Class : 11

Register Number

SECOND REVISION EXAMINATION - 2025

MATHEMATICS

Time Allowed : 3.00 Hours] [Max. Marks : 90

PART - I

I. Answer the following: 20x1=20

1. Let $f : R \to R$ be defined by $f(x) = 1 - |x|$. Then the range of f is

   1) R 2) $(1,\infty)$ 3) $(-1, \infty)$ 4) $(-\infty,1]$

2. The value of $\log_{\sqrt{2}} 512$ is

   1) 16 2) 18 3) 9 4) 12

3. If $\tan\alpha$ and $\tan\beta$ are the root 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) $\frac{-b}{a}$

4. $(n-1) C_r + (n-1) C_{(r-1)}$ is

   1) $(n+1) C_r$ 2) $(n-1) C_r$ 3) nC_r 4) nC_{r-1}

5. The value of $\frac{1}{2!} + \frac{1}{4!} + \frac{1}{6!} + \ldots\ldots\ldots\ldots$ is

   1) $\frac{e^2+1}{2e}$ 2) $\frac{(e+1)^2}{2e}$ 3) $\frac{(e-1)^2}{2e}$ 4) $\frac{e^2-1}{2e}$

6. Equation of the straight line $\perp$ to the line $x - y + 5 = 0$, through the point of intersection the y - axis and the given line.

   1) $x - y - 5 = 0$ 2) $x + y - 5 = 0$ 3) $x + y + 5 = 0$ 4) $x + y + 10 = 0$

7. 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

8. If $\vec{BA} = 3\hat{i} + 2\hat{j} + \hat{k}$ and the position vector of $\vec{B}$ is $\hat{i} + 3\hat{j} - \hat{k}$, then the position vector A is

   1) $4\hat{i} + 2\hat{j} + \hat{k}$ 2) $4\hat{i} + 5\hat{j}$ 3) $4\hat{i}$ 4) $-4\hat{i}$

9. $\lim_{x\to 0} \frac{e^{\tan x} - e^x}{\tan x - x} =$

   1) 1 2) e 3) ½ 4) 0

10. If the derivative of $(ax - 5) e^{3x}$ at $x = 0$ is -13, then the value of a is

    1) 8 2) -2 3) 5 4) 2

11. If $\int f(x)\,dx = g(x) + c$, then $\int f(x)\, g'(x)\, dx$

    1) $\int (f(x))^2\, dx$ 2) $\int f(x)g(x)\, dx$ 3) $\int f'(x)g(x)dx$ 4) $\int (g(x))^2\, dx$

12. If two events A and B are such that $P(\overline{A}) = \frac{3}{10}$ and $P(A\cap\overline{B}) = ½$, then $P(A\cap B)$ is

1) $\frac{1}{2}$ 2) $\frac{1}{3}$ 3) $\frac{1}{4}$ 4) $\frac{1}{5}$

13. If n(A) = 2 and n (B∪C) = 3, then n[(A x B) ∪ (AxC)] is

1) 2^3 2) 3^2 3) 3 4) 4

14. 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

15. The value of $\cos 2\theta \cos 2\phi + \sin^2(\theta-\phi) - \sin^2(\theta+\phi)$

1) $\sin 2(\theta+\phi)$ 2) $\cos 2(\theta+\phi)$ 3) $\sin 2(\theta-\phi)$ 4) $\cos 2(\theta-\phi)$

16. If m is a number such that $m \leq 5$, then the probability that quadratic equation $2x^2 + 2mx + 1 = 0$ has real roots is

1) $\frac{1}{5}$ 2) $\frac{2}{5}$ 3) $\frac{3}{5}$ 4) $\frac{4}{5}$

17. $\int e^{-4x} \cos x \, dx =$

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) $\frac{e^{-4x}}{17}[-4\cos x - \sin x] + c$

18. If one of the lines given by $6x^2 - xy + 4cy^2 = 0$ is $3x + 4y = 0$ then C equals to

1) -3 2) -1 3) 3 4) 1

19. If (1,2,4) and (2, -3λ, -3) are the initial and terminal points of the vector $\hat{i} + 5\hat{j} - 7\hat{k}$, then the value of λ is equal to

1) $\frac{7}{3}$ 2) $\frac{-7}{3}$ 3) $\frac{-5}{3}$ 4) $\frac{5}{3}$

20. If $g(x) = (x^2 + 2x + 1) f(x)$ and $f(0) = 5$ and $\lim_{x\to 0} \frac{f(x) - 5}{x} = 4$, then $g'(0)$ is

1) 20 2) 14 3) 18 4) 12

PART- II

II. Answer any 7 of the following questions. Question no: 30 is compulsory: 7x2=14

21. If ρ(A) denotes the power set of A, then find n(ρ(ρ(ρ(ϕ))))

22. Find the value of cosec (-1410°)

23. Find the equation of the lines passing through the point (1,1) with slope 3

24. Solve $3x - 5 \leq x + 1$ for x.

25. Write the first 6 terms of the sequences whose n^{th} term an is given below.

$$a_n = \begin{cases} 1 & \text{if } n = 1 \\ 2 & \text{if } n = 2 \\ a_{n-1} + a_{n-2} & \text{if } n > 2 \end{cases}$$

26. An experiment has the four possible mutually exclusive and exhaustive outcomes A,B,C and D. Check whether the following assignments of probability are permissible.

$P(A) = \frac{2}{5}$, $P(B) = \frac{3}{5}$ $P(C) = \frac{-1}{5}$, $P(D) = \frac{1}{5}$

27. Integrate cos (5 - 11x) with respect to x.

28. Differentiate : $y = (x^3 - 1)^{100}$

29. If $\vec{a} = 2\hat{i} + 2\hat{j} + 3\hat{k}$, $\vec{b} = -\hat{i} + 2\hat{j} + \hat{k}$ and $\vec{c} = 3\hat{i} + \hat{j}$ be such that $\vec{a} + \lambda\vec{b}$ is perpendicular to $\vec{c}$ then find λ

30. Compute $\lim\limits_{x\to 1} \frac{\sqrt{x} - 1}{x - 1}$

PART- III

III. Answer any 7 questions of the following. Question no: 40 is compulsory. 7x3=21

31. If the equ ations $x^2 - ax + b = 0$ and $x^2 - ex + f = 0$ have one root in common and if the second equation has equal roots, then prove that ae = 2 (b + f)

32. Find the sum $1 + \frac{4}{5} + \frac{7}{25} + \frac{10}{125} + \ldots\ldots\ldots\ldots$

33. Prove that $\sin 105^\circ + \cos 105^\circ = \cos 45^\circ$

34. Find the distinct permutations of the letters of the word MISSISSIPPI?

35. The length of the perpendicular drawn from the origin to a line is 12 and makes an angle 150° with positive direction of the x - axis. Find the equation of the line.

36. A die is rolled. If it shows an odd number, then find the probability of getting 5

37. If $f''(x) = 12x - 6$ and $f(1) = 30$, $f'(1) = 5$ find f(x)

38. Find $\frac{dy}{dx}$ if $x = a(t - \sin t)$, $y = a(1 - \cos t)$

39. Show that the points whose position vectors are $2\hat{i} + 3\hat{j} - 5\hat{k}$, $3\hat{i} + \hat{j} - 2\hat{k}$ and , $6\hat{i} - 5\hat{j} + 7\hat{k}$ are collinear.

40. If (k, 2), (2,4) and (3,2) are vertices of the triangle of area 4 square units then determine the value of k.

PART - IV

IV. Answer all questions of the following: 7x5=35

41. (a) If $f : R \to R$ is defined by $f(x) = 3x - 5$, Prove that f is bijection and find its inverse.

(b) If A_i, B_i, C_i are the co factors of a_i, b_i, c_i respectively, i = 1 to 3

$$|A| = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}, \text{ show that } \begin{vmatrix} A_1 & B_1 & C_1 \\ A_2 & B_2 & C_2 \\ A_3 & B_3 & C_3 \end{vmatrix} = |A|^2$$

42. (a) Resolve the following rational expression into partial fractions: $\frac{6x^2 - x + 1}{x^3 + x^2 + x + 1}$

(OR)

(b) Prove that $\lim_{\theta \to 0} \frac{\sin\theta}{\theta} = 1$

43. (a) State and Prove Napier's formula.

(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 $n \geq 1$, $1 + 2 + 3 + \ldots\ldots\ldots\ldots + n = \frac{n(n+1)}{2}$

(OR)

(b) The medians of a triangle are concurrent.

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

(OR)

(b) Evaluate $\int \frac{x+1}{x^2 - 3x + 1} dx$

46. (a) If $y = \frac{\sin^{-1}}{\sqrt{1 - x^2}}$, show that $(1 - x^2) y_2 - 3xy_1 - y = 0$

(OR)

(b) In a survey of 5000 persons in a town, it was found that 45% of the persons know language A, 25% know language B, 10% know language C, 5% know languages A and B, 4% know languages B and C, and 4% know languages A and C. If 3% of the persons know all the three languages, Find the number of persons who knows only languages A.

47. (a) A factory has two machine I and II. Machine - I produces 40% of items of the output and Machine - II produces 60% of items. Further 4% of items produced by Machine - I are defective and 5% produced by Machine - II are defective. If an item is drawn at random, Find the probability that it is a defective item.

(OR)

(b) Show that the equation $4x^2 + 4xy + y^2 - 6x - 3y - 4 = 0$ represents a pair of parallel lines.