

SAMPLE PAPER 2021-22

CLASS XII

MATHEMATICS (TERM-II)

Time: 2 Hours

Max. Marks: 40

INSTRUCTIONS:

1. All the questions are compulsory.
2. The question paper consists of 11 questions divided into 3 sections A, B and C.
3. Section A comprises of 5 questions of 2 marks each.
4. Section B comprises of 3 questions of 4 marks each.
5. Section C comprises of 3 questions of 6 marks each.
6. There is no overall choice. However, an internal choice has been provided in two questions of 2 marks, two questions of 4 marks and two questions of 6 marks each. You have to attempt only one of the alternatives in all such questions.
7. Use of calculator is not allowed.

SECTION-A

1. Find the equation of the line passing through two points (1,2) and (3,6) using determinants.
2. Evaluate $\int \tan^2 x \, dx$.

Or

Evaluate $\int \sin 2x \sin 3x \, dx$.

3. Evaluate $\int_0^{\pi/2} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} \, dx$.
4. Determine the order and degree of the differential equation given by $x \left(\frac{d^2 y}{dx^2} \right)^3 + \left(\frac{dy}{dx} \right)^4 + x^3 = 0$. Also, write the number of arbitrary constants in its general solution.

Or

Find the particular solution of the differential equation $\cos \left(\frac{dy}{dx} \right) = a$ ($a \in \mathbb{R}$), $y = 2$

When $x = 0$.

5. Find the value of k so that the lines $\frac{x-3}{2} = \frac{y+1}{3} = \frac{z-2}{2k}$ and $\frac{x+2}{1} = \frac{4-y}{k} = \frac{z+5}{1}$ are at right angles.

SECTION-B

6. Evaluate $\int \frac{1}{(x+1)(x+2)(x+3)} dx$.

Or

Evaluate $\int_1^3 (3x^2 + 2x) dx$ as limit of sum.

7. Find the area of the region bounded by the two parabolas $y^2 = x$ and $x^2 = y$.

8. Solve the differential equation: $x \frac{dy}{dx} + 2y = x^2 \log x$.

Or

Solve the differential equation: $(x - y)dy - (x + y)dx = 0$.

SECTION-C

9. Using matrix method, solve the system of equations given by $x - y + z = 4$, $2x + y - 3z = 0$, $x + y + z = 2$.

Or

Show that $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ satisfies the equation $A^2 - 4A - 5I = O$. Hence, find A^{-1} .

10. Find the shortest distance between the lines given by

$$\vec{r} = \hat{i} + 2\hat{j} + \hat{k} + \lambda(\hat{i} - \hat{j} + \hat{k}) \text{ and } \vec{r} = 2\hat{i} - \hat{j} - \hat{k} + \mu(2\hat{i} + \hat{j} + 2\hat{k})$$

Or

Find the equation of the plane through the intersection of the planes $3x - y + 2z - 4 = 0$ and $x + y + z = 2$ and the point $(2, 2, 1)$

11. Graphically maximize and minimize $Z = 7x + 2y$ subject to the constraints:

$$x - 2y \leq 2, \quad 3x + 2y \leq 12, \quad -3x + 2y \leq 3, \quad x \geq 0, y \geq 0$$