Model Paper Class 11th

Exam: Hr. Sec. Part I **Max Marks: 100**

Subject: Mathematics **Time: 3 Hours**

Section (A) Long Answer Type Questions (5Q X 6M = 30Marks)

Q.No.1. Prove that; $Cos^2 x + Cos^2\left(x + \frac{\pi}{3}\right) + Cos^2\left(x - \frac{\pi}{3}\right) = \frac{3}{2}$

Or

Find the general solution and the principle solution of:

$\cos 3x + \cos x - \cos 2x = 0$

Q.No.2. The coefficient of the $(r-1)^{th}, r^{th} and\ (r+1)^{th}$ terms in the expansion of $(x+1)^n$ are in the ratio of 1:3:5. Find 'n' and 'r'

Or

Show that $9^{n+1} + 8n - 9$ is divisible by 64, whenever 'n' is positive integer.

Q.No.3. Find the equation of circle passing through the points (2,3) and (-1,1) and whose centre is on the line $x - 3y - 11 = 0$

or

Find the coordinates of the foci, the vertices, the length of major and minor axes, the eccentricity and the length of the Latus Rectum of the ellipse $\frac{x^2}{36} + \frac{y^2}{16} = 1$

Q.No.4. Compute the derivative of $\sin x$ from the first principle.

Or

Find the derivative of; $\frac{\sin x + \cos x}{\sin x - \cos x}$

Q.No.5. Find the mean deviation about the mean for the following data;

x_i	2	5	6	8	10	12
f_i	2	8	10	7	8	5

Or

Calculate the mean, variance and the standard deviation for the following distribution;

Class:	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency:	3	7	12	15	8	3	2

Section (B) Short Answer Type Questions (10Q×4M=40Marks)

Q.No.6. If U ={1,2,3,4,5,6,7,8,9}, A={2,4,6,8} and B={2,3,5,7}. Verify that;

(I) $(A \cup B)' = A' \cap B'$

(II) $(A \cap B)' = A' \cup B'$

Q.No.7. Determine the domain and range of the relation R defined by:

$$R = \{(x, x+5): x \in \{1,2,3,4,5\}\}$$

Q.No.8. Prove that: $\frac{\sin 5x + \sin 3x}{\cos 5x - \cos 3x} = \tan 4x$

Q.No.9. Prove that: $1^3 + 2^3 + 3^3 + \cdots + n^3 = \left[\frac{n(n+1)}{2}\right]^2$ by using principle of Mathematical induction.

Q.No.10. Convert the given complex number into the polar form;

$$Z = \sqrt{3} + i$$

Q.No.11. Find the value of 'x' if $\frac{1}{6!} + \frac{1}{7!} = \frac{x}{8!}$

Q.No.12. Find the sum of the sequence; 8, 88, 888, 8888, ... n-terms.

Q.No.13. If $p(a, b)$ is midpoint a line segment between axes. Show that the equation of the line is $\frac{x}{a} + \frac{y}{4} = 2$

Q.No.14. Find the ratio in which $YZ - plane$ divides the line segment formed by the joining the points (-2, 4, 7) and (3, -5, 8)

Q.No.15. If E and F are the events such that $P(E) = \frac{1}{4}; P(F) = \frac{1}{2}$ and $p(E \text{ and } F) = \frac{1}{8}$. Find;

(I) $P(E \text{ or } F)$ (II) $P(\text{Not } E \text{ and Not } F)$

Section (C) Very Short Answer Type Questions (10Q×2M=20Marks)

Q No 16. Write down the all subsets of $A = \{a, b\}$

Q.No 17. Find the range of the function $f(x) = 2 - 3x; x \in R$

Q.No.18. Find the value of 'r' if $5_{P_r} = 6_{P_{r-1}}$

Q.No.19. Find first five terms of sequence $a_n = n(\frac{n^2+5}{4})$

Q.No.20. Reduce the equation $6x + 3y - 5 = 0$ in intercept form

Q.No.21. Find the equation of parabola whose focus is (6,0) and the directrix $x = -6$

Q.No.22. Evaluate the limit; $\lim_{n\to 0} \frac{\sin ax+bx}{ax+\sin bx}$, a, b, a+b≠0

Q.No.23. Write the negation of the following statements;

(I) Srinagar is a city (II) $\sqrt{7}$ is a rational number

Q.No.24. Write the converse of the following statements;

(I) If 'n' is even, then n^2 is even.

(II) If a number is divisible by 10, It is divisible by 5/.

Q.No.25. If $P(A) = \frac{1}{4}$ then what is $p(not\ A)$?

Section (D) Objective Type Questions (10Q×1M=10Marks)

Q. No. 26. Choose the most appropriate answer.

(I) The general solution of the equation $\sin x = 0$

(a) $x = 2n\pi$ (b) $x = n\pi$

(c) $x = (2n + 1)\frac{\pi}{2}$ (d) *None of these*

(II) The value of; $\frac{\sin 31\pi}{3}$ is;

(a) $\frac{\sqrt{3}}{2}$ (b) $\frac{1}{2}$

(c) $\sqrt{3}$ (d) 1

(III) The set of values of 'x' which satisfy $5x + 2 < 3x + 8$ and $\frac{x+2}{x-1} < 4$ is;

(a) (2,3) (b) $(-\infty,1)\cup(2,3)$

(c)(2,3) (d) (1.3)

(IV) If AM, GM and HM are arithmetic mean, Geometric mean and Harmonic means of any two positive real numbers, then;

(a) AM$\leq GM \leq HM$ (b) $AM < GM < HM$

(c) $AM > GM > HM$ (d) $AM \geq GM \geq HM$

(V) The coordinates of the foci of hyperbola $\frac{x^2}{9} - \frac{y^2}{16} = 1$

(a) $((0 \pm \sqrt{17})$ (b) $(\pm\sqrt{17}, 0)$

(c) $(\sqrt{17}, 0)$ (d) $(-\sqrt{17}, 0)$

(VI) A hyperbola in which $a = b$ is called an equilateral hyperbola

(True/ False)

(VII) The value of $\lim_{n\to 0} \frac{Sin\, x}{x}$(Where 'x' is in radians) is = 0

(True/False)

(VIII) The value of; $\lim_{n\to\infty} \frac{x^n - a^n}{x-a} = na^{n-1}$ (True/False)

(IX) The sum of n-terms of a GP, when r >1

(a) $\frac{a}{1-r}$ (b) $\frac{n}{2}[2a + (n-1)d]$

(c)$\frac{a(r^n-1)}{r-1}$ (d) ar^{n-1}

(X) The least positive integral vale of 'm' for which $\left[\frac{1+i}{1-i}\right]^m = 1, is$

(a) 1 (b) 2

(c) 3 (d) 4