

DU MSc Mathematics Education

Topic:- ME MSC

1) A rhombus has a side of 13 cms and the sum of its diagonals is 34 cms. Then the area of the rhombus is [Question ID = 11377]

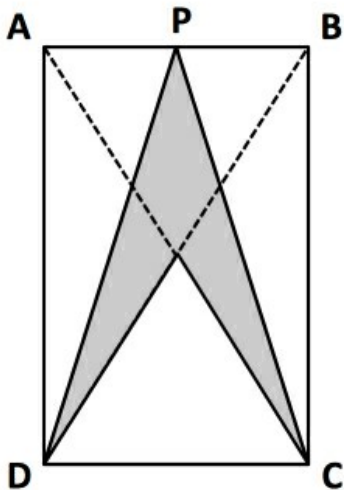
1. 120 cms² [Option ID = 45505]
2. 221 cms² [Option ID = 45506]
3. 442 cms² [Option ID = 45507]
4. 240 cms² [Option ID = 45508]

2) Two real numbers x and y lie on the unit circle $x^2 + y^2 = 1$. Then the maximum value of $\frac{1}{x^2 + 3xy + 5y^2}$ is

[Question ID = 11378]

1. 2
[Option ID = 45509]
2. 1
[Option ID = 45510]
3. 3
[Option ID = 45511]
4. 9
[Option ID = 45512]

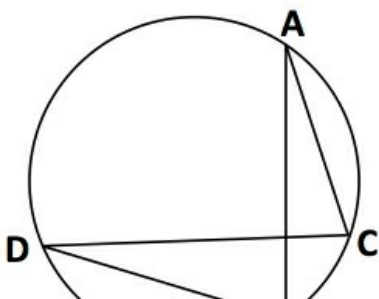
3) ABCD is a rectangle with P the midpoint of the side AB. The percentage of the area of the shaded region is



[Question ID = 11379]

1. 25%
[Option ID = 45513]
2. 50%
[Option ID = 45514]
3. 12.5%
[Option ID = 45515]
4. 33.33%
[Option ID = 45516]

4) Read the passage and answer the following question: AB and CD are two perpendicular chords of a circle such that AC = 6 units and BD = 8 units (Figure not to scale)

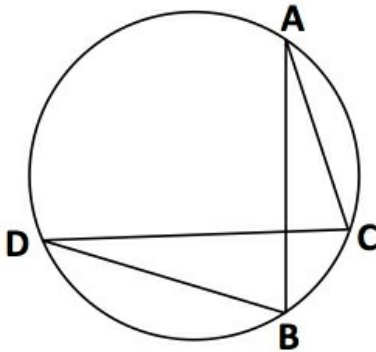




The radius of the circle is [Question ID = 11380]

1. 5 units [Option ID = 45517]
2. 10 units [Option ID = 45518]
3. 7 units [Option ID = 45519]
4. 14 units [Option ID = 45520]

5) Read the passage and answer the following question: AB and CD are two perpendicular chords of a circle such that AC = 6 units and BD = 8 units (Figure not to scale)



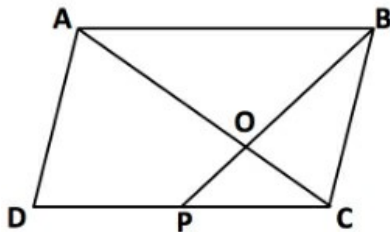
$\angle BAC$ is [Question ID = 11381]

1. $\sin^{-1}(5/6)$ [Option ID = 45521]
2. $\sin^{-1}(3/4)$ [Option ID = 45522]
3. $\sin^{-1}(3/5)$ [Option ID = 45523]
4. $\sin^{-1}(4/5)$ [Option ID = 45524]

6) An isosceles triangle ABC is inscribed in a circle such that $\angle A = \angle B = \angle C$. If BC is a side of a regular n-gon inscribed in the circle, then the value of n is [Question ID = 11382]

1. 1729 [Option ID = 45525]
2. 729 [Option ID = 45526]
3. 1024 [Option ID = 45527]
4. 512 [Option ID = 45528]

7) ABCD is a parallelogram and P is the mid-point of the side CD. If the area of the triangle BOC is 42 sq. units, then the area of the triangle POC is



[Question ID = 11383]

1. 21 sq. units [Option ID = 45529]
2. 14 sq. units [Option ID = 45530]
3. 42 sq. units [Option ID = 45531]
4. 7 sq. units [Option ID = 45532]

8)
$$\lim_{x \rightarrow \pi/2} \frac{1 + \cos 2x}{(\pi - 2x)^2} =$$

[Question ID = 11384]

1. 0.5 [Option ID = 45533]
2. 1 [Option ID = 45534]
3. 0 [Option ID = 45535]
4. ∞

[Option ID = 45536]

9) If $x = \sqrt{6 + \sqrt{6 + \sqrt{6 + \dots}}}$ and $y = \sqrt{20 - \sqrt{20 - \sqrt{20 - \dots}}}$, then $x + y =$

[Question ID = 11385]

1. 7 [Option ID = 45537]
2. 26 [Option ID = 45538]
3. 13 [Option ID = 45539]
4. 14 [Option ID = 45540]

10) $\ln \left(\sum_{n=0}^{\infty} \frac{e^n}{n!} \right) =$

[Question ID = 11386]

1. e [Option ID = 45541]
2. e^2 [Option ID = 45542]
3. ∞

[Option ID = 45543]

4. 1 [Option ID = 45544]

11) The value of $\ln \left(\frac{1}{2!} - \frac{1}{3!} + \frac{1}{4!} - \dots \right)$ is

[Question ID = 11387]

1. -1
2. 1

[Option ID = 45545]

[Option ID = 45546]

3. e
4. $e - 1$

[Option ID = 45547]

[Option ID = 45548]

12) If $f(x) = (x+1)(x+2)(x+3)\dots(x+n)$ then the derivative of $f(x)$ at $x = 0$ is

[Question ID = 11388]

1. $n! \left(1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{n} \right)$
2. $n! \left(1 + \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \dots + \frac{1}{n!} \right)$

[Option ID = 45549]

[Option ID = 45550]

3. $n!$
4. $1 + \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \dots + \frac{1}{n!}$

[Option ID = 45551]

[Option ID = 45552]

13) $\lim_{n \rightarrow \infty} n \left(\frac{1}{n} + \frac{1}{n+1} + \frac{1}{n+2} + \dots + \frac{1}{2n} \right)$ is

[Question ID = 11389]

1. $n + \frac{1}{2}$
2. $n + 1$

[Option ID = 45553]

[Option ID = 45554]

3. n
4. $n + \frac{3}{2}$

[Option ID = 45555]

[Option ID = 45556]

14) If $\theta = \frac{\pi}{13}$, then the value of $\frac{1}{\cos \theta \cos 2\theta \cos 3\theta \cos 4\theta \cos 5\theta \cos 6\theta}$

[Question ID = 11390]

1. 64 [Option ID = 45557]
2. 1 [Option ID = 45558]
3. 4 [Option ID = 45559]
4. 32 [Option ID = 45560]

15) a and b are the roots of the equation $x^2 - 15x + 17 = 0$. The value of $a^3 + b^3$ is [Question ID = 11391]

1. 2610 [Option ID = 45561]
2. 2160 [Option ID = 45562]
3. 2016 [Option ID = 45563]

4. 1206 [Option ID = 45564]

16) The smallest positive integer a such that the equation $189x + 45y = a$ where x and y are integers is [Question ID = 11392]

1. 9 [Option ID = 45565]
2. 1 [Option ID = 45566]
3. 6 [Option ID = 45567]
4. 3 [Option ID = 45568]

17) Let $a_1, a_2, \dots, a_5$ denote the roots to the equation $x + 2x^2 + 3x^3 + 4x^4 + 5x^5 = 0$, then the value of $(4a_1 + 1)(4a_2 + 1)(4a_3 + 1)(4a_4 + 1)(4a_5 + 1)$ is [Question ID = 11393]

1. 33 [Option ID = 45569]
2. 32 [Option ID = 45570]
3. 1025 [Option ID = 45571]
4. 1024 [Option ID = 45572]

18) The different ways in which the five boxes can be filled with the numbers 1 to 5 using each number exactly once so that each number in the shaded box is larger than its two neighbours is



[Question ID = 11394]

1. 16
[Option ID = 45573]
2. 8
[Option ID = 45574]
3. 9
[Option ID = 45575]
4. 15
[Option ID = 45576]

19) There are four boxes A, B, C and D. Box A has four coins of denomination 5, Box B has three coins of denomination 5 and one coin of denomination 10, Box C has two coins of denomination 5 and two coins of denomination 10 and Box D has one coin of denomination 5 and three coins of denomination 10. One box is randomly chosen and two coins are randomly selected. The probability that the second coin selected is of denomination 10 is [Question ID = 11395]

1. $\frac{3}{8}$
[Option ID = 45577]
2. $\frac{5}{8}$
[Option ID = 45578]
3. $\frac{1}{4}$
[Option ID = 45579]
4. $\frac{3}{4}$
[Option ID = 45580]

20) A function is defined as $f(x) = ax^4 + bx^3 + cx^2 + dx + \lambda$. This function has a special property:

$$\frac{f(1)}{1} = \frac{f(2)}{2} = \frac{f(3)}{3} \text{ and } \lim_{x \rightarrow \infty} \frac{f(x)}{x^4} = 1. \text{ Then the value of } f(i) + f(-i) =$$

(Note: $i = \sqrt{-1}$)

[Question ID = 11396]

1. -20 [Option ID = 45581]
2. 20 [Option ID = 45582]
3. -22 [Option ID = 45583]
4. 22 [Option ID = 45584]

21) The number of complex numbers that are the conjugate of their own cube are [Question ID = 11397]

1. 5 [Option ID = 45585]
2. 7 [Option ID = 45586]
3. 4 [Option ID = 45587]

4. 6 [Option ID = 45588]

22) If $\vec{a} \cdot \vec{b} + \vec{b} \cdot \vec{c} + \vec{c} \cdot \vec{a} = 0$ and $|\vec{a} + \vec{b} + \vec{c}|^2 = 3$, then the value of $|\vec{a} + \vec{b} - \vec{c}|^2 + |\vec{a} - \vec{b} + \vec{c}|^2 + |-\vec{a} + \vec{b} + \vec{c}|^2$

[Question ID = 11398]

1. 9 [Option ID = 45589]
2. 3 [Option ID = 45590]
3. 1 [Option ID = 45591]
4. 27 [Option ID = 45592]

23) A matrix A has eigen values 3, -2, 4. The determinant of the matrix is [Question ID = 11399]

1. -24 [Option ID = 45593]
2. ± 24

[Option ID = 45594]

3. 9 [Option ID = 45595]
4. 5 [Option ID = 45596]

24) If 2 and -4 are eigenvalues of a 2×2 matrix A, then $A^3 =$ (Note I is the identity matrix) [Question ID = 11400]

1. $12A - 16 I_{2 \times 2}$ [Option ID = 45597]
2. $A^2 - 8 I_{2 \times 2}$ [Option ID = 45598]
3. $-2A + 8 I_{2 \times 2}$ [Option ID = 45599]
4. $8A - 12 I_{2 \times 2}$ [Option ID = 45600]

25) The vertices of a right angled triangle are (0, 0), (21, 0) and (0, 21). Then the number of points lying exactly in the interior of the triangle with coordinates (x, y) such that x and y are integers is [Question ID = 11401]

1. 190 [Option ID = 45601]
2. 400 [Option ID = 45602]
3. 200 [Option ID = 45603]
4. 441 [Option ID = 45604]

26) Define a function $\phi: \mathbb{N} \rightarrow \mathbb{N}$ as follows: $\phi(1) = 1$ $\phi(p^n) = p^{n-1}(p-1)$ if p is prime and $n \in \mathbb{N}$ (the set of natural numbers) $\phi(mn) = \phi(m)\phi(n)$ if $\gcd(m, n) = 1$ If $n \in \mathbb{N}$, then $\phi(4n+2) =$ [Question ID = 11402]

1. $\phi(2n+1)$ [Option ID = 45605]
2. $\phi(4n)$ [Option ID = 45606]
3. $\phi(2n)$ [Option ID = 45607]
4. $\phi(2n+4)$ [Option ID = 45608]

27) Define a function $\phi: \mathbb{N} \rightarrow \mathbb{N}$ as follows: $\phi(1) = 1$ $\phi(p^n) = p^{n-1}(p-1)$ if p is prime and $n \in \mathbb{N}$ (the set of natural numbers) $\phi(mn) = \phi(m)\phi(n)$ if $\gcd(m, n) = 1$ The number of natural numbers n such that $\phi(n)$ is odd is [Question ID = 11403]

1. one [Option ID = 45609]
2. two [Option ID = 45610]
3. three [Option ID = 45611]
4. Infinite [Option ID = 45612]

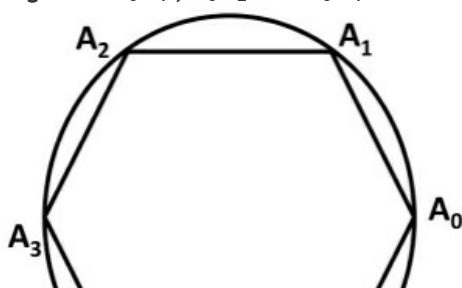
28) If $a, b \in \mathbb{I}$ (the set of integers) and $n \in \mathbb{N}$ (the set of natural numbers), then $a \equiv b \pmod{n}$ if and only if n divides $(a-b)$ leaving no remainder. Further, if $a \equiv b \pmod{n}$ and $c \equiv d \pmod{n}$ then $a \mp c \equiv b \mp d \pmod{n}$ and $a^k \equiv b^k \pmod{n}$ for $k \in \mathbb{N}$ The remainder when 10^{73} is divided by 7 is [Question ID = 11404]

1. 2 [Option ID = 45613]
2. 4 [Option ID = 45614]
3. 1 [Option ID = 45615]
4. 3 [Option ID = 45616]

29) If $a, b \in \mathbb{I}$ (the set of integers) and $n \in \mathbb{N}$ (the set of natural numbers), then $a \equiv b \pmod{n}$ if and only if n divides $(a-b)$ leaving no remainder. Further, if $a \equiv b \pmod{n}$ and $c \equiv d \pmod{n}$ then $a \mp c \equiv b \mp d \pmod{n}$ and $a^k \equiv b^k \pmod{n}$ for $k \in \mathbb{N}$ The smallest value of $x > 99$ for which $29x \equiv 1 \pmod{17}$ is [Question ID = 11405]

1. 112 [Option ID = 45617]
2. 114 [Option ID = 45618]
3. 111 [Option ID = 45619]
4. 113 [Option ID = 45620]

30) Let $A_0 A_1 A_2 A_3 A_4 A_5$ be a regular hexagon inscribed in a circle of unit radius. Then the product of the length of the line segments $A_0 A_1$, $A_0 A_2$ and $A_0 A_4$ is





[Question ID = 11406]

1. 3 [Option ID = 45621]

2. $3\sqrt{3}$

[Option ID = 45622]

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

[Option ID = 45623]

4. $\frac{\sqrt{3}}{4}$

[Option ID = 45624]

31) For some positive integer n , let $y_n(x) = e^x \times e^{x^2} \times e^{x^3} \times \dots \times e^{x^n}$. Then the limit $\left(\lim_{n \rightarrow \infty} \frac{dy_n(x)}{dx} \right)_{n=1/2} =$

[Question ID = 11407]

1. $4e$ [Option ID = 45625]

2. $3e$ [Option ID = 45626]

3. $2e$ [Option ID = 45627]

4. e [Option ID = 45628]

32) Read the passage and answer the following question: A police van approaches a right angled intersection from north and is chasing a stolen car that has turned the corner and is now moving towards east.

At the moment T the police van is 0.6 km north of the intersection and the car is 0.8 km to the east the distance between the police van and the car is increasing at the rate of 20km/hr. If the van is moving at the speed of 60 km/hr at the moment T, the speed of the car at that instant is

[Question ID = 11408]

1. 70 km/hr

[Option ID = 45629]

2. 80 km/hr

[Option ID = 45630]

3. 75 km/hr

[Option ID = 45631]

4. 60 km/hr

[Option ID = 45632]

33) Read the passage and answer the following question:

A police van approaches a right angled intersection from north and is chasing a stolen car that has turned the corner and is now moving towards east. At the moment T the police van is 0.6 km north of the intersection and the car is 0.8 km to the east the distance between the police van and the car is increasing at the rate of 20km/hr. If s is the distance between the stolen car and the police van at time t , x is the position of the stolen car at time t and y the position of the police van at time t , then $\frac{ds}{dt} =$

[Question ID = 11409]

1. $\frac{1}{\sqrt{x^2+y^2}} \left(x \frac{dx}{dt} + y \frac{dy}{dt} \right)$

[Option ID = 45633]

2. $\frac{2}{\sqrt{x^2+y^2}} \left(x \frac{dx}{dt} + y \frac{dy}{dt} \right)$

[Option ID = 45634]

3. $\frac{2}{\sqrt{x^2+y^2}} \left(\frac{dx}{dt} + \frac{dy}{dt} \right)$

[Option ID = 45635]

4. $\frac{1}{\sqrt{x^2+y^2}} \left(x^2 \frac{dx}{dt} + y^2 \frac{dy}{dt} \right)$

[Option ID = 45636]

34) Read the passage and answer the following question:

A police van approaches a right angled intersection from north and is chasing a stolen car that has turned the corner and is now moving towards east. At the moment T the police van is 0.6 km north of the intersection and the car is 0.8 km to the east the distance between the police van and the car is increasing at the rate of 20km/hr.

At the moment T, $\frac{d^2x}{dt^2} = -40 \text{ km/hr}^2$ and $\frac{d^2y}{dt^2} = 50 \text{ km/hr}^2$, then $\frac{d^2s}{dt^2} =$

[Question ID = 11410]

1. 8098 km/hr²

[Option ID = 45637]

2. 6400 km/hr²

[Option ID = 45638]

3. 8200 km/hr²

[Option ID = 45639]

4. 6450 km/hr²

[Option ID = 45640]

35) $\int_{-1}^3 \left(\tan^{-1}\left(\frac{x}{x^2+1}\right) + \tan^{-1}\left(\frac{x^2+1}{x}\right) \right) dx =$

[Question ID = 11411]

1. π

[Option ID = 45641]

2. 2π

[Option ID = 45642]

3. 3π

[Option ID = 45643]

4. 4π

[Option ID = 45644]

36) $\int_2^3 \frac{2x^5 + x^4 - 2x^3 + 2x^2 + 1}{(x^2 + 1)(x^4 - 1)} dx =$

[Question ID = 11412]

1. $\frac{1}{2} \log 6 - \frac{1}{10}$

[Option ID = 45645]

2. $\frac{1}{2} \log 6 + \frac{1}{10}$

[Option ID = 45646]

3. $\frac{1}{2} \log 3 - \frac{1}{10}$

[Option ID = 45647]

4. $\frac{1}{2} \log 3 + \frac{1}{10}$

[Option ID = 45648]

37) If $\int_0^{\pi/2} \cos^n x \sin^n x dx = \lambda \int_0^{\pi/2} \sin^n x dx$, then $\lambda =$

[Question ID = 11413]

1. $2 \cdot \pi$

[Option ID = 45649]

2. $2 \cdot \pi^{+1}$

[Option ID = 45650]

3. $2 \cdot \pi^{-1}$

[Option ID = 45651]

4. $2\pi^{-1}$

[Option ID = 45652]

38) If $I_n = \int_0^1 e^x (x-1)^n dx = 16 - 6e$, then the value of n is

[Question ID = 11414]

1. 3

[Option ID = 45653]

2. 5

[Option ID = 45654]

3. 2

[Option ID = 45655]

4. 4

[Option ID = 45656]

39) If $I_1 = \int_0^\pi \frac{x \sin x}{1 + \cos^2 x} dx$ and $I_2 = \int_0^\pi x \sin^4 x dx$ then $I_1 : I_2 =$

[Question ID = 11415]

1. 4 : 3

[Option ID = 45657]

2. 3 : 4

[Option ID = 45658]

3. 1 : 2

[Option ID = 45659]

4. 2 : 3

[Option ID = 45660]

40) If $f(x) = \frac{x^2 - ax + 1}{x^2 + ax + 1}$, $0 < a < 2$, then the correct statement is

[Question ID = 11416]

1. $(2 + a)^2 f''(1) + (2 - a)^2 f''(-1) = 0$

[Option ID = 45661]

2. $(2 - a)^2 f''(1) + (2 + a)^2 f''(-1) = 0$

[Option ID = 45662]

3. $f'(1) + f'(-1) = (2 - a)^2$

[Option ID = 45663]

4. $f'(1) f'(-1) = -(2 - a)^2$

[Option ID = 45664]

41) The difference between the greatest and the least value of the function $f(x) = \cos x + \frac{1}{2} \cos 2x - \frac{1}{3} \cos 3x$ is

[Question ID = 11417]

1. $\frac{9}{4}$

[Option ID = 45665]

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

[Option ID = 45666]

3. $\frac{7}{8}$

[Option ID = 45667]

4. $\frac{3}{8}$

[Option ID = 45668]

42) If $f(x) = \frac{x^2 - 1}{x^2 + 1}$ for every real number x, then

[Question ID = 11418]

1. the minimum value of f is -1

[Option ID = 45669]

2. the maximum value of f is 1

[Option ID = 45670]

3. the minimum value of f is $-\frac{1}{\sqrt{3}}$

[Option ID = 45671]

4. The maximum value of f is $\frac{1}{\sqrt{3}}$

[Option ID = 45672]

43) Let S_1 be the area of the region bounded by $y = x^2$ and $y = 1$. Let S_2 be the area of the region bounded by $y = x^2$ and $y = (7/8)x^2 + k$, where $k > 0$. If $S_2 = S_1$, then the value of $1/k$ is

[Question ID = 11419]

1. 2

[Option ID = 45673]

2. $2^{5/3}$

[Option ID = 45674]

3. $2^{4/3}$

[Option ID = 45675]

4. $2^{2/3}$

[Option ID = 45676]

44) $\int_0^1 \sqrt{\sqrt{\sqrt{\sqrt{\sqrt{x}}}}} dx =$

[Question ID = 11420]

1. $4/3$ [Option ID = 45677]

2. $3/4$ [Option ID = 45678]

3. $1/2$ [Option ID = 45679]

4. $2/3$ [Option ID = 45680]

45) If $x = \frac{4}{(\sqrt{5}+1)(\sqrt[4]{5}+1)(\sqrt[8]{5}+1)(\sqrt[16]{5}+1)}$, then $(x+1)^{64} =$

[Question ID = 11421]

1. 625

[Option ID = 45681]

2. 25

[Option ID = 45682]

3. 20

[Option ID = 45683]

4. $4\sqrt{5}$

[Option ID = 45684]

46) $\lim_{n \rightarrow \infty} (\sqrt[3]{n^2 - n^3} + n) =$

[Question ID = 11422]

1. $1/3$

[Option ID = 45685]

2. $-1/3$

[Option ID = 45686]

3. does not exist

[Option ID = 45687]

4. 1

[Option ID = 45688]

47) Read the passage and answer the following question:

Consider the data

x	x_0	x_1	x_2	$\dots$	x_n
$f(x)$	$f(x_0)$	$f(x_1)$	$f(x_2)$	$\dots$	$f(x_n)$

The first divided difference is defined by $f[x_i, x_{i+1}] = \frac{f(x_{i+1}) - f(x_i)}{x_{i+1} - x_i}$, $i = 0, 1, 2, \dots, (n-1)$

The second divided difference is defined by $f[x_i, x_{i+1}, x_{i+2}] = \frac{f[x_{i+1}, x_{i+2}] - f[x_i, x_{i+1}]}{x_{i+2} - x_i}$, $i = 0, 1, 2, \dots, (n-2)$

Similarly, the n^{th} divided difference is defined by $f[x_0, x_1, \dots, x_n] = \frac{f[x_1, x_2, \dots, x_n] - f[x_0, x_1, \dots, x_{n-1}]}{x_n - x_0}$

The Newton's divided difference interpolating polynomial of degree n is then defined as

$$P_n(x) = f(x_0) + (x - x_0)f[x_0, x_1] + (x - x_0)(x - x_1)f[x_0, x_1, x_2] + \dots + (x - x_0)(x - x_1)\dots(x - x_{n-1})f[x_0, x_1, x_2, \dots, x_n]$$

Let $f(x)$ be a polynomial satisfying $f(0) = 1, f(1) = 1, f(2) = 2, f(3) = 3, f(4) = 5, f(5) = 8$

The Newton's divided difference interpolating polynomial for the given data is of degree

[Question ID = 11423]

1. 5

[Option ID = 45689]

2. 6

[Option ID = 45690]

3. 7

[Option ID = 45691]

4. 8

[Option ID = 45692]

48) Read the passage and answer the following question:

Consider the data

x	x_0	x_1	x_2	...	x_n
$f(x)$	$f(x_0)$	$f(x_1)$	$f(x_2)$	...	$f(x_n)$

$$f[x_i, x_{i+1}] = \frac{f(x_{i+1}) - f(x_i)}{x_{i+1} - x_i}, i = 0, 1, 2, \dots, (n-1)$$

The first divided difference is defined by

$$f[x_i, x_{i+1}, x_{i+2}] = \frac{f[x_{i+1}, x_{i+2}] - f[x_i, x_{i+1}]}{x_{i+2} - x_i}, i = 0, 1, 2, \dots, (n-2)$$

The second divided difference is defined by

$$f[x_0, x_1, \dots, x_n] = \frac{f[x_1, x_2, \dots, x_n] - f[x_0, x_1, \dots, x_{n-1}]}{x_n - x_0}$$

Similarly, the n^{th} divided difference is defined by

The Newton's divided difference interpolating polynomial of degree n is then defined as

$$P_n(x) = f(x_0) + (x - x_0)f[x_0, x_1] + (x - x_0)(x - x_1)f[x_0, x_1, x_2] + \dots + (x - x_0)(x - x_1)\dots(x - x_{n-1})f[x_0, x_1, x_2, \dots, x_n]$$

Let $f(x)$ be a polynomial satisfying $f(0) = 1, f(1) = 1, f(2) = 2, f(3) = 3, f(4) = 5, f(5) = 8$

The value of $f(6)$ is

[Question ID = 11424]

1. 8

[Option ID = 45693]

2. 13

[Option ID = 45694]

3. -8

[Option ID = 45695]

4. 5

[Option ID = 45696]

49) Read the passage and answer the following question:

Consider the data

x	x_0	x_1	x_2	...	x_n
$f(x)$	$f(x_0)$	$f(x_1)$	$f(x_2)$	...	$f(x_n)$

The first divided difference is defined

$$f[x_i, x_{i+1}] = \frac{f(x_{i+1}) - f(x_i)}{x_{i+1} - x_i}, i = 0, 1, 2, \dots, (n-1)$$

by

The second divided difference is defined

$$\text{by } f[x_i, x_{i+1}, x_{i+2}] = \frac{f[x_{i+1}, x_{i+2}] - f[x_i, x_{i+1}]}{x_{i+2} - x_i}, i = 0, 1, 2, \dots, (n-2)$$

Similarly, the n^{th} divided difference is defined

$$\text{by } f[x_0, x_1, \dots, x_n] = \frac{f[x_1, x_2, \dots, x_n] - f[x_0, x_1, \dots, x_{n-1}]}{x_n - x_0}$$

The Newton's divided difference interpolating polynomial of degree n is then defined as

$$P_n(x) = f(x_0) + (x - x_0)f[x_0, x_1] + (x - x_0)(x - x_1)f[x_0, x_1, x_2] + \dots + (x - x_0)(x - x_1)\dots(x - x_{n-1})f[x_0, x_1, x_2, \dots, x_n]$$

Let $f(x)$ be a polynomial satisfying $f(0) = 1, f(1) = 1, f(2) = 2, f(3) = 3, f(4) = 5, f(5) = 8$ The coefficient of the highest power of the Newton's divided difference interpolating polynomial obtained from the given data is

[Question ID = 11425]

1. $-1/40$

[Option ID = 45697]

2. 1

[Option ID = 45698]

3. $-1/24$

[Option ID = 45699]

4. $1/12$

[Option ID = 45700]

50)

Read the passage and answer the following question:

Consider the data

x	x_0	x_1	x_2	$\dots$	x_n
$f(x)$	$f(x_0)$	$f(x_1)$	$f(x_2)$	$\dots$	$f(x_n)$

The first divided difference is defined by $f[x_i, x_{i+1}] = \frac{f(x_{i+1}) - f(x_i)}{x_{i+1} - x_i}, i = 0, 1, 2, \dots, (n-1)$

The second divided difference is defined by $f[x_i, x_{i+1}, x_{i+2}] = \frac{f[x_{i+1}, x_{i+2}] - f[x_i, x_{i+1}]}{x_{i+2} - x_i}, i = 0, 1, 2, \dots, (n-2)$

Similarly, the n^{th} divided difference is defined by $f[x_0, x_1, \dots, x_n] = \frac{f[x_1, x_2, \dots, x_n] - f[x_0, x_1, \dots, x_{n-1}]}{x_n - x_0}$

The Newton's divided difference interpolating polynomial of degree n is then defined as

$$P_n(x) = f(x_0) + (x - x_0)f[x_0, x_1] + (x - x_0)(x - x_1)f[x_0, x_1, x_2] + \dots + (x - x_0)(x - x_1)\dots(x - x_{n-1})f[x_0, x_1, x_2, \dots, x_n]$$

Let $f(x)$ be a polynomial satisfying $f(0) = 1, f(1) = 1, f(2) = 2, f(3) = 3, f(4) = 5, f(5) = 8$

The value of $f[x_1, x_2, x_3]$ is

[Question ID = 11426]

1. 0

[Option ID = 45701]

2. $1/2$

[Option ID = 45702]

3. $-1/2$

[Option ID = 45703]

4. 1

[Option ID = 45704]

51) Howard Gardener proposed the theory of multiple intelligences in his book:[Question ID = 11427]

1. Frames of mind: The theory of multiple intelligences [Option ID = 45705]

2. The unschooled mind [Option ID = 45706]

3. Multiple Intelligences: The theory in practice [Option ID = 45707]

4. Disciplined Mind [Option ID = 45708]

52) Which of the following is not true about "learning"?[Question ID = 11428]

1. Learning is a continuous process. [Option ID = 45709]
2. Learning is striving for achievement and success. [Option ID = 45710]
3. Learning brings change in the behavior of the learner. [Option ID = 45711]
4. Learning is acquisition of knowledge, attitude, skills and the way of thinking. [Option ID = 45712]

53) Piaget gave the theory of:[Question ID = 11429]

1. Cognitive development [Option ID = 45713]
2. Emotional development [Option ID = 45714]
3. Social development [Option ID = 45715]
4. Moral development [Option ID = 45716]

54) John Dewey is known for his pioneer work on:[Question ID = 11430]

1. Experiential learning [Option ID = 45717]
2. Natural learning [Option ID = 45718]
3. Value based learning [Option ID = 45719]
4. Didactic learning [Option ID = 45720]

55) Rabindranath Tagore proposes that[Question ID = 11431]

1. Education should be given in natural surroundings. [Option ID = 45721]
2. Education should be given through story and plays. [Option ID = 45722]
3. Education should focus on art and culture. [Option ID = 45723]
4. Education should primarily focus on skills. [Option ID = 45724]

56) Mahatma Gandhi gave the theory of:[Question ID = 11432]

1. Basic education [Option ID = 45725]
2. Modern education [Option ID = 45726]
3. Need based education [Option ID = 45727]
4. Critical education [Option ID = 45728]

57) The correct sequence of Teaching is:[Question ID = 11433]

1. Planning- Teaching- Assessment- Reflection [Option ID = 45729]
2. Planning- Testing- Teaching -Assessment [Option ID = 45730]
3. Testing- Teaching -Planning-Assessment [Option ID = 45731]
4. Planning- Teaching- Assessment- Judgment [Option ID = 45732]

58) To encourage students' participation in the class, a teacher should:[Question ID = 11434]

1. ask students to read aloud the lesson. [Option ID = 45733]
2. to encourage peer tutoring. [Option ID = 45734]
3. to give high marks to students who participate. [Option ID = 45735]
4. to provide space, time and emotionally safe classroom environment. [Option ID = 45736]

59) A teacher should be an effective communicator because:[Question ID = 11435]

1. it makes good impression on students and parents. [Option ID = 45737]
2. it helps saving time. [Option ID = 45738]
3. it helps the teacher to explain teaching content more effectively. [Option ID = 45739]
4. it encourages students to become good communicator. [Option ID = 45740]

60) Teaching as a profession requires teachers to:[Question ID = 11436]

1. upgrade their knowledge and skills time to time. [Option ID = 45741]
2. do research and publications. [Option ID = 45742]
3. join some associations of teachers. [Option ID = 45743]
4. attend conferences. [Option ID = 45744]

61) Foundational capacities as mentioned in National Education Policy 2020 refer to:[Question ID = 11437]

1. lieteracy and numeracy [Option ID = 45745]
2. verbal and written communication [Option ID = 45746]
3. scientific thinking and mathematization [Option ID = 45747]
4. numeracy and computer literacy [Option ID = 45748]

62) National Education Policy 2020 suggested:[Question ID = 11438]

1. light but tight regulatory framework [Option ID = 45749]
2. light and tight curriculum framework [Option ID = 45750]
3. light but tight evaluation framework [Option ID = 45751]
4. light but tight monitoring framework [Option ID = 45752]

63) The new pedagogy and curricula structure for school education as proposed by National Education Policy 2020 suggests:[Question ID = 11439]

1. to replace 10+ 2 years of schooling to 2 +6+3+4 years of schooling. [Option ID = 45753]
2. to replace 10+ 2 years of schooling to 5 +3+3+4 years of schooling. [Option ID = 45754]
3. to replace 10+ 2 years of schooling to 5 +6+4 years of schooling. [Option ID = 45755]
4. to replace 10+ 2 years of schooling to 5 +3+3+2 years of schooling. [Option ID = 45756]

64) Divyangjan refers to the:[Question ID = 11440]

1. persons with emotional conflict [Option ID = 45757]
2. persons with exceptional abilities [Option ID = 45758]
3. persons with disabilities [Option ID = 45759]
4. persons with family disconnect [Option ID = 45760]

65) SARTHAQ, the plan to implement National Education Policy 2020 refers to:[Question ID = 11441]

1. Student and Teacher Holistic Advancement through Quality Education. [Option ID = 45761]
2. Student and Teacher Holistic Development through Quality Schemes. [Option ID = 45762]
3. Student and Teacher Holistic Development through Quality Implementation. [Option ID = 45763]
4. Student and Teacher holistic development through Quality Resources. [Option ID = 45764]

66) DIKSHA, is a digital platform to:[Question ID = 11442]

1. conduct entrance exams for various courses. [Option ID = 45765]
2. conduct online meetings of school staff. [Option ID = 45766]
3. submit schools related grievances. [Option ID = 45767]
4. provide e-resources for students and teachers. [Option ID = 45768]

67) Sustainable Development Goals (SDGs) as adopted by United Nations General Assembly refers to:[Question ID = 11443]

1. seventeen interconnected goals designed to achieve a better and more sustainable future for all. [Option ID = 45769]
2. a set of goals designed to bring peace and harmony in the world. [Option ID = 45770]
3. millennium goal designed to reduce carbon footprints. [Option ID = 45771]
4. universal goals designed to eliminate war zones in the world. [Option ID = 45772]

68) The financial obligations to implement the provisions of Right to Education Act is the:[Question ID = 11444]

1. concurrent responsibility of the Central and State Government. [Option ID = 45773]
2. concurrent responsibility of the district administration and the school. [Option ID = 45774]
3. sole responsibility of the State government. [Option ID = 45775]
4. sole responsibility of the Central Government. [Option ID = 45776]

69) Kishore Vyganik Protsahan Yojana (KVPY) is a national scheme to[Question ID = 11445]

1. Attract talented students for pursuing research in basic science. [Option ID = 45777]
2. Attract talented students for pursuing career in science innovation. [Option ID = 45778]
3. Provide fellowship to talented students from economically weaker sections. [Option ID = 45779]
4. Provide fellowship to talented students for pursuing higher studies outside India. [Option ID = 45780]

70) 11th May celebrated as National Technology Day to[Question ID = 11446]

1. mark the anniversary of the Pokhran Nuclear Test. [Option ID = 45781]
2. mark the birthday of Dr. Homi Jehangir Bhabha. [Option ID = 45782]
3. mark the anniversary of India's first space mission. [Option ID = 45783]
4. mark the foundation day of The Indian Space Research Organization. [Option ID = 45784]

71) Formative assessment is also referred as:[Question ID = 11447]

1. assessment of learning. [Option ID = 45785]
2. assessment for learning. [Option ID = 45786]
3. mid way assessment. [Option ID = 45787]
4. diagnostic assessment. [Option ID = 45788]

72) The number of diagonals in a dodecagon is:[Question ID = 11448]

1. 24 [Option ID = 45789]
2. 54 [Option ID = 45790]
3. 44 [Option ID = 45791]
4. 42 [Option ID = 45792]

73) In mutually exclusive events:[Question ID = 11449]

1. there are no common sample points. [Option ID = 45793]
2. all sample points are common. [Option ID = 45794]
3. few sample points are common. [Option ID = 45795]
4. there are no sample points. [Option ID = 45796]

74) In a discrete probability distribution function, sum of the probabilities is:[Question ID = 11450]

1. 1 [Option ID = 45797]
2. 0 [Option ID = 45798]
3. lies between 0 and 1 [Option ID = 45799]
4. can't say [Option ID = 45800]

75) Which of the following statement is not true for Gaussian Probability Distribution (GPD)?[Question ID = 11451]

1. Gaussian Probability Distribution is a normal distribution. [Option ID = 45801]
2. Gaussian Probability Distribution is a continuous distribution. [Option ID = 45802]
3. The area under the Gaussian Probability Distribution Curve is 1. [Option ID = 45803]
4. Gaussian Probability Distribution is applicable for discrete variables. [Option ID = 45804]

76) The $\lim_{x \rightarrow a} f(x)$ can exist even if $f(a)$ is not defined? Is the statement true?

[Question ID = 11452]

1. Always
[Option ID = 45805]
2. Never
[Option ID = 45806]
3. Sometimes
[Option ID = 45807]
4. Can't determine
[Option ID = 45808]

77) In a bucket filled with water, one milliliter of water is added to the bucket at precisely one-second interval. If p be the function that represents volume of water in the bucket at time, then, t is:[Question ID = 11453]

1. p is a continuous function at every time t . [Option ID = 45809]
2. p is continuous for all values of t , except the precise time when the water drops into the bucket. [Option ID = 45810]
3. p is not continuous at any time. [Option ID = 45811]
4. Can't determine the nature of continuity of the function p . [Option ID = 45812]

78) A function can have:[Question ID = 11454]

1. maximum two horizontal asymptotes. [Option ID = 45813]
2. maximum one horizontal asymptotes. [Option ID = 45814]
3. maximum three horizontal asymptotes. [Option ID = 45815]
4. many horizontal asymptotes. [Option ID = 45816]

79) You cannot go out _____ you complete the homework.[Question ID = 11455]

1. until [Option ID = 45817]
2. before [Option ID = 45818]
3. if [Option ID = 45819]
4. otherwise [Option ID = 45820]

80) It was a _____ group of students coming from different home environment.[Question ID = 11456]

1. homogenous [Option ID = 45821]
2. heterogonous [Option ID = 45822]
3. similar [Option ID = 45823]
4. related [Option ID = 45824]

81) Following is the correct chronological order of the mathematicians starting from the earliest: [Question ID = 11457]

1. Euclid, Pythagoras, Aryabhata, Heron, Ramanujan, John Napier [Option ID = 45825]
2. Euclid, Pythagoras, Heron, Aryabhata, John Napier, Ramanujan [Option ID = 45826]
3. Pythagoras, Euclid, Heron, Aryabhata, John Napier, Ramanujan [Option ID = 45827]
4. Pythagoras, Euclid, Aryabhata, Heron, Ramanujan, John Napier [Option ID = 45828]

82) Match List I with List II

List I	List II
Idioms	Meaning
A. Take someone to the cleaners	I. To want to talk to someone about something annoying they have done
B. Give someone a piece of your mind	II. To make you feel frightened or nervous
C. Have a bone to pick with someone	III. To get a lot of money from someone
D. Give someone the creeps	IV. To speak angrily to someone because they have done something wrong

Choose the correct answer from the options given below:

[Question ID = 11458]

1. A - III , B - IV , C - II , D - I [Option ID = 45829]
2. A - IV , B - III , C - II , D - I [Option ID = 45830]
3. A - I , B - III , C - IV , D - II [Option ID = 45831]
4. A - III , B - IV , C - I , D - II [Option ID = 45832]

83) Which of the following are TRUE facts about Earth Day?

- A. Earth Day was founded by American senator Gaylord Nelson in the form of environmental education.
- B. Earth Day commenced on April 22, 1970.
- C. The theme of Earth Day 2021 was 'Restore Our Earth'.
- D. Events on Earth Day are coordinated globally by the organization Earth Day Network.

Choose the correct answer from the options given below:

[Question ID = 11459]

1. A, B and C only
[Option ID = 45833]
2. B, C and D only
[Option ID = 45834]

3. A, B and D only

[Option ID = 45835]

4. All A, B, C and D are true.

[Option ID = 45836]

84) Which of the following monument was NOT built by a Mughal emperor?[Question ID = 11460]

1. Badshahi Mosque in Lahore [Option ID = 45837]

2. Siri Fort in Delhi [Option ID = 45838]

3. Bibi Ka Maqbara in Aurangabad [Option ID = 45839]

4. Buland Darwaja in Agra [Option ID = 45840]

85) What is new name of Facebook-backed Libra cryptocurrency?[Question ID = 11461]

1. Digitgo [Option ID = 45841]

2. Deim [Option ID = 45842]

3. Jagget [Option ID = 45843]

4. Clown [Option ID = 45844]

86) There are three students P, Q and R. One of them is Allan who always tells truth. Bret always lies and Greg can tell truth as well as lie. P declares that he is not Bret. Q says he is Bret. R says he is not Bret.

Who is Greg?

[Question ID = 11462]

1. P

[Option ID = 45845]

2. Q

[Option ID = 45846]

3. R

[Option ID = 45847]

4. Information is not sufficient to conclude

[Option ID = 45848]

87) Find the odd one out: 41, 43, 47, 53, 61, 71, 73, 81[Question ID = 11463]

1. 41 [Option ID = 45849]

2. 61 [Option ID = 45850]

3. 71 [Option ID = 45851]

4. 81 [Option ID = 45852]

88) If Monday = 166, TUESDAY = 2714, ... , FRIDAY = 5630 Then SUNDAY = ? [Question ID = 11464]

1. 7642 [Option ID = 45853]

2. 0642 [Option ID = 45854]

3. 6024 [Option ID = 45855]

4. 6724 [Option ID = 45856]

89) Given below are three facts.

Fact 1: All chickens are birds.

Fact 2: Some chickens are hens.

Fact 3: Female birds lay eggs.

Based on above three facts, which of the following statements must also be a fact?

A. All birds lay eggs.

B. Hens are birds.

C. Some chickens are not hens.

Choose the correct answer from the options given below:

[Question ID = 11465]

1. B only

[Option ID = 45857]

2. B and C only

[Option ID = 45858]

3. All A, B and C

[Option ID = 45859]

4. None of the statements is a fact

[Option ID = 45860]

90) Logarithm tables were invented by:[Question ID = 11466]

1. J.J. Thompson [Option ID = 45861]

2. John Napier [Option ID = 45862]
3. Paul Ehrlich [Option ID = 45863]
4. A.G. Bell [Option ID = 45864]

91) Which of the following film secured the best film award announced in 2021?[Question ID = 11467]

1. Gunjan Saxena [Option ID = 45865]
2. Thappad [Option ID = 45866]
3. Gulabo Sitabo [Option ID = 45867]
4. Chhappak [Option ID = 45868]

92) Social Media and Digital News are brought under which following law?[Question ID = 11468]

1. Information Technology Act [Option ID = 45869]
2. Cinematography Act [Option ID = 45870]
3. Cyber laws [Option ID = 45871]
4. National Media Policy [Option ID = 45872]

93) Which of the following web portal helps in detecting fake news?[Question ID = 11469]

1. NewsLaundry.com [Option ID = 45873]
2. Turnitin.com [Option ID = 45874]
3. Quora.com [Option ID = 45875]
4. AltNews.in [Option ID = 45876]

94) What is the mechanism behind Cryptocurrency?[Question ID = 11470]

1. Market Mix [Option ID = 45877]
2. Stockbroking [Option ID = 45878]
3. Blockchain [Option ID = 45879]
4. Share Marketing [Option ID = 45880]

95) Which of the following mobile game is an example of Augmented reality?[Question ID = 11471]

1. PUBG [Option ID = 45881]
2. Minecraft [Option ID = 45882]
3. Pokemon Go [Option ID = 45883]
4. Candy crush [Option ID = 45884]

96) Which of the following comes first in producing a film/video?[Question ID = 11472]

1. Adding visual effects [Option ID = 45885]
2. Video editing [Option ID = 45886]
3. Script Writing [Option ID = 45887]
4. Shooting [Option ID = 45888]

97) Which of the following is the MOOC platform by the Government of India?[Question ID = 11473]

1. Coursera [Option ID = 45889]
2. SWAYAM [Option ID = 45890]
3. Moodle [Option ID = 45891]
4. Udemy [Option ID = 45892]

98) “Satyam Shivam Sundaram” is the motto of which television channel?[Question ID = 11474]

1. Aajtak [Option ID = 45893]
2. Doordarshan [Option ID = 45894]
3. NDTV [Option ID = 45895]
4. India TV [Option ID = 45896]

99) Which of the following is not the OTT platform?[Question ID = 11475]

1. Hochoi [Option ID = 45897]
2. Aha [Option ID = 45898]
3. Koodo [Option ID = 45899]
4. Tumbler [Option ID = 45900]

100) Name of the Covid cure drug developed by DRDO, Government of India?[Question ID = 11476]

1. Fabiflu [Option ID = 45901]
2. Favipiravir [Option ID = 45902]
3. 2-deoxy-D-glucose [Option ID = 45903]
4. Moderna [Option ID = 45904]