CLASS: XI FULL MARKS: 100
SUBJECT: MATHEMATICS TIME: 3 HRS.

General Instructions:

1. All questions are compulsory.
2. The question paper consists of **29** questions divided into three sections **A**,**B** and **C**. **Section A** comprises of **10** questions of **1** mark each, **Section B** comprises of **12** questions of **4** marks each and **Section C** comprises of **7** questions of **6** marks each.
3. All questions in **Section A** are to be answered in one word, one sentence or as per the exact requirement of the question.
4. Use of calculator is not permitted. You may ask for **logarithmic tables**, if required.

SECTION A

1) Explain with reason whether the following statement is true or false
   If $x \in A$ and $A \in B$, then $x \in B$
2) Let $A = \varnothing$. Find the number of elements in $P(P(A))$ and list them.
3) Let A={1,2,3}, B={3,4} and C={4,5,6}. Find $A \times (B \cap C)$
4) Let f(x)=3x+1, g(x)=$\frac{|x|-1}{3}$. Find (f+g)(-2) and $\left(\frac{g}{f}\right)(2)$
5) Find the value of sin 765°
6) Given sin x= $\frac{-3}{5}$, x lies in third quadrant, Find the value of tan x.
7) A point P moves in such a way that its sum of the distance from two fixed is fixed. Identify the conic.
8) Sketch the conic $x^2=-9y$, find the focus and the length of latus rectum.
9) Three events A,B and C are mutually exclusive and exhaustive; if P(A)=3/5 and P(B)=1/6, find P(C).
10) If $\frac{1}{6!}+\frac{1}{7!}=\frac{x}{8!}$, find x

SECTION B

11) For any set A and B , show that $P(A \cap B)=P(A) \cap P(B)$
12) Let R be a relation from N to N defined by R={(a,b): a,b ∈ N and $a=b^2$}. Are the following true? i) (a,b) ∈ R, implies (b,a) ∈ R ii) (a,a) ∈ R, for all a ∈ N iii)(a,b) ∈ R and (b,c) ∈ R implies (a,c) ∈ R
13) Prove that $\cos 4x = 1 - 8\sin^2 x\cos^2 x$
14) Find the general solution of $2\cos^2 x + 3\sin x = 0$

15) If $\left(\frac{1+i}{1-i}\right)^2 = 1$, then find the least positive integral value of m.

16) Find the equation of the line perpendicular to the line x-7y+5=0 and have x intercept 3.

17) Find the equation of the ellipse, with major axis along the x-ais and passing through the points (4,3) and (6,2).

18) A circle has radius 3 units and its centre lies on the line y=x-1. Find the equation of the circle if it passes through (7,3).

19) Find the coordinate of a point(s) on y-axis which are at a distance of $5\sqrt{2}$ from the point (3,-2,5).

20) Find the numbers of different 8-letter arrangements that, can be made from the letters of the word 'DAUGHTER' such that all vowels do not occur together.

21) A committee of two person is selected from two men and two women. What is the probability that the committee will have a) no man b) one man

22) The probability that at least one of A and B occurs is 0.6. If A and B occur simultaneously with probability 0.3, find $P(A^{'}) + P(B^{'})$.

SECTION-C

23) Show by the Principle of Mathematical Induction that $x^{2n-1} + y^{2n-1}$ is divisible by x+y, for all n $\in$ N.

24) Given that $z_1 z_2 \neq 0$, prove that Re($z_1 \overline{z_2}$)= $|z_1||z_2|$ if and only if $\theta_1 - \theta_2$=2n π, n$\in$ $\mathbf{Z}$, $\theta_1 = Arg(z_1)$, $\theta_2 = Arg(z_2)$

25) If p is the length of perpendicular from the origin to the line whose intercept on the axes are a and b, then show that $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$.

26) Find the area of the triangle formed by the lines joining the vertex of the parabola x^2=12y to the end points of the latus rectum.

27) a) How many 6-digit numbers can be formed from the digits 0,1,3,5,7 and 9 which are divisible by 10 and no digit is repeated?

b) Show that ${}^nC_r + {}^nC_{r-1} = {}^{n+1}C_r$.

28) m men and n women are to be seated in a row so that no two women sit together. If m>n, then show that the number of ways in which they can be seated together is

$$\frac{m!(m+1)!}{(m-n+1)!}$$

29) If z_1 and z_2 are two complex number prove that $|z_1 + z_2| \leq |z_1| + |z_2|$

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