DELHI PUBLIC SCHOOL GHAZIABAD
VASUNDHARA
ANNUAL EXAMINATION 2019-20
CLASS-XI

SUBJECT: MATHEMATICS **TIME: 3Hrs.**
DATE : 29th JANUARY,2020 **M.M: 80**

General Instructions:

(i) All question are compulsory

*(ii) The question paper consists of **36** questions divided into four section A,B,C and D Section A comprises of **20** questions of **one mark** each , Section B comprises of **6** questions of **two marks** each , Section C comprises of **6** questions of **four marks** each and Section D comprises of **4** questions of **six marks** each*

(iii) All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.

(iv) There is no overall choice. However , internal choice has been provided.

SECTION – A

(Q.1-Q.10) are multiple choice type questions. Select the correct option.

Q 1. $\lim_{x\to 1}\frac{x^m-1}{x^n-1}$ *is*

(A) 1 (B) m/n (C) -m/n (D) $\frac{m^2}{n^2}$

Q 2. If $= \sqrt{x}+\frac{1}{\sqrt{x}}$, then $\frac{dy}{dx}$ at x = 1 is

(A) 1 (B) 1/2 (C) $\frac{1}{\sqrt{2}}$ (D) 0

Q 3. The distance of point P(3,4,5) from the yz-plane is

(A) 3units (B) 4units (C) 5units (D) $\sqrt{41}$units

Q 4. The area of the circle centred at (1,2) and passing through (4,6) is

(A) 5π (B) 10π (C) 25π (D) none of these

Q 5. Slope of a line which cuts off intercepts of equal lengths on the axes is

(A) -1 (B) 0 (C) $\sqrt{3}$ (D) none of these

Q 6. Given the integers $r > 1, n > 2$, and coefficients of $(3r)^{th}$ and $(r+2)^{th}$ terms in the Binomial expansion of $(1+x)^{2n}$ are equal , then

(A) n=2r (B) n=3r (C) n=2r+1 (D) none of these

Q 7. The total number of terms in the expansion of $(x+a)^{51}-(x-a)^{51}$ after simplification is
(A)102 (B)25 (C)26 (D)51

Q 8.If Z = x+iy is any complex number then $|z| = 4$, represent a
(A) straight line (B) circle (C) parabola (D) hyperbola

Q 9. Let $n(A) = m$ and $n(B) = n$. Then the total number of non-empty relations that can be defined from A to B is
(A) m^n (B) $n^m - 1$ (C) mn-1 (D) $2^{mn} - 1$

Q 10. Two finite sets have m and n elements. The number of subsets of the first set is 112 more than that of the second set. The values of m and n are respectively.
(A) 4,7 (B) 7,4 (C) 8,5 (D) none of these

(Q.11-Q.15) Fill in the blanks.

Q 11. If the variance of a data is 121, then the standard deviation of the data is _____.

Q 12. If the focus of a parabola is (0,-3) and its directrix is y = 3, then its equation is _____.

Q 13. If $sin\theta + cos\theta = 1$, then the value of $sin2\theta$ is ____.

OR

General solution of $cos3\theta = \frac{1}{2}$ is _____.

Q 14. If A and B are finite sets such that $A \subset B$, then $n(A \cup B) =$ _____.

Q 15. If $|x+2| \leq 9$, then $x \in$ ____.

(Q.16-Q.20) Answer the following questions.

Q 16. The third term of G.P is 4. Find the product of its first 5 terms.

OR

Find the sum to infinity of the G.P. $-\frac{5}{4}, \frac{5}{16}, -\frac{5}{64}$

Q 17. Find the domain of $\sqrt{a^2 - x^2}$, $(a > 0)$.

Q 18. Write the middle term in the expansion of $(x + \frac{1}{x})^{10}$.

Q 19. Solve : $4x - 2 < 8$, when $x \in Z$.

Q 20. Describe the set {10,11,12,13,14,15} in set-builder form.

SECTION- B

Q 21. Find the eccentricity and length of latusrectum of the ellipse $36x^2 + 4y^2 = 144$

Q 22. Find the equation of hyperbola whose vertices are $(\pm 2,0) and\ foci\ at\ (\pm 3,0)$.

Q 23. If the points A(3,2,-4) , B(9,8,-10) and C(5,4,-6) are collinear , find the ratio in which C divides AB.

OR

The centroid of a ABC is at the point (1,1,1). If the coordinates of A and B are (3,-5,7) and (-1,7,-6) respectively, find the coordinates of the point C.

Q 24. Let $R = \{(x,y): x,y \in Z, y = 2x - 4\}$. If $(a,-2)\ and\ (4,b^2) \in R$, then find the values of 'a' and 'b' .

Q 25. The letters of word 'SOCIETY' are placed at random in a row. What is the probability that three vowels come together ?

OR

In a single throw of three dice , determine the probability of getting a total of at least 5.

Q 26. Differentiate $sin^2 2x.tan3x$ with respect to x.

SECTION-C

Q 27. Prove by using the principle of mathematical induction for all n ε N

$$1.3 + 2.3^2 + 3.3^2 + \ldots\ldots\ldots + n.3^n = \frac{(2n-1)3^{n+1} + 3}{4}$$

OR

Prove by using the principle of mathematical induction for all n ε N

$11^{n+2} + 12^{2n+1}$ is divisible by 133 for all nεN.

Q 28. Exhibit graphically the solution set of linear inequations:
$x \leq 5000, y \leq 5000, x + y \leq 8000, x + y \geq 4000, x \geq 0, y \geq 0$

Q 29. Differentiate the function with respect to x by first principle, $f(x) = \frac{3+2x}{2-3x}$

Q 30. If 4-digit numbers greater than 5,000 are randomly formed from the digits 0,1,3,5 and 7. What is the probability of forming a number divisible by 5 ? when (i) repetition of digits is not allowed. (ii) repetition of digits is allowed.

OR

Five marbles are drawn from a bag which contains 7 blue marbles and 4 black marbles. What is the probability that
(i) all will be blue (ii) 3 will be blue and 2 black.

Q 31. Find real x such that $\frac{3+2i\sin x}{1-2i\sin x}$ is purely real.

Q 32. Find the mean deviation about the mean

x	5	10	15	20	25
f	7	4	6	3	5

SECTION-D

Q 33. A candidate is required to answer 7 questions out of 12 questions which are divided into two groups , each containing 6 questions. He is not permitted to attempt more than 5 questions from either group . In how many ways can he choose the 7 questions.

Q 34. *Find* $\sin\frac{x}{2}, \cos\frac{x}{2}$ *and* $\tan\frac{x}{2}$, *when* $\tan x = -\frac{4}{3}$, x lies in quadrant II .

OR

Show that $\tan(60^0+\theta)\tan(60^0-\theta) = \frac{2\cos 2\theta+1}{2\cos 2\theta-1}$

Q 35. A person standing at the junction (crossing) of two straight paths represented by the equations $2x - 3y + 4 = 0$ and $3x + 4y - 5 = 0$ wants to reach the path whose equation is $6x - 7y + 8 = 0$ in the least time. Find the equation and length of the path that he should follow.

Q 36. The ratio of the A.M and G.M of two positive numbers a and b, is m:n. Show that $a:b = \left(m+\sqrt{m^2-n^2}\right):\left(m-\sqrt{m^2-n^2}\right)$.

OR

If S_1, S_2, S_3 be respectively the sum of n , 2n , 3n terms of a G.P, then prove that $S_1^2 + S_2^2 = S_1(S_2 + S_3)$