

SECOND REVISION TEST - 2024

Standard XI

Reg.No.

MATHEMATICS

Time : 3.00 hrs

Part - I

Marks : 90

20 x 1 = 20

I. Choose the correct answer:

1. The range of the function $f(x) = \lfloor x \rfloor - x$, $x \in \mathbb{R}$ is
 a) $[0, 1]$ b) $[0, \infty)$ c) $[0, 1)$ d) $(0, 1)$
2. The function $f: \mathbb{R} \rightarrow \mathbb{R}$ is defined by $f(x) = \sin x + \cos x$ is
 a) Odd function b) Neither an odd function nor an even function
 c) an even function d) both odd function and even function
3. If $\frac{1-2x}{3+2x-x^2} = \frac{A}{3-x} + \frac{B}{x+1}$, then the value of $A+B$ is,
 a) $-\frac{1}{2}$ b) $-\frac{2}{3}$ c) $\frac{1}{2}$ d) $\frac{2}{3}$
4. $\frac{\sin(A-B)}{\cos A \cos B} + \frac{\sin(B-C)}{\cos B \cos C} + \frac{\sin(C-A)}{\cos C \cos A}$ is
 a) $\sin A + \sin B + \sin C$ b) 1
 c) 0 d) $\cos A + \cos B + \cos C$
5. The product of r consecutive positive integers is divisible by
 a) $r!$ b) $(r-1)!$ c) $(r+1)!$ d) r^n
6. Which is not true in the following? Area of $\triangle ABC$ is
 a) $\frac{1}{2} ab \sin C$ b) $\frac{1}{2} ac \sin C$ c) $\frac{1}{2} bc \sin A$ d) $\frac{1}{2} ac \sin B$
7. The HM of 2 positive numbers whose AM and GM are 16, 8 respectively is
 a) 10 b) 6 c) 5 d) 4
8. The value of $1 - \frac{1}{2} \left(\frac{2}{3}\right) + \frac{1}{3} + \left(\frac{2}{3}\right)^2 - \frac{1}{4} \left(\frac{2}{3}\right)^3 + \dots$ is
 a) $\log \frac{5}{3}$ b) $\frac{3}{2} \log \frac{5}{3}$ c) $\frac{5}{3} \log \frac{5}{3}$ d) $\frac{2}{3} \log \frac{2}{3}$
9. If the point $(8, -5)$ lies on the locus $\frac{x^2}{16} - \frac{y^2}{25} = K$, then the value of K
 a) 0 b) 1 c) 2 d) 3
10. The equation of straight line parallel to $ax + by + c = 0$ is
 a) $ax - by + d = 0$ b) $bx - ay + d = 0$
 c) $ax + by + d = 0$ d) $bx + ay + d = 0$
11. If $A = \begin{bmatrix} \lambda & 1 \\ -1 & -\lambda \end{bmatrix}$, then for what value λ , $A^2 = 0$?
 a) 0 b) ± 1 c) -1 d) 1
12. If A is a square matrix, then which of the following is not symmetric?
 a) $A+A^T$ b) AA^T c) $A^T A$ d) $A-A^T$

13. If $\lambda\hat{i} + 2\lambda\hat{j} + 2\lambda\hat{k}$ is a unit vector then the value of λ is

- a) $\frac{1}{3}$ b) $\frac{1}{4}$ c) $\frac{1}{9}$ d) $\frac{1}{2}$

14. $\lim_{x \rightarrow \infty} \left(\frac{x^2 + 5x + 3}{x^2 + x + 3} \right)^{1/x}$ is

- a) e^4 b) e^2 c) e^3 d) 1

15. $\frac{d}{dx} \left(\frac{2}{\pi} \sin x^\circ \right)$ is

- a) $\frac{\pi}{180} \cos x^\circ$ b) $\frac{1}{90} \cos x^\circ$ c) $\frac{\pi}{90} \cos x^\circ$ d) $\frac{2}{\pi} \cos x^\circ$

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

- a) 1 b) 2 c) 3 d) -3

17. $\int e^{\sqrt{x}} dx$ is

- a) $2\sqrt{x}(1 - e^{\sqrt{x}}) + c$ b) $2\sqrt{x}(e^{\sqrt{x}} - 1) + c$
 c) $2e^{\sqrt{x}}(1 - \sqrt{x}) + c$ d) $2e^{\sqrt{x}}(\sqrt{x} - 1) + c$

18. $\lim_{x \rightarrow 1} \frac{x^m - 1}{x^n - 1}$ where m and n are integers is

- a) mn b) $\frac{m}{n}$ c) $\frac{n}{m}$ d) 1

19. Ten coins are tossed. The probability of getting at least 8 head is

- a) $\frac{7}{64}$ b) $\frac{7}{32}$ c) $\frac{7}{16}$ d) $\frac{7}{128}$

20. $\int \tan x dx =$

- a) $\sec^2 x + C$ b) $\log|\sec x| + C$ c) $\log|\sin x| + C$ d) $\tan x \sec x + C$

Part - II

II. Answer any 7 questions. (Q.No.30 is compulsory)

7 x 2 = 14

21. Construct a quadratic equation with roots 7 and -3 $x^2 - 4x - 21 = 0$

22. If $f(x) = \frac{x}{1-x}$, $x \neq 1$, then find $(f \circ f)(x)$? $\frac{x}{1-2x}$

23. If $\frac{1}{7!} + \frac{1}{8!} = \frac{A}{9!}$, find value of A? $A = 81$

24. Find the value of n , if the sum of n terms of the series $\sqrt{3} + \sqrt{75} + \sqrt{243} + \dots$ is

$435\sqrt{3}$ $n = 15$

25. Find the area of the triangle whose vertices are $(-2, -3)$, $(3, 2)$ and $(-1, -8)$ = 15

26. Find the value of λ for which the vectors $2\hat{i} + \lambda\hat{j} + \hat{k}$ and $\hat{i} - 2\hat{j} + 3\hat{k}$ are perpendicular

$\lambda = \frac{5}{2}$

27. Differentiate : $y = e^x + \sin x + 2$ w.r.t x $\frac{dy}{dx} = e^x + \cos x$

28. The odds that the event A occurs is 5 to 7. Find $p(A) = \frac{5}{12}$

29. Compute $\lim_{x \rightarrow 0} \left[\frac{x^2 + x}{x} + 4x^3 + 3 \right] = 4$

30. Express the equation $\sqrt{3x} - y + 4 = 0$ in the intercept form $x = \frac{-4}{\sqrt{3}}$ $y = 4$

Part - III

III. Answer any 7 questions. (Q.No.40 is compulsory)

7 x 3 = 21

31. Find the value of $\tan 165^\circ = 1 - \sqrt{3} / 1 + \sqrt{3}$

32. Find the distinct permutations of the letters of word "MISSISSIPPI"? 34650

33. Find the sum : $1 + \frac{4}{5} + \frac{7}{25} + \frac{10}{125} + \dots = \frac{35}{16}$

34. Find the distance between the parallel lines $3x - 4y + 5 = 0$ and $6x - 8y - 15 = 0$ $\frac{5}{2}$

35. Find the product : $\begin{vmatrix} \log_3 64 & \log_4 3 \\ \log_3 8 & \log_4 9 \end{vmatrix} \times \begin{vmatrix} \log_2 3 & \log_8 3 \\ \log_3 4 & \log_3 4 \end{vmatrix} = 6$

36. The position vectors of the points P, Q, R, S are $\hat{i} + \hat{j} + \hat{k}$, $2\hat{i} + 5\hat{j}$, $3\hat{i} + 2\hat{j} - 3\hat{k}$ and $\hat{i} - 6\hat{j} - \hat{k}$ respectively. Prove that the lines PQ and RS are parallel.

37. Find y' , y'' and y''' if $y = x^3 - 6x^2 - 5x + 3$ $y' = 3x^2 - 12x - 5$, $y'' = 6x - 12$

38. Evaluate : $\int (x-3)\sqrt{x+2} dx = \frac{2}{5}(x+2)^{5/2} - \frac{10}{3}(x+2)^{3/2} + C$ $y''' = 6$

39. In a sample space S, $P(A) = \frac{1}{3} P(B)$ and $S = A \cup B$ where A and B are mutually exclusive. Then what is $P(A)$?

40. Evaluate : $\left\{ \left[(256)^{-1/2} \right]^{-1/4} \right\}^3 = 8$

Part - IV

IV. Answer all the questions.

7 x 5 = 35

41. a) Let $f, g : R \rightarrow R$ be defined as $f(x) = 2x - |x|$ and $g(x) = 2x + |x|$. Find $f \circ g$ and $g \circ f$
(OR) $f \circ g = 3x, g \circ f = 3x$

b) If $A + B + C = \pi$, then prove that $\sin 2A + \sin 2B + \sin 2C = 4 \sin A \sin B \sin C$

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

- i) the value of λ and the separate equations of the line $\lambda = 2$
- ii) Point of intersections of the lines $(x, y) = -10, -\frac{7}{2}$

(OR)

b) Prove that $\begin{vmatrix} a^2 & bc & ac + c^2 \\ a^2 + ab & b^2 & ac \\ ab & b^2 + bc & c^2 \end{vmatrix} = 4a^2 b^2 c^2$

43. a) Resolve into partial fraction: $\frac{x^2 + x + 1}{x^2 - 5x + 1}$ $A = -7, B = 13$

(OR)

b) Solve for x: $\begin{vmatrix} 3-x & -6 & 3 \\ -6 & 3-x & 3 \\ 3 & 3 & -6-x \end{vmatrix} = 0$

44. a) Using mathematical induction, S.T for any natural number

$$\frac{1}{1.2} + \frac{1}{2.3} + \dots + \frac{1}{n(n+1)} = \frac{n}{n+1} \quad P(k+1) = \frac{k+1}{k+2}$$

(OR)

b) P.T the points which position vectors $2\hat{i} + 4\hat{j} + 3\hat{k}$, $4\hat{i} + \hat{j} + 9\hat{k}$ and $10\hat{i} - \hat{j} + 6\hat{k}$ form a right angled triangle. $BC^2 = 49, CA^2 = 98, AB^2 = 49$

45. a) Show that $\lim_{x \rightarrow 0^+} x \left(\left\lfloor \frac{1}{x} \right\rfloor + \left\lfloor \frac{2}{x} \right\rfloor + \left\lfloor \frac{3}{x} \right\rfloor + \dots + \left\lfloor \frac{15}{x} \right\rfloor \right) = 120$ ~~$\lim_{x \rightarrow 0^+} x \left\lfloor \frac{1}{x} \right\rfloor$~~

(OR)

b) Solve for x: $\frac{x^2 - 4}{x^2 - 2x - 15} \leq 0$ $[-3, -2] \cup [2, 5)$

46. a) Prove that $\sqrt[3]{x^3 + 6} - \sqrt[3]{x^2 + 3}$ is approximately equal to $\frac{1}{x^2}$, where x is sufficiently large.

(OR)

b) Suppose that the diameter of an animal's pupils is given by $f(x) = \frac{160x^{-0.4} + 90}{4x^{-0.4} + 15}$, where x is the intensity of light and f(x) is in mm. Find the diameter of the pupils with
a) maximum light b) minimum light

47. a) Integrate: $\int \frac{2x+3}{\sqrt{x^2+4x+1}} dx$ with respect to x $2\sqrt{x^2+4x+1} - \log|x+2+\sqrt{x^2+4x+1}| + C$

(OR)

b) A firm manufactures PVC pipes in their plants viz., X, Y and Z. The daily production volumes from the three firms X, Y and Z are respectively 2000 units, 3000 units and 5000 units. It is known that from the past experience that 3% of the output from the plant X, 4% of the output from the plant Y and 2% from Z. A pipe is selected at random from a day's total production.

- Find the probability that the selected pipe is a defective one? $\frac{7}{250}$
- If the selected pipe is a defective one then what is the probability that it was produced by plant Y? $\frac{3}{7}$
