Mathematics

Single correct answer type:

1. The value of ( ) is ( )

(A) ( ) √

(B) ( ) √

(C) ( ) √

(D) ( ) √

(E) ( ) √

Solution: (B)

( ) ( )

( )

( ) (

)

( ) √ √

( ) √

2. If the conjugate of a complex number is , then is

(A)

(B)

(C)

(D)

(E)

Solution: (D)

$-\ (\ )$

$-(\quad)\quad \frac{(\quad)}{(\quad)}$

$-\frac{(\ )}{(\ )(\ )}$

3. The value of (............../) is equal to

(A) —
(B)
(C) —
(D)√ √ –
(E)

Solution: (E)

$8\ (\quad -)\quad 9 \quad 8(\ ) \quad (-) \quad -9$

$[\ (\ )\ ] \quad -$

$[-]$

$— \quad -(\ ) \quad -$

4. The modulus of is — —

(A)
(B) √–
(C)
(D)
(E)

Solution: (A)

$\frac{(\ )(\ )}{}$

Modulus of | | —
√ √

5. If , then ( ) is equal to
(A)
(B)
(C)
(D)
(E)

Solution: (B)

(— —)

– √

( ) ,( ) ( ) -
, -
,( ) ( ) -
( )

( )
( )

6. If and are real numbers and ( ) , then ( ) is equal to
(A)
(B)
(C)
(D)
(E)

Solution: (E)
Given, ( )
So, ( )..(i)
Then, ( ) ( ) 2 3 –
( ) * +
( )
From Equation (i), we get
( )

7. If , then the equation having and as its roots is – –

(A) (B)
(C)
(D)
(E)

Solution: (E)
Given, and

√

√

Similarly, √

√ √

Now, addition of roots

√ √

√ √

Multiplication of roots

( )

8. The focus of the parabola is

(A) . /
(B) . /
(C)
.
(D) .
(E) .

Solution: (D)

( )
( )
( ) ( )

Let ....(i)

Here, ( ) ( )

Vertices ( ) ( )

Equation (i) comparing on

Focus - / - _ /

9. If ( ) is an increasing function and if $\frac{()}{()}$, then $\frac{()}{()}$ is equal to

(A) –

(B) –

(C)

(D)

(E)

Solution: (E)

Given ( ) is an increasing function.

And $\frac{()}{()}$

So, ( ) ( )

( ) constant.

Therefore, $\frac{()}{()}$

10. If is differentiable at , then $\frac{()\,()}{}$ is

(A) ( )

(B) ( ) ( )

(C) ( ) ( )

(D) ( ) ( )

(E) ( ) ( )

Solution: (C)

$\frac{()\,()}{}$

By Rule,

$\frac{()\,()}{()\,()}$

11. Eccentricity of the ellipse is

(A) $\frac{\sqrt{}}{}$

(B) √

(C) √ / √

(D) √

(E) √

Solution: (A)
Equation is an ellipse.

( ) ( )
( ) ( )

( ) ( ), where

Eccentricity ( ) √

√ √ √

12. The focus of the parabola ( ) ( ) is (A) ( )
(B) ( )
(C) ( )
(D) ( )
(E) ( )

Solution: (A)
Given, ( ) ( )

Here, ( )
Vertices ( ) ( )
Comparing Equation (i) from

Focus ( )
( )

13. Which of the following is the equation of a hyperbola?
(A)
(B) (C)
(D) (E)

Solution: (D)

(−) ( ) −

(−) ( ) ——

- / ( )

—— ——

It is hyperbola equation.

14. Let ( ) , where are constants and If ( ) ( ) and ( ) , then the other root of is

(A)
(B)
(C)
(D)
(E)

Solution: (A)
( )
( )
…… (i)
One root is
and ( ) ( )
( )
.….(ii)
Equation (ii) - Equation (i), we get

Then, equation is
Roots
Sum of roots −

So, another root

15. Let satisfy ( ) ( ) ( ) for all real numbers and . If ( ) , then
-−/

(A)
(B) –
(C) –
(D)
(E) Solution:
(B) Given

( ) ( ) ( ) …(i)
On taking
( ) ( ) ( ) ( ) ( ) ( )
Now, -, then from equation (i)

( ) (–) ( ) –

--/ ( ) , ( ) -

( ) – ( )

On putting the value of ( ),

( ) – –

16. Sum of last coefficents in the binomial expansion of ( ) is
(A)
(B)
(C)
(D)
(E)

Solution: (C)
We have, ( )
Sum of last coefficient of the binomial expansion

We know that,

( ) ( ) ( )
( ) , -

Sum of last coefficient of the binomial expansion ( ) is .

17. ($\sqrt{}\sqrt{}$) ($\sqrt{}\sqrt{}$) – –
(A) $\sqrt{}$
(B) $\sqrt{}$
(C) $\sqrt{}$
(D) $\sqrt{}$
(E) $\sqrt{}$

Solution: (D)
Take,
( )
( )

( ) ....(i)
Similarly, ( ) ....(ii)
On subtracting Equation (ii) from Equation (i), we get
( ) ( ) ( )
Now, putting √ and √
(√ √) (√ √) √ √ 0(√) (√) 1
√ ( ) √ √

18. Three players and play a game. The probability that and will finish the game are respectively and . The probability that the game is finished is.

(A) –

(B)

(C) –

(D) –

(E) –

Solution: (D)
We have, ( ) ( ) and ( )
Required probability
( ) ( ) ( )

19. If and , then | | is

(A)
(B) √
(C)
(D) √
(E)

Solution: (B)
Given, and
Then, | | |
| | ( )
( ) ( )

( )

| |

| |

√( ) ( )

√ √

20. If ( ) √ , then ( ) is equal to

(A)

(B)

(C)

(D)

(E)

Solution: (A)

Given, ( ) √

Now, ( ) √

√

√ 4 5

21. The value of is

(A) √

(B) √

(C) √

(D) √

(E)

Solution: (A)

. /

√

22. The sum of odd integers from to is
(A) ( )
(B) ( )
(C) ( )
(D) ( )
(E) ( )

Solution: (C)

Sum of odd integers ( )

23. If , then ( ) is equal to
(A)
(B)
(C)
(D)
(E)

Solution: (C)

( )

( )

( )

( )

24. The foci of the hyperbola are
(A) - √ /
(B) - √ /
(C) - √ /
(D) - √ /
(E) - √ /

Solution: (A)

( ) ( )

( ) ( )
( ) ( )
( ) ( ) .... (i)

We know that,......................... (ii)

Foci ( )

On comparing Equations (i) and (ii), we get

$\sqrt{\ }$ $\sqrt{\ }$

$\sqrt{\ }$

Hence, - /

25. If the sum of the coefficients in the expansions of ( ) is zero, then is equal to

(A)

(B)

(C)

(D)

(E)

Solution: (B)

( )

For sum of coefficients put

( )

*( ) +

26. The mean deviation of the data from the mean is

(A)

(B)

(C)

(D)

(E)

Solution: (C)
Mean of the given data is

The deviations of the respective observations from the mean ‾, i.e. ‾ are

The absolute values of the deviations, i.e. | are
The required mean deviation about the mean is

$\sum |$

27. The mean and variance of a binomial distribution are and respectively. What is ( )?
(A)
(B)
(C)
(D)
(E)

Solution: (B)
Let and be the parameters of the binomial distribution.
Mean and variance
and
and
Required probability ( )

( ) ( ) ( )

28. The number of diagonals of a polygon with sides is
(A)
(B)
(C)
(D)
(E)

Solution: (A)
The number of diagonals of a polygon with sides is

———

29. In a class, of students study Maths and Science and of students study Maths. What is the probability of a students studying Science given the student is already studying Maths?
(A) –

(B) –

(C) –

(D) –

(E) –

Solution: (C)
Probability of Maths and Science students — –

Probability of maths students — –

P(Science/Maths) ( ) ——— – –
( )

30. The eccentricity of the conic is
(A)
(B) —
√
(C) –
(D) √
(E)

Solution: (B)

( ) (– — —)

( ) (–) –

( ) (–) –

( ) . /
– —

Ellipse √ — √

√ √ — –

31. If the mean of a set of observations is , then the mean of is

(A)
(B)
(C)
(D)
(E)

Solution: (C)
Mean of a set of observations

Then, according to question,

( )

32. A letter is taken at random from the word "STATISTICS" and another letter is taken at random from the word "ASSISTANT". The probability that they are same letters is

(A) —

(B) —

(C) —

(D) —

(E) —

Solution: (C) Probability of take a random from the word STATISTICS

Probability of take a random from the word ASSISTANT

The probability is that they are same letters

33. If and are the roots of the equation , then (A)
(B) ( )
(C) (D)
(E)

Solution: (A)

Roots are and

– …. (i)

and – ….. (ii)

( ) —

Using Equation (i), we get

. / – —

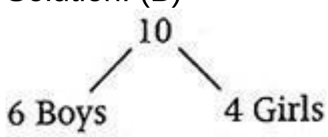
34. If the sides of triangle are and......... Then the area (in sq cm) of triangle is
(A) –
(B) √ –
(C) —
(D) √ –
(E) √ –

Solution: (E)
Given, triangle of sides

Then, area of triangle
√ ( )( )( )
√ ( ) ( ) ( )
√ ( ) ( ) ( ) √

35. In a group of boys and girls, a team consisting of four children is formed such that the team has atleast one boy. The number of ways of forming a team like this is
(A)
(B)
(C)
(D)
(E)

Solution: (B)



The team has atleast one boy
= Total case – No anyone boy

36. A password is set with distinct letters from the word LOGARITHMS. How many such passwords can be formed?
(A)
(B)
(C)
(D)
(E)

Solution: (B)
LOGARITHMS letters are .
A password is set with distinct letters

37. If is divided by , the remainder obtained is
(A)
(B)
(C)
(D)
(E)

Solution: (B) We know that,
, where is a positive integer.
( ) ( )
( ) ( ) ( ) ( ) (by binomial theorem)
[ ]

( )

On multiplying both sides by , we get

( )

Hence, the required remainder is .

38. A quadratic equation , with distinct coefficients is formed. It are chosen from the numbers then the probability that the equation has real roots is

(A) –

(B) –

(C) –

(D) –

(E) –

Solution: (A)

Total number of ways of assigning values to

Now, for quadratic equation to have real roots This is possible only when or

Required probability – –

39. ―――――― is equal to

(A) –

(B) –

(C) —

(D) –

(E) –

Solution: (D)

$0 \quad - \quad - \quad -1$

$0 \quad - \quad -1$

On putting , we get

, -

, - –

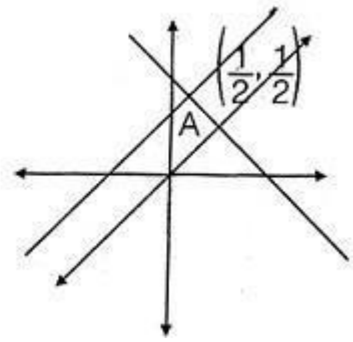
40. The minimum value of ( ) * + is

(A) –

(B) –

(C)
(D)
(E)

Solution: (B)
we have,
( ) * +
The graph of ( ) is



Clearly from graph minimum value of ( ) at point .– –/.

Minimum value of ( ) is . –

41. The equations of the asymptotes of the hyperbola are
(A)
(B)
(C)
(D)
(E)

Solution: (B)
We have equation of hyperbola is

( ) ( )
We know that asymptote of hyperbola
is and .
Asymptote of hyperbola
( ) ( ) is

42. If ( ) then ( ) is equal to
(A)
(B)
(C) ( )
(D)

(E)

Solution: (C)

( )

( ) ( ) 0 ( ) 1 —

[( ) ( )]

43. The standard deviation of the data is

(A) √

(B) —

(C) √

(D) —

(E)

Solution: (A)

Given data Mean of the given data (

—

The deviation of the respective data from the mean i.e. (are

( )

(

∑(

Standard deviation ( ) —

√– ∑(√ —

44.44.

(A)

(B)

(C)

(D)

(E)

Solution: (A)

{- -}

{- -}

[ ]

45.4
5
.

(A)
(B)
(C)
(D)
(E)

Solution: (D)

Using Rule,

Using limit, we get

√( )

46. Let and be differentiable functions such that ( ) ( ) ( )
( ) ( ) and ( ) . If ( ) ( )( ), then ( )
(A)
(B)
(C)
(D)
(E)

Solution: (B)
( ) (( ))

( ) (( )) ( )
( ) (( )) ( ) [( )]
( )
( )

47. √ ( ) ( )

(A)
(B) √
(C)
(D)
(E)

Solution: (D)

√

( ) ( )

√( ) ( )

( ) ( )

√ 6 ( ) ( ) 7

( ) ( )

, -

( )

( )

, ( ) -

48. A poison variate satisfies
( ) ( ) ( ) is equal to

(A)
(B)
(C)
(D)
(E)

Solution: (A)
Given that,
( ) ( )

( ) ( )

49. Let and be consecutive integers selected from the first natural numbers.
The probability that √ is an odd positive integer is

(A) —

(B) —

(C) —

(D)

(E)

Solution: (D)

and are two consecutive number.

Let

Now, √

√ ( ) ( )

√ ( )

√

√

√( )

( )

It is always odd.

Probability of √ is an odd integer is

50. An ellipse of eccentricity √ – is inscribed in a circle. A point is chosen inside the circle at random. The probability that the point lies outside the ellipse is

(A) –

(B) –

(C) –

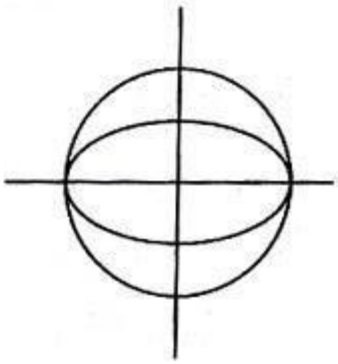
(D) –

(E) —

Solution: (B)
Given, $\sqrt{\ }$ –

—

— – ....(i)



( ) ————

–

– [using Equation (i)]

( ) –

51. If the vectors ˆ ˆ ˆ ˆ ˆ ˆ and ˆ ˆ ˆ are coplanar, then is equal to
(A)
(B)
(C)
(D)
(E)

Solution: (C)
Given vectors ˆ ˆ ˆ ˆ ˆ ˆ and ˆ ˆ ˆ are coplanar.

Then, | |

( ) ( ) ( )

52. Let → ˆ ˆ ˆ → ˆ ˆ ˆ and → ˆ ˆ ˆ. Then, the area of the parallelogram with diagonals → → and → → is
(A) $\sqrt{\ }$

(B) √ —

(C) √

(D) √

(E) √

Solution: (A) Given,

Diagonals: and

Area of parallelogram , - … (i)

From Equation (i),

| | − | |

− [( ) ( ) ( )]

− | |

− √ √ √ −

53. If | | | | | | and , then the value of is equal to

(A)

(B)

(C)

(D)

(E)

Solution: (D)

| | | | | | ,

( ) | | | | | | ( )

( ) ( ) ( ) ( )

54. If | | | | | | , then the angle between and is equal to

(A) –

(B)___

(C) –

(D)

(E)

Solution: (A)

| → →→| | →| | →→|

| → →→| → →→

| →|| →→|

– –

–

55. If the vectors → ^ ^ ^ ↠ ^ ^ ^ and → ^ ^ ^ are mutually orthogonal, then is equal to

(A)

(B)

(C)

(D)

(E)

Solution: (B)

Given,

→ ^ ^ ^ ↠ ^ ^ ^

→ ^ ^ ^

Vectors are mutually orthogonal, so

→ →→→→ → → →

→ →→

..…(i)

..…(ii)

On solving Equations (i) and (ii), we get

56. The solution of – – are

(A)

(B)

(C)

(D)

(E)

Solution: (D)

We have, – –

Let –

( ) ( )
( ) ( )

– or –
( ) or
or

57. If the equations and have a real common root , then the value of is equal to

(A)
(B)
(C)
(D)
(E)

Solution: (C)

Given equations,

is common root, so satisfied both equations.

( ) ( )

58. If , then the value of is equal to

(A)
(B)
(C)
(D)
(E)

Solution: (A)

Given,

( ) ( )
( )
.....(i)
, -

On squaring both sides,

( ) ( )

( )

..... (ii)
From Equations (ii) and (i), we get

59. Two dice of different colours are thrown at a time. The probability that the sum is either or is
(A) —

(B) –

(C) –

(D) –

(E) –

Solution: (B)
Probability of sum of
( ) ( ) ( ) ( ) ( ) ( ) and probability of sum of
( ) ( )

( ) — —

— –

60. – — — — – Is equal to

(A) —

(B) —

(C) —

(D) —

(E) —

Solution: (A)

— — — — —

— [— — — — —]

— [ ]

— —

61. The order and degree of the differential equation ( ) ( ) ( ) is

(A) and
(B) and
(C) and
(D) and
(E) and

Solution: (A)
The given differential equation is ( ) ( ) ( )
Clearly, its order is and degree is . Hence, option and is correct.

62. ∫ | | is equal to
(A)
(B)
(C)
(D)
(E) –

Solution: (D) Given that,

∫ | |

∫ ∫

6__7 6__7

( ) ( )

63. ∫ ______ is equal to
(A)
(B) –
(C) —
(D) –
(E) __

Solution: (B)
Given that,

∫ __________

∫ __ ( ) , ( )-

, ( ) ( )- –

64. If $\int$ ( ) and $\int (( ))$, then $\int$ ( ) is
(A)
(B)
(C)
(D)
(E)

Solution: (E)
We know, $\int$, ( )-

$\int \int ( )$

( ) $\int ( )$

( ) $\int ( )$

$\int ( )$

$\int$ ( )...............................(i)
Now, $\int$ ( )

$\int ( ) \int ( )$

$\int$ ( ) [from Equation (i)]

$\int ( )$

65. $\int$-( )
(A) ——
(B) ——
(C) ——
(D) ——
(E) ——

Solution: (A)
Given that,

$\int \frac{}{( )}$ $\int \frac{(\quad)}{( )}$

$\int (\frac{}{} \quad \frac{}{( )})$

66. The remainder when is divided by is
(A)
(B)
(C)
(D)
(E)

Solution: (A)
( )
( ) ( )
When divided by , then remainder ( )
Hence, remainder

67. The coefficient of in the expansion of ( ) is (A)
(B)
(C)
(D)
(E)

Solution: (B)

For the coefficient of ,

Coefficient of

68. The maximum value of
. −/ is
(A)
(B)
(C)
(D)
(E)

Solution: (C)
. /−
, -

√‾
6_____ —— 7

√‾
—— ——

Let and √ ‾ ——

Then expression becomes,

Maximum value of this type of expression is equal to, --------Maximum value

After putting values of and , we get , --Max value
Max value

69. The area of the triangle in the complex plane formed by and is
(A) | |
(B) | |
(C) | |
(D) | |
(E) | |

Solution: (C)
Let ( ) ( ) and . If is the area of triangle formed by and , then

– | |

Applying

– | |

– ( ) | | –

70. Let ( ) ( ) be a differentiable function. If is even, then ( ) is equal to
(A)
(B)
(C)
(D)
(E) –

Solution: (C)
( ) ( )
( ) ( ) ( ) ( )
( ) ( )

71. The coordinate of the point dividing internally the line joining the points ( ) and ( ) in the ratio is
(A) ( )
(B) ( )
(C) .— –/
(D) .– —/
(E) ( )

Solution: (C)
Here, and

and

( ) (— –)

72. The area of the triangle formed by the points ( ) ( ) ( ) is
(A)
(B)
(C)
(D)
(E) ( )

Solution: (D)

Area of triangle – | |

– | |

, -

| |

73. If ( ) is equidistant from ( ) and ( ), then
(A)
(B)
(C)

(D)
(E)

Solution: (D)
According to question,
* ( )+ * ( )+
* ( )+ * ( )+
( ) ( ) ( ) ( )
( ) ( ) ( ) ( )
By solving, we get

74. The equation of the line passing through ( ) and parallel to the line – – is

(A) – –

(B) – –

(C) – –

(D) – –

(E) – –

Solution: (B)
Given equation of line is
– – ……(i)

–

So, equation of line passing through ( ) and parallel to Equation (i) is

–( )

– –

– –

75. If the points ( ) ( ) and ( ) enclose a triangle of area units, then the centroid of the triangle is equal to
(A) ( )
(B) ( )
(C) ( )
(D) (√ √) –
(E) ( )

Solution: (B)
Given, that Area of triangle

−| |

| |

( ) ( ) ( )

Now, centroid of the given triangle will be

(—————— ——————) (— —)

When centroid . / ( ) —— ——

76. The area of a triangle is units. Two of its vertices are ( ) and ( ). The third vertex lies on .... The coordinates of the third vertex can be
(A) .— —/
(B) ./ —
(C) ._ _/
(D) .— –/
(E) .– –/

Solution: (C)
Let the coordinates of third vertex be ( ). Given that, area of a triangle

−| |

( ) ( ) ( )

.....(i)
Since, third vertex lies as..............................(ii)
By solving Equations (i) and (ii), we get

– —

77. If represents a pair of straight lines, then is equal to
(A)
(B)

(C)
(D)
(E)

Solution: (B)
Given equation of pair of straight lines is
Since, the necessary and sufficient condition for pair of straight lines is

| |

| |

( ) ( )

78. If is the angle between the pair of straight lines , then
is equal to
(A) —
(B) —
(C) —
(D) —
(E) —

Solution: (C)
Given equation of straight line is

$\sqrt{\quad}$

$\cdot \sqrt{\;}$

| |

$\sqrt{\;}$

| | $-\sqrt{\;}$ – – – –

—

79. If ˆ ˆ ˆ (ˆ ˆ ˆ) (ˆ ˆ ˆ) (ˆ ˆ ˆ), then
(A)
(B)
(C)
(D)

(E)

Solution: (C)
Given that,
^ ^ ^ (^ ^ ^) (^ ^ ^) (^ ^ ^)
^ ^ ^ ( ) ^( ) ^( )
By equating the coefficients of ^ ^ and ^, we get
.….(i)
.….(ii)
… (iii)
By solving Equations (i), (ii) and (iii), we get

80.
(A) $\frac{\sqrt{}}{\sqrt{}}$
(B) $\frac{\sqrt{}}{}$
(C) $\frac{\sqrt{}}{}$
(D) $\frac{\sqrt{}}{}$
(E) $\frac{(\sqrt{})}{\sqrt{}}$

Solution: (A)
( )

$\sqrt{}$ $\sqrt{}$ $\sqrt{}$
$\sqrt{}$
$\sqrt{}$ $\sqrt{}$
$\sqrt{}$
$\sqrt{}$

81. If $\bar{}$ and $\bar{}$ ^ ^ ^ are collinear and $\bar{}$ $\bar{}$, then $\bar{}$ is equal to
(A) (^ ^ ^)
(B) ^ ^ ^
(C) ^ ^ ^
(D) ^ ^ ^
(E) ^ ^ ^

Solution: (B)
Since, $\vec{}$ and $\vec{}$ are collinear vector. Therefore,
$\vec{}$ $\vec{}$.….(i)

$\rightarrow \rightarrow\rightarrow$

$|\vec{}||\vec{}\vec{}|$

$|\vec{}\vec{}|\ \sqrt{\quad}$

$|\vec{}|$ —

By Equation (i),

$\rightarrow \rightarrow\rightarrow$

$|\vec{}|\ |\ ||\vec{}\vec{}|$

| |

| | –

$\rightarrow$ –(^ ^ ^)

$\rightarrow$ (^ ^ ^)

82. If $|\vec{}|\ |\vec{}\vec{}|$ and $\vec{}\ \vec{}\vec{}$, then $|\vec{}\ \vec{}\vec{}|$ is equal to

(A)

(B) $\sqrt{}$ —

(C) $\sqrt{}$ —

(D) $\sqrt{}$ —

(E) $\sqrt{}$ —

Solution: (E)

Given that,

$|\vec{}|\ |\vec{}\vec{}|$ and $\vec{}\ \vec{}\vec{}$

$\vec{}\ \vec{}\vec{}\ |\vec{}||\vec{}\vec{}|$

$|\vec{}\ \vec{}\vec{}|\ |\vec{}||\vec{}\vec{}|$

$\sqrt{}$

— $\sqrt{}$

83. If , then is equal to

(A)
(B)
(C)
(D)
(E)

Solution: (B)
Given that,

( )

( )

( )

84. Distance between two parallel lines and is
(A)
(B) $\sqrt{}$
(C) $\sqrt{}$
(D)
(E) $\sqrt{}$

Solution: (C)
Distance between parallel lines
or and
or is

$\sqrt{(\quad) \quad (\quad)}$ $\sqrt{}$ $\sqrt{}$

85. ( ) ( ) ( )
(A) (B)
(C)
(D)
(E)

Solution: (C)
( ) ( ) ( )

,

86. The coefficient of in the expansion of ( )( ) is
(A)
(B)
(C)

(D)
(E)

Solution: (D)
( ) ( )
( )
( )
( ) ( )
Coefficient of

87. The equation of the circle with centre ( ) which passes through ( ) is
(A)
(B) (C)
(D) (E)

Solution: (B)
Radius of circle is √( ) ( ) √ So, equation of circle is
( ) ( )

88. The point in the plane which is equidistant from ( ) ( ) and ( ) is
(A) ( )
(B) ( )
(C) ( )
(D) ( )
(E) ( )

Solution: (D)
Let the points are ( ) ( ) and ( ).
We know that -coordinate of every point an -plane is zero so let ( ) be a point on -plane such that
Now,

( ) ( ) ( ) ( ) ( ) ( )
……(i)
and,

( ) ( ) ( ) ( ) ( ) ( )

..… (ii)
Putting in Equation (i), we get
Hence, the required point is ( )

89. Let be such that ( ) and ( ) ( ) ( ) for all natural numbers and . If ∑ ( ) ( ), then is equal to

(A)
(B)
(C)
(D)
(E)

Solution: (A)
We have,
( ) and ( ) ( ) ( )
Now, ( ) ( ) ( ) ( )
( ) ( ) ( ) ( )
and so on
( ) ....(i)
Now, we have

∑ ( ) ( )

( ) ( ) ( ) ( )
( ) ( ) ( ) ( ) ( ) ( ) ( )
( ) , ( ) ( ) ( )- ( )
( ), - ( )- (
)
( ) 6 7 ( )

( ) ( ) ( ) ( )
, ( ) ( ) -

90. If and , then
(A)
(B)
(C)
(D)
(E)

Solution: (D)
Given that,

and

Here, — — and — —

and
By solving these equations, we get

91. Let ( ) ( ) be continuous, ( ) ( ) for all ( ) and ( )
–, then the value of -–/ is

(A)
(B)
(C)
(D)
(E)

Solution: (B)
is continuous
( ) ( ) ( )
–( ) (–)
( ) ( ) –

Given, -–/ - / —
( ) - / - – … (i)

Therefore, -–/
– [using Equation (i)]

92. √ √

(A)
(B)
(C)
(D)
(E)

Solution: (C)
-√ √ /
(√ √) (√ √) / (√ √) (by rationalization)
√ √ √ √
4√ √-5

93. If is differentiable at and – ( ) ( )

(A)

(B)
(C)
(D)
(E)

Solution: (E)

( ) ( ) ( ); function is differentiable.

( ) and ( ); Given function is continuous.

Hence, ( ) ( )

94. The maximum value of the function is attained at
(A)
(B)
(C)
(D)
(E)

Solution: (D)
We have, ( )
( )
and ( )
At point of local maximum as minimum, we must have
( ) ( )
Clearly, ( )
and ( )
So, ( ) has local maximum at .

95. If ∫ ( ) –* ( )+ , then..... is
(A)
(B) –
(C)
(D)
(E)

Solution: (C)
We have,

∫ ( ) * ( )+ –

On differentiating both sides, we get
( ) ( ) ( )
( )
( )

96. $\int$

(A) ($\sqrt{}$)
(B) ($\sqrt{}$)
(C) ($\sqrt{}$)
(D) ($\sqrt{}$)
(E) $\frac{}{\sqrt{}}$

Solution: (E)

Let $\int$ ….(i)

$$\int$$

$\int$ ( ) ….(ii)

6 $\int$ ( ) $\int$ ( ) 7

By adding Equations (i) and (ii), we get

$$\int$$

$$\int ( ) ( )$$

$$\int$$

$$\int , -$$

, -

[($\sqrt{}$) ($\sqrt{}$)]

[$\sqrt{}$ $\sqrt{}$]

[$\sqrt{}$]

$$\frac{(\sqrt{-} \ [\sqrt{-} \quad] \ )}{(\sqrt{-})} (\sqrt{-})$$

$$\frac{-}{\sqrt{}}$$

97. $\int^{-}$ ——

(A)

(B)

(C) –

(D)

(E)

Solution: (C)

Let $\int^{-}$ —— .....(i)

$\int^{-}$ ——

$\int^{-}$ —— .....(ii)

By adding Equations (i) and (ii), we get

$\int^{-}$ ——

$\int$, -

–

–

98. 4 $\frac{\int \sqrt{} \quad -}{\quad}$ 5

(A) –

(B) –

(C) –

(D)

(E) –

Solution: (D)

$\int \quad \sqrt{}$

Where, ( ) ( )

$\frac{(\ )}{(\ )}$

Where, ( ) √ ( ) — —

99. The area bounded by and is –

(A) –

(B) –

(C) –

(D) —

(E)

Solution: (B)

Required area ∫–

∫ [———]

–

– ∫ ( )

–

– [——]–

– 0( ) .–/1

– 0-1 –

100. The differential equation of the family of curves ( ), where and are arbitrary constants is

(A)

(B) (C)

(D)

(E)

Solution: (A)
Given, system of equation is
( )
— ( )..(i)

— ( )

, - —

— . / [by Equation (i)]

— —

This is required differential equation.

101. The real part of (√) is
(A)
(B) (C)
(D)
(E)

Solution: (B)
(√) —
√ — 6
— 7

( ) 6 √ 7 —

— √
6 — 7

[√] √ — —
Hence, real part is √ . —

102. (—
A) –
(B) —
(C)
(D)
(E)

Solution: (B)

[by Hospital's rule]

103. $\int ()()$

(A)

(B)

(C)

(D)

(E)

Solution: (B)
We have,

$\int ()()$

Put ( ) and ( )

$\int \frac{(())}{()}$

$\int \frac{()(}{)}$

$\int$

$\int$

$\int$

Put . / . /

$\int$

104. A plane is at a distance of units from the origin and perpendicular to the vector . The equation of the plane is

(A) ( )

(B) ( )

(C) ( )

(D) ( )

(E) ( )

Solution: (C)

Equation of plane whose distance from origin is and normal is is

Given that,

By formula,

( )

105. ~~is equal t~~o

(A)

(B) ( )

(C)

(D)

(E) ( )

Solution: (D

Given that,

( )

106. If , then ―

(A)
(B)
(C)
(D)
(E)

Solution: (B)
Given that,
……(i)
Differentiating to ,

― ( )

― , -

Again differentiating to ,

― , ( ) -

, -

― [by Equation (i)]

107. The arithmetic mean of is

(A) ―

(B) ―

(C) ―

(D) ―

(E) ―

Solution: (A)
( )
Take
( ) ( ) ( ) ( )

Now, arithmetic mean
Σ , where ( )

―

―

108. The variance of first natural numbers is

(A)

(B)

(C)

(D)

(E)

Solution: (D)
Since, variance of first natural number is

( )

Variance of first natural number is

( )

( )

109. If is a set with elements and *( ) +, then the number of elements in is
(A)
(B)
(C)
(D)
(E)

Solution: (B)
Total numbers of elements in the set The selection of two distinct elements from given elements.

( )

110. A coin is tossed and a die is rolled. The probability that the coin shows head and the die shows is
(A)

(B)

(C)

(D)

(E)

Solution: (B)

( ) and ( )

So, required probability - / - / —

111. If ( ), then the sum of all the diagonal entries of is

(A)
(B)
(C)
(D)
(E)

Solution: (E)

[ ]

| | ( ) ( ) ( )
( ) ( )
( ) ( )
( ) ( )
( ) ( )
( )

| | [ ]

[ ]
, -
| |

Sum of all diagonal entries of

112. Let ( ) | |. If is a root of

( ) , then the other roots are

(A) and
(B) and
(C) and

(D) and
(E) and

Solution: (A)

Given, ( ) | |

| |

, -

( ) | |

( ) | |

, -
( ),( )( ) ( )-
( )( ), -
( ) ( ) ( )( )
at ( )
( ) ( )( )

Hence, other roots are and .

113. If , ------[ ] [ ] , then can be

(A)
(B)
(C)
(D)
(E)

Solution: (D)

Given that, , -[ ] [ ]

[ ] [ ]

[ ] [ ]

( ) ( )

( ) ( )
( )( )

114. If 0 1 and 0 1, then

(A)
(B) –
(C)
(D)
(E)

Solution: (B)
We have,

0 1

—— 0 1

{ 0 1 ———— 0 1}

—
[ ]
— –

Now, it is given that

0 1

—
[ ] 0 1
— –

–

115. If | | , then is equal to

(A)
(B)
(C)
(D)
(E)

Solution: (B)

Given that, | | ,

( ) ( ) ( )

On equating the coefficient of both sides, we get

( ) ( ) ( )

116. | |

(A)
(B)
(C) ( )( )( )
(D)
(E) ( )

Solution: (B)
Given that,

| | || ||

, -

( ) | |

( ) , -

117. If ( ) | |, then ( )
( ) ( )( ) ( )

(A)
(B)
(C)
(D)
(E)

Solution: (A)
Given,

( ) | |
                  (   )   (   )(   )   ( )

| |
         (   )(   )   (   )   ( )
, -

(   ) |(   ) |
             (   )
( ), ( ) ( )-
( )
( )

118. If ( ) | |, then

∫( )

(A) —

(B) -

(C)

(D)

(E)

Solution: (A)

Given,

( ) | |

| |

, ( )-

| |

, -

( ) ( ) ( )( )

∫ ( ) – ∫

–

–[–]

–, -

–, -

– –

119. The equation of the plane passing through the points ( ) ( ) and ( ) is
(A)
(B)
(C)
(D)
(E)

Solution: (B)
Given that,

and
Equation of plane passing through these points is

| |

( )( ) ( )( ) ( )( )
( )( ) ( )( ) ( )( )

120. In an arithmetic progression, if the th term is , then the sum of first terms is
(A) ( )
(B) ( )
(C) ( )
(D) ( )
(E) ( )

Solution: (A)
Let be the first term of an and is the common difference.
( )
Since,
( ) ( )

( ) ( )

Equating both sides, we get

and

¬, ( ) -

—— , -

, - ( )