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Time: 3hrs.

XI MATHEMATICS

Max marks: 100

All questions are compulsory. Internal choices are given for 2 Qns in Section B and 3 Qns in C

SECTION A

1 X 10 = 10

1. If $A = \{1, 2, 3, 4, 5, 6\}$, $B = \{3, 4, 5, 6, 7, 8\}$. Find $(A \setminus B) \cup (B \setminus A)$
2. Write the following set in set-builder form.
 $\{1, 7, 49, 343\}$
3. Let $A \times B = \{(x, a) (y, a) (z, a) (x, b) (y, b) (z, b)\}$ then find A and B
4. A function f is defined by $f(x) = 2x - 5$ write the value of $f(-3)$
5. Find the Principal value of the equation $\tan x = \sqrt{3}$
6. Find the degree measure of $\frac{3\pi}{5}$
7. Find the multiplicative inverse of $4 - 3i$
8. Find the 3rd term in the expansion of $(x^2 + 1)^7$
9. Which term in the A.P. 68, 64, 60... is -8?
10. For what values of x, the numbers $-2/7, x, -7/2$ are in G.P?

SECTION B

4 X 12 = 48

11. For any two sets A and B P.T. $P(A \cap B) = P(A) \cap P(B)$
12. Let $A = \{9, 10, 11, 12, 13\}$ and let $f: A \rightarrow \mathbb{N}$ be defined by $f(n) =$ the highest prime factor of n. Find the range of f.
13. Find the values of the other five trigonometric functions if $\sin x = 3/5$, x lies in the second quadrant.
14. Find the general solution of $7\cos^2 x + 3\sin^2 x = 4$.

(2)

15. By the Principle of Mathematical Induction P.T. $2 \times 7^n + 3 \times 5^n - 5$ is divisible by 24, for all $n \in \mathbb{N}$.

16. Solve: $\sqrt{3}x^2 - \sqrt{2}x + 3\sqrt{3} = 0$.

17. Convert the complex number $\frac{-16}{1+i\sqrt{3}}$ into polar form.

(OR)

Find the modulus and argument of the complex number $\frac{1+2i}{1-2i}$

18. If $\frac{n!}{3!(n-4)!}$ and $\frac{n!}{5!(n-5)!}$ are in the ratio 5:3, find the value of n.

(OR)

Find n if $n-1 P_3 : nP_4 = 1:9$

19. In how many of the distinct permutations of the letters in MISSISSIPPI do the four I's not come together?

20. Find the middle terms in the expansion of $(2x - \frac{x^2}{6})^9$

21. Insert five numbers between 8 and 26 so that the resulting sequence is an A.P.

22) The sums of n terms of two arithmetic progressions are in the ratio $5n+4:9n+6$. Find the ratio of their 18th terms.

SECTION C

6 x 7 = 42

23. In a survey of 25 students, it was found that 15 had taken maths, 12 had taken physics and 11 had taken chemistry, 5 had taken maths and chemistry, 9 had taken maths and physics, 4 had taken phy and che and

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had taken all the three subjects. Find the number of students who had taken

a) only chemistry, b) only physics, c) only Maths, d) only one of the subjects e) none of the subjects.

24). a) P.T. $\cot x \cot 2x - \cot 2x \cot 3x - \cot 3x \cot x = 1$.

b) P.T. $\cos 4x = 1 - 8\sin^2 x \cos^2 x$

(OR)

a) $\frac{1 + \sin 2x - \cos 2x}{1 + \sin 2x + \cos 2x} = \tan x$

b) Find the value of $\cos 75^\circ$

25) Prove by Principle of Mathematical Induction

$$\frac{1}{2 \times 5} + \frac{1}{5 \times 8} + \frac{1}{8 \times 11} + \dots + \frac{1}{(3n-1)(3n+2)} = \frac{n}{6n+4}$$

(OR)

Prove by Principle of Mathematical Induction

$$\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \dots + \frac{1}{n(n+1)} = \frac{n}{n+1}$$

26) Solve the following system of inequalities graphically

$$X - 2y \leq 3, 3x + 4y \geq 12 \quad x \geq 0, y \geq 1.$$

27) A committee of 7 has to be formed from 9 boys and 4 girls. In how many ways can this be done when the committee consists of a) exactly 3 girls. B) atleast 3 girls c) atmost 3 girls.

(OR)

In an examination, a question paper consists of 12 questions divided into two parts. i.e. Part I and Part II containing 5 and 7 questions resp. A student is required to attempt 8 questions in all, selecting at least 3 from each part. In how many ways can a student select the questions?

28) Find a, b and n in the expansion $(a+b)^n$ if the first three terms of the expansion are 729, 7290 and 30375 resp.

(OR)

The coefficient of $(r-1)^{th}$, r^{th} and $r+1^{th}$ terms in the expansion of $(x+1)^n$ are in the ratio 1: 3:5 find n and r

29) a) The sum of the first 3 terms of a G.P. are $13/12$ and their product is -1. Find the common ratio and the terms.

b) Find the sum of the sequence

$7 + 77 + 777 + \dots$ to n terms.
