

SAMPLE PAPER-2015

MATHEMATICS

CLASS-XI

T.MARKS:100

TIME ALLOWED: 3HRS.

General instructions:

- i) All the questions are **compulsory**.
- ii) The question paper is divided into **three parts**. **Section A** contains **6 questions 1 mark each**, **Section B** contains **13 questions of 4 marks each** and **Section C** contains **7 questions of 6 marks each**.
-

SECTION:A

- Q.1 Find the value of $\tan \frac{22\pi}{3}$
- Q.2 Evaluate: $\lim_{x \rightarrow 0} \frac{\sin ax}{b \sin x}$
- Q.3 Let, $A = \{x : x \text{ is a natural number less than } 1\}$. Find $n(P(A))$
- Q.4 If $f(x) = \{(x, y) : y = x^2; -1 \leq x \leq 4\}$, write the range of 'f'.
- Q.5 Let f be the subset of $\mathbf{Z} \times \mathbf{Z}$ defined by $f = \{(ab, a + b) : a, b \in \mathbf{Z}\}$. Is f a function from \mathbf{Z} to \mathbf{Z} ? Justify your answer.
- Q.6 Convert $40^\circ 20'$ into radian measure.

SECTION: B

- Q.7 Prove that: $\cos 2x \cdot \cos \frac{x}{2} - \cos 3x \cdot \cos \frac{9x}{2} = \sin 5x \cdot \sin \frac{5x}{2}$
- Q.8 Define a relation R on the set \mathbf{N} of natural numbers by $R = \{(x, y) : y = x + 5, x \text{ is a natural number less than } 4; x, y \in \mathbf{N}\}$. Depict this relationship using roster form. Write down the domain and the range.
- Q.9 Find the value of $\sin 22 \frac{1}{2}^\circ$
- Q.10 Solve and plot the solution set on a number line: $\frac{5-3x}{2} \leq \frac{x}{5} - 6$
- Q.11 The sums of n terms of two APs are in the ratio $(3n + 8) : (7n + 15)$. Find the ratio of their 15^{th} terms.
- Q.12 Between 1 and 31, m numbers have been inserted in such a way that the resulting sequence is an AP and the ratio of 7^{th} and $(m-1)^{\text{th}}$ numbers is 5:9. Find the value of m .
- Q.13 Find the sum of n terms of the series: $0.7+0.77+0.777+0.7777+\dots$

- Q.14 Find the derivative of $f(x) = \tan x$ from the first principle.
- Q.15 Let R be a relation from \mathbf{N} to \mathbf{N} defined by $R = \{(a, b) : a, b \in \mathbf{N} \text{ and } a = b^2\}$. Are the following true? Justify your answer in each case.
- (i) $(a, a) \in R$, for all $a \in \mathbf{N}$
- (ii) $(a, b) \in R$, implies $(b, a) \in R$
- (iii) $(a, b) \in R$, $(b, c) \in R$ implies $(a, c) \in R$.
- Q.16 Prove That:
$$\frac{\sin 5x - 2 \sin 3x + \sin x}{\cos 5x - \cos x} = \tan x$$
- Q.17 Prove that in a triangle ABC , with usual meaning of symbols:
 $a \cos A + b \cos B + c \cos C = 2a \sin B \sin C$
- Q.18 Draw the graph of $\tan x$ in $(-2\pi, 2\pi)$
- Q.19 Evaluate:
$$\lim_{x \rightarrow 1} \left[\frac{x-2}{x^2-x} - \frac{1}{x^3-3x^2+2x} \right]$$

SECTION: C

- Q.20 For the function: $f(x) = \frac{x^{100}}{100} + \frac{x^{99}}{99} + \frac{x^{98}}{98} + \dots + \frac{x^2}{2} + x + 1$, find $f'(x)$ and show that:
 $f'(1) = 100f'(0)$
- Q.21 If $f(x) = \begin{cases} mx^2 + n, & x < 0 \\ nx + m, & 0 \leq x \leq 1 \\ nx^3 + m, & x > 1 \end{cases}$ For what integers m and n does both $\lim_{x \rightarrow 0} f(x)$ and $\lim_{x \rightarrow 1} f(x)$ exist?
- Q.22 Solve: $2 \sin^2 x + \sin^2 2x = 2$
- Q.23 Find the limit:
$$\lim_{x \rightarrow 2} \frac{3 - \sqrt{7-x}}{2-x}$$
- Q.24 Find the domain and range of the function: $f(x) = -\sqrt{x^2 - 25}$
- Q.25 In a survey it was found that 21 people liked product A, 26 liked product B and 29 liked product C. If 14 people liked products A and B, 12 people liked products C and A, 14 people liked products B and C and 8 liked all the three products. Find how many liked product C only.
- Q.26 Solve the following system of inequalities graphically: $2x + y \leq 6$, $3x + 4y < 12$, $x, y \geq 0$
