مدرسة دلهي الخاصة ذ.م.م.
DELHI PRIVATE SCHOOL L.L.C.
Affiliated to C.B.S.E., DELHI
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HY/MAQP/1121/A **28-NOV-2021**

HALF YEARLY EXAMINATION (2021-22)

SET A

Subject: MATHEMATICS **Max. Marks: 40**

Grade: XI **Time: 90 minutes**

Name: **Section:** **Roll No:**

General Instructions:

- **This question paper contains three sections – A, B and C. Each part is compulsory.**
- **Section - A has 20 MCQs, attempt any 16 out of 20. Section - B has 20 MCQs, attempt any 16 out of 20. Section - C has 10 MCQs, attempt any 8 out of 10.**
- **There is no negative marking. All questions carry equal mark**
- **This question paper consists of 6 printed pages.**
- **All answers to be marked on the OMR sheet provided.**

SECTION A (Answer any 16)

1. If f (x) = x and g (x) = | x |, then (f + g) (x) is equal to

a. 0 for all $x \in R$

b. 2x for all $x \in R$

c. $\begin{cases} 2x, for\ x \geq 0 \\ 0, for\ x < 0 \end{cases}$

d. $\begin{cases} 0, for\ x \geq 0 \\ 2x, for\ x < 0 \end{cases}$

2. If A is the set of even natural numbers less than 8 and B is the set of prime numbers less than 7, then the number of relations from A to B is

a. 2^9

b. 9^2

c. 3^2

d. $2^9 - 1$

3. The value of $\sqrt{-16} + 3\sqrt{-25} + \sqrt{-36} - \sqrt{-625}$ is

a. 0

b. 50i

c. 50

d. 25i

4. The complex number $\frac{1+7i}{(2-i)^2}$ in standard form is

a. $1 + i$

b. $-1 + i$

c. $1 - i$

d. $-1 - i$

5. The conjugate of the complex number $\frac{2+5i}{4-3i}$ is equal to

a. $\frac{7-26i}{25}$ **b.** $\frac{-7+26i}{25}$

c. $\frac{-7-26i}{25}$ **d.** $\frac{7+26i}{25}$

6. Find the least positive integral value of n for which $\frac{(1+i)^n}{(1-i)^{n-2}}$ is a real number

a. 2 **b.** 4

c. 1 **d.** 3

7. For a given data, the variance is 15. If each observation is multiplied by 2, what is the new variance of the resulting observations?

a. 15 **b.** 60

c. 30 **d.** 7.5

8. The angle between the lines $y = \left(2 - \sqrt{3}\right)(x+5)$ and $y = \left(2 + \sqrt{3}\right)(x - 7)$ is

a. $30°$ **b.** $90°$

c. $45°$ **d.** $120°$

9. The angle between the X-axis and the line joining the points $(3,-1)\ and\ (4,\ -2)\ is$

a. $45°$ **b.** $135°$

c. $90°$ **d.** $180°$

10. Slope of a line which cuts off equal intercepts on the axes is

a. - 1 **b.** 0

c. 2 **d.** $\sqrt{3}$

11. The value of y, if the line passing through $(3,\ y)\ and\ (2,\ 7)$ is parallel to the line through $(-1,\ 4)$ and $(0,\ 6)$ is

a. 7 **b.** 8

c. 9 **d.** 10

12. a, b, c are in AP, p is the A.M between a and b, q is the A.M between b and c, then

a. a is the A.M between p and q **b.** b is the A.M between p and q

c. c is the A.M between p and q **d.** No such relation

13. The first term of an infinite G.P. is 1 and each term is twice the sum of the succeeding terms, then the sum of the series is

a. $\frac{1}{2}$ **b.** $\frac{1}{3}$

c. $\frac{3}{2}$ **d.** $\frac{5}{2}$

14. If the sum of the first 2n terms of 2, 5, 8, ...is equal to the sum of the first n terms of 57, 59, 61....., then n is equal to

a. 10 **b.** 12

c. 11 **d.** 13

15. If the third term of a GP is 4, then the product of its first five terms is

a. 4^3 **b.** 4^5

c. 4^4 **d.** 4^2

16. If a, b, c are in arithmetic progression, then the value of $(a + 2b - c)(2b + c - a)(a + 2b + c)$ is

a. $8abc$ **b.** $4abc$

c. $16abc$ **d.** $3abc$

17. The value of $\lim_{x\to\pi} \frac{\sqrt{2+cosx}-1}{(\pi-x)^2}$ is

a. $\frac{1}{2}$ **b.** $\frac{1}{4}$

c. $\frac{1}{8}$ **d.** $\frac{1}{16}$

18. The value of $\lim_{x\to 0} \frac{10^x - 2^x - 5^x + 1}{x\ sinx}$

a. $\log 2 + \log 5$ **b.** $(\log 2)(\log 5)$

c. $\frac{\log 2}{\log 5}$ **d.** $\log 2 - \log 5$

19. The value of $\lim_{x\to 0} \frac{tanx - sinx}{x^3}$ is

a. $\frac{1}{2}$ **b.** $\frac{1}{4}$

c. $\frac{1}{8}$ **d.** $\frac{1}{16}$

20. The value of $\lim_{x\to\frac{\pi}{6}} \frac{\sqrt{3}Sinx - Cosx}{x - \frac{\pi}{6}}$ is

a. $\frac{1}{2}$ **b.** $\frac{1}{4}$

c. 2 **d.** 4

SECTION B (Answer any 16 questions)

21. If $f(x) = x^3 - \frac{1}{x^3}$ then $f(x) + f\left(\frac{1}{x}\right)$ is equal to

a. x^3 **b.** $\frac{2}{x^3}$

c. 0 **d.** 1

22. Let f = {(1, 1), (2, 3), (0, –1), (–1, –3)} be a linear function from Z into Z, then f(x) =

a. 2x – 1 **b.** 2x

c. 2x + 1 **d.** – 2x +1

23. The values of x and y if *(3x – 2iy) (2 + i)^2 = 10(1+ i).* are

a. $x = \frac{14}{5}, y = -\frac{2}{5}$ **b.** $x = \frac{14}{5}, y = \frac{1}{5}$

c. $x = \frac{14}{15}, y = \frac{1}{5}$ **d.** $x = \frac{14}{15}, y = -\frac{1}{5}$

24. The real value of θ, for which the complex number $\frac{1+i\cos\theta}{1-2i\cos\theta}$ is purely imaginary is

a. $\frac{\pi}{4}$ **b.** $\frac{\pi}{2}$

c. 0 **d.** π

25. If $\frac{|z-5i|}{|z+5i|} = 1$, then z

a. is purely imaginary **b.** is purely real

c. is equal to 0 **d.** is equal to $i + 2$

26. Consider the following data

x_i	5	7	9	10	12	15
f_i	8	6	2	2	2	6

The mean deviation from the median is

a. 3.15 **b.** 3.23

c. 3.21 **d.** 3.17

27. The mean deviation of the data 3, 10, 10, 4, 7, 10, 5 from the mean is

a. 2 **b.** 2.57

c. 3 **d.** 3.75

28. If the coordinates of the midpoint of the portion of the line intercepted between the coordinates is $(3,\ 2)$, then the equation of the line will be

a. $2x + 3y = 12$ **b.** $3x + 2y = 12$

c. $4x\ -\ 3y = 6$ **d.** $5x\ -\ 2y = 10$

29. If the normal form of the equation $\sqrt{3}x + y\ -\ 8 = 0$ is $x\ cos\omega + y\ sin\omega = p$, then p and ω are respectively

a. $4, 45°$ **b.** $4, 30°$

c. $3, 45°$ **d.** $3, 30°$

30. The distance between the lines $3x + 4y = 9\ and\ 6x + 8y = 15$ is

a. $\frac{3}{10}$ **b.** $\frac{2}{25}$

c. $\frac{7}{10}$ **d.** $\frac{3}{25}$

31. The equation of the line passing through the point $(1,\ 2)$and perpendicular to the line $x + y\ + 1 = 0$ is

a. $y\ -\ x\ + 1 = 0$ **b.** $y\ -\ x\ -\ 1 = 0$

c. $y\ -\ x\ + 2 = 0$ **d.** $y\ -\ x\ -\ 2 = 0$

32. If there are $(2n + 1)$ terms in an AP, then the ratio of the sum of all odd terms to the sum of all even terms is

a. $(n+1):n$ **b.** $(n+2):n$

c. $(n-1):n$ **d.** $1:1$

33. If the ratio of the sums of m and n terms of an AP be $(m^2:n^2)$ then the ratio of their mth and nth terms is

a. $\frac{(2m-1)}{(2n-1)}$ **b.** $\frac{(2m+1)}{(2n+1)}$

c. $m^2:n^2$ **d.** $m:n$

34. If the nth term of a GP is 2^n, then the sum of the first 6 terms is

a. 124 **b.** 126

c. 190 **d.** 254

35. The sum of the infinite series $\left(\frac{2}{5}+\frac{3}{5^2}+\frac{2}{5^3}+\frac{3}{5^4}+\frac{2}{5^5}+\ldots\ldots\ldots\ldots\ldots\ldots\infty\right)=?$

a. $\frac{11}{15}$ **b.** $\frac{13}{15}$

c. $\frac{11}{24}$ **d.** $\frac{13}{24}$

36. If the lines $3x+y-2=0$, $px+2y-3=0$ and $2x-y-3=0$ are concurrent, then the value of p is

a. 5 **b.** 4

c. - 5 **d.** - 1

37. Let f(x) = $\begin{cases} x^2-1, 0<x<2 \\ 2x+3, 2\le x<3 \end{cases}$, the quadratic equation whose roots are $\lim_{x\to 2^-} f(x)$ and $\lim_{x\to 2^+} f(x)$ is

a. $x^2-6x+9=0$ **b.** $x^2-7x+8=0$

c. $x^2-14x+49=0$ **d.** $x^2-10x+21=0$

38. If $\lim_{x\to 3}\frac{x^n-3^n}{x-3}$ = 108, the value of n is

a. 3 **b.** 4

c. 2 **d.** 1

39. The value of $\lim_{x\to 1}\frac{(2x-3)(\sqrt{x}-1)}{2x^2+x-3}$

a. 0 **b.** $\frac{2}{5}$

c. $-\frac{1}{10}$ **d.** 1

40. The value of $\lim_{h\to 0}\frac{2\left[\sqrt{3}sin\left(\frac{\pi}{6}+h\right)-\cos\left(\frac{\pi}{6}+h\right)\right]}{\sqrt{3}h(\sqrt{3}\cosh-\sinh)}$

a. $\frac{3}{4}$ **b.** $\frac{4}{3}$

c. 2 **d.** 1

SECTION C (Answer any 8 questions)

41. The foot of the perpendicular from the point $(3,\ 8)$ to the line $x+3y=7$ is

a. $(1, 4)$ **b.** $(1, 2)$

c. $(-1, -2)$ **d.** $(-1, -4)$

42. The AM between two positive numbers a and b (a > b) is twice their GM. Then a : b = ?

a. $(3 + \sqrt{2}) : (3 - \sqrt{2})$ **b.** $(2 + \sqrt{3}) : (2 - \sqrt{3})$

c. 2 : 3 **d.** 3 : 2

43. Roots of the quadratic equation $3x^2 - 4x + \frac{20}{3} = 0$ are given by

a. $\frac{2}{3} \pm \frac{4}{3}i$ **b.** $\frac{4}{3} \pm \frac{2}{3}i$

c. $\frac{3}{4} \pm \frac{5}{4}i$ **d.** $-\frac{3}{4} \pm \frac{5}{4}i$

44. The variance of the data: 6, 7, 10, 12, 13, 4, 8, 12 is

a. 8.25 **b.** 9.25

c. 10.5 **d.** 8.9

45. The value of $\lim_{x \to 0} \frac{1-\cos x\sqrt{\cos 2x}}{x^2}$ is

a. $-\frac{1}{2}$ **b.** $\frac{3}{2}$

c. 2 **d.** - 4

46. **CASE STUDY**

In a company, 100 employees offered to complete a project. Out of these employees, 10 could work on the ground floor only, 15 could work on the first floor only, 10 could work on the second floor only. 30 employees could work on the second and ground floor, 25 employees could work on the first and second floor and 15 employees worked on the ground and first floor. 60 employees worked on the second floor. Based on the above information, answer the following:

The number of employees who could work on all three floors is

a. 4 **b.** 3

c. 5 **d.** 6

47. The number of employees who could work on the ground floor is

a. 50 **b.** 60

c. 65 **d.** 70

48. The number of employees who could work on the first floor is

a. 40 **b.** 45

c. 50 **d.** 55

49. The number of employees who could work on the ground floor and first floor but not the second floor is

a. 10 **b.** 15

c. 20 **d.** 25

50. The number of employees who could not work on any of the floors is

a. 15 **b.** 10

c. 5 **d.** 0

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