SAMPLE PAPER-2015
MATHEMATICS
CLASS XII

Time:3Hrs **M.M:100**

General Instructions

- *All questions are compulsory.*
- *. The question paper consist of 29 questions divided into three sections A, B and C. Section A comprises of **10** questions of **one** mark each, section B comprises of **12** questions of **four** marks each and section C comprises of **07** questions of **six** mark each.*
- *All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.*
- *There is no overall choice. However, internal choice has been provided in **04** questions of **four** marks each and **2** questions of **six** marks each. You have to attempt only one of the alternatives in all such questions.*
- *. Use of calculators in not permitted. You may ask for logarithmic tables, if required*

SECTION – A

Question numbers 1 to 10 carry 1 mark each.

1. Let * be a binary operation on N given by a * b = HCF(a, b) for all a, b ε N. Find 5 * 7.

2. Find unit vector in the direction of the vector $\vec{a}$ = i + j + 2k

3. For a 2 x 2 matrix A = $[a_{ij}]$,Whose elements are given by $a_{ij} = \frac{(i+2j)^w}{4}$, Write $a_{22.}$

4. Evaluate: $\int \frac{(x+1)(x+logx)^2}{x}dx$

5. If

$$\Delta = \begin{matrix} 5 & 3 & 8 \\ 2 & 0 & 1 \\ 1 & 2 & 3 \end{matrix}$$

, Write the minor of the element a_{22}.

6.For what value of p, $\begin{matrix} 1+p & 7 \\ 3-x & 8 \end{matrix}$ is a singular matrix?

7. Write the distance between two planes:2x + 3y + 4z = 5 and 4x +6y + 8z =10.

8. If α, β, γ are the angles which make with the positive direction of axes. Find the value of $cos2a + cos2b + cos2y$.

9. Find the principal value of $\tan^{-1}\sqrt{3 - \sec^{-1}(-2)}$.

10 Evaluate $\int e^{3\log x}.x^4$dx

SECTION – B

Question numbers 11 to 22 carry 4 marks each.

11. Let * be a binary operation on Q Defined by a* b=$\frac{2ab}{5}$. Show that * is commutative as well as associative. Also find it's identify element, If it exists.

12. Solve for x: $\tan^{-1}\frac{1-x}{1+x} = \frac{1}{2}\tan^{-1}x = 0x > 0$

OR

Prove that cos [$\tan^{-1}$\{sin($\cot^{-1}$x)\}]=$\sqrt{\frac{1+x^2}{2+x^2}}$

13.Find the value of k so that f is continuous at the indicated point

$$f(x) = \begin{cases} \frac{1-\cos 4x}{x^2} & x < 0 \\ a & x = 0 \\ \frac{\sqrt{x}}{\sqrt{16+\sqrt{x}-4}} & x > 0 \end{cases}$$

If f(x) is continuous at x = 0, find the value of a.

14. Find the intervals in which the function f given by $f(x) = 2x^3 - 3x^2 - 36x + 7$ is (a) strictly increasing (b) strictly decreasing

OR

Use differential to appropriate $\sqrt{36.6}$

15. Prove that $\begin{vmatrix} a & b & y \\ a^2 & b^2 & y^2 \\ B+y & a+y & a+b \end{vmatrix}$ = (a-b)(b-y)(y-a))(a+b+y)

16. If y = 3cos (log x) + 4 sin(log x), Show that: $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = 0$

OR

If sin y = x sin (a + y), Prove that $\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin a}$

17. If the lines $\frac{x-1}{3} = \frac{y-2}{2k} = \frac{z-3}{2}$ and $\frac{x-1}{3k} = \frac{y-1}{1} = \frac{z-6}{-5}$ are perpendicular to each other. Find the value of k.

18. The probability of a shooter hitting a target is $\frac{3}{4}$. How many maximum numbers of times must he/she fire so that the probability of hitting the target at least once is more than 0.99?

19. Show that (a-b) x (a+b) = 2 (a X b)

20. Find the general solution of the differential equation $y\,dx + (x - y^2)\,dy = 0$

21. Find the particular solution of the differential equation $\frac{dy}{dx} + \frac{y^2+y+1}{x^2+x+1} = 0$ is given by (x + y + 1) = A(1- x- y -2xy), where A is parameter.

22. Evaluate: $\int \frac{1}{\sin x \cos^3 x} dx$ **OR** Evaluate: $\int \frac{1}{x(x^4-1)} dx$

Question numbers 23 to 29 carry 6 marks each

23.Find the coordinate of foot of perpendicular drawn from point (1, 6, 3) on the line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$ and also find the image of the point (1, 6, 3) in the given line.

OR

Find the vector equation of the plane passing through the intersection of planes r.(2i – 7j +4 k) = 3 and r.(3i -5 j +4 k) + 11 = 0 and passing through the point(-2, 1, 3)

24. If a machine is correctly set up, it produces 90 % acceptable items. If it is incorrectly set up, it produces only 40 % acceptable items. Past experience shows that 80 % of the set ups are correctly done. If after a certain set up, the

machine produces 2 acceptable items, Find the probability that the machine is correctly set up.

25. Find the area of the region $\{(x, y): 0 \le y \le x^2 + 1, 0 \le y \le x+1, 0 \le x \le 2\}$
$2x + y = 4$, $3x - 2y = 6$ and $x - 3y + 5 = 0$

26. Evaluate: $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{\sin x + \cos x}{\sqrt{\sin 2x}}\, dx$

27. For the matrix A= $\begin{vmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{vmatrix}$, Find A^{-1}. Using A^{-1} solve the system of equations $2x - 3y + 5z = 11$, $3x + 2y - 4z = -5$ and $x + y - 2z = -3$

28. Show that the height of the cylinder of maximum volume that can be inscribed in a sphere of radius R is $\frac{2R}{\sqrt{3}}$. Also find the maximum volume.

OR

Find the maximum areas of an isosceles triangle inscribed in the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2} = 1$ with its vertex at one end

29. There are two factories located one at place P and the other at place Q. From these locations, a certain commodity is to be delivered to each of the three depots situated at A , B and C. The weekly requirements of the depots are respectively 5, 5 and 4 units of the commodity while the production capacity of the factories at P and Q are respectively 8 and 6 units. The costs of transportation per unit are given below:

From/To	**Number of hours required on machines**		
	A	B	C
P	160	100	150
Q	100	120	100

How many units should be transported from each factory to each depot in order that the transportation cost is minimum? What will be the minimum transportation cost?