1. If A contains 10 elements then total number of functions defined from A to A is

(a) 10 (b) 2^{10} (c) 10^{10} (d) $2^{10}-1$

2. If $f(x)=\frac{x-|x|}{|x|}$, then $f(-1)=$

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

3. If $f(y)=\log y$, then $f(y)+f\left(\frac{1}{y}\right)$ is equal to

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

4. If $f(x)=\log\left[\frac{1+x}{1-x}\right]$, then $f\left[\frac{2x}{1+x^2}\right]$ is equal to

(a) $[f(x)]^2$ (b) $[f(x)]^3$

(c) $2f(x)$ (d) $3f(x)$

5. If $f(x)=\cos[\pi^2]x+\cos[-\pi^2]x$, then

(a) $f\left(\frac{\pi}{4}\right)=2$ (b) $f(-\pi)=2$

(c) $f(\pi)=1$ (d) $f\left(\frac{\pi}{2}\right)=-1$

6. If $f:R\to R$ satisfies $f(x+y)=f(x)+f(y)$, for all $x,y\in R$ and $f(1)=7$, then $\sum_{r=1}^{n}f(r)$ is

(a) $\frac{7n}{2}$ (b) $\frac{7(n+1)}{2}$

(c) $7n(n+1)$ (d) $\frac{7n(n+1)}{2}$

7. If $f(x)=\frac{1}{\sqrt{x+2\sqrt{2x-4}}}+\frac{1}{\sqrt{x-2\sqrt{2x-4}}}$ for $x>2$, then $f(11)=$

(a) $\frac{7}{6}$ (b) $\frac{5}{6}$ (c) $\frac{6}{7}$ (d) $\frac{5}{7}$

8. Domain of the function $\frac{1}{\sqrt{x^2-1}}$ is

(a) $(-\infty,-1)\cup(1,\infty)$ (b) $(-\infty,-1]\cup(1,\infty)$

(c) $(-\infty,-1)\cup[1,\infty)$ (d) None of these

9. The domain of the function $f(x)=\frac{1}{\sqrt{|x|-x}}$ is

(a) R^+ (b) R^- (c) R_0 (d) R

10. Find the domain of definition of $f(x)=\frac{\log_2(x+3)}{x^2+3x+2}$

(a) $(-3,\infty)$ (b) $\{-1,-2\}$

(c) $(-3,\infty)-\{-1,-2\}$ (d) $(-\infty,\infty)$

11. The domain of the function $f(x)=\sqrt{(2-2x-x^2)}$ is

(a) $-3\le x\le\sqrt{3}$ (b) $-1-\sqrt{3}\le x\le-1+\sqrt{3}$

(c) $-2\le x\le 2$ (d) None of these

12. If the domain of function $f(x)=x^2-6x+7$ is $(-\infty,\infty)$, then the range of function is

(a) $(-\infty,\infty)$ (b) $[-2,\infty)$

(c) $(-2,3)$ (d) $(-\infty,-2)$

13. The domain of the function $f(x)=\sqrt{x-x^2}+\sqrt{4+x}+\sqrt{4-x}$ is

(a) $[-4,\infty)$ (b) $[-4,4]$

(c) $[0,4]$ (d) $[0,1]$

14. The domain of the function $\sqrt{\log(x^2-6x+6)}$ is

(a) $(-\infty,\infty)$ (b) $(-\infty,3-\sqrt{3})\cup(3+\sqrt{3},\infty)$

(c) $(-\infty,1]\cup[5,\infty)$ (d) $[0,\infty)$

15. The domain of definition of the function $y(x)$ given by $2^x+2^y=2$ is

(a) (0, 1] (b) [0, 1]

(c) $(-\infty,0]$ (d) $(-\infty,1)$

16. The domain of the function $f(x)=\sin^{-1}[\log_2(x/2)]$ is

(a) [1, 4] (b) [- 4, 1] (c) [- 1, 4] (d) None of these

17. The domain of the derivative of the function

$f(x)=\begin{cases}\tan^{-1}x, & |x|\le 1\\ \frac{1}{2}(|x|-1), & |x|>1\end{cases}$ is

(a) $R-\{0\}$ (b) $R-\{1\}$

(c) $R-\{-1\}$ (d) $R-\{-1,1\}$

18. Domain of definition of the function

$f(x)=\frac{3}{4-x^2}+\log_{10}(x^3-x)$, is

(a) (1, 2) (b) (-1, 0) ∪ (1, 2)

(c) (1, 2) ∪ (2, ∞) (d) (-1, 0) ∪ (1, 2) ∪ (2, ∞)

19. The domain of the function $f(x)=\log_{3+x}(x^2-1)$ is

(a) $(-3,-1)\cup(1,\infty)$

(b) $[-3,-1)\cup[1,\infty)$

(c) $(-3,-2)\cup(-2,-1)\cup(1,\infty)$

(d) $[-3,-2)\cup(-2,-1)\cup[1,\infty]$

20. Domain of definition of the function $f(x)=\sqrt{\sin^{-1}(2x)+\frac{\pi}{6}}$, for real value x, is

(a) $\left[-\frac{1}{4},\frac{1}{2}\right]$ (b) $\left[-\frac{1}{2},\frac{1}{2}\right]$

(c) $\left(-\frac{1}{2},\frac{1}{9}\right)$ (d) $\left[-\frac{1}{4},\frac{1}{4}\right]$

21. The range of the function $f(x)=\frac{x+2}{|x+2|}$ is

(a) {0, 1} (b) {- 1, 1}

(c) R (d) $R-\{-2\}$

22. The range of $f(x)=\sec\left(\frac{\pi}{4}\cos^2 x\right)$, $-\infty<x<\infty$ is

(a) $[1,\sqrt{2}]$ (b) $[1,\infty)$

(c) $[-\sqrt{2},-1]\cup[1,\sqrt{2}]$ (d) $(-\infty,-1]\cup[1,\infty)$

23. Range of the function $f(x)=\frac{x^2+x+2}{x^2+x+1};x\in R$ is

(a) $(1,\infty)$ (b) $(1,11/7)$ (c) $(1,7/3]$ (d) $(1,7/5]$

24. Function $f:N\to N, f(x)=2x+3$ is

(a) One-one onto (b) One-one into

(c) Many-one onto (d) Many - one into

25. The function $f:R\to R$ defined by $f(x)=(x-1)(x-2)(x-3)$ is

(a) One-one but not onto (b) Onto but not one-one

(c) Both one-one and onto (d) Neither one-one nor onto

26. Find number of surjection from A to B where $A=\{1,2,3,4\}, B=\{a,b\}$

(a) 13 (b) 14 (c) 15 (d) 16

27. If $A=\{a,b,c\}$, then total number of one-one onto functions which can be defined from A to A is

(a) 3 (b) 4 (c) 9 (d) 6

28. If $f:R\to R,$ then $f(x)=|x|$ is

(a) One-one but not onto (b) Onto but not one-one

(c) One-one and onto (d) None of these

29. Let $f:R\to R$ be a function defined by $f(x)=\frac{x-m}{x-n}$, where $m\neq n$. Then

(a) f is one-one onto (b) f is one-one into

(c) f is many one onto (d) f is many one into

30. The function $f:R\to R$ defined by $f(x)=e^x$ is

(a) Onto (b) Many-one

(c) One-one and into (d) Many one and ont

31. A function f from the set of natural numbers to integers defined by $f(n)=\begin{cases}\frac{n-1}{2}, & \text{when } n \text{ is odd}\\ -\frac{n}{2}, & \text{when } n \text{ is even}\end{cases}$, is

(a) One-one but not onto

(b) Onto but not one-one

(c) One-one and onto both

(d) Neither one-one nor onto

32. Which of the following is an even function

(a) $x\left(\frac{a^x-1}{a^x+1}\right)$ (b) $\tan x$

(c) $\frac{a^x-a^{-x}}{2}$ (d) $\frac{a^x+1}{a^x-1}$

33. Let $f(x)=\sqrt{x^4+15},$ then the graph of the function $y=f(x)$ is symmetrical about

(a) The x-axis (b) The y-axis

(c) The origin (d) The line $x=y$

34. If $f:R\to R, f(x)=(x+1)^2$ and $g:R\to R, g(x)=x^2+1$, then $(fog)(-3)$ is equal to

(a) 121 (b) 144 (c) 112 (d) 11

35. $f(x)=\sin^2 x+\sin^2\left(x+\frac{\pi}{3}\right)+\cos x\cos\left(x+\frac{\pi}{3}\right)$ and $g\left(\frac{5}{4}\right)=1$, then $(gof)(x)$ is equal to

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

36. If $g(x)=x^2+x-2$ and $\frac{1}{2}(gof)(x)=2x^2-5x+2,$ then $f(x)$ is equal to

(a) $2x-3$ (b) $2x+3$

(c) $2x^2+3x+1$ (d) $2x^2-3x-1$

37. If $f(y)=\frac{y}{\sqrt{1-y^2}}, g(y)=\frac{y}{\sqrt{1+y^2}},$ then $(fog)(y)$ is equal to

(a) $\frac{y}{\sqrt{1-y^2}}$ (b) $\frac{y}{\sqrt{1+y^2}}$

(c) y (d) $\frac{1-y^2}{\sqrt{1+y^2}}$

38. Let $g(x)=1+x-[x]$ and $f(x)=\begin{cases}-1, & x<0\\ 0, & x=0\\ 1, & x>0\end{cases}$, then for all x, $f(g(x))$ is equal to

(a) x (b) 1 (c) $f(x)$ (d) $g(x)$

39. If $f(x)=\frac{2x+1}{3x-2},$ then $(fof)(2)$ is equal to

(a) 1 (b) 3 (c) 4 (d) 2

40. If $f:R\to R$ and $g:R\to R$ are given by $f(x)=|x|$ and $g(x)=[x]$ for each $x\in R,$ then $\{x\in R: g(f(x))\le f(g(x))\}=$

(a) $Z\cup(-\infty,0)$ (b) $(-\infty,0)$ (c) Z (d) R

41. If $f:R\to R$ is given by $f(x)=3x-5,$ then $f^{-1}(x)$

(a) Is given by $\frac{1}{3x-5}$

(b) Is given by $\frac{x+5}{3}$

(c) Does not exist because f is not one-one

(d) Does not exist because f is not onto

42. Let $f:R\to R$ be defined by $f(x)=3x-4,$ then $f^{-1}(x)$ is

(a) $3x+4$ (b) $\frac{1}{3}x-4$

(c) $\frac{1}{3}(x+4)$ (d) $\frac{1}{3}(x-4)$

43. Let f: R → R be any function. Define g : R → R by g(x) = |f(x)| for all x. Then g is (2000 S)

(a) Onto if f is onto

(b) One-one if f is one-one

(c) Continuous if f is continuous

(d) Differentiable if f is differentiable.

44. The domain of definition of the function f(x) given by the equation $2^x+2^y=2$ is

(a) $0<x\le 1$ (b) $0\le x\le 1$

(c) $-\infty < x \le 0$ (d) $-\infty < x < 1$

45. Let $g(x) = 1 + x - [x]$ and $f(x)\begin{cases} -1, & x < 0 \\ 0, & x = 0 \\ 1, & x > 0 \end{cases}$. Then for all x, f(g(x)) is equal to (2001 S)

(a) x (b) 1 (c) f(x) (d) g(x)

46. If $f:[1, \infty) \to [2, \infty)$ is given by $f(x) = x + \frac{1}{x}$ then $f^{-1}(x)$ equals

(a) $\frac{\left(x + \sqrt{x^2 - 4}\right)}{2}$ (b) $\frac{x}{\left(1 + x^2\right)}$

(c) $\frac{\left(x - \sqrt{x^2 - 4}\right)}{2}$ (d) $\left(1 + \sqrt{x^2 - 4}\right)$

47. The domain of definition of $f(x)$ $\frac{\log_2(x+3)}{x^2 + 3x + 2}$ is

(a) $R/\{-1, -2\}$ (b) $(-2, \infty)$

(c) $R/\{-1, -2, -3\}$ (d) $(-3, \infty)/\{-1, -2\}$

48. Let E = {1, 2, 3, 4} and F = {1, 2}. Then the number of onto functions from E to F is (2001 S)

(a) 14 (b) 16 (c) 12 (d) 8

49. Let $A = \{x_1, x_2, ...x_m\}$, $B = \{y_1, y_2 .....y_n\}$ then total number of functions $f : A \to B$ is equal to

(a) n^m (b) m^n (c) m! (d) n!

50. In n(A)=m & n(B)=n, total number of one-one functions $f : A \to B$ is equal to

(a) ${}^nP_m$ (b) ${}^nC_B$ (c) n! (d) m!