Mathematics
Class 11

Time - 3 hrs Max. Marks. - 100

General Instructions :-

1) All questions are compulsory.

2) The question paper consists of 29 questions divided into three sections:
   Section A → 10 question → 1 marks
   Section - B → 12 question → 4 marks
   Section - C → 7 question → 6 marks

Section - A

1. Write down all possible subsets of $A = \{1, \{2, 3\}\}$

2. Find the domain of the real function, $f(x) = \frac{x^2 + 2x + 1}{x^2 - 7x + 12}$

3. Solve :- $\frac{x - 3}{x + 4}$

4. Compute :- $\frac{(12!) - (10!)}{9!}$

5. How many terms are there in the A.P 7, 13, 19, ..., 205?

6. Find the value of $\tan 330^\circ$

7. Find the equation of a circle with centre (3, -2) and radius 5.

8. Find the length of the latus rectum of the hyperbola $9x^2 - 16y^2 = 144$.

9. Find the distance between the points A(-2, 1, -3) and B(4, 3, -6)

10. Write the true value of the following biconditional statements.

$3 < 2$ if and only if $2 < 1$.

Section-B

11. If the odds in favour of an event be 3/5, find the probability of the occurrence of the event.

or

A natural number is chosen at random from among the first 500. What is the probability that the number so chosen is divisible by 3 or 5?

12. Find the standard deviation for the following data:-

x_i	3	8	13	18	23
f_i	6	10	14	10	10

13. Find the derivative from the first principle.

$\sqrt{\cos 3x}$

14. Evaluate $\lim_{x \to \pi/6} \frac{(\sqrt{3}\sin x - \cos x)}{(x - \pi/6)}$

15. The midpoints of the sides of a triangle are (1, 5, -1), (0, 4, -2) and (2, 3, 4). Find its vertices.

16. Find the equation of the parabola which is symmetric about the y-axis and passes through the point P(2, -3)

17. Find the equation of the line through the intersection of the lines $3x+y-9=0$ and $4x+3y-7=0$ and which is perpendicular to the line $5x-4y+1=0$

18. If $A+B+C=\pi$, prove that

$$\sin^2\frac{A}{2}+\sin^2\frac{B}{2}-\sin^2\frac{C}{2}=1-2\cos\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$$

19. Prove $\dfrac{\cos x}{(1-\sin x)}=\tan\left(\dfrac{\pi}{4}+\dfrac{x}{2}\right)$

20. Find the sum of the series whose nth term is given by (n^3-3^n)

21. Expand by using binomial expansion. $(1-x+x^2)^4$

22. Using the principle of mathematical induction, prove that $(2.7^n+3.5^n-5)$ is divisible by 24 for all $n\in N$.

Section - C

23. Represent in the polar form
   i) $(1-i)$
   ii) $(-1-\sqrt{3}i)$

24. Solve the following system of inequations graphically:-
$3x+4y\geq 12$, $4x+7y\leq 28$, $y\geq 1$, $x\geq 0$, $y\geq 0$

25. If the sum of first n, $2n$, $3n$ terms of an AP be S_1, S_2, S_3 respectively then prove that
$$S_3=3(S_2-S_1)$$

26. Differentiate with respect to x

i) $e^{-5x} \cot 4x$

ii) $\dfrac{x}{\sqrt{1-x^2}}$

27. The mean and S.D. of 100 observations were calculated as 40 and 5.1 respectively by a student who took by mistake 50 instead of 40 for one observation. What are the correct mean and S.D?

28. A card is drawn from a deck of 52 cards. Find the probability of getting a king or a heart or a red card.

29. There are 7 questions in a question paper. In how many ways can a boy solve one or more question?