مدرسة دلهي الخاصة ذ.م.م.
DELHI PRIVATE SCHOOL L.L.C.
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FT/MAQP/1121/B **29-SEP-2021**

FIRST TERM EXAMINATION (2021-22)

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 7 printed pages.**
- **All answers to be marked on the OMR sheet provided.**

SECTION A (Answer any 16)

1. If A = {1, 2, 3, 4, 5} then the number of proper subsets of A is

a. 120 **b.** 30

c. 31 **d.** 32

2. If $A \cap B = B$, then

a. $A \subseteq B$ **b.** $B \subseteq A$

c. $A = \phi$ **d.** $B = \phi$

3. If A = {1, 2, 4}, B = {2, 4, 5}, C = {2, 5} then $(A - B) \times (B - C)\ is$

a. {(1, 2), (1, 5), (2, 5)} **b.** {(1, 4)}

c. (1, 4) **d.** {(1, 5)}

4. If R is a relation on a set having n elements, then the number of relations on A is

a. 2^n **b.** n^2

c. 2^{n^2} **d.** n^n

5. If R is a relation on the set of natural numbers **N** defined by $R = \left\{(x, y): y = x + \frac{12}{x}\ , x, y \in N\right\}$, then the domain of R is

a. {1, 2, 3, 4, 6, 12} **b.** {1, 2, 3, 4, 6}

c. {2, 3, 4, 6, 12} **d.** {3, 6, 12}

6. If A= {1, 2, 3} and B = {2, 3, 4}, then which of the following is a function from A to B?

a. {(1, 2), (1, 3), (2, 3), (3, 3)} **b.** {(1, 3), (2, 4)}

c. {(1, 3), (2, 2), (3, 3)} **d.** {(1, 2), (2, 3), (3, 2), (3, 4)}

7. The value of $(i^n + i^{n+1} + i^{n+2} + i^{n+3})$ is

a. 0 **b.** i

c. -1 **d.** 1

8. If $z = \frac{(1 - i\sqrt{3})}{2(1 - i)}$, then $|z| =$

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

c. $\frac{1}{\sqrt{3}}$ **d.** $\frac{1}{3\sqrt{2}}$

9. If $z = (3 + \sqrt{2}\, i), then\ z\, \bar{z}\ is\ equal\ to$

a. 13 **b.** $\sqrt{13}$

c. 11 **d.** $\sqrt{11}$

10. The multiplicative inverse of $(-2 + 5i)$ is

a. $\frac{2}{29} + \frac{5}{29}i$ **b.** $\frac{2}{29} - \frac{5}{29}i$

c. $\frac{-2}{29} - \frac{5}{29}i$ **d.** $\frac{-2}{29} + \frac{5}{29}i$

11. If α and β are different complex numbers with $|\beta| = 1$, then the value of $\left|\frac{\beta - \alpha}{1 - \bar{\alpha}\beta}\right|$ is

a. 1 **b.** -1

c. $|\alpha + \beta|$ **d.** $|\alpha - \beta|$

12. If $x + iy = \frac{3+5i}{7-6i}$, then the value of y is

a. $\frac{9}{85}$ **b.** $\frac{-9}{85}$

c. $\frac{53}{85}$ **d.** $\frac{3}{85}$

13. If $z = \frac{1+7i}{(2-i)^2}$ then

a. $|z| = 2$ **b.** $|z| = 4$

c. $|z| = \sqrt{2}$ **d.** $|z| = 0$

14. The sum of n terms of an AP is $(3n^2 + 2n)$, What is the common difference?

a. 5 **b.** -5

c. 6 **d.** - 6

15. The 4th, 7th, and the 10th terms of a GP form

a. an arithmetic progression **b.** a geometric progression

c. neither AP nor GP **d.** cannot say

16. If a, x, b are in GP then

a. $x^2 = ab$ **b.** $a^2 = xb$

c. $b^2 = ax$ **d.** $x = \frac{(a+b)}{2}$

17. The geometric mean between 27 and 243 is

a. 81 **b.** 130

c. $3\sqrt{30}$ **d.** 40.5

18. For any two positive numbers a and b, which statement is true?

a. $AM \leq GM$ **b.** $AM \geq GM$

c. $AM = \frac{3}{4}GM$ **d.** $AM = \sqrt{2}\,GM$

19. If the sum of n terms of a GP is $(2^n - 1)$ then the common ratio is

a. 2 **b.** 3

c. $\frac{1}{2}$ **d.** $-\frac{1}{2}$

20. If the n[th] term of a GP $3, \sqrt{3}, 1, \ldots\ldots\ldots, is\ \frac{1}{243}$ then the value of n is

a. 12 **b.** 13

c. 14 **d.** 15

SECTION B (Answer any 16 questions)

21. Two finite sets have m and k elements. If the total number of subsets of first set is 112 more than the total number of subsets of second set, what are the values of m and k?

a. m = 7, k = 4 **b.** m = 6, k = 3

c. m = 3, k = 6 **d.** m = 4, k = 7

22. $If\ n(\xi) = 40, n(A \cup B)' = 12, n(A - B) = 10\ and\ n(B - A) = 14, then\ n(A \cap B)\ is\ equal\ to$

a. 8 **b.** 4

c. 6 **d.** 28

23. In a beauty contest half the judges voted for Ms. Aruna, $\frac{2}{3}$ voted for Ms. Brinda, 10 voted for both and 6 did not vote for either. The number of judges present in all were

a. 20 **b.** 36

c. 24 **d.** 12

24. Let $R = \{(x, y): x, y \in \boldsymbol{Z}, y = 2x - 4\}$. If (a, -2) and (4, b^2) belong to R, the values of a and b are

a. $a = -2, b = \pm 2$ **b.** $a = -2, b = 4$

c. $a = 1, b = \pm 2$ **d.** $a = \pm 2, b = 2$

25. If $f = \left\{\left(x, \frac{x^2}{1+x^2}\right) : x \in R\right\}$ *be a function from R to R, then the range of f is*

a. [0, 1) **b.** [0, 1]

c. {0, 1} **d.** (0, 1)

26. If f is a real valued function given by $f(x) = 1 - |x - 2|$, then the range of f is

a. R **b.** $(-\infty, 1)$

c. $[1, \infty)$ **d.** $(-\infty, 1]$

27. The least positive integer n such that $\left(\frac{2i}{1+i}\right)^n$ is a positive integer is

a. 16 **b.** 8

c. 4 **d.** 2

28. If $(x + iy)^{\frac{1}{3}} = a + ib$, where $x, y, a, b \in R$, then the value of $\frac{x}{a} - \frac{y}{b}$ is equal to

a. $-2(a^2 + b^2)$ **b.** $2(a^2 + b^2)$

c. $(a^2 + b^2)$ **d.** $-(a^2 + b^2)$

29. If $(1 + i)(1 + 2i)(1 + 3i) \ldots\ldots\ldots\ldots (1 + ni) = a + ib$ *then* $2 \cdot 5 \cdot 10 \cdot 17 \ldots\ldots\ldots (1 + n^2) =$

a. $a^2 + b^2$ **b.** $a^2 - b^2$

c. $a + ib$ **d.** $a - ib$

30. If $\frac{3+2isin\theta}{1-2isin\theta}$ is a real number, then the value of θ is

a. π **b.** $\frac{\pi}{2}$

c. $\frac{\pi}{3}$ **d.** $\frac{\pi}{6}$

31. If $x + iy = \frac{(a^2+1)^2}{2a - i}$, then $x^2 + y^2$ is equal to

a. $\frac{(a^2+1)^4}{4a^2+1}$ **b.** $\frac{(a+1)^2}{4a^2+1}$

c. $\frac{(a^2-1)^4}{4a^2+1}$ **d.** $\frac{(a-1)^4}{4a^2+1}$

32. If $a + ib = \frac{c+i}{c-i}$ then $\frac{b}{a}$ is equal to

a. $\frac{2c}{c^2+1}$ **b.** $\frac{2c}{c^2-1}$

c. $\frac{c^2-1}{c^2+1}$ **d.** $\frac{c^2+1}{c^2-1}$

33. Given the equation $|z| = z + 1 + 2i$, the complex number z is equal to

a. $z = 3 - 2i$

b. $z = \frac{3}{2} - 2i$

c. $z = \frac{3}{2} + 2i$

d. $z = 3 + 2i$

34. The sum of an infinite series is 8 and the second term is 2. The common ratio is

a. $\frac{1}{2}$

b. $\frac{1}{4}$

c. $\frac{2}{3}$

d. $\frac{3}{4}$

35. If 9 times the 9th term of an A.P. is equal to 13 times the 13th term, then the 22nd term of the A.P. is

a. 0

b. 22

c. 220

d. 198

36. If n A.M's are inserted between 3 and 17 such that the ratio of the last mean to the first mean is 3:1, then the value of n is

a. 6

b. 8

c. 4

d. 10

37. The sum of the infinite series $(\sqrt{2}+1), 1, (\sqrt{2}-1), , \ldots\ldots\ldots\ldots\ldots\ldots\ldots\infty$ is

a. $\frac{(2+3\sqrt{2})}{2}$

b. $\frac{(4+3\sqrt{2})}{2}$

c. $\frac{(3+2\sqrt{2})}{2}$

d. $\frac{(3+\sqrt{2})}{2}$

38. For the infinite GP $y = x + x^2 + x^3 + x^4 +, \ldots\ldots\ldots\ldots\ldots\ldots\ldots\infty, where |x| < 1$, the value of x is

a. $\frac{y}{1-y}$

b. $\frac{y}{1+y}$

c. $\frac{y-1}{y}$

d. $\frac{y+1}{y}$

39. The ratio between the sums of n terms of two arithmetic progressions is $\frac{3n+8}{7n+15}$. The ratio of their 12^{th} terms is

a. 9:14

b. 7:16

c. 8:15

d. 6:11

40. If $4, A_1, A_2, A_3, 28 \; are \; in \; AP, then \; A_3 = ?$

a. 24 **b.** 22

c. 20 **d.** 16

SECTION C (Answer any 8 questions)

41. If $f = \{(0,-5), (1,-2), (2,1), (3,4), (4,7)\}$ is a linear function from Z into Z, then the function f is given by

a. $f(x) = 2x + 5$ **b.** $f(x) = 3x + 5$

c. $f(x) = 3x - 5$ **d.** $f(x) = 5x - 3$

42. The value of $(1+i)^4 + (1-i)^4$ is equal to

a. 8 **b.** 4

c. - 8 **d.** - 4

43. The value of $\frac{(i^5+i^6+i^7+i^8+i^9)}{1+i}$ is equal to

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

c. $\frac{1}{2}$ **d.** 1

44. In a GP the ratio of the sum of first three terms to the sum of first 6 terms is $\frac{125}{152}$. The common ratio is

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

c. $\frac{3}{5}$ **d.** $\frac{5}{6}$

45. How many terms of the GP $\frac{2}{9} - \frac{1}{3} + \frac{1}{2} - \ldots\ldots\ldots$ must be taken to make the sum $\frac{55}{72}$

a. 6 **b.** 5

c. 7 **d.** 8

46. **CASE STUDY**

In a group of children, 45 play football out of which 30 play football only, 28 play hockey, 25 play cricket, out of which 11 play cricket only. Further 7 play cricket and football but not hockey. 5 play football and hockey but not cricket and 10 play football and cricket both. 4 children do not play any game.

How many children play all the three games?

a. 2 **b.** 7

c. 3 **d.** 4

47. How many play hockey only?

a. 20 **b.** 16

c. 11 **d.** 21

48. How many children are there in the group?

a. 80 **b.** 76

c. 128 **d.** 124

49. How many children play atleast one game?

a. 57 **b.** 61

c. 76 **d.** 24

50. How many children play only one game?

a. 128 **b.** 73

c. 61 **d.** 57

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