Interest

Semiannual Rate of Interest (i) = 8/2 = 4 %

n = 5 X 2 = 10, P = ` 75,000

Compound Value = P (1+i)n

= 75,000 (1+4 %)10

= 75,000 x 1.4802 = ` 1,11,015

Compound Interest = ` 1, 11,015 – ` 75,000 = ` 36,015.

Que. 5. Calculate if ` 10,000 is invested at interest rate of 12% per annum, what is the amount after 3 years if the compounding of interest is done?

a. 14049.28 b. 14185.19

c. 14857.61 d. 14094.28

Answer: B

Solution:

$10,000[1+12/(100\times2)]^{3\times2}$

$= 10,000\ (1 + 0.06)^6$

$=10,000 \times 1.418519$

=`14,185.19

Que. 6. Rs. 2000 is invested at annual rate of interest off 10%. What is the amount after two years if compounding is done:

(i) ANNUALLY

a. 2420 b. 2431

c. 2440 d. 2469

Answer: A

Solution:

$A_n = P\ (1+i)^n$

$A_2 = 2000(1+0.1)^2$

$= 2000 \times (1.1)^2$

= Rs. 2000×1.21

= Rs. 2420

(ii)SEMI-ANNUALLY

a. 2420 b. 2431

c. 2440 d. 2469

Answer: A

Solution:

$A_n = P(1+i)^n$

$n = 2 \times 2 = 4$

$i = 0.1/2 = 0.05$

$A_4 = 2000(1+0.05)^4$

$= 2000 \times 1.2155 = \text{Rs. } 2{,}431$

(iii) QUARTERLY

a. 2420 b. 2431

c. 2440 d. 2436.80

Answer: D

Solution:

$n = 4 \times 2 = 8$

$i = 0.1/4 = 0.025$

$A_8 = 2000(1+0.025)8$

$= 2000 \times 1.2184$

$= \text{Rs. } 2{,}436.80$

(iv) MONTHLY

a. 2420 b. 2431

c. 2440.58 d. 2436.80

Answer: C

Solution:

$n = 12 \times 2 = 24$

$i = 0.1/12 = 0.00833$

$A24 = 2000(1+0.00833)24$

$= 2000 \times 1.22029 = \text{Rs. } 2440.58$

3. EFFECTIVE INTEREST

Que. 7. Relationship between annual nominal rate of interest and annual effective rate of interest, if frequency of compounding is greater than one:

a. Effective rate > Nominal rate

b. Effective rate < Nominal rate

c. Effective rate = Nominal rate

d. None of the above

Answer: A

Solution:

Effective rate > Nominal rate

Que. 8. Which is a better investment 3% per year compounded monthly or 33.2% per year simple intrest? Given that $(1+0.0025)^{12} = 1.0304$.

a. 3.04% b. 3.4%

c. 30.4% d. 0.34%

Answer: A

Solution:

$i = 3/12 = 0.25\%$

$= 0.0025$

$n = 12$

$E = (1+i)n-1$

$= (1+0.0025)^{12}-1$

$= 1.0304-1 = 0.0304$

$= 3.04\%$

Effective rate of intereste€ being less than 3.2%, the simple interest 3.2% per year is the better investment.

4. ANNUITY

(a) FUTURE VALUE

(i) ORDINARY/ NORMAL

Que. 9. Bichara invest ` 3000 in a two year investment that pays you 12% per annum. Calculate the future value of the investment.

a. 3,763.20 b. 376.320

c. 37632.00 d. 37.6320

Answer: A

Solution:

We know F = C.F. $(1 + i)^n$

Where F = Future value

C.F. = Cash flow = ` 3,000

i = rate of interest = 0.12, n = time period = 2

F = Rs.3,000$(1+0.12)^2$

= Rs.3,000×1.2544 = ` 3,763.20

(ii) DUE

Que. 10. Me. X invest Rs. 10,000 every year starting from today for next: 10 years suppose interest rate is 8% per annual compounded annually. 8% per annual compounded annually. Calculate future value of the annuity.

a. Rs. 1,56,454.88 b. Rs.1,56,554.88

c. Rs. 1,44,865.625 d. None

Answer: A

Solution:

Annual Installment (A) = 10,000 A=? R= 8% p.a.c.i n= 10years

Future Value of Annuity due

$$= A_{n,i} = \frac{A}{I}[(1+i)^n - 1](1+i)$$

$$= \frac{10,000}{0.08}[(1+0.08)^{10} - 1](1+0.08)$$

$$= \frac{10,000}{0.08}[(1.08)^{10} - 1](1+0.08)$$

= 1,56454.88

(b) PRESENT VALUE

(i) ORDINARY

Que. 11. A builder borrows Rs. 2550 to be paid back with compound interest at the rate of 4% per annum by the end of 2 years in two equal yearly installments. How much will each installment be?

a. Rs. 1352
b. Rs. 1377
c. Rs. 1275
d. Rs. 1283

Answer: A

Solution:

Amount = Rs 2550

Rate = 4% per annum

Time = 2 years

Applying the formula

P= X/ (1+r/100) n+ ....X/ (1+r/100)

Here we have two equal installments, so

$$P = \frac{X}{\left[1+\frac{r}{100}\right]^2} + \frac{X}{\left[1+\frac{r}{100}\right]}$$

$$=2550= \frac{X}{\left[\frac{4}{100}\right]^2} + \frac{X}{\left[1+\frac{4}{100}\right]}$$

= Rs. 1352

1. FACTORIAL

Que. 1.The value of N in $\frac{1}{7!} + \frac{1}{8!} = \frac{N}{9!}$ is.

a. Rs. 81 b. Rs. 78

c. Rs. 89 d. Rs. 64

Answer: A

Solution:

$$If\ \frac{1}{7!} + \frac{1}{8!} = \frac{N}{9!}$$

$$= \frac{9 \times 8 \times 1}{9 \times 8 \times 7!} - \frac{9 \times 1}{9 \times 8!} = \frac{N}{9!}$$

$$= \frac{72}{9!} + \frac{9}{9!} = \frac{N}{9!}$$

$$= \frac{81}{9!} = \frac{N}{9!}$$

Que. 2. Evaluate: 6! / (2! X 4!)

a. 15 b. 78

c. 8 d. 4

Answer: A

Solution:

6! / (2! X 4!)

=(1 X 2 X 3 X 4 X 5 X 6) / [(1 X 2) X (1 X 2 X 3 X 4)]

=15

2. PERMUTATION

Que. 3. If n_{P_r}=720, n_{C_r} =120, then r is

a. 3 b. 4

c. 5 d. 6

Answer: A

Solution:

Given n_{P_r}=720, $n_{C_r} = 120$

We know that

$\frac{n_{C_r}}{n_{P_r}} = \frac{1}{\underline{r}}$

$\frac{120}{720} = \frac{1}{\underline{r}}$

$\frac{1}{6} = \frac{1}{\underline{r}}$

R= 3

(A) NUMBER SYSTEM

Que. 4. A bag contains 4 red, 3 black, and 2 white balls. In how many ways 3 balls can be drawn from this bag so that they include at least one black ball?

a. 64 b. 46

c. 85 d. None

Answer: A

Solution:

No. of Total balls = 4 Red+3 Black+2 white = 9 balls

2. If 3 are drawn from this bag getting at least one black balls.

It may be following cases:

(a) 1B & 2 other $= 3_{C_1} \times 6_{C_2} = 3 \times 15 = 45$

(b) 2B & 1 other $= 3_{C_2} \times 6_{C_1} = 3 \times 6 = 18$

(c) 3B & 0 other $= 3_{C_3} \times 6_{C_0} = 1 \times 1 = 1$

Total ways = 45+18+1

= 64

Que. 5. Compute the sum of 4 digit numbers which can be formed with the four digits 1, 3, 5, 7, if each digit is used only once in each arrangement.

a. 1,06,656 b. 1,46,800

c. 7,19,500 d. 4,10,800

Answer: A

Solution:

The number of arrangements of 4 different digits taken 4 at a time is given by $4P4 = 4! = 24$.

All the four digits will occur equal number of times at each of the positions, namely ones, tens, hundreds, thousands.

Thus, each digit will occur $24 / 4 = 6$ times in each of the positions.

The sum of digits in one's position will be $6 \times (1 + 3 + 5 + 7) = 96$.

Similar is the case in ten's, hundred's and thousand's places.

Therefore the sum will be $96 + 96 \times 10 + 96 \times 100 + 96 \times 1000 = 1,06,656$.

(B) LETTER SYSTEM

Que. 6. How many arrangements can be made out of the letters of the word `DRAUGHT', the vowels never beings separated?

a. 1440 b. 720

c. 740 d. 750

Answer: A

Solution:

The word `DRAUGHT' consists of 7 letters of which 5 are consonants and two are vowels.

In the arrangement we are to take all the 7 letters but the restriction is that the two vowels should not be separated. We can view the two vowels as one letter.

The two vowels A and U in this one letter can be arranged in 2! =

2 ways. (i) AU or (ii) UA. Further, we can arrange the six letters: 5 consonants and one letter compound letter consisting of two vowels. The total number of ways of arranging them is 6P6 = 6! = 720 ways.

Hence, by the fundamental principle, the total number of arrangements of the letters of the word DRAUGHT, the vowels never being separated

= 2 × 720 = 1440 ways.

Que. 7. A person has ten friends of whom six are relatives. If h invites five guests 'SUCH' that three of them are his relatives, then the tot number of ways in which he can invite them are:

a. 30 b. 60
c. 120 d. 75

Answer: C

Solution:

Total Friend = 10

No. of Relative = 6

No. of Friend = 4

No. of ways to invite five guest such that three of them are his relatives.

$= {}^6C_3 \times {}^4C_2$

= 6x5x4x 4x3

= 3x2x1 2x1

=20 × 6 = 120

Que. 8. The number of words from the letter of word BHARAT, in which B and H will never come together, is

a. 360 b. 240
c. 120 d. None

Answer: B

Solution:

Given Word

B H A R A T

1 2 3 4 5 6

Total No. of ways arrange the letter of word = 6!/2!=720/2=360

If Letter 'B' and 'H' are never taken together

=360-120 =240

3. CIRCULAR PERMUTATION

Que. 9. m men and n women are to be seated in a row so that no two women sit together. If m>n, then the number of ways in which they can be seated is

a. $\frac{m!(m+1)!}{(m-n+1)!}$

b. $\frac{m!(m-1)!}{(m-n+1)!}$

c. $\frac{(m-1)!(m+1)!}{(m-n+1)!}$

d. none

Answer: A

Solution:

First arrange m men, in a row in m! ways. Since n<m and no two women can sit together, in any one of the m! arrangement, there are places in which n women can be arranged in

$$m+1_{P_n} = \frac{m!.(m+1)!}{\{(m+1)-n\}!} = \frac{m!(m+1)!}{(m-n+1)!}$$

Que. 10. 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?

a. 3 b. 6

c. 12 d. 18

Answer: D

Solution:

Using the given restrictions, we must have AB or AC and BC or BD.

Therefore, we have the following alternatives

A, B, C, D, E, F which gives (4 -1)! Or 31 ways.

ABD, C, E, F which gives (4 -1)!'Or 31 ways.

AC, DB, E, F which gives (4' -1) or 31 ways.

Hence, the total number of ways are

= 3! + 3! + 3!

= 6 + 6 + 6 = 18 ways

Que. 11. Find the number of ways in which 5 people A,B,C,D,E can be seated at a round table, such that: A and B must always sit together.

a. 20 b. 22

c. 12 d. 56

Answer: C

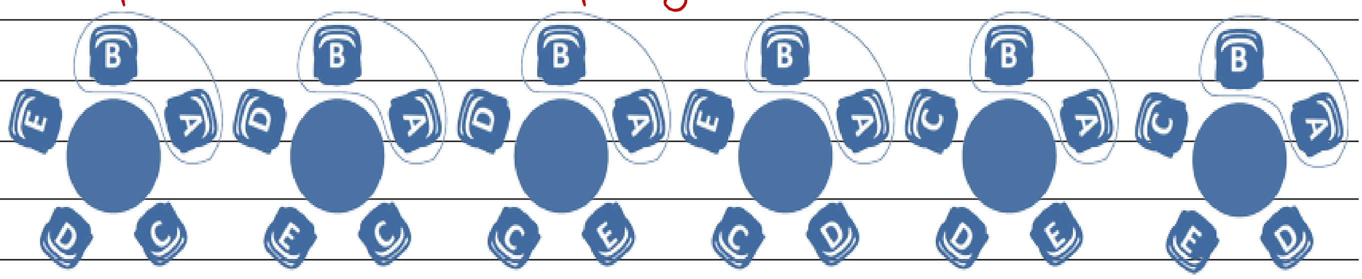
Solution:

If we wish to seat A and B together in all arrangements, we can, consider these two as one unit, along with 3 others.

So effectively we've to arrange 4 people in a circle, the number of ways being (4 – 1)! Or 6.

But in each of these arrangements, A and B can themselves interchange places in 2 ways

Therefore, the total number of ways will be 6 x 2 = 12.



Que. 12. In how many ways can the top 3 ranks be awarded for a particular Exam/competition involving 12 participants?

a. 85 ways b. 1320 ways.

c. 1230 ways d. none

Answer: C

Solution:

There are 12 participants and 3 ranks, hence if a person secures the first rank then he cannot get the second rank,

Likewise, if a person secures the second rank he cannot secure the third rank. So, 12 x 11 x 10 = 1320 ways.

Therefore, there are 1230 ways in which the top 3 ranks can be awarded.

4. COMBINATION

Que. 13. $\mathbf{1000_{C_{98}} - 999_{C_{97}} + x_{C_{901}}, \textit{Find } x}$:

a. 999 b. 998

c. 997 d. 1000

Answer: A

Solution:

If $\mathbf{1000_{C_{98}} - 999_{C_{97}} + x_{C_{901}}}$

$\therefore \mathbf{n_{C_r} + n_{C_{r-1}} = n + 1_{C_r}}$

Then $\mathbf{x = 999[999_{C_{901}} + 999_{C_{98}}]}$

Que. 14. The number of triangle that can be formed by choosing the vertices from a set of 12 points, seven of which lie on the same straight line, is:

a. 185 b. 175

c. 115 d. 105

Answer: A

Solution:

Here n=12, k=7

No. of triangle are formed from 'n' point

In which (k) points are collinear = n_{C_3}-k_{C_3}

$12_{C_3} - 7_{C_3}$

$\frac{12 \times 11 \times 10}{3 \times 2 \times 1} - \frac{7 \times 6 \times 5}{3 \times 2 \times 1}$

=220-35 =185

Que. 15. A boy has 3 library tickets and 8 books of his interest in the library of these 8, he does not want to borrow Mathematics part-II unless Mathematics part-I is also borrowed? In how many ways can he choose the three books to be borrowed?

a. 41 b. 51

c. 61 d. 71

Answer: A

Solution:

There are two cases possible

CASE 1: When Mathematics Part - II is borrowed (i.e. it means Mathematics Part-I has also been borrowed) Number of ways = 6C1 = 6 ways

CASE 2: When Mathematics part-II is not borrowed (i.e. 3 books are to be selected out of 7) Number of ways = 7C3 = 35 ways

Therefore, total number ways 35 + 6 = 41 ways

Que. 16. An examination paper consists of 12 questions divided into 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 from each part. In how many maximum ways can the candidate select the questions?

a. 35
b. 175
c. 210
d. 420

Answer: D

Solution:

The candidate can select 8 Questions.by selecting at last" three from each part in the following ways: 3 questions from part A and 5 questions from part B = 7 C 3 x 5C 5 = 35 ways 4 questions from part A and part B each = 7C4 x 5C4 = 175 ways.

Questions from part A and 3 questions from part B• = 7C5 x 5C3 = 210 ways.

Hence, the total number of ways in which the candidate can select the question will be = 35 + 175 + 210 = 420 ways

1. SEQUENCE

Que. 1. A sequence of odd positive integers within 11 is

a. 1,3,5,7,9 b. 2,4,6,10

c. Both d. None

Answer: A

Solution:

A sequence of odd positive integers within 11 is 1,3,5,7,9

Que. 2. A sequence of numbers is called?

a. geometric progression b. Arithmetic Progression (AP)

c. Harmonic Progression (HP) d. All

Answer: D

Solution:

Harmonic Progression (HP)

A sequence of numbers is called a harmonic progression if the reciprocal of the terms are in AP. In simple terms, a,b,c,d,e,f are in HP if 1/a, 1/b, 1/c, 1/d, 1/e, 1/f are in AP.

Arithmetic Progression (AP)

A sequence of numbers is called an arithmetic progression if the difference between any two consecutive terms is always same.

Geometric Progression (GP)

A sequence of numbers is called a geometric progression if the ratio of any two consecutive terms is always same.

2. SERIES

Que. 3. Find the sum of the series -2, 6, -18.....7 terms?

a. 1554 b. -1094

c. 1094 d. -8223

Answer: B

Solution:

Here $a = -2, r = -3, n = 7$

$S_n = a.(1 - r^n) / (1 - r)$ when $r<1$

$S_7 = (-2) [1 - (-3)^7] / [1 - (-3)]$

$= (-2)(1 + 2187) / 4$

$= (-2)(2188) / 4$

$S_7 = -1094$

Que. 4. If the sum of n terms of an AP is $3n^2-n$ and its common difference is 6, then its first term is:

a. 3 b. 2

c. 1 d. 4

Answer: C

Solution:

Given $S_n = (3n^2-n)$

$n=1, S_1 = 3(1)^2-1=3-1=2$

$n=2, S_2=3(2)^2-1=12-1=11$

$n=3, S_3=3(3)^2-1=27-1=26$

$T_1=S_1= 2$

$T_2=S_2= 2 -S_1= 11-2= 9$

$T_3=S_3-S_2= 26-11= 15$

First term of series

$T_1=2$

3. ARITHMETIC PROGRESSION

Que.5. If 5th and 12th terms of an A.P. are 14 and 35 respectively, find the A.P.

a. 2, 5, 8, 11, 14,...............

b. 2, 3, 8, 11, 12,..............

c. 2, 3, 4, 11, 14,..............

d. 2, 5, 8, 1, 4,..............

Answer: A

Solution:

Let a be the first term & d be the common difference of A.P.

$t_5 = a + 4d = 14$

$t_{12} = a + 11d = 35$

On solving the above two equations,

$7d = 21$ =i.e., $d = 3$

and $a = 14 - (4 \times 3) = 14 - 12 = 2$

Hence, the required A.P. is 2, 5, 8, 11, 14, ...

Que.6. The 10th term of an A. P. is – 15 and 31st term is –57, find the 15th term.

a. -20 b. 20

c. -25 d 25

Answer: C

Solution:

Let a be the first term and d be the common difference of the A. P.

Then from the formula:

$t_n = a + (n - 1)\ d$, we have

$t_{10} = a + (10 - 1)\ d = a + 9d$ $t_{31} = a + (31 - 1)\ d = a + 30\ d$

We have,

$a + 9d = -15$ ...(1)

$a + 30d = -57$...(2)

Solve equations (1) and (2) to get the values of a and d.

Subtracting (1) from (2),we have

$21d = -57 + 15 = -42$

Again from (1), $a = -15 - 9d = -15 - 9\ (-2) = -15 + 18 = 3$

Now $t_{15} = a + (15-1)d = 3 + 14(-2) = -25$

Que.7. Which term of the A. P.: 5, 11, 17 ... is 119?

a. $n = 20$
b. $n = 2$
c. $n = 30$
d. $n = 19$

Answer: A

Solution:

Here $a = 5$, $d = 11-5 = 6$

$t_n = 119$ We know that

$t_n = a + (n-1)d$ $119 = 5 + (n-1) \times 6$

$(n-1) = (119-5)/6 = 19$

$n = 20$,

Therefore, 119 is the 20th term of the given A. P.

Que.8. The sum of the series -8,-6, -4...n terms is 52. The number of terms n is:

a. 11
b. 12
c. 13
d. 10

Answer: C

Solution:

Given series

-8, -6,-4, ... n term

Let term $(a) = -8$

Common difference $(d) = (-6) - (-8)$

$= -6+8 = 2$

Sum of 'n' term $(S_n) = 52$, $n = ?$

We know that $S_n = n/2(2a+(n-1)d)$

$52 = \frac{n}{2}[2 \times (-8) + (n-1)(2)]$

$104 = n[2n-18]$

$104 = 2n^2 - 18n$

$2n^2-18n-104=0$

$n^2-9n-52=0$

$(n-13)\ (n+4)=0$

If $n-13=0 \rightarrow n=13$ and $n+4=0 \rightarrow n=-4$

Que.9. If the P^{th} term of an A.P. is 'q' and the q^{th} term is 'p', then its r^{th} term is

a. $p+q-r$

b. $P+q+r$

c. $p-q-r$

d. $p-q$

Answer: A

Solution:

Let 1^{st} term of AP is 'a' And common difference is 'd'

Given $T_p=q$

$a+(p-1)d=q$

$a+pd-d=q$ ________________ (i)

and $T_p=P$

$a+(q-1)d=p$

$a+qd-d=p$ ________________ (ii)

equation (i) and equation (ii)

$a+pd-d=p$

$a+qd-d=p$

$\underline{\ \ -\ \ -\ \ +\ \ -\ \ }$

$Pd-qd=q-p$

$d(p-q)=-(p-q)$

$d=-1$

Putting $d=-1$ in equation (i)

$a+p(-1)-(-1)=q$ $a-p+1=q$ $a=p+q-1$

Then, $T_r=a+(r-1)d$

$=p+q-1+(r-1)(-1)$

=p+q-1-r+1

4. GEOMETRIC PROGRESSION

Que.10. Which term of the G. P.: 5, –10, 20, – 40, ... is 320?

a. 7^{th} b. 8^{th}

c. 10^{th} d. 1^{st}

Answer: A

Solution:

In this case, $a = 5; r = \frac{-10}{5} = -2$.

Suppose that 320 is the nth term of the G. P. By the formula ,

$t\,n = ar^{n-1}$, we get

$t_n = 5.\,(-2)^{n-1}$

$\therefore 5.\,(-2)^{n-1} = 320$ (Given)

$\therefore (-2)^{n-1} = 64 = (-2)^6$

$\therefore n - 1 = 6$

$\therefore n = 7$

Hence, 320 is the 7th term of the G. P.

Que.11. The sum of three numbers in a GP is 26 and their product is 216. and the numbers.

a. 2, 6 and 18 b. 3, 7, and 11

c. Both d. None of these

Answer: C

Solution:

Let the numbers be a/r, a, ar.

=> $(a / r) + a + a\,r = 26$

=> $a(1 + r + r^2) / r = 26$

Also, it is given that product = 216

=> $(a / r) \times (a) \times (a r) = 216$

=> $a^3 = 216$

=> $a = 6$

=> $6(1 + r + r^2) / r = 26$

=> $(1 + r + r^2) / r = 26 / 6 = 13 / 3$

=> $3 + 3r + 3r^2 = 13r$

=> $3r^2 - 10r + 3 = 0$

=> $(r - 3)(r - (1/3)) = 0$

=> $r = 3$ or $r = 1/3$

Thus, the required numbers are 2, 6 and 18.

Que.12. Find the sum of 1st 8 terms of G.P series1+2+4+8+……

a. 155 b. 255

c. 185 d. -822

Answer: B

Solution:

Here $a = 1$, $r = 2$, $n = 8$

$S_n = a.(r^n - 1) / (r - 1)$ when $r > 1$

$S_8 = 1.(2^8 - 1) / (2 - 1)$

$= 1(256 - 1) = 255$

Thus $S_8 = 255$

Que.13. If n geometric means between a and b be $G_1, G_2, \ldots G_n$ and a geometric mean be G, then the true relation is

a. $G_1, G_2, \ldots G_n = G$ b. $G_1, G_2, \ldots G_n = G^{1/n}$

c. $G_1, G_2, \ldots G_n = G^n$ d. None

Answer: C

Solution:

Here $G = (a\,b)^{\frac{1}{2}}$ and

$G_1 = ar^1, G_2 = ar^2, \ldots\ldots G_n = ar^n$. Therefore

$G_1.G_2.G_3 \ldots\ldots G_n = a^n\,r^{1+2+\cdots+n} = a^n r^{n(n+1)/2}$ but

$ar^{n+1} = b$

$r = \left(\frac{b}{a}\right)^{\frac{1}{n+1}}$

Therefore, the required product is $a^n \left(\frac{b}{a}\right)^{\frac{1}{l(n+1)}.n(n+1)2}$

$= (ab)^{\frac{n}{2}}$

$= \left\{(ab)^{\frac{1}{2}}\right\}^n$

$= G^n$

Note: It is a well-known fact.

1. SET

Que.1. If A={1,2,3,4,5,6,7} and s= {2,4,6,8}. Cardinal number of A – B is:

a. 4 b. 9
c. 9 d. 7

Answer: A

Solution:

A = {1,2,3,4,5,6,7}

B = {2,4,6,8}

A-B = {1,2,3,4,5,6,7} - {2,4,6,8}

= {1,3,5,7}

n (A-B) = 4

Que.2. If A= {1, 2} and B:;: {3, 4}. Determine the number of relations from A and B

a. 3 b. 16
c. 5 d. 6

Answer: B

Solution:

Given A ={1,2}

B ={3,4}

A x B = {1,2} x {3,4}

= {(1,3) (1,4) (2,3) (2,4)}

n(AxB) = 4

No. of relation from A and B = 2"

= 2^4 = 16 or A liter Shortcut:

A = {1,2} , n (A) = 2

B = {3,4}, n (B) = 2

No. of Relation from A and B = 2m*n

= 2 2*2 =2 4 = 16

Que.3. The Cartesian Product B x A is equal to the Cartesian product A x B. Is it True or False?

a. True b. False

c. partial true d. not sure

Answer: B

Solution:

Let A = {1, 2} and B = {a, b}.

The Cartesian product A x B = {(1, a), (1, b), (2, a), (2, b)}

and the Cartesian product B x A = {(a, 1), (a, 2), (b, 1), (b, 2)}.

This is not equal to A x B.

Que.4. The numbers of proper sub set of the set {3,4,5,6,7} is:

a. 32 b. 31

c. 30 d. 25

Answer: B

Solution:

Given

A = {3, 4, 5, 6, 7}

n(A)'=5

No. of proper subset = $2^n-1 = 2^5-1$

= 32-1

= 31

2. DE' MORGAN'S LAW

Que.5. If A and B be any two sets, then (A∩B)' is equal to

a. A'∩B' b. A'UB'

c. A∩B d. AUB

Answer: D

Solution:

From De' Morgan's law, $(A \cap B)' = A' \cup B'$

Que.6. If $A = \{1, 2, 3, 4, 5\}$, $B = \{2, 4, 6\}$, $C = \{3, 4, 6\}$, then $(A \cup B) \cap C$ is

a. $\{3, 4, 6\}$ b. $\{1, 2, 3\}$

c. $\{1, 4, 3\}$ d. None of these

Answer: A

Solution:

$A \cup B = \{1,2,3,4,5,6\}$ \ $(A \cup B) \cap C = \{3,4,6\}$

3. VENN DIAGRAMS

Que.7. Let A and B be two sets then $(A \cup B)' \cup (A' \cap B)$ is equal to

a. A' b. A

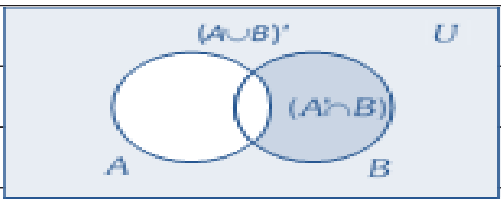
c. B' d. None of these

Answer: A

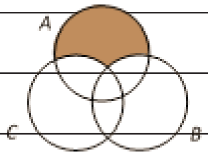
Solution:

From Venn-Euler's Diagram,

$\therefore (A \cup B)' \cup (A' \cap B) = A'$



Que.8. The shaded region in the given figure is



a. $A \cap (B \cup C)$ b. $A \cup (B \cap C)$

c. $A \cap (B - C)$ d. $A - (B \cup C)$

Answer: D

Solution:

From Venn-Euler's diagram, $A - (B \cup C)$

3. FUNCTION

Que.9. Identity the function from the following:

a. {(1,1), (1,2), (1,3)}

b. {(1,1), (2,1), (2,3)}

c. {(1,2), (2,2), (3,2),(4,2)}

d. None of these

Answer: C

Solution:

{(1,2) (2,2) (3,2) (4,2)} is the function Many one function

Que.10. Let N be the set of all natural numbers; E be the set of all even natural numbers then the function F:N = E defined as f(x) = 2x-VxEN is =

a. One-one-into

b. Many-one-into

c. One-one onto

d. Many-one-onto

Answer: C

Solution:

Given

N = {1, 2, 3, 4,5,6 ....:...... oo}

E = {2, 4, 6, 8, ... oo}

F:N→E

VXEN

f(x) =,-2x

f(1) = 2 X 1 = 2

f(2) = 2 X 2 = 4

f(3) = 2 X 3 = 6

Range of function = {2,4,6,.......} = E

and / (x1) = f (x2)

$2X_1 = 2X_2 = X_2$

So f(x) function is one-one and one to.

Que.11. Identity the function from the following:

a. {(1,1), (1,2), (1,3)}

b. {(1,1), (2,1), (2,3)}

c. {(1,2), (2,2), (3,2).,(4,2)}

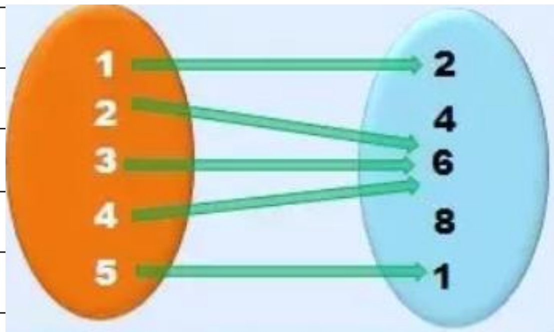
d. None of these

Answer: C

Solution:

{(1,2) (2,2) (3,2) (4,2)}

is the function Many one function



DIFFERENTIAL COEFFICIENT

1. DIFFERENTIAL COEFFICIENT

Que.1. $\lim_{n\to\infty} \frac{1^P+2^P+3^P+\cdots..+n^P}{n^{P+1}}$

a. $\frac{1}{p=1}$

b. $\frac{1}{1-p}$

c. $\frac{1}{p}-\frac{1}{p-1}$

d. None

Answer: A

Solution:

$$\lim_{n\to\infty} \frac{1^p+2^p+3^p+\ldots\ldots+n^p}{n^{p+1}} = \lim_{n\to\infty} \sum_{r=1}^{n}\left[\frac{r^p}{n^{p+1}}\right]$$

=

$$\lim_{n\to\infty} \frac{1}{n}\sum_{r=1}^{n}\left(\frac{r}{n}\right)^p = \int_0^1 x^p dx = \left[\frac{x^{p+1}}{p+1}\right]_0^1 = \frac{1}{p+1}.$$

Que.2. $\lim_{n\to\infty}\left[\frac{1}{n}+\frac{1}{n+1}+\frac{1}{n+2}+\cdots+\frac{1}{2n}\right] =$

a. 0

b. $Log_e 4$

c. $Log_e 3$

d. $Log_e 2$

Answer: D

Solution:

$$\lim_{n\to\infty}\left[\frac{1}{n}+\frac{1}{n+1}+\frac{1}{n+2}+\cdots+\frac{1}{2n}\right]$$

$$= \frac{1}{n}\lim_{n\to\infty}\left[1+\frac{1}{1+\frac{1}{n}}+\frac{1}{1+\frac{2}{n}}+\cdots+\frac{1}{1+\frac{n}{n}}\right]$$

$$\frac{1}{n}\lim_{n\to\infty}\sum_{r=0}^{n}\left[\frac{1}{1+\frac{r}{n}}\right]$$

$$\int_0^1 \frac{1}{1+x}dx$$

$[\log_e(1+x)]_0^1$ => $\log_e 2 - \log_e 1 = \log_e 2$

2. DERIVATIVE OF A FUNCTION OF FUNCTION

Que.3. Differentiate log $(1 + x^2)$ wrt. x

a. $\frac{2x}{(1+x^2)}$ b. $\frac{2x}{(1-x^2)}$

c. $\frac{2x}{(1+x)}$ d. None

Answer: A

Solution:

Let $y = \log(1 + x^2) = \log t$ when $t = 1 + x^2$

$$\frac{dy}{dx} = \frac{dy}{dt}\frac{dt}{dx} = \frac{1}{t} \times (0 + 2x) = \frac{2x}{t} = \frac{2x}{(1 + x^2)}$$

The rule is called Chain Rule

3. IMPLICIT FUNCTIONS

Que.4. The value of $\int_1^2 \frac{1-x}{1+x} dx$ is equal to:

a. $\log\frac{3}{2} - 1$ b. $2\log\frac{3}{2} - 1$

c. $\frac{1}{2}\log\frac{3}{2} - x$ d. $\frac{1}{2}\log\frac{3}{2} - 1$

Answer: B

Solution:

$$\int_1^2 \left(\frac{1-x}{1+x}\right) dx = \int_1^2 \left(\frac{1}{1+x} - \frac{x}{1+x}\right) dx$$

$$\int_1^2 \frac{1}{1+X} dx - \int_1^2 \frac{x}{x+1} dx$$

$$\int_1^2 \frac{1}{1+x} dx - \int_1^2 \left(\frac{1+x-1}{1+x}\right) dx$$

$$\int_1^2 \frac{1}{(1+x)} dx - \int_1^2 \left(\frac{1}{1+x}\right) dx$$

$$\int_1^2 \frac{1}{1+x}dx - \int_1^2 1 \times dx + \int_1^2 \frac{1}{1+x}dx$$

$$2\int_1^2 \frac{1}{1+x} - \int_1^2 1\,dx$$

$2[log(1+x)]_1^2 - [x]_1^2$

$2[\log(2+1) - \log(1+1)] - [2-1]$

2[log3-log2]-1

$$2log\frac{3}{2} - 1$$

4. LOGARITHMIC DIFFERENTIATION

Que.5. The rate of increase of bacteria in a certain culture is proportional to the number present. If it double in 5 hours then in 25 hours, its number would be

a. 8 times the original
b. 16 times the original
c. 32 times the original
d. 64 times the original

Answer: C

Solution:

Let Pe be the initial population and let the population after t years be p

Then $\frac{dp}{dt} = kp = \frac{dp}{p} = kdt$

On intergrating we have log P=kt+log Po

Log Po = kt

When t = 5 hrs, p = 2Po

Log $\frac{2Po}{po} = 5k = k = \frac{log2}{5} : \log\frac{p}{Po} = \frac{log2}{5}t$

$\left(\frac{dy}{dx}\right)^2$ $y\left(\frac{dy}{dx}\right)^3 - x^2\left(\frac{dy}{dx}\right)^2 + xy\left(\frac{dy}{dx}\right)^1 - \frac{y^2}{4} - 0$When T=25 hours, we have

$$\log\frac{p}{Po} = \frac{\log 2}{5}X25 = 5\log 2 = \log 32 : p = 32Po$$

5. DEGREE OF DIFFRENTIAL EQUATION

Que.6.The degree of the differential equation $3\frac{d^2y}{dx^2} = \{1 + \left(\frac{dy}{dx}\right)^2\}^{3/2}$

a. 1 b. 2

c. 3 d. 6

Answer: B

Solution:

$$3\frac{d^2y}{dx^2} = \left\{1 + \left(\frac{dy}{dx}\right)^2\right\}^{\frac{3}{2}}$$

On Square we get,$9\left(\frac{d^2y}{dx^2}\right)^2 = \left\{1 + \left(\frac{dy}{dx}\right)^2\right\}^3$

Obviously the Highest derivative $\frac{d^2y}{dx^2}$

Que.7. The differential equation representing the family of curves $y^2=2c(x+\sqrt{c})$,where c is a positive parameter, is of

a. Order 1 b. Order 2

c. Degree 2 d. Degree 4

Answer: A

Solution:

Given curve is $y^2=2c(x+\sqrt{c})$

Differentiate w.r.t.x, $2y\frac{dy}{dx} = 2c = c = y\frac{dy}{dx}$

Hence Differencial Equation is $y^2 = 2y\frac{dy}{dx}\left(x + \sqrt{y\frac{dy}{dx}}\right)$

$y\frac{2dy}{dx} - x\sqrt{y\frac{dy}{dx}}$ Squaring and Multiplying By

$\left(\frac{dy}{dx}\right)^2 \quad y\left(\frac{dy}{dx}\right)^3 - x^2\left(\frac{dy}{dx}\right)^2 + xy\left(\frac{dy}{dx}\right)^1 - \frac{y^2}{4} - 0$

6. PARAMETRIC EQUATION

Que.8. $\int_0^2 \frac{3^{\sqrt{x}}}{\sqrt{x}}$ is equal to

a. $\frac{\sqrt[2]{2}}{\log_e 3}$

b. 0

c. $\frac{2(3\sqrt{2}-1)}{\log_e 3}$

d. $\frac{3\sqrt{2}}{\sqrt{2}}$

Answer: C

Solution:

$\int_0^2 \frac{3^{\sqrt{x}}}{\sqrt{x}} dx$

Let $\sqrt{x} = t$

$\int_0^2 3^{\sqrt{x}}.\frac{1}{\sqrt{x}} dx \quad \frac{1}{2\sqrt{x}} dx = dt$

$\frac{1}{\sqrt{x}} dx = 2dt$

X	0	2
t	0	$\sqrt{2}$

$\int_0^{\sqrt{2}} 3^t.2dt \quad = \int_0^{\sqrt{2}} 3^t dt$

$\left[\frac{3^t}{\log 3}\right]_0^{\sqrt{2}} \quad = 2\left[\frac{3^{\sqrt{2}}}{\log 3} - \frac{3^0}{\log 3}\right]$

$\frac{2\left(3^{\sqrt{2}} - 3^0\right)}{\log_e 3}$

Que.1.Frequency density is used in the construction of

a. Histogram
b. Ogive
c. Frequency polygon
d. None when the classes are of unequal width

Answer: A

Solution:

Frequency density is used in the construction of Histogram

Que.2.Which of the following is not a measure of central tendency?

a. Mean
b. Median
c. Mode
d. Standard deviation

Answer: D

Solution:

Mean, median and mode are the measures of central tendency.

Que.3.The following frequency distribution is classified as:

X	12	17	24	36	45
F	2	5	3	8	9

a. Continuous distribution
b. Discrete distribution
c. Cumulative frequency distribution
d. None of the above

Answer: D

Solution:

X	12	17	24	36	45
F	2	5	3	8	9

is classified as Discrete distribution.

Que.4. An ogive is a graphical representation of

a. Cumulative frequency distribution
b. A frequency distribution
c. Ungrouped data
d. None of the above

Answer: A

Solution:

An 'O' give is a graphical representation of cumulative frequency distribution.

Que.5.

Class	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
Frequency	4	6	20	8	3

For the class 20-30. Cumulative frequency is:

a. 10 b. 26

c. 30 d. 41

Answer: C

Solution:

C.I	F	C. F
0-10	4	4
10-20	6	10
20-30	20	30
30-40	8	38
40-50	3	

Cumulative frequency of Class Interval '20-30' is 30

MEASURES OF CENTRAL TENDENCY

1. ARITHMETIC MEAN

(A) COMBINED MEAN

Que.1. The mean salary for a group of 40 female workers is Rs.5200 per month and that for a group of 60 male workers is Rs.6800 per month. What is the combined mean salary?

a. 6160 b. 616

c. 6.16 d. 61.6

Answer: A

Solution:

As given $n_1 = 40$, $n_2 = 60$,

x_1 = Rs.5200 and x_2 = Rs.6800

hence, the combined mean salary per month is

$$\bar{X} = \frac{n_1x_1+n_2x_2}{n_1+n_2}$$

=6160

Que.2. Find the AM for the following distribution:

Class Interval	350-369	370-389	390 – 409	410 – 429	430 – 449	450 – 469	470 – 489
Frequency	23	38	58	82	65	31	11

a. 416 b. 416.17

c. 416.71 d. 41.71

Answer: C

Solution:

Computation of AM

Class Interval	Frequency (f)	Mid-Value (x)	d= xi-A xi= -419.50	fd
(1)	(2)	(3)	(4)	(5) = (2)X(4)
350 – 369	23	359.50	– 3	– 69
370 – 389	38	379.50	– 2	– 76
390 – 409	58	399.50	– 1	– 58
410 – 429	82	419.50 (A)	0	0
430 – 449	65	439.50	1	65
450 – 469	31	459.50	2	62
470 – 489	11	479.50	3	33
Total	308	-	-	– 43

The required AM is given by

$X = A + \frac{\sum fidi}{N} \times c$

$= 419.50 + \frac{(-43)}{308} \times 20$

$= 419.50 - 2.79$

$= 416.71$

(B) MISSING VALUE

Que.3. If the mean of five observations x, x + 4, x + 6, x + 8 and x + 12 is 16, find the value of x

a. 154 b. 54

c. 451 d. 541

Answer: C

Solution:

Mean of the given observations

$= x + (x + 4) + (x + 6) + (x + 8) + (x + 12)/5$

= (5x + 30)/5 According to the problem, mean = 16 (given).

Therefore, (5x + 30)/5 = 16

⇒ 5x + 30 = 16 × 5 ⇒ 5x + 30 = 80

⇒ 5x + 30 - 30 = 80 - 30

⇒ 5x = 50 ⇒ x = 50/5

⇒ x = 10

Hence, x = 10.

148 + 153 + 146 + 147 + 154

(C) CORRECTED MEAN

Que.4. The mean of 40 numbers was found to be 38. Later on, it was detected that a number 56 was misread as 36. Find the correct mean of given numbers.

a. 38.5 b. 0.369

c. 3.25 d. 3.85

Answer: C

Solution:

Calculated mean of 40 numbers = 38.

Therefore, calculated sum of these numbers = (38 × 40) = 1520

Correct sum of these numbers

= [1520 - (wrong item) + (correct item)]

= (1520 - 36 + 56)

= 1540.

Therefore, the correct mean = 1540/40 = 38.5.

(D) REPLACING VALUE

Que.5. Mean of twenty observations is 15. If two observations 3 and

14 replaced by 8 and 9 respectively, then the new mean will be

a. 14 b. 15

c. 16 d. 17

Answer: D

Solution:

Mean of 20 observations =15

∴Sum of 20 observations =15×20=300

Replacing 3 and 14 by 8 and 9 will mean that 3+14=17is replaced by 8+9=17

Hence there will be no effect on the sum. It will still remain 300, so the mean will not change and will remain 15.

(E) GEOMETRIC MEAN

Que.6. The Geometric mean of 3, 6, 24 and 48 is

a. 8 b. 12

c. 24 d. 6

Answer: B

Solution:

G.M. $= (x_1 X_2 . X_3 . X_4)$ 1/4

Here, n = 4}

$(3 \times 6 \times 24 \times 48)^{1/4}$

$\sqrt{(3\times6\times24\times48)}$

$=\sqrt[4]{(3\times3\times2\times2\times2\times2\times3\times2\times2\times2\times2\times3)}$

= 2x2x3

= 12

2. MEDIAN

(A) REPLACING VALUE

Que.7. The height of 30 boys of a class are given in the following table:

Height in cm	Frequency
120 – 129	2
130 – 139	8
140 – 149	10
150 – 159	7
160 – 169	3

If by joining of a boy of height 140 cm, the median of the heights is changed from M_1 to M_2 then M_1-M_2 in cm is

a. 0.1 b. -0.1

c. 0 d. 0.2

Answer: C

Solution:

Height In cms	Frequency	Cumulative Frequency	Actual Class limit
120 - 129	2	2	119.5−129.5
130 - 139	8	10	129.5−139.5
140 - 149	10	20	139.5−149.5
150 - 159	7	27	149.5−159.5
160 - 169	3	30	159.5−169.5
$n = 30$			

Here $n = 30$ $\therefore \frac{n}{2} + 1 = 15 + 1 = 16$

∴ 16 is under cumulative frequency 20. So median class be 140−149 $L_1 = 139.5$, $L_2 = 149.5$, f=10,n=30,c=10.

Median $M_1 = L_1 + \frac{L_2-L_1}{f}\left(\frac{n}{2} - c\right)$

$= 139.5 + \frac{10}{10}(15 - 10)$

$=139.5 + \frac{10}{10} \times 5 = 144.5$

If by joining f a boy of height 140 cms, the n=31,f=11

∴Median $M_2 = 139.5 + \frac{149.5-139.5}{11}(15.5 - 10)$

$= 139.5 + \frac{10}{11} \times 5.5 = 144.5$ cms

Then M_1-M_2 = 144.5-144.5 = 0

Que.8. The mean of 20 items of data is 5 and if each item is multiplied by 3, then the new mean will be

a. 5 b. 10

c. 15 d. 20

Answer: C

Solution:

By shifting the scale Mean is changed

New Mean = K x original Mean = 5

k = 3

New Mean =3x5 = 15

3. MODE

Que.9. Identify the mode of the given distribution.

Marks	4	5	6	7	8
Number of Students	3	5	10	6	1

a. 7 b. 1

c. 8 d. 6

Answer: D

Solution:

Mode is 6 as it has the highest frequency

Que.10. Find the mode for the following data.

Age	0-6	6-12	12-18	18-24	24-30	30-36	36-42
Frequency	6	11	25	35	18	12	6

a. 19.41 b. 21.12

c. 20.14 d. 20.22

Answer: D

Solution:

Since, maximum class frequency is 35, so the mode class is $18-24$.

Now, Mode $= L + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$

$18 + \left(\frac{35-25}{2\times35-25-18}\right) \times 6$

$= 18 + 2.22 = 20.22$

4. RELATION OF MEAN MEDIAN & MODE

Que.11. Relationship between Mean, Median and Mode

a. Mean – Mode = 3(Mean – Median)

b. Mode = 3 Median – 2 Mean

c. Both

d. None of these

Answer: C

Solution:

If a frequency distribution is positively skewed, the mean is greater than median and median is greater than mode.

Que.12. If median – 20 , and mean-22.5 in a moderately skewed distribution then compute approximate value of mode

a. 15 b. 20

c. 25 d. 30

Answer: A

Solution:

Mean – Mode =3(Mean-Median)

22.5 – Mode = 3(22.5 – 20)

22.5 – Mode = 7.5

Mode =22.5 – 7.5

Mode = 15

Que.13. Median and mode of the wage distribution are known to be Rs. 33.5 and 34 respectively. Find the third missing values.

Wages (Rs.)	No. of Workers
0 – 10	4
10 – 20	16
20 – 30	?
30 – 40	?
40 – 50	?
50 – 60	6
60 – 70	4
Total	230

a. 6 b. 10

c. 9 d. 60

Answer: D

Solution:

We assume the missing frequencies as 20 – 30 as x, 30 – 40 as y, and

40 – 50 as 230 – (4 + 16 + x + y + 6 + 4) = 200 – x – y.

We now proceed further to compute missing frequencies:

Wages (Rs.) x	No. of workers f	Cumulative frequencies cf
0 – 10	4	4
10 – 20	16	20
20 – 30	x	20 + x
30 – 40	y	20 + x + y
40 – 50	200 – x – y	220
50 – 60	6	226
60 – 70	4	230
	N = 230	

Apply, Median

$= 33.5 = y(33.5 - 30) = (115 - 20 - x)10$

$3.5y = 1150 - 200 - 10x$

$10x + 3.5y = 950$ ...(i)

Apply, Mode = 34

$= 4(3y - 200) = 10(y - x)$

$10x + 2y = 800$ ...(ii)

Subtract equation (ii) from equation (i),

$1.5y = 150,\ y = 15$

Substitute the value of $y = 100$ in equation (i),

we get

$10x + 3.5(100) = 950$

$10x = 950 - 350$

$x = 600/10 = 60$

Third missing frequency $= 200 - x - y = 200 - 60 - 100 = 40$.

Que.14.

If in a moderately skewed distribution the values of mode and mean are 32.1 and 35.4 respectively, then the value of the median is

a. 34.3 b. 33.3

c. 34 d. 33

Answer: A

Solution:

Given:

Mode = 32.1,

Median =?

Mean= 35.4

Mode = 3 Median - 2 Mean

32.1 = 3 Median - 2 x 35.4

32.1 = 3 Median - 70.8 3

Median = 32.1 + 70.8 3 Median = 102.9

=> Median $\frac{102.9}{3}$=34.3

DISPERSION

1. RANGE

Que.15. What is the coefficient of Range for the following distribution of weights?

Weights in kgs:	50 – 54	55 – 59	60 – 64	65 – 69	70 – 74
No. of Students:	12	18	23	10	3

a. 20 b. 21

c. 20.16 d.40.34

Answer: C

Solution:

The lowest class boundary is 49.50 kgs.

and the highest class boundary is 74.50 kgs.

Thus we have Range = 74.50 kgs. – 49.50 kgs. = 25 kgs.

$$= \text{coefficient of Range} = \frac{74.50 - 49.50}{74.50 + 49.50} \times 100$$

$$= \frac{25}{124} \times 100$$

=20.16

2. MEAN DEVIATION

Que.16. What is the mean deviation about mean for the following numbers? 5, 8,

a. 1.74, 123
b. 1.67, 12.45
c. 1.8, 989
d. 1.47, None

Answer: B

Solution:

The mean is given by

$$\bar{X} = \frac{5+8+10+10+12+9}{6}$$

= 9

Computation of MD about AM

X_i	$X_i - X$
5	4
8	1
10	1
10	1
12	3
9	0
Total	10

Thus mean deviation about mean is given by

$x_i - x = \frac{\sum 10}{6}$

$= 1.67$

coefficient of mean deviation $= \frac{\text{MD about Median}}{\text{Median}} \times 100$

$\frac{8714.28}{70000} \times 100$

$=12.45$

3. QUARTILE DEVIATION

Que.17. The wheat production (in Kg) of 20 acres is given as:, 1320, 1040, 1080, 1200, 1440, 1360, 1680, 1730, 1785, 1342, 1960, 1880, 1755, 1720, 1600, 1470, 1750, 1120, 1240 and 1885. Find the quartile deviation.

a. 246.875

b. 246

c. 246.89

d. 1750

Answer: A

Solution:

After arranging the observations in ascending order, we get 1040, 1080, 1120, 1200, 1240, 1320, 1342, 1360, 1440, 1470, 1600, 1680, 1720, 1730, 1750, 1755, 1785, 1880, 1885, 1960.

Q1=Value of $(\frac{n+1}{4})$th item

=Value of $\left(\frac{20+1}{4}\right)$th

=Value of (5.25)th item

=5th item+0.25(6th item−5th item)=1240+0.25(1320−1240)

Q1=1240+20=1260

Q3=Value of $3(\frac{n+1}{4})$th item

=Value of $3\left(\frac{20+1}{4}\right)$th item

=Value of (15.75)th item

=15th item+0.75(16th item−15th item)=1750

Q3=1750+3.75=1753.75

$$Q.D. = \frac{Q_3 - Q_1}{2} = \frac{1753.75 - 1260}{2} = \frac{492.75}{2}$$

=246.875

4. STANDARD DEVIATION

Que.18. If the S.D. of the 1st n natural Nos. is √30, Then the value of n is

a. 19 b. 20

c. 21 d. None

Answer: A

Solution:

S.D of First 'n' natural

$$= \sqrt{\frac{n^2 - 1}{12}}$$

$$\sqrt{30} = \sqrt{\frac{n^2 - 1}{12}}$$

On squaring both side $30 = \frac{n^2-1}{12}$

Numbers360 = n^2-1

n^2 = 360 + 1

n^2 = 361

n =√361

n = 19

Que.19. Standard Deviation for the marks obtained by a student in test in mathematic (out of 50) as 30, 35, 25, 20, 15 is

a. 25

b. $\sqrt{50}$

c. $\sqrt{30}$

d. 50

Answer: B

Solution:

Given data's are

15, 20, 25, 30, 35

$$\text{Mean } (\bar{X}) = \frac{\sum x}{N} = \frac{15+20+25+30+35}{5} = \frac{125}{5} = 5$$

For S.D

x	$\bar{X}$	d = x-$\bar{X}$	d²
15	25	-10	100
20	25	-5	25
25	25	0	0
30	25	5	25
35	25	10	100
N=5			$\sum d^2 = 250$

$$SD = \sqrt{\frac{\sum d^2}{N}} = \sqrt{\frac{250}{5}}$$

$$= \sqrt{50}$$

1. RANDOM EXPERIMENT

Que.1. What is the probability of having at least one' six' years throws of a project die?

a. 5/6

b. (5/6)3

c. 1-(1/6)3

d. 1-(5/6)3

Answer: D

Solution:

For a die Probability of getting Six

$P\ (A) = \frac{1}{6} \rightarrow p$

$P\ (\bar{A}) = 1 - \frac{1}{6} = \frac{5}{6} \rightarrow q$

Here $n = 3$

P(getting at least '1' Six) = P (X>1)

= 1-P (X<1)

= 1-P (X=0)

$= 1\text{-}3_{C_0}.\left[\frac{1}{6}\right]^0.\left(\frac{1}{6}\right)^{3-0}$

$= 1\text{-}1\times1\times\left[\frac{5}{6}\right]^3 = 1\text{-}\left[\frac{5}{6}\right]^3$

Que.2. A coin is tossed six times, then the probability of obtaining heads and tells alternatively is

a. 1/2

b. 1/64

c. 1/32

d. 1/16

Answer: C

Solution:

If one coin is tossed '6' times

P(H) = 1/2, P(T) = 1/2

P (Alternate getting 'H' & 'T') = P (HT HT HT) +P (TH TH TH)

$$\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}+\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}$$

$$\frac{1}{64}+\frac{1}{64}=\frac{2}{64}=\frac{1}{32}$$

2. CLASSICAL DEFINITION OF PROBABILITY OR A PRIOR DEFINITION

Que.3. Tickets numbered 1 to 20 are mixed up and then a ticket is drawn at random. What is the probability that the ticket drawn has a number which is a multiple of 3 or 5?

a. ½ b. 3/5

c. 9/20 d. 8/15

Answer: C

Solution:

Here, S = {1, 2, 3, 4, ..., 19, 20}.

Let E = event of getting a multiple of 3 or 5

= {3, 6 , 9, 12, 15, 18, 5, 10, 20}.

P(E) = n(E)/n(S) = 9/20.

Que.4. One card is drawn at random from a pack of 52 cards. What is the probability that the card drawn is a face card (Jack, Queen and King only)?

a. 3/13 b. 1/13

c. 3/52 d. 9/52

Answer: D

Solution:

Clearly, there are 52 cards, out of which there are 12 face cards.

P (getting a face card) = 12/52=3/13.

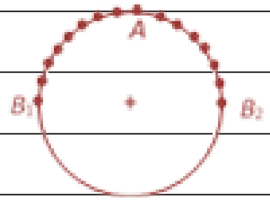
Que.5. Fifteen persons among whom are A and B, sit down at random at a round table. The probability that there are 4 persons between A and B, is

a. 1/3 b. 2/3

c. 2/7 d. 1/7

Answer: D

Solution:



Let A occupy any seat at the round table.

Then there are 14 seats available for B.

If there are to be four persons between A and B

Then B has only two ways to sit, as show in the fig.

Hence required probability 2/14=1/7

Que.6. A bag contains 8 red and 7 black balls. Two balls are drawn at random. The probability that both the balls are of the same colour is

a. 14/15 b. 11/15

c. 7/15 d. 4/15

Answer: C

Solution:

Required probability = Either the balls are red or the balls are black

$$\frac{8_{C_2}}{15_{C_2}} + \frac{7_{C_2}}{15_{C_2}} = \frac{28+21}{105}$$

$$\frac{49}{105} = \frac{7}{15}$$

2. MUTUALLY & NON- MTUALLY EXCLUSIVE EVENT

Que.7. The theorem of compound probability states that for any two A and B

a. $P(A \cap B) = P(A) \times P(B/A)$

b. $P(A \cup B) = P(A) \times P(B/A)$

c. $P(A \cap B) = P(A) \times P(B)$

d. $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

Answer: A

Solution:

The theorem of compound probability states that for only events A an B given by $P(A \cap B) = P(A) \times P(B/A)$

Que.8. If $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$, and $P(A \cap B) = \frac{1}{4}$, then $P(A \cup B)$ is equal to

a. 11/12
b. 10/12
c. 7/12
d. 1/6

Answer: C

Solution:

$P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$, and $P(A \cap B) = \frac{1}{4}$

We know that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$$\frac{1}{2} + \frac{1}{3} - \frac{1}{4}$$

$$\frac{6+4-3}{12} = \frac{7}{12}$$

Que.9. If $P(A \cup B) = 0.8$ and $P(A \cap B) = 0.3$, then $P(\bar{A}) + P(\bar{B})$ is equal to

a. 0.3
b. 0.5
c. 0.7
d. 0.9

Answer: D

Solution:

Given

P(AUB) = 0.8 and P(A∩B) = 0.3

We know that, P(AUB) = P(A) + P(B) - P(A∩B)

0.8 = [1-P($\bar{A}$)] + [1-P($\bar{B}$)]-0.3

$P(\bar{A}) + P(\bar{B}) = 2 - 0.3 - 0.8$

$P(\bar{A}) + P(\bar{B}) = 0.9$

Que.10. Sum of all probabilities mutually exclusive and exhaustive events is equal to

a. 0 b. 1/2

c. 1/4 d. 1

Answer: D

Solution:

Sum of all probabilities mutually exclusive and exhaustive events is equal to 1

3. RANDOM VARIABLE

Que.11. Variance of a random variable x is given by

a. $E(X-\mu)^2$ b. $E[X-E(X)]^2$

c. E (X2-μ) d. (a) or (b)

Answer: D

Solution:

Variance of a random variable x is given by $V(x) = E(X-\mu)^2$

or

$V(x) = [E(X-E(x)]^2$

Que.12. If two random variables x and y are related by Y=2-3x, then the SD of y is given by

a. -3 X SD of x b. 3X SD of x

c. 9 X SD of x d. 2 XSD of x

Answer: B

Solution:

Given Equation

$y = 2 - 3x$

$$b = \frac{-\text{coefficient of } x}{\text{coefficient of } y} = \frac{-3}{1} = -3$$

S.D of y = |b| S.D of x

= |-3|. SD of x

= 3x SD of x

1. BINOMIAL DISTRIBUTION

Que.1. The variance of a binomial distribution with parameters n and p is:

a. $np^2(1-p)$ b. nq(1-q)

c. $\sqrt{np-(1-p)}$ d. $n^2p^2(1-p)^2$

Answer: C

Solution:

= npq

= nqp

= nq(1-q)

Que.2. In a Binomial Distribution, if p, q and n are probability of success, failure and number of trials respectively then variance is given by

a. np b. npq

c. np^2q d. npq^2

Answer: C

Solution:

For a discrete probability function, the variance is given by

$$Variance(V) = \sum_{x=0}^{n} x^2 p(x) - \mu^2$$

Where μ is the mean, substitute P(x) =nCx px q(n-x) in the above equation

and put $\mu = np$ to obtain

V = npq

Que.3. In a Binomial Distribution, if p = q, then P(X = x) is given by

a. ${}^nC_x\ (0.5)^n$ b. ${}^nC_n\ (0.5)^n$

c. ${}^nC_x\ p^{(n-x)}$ d. ${}^nC_n\ p^{(n-x)}$

Answer: A

Solution:

If $p = q$, then $p = 0.5$

Substituting in $P(x) = {}^nC_x\, p^x\, q^{(n-x)}$ we get ${}^nC_n\ (0.5)^n$.

2. POISSION DISTRIBUTION

Que.4. For a poisson variate X, $P(X=2)=3P\ (X=4)$, then the standard deviation of X is

a. 2 b. 4

c. $\sqrt{2}$ d. 3

Answer: C

Solution:

For Poisson Variate X,

$$\frac{e^{m}m^2}{2!} = \frac{3e^{-m}m^4}{4!}$$

$$\frac{m^2}{2} = \frac{3m^4}{24}$$

$$6m^4 = 24m^2$$

$$m^2 = \frac{24}{6}$$

$$m^2 = 4$$

$$m = 2$$

$$S.D. = \sqrt{m} = \sqrt{2}$$

Que.5. A man was able to complete 3 files a day on an average. Find the probability that he can complete 5 files the next day

a. 0.108 b. 0.1008

c. 0.008 d. None

Answer: C

Solution:

Here we know this is a Poisson experiment with following values given:

$\mu = 3$, average number of files completed a day

$x = 5$, the number of files required to be completed next day

And $e = 2.71828$ being a constant

On substituting the values in the Poisson distribution formula mentioned above

we get the Poisson probability in this case

We get,

$$P(x, \mu) = \frac{(e^{-\mu})(\mu^{x})}{x!}$$

$$\rightarrow P(5, 3) = \frac{(2.71828)^{-3}(3^{5})}{5!}$$

= 0.1008 approximately.

Hence the probability for the person to complete 5 files the next day is 0.1008 approximately.

3. NORMAL DISTRIBUTION

Que.6. Using the table of areas under the standard normal curve, find the following probabilities :

$P(0 \leq z \leq 1.3)$

$P(-1 \leq z \leq 0)$

$P(-1 \leq z \leq 12)$

a. 0.4032, 0.3413,0.8185

b. 0.4072, 0.4413,0.8185

c. 0.40456, 0.3456,0.8155

d. None

Answer: A

Solution:

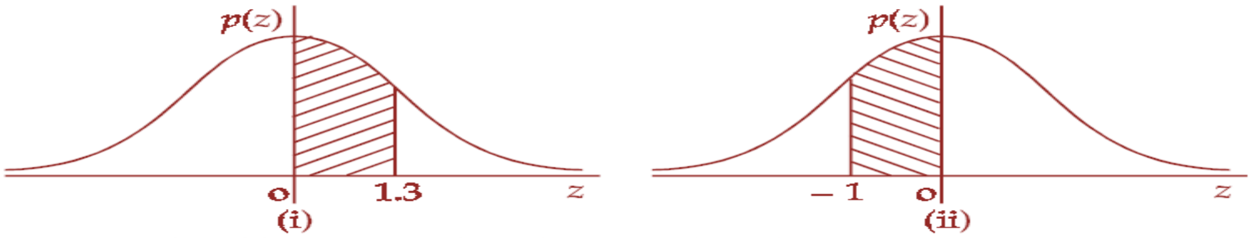
The required probability, in each question, is indicated by the shaded are of the corresponding figure.

A. From the table,

B. (i)we can write $P(0 \leq z \leq 1.3) = 0.4032$.

ii)We can write $P(-1 \leq z \leq 0) = P(0 \leq z \leq 1)$,

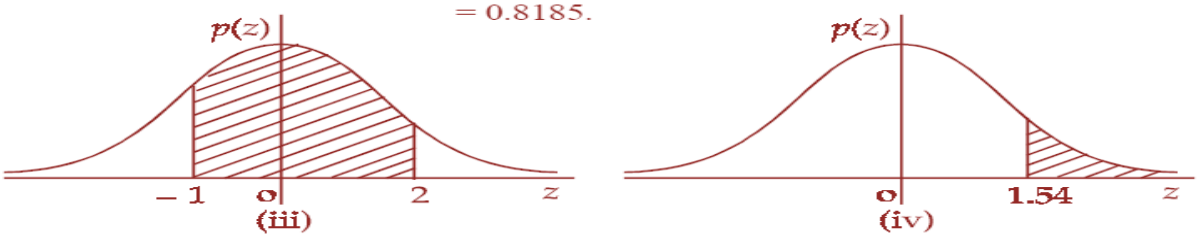
because the distribution is symmetrical.



From the table, we can write $P(-1 \leq z \leq 0) = P(0 \leq z \leq 1) = 0.3413$.

(iii) We can write $P(-1 \leq z \leq 2) = P(-1 \leq z \leq 0) + P(0 \leq z \leq 2)$

$= P(0 \leq z \leq 1) + P(0 \leq z \leq 2) = 0.3413 + 0.4772$
$= 0.8185$.



Que.7. What is the first quartile of x having the following probability of function? $f(x)\ \frac{1}{\sqrt{72x}}\, e^{-(x-10)^2/72}$ for $-\infty < x < \infty$

a. 4

b. 5

c. 5.95

d. 6.75

Answer: C

Solution:

Given: $f(x)\ \frac{1}{\sqrt{72x}}\, e^{\frac{-(x-10)^2}{72}}$ for $-\infty < x < \infty$

$f(x)\ \frac{1}{6\sqrt{2x}}\, e^{\frac{-(x-10)^2}{72}}$

$f(x)\ \frac{1}{\sqrt[6]{2x}}e^{\frac{-(x-\mu)^2}{20^{-2}}}$

We get

$\sigma = 6$, μ=10

First quartile $Q_1 = \mu - 0.675\,\sigma$

= 10-0.675X6

= 10-4.05

= 5.95

Que.8. If for a normal distribution Q_1 = 54.52 and Q_3 = 78.86, then the median of the distribution is

a. 12.17 b. 39.43

c. 66.69 d. None

Answer: C

Solution:

Q1 = 54.52 and Q3 = 78.86

We know that

Q1 = μ-0.675 = 54.52 ______ (1)

Q3 = μ-0.675 = 78.86 ______ (2)

on Adding

2μ = 133.38

μ = 133.38/2

μ = 66.69

In normal Distribution Mean, Median and Mode are equal.

So, Median = Mean = 66.369

1. CORRELATION

(A) CORRELATION COEFFICIENT

Que.1. The table below shows the height, x, in inches and the pulse rate, y, per minute, for 9 people. Find the correlation coefficient and interpret your result

x	68	72	65	70	62	75	78	64	68
y	90	85	88	100	105	98	70	65	72

a. 0.15
b. 0.56
c. -0.15
d. 0.69

Answer: C

Solution:

You may use the facts that (double check this for practice)

$\sum x = 622, \quad \sum y = 773, \quad \sum x^2 = 43,206, \quad \sum y^2 = 68,007, \quad \sum xy = 53,336.$

Calculate the numerator:

$n\sum(xy) - \left(\sum x\right)\left(\sum y\right) = 9 \cdot 53336 - 622 \cdot 773 = -782$

$\sqrt{n\sum x^2 - \left(\sum x\right)^2}\sqrt{n\sum y^2 - \left(\sum y\right)^2}$

$= \sqrt{9.43206 - (622)^2}.\sqrt{9.68007 - (773)^2}$

$= \sqrt{1970}.\sqrt{14534} = 5350.89$

Now, divide to get $r = \dfrac{-782}{5350.89} = -0.15$

Que.2. If the correlation coefficient between the variable X and Y is 0.5, then the correlation between the variable 2x-4 and 3-2y is

a. 1
b. 0.5
c. -0.5
d. 0

Answer: B

Solution:

If coefficient of correlation rxy = 0.5

Given u = 2x-4 and v = 3-2y

2x-u-4 =0 and 2y + v -3 0

b= $\frac{-coefficient\ of\ u}{coefficient\ of\ x}$ and d= $\frac{-coefficient\ of\ v}{coefficient\ of\ y}$

b = $\frac{1}{2}$ d= $\frac{-1}{2}$

Here, b and d both have different sign so r_{uv} = -r_{xy} = 0.5

(B) PEARSON'S CORRELATION COEFFICIENT

Que.3. The following data relate to the test scores obtained by eight salesmen in an aptitude test and their daily sales in thousands of rupees:

	1	2	3	4	5	6	7	8
scores :	60	55	62	56	62	64	70	54
Sales :	31	28	26	24	30	35	28	24

a. 45

b. 56

c. 43.5

d. 0.48

Answer: D

Solution: As b = $\frac{24+35}{2}$ = 30

Scores (x_i) (1)	Sales in `1000 (y_i) (2)	u_i= x_i -62 (3)	v_i= y_i –30 (4)	u_iv_i (5)=(3)x(4)	u^{2} i (6)=(3) ^{2}	v_i^2 (7)=(4)
60	31	–2	1	–2	4	**1**
55	28	–7	–2	14	49	**4**
62	26	0	–4	0	0	**16**
56	24	–6	–6	36	36	**36**
62	30	0	0	0	0	**0**
64	35	2	5	10	4	**25**
70	28	8	–2	–16	64	**4**
54	24	–8	–6	48	64	**36**
Total	**—**	**–13**	**–14**	**90**	**221**	**122**

Since correlation coefficient remains unchanged due to change of origin, we have

$$= \frac{8\times90-(-13)\times(-14)}{\sqrt{8\times221-(-13)^2}\times\sqrt{8\times122-(-14)^2}} = \frac{538}{\sqrt{1768-169}\times\sqrt{976-196}} = 0.48$$

(C) PROBABLE ERROR

Que.4. If r = 0.7 ; and n = 64 find out the probable error of the coefficient of correlation

a. 0.043
b. 0.43
c. 0.747 , 0.657
d. 0.7

Answer: A

Solution:

r = 0.7 ; n= 64 Probable Error (P.E.) $= 0.6745 \times \frac{1-(0.7)^2}{\sqrt{64}}$

$= (0.6745) \times (0.06375) = 0.043$

(D) RANK CORRELATION

Que.5. Three competitors in a contest are ranked by two judges in the order 1,2,3 and 2,3,1 respectively. Calculate the Spearman's rank correlation coefficient.

a. -0.5
b. -0.8
c. 0.8
d. 0.5

Answer: A

Solution

Rank by 1stJudge R1	Rank by IInd Judge R2	Diff D= R1 - H2	02
1	2	-1	1
2	3	-1	1
	1	+2	4
			$\sum d^2 = 6$

Here $n = 3$

Spearman's Rank Correlation coefficient $= 1 - 6\frac{\sum d^2}{n(n^2-1)}$

$= 1 - \frac{6 \times 6}{3(3^2-1)}$

= -0.5

(E) REGRESSION

Que.6. If the two regression lines are 3x = y and 8y = 6x, then the value of correlation coefficient is

a. 0.5

b. -0.5

c. 0.75

d. -0.80

Answer: A

Solution

Given Regression line

3x=y and 8y=6x

3x-y =0 and 6x-8y = 0

bxx $= \frac{-coeff.of\ y}{coeff.of\ x}$ and bxy $= \frac{-coeff.of\ x}{coeff.of\ y}$

$\frac{-(-1)}{3} = \frac{-6}{-8} = \frac{3}{4}$

bxy $= \frac{1}{3}$

Coeff. Of correlation is given by

$r = \pm\sqrt{byx \times bxy}$

$= \pm\sqrt{\frac{3}{4} \times \frac{1}{3}}$

$= +\sqrt{\frac{1}{4}}$ = + ½ = 0.5

Que.7. If the two line of regression are x+2y-5=0 and 2x+3y-8 =0,then the regression line of y on x s:

a. x+2y-5 = 0

b. 2x+3y-8 = 0

c. $x+2y=0$ d. $2x+3y=0$

Answer: A

Solution

Given two regression lines are

$x+2y-5=0$ and $2x+3y-8=0$

$byx = \frac{-coeff.of\ x}{coeff.of\ y} = \frac{-1}{2}$ and $bxy = \frac{-coeff.of\ y}{coeff.of\ x} = \frac{-3}{2}$

Here, $byx \times bxy \leq 1$ which is satisfied.

So 1st equation $x+2y-5=0$ is the regression equation y on x.

Que.8. A relationship $r^2 = 1 - \frac{500}{300}$ is not possible

a. True b. False

c. Both d. None

Answer: A

Solution

Given

$r^2 = 1 - \frac{500}{300}$ is possible

$r^2 = -\frac{200}{300}$ is not possible

So, it is true.

INDEX NUMBER

1. PRICE RELATIVE

Que.1. The most appropriate average in averaging the price relatives is

a. Median
b. Harmonic mean
c. Arithmetic mean
d. Geometric mean

Answer: D

Solution

Geometric mean index numbers are a multiplicative aggregation of (price or quantity) ratios with their importance exponents/weights derived from one or more observed budget shares. ... This approach is directly inspired by the literature on index number theory.

2. SIMPLE AGGREGATIVE PRICE INDEX

Que.2. Construct the following indices by taking 1997 as the base:

(i) simple Aggregative price Index Items

Items	A	B	C	D	E
Prices Rs. (1997)	6	2	4	10	8
Prices Rs. (1998)	10	2	6	12	12
Prices Rs. (1999)	15	3	8	14	16

a. 140 , 186.67
b. 120.90 , 140.6
c. 140 , 120.90
d. 56 , 420

Answer: A

Solution

Simple Aggregative Price Index:

Items	P_0	P_1	P_2	$P_1 = \frac{P_1}{P_0} \times 100$	$P_2 = \frac{P_2}{P_0} \times 100$
A	6	10	15	166.67	250
B	2	2	3	100.00	150
C	4	6	8	150.00	200
D	10	12	14	120.00	140
E	8	12	16	150.00	200
	$\sum P_0 = 30$	$\sum P_1 = 42$	$\sum P_2 = 56$	$\sum\left(\frac{P_1}{P_0} \times 100\right) = 686.67$	$\sum\left(\frac{P_2}{P_0} \times 100\right) = 940$

$$P_{01} = \frac{\sum P_1}{\sum P_0} \times 100 = \frac{42}{30} \times 100 = 140 \quad (\text{For } 1998)$$

$$P_{02} = \frac{\sum P_2}{\sum P_0} \times 100 = \frac{56}{30} \times 100 = 186.67 \quad (\text{For } 1999)$$

3. WEIGHTED AGGREGATIVE PRICE INDEX

(A) LASPEYRE'S METHOD

Que.3. Calculate weighted aggregative price index from the following data using Laspeyre's method

Base Period		Current Period		
Price	Quantity	Price	Quantity	
A	2	10	4	5
B	5	12	6	10
C	4	20	5	15
D	2	15	3	10

a. 155.09 b. 120.60

c. 135.26 d. 12.888

Answer: C

Solution

Commodity								
A	2	10	4	5	20	40	10	20
B	5	12	6	10	60	72	50	60
C	4	20	5	15	80	100	60	75
D	2	15	3	10	30	45	20	30
					$\sum P_0q_0 = 190$	$\sum P_1q_0 = 257$	$\sum P_0q_1 = 140$	$\sum P_1q_1 = 185$

$$P_{01}^{L} = \frac{\sum P_1 q_0}{\sum P_0 q_0} \times 100 = \frac{257}{190} \times 100 = 135.26$$

Que.4. $\sum\sum P_0Q_0 = 240\ \sum P_1Q_1 = 480, \sum p_1Q_0 = 600, \sum P_0Q_1 = 192$ then the Laspeyre's. Index number is

a. 250 b. 300

c. 350 d. 200

Answer: A

Solution:

If $\sum\sum P_0Q_0 = 240\ \sum P_1Q_1 = 480, \sum p_1Q_0 = 600, \sum P_0Q_1 = 192$

Laspeyra's. Index No. $\frac{\sum P_1Q_0}{\sum P_0Q_0} = \frac{600}{240} \times 100 = 250$

(B) PASSCHE'S METHOD

Que.5. Calculate weighted aggregative price index number from the following data by using Passche's method :

Commodity	Base Year		Current	
	Price	Quantity	Price	Quantity
A	10	30	12	50
B	8	15	10	25
C	6	20	6	30
D	4	10	6	20

a. 199.79
b. 119.79
c. 135.26
d. 12.888

Answer: B

Solution:

Commodity	P_0	q_0	P_1	q_1	P_0q_1	P_1q_1
A	10	30	12	50	500	600
B	8	15	10	25	200	250
C	6	20	6	30	180	180
D	4	10	6	20	80	120
					$\sum P_0q_1 = 960$	$\sum P_1q_1 = 1150$

$$Passche's.Index\ No. \frac{\sum P_1q_1}{\sum P_0Q_1} = \frac{1150}{960} \times 100$$

$= 119.79$

(C) FISHER'S METHOD

Que.6. If Laspeyre's Index Number is 250 and Paache's Index Number is 160, then Fisher's Index Number is

a. 40,000
b. 25/16
c. 200
d. 16/25

Answer: C

Solution:

Given

Laspeyre Index No. (L) = 250

Paasche Index No. (P) = 160

Fisher Index No. (F) = $\sqrt{L \times P}$

$= \sqrt{(250 \times 160)}$

$= \sqrt{40,000} = 200$

3. CONSUMER PRICE INDEX

Que.7. An enquiry into the budgets of the middle class families in a certain city gave the following information:

Expenses on Items	Food 35%	Fuel 10%	Clothing 20%	Rent 15%	Misc. 20%
Prices in 2004 (Rs.)	1500	250	750	300	400
Prices in 1995 (Rs.)	1400	200	500	200	250

a. 165.62

b. 134.5

c. 165.60

d. 325.89

Answer: B

Solution:

Items	W in %	P_0 (1995)	P_1 (2004)	$R=\frac{P_1}{P_0}\times 100$	RW
Food	35	1400	1500	107.14	3750
Fuel	10	200	250	125.00	1250
Clothing	20	500	750	150.00	3000
Rent	15	200	300	150.00	2250
Misc :	20	250	400	160.00	3200

$$CPI = \frac{\sum RW}{\sum W} = \frac{13450}{100} = 134.5$$

4. COST OF LIVING INDEX

Que.9. What will be the real wage of the consumer if his money wage is Rs. 10,000 and the cost of living index is 526?

a. 1900

b. 1901

c. 2186

d. 4664

Answer: B

Solution:

$$\text{Real Wages} = \frac{Money\ Wages}{Cost\ of\ living\ Index} \times 100$$

$$\frac{10{,}000}{526} \times 100 = \text{Rs. } 1901$$

5. TIME REVERSAL

Que.9. Which of the following formula satisfy the time reversal test?

a. $p_{01} = \frac{\sum P_1 q_0}{\sum P_0 Q_0}$

b. $p_{01} = \frac{\sum P_1 q_1}{\sum P_0 Q_1}$

c. $p_{01} = \sqrt{\frac{\sum P_1 q_0}{\sum P_0 Q_0} \times p_{01} = \frac{\sum P_1 q_1}{\sum P_0 Q_1}}$

d. None

Answer: C

Solution:

Time reversal test. This test is proposed by Irving Fisher. According to him, an index number (formula) should be such that when the base year and current year are interchanged (reversed) the resulting index number should be the reciprocal of the earlier.

Que.10. Time reversal & factor reversal are:

a. Quantity Index

b. Ideal Index

c. Price Index

d. Test of consistency

Answer: C

Solution:

Time reversal and factor reversal test are test of consistency.

6. INFLATION RATE

Que.11. Given the following data: Year 1995-96 1996-97 1997-98

Year	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01	2001-02	2002-03
WPI (1993-94)	121.6	127.2	132.8	140.7	145.7	155.7	161.3	166.8

a. 5.94%　　b. 59.89%

d. 4.4%　　d. None

Answer: A

Solution:

Inflation rate for different years are calculated as:

$$\text{Year 1996-97} = \frac{X_t - X_{t-1}}{X_{t-1}} \times 100 = \frac{127.2-121.6}{121.6} \times 100 = 4.6\%$$

$$\text{Year 1997-98} = \frac{X_t - X_{t-1}}{X_{t-1}} \times 100 = \frac{132.8-127.2}{127.2} \times 100 = 4.40\%$$

$$\text{Year 1998-99} = \frac{X_t - X_{t-1}}{X_{t-1}} \times 100 = \frac{140.7-132.8}{132.8} \times 100 = 5.94\%$$

7. CIRCULAR TEST

Que.12. Circular test is satisfied by

a. Lespeyre's Index Number

b. Paasche's Index Number

c. The simple geometric mean of price relatives and the weighted aggregative with fixed weights.

d. None of these

Answer: C

Solution:

Circular test is satisfied by the simple geometric m an of price relatives and weighted aggregative with fixed weights.

8. TEST OF ADEQUACY

Que.13. The number of test of Adequacy is

a. 2　　b. 5

c. 3 d. 4

Answer: D

Solution:

The Number of test of Adequacy is 4.

TIME SERIES

Que.1. Methods of Measuring Trend?

a. Free hand curve method b. Average method

c. Geographical method d. None

Answer: A

Solution:

Trend can be determined:

(i) free hand curve method;

(ii) moving averages method;

(iii) semi averages method; and

(iv) least-squares method.

Que.2. Which of these is a method of least square?

a. Linear Trend b. Exponential Trend

c. Parabolic Trend d. All of the above.

Answer: D

Solution:

There will be many straight lines which can meet the first condition. Among all different lines, only one line will satisfy the second condition. It is because of this second condition that this method is known as method of least squares.

Que.3. Additive model of time series is

a. O = T + S + C + I b. O = TSCI

c. O= a+ bx

d. none

Answer: A

Solution:

O = T × S × C × I

where O refers to original data,

T refers to trend

S refers to seasonal variations,

C refers to cyclical variations and

I refers lo irregular variations.

This is the most commonly used model in the decomposition of time series.

This model is called Additive model.

Que.4. The multiplicative time series model is

a. y = T+S+C+I

b. y = TSCI

c. y = a+bx

d. $y = a+bx+cx^2$

Answer: A

Solution:

y = T × S × C × I,

where,

T refers to Trend Variation

S refers to seasonal variations,

C refers to cyclical variations and

I refers lo irregular variations.

Que.5. The sale of Cold Drink would go up •in summers and go down in the winters is an example of

a. Trend Variation

b. Seasonal Variation

c. Cyclical Variation

d. Irregular Variation

Answer: b

Solution:

The sale of cold drink would go up in summers end go down in the winder is an example of seasonal variation.