SECOND REVISION TEST - 2024	Exam No.						
Time : 3-00 Hours	XI - MATHS						Marks : 90

PART - I

Note : 1) Answer all the questions. **(20x1=20)**

2) Choose the most appropriate answer from the four alternatives and write the option code and the corresponding answer.

1. The number of relations on a set containing 3 elements is
   1) 9 2) 81
   3) 512 4) 1024
2. Let f: R $\to$ R be defined by f(x) = 1 – |x|. Then the range of f is
   1) R 2) (1, ∞)
   3) (–1, ∞) 4) ($-\infty$, 1]
3. The solution set of the following inequality |x–1| $\geq$ |x–3| is
   1) [0, 2] 2) [2, ∞)
   3) (0, 2) 4) ($-\infty$, 2)
4. The value of $\log_3 11 \log_{11} 13 \log_{13} 15 \log_{15} 27 \log_{27} 81$ is
   1) 1 2) 2
   3) 3 4) 4
5. If tan α and tan β are the roots of $x^2+ax+b=0$, then $\frac{\sin(\alpha+\beta)}{\sin\alpha \sin\beta}$ is equal to
   1) $\frac{b}{a}$ 2) $\frac{a}{b}$
   3) $-\frac{a}{b}$ 4) $-\frac{b}{a}$
6. 1+3+5+7+.....+17 is equal to
   1) 101 2) 81
   3) 71 4) 61
7. Find the last two digits of the number 7^{400}
   1) 00 2) 01
   3) 10 4) 11
8. If a is the arithmetic mean and g is the geometric mean of two numbers, then
   1) a$\leq$g 2) a$\geq$g
   3) a=g 4) a>g
9. Find the locus of a point which moves such that its distance from the x-axis is equal to the distance from the y-axis
   1) circle 2) ellipse
   3) straight line 4) square
10. The image of the point (2, 3) in the line y=–x is
    1) (–3, –2) 2) (–3, 2)
    3) (–2, –3) 4) (3, 2)
11. Which one of the following is not true about the matrix $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 5 \end{bmatrix}$?
    1) a scalar matrix 2) a diagonal matrix
    3) an upper triangular matrix 4) a lower triangular matrix

12. If the points (x, –2), (5, 2), (8, 8) are collinear, then x is equal to
1) –3 2) $\frac{1}{3}$
3) 1 4) 3

13. If $\vec{a} \cdot \vec{b} = 0$, which of the following is not true?
1) $|\vec{a}| = 0$ 2) $|\vec{b}| = 0$
3) $\theta = \frac{\pi}{2}$ 4) $\theta = \frac{\pi}{4}$

14. If $|\vec{a}| = 13$, $|\vec{b}| = 5$ and $\vec{a} \cdot \vec{b} = 60°$, then $|\vec{a} \times \vec{b}|$ is
1) 15 2) 35
3) 45 4) 25

15. $\lim_{x \to \infty} \frac{\sin x}{x}$
1) 1 2) 0
3) ∞ 4) $-\infty$

16. If y=mx+c and f(0)=f'(0)=1, then f(2) is
1) 1 2) 2
3) 3 4) –3

17. If y = sec x then y'
1) $\sec^2 x$ 2) –cosec x cot x
3) $-\text{cosec}^2 x$ 4) sec x tan x

18. $\int e^{-4x} \cos x \, dx$ is
1) $\frac{e^{-4x}}{17}$ [4 cos x – sin x] + C 2) $\frac{e^{-4x}}{17}$ [– 4 cos x + sin x] + C
3) $\frac{e^{-4x}}{17}$ [4 cos x + sin x] + C 4) $\frac{e^{-4x}}{17}$ [– 4 cos x – sin x] + C

19. If two events A and B are independent such that P(A)=0.35 and P(A∪B)=0.6, then P(B) is
1) $\frac{5}{13}$ 2) $\frac{1}{13}$
3) $\frac{4}{13}$ 4) $\frac{7}{13}$

20. Ten coins are tossed. The probability of getting atleast 8 heads is
1) $\frac{7}{64}$ 2) $\frac{7}{32}$
3) $\frac{7}{16}$ 4) $\frac{7}{128}$

PART -II

Note : 1) Answer any seven questions.
2) Question number 30 is compulsory. ***(7x2=14)***

21. If P(A) denotes the power set of A, then find n(P(P(P(ϕ)))).
22. Solve: |2x–3| = |x–5|
23. Prove that: sin (30° + θ) + cos (60° + θ) = cos θ
24. If $nC_{12} = nC_9$ find $21C_n$.
25. Find the distance between two points (5, 4) and (2, 0).
26. If $A = \begin{bmatrix} 0 & 2 & 3 \\ -2 & 0 & 4 \\ -3 & -4 & 0 \end{bmatrix}$, then Prove that A is a skew - symmetric matrix.

27. Find: $\lim_{x\to 2} \frac{x^4 - 16}{x - 2}$

28. Find $\frac{dy}{dx}$ if $x^2+y^2=1$.

29. If A and B are mutually exclusive events P(A) = $\frac{3}{8}$ and P(B) = $\frac{1}{8}$ then find P(A∪B).

30. If $\vec{a}$ and $\vec{b}$ are two unit vectors such that $\vec{a}+2\vec{b}$ and $5\vec{a}-4\vec{b}$ are perpendicular to each other, then find the angle between $\vec{a}$ and $\vec{b}$.

PART -III

Note : 1) Answer any seven questions.
2) Question number 40 is compulsory. ***(7x3=21)***

31. Let f and g be the two functions from R to R defined by f(x)=3x–4 and g(x)=x^2+3. Find g ∘ f and f ∘ g.

32. If α and β are the roots of the quadratic equation $x^2+\sqrt{2}x+3=0$, then form a quadratic equation with zeroes $\frac{1}{\alpha}, \frac{1}{\beta}$.

33. Find the number of ways of arranging the letter's of the word RAMANUJAN so that the relative positions of vowels and consonants are not changed.

34. Find $\sqrt[3]{1001}$ approximately.

35. If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ x & 2 & y \end{bmatrix}$ is a matrix such that $AA^T=9I$. Find the values of x and y.

36. Find the angle between the vectors $2\hat{i}+\hat{j}-\hat{k}$ and $\hat{i}+2\hat{j}+\hat{k}$ using vector product.

37. Calculate: $\lim_{x\to\infty} \frac{x^3+2x+3}{5x^2+1}$

38. Find the derivative of with x^x with respect to x log x.

39. If f''(x) = 12x – 6 and f(1)=30, f'(1)=5 find f(x).

40. If the distance of any point (x, y) from origin is defined as d(x, y) = |x| + |y|, then find the locus of d(x, y)=1.

PART -IV

Note : Answer all the questions. ***(7x5=35)***

41. a) From the curve y = sin x graph the functions
(i) y = sin (–x) (ii) y = – sin (–x)
(iii) $y = \sin\left(\frac{\pi}{2}+x\right)$ (iv) $y = \sin\left(\frac{\pi}{2}-x\right)$

(OR)

b) If ABCD is a quadrilateral and E and F are the midpoints of AC and BD respectively, then prove that $\vec{AB}+\vec{AD}+\vec{CB}+\vec{CD}=4\vec{EF}$.

42. a) If A+B+C=π, Prove that $\cos^2A+\cos^2B+\cos^2C = 1-2\cos A\cos B\cos C$

(OR)

b) Prove that $\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = abc\left(1+\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)$.

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

(OR)

b) For what value of α is this function

$$f(x) = \begin{cases} \frac{x^4-1}{x-1} & ; \text{ if } x \neq 1 \\ \alpha & ; \text{ if } x = 1 \end{cases}$$ continuous at x=1?

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

i) the value of λ

ii) point of intersection of the lines

iii) angle between the lines

(OR)

b) If $y = e^{\tan^{-1} x}$, show that $(1+x^2)\, y'' + (2x-1)\, y' = 0$.

45. a) Resolve into partial fractions: $\frac{3x+1}{(x-2)(x+1)}$

(OR)

b) Evaluate: $\int \frac{3x+5}{x^2+4x+7}\, dx$

46. a) By principle of mathematical induction prove that $n \geq 1$,

$$1^3+2^3+3^3+.....+n^3 = \left[\frac{n(n+1)}{2}\right]^2$$

(OR)

b) A coin is tossed twice. Events E and F are defined as follows E=Head on first toss, F=Head on second loss. Find

(i) P (E $\cup$ F)

(ii) P (E / F)

(iii) P ($\overline{E}$ / F)

(iv) Are the events E and F independent?

47. a) In the set z of integers, define mRn if m–n is divisible by 7. Prove that R is an equivalence relation.

(OR)

b) $f(x) = (2x+1)^5 (x^3 - x+1)^4$ then $f'(x)$=?