



MATHS

BOOKS - GURUKUL BOOKS & PACKAGING

MATHS (HINGLISH)

OCTOBER 2015

Section I

1. Select and write the most appropriate answer from the given alternatives in each of the following sub-questions :

If $p \wedge q = F$, $p \rightarrow q = F$, then the truth value of p and q is

A. T,T

B. T,F

C. F,T

D. F,F

Answer: B



[Watch Video Solution](#)

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

$$\text{If } A^{-1} = \frac{1}{3} \begin{pmatrix} 1 & 4 & -2 \\ -2 & -5 & 4 \\ 1 & -2 & 1 \end{pmatrix} \text{ and } |A| = 3,$$

then $(\text{adj } A) = \dots$

$$\text{A. } \frac{1}{9} \begin{bmatrix} 1 & 4 & -2 \\ -2 & -5 & 4 \\ 1 & -2 & 1 \end{bmatrix}$$

$$\text{B. } \begin{bmatrix} 1 & 2 & 1 \\ 4 & -5 & -2 \\ -2 & 4 & 4 \end{bmatrix}$$

$$\text{C. } \begin{bmatrix} 1 & 4 & -2 \\ -2 & -5 & 4 \\ 1 & -2 & 1 \end{bmatrix}$$

$$\text{D. } \begin{bmatrix} -1 & -4 & 2 \\ 2 & 5 & -4 \\ 1 & -2 & 1 \end{bmatrix}$$

Answer: C



Watch Video Solution

3. Select and write the most appropriate answer from the given alternatives in each of the following sub-questions :

The slopes of the lines given by $12x^2 + bxy - y^2 = 0$ differ by 7. Then the value of b is :

A. 2

B. ± 2

C. ± 1

D. 1

Answer: C

 [Watch Video Solution](#)

4. In a $\triangle ABC$, with usual notations , prove that

$$\frac{a - b \cos C}{b - a \cos C} = \frac{\cos B}{\cos A}.$$

 [Watch Video Solution](#)

5. If the equation given by $hxy + 10x + 6y + 4 = 0$ represents a pair of lines, then h is equal to



[Watch Video Solution](#)

6. If A, B, C and D are four non-collinear points in the plane such that $\overline{AD} + \overline{BD} + \overline{CD} = \vec{0}$, then prove that the point D is the centroid of the triangle ABC .



[Watch Video Solution](#)

7. Direction cosines of the line

$$\frac{x + 2}{2} = \frac{2y - 5}{3}, z = -1 \text{ are}$$

 [Watch Video Solution](#)

8. If the points $(1, 1, p)$ and $(3, 0, 1)$ be

equidistant from the plane $\rightarrow r3\hat{i} + 4\hat{j} - 12\hat{k} + 13 = 0$

, then find the value of p .

 [Watch Video Solution](#)

9. Using truth table, prove that

$$p \leftrightarrow q \equiv (p \wedge q) \vee (\sim p \wedge \sim q).$$

 [Watch Video Solution](#)

10. Show that a homogeneous equations of degree two in x and y , i.e., $ax^2 + 2hxy + by^2 = 0$ represents a pair of lines passing through the origin if $h^2 - 2ab \geq 0$.

 [Watch Video Solution](#)

11. Prove that volume of a parallelopiped with coterminal edges as $\bar{a}, \bar{b}, \bar{c}$ is $[\bar{a}, \bar{b}, \bar{c}]$. Hence find the volume of the parallelopiped with coterminal edges $\hat{i} + \hat{j}, \hat{j} + \hat{k}$ and $\hat{k} + \hat{i}$.

 [Watch Video Solution](#)

12. Find the inverse of the matrix $A = \begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$ by using column transformations.

 [Watch Video Solution](#)

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

$$\left(\frac{A - B}{2}\right) = \left(\frac{a - b}{a + b}\right) \cot. \frac{C}{2}.$$

 [Watch Video Solution](#)

14. Show that the lines

$$\frac{x + 1}{-3} = \frac{y - 3}{2} = \frac{z + 2}{1} \text{ and } \frac{x}{1} = \frac{y - 7}{-3} = \frac{z + 7}{2}$$

are coplanar. Also, find the equation of the plane containing them.



Watch Video Solution

15. Express $-\hat{i} - 3\hat{j} + 4\hat{k}$ as the linear combination of the vectors $2\hat{i} + \hat{j} - 4\hat{k}$, $2\hat{i} - \hat{j} + 3\hat{k}$ and $3\hat{i} + \hat{j} - 2\hat{k}$.



Watch Video Solution

16. Find the length of the perpendicular from $(3, 2, 1)$ to the line $\frac{x - 7}{-2} = \frac{y - 7}{2} = \frac{z - 6}{3}$.



Watch Video Solution

17. Show that the angle between any two diagonals of a cube is $\cos^{-1}\left(\frac{1}{3}\right)$.

 [Watch Video Solution](#)

18. Minimize $z = 6x + 4y$, subject to

$$3x + 2y \geq 12, x + y \geq 5, 0 \leq x \leq 4, 0 \leq y \leq 4.$$

 [Watch Video Solution](#)

19. If $\tan^{-1}\left(\frac{x-1}{x-2}\right) + \cot^{-1}\left(\frac{x+2}{x+1}\right) = \frac{\pi}{4}$, find x .

 [Watch Video Solution](#)

1. If $y = \sec^{-1}\left(\frac{\sqrt{x-1}}{x+\sqrt{x}}\right) + \sin^{-1}\left(\frac{x+\sqrt{x}}{\sqrt{x-1}}\right)$, then

$$\frac{dy}{dx} = \dots\dots\dots$$

A. x

B. $\frac{1}{x}$

C. 1

D. 0

Answer: C



Watch Video Solution

2. If $I = \int_{-\pi/2}^{\pi/2} \frac{\sin^4 x}{\sin^4 x + \cos^4 x} dx$, then the value of I is

A. 0

B. π

C. $\frac{\pi}{2}$

D. $\frac{\pi}{4}$

Answer: C



Watch Video Solution

3. The solution of the differential equation

$$\frac{dy}{dx} = \sec x - y \tan x \text{ is :}$$

A. $y \sec x = \tan x + c$

B. $y \sec x + \tan x = c$

C. $\sec x = y \tan x + c$

D. $\sec x + y \tan x = c$

Answer:

 [Watch Video Solution](#)

4. Evaluate : $\int \frac{1}{x \log x \log(\log x)} dx$

 [Watch Video Solution](#)

5. Find the area of the parabola $y^2 = 4ax$ bounded by its latus rectum.

 [Watch Video Solution](#)

6. Find k , such that the function

$$P(x) = \begin{cases} k \binom{4}{x}, & x = 0, 1, 2, 3, 4, k > 0 \\ 0, & \text{otherwise.} \end{cases}$$

is a probability mass function (p.m.f.)

 [Watch Video Solution](#)

7. Given $X \sim B(n, p)$. If $E(X) = 6$ and $\text{Var}(X) = 4.2$, find the value of n .

 [Watch Video Solution](#)

8. Solve the different equation $y - x \frac{dy}{dx} = 0$.

 Watch Video Solution

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

$$f(x) = \left. \begin{array}{l} \frac{1 - \sin x}{\left(\frac{\pi}{2} - x\right)^2}, \quad \text{for } x \neq \frac{\pi}{2} \\ = 3, \quad \text{for } x = \frac{\pi}{2} \end{array} \right\} \text{at } x = \frac{\pi}{2} .$$

 Watch Video Solution

10. If $f'(x) = k(\cos x - \sin x)$, $f'(0) = 3$, $f\left(\frac{\pi}{2}\right) = 15$, find $f(x)$

 Watch Video Solution

 Watch Video Solution

11. $\cos^{-1} \left(\frac{3 \cos x - 2 \sin x}{\sqrt{13}} \right)$

 Watch Video Solution

12. Show that $\int \frac{1}{x^2 \sqrt{a^2 + x^2}} dx = \frac{-1}{a^2} \frac{\sqrt{a^2 + x^2}}{x} + c$

 Watch Video Solution

13. A rectangle has an area of 50 cm^2 . Find its dimensions for least perimeter.

 Watch Video Solution

14. $\int_{-a}^a f(x) dx = 2 \int_0^a f(x) dx$, if f is an even function

0, if f is an odd function.



[Watch Video Solution](#)

15. If $y = f(u)$ is differentiable function of u , and $u = g(x)$ is a differentiable function of x , then proven that $y = f [g(x)]$ is a differentiable function of x and $\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$.



[Watch Video Solution](#)

16. Each of the total five questions in a multiple choice examination has four choices, only one of which is

correct. A student is attempting to guess the answer .

The random variable X is the number of questions answered correctly. What is the probability that the student will give at least one correct answer ?

 [Watch Video Solution](#)

17. If $f(x) = x^2 + a$, for $x \geq 0$, $f(x) = 2\sqrt{x^2 + 1} + b$, for $x < 0$ and $f\left(\frac{1}{2}\right) = 2$, is continuous at $x = 0$, find a and b .

 [Watch Video Solution](#)

18. Find the approximate values of :

$\cos(89^\circ 30)$, given $1^\circ = 0.0175^c$.



Watch Video Solution

19. Solve the different equation :

$x + y \frac{dy}{dx} = \sec(x^2 + y^2)$. Also find the particular

solution if $x=y=0$.



Watch Video Solution

20. Find the expected value ,variance and standard deviation of random variable X whose probability mass

function (p.m.f.) is given below.

$X = x$	1	2	3
$P(X = x)$	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{2}{5}$



Watch Video Solution