

**PUNJAB BOARD CLASS 12 MATHS (A)
PREVIOUS YEAR PAPER- 2018**

Roll No

143/A

Total No. of Printed Pages: 12]

[Total No. of Questions: 23

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MATHEMATICS

(Common for Humanities, Sc & Agri Groups)

Time: 03 Hours

Maximum Marks: 90

(English Version)

- Note:
- (i) You must write the subject-code/paper-code 028/A in the box provided on the title page of your answer-book.
 - (ii) Make sure that the answer-book contains 30 pages (including title page) and are properly serialised as soon as you receive it.
 - (iii) Question/s attempted after leaving blank page/s in the answer-book would not be evaluated.
 - (iv) All questions are compulsory.
 - (v) Use of calculator is not allowed but Log Tables can be used.
 - (vi) 0.1 will consist of 10 parts and each part will carry 1 mark.
 - (vii) 2.2 to Q. 9 each will be of 2 marks.
 - (viii) Q. 10 to Q. 19 each will be of 4 marks.
 - (ix) 9. 20 to Q. 23 each will be of 6 marks.
 - (x) Graph paper is attached with the question paper.
 - (xi) Question number 12, 15, 17, 20, 21, 22 and 23 contain internal choice.

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1. (i) If $*$ is a binary operation such that $a * b = a^2 + b^2$ then $3 * 5$ is 1
 (a) 34 (b) 9 (c) 8 (d) 25
- (ii) If $\cos^{-1} x = y$ then 1
 (c) $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$ (b) $-\pi \leq y \leq \pi$ (c) $0 \leq y \leq \frac{\pi}{2}$ (d) $0 \leq y \leq \pi$
- (iii) If A is a matrix of order 3×3 and $|A| = 10$ then $|\text{adj} \cdot A|$ is 1
 (a) 0 (b) 10 (c) 100 (d) 1000
- (iv) If $y = \sin(\sin^{-1} x + \cos^{-1} x)$, $x \in [-1, 1]$ then $\frac{dy}{dx}$ is 1
 (a) $\frac{\pi}{2}$ (b) $-\frac{\pi}{2}$ (c) 0 (d) 1
- (v) If $f(x) = \begin{cases} \frac{\sin x}{x}, & x \neq 0 \\ k-1, & x = 0 \end{cases}$, $x=0$ is continuous at $x=0$ then 1
 (a) 2 (b) 0 (c) -1 (d) 1
- (vi) $\int e^x (\log x - \frac{1}{x}) dx$ is equal to 1
 (a) $e^x + c$ (b) $e^x \log x + c$ (c) $\frac{e^x}{x} + c$ (d) $\log x + c$
- (vii) Integrating factor of differential equation $\frac{dy}{dx} + y = 3$ is 1
 (a) x (b) e (c) e^x (d) $\log x$
- (viii) The inequality $|a \cdot b| \leq |a| |b|$ is called 1

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- (a) Cauchy-Schwartz inequality (b) Triangle inequality
(c) Rolle's Theorem (d) Lagrange's Mean Value theorem

(ix) Distance between plane $3x + 4y - 20 = 0$ and point $(0, 0, -7)$ is 1

- (a) 4 units (b) 3 units (c) 2 units (d) 1 unit

(x) If $P(E)$ denotes probability of occurrence of event E then 1

- (a) $P(E) \in [-1, 1]$ (b) $P(E) \in (1, 2)$ (c) $P(E) \in (0, 1)$ (d) $P(E) \in [0, 1]$

2. If matrix $A = [a_{ij}]_{3 \times 2}$, and $a_{ij} = (3i-2j)^2$ or matrix A find them 2

3. Check whether Lagrange's mean value theorem is applicable on $f(x) = \sin x + \cos x$ Interval $[0, \frac{\pi}{2}]$ 2

4. Evaluate $\int_0^{\frac{\pi}{2}} \frac{\sin^3 x / \sin^3 x + \cos^3 x}{\sin^3 x + \cos^3 x} dx$ 2

5. Evaluate $\int \frac{7dx}{x(x^7-1)}$ 2

6. Find particular solution of differential equation $\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$ given that $x=0 \Rightarrow y=1$ 2

7. Form differential equation representing the family of lines making equal intercepts on the co-ordinate axes. 2

8. Find the angle between the plane $2x+3y-5z=10$ and the line passing from the points $(2, 3, -1)$ Or $(1, 2, 1)$ 2

9. If $P(A) = 7/13$, $P(B) = 9/13$ and $P(A \cup B) = 12/13$ then find $P(A|B)$ 2

10. Prove that function $f: \mathbb{R} \rightarrow \mathbb{R}$, $f(x) = \frac{3-2x}{7}$ in one-one and onto. Also find f^{-1} 4

11. Prove that: $\sin^{-1} \frac{5}{13} + \cos^{-1} \frac{4}{5} = \frac{1}{2} \sin^{-1} \frac{3696}{4225}$ 4

12. Express $\begin{bmatrix} 2 & 5 & -1 \\ 3 & 1 & 5 \\ 7 & 6 & 9 \end{bmatrix}$ as sum of symmetric and skew-symmetric matrices

Or
 $x \quad x^2 \quad \frac{1}{1+x^3}$

If x, y, z are different and $y \quad y^2 \quad 1+y^3 = 0$ then prove that $xyz = -1$

$z \quad z^2 \quad 1+z^3$

13. If $y = (x)^{\tan x} + (\tan x)^x$ then find $\frac{dy}{dx}$ 4

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14. Using differentials find approximate value of $0.37^{1/2}$ 4

15. Evaluate $\int \frac{x^2+1}{x^4+1} dx$ 4

Or

Evaluate $\int \frac{dx}{x^2+1}$

16. Find the area of region bounded by the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ 4

17. Find the particular solution of differential equation $[x \sin^2(y/x) - y] dx + xdy = 0$; $y(1) = \frac{\pi}{4}$ 4
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Find the particular solution of differential equation "
given that $\tan x \frac{dx}{dx} + y = 2x \tan x + x^2$, $x \neq 0$ given that $y=0$ when $x = \frac{\pi}{2}$

18. ਜੇਕਰ $\vec{a} = 2i-3j+4k$ ਅਤੇ $\vec{b} = 5i +j-k$ represents sider parallelogram then find both diagonals and a unit vector perpendicular to both dingonals. 4

19. Two cards are drawn (without replacement from a well shulle distribution table and mean of number of kings. 6

20. Solve the following system of linear equations by matrix method:

$$x - 2y + 3z = -5, 3x + y + cz = 8, 2x - y + 2z = 1$$

Or

Using elementary transformations find inverse of $\begin{bmatrix} 2 & 4 & 1 \\ 1 & 2 & 3 \\ 1 & -3 & 0 \end{bmatrix}$

21. A window is in the form of rectangle surmounted by a semi-circular opening. The perimeter of window is 30 m. Find the dimensions of window so that it can admit maximum light through the whole opening. 6

Or

Prove that volume of largest cone, which can be inscribed in a sphere, is $\frac{8}{27}$ part of sphere.

22. Find the distance between the point (2, 3, -1) and foot of perpendicular drawn from (3, 1) to the plane is $X - y + 3z = 10$. 6

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23. Find the equation of plane passing from the point A (2,-1, 1), B (4,3, 2) and C (6, 5,-?)
Also prove that point (5, - 1,) lies on the plane given by points A, B and C. 6

24. Maximize and Minimize: $Z=15x + 30y$ Subject to the constraints: $x+y \leq 8$, $2x+y \geq 28$,
 $x- 2y \geq 0$, $x, y \geq 0$ 6

Or

Maximise and minimize $Z = 4x + 3y - 7$ Subject to the constraints : $x+y \leq 10$, $x +y \geq 3$,
 $x \leq 8$, $y \leq 9$, $x, y \geq 0$