RS-2

11 - Std

SECOND REVISION EXAMINATION - 2025

MATHEMATICS

Time : 3.00 hrs. Marks : 90

PART-I

Choose the correct answer: 20*1=20

1. If the function $f:[-3,3] \rightarrow S$ defined by $f(x) = x^2$ is onto, then S is

(a) $[-9,9]$ (b) $\mathbb{R}$ (c) $[-3,3]$ (d) $[0,9]$

2. The solution of $5x - 1 < 24$ and $5x + 1 > -24$ is

(a) $(4,5)$ (b) $(-5,-4)$ (c) $(-5,5)$ (d) $(-5,4)$

3. $\cos 2\theta \cos 2\phi + \sin^2(\theta - \phi) - \sin^2(\theta + \phi)$ is equal to

(a) $\sin 2(\theta + \phi)$ (b) $\cos 2(\theta + \phi)$ (c) $\sin 2(\theta - \phi)$ (d) $\cos 2(\theta - \phi)$

4. In ${}^{2n}C_3 : {}^{n}C_3 = 11:1$ then n is

(a) 5 (b) 6 (c) 11 (d) 7

5. The coefficient of x^6 in $(2 + 2x)^{10}$ is

(a) ${}^{10}C_6$ (b) 2^6 (c) ${}^{10}C_6 2^6$ (d) ${}^{10}C_6 2^{10}$

6. If S_n denotes the sum of n terms of an AP whose common difference is d, the value of $S_n - 2S_{n-1} + S_{n-2}$ is

(a) d (b) 2 d (c) 4 d (d) d^2.

7. If the point $(8,-5)$ lies on the locus $\frac{x^2}{16} - \frac{y^2}{25} = k$, then the value of k is

(a) 0 (b) 1 (c) 2 (d) 3

8. The value of x, for which the matrix $A = \begin{bmatrix} e^{x-2} & e^{7+x} \\ e^{2+x} & e^{2x+3} \end{bmatrix}$ is singular is

(a) 9 (b) 8 (c) 7 (d) 6

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

(a) $4\hat{i} + 2\hat{j} + \hat{k}$ (b) $4\hat{i} + 5\hat{j}$ (c) $4\hat{i}$ (d) $-4\hat{i}$

10. Let the function f be defined by $f(x) = \begin{cases} 3x & 0 \le x \le 1 \\ -3x + 5 & 1 < x \le 2 \end{cases}$, then

(a) $\lim_{x \to 1} f(x) = 1$ (b) $\lim_{x \to 1} f(x) = 3$ (c) $\lim_{x \to 1} f(x) = 2$ (d) $\lim_{x \to 1} f(x)$ does not exist

11. $\lim_{\alpha \to \frac{\pi}{4}} \frac{\sin \alpha - \cos \alpha}{\alpha - \frac{\pi}{4}}$ is

(a) $\sqrt{2}$ (b) $\frac{1}{\sqrt{2}}$ (c) 1 (d) 2

12. $\frac{d}{dx}\left(e^{x+5\log x}\right)$ is

(a) $e^x \cdot x^4(x+5)$ (b) $e^x \cdot x(x+5)$ (c) $e^x + \frac{5}{x}$ (d) $e^x - \frac{5}{x}$

13. If $\int f'(x)e^{x^2}dx = (x-1)e^{x^2} + c$, then $f(x)$ is

(a) $2x^3 - \frac{x^2}{2} + x + c$ (b) $\frac{x^3}{2} + 3x^2 + 4x + c$

(c) $x^3 + 4x^2 + 6x + c$ (d) $\frac{2x^3}{3} - x^2 + x + c$

14. $\int \sin\sqrt{x}\, dx$ is

(a) $2(-\sqrt{x}\cos\sqrt{x} + \sin\sqrt{x}) + c$ (b) $2(-\sqrt{x}\cos\sqrt{x} - \sin\sqrt{x}) + c$

(c) $2(-\sqrt{x}\sin\sqrt{x} - \cos\sqrt{x}) + c$ (d) $2(-\sqrt{x}\sin\sqrt{x} + \cos\sqrt{x}) + c$

15. If A and B are any two events, then the probability that exactly one of them occur is

(a) $P(A \cup \bar{B}) + P(\bar{A} \cup B)$ (b) $P(A \cap \bar{B}) + P(\bar{A} \cap B)$

(c) $P(A) + P(B) - P(A \cap B)$ (d) $P(A) + P(B) + 2P(A \cap B)$

16. $f: R - \{0\} \to R$ defined by $f(x) = \frac{1}{x}$ is

(a) not a function (b) not one to one but onto

(c) one to one but not onto (d)both one to one and onto

17. The value of $\cos A \cos 2A \cos 4A$ is

(a) $\frac{\sin 8A}{8\sin A}$ (b) $\frac{8\sin A}{\sin 8A}$ (c) $\frac{\sin 8A}{8}$ (d) $\frac{\sin 8A}{\sin A}$

18. The locus of the moving point $(a\cos\theta, b\sin\theta)$ is

(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) $x^2 - y^2 = a^2b^2$ (d) $x^2 + y^2 = \frac{a^2}{b^2}$

19. If $|\vec{a}| = 3$ and $|\vec{b}| = 2$, then $(\vec{a} + \vec{b}).(\vec{a} - \vec{b})$ is equal to

(a) $-\frac{1}{5}$ (b) -5 (c) $\frac{1}{5}$ (d) 5

20. If $y = \sec(tan^{-1}x)$ then $\frac{dy}{dx}$ at $x = 1$ is equal to

(a) $\frac{1}{\sqrt{2}}$ (b) $\frac{1}{2}$ (c) 1 (d) $\sqrt{2}$

PART-II

Answer any seven questions: (Q.No. 30 is compulsory) **7*2=14**

21. If $n(A \cap B) = 3$ and $n(A \cup B) = 10$, then find $n(\wp(A \Delta B))$.

22. Solve for x: $|4x - 5| \geq 2$

23. In a circle of diameter 40 cm, a chord is of length 20 cm. Find the length of the minor arc of the chord

24. If $\frac{1}{7!}+\frac{1}{8!}=\frac{A}{9!}$ then find the value of A

25. Show that the lines are $3x+2y+9=0$ and $12x+8y-15=0$ are parallel lines

26. Show that the points $(a,b+c),(b,c+a)$ and $(c,a+b)$ are collinear

27. Compute $\lim_{x\to 0}\left[\frac{x^2+x}{x}+4x^3+3\right]$

28. Integrate $\frac{x^{24}}{x^{25}}$ with respect to x:

29. Given that $P(A)=0.52$, $P(B)=0.43$ and $P(A\cap B)=0.24$, find (i) $P(A\cap \bar{B})$ (ii)$P(A\cup B)$

30. Differentiate 5^x.

PART-III

Answer any seven questions : (Q.No. 40 is compulsory) 7*3=21

31. Find the largest possible domain for the real valued function given by $f(x)=\frac{\sqrt{9-x^2}}{\sqrt{x^2-1}}$

32. If $a^2+b^2=7ab$, show that $\log\frac{a+b}{3}=\frac{1}{2}(\log a+\log b)$.

33. How many different selections of 5 books can be made from 12 different books if, (i) Two particular books are always selected? (ii)Two particular books are never selected?

34. Find the constant term of $\left(2x^3-\frac{1}{3x^2}\right)^5$

35. Prove that $\begin{vmatrix}1 & x & x\\ x & 1 & x\\ x & x & 1\end{vmatrix}^2=\begin{vmatrix}1-2x^2 & -x^2 & -x^2\\ -x^2 & -1 & x^2-2x\\ -x^2 & x^2-2x & -1\end{vmatrix}$

36. Find the area of the triangle whose vertices are $A(3,-1,2),B(1,-1,-3$ and $C(4,-3,1)$

37. Differentiate $y=x^{\sqrt{x}}$

38. Evaluate $\int e^x(\sin x+\cos x)dx$

39. If $P(A)=0.5,P(B)=0.8$ and $P(B/A)=0.8$, find $P(A/B)$ and $P(A\cup B)$

40. Solve $2\sin^2 x-7\sin x+3=0$

PART-IV

Answer all: 7*5=35

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

b) If $\theta + \phi = \alpha$ and $\tan\theta = k\tan\phi$, then prove that $\sin(\theta - \phi) = \frac{k-1}{k+1}\sin\alpha$

42. a) If one root of $k(x-1)^2 = 5x - 7$ is double the other root, show that $k = 2$ or -25. (OR)

b) If $A + B + C = \pi$, prove that $\cos^2 A + \cos^2 B + \cos^2 C = 1 - 2\cos A\cos B\cos C$

43. a) By the principle of Mathematical induction, prove that, for $n \geq 1$.

$1.2 + 2.3 + 3.4 + \cdots + n \cdot (n+1) = \frac{n(n+1)(n+2)}{3}$. (OR)

b) Integrate with respect to x: $\frac{x+1}{(x+2)(x+3)}$

44. a) Find the equation of the line through the intersection of the lines $3x + 2y + 5 = 0$ and $3x - 4y + 6 = 0$ and the point $(1,1)$. (OR)

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

45. a) Show that the vectors $5\hat{i} + 6\hat{j} + 7\hat{k}$, $7\hat{i} - 8\hat{j} + 9\hat{k}$, $3\hat{i} + 20\hat{j} + 5\hat{k}$ are coplanar. (OR)

b) Evaluate $\lim_{x\to\infty}\{x[\log(x+a) - \log(x)]\}$ (OR) (OR)

46. a) If $x = a(\theta + \sin\theta), y = a(1 - \cos\theta)$ then prove that at $\theta = \frac{\pi}{2}, y'' = \frac{1}{a}$. (OR)

b) The probability that a new railway bridge will get an award for its design is 0.48, the probability that it will get an award for the efficient use of materials is 0.36, and that it will get both awards is 0.2. What is the probability, that (i) it will get at least one of the two awards (ii) it will get only one of the awards.

47. a) Differentiate (i) $f(x) = e^{-2x}\cos x$ (ii) $f(t) = \frac{1+t}{1+t^2}$. (OR)

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