AHSEC Class 11 Exam Sample Paper - 4

Mathematics

Full marks -100   **Time - 3 hrs.**

Q1.Answer the followings: **(1x10=10 Marks)**

a) Find the derivative of sin(x + 1).

b) Write the domain and range of the function $\sin^{-1} x$

c) A coin is tossed twice. Find the probability of getting at least one head.

d) Two lines are *perpendicular* if and only if their slopes are _____.

e) Write the condition for which C(n,r) is greatest when n is even

f) Simplify: $\frac{1+3i}{1-2i}$

g) Write down the length of the latus rectum of a parabola represented by the equation $y^2 = 4ax$.

h) Find the centre and radius of the circles: $(x + 5)^2 + (y - 3)^2 = 36$

i) Solve the inequality: $3x - 7 > 5x - 1$

j) How many 4 digits numbers can be formed with the digits 1, 2 ,3 , 4 ,5 that are divisible by 4.

Q2.Solve the followings (3x10=30 Marks)

i) Solve 3x + 8 > 2 when
(i) x is integer
(ii) x is a real number

ii) Find sum : $10^3 + 11^3 + 12^3 + \cdots.. + 20^3$

iii) Find the 7th term in the expansion of $(a - 4d)^{20}$.

iv) Find the general solutions of the equation: $\tan 2x \tan x = 1$

v) Find the probability such that when 7 cards are drawn from a well shuffled deck of 52 cards, all the aces are obtained.

vi) Let A and B be two sets such that : $n(A) = 20$, $n(A \cup B) = 42$ and $n(A \cap B) = 4$. Find $n(B)$ and $n(A - B)$.

vii) Three consecutive vertices of a parallelogram ABCD are A (4, -11), B (5, 3) & C (2, 15). Find D

viii) There are 11 teachers who teach mathematics or physics in school. Of these, 7 teach mathematics and 3 teach both subjects. How may teach physics?

ix) Solve $sin5\alpha \, cos\alpha = sin6\alpha \, cos2\alpha$

x) Prove by mathematical induction that $10^{2n} - 1$ is divisible by 11 for all positive integer values of n

Q3.Solve the followings (4x10=40 Marks)

i) Calculate the mean and standard deviation for the following table, given the age distribution of a group of people:

Age:	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No. of persons:	3	51	122	141	130	51	2

ii) If the power sets of two sets are equal, then show that the sets are also equal.

iii) In the expansion of $(1 + a)^{m+n}$, prove that coefficients of a_m and a_n are equal

iv) Find the derivative of the following functions from first principle $\cos(x - \frac{\pi}{8})$

v) Find the sum of the first n terms of the series: $3 + 7 + 13 + 21 + 21 + \ldots\ldots..$

vi) Write down the binomial expression $(1 + x)n + 1$, when $x = 8$. Deduce that $9n + 1 - 8n - 9$ is divisible by 64, when n is an integer.

vii) Solve for x: $\sin x + \sin 2x + \sin 3x = 0$

viii) Find the principal and general solutions of the equation: cosec $x = -2$

ix) Prove: $\cos^2 \frac{3\pi}{8} + \cos^2 \frac{\pi}{8}$

x) Solve the inequality $|x + 1| + |x - 7| > 7$

Q4.Solve the followings (5x4=20 Marks)

i) In a triangle ABC , m points are taken on side AB. n points are taken on side BC and k points are taken on side AC. But no points taken are at the vertices A, B, C. Find how many triangles can be formed with those points taken as vertices.

ii) Find the equation of the hyperbola whose vertices are at (0, ±7) and foci at (0,±28/3)

iii) How many diagonals are there in a polygon of n sides

iv) Find an AP whose first term is unity and the second , tenth and 34th term form a GP

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