AMRITA VIDYALAYAM

FIRST TERMINAL EXAMINATION 2018 -'19

Class : XI **Marks : 100**

Time : 3 hrs

MATHEMATICS

GENERAL INSTRUCTIONS:

1. All questions are compulsory.
2. Question No. 1 to 4 are very short answer questions of 1 mark each.
3. Question No. 5 to 12 are short answer questions of 2 marks each.
4. Question No. 13 to 23 are also short answer questions of 4 marks each.
5. Question No. 24 to 29 are long answer questions of 6 marks each.

SECTION - A

1. Define signum function and write its domain and range.
2. Write down the power set of A = {0}.
3. Convert 25^0 into radian measure.
4. Express $i^9 + i^{19}$ in the form a + ib.

SECTION - B

5. If A = {2, 3, 5, 7, 8} B = {1, 5, 9} and A^1 = {1, 4, 6, 9} verify that $(AUB)^1 = A^1 \cap B^1$.
6. Given A = {2, 3, 4, 5} and R = {(x, y) : x ε A, y ε A}. Find the set of ordered pairs which satisfy x + y = 5.
7. If sin x = 12/13, find the quadrant in which *x* can lie. Also find the values of cos *x*.
8. Let p(n) be the statement 'n(n+1)(n+2) is divisible by 6'. What is p(3)?
9. Express 3(7 + i7) + i (7 + i7) in the standard form.
10. Solve. $\frac{2x + 1}{3} \geq \frac{3x - 2}{5}$, x ε R
11. Using binomial theorem find the value of 99^4.
12. Find a and b if (4a + 3, b) = (3a + 5, -2)

SECTION - C

13. Let X = the set of all letters in the word 'NEW DELHI' and Y = the set of all letters in the word 'CHANDIGARH'. Find
    a) XUY b) $X \cap Y$ c) X - Y
14. Let f be a function defined by f : $x \rightarrow 5x^2 + 2$, x ε R. Find
    a) the image of 3 under f. b) f(3) × f (2)
    c) Find x such that f (x) = 22 d) f(-2) / f (-1)
15. In a circle of diameter 40 cm the length of a chord is 20 cm. Find the length of the minor arc.
16. Prove by induction that 1 + 5 + 9 + …… + (4n - 3) = n (2n -1).
17. Find the real values of x and y if (x - iy) (3 + 5i) is the conjugate of -6 - 24i.
18. Solve the following inequalities.
    a) 3 (2 - x) ≥ 2 (1 - x) b) $\frac{2x - 1}{3} \geq \frac{3x - 2}{4} - \frac{2 - x}{5}$
19. Find the coefficient of x^{11} in the expansion of $(2x^2 + x - 3)^6$.

    OR

    Using induction prove that $n(n^2 + 5)$ is divisible by 6.
20. If $z_1 = 2 - i$ and $z_2 = -2 + i$. Find Im $\frac{(z_1 z_2)}{z_1}$.

21. Find the domain and range of the function f defined by $f(x) = \frac{x + 2}{/ x + 2 /}$

22. If sec x + tan$x$ = p, obtain the values of sec x, tan x, and sin x interms of p.

23. In the first four papers each of 100 marks, Sujatha got 90, 75, 73, 85 marks. If she wants an average of greater than or equal to 75 marks and less than 80 marks, find the range of marks she should score in the fifth paper.

SECTION - D

24. In an University out of 100 students 15 offered Mathematics only, 12 offered statistics only, 8 offered only Physics, 40 offered Physics and Mathematics, 20 offered Physics and Statistics, 10 offered Mathematics and Statistics. 65 offered Physics. By drawing a Venn diagram, find the number of students who offered
a) Statistics. b) Mathematics. c) did not offer any of the above three subjects.

25. Solve the following system of inequalities graphically.
$2x + y \geq 6$, $3x + 4y \leq 12$

26. Let A = {1, 2} B = {1, 2, 3, 4} C = {5, 6} and D = {5, 6, 7} verify that
a) $A \times (B \cap C) = (A \times B) \cap (A \times C)$ b) AXC is a subset of BXD.

OR

Find the squareroot of 3 – 4i.

27. Find the modulus and argument of the complex number $\frac{1 + 2i}{1 - 3i}$ and convert it into polar form.

28. Find a if the 17^{th} and 18^{th} terms of the expansion $(2 + a)^{50}$ are equal.

OR

For all $n \geq 1$. Prove that $1^2 + 2^2 + 3^2 + \ldots + n^2 = \frac{n(n + 1)(2n + 1)}{6}$

29. Prove that
a) $\frac{\sin x + \sin 3x}{\cos x + \cos 3x} = \tan 2x$. b) $\cos\left(\frac{3\pi}{4} + x\right) - \cos\left(\frac{3\pi}{4} - x\right) = -\sqrt{2}\sin x$.