MATHS

BOOKS - GURUKUL BOOKS & PACKAGING MATHS (HINGLISH)

MARCH 2017

Section I

1. If the points $A(2, 1, 1,), B(0, \ -1, 4)$ and $C(k, 3, \ -2)$ are collinear, then k= . . . .

A. 0

B. 1

C. 4

D. -4

Answer:

2. Select and write the most appropriate answer from the given alternatives in each of the following :

The inverse of the matrix $\begin{pmatrix} -1 & 5 \\ -3 & 2 \end{pmatrix}$ is

A. $\dfrac{1}{13} \begin{bmatrix} 2 & -5 \\ 3 & -1 \end{bmatrix}$

B. $\dfrac{1}{13}\begin{bmatrix} -1 & 5 \\ -3 & 2 \end{bmatrix}$

C. $\dfrac{1}{13}\begin{bmatrix} -1 & -3 \\ 5 & 2 \end{bmatrix}$

D. $\dfrac{1}{13}\begin{bmatrix} 1 & 5 \\ 3 & -2 \end{bmatrix}$

Answer:

3. In $\triangle ABC$, if $a = 13, b = 14$ and $c = 15$, then sin. $\dfrac{A}{2} = $ ....

A. $\dfrac{1}{5}$

B. $\sqrt{\dfrac{1}{5}}$

C. $\dfrac{4}{5}$

D. $\dfrac{2}{5}$

Answer:

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4. Find the volume of the parallelopiped whose conterminus edges are given by vectros $2\hat{i} + 3\hat{j} - 4\hat{k}, \ \hat{k} + 7\hat{j} + 5\hat{k}$ and $4\hat{i} + 5\hat{j} - 2\hat{k}$.

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5. In any $\triangle ABC$, prove that

$$a(b\cos C - c\cos B) = (b^2 - c^2)$$

6. If from a point $P(a, b, c)$ perpendiculars $PA and PB$ are drawn to $YZ and ZX - planes$ find the vectors equation of the plane $OAB.$

7. Find the cartesian equation of the line passing through the points $A(3, 4, -7)$ and $B(6, -1, 1)$

8. Write the following statement is symbolic form and find its truth value :

$\forall n \in N, n^2 + n$ is an even number and $n^2 - n$ is an odd number.

9. Using truth tables. Examine whether the stateements pattern $(p \wedge q)v(p \wedge r)$ is tautology. Contradiction or continegency.

10. Find the shortest distance between the lines

$$\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4} \, and \, \frac{x-2}{3} = \frac{y-4}{4} = \frac{z-5}{5}$$

.

11. निम्नलिखित प्रश्न 7 से 14 तक प्रत्येक समीकरण निकाय को आव्यूह

विधि से हल कीजिये। $x - y + z = 4$

$$2x + y - 3z = 0$$

$$x + y + z = 2$$

12. If θ is the measure of the acute angle between the lines represented by equation $ax^2 + 2hx + by^2 = 0$, then prove that $\tan\theta = \left|\dfrac{2\sqrt{h^2 - ab}}{a + b}\right|$ where $a + b \neq 0$ and $\neq 0$. Find the condition for coincident lines.

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13. Using vector method, find the incentre of the triangle whose vertices are P(0,4,0),Q(0,0,3) and R(0,4,3).

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14. Construct the switcing circuit for statement

$(p \wedge q) v(\sim p) v(p \wedge \sim q)$

15. Find the joint equation of the pair of lines through the origin which are perpendicular to the lines given by $5x^2 + 2xy - 3y^2 = 0$.

16. Prove that: $\dfrac{\tan^{-1} 4}{5} + \dfrac{\cos^{-1}(12)}{13} = \dfrac{\cos^{-1}(33)}{65}$

17. Find the direction angles of the line with the X-axis which makes direction angles of $135°$ and $45°$ with Y-axes Z-axes respectively.

18. Find the vector and cartesiooan equations of the plane passing through the points $A(1, 1 - 2), B(1, 2, 1), C(2, \ -1, 1)$

19. Solve the following LPP by using graphical method.

Maximize : $Z = 6x + 4y,$

Subject   to

$x \leq 2,\ x + y \leq 2,\ -2x + y \leq 1,\ x \geq 0,\ y \geq 0.$ Also

find maximum value of Z.

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Section Ii

1. Derivative of $\tan^3 \theta$ with respect to $\sec^3 \theta$ at $\theta = \dfrac{\pi}{3}$

is

A. $\dfrac{3}{2}$

B. $\dfrac{\sqrt{3}}{2}$

C. $\dfrac{1}{2}$

D. $-\dfrac{\sqrt{3}}{2}$

Answer:

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2. Find the equation of the tangent to the curve

$y = 3x^2 - x + 1$ at P(1, 3).

A. $5x - y = 2$

B. $x + 5y = 16$

C. $5x - y + 2 = 0$

D. $5x = y$

Answer:

3. The expected value of the number of heads obtained when three coins are tossed simultaneously is .....

A. 1

B. $1 \cdot 5$

C. 0

D. -1

Answer:

4. Find $\dfrac{dy}{dx}$ if $x \sin y + y \sin x = 0$

5. Test whether the following funtions are increasing

or decreasing :

$f(x) = x - \dfrac{1}{x}, \; x \in R, \; x \neq 0.$

6. Evaluate: $\int \dfrac{\sin \sqrt{x}}{\sqrt{x}}\, dx$

7. If $y = ae^{5x} + be^{-5x}$, then find differential equation

8. The probability that a bomb will hit a target is 0.8

Find the probability that out of 10 bombs

dropped.exactly 4 will hit the target .

9. Solve $\dfrac{dy}{dx} = \cos(x + y)$

10. If u and v are two functions of x then prove that :

$$\int uv\,dx = u\int v\,dx - \int\left[\frac{du}{dx}\int v\,dx\right]dx$$

Hence, evaluate $\int xe^x\,dx$

11. If the function $f(x) = \dfrac{e^{x^2} - \cos x}{x^2}$ for $x \neq 0$ is

continuous at $x = 0$ then $f(0)$

12. If $y = f(x)$ is a differentiable function x such that invrse function $x = f^{-1}$ y exists, then prove that x is a differentiable function of y and $\dfrac{dx}{dy} = \dfrac{1}{\frac{dy}{dx}}$

where $\dfrac{dy}{dx} \neq 0$

Hence, find $\dfrac{d}{dx}\left(\tan^{-1} x\right)$.

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13. A telephone company in the town has 5000 subscribers on its list and collects fixed rent charges of Rs. 3000 per year from each person. The company proposes to increase the annual rent and it is believed

that for every increase of 1 rupee in the rent, one subscriber will be discontinued. Find what increased annual rental will bring the maximum annual income to the company.

14. Evaluate $\displaystyle\int_{-a}^{a} \sqrt{\frac{a - x}{a + x}}\, dx.$

15. Discuss the continuity of the following functions at the points shown against them :

$$f(x) = \frac{x}{|x|}, \quad \text{for} x \neq 0$$
$$= 1, \quad\quad \text{for} x = 0 \Bigg\} \, at x = 0.$$

16. If the population of a country doubles in 60 years , in how many years will it be triple (treble) under the assumption that the rate of increase is proportional to the number of inhabitants ?

17. A fair coin is tossed 8 times. Find the probability that it shows heads

(i) exactly 5 times (March ' 17)

(2) at lest once . (March ' 14- 17)

18. $\int \dfrac{d\theta}{\sin\theta + \sin 2\theta}$

19. Find the area of the region included between the parabolas $y^2 = 4ax and x^2 = 4ay, where a > 0.$

20. Given the probability density functio (p.d.f) of a continuos random variable X as.

$$f(x) = \frac{x^2}{3}, \quad -1 < x < 2$$

Determine the cumulative distribution function (c.d.f) X and hence find $P(X < 1), P(X > 0), P(1 < X < 2)$.