V11M

Virudhunagar District

Common First Revision Test - January 2025

Standard 11

MATHEMATICS

Time Allowed: 3.00 Hours Maximum Marks: 90

PART - I

Answer all the questions. Choose the correct option: **20×1=20**

1) The rule $f(x) = x^2$ is a bijection if the domain and the co-domain are given by
   a) R, R b) R, $(0, \infty)$ c) $(0, \infty)$, R d) $[0, \infty)$, $[0, \infty)$

2) If $n(A) = 2$ and $n(B \cup C) = 3$, then $n[(A \times B) \cup (A \times C)]$ is
   a) 2^3 b) 3^2 c) 6 d) 5

3) Range of the function cosx is
   a) $[-1, 1)$ b) $(-1, 1)$ c) $[-1, 1]$ d) $(-1, 1)$

4) If $|x+2| \leq 9$, then x belongs to
   a) $(-\infty, -7)$ b) $[-11, 7]$
   c) $(-\infty, -7) \cup [11, \infty)$ d) $(-11, 7)$

5) If $\log_{\sqrt{x}} 0.25 = 4$, then the value of x is
   a) 0.5 b) 2.5 c) 1.5 d) 1.25

6) The value of log 1 is
   a) 1 b) 0 c) ∞ d) -1

7) Which of the following is not true?
   a) $\sin\theta = \frac{-3}{4}$ b) $\cos\theta = -1$ c) $\tan\theta = 25$ d) $\sec\theta = \frac{1}{4}$

8) In a triangle ABC, $\sin^2A+\sin^2B+\sin^2C = 2$, then the triangle is
   a) equilateral triangle b) isosceles triangle
   c) right triangle d) scalene triangle

9) If $\sec\theta = -2$, then the principal value of θ is
   a) $\frac{\pi}{3}$ b) $\frac{5\pi}{3}$ c) $\frac{2\pi}{3}$, d) $\frac{4\pi}{3}$

10) The number of 5 digit numbers all digits of which are odd is
   a) 25 b) 5^5 c) 5^6 d) 625

11) 1+3+5+7+.....+17 is equal to
   a) 101 b) 81 c) 71 d) 61

12) In a plane there are 10 points are there out of which 4 points are collinear, then the number of triangles formed is
   a) 110 b) $^{10}C_3$ c) 120 d) 116

13) If $\frac{6!}{n!} = 6$, then the value of n is
   a) 5 b) 6 c) 4 d) 3

14) The value of the series $\frac{1}{2}+\frac{7}{4}+\frac{13}{8}+\frac{19}{16}+$..... is
   a) 14 b) 7 c) 4 d) 6

15) The HM of two positive numbers whose AM and GM are 16, 8 respectively is
a) 10 b) 6 c) 5 d) 4

16) The n^{th} term of the sequence 2, 7, 14, 23, ... is
a) n^2+2n+1 b) n^2+2n-1 c) n^2-2n-1 d) n^2-2n+1

17) Angle between the pair of straight lines $x^2-xy-6y^2-7x+31y-18=0$ is
a) 45° b) 60° c) 90° d) 30°

18) Which of the following equation is the locus of $(at^2, 2at)$?
a) $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ b) $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ c) $x^2+y^2=a^2$ d) $y^2=4ax$

19) The equation of the line with slope 2 and the length of the perpendicular from the origin equal to $\sqrt{5}$ is
a) $x+2y=\sqrt{5}$ b) $2x+y=\sqrt{5}$ c) $2x+y=5$ d) $x+2y-5=0$

20) The area of the triangle formed by the lines $x^2-4y^2=0$ and $x=a$ is
a) $2a^2$ b) $\frac{\sqrt{3}}{2}a^2$ c) $\frac{1}{2}a^2$ d) $\frac{2}{\sqrt{3}}a^2$

PART - II

Answer any 7 of the following: (Question number 30 is compulsary) 7×2=14

21) If $f:[-2, 2] \to B$ is given by $f(x)=2x^3$, then find B so that f is onto.

22) Draw the curves (i) $y=x^2+1$ (ii) $y=(x+1)^2$.

23) Rationalize the denominator of $\frac{\sqrt{5}}{\sqrt{6}+\sqrt{2}}$.

24) If ${}^nC_4=495$, what is n?

25) Write the relationship between permutation and combination.

26) Find the expansion of $(2x+3)^5$.

27) Find the principal solution of $\sin\theta=\frac{1}{\sqrt{2}}$.

28) Write the equation of the line through the point (1, −1) and parallel to $x+3y-4=0$.

29) Express the equation $\sqrt{3}x-y+4=0$ in slope and intercept form.

30) Determine the function $f(x)=\sin^2x-2\cos^2x-\cos x$ is even, odd or neither.

Part - III

Answer any 7 of the following: (Question number 40 is compulsary) 7×3=21

31) Find the range of the function $f(x)=\frac{1}{1-3\cos x}$.

32) Find the complete set of values of a for which the quadratic $x^2-ax+a+2=0$ has equal roots.

33) Solve: $\log_8 x+\log_4 x+\log_2 x=11$

34) Prove that $\cot(A+B)=\frac{\cot A\cot B-1}{\cot A+\cot B}$.

35) Out of 7 consonants and 4 vowels, how many strings of 3 consonants and 2 vowels can be formed?

36) Find the rank of the word GARDEN.

37) Find the coefficient of x^{15} in $\left(x^2+\frac{1}{x^3}\right)^{10}$.

38) If the 5th and 9th terms of a harmonic progression are $\frac{1}{19}$ and $\frac{1}{35}$, find the 12th term of the sequence.

39) If θ is a parameter, find the equation of the locus of a moving point whose coordinates are $(a\sec\theta, b\tan\theta)$.

40) The slope of one of the straight lines, $ax^2+2hxy+by^2 = 0$ is twice that of the other, show that $8h^2 = 9ab$.

Part - IV

Answer all the questions: **7×5=35**

41) a) If the function f is defined as $f(x)=\begin{cases}3x-2, & x>3\\ x^2-2, & -2\le x\le 2\\ 2x+1, & x<-2\end{cases}$.

Then find the values of f(4), f(−4), f(0), f(−7).

(OR)

b) Solve: $\cos x+\sin x = \cos 2x+\sin 2x$

42) a) If $\frac{\log x}{y-z}=\frac{\log y}{z-x}=\frac{\log z}{x-y}$, then prove that $xyz = 1$.

(OR)

b) An exam paper contains 8 questions 4 in Part - A and 4 in Part - B. Examiners are required to answer 5 questions. In how many ways can this be done if

i) There are no restrictions of choosing a number of questions in either parts.

ii) At least two questions from Part - A must be answered.

43) a) If $A+B+C = 180^\circ$, prove that $\sin 2A+\sin 2B+\sin 2C = 4\sin A\sin B\sin C$.

(OR)

b) Prove that $\sqrt[3]{x^3+7}-\sqrt[3]{x^3+4}$ is approximately equal to $\frac{1}{x^2}$, when x is large.

44) a) By the principle of mathematical induction, prove that for all integers $n\ge 1$, $1^2+2^2+3^2+\ldots\ldots+n^2=\frac{n(n+1)(2n+1)}{6}$.

(OR)

b) The sum of the distance of a moving point from the points (4, 0) and (−4, 0) is always 10 units. Find the equation of the locus of the moving point.

45) a) In the binomial coefficents of $(1+x)^n$, the coefficents of the 5^{th}, 6^{th} and 7^{th} terms are in AP. Find all values of n.

(OR)

b) If A×A has 16 elements, S = {(a, b) ∈ A×A, a<b} (−1, 2) and (0, 1) are two elements of S, then find the remaining elements of S.

46) a) If the equation $\lambda x^2-10xy+12y+5x-16y-3 = 0$ represents a pair of straight lines, find the value of λ and the separate equations of the lines.

(OR)

b) Simplify: $\frac{1}{3-\sqrt{8}} - \frac{1}{\sqrt{8}-\sqrt{7}} + \frac{1}{\sqrt{7}-\sqrt{6}} - \frac{1}{\sqrt{6}-\sqrt{5}} + \frac{1}{\sqrt{5}-2}$

47) a) If $\theta+\phi = \alpha$ and $\tan\theta = K\tan\phi$, then prove that $\sin(\theta-\phi) = \frac{K-1}{K+1}\sin\alpha$.

(OR)

b) Solve the equation: $\sqrt{6-4x-x^2} = x+4$
