10. If x and y are of same sign, then the value of $\frac{x^3}{2}\text{cosec}^2\left(\frac{1}{2}\tan^{-1}\frac{x}{y}\right)+\frac{y^3}{2}\sec^2\left(\frac{1}{2}\tan^{-1}\frac{y}{x}\right)$ is equal to

(A)$(x-y)(x^2+y^2)$ (B) $(x+y)(x^2-y^2)$ (C) $(x+y)(x^2+y^2)$ (D) $(x-y)(x^2-y^2)$

11. For $f(x)=\tan^{-1}\left(\frac{\left(\sqrt{12}-2\right)x^2}{x^4+2x^2+3}\right)$

(A) $f_{max}=\frac{\pi}{12}$ (B) $f_{min}=0$ (C) f_{min} does not exist (D) $f_{max}=\frac{\pi}{2}$

12. If $f(x)=\begin{cases}x+1, & x\le 0\\ 2-x, & x>0\end{cases}$ and $g(x)=\begin{cases}x^2+1, & x\ge 1\\ 2x-3, & x<1\end{cases}$ then

(A) Range of gof (x) is $(-\infty,-1)\cup[2,5]$ (B) Range of gof (x) is $(-\infty,-1)\cup[2,5)$
(C) gof (x) is one-one for $x\in[0,1]$ (D) gof (x) is many one for $x\in[0,1]$

13. If f(x) is identity function, g(x) is absolute value function and h(x) is reciprocal function then
(A) fogoh(x) = hogof(x) (B) hog(x) = hogof(x)
(C) gofofofohogof(x) = gohog(x) (D) hohohoh(x) = f(x)

14. The function $y=\frac{x}{1+|x|}:R\to R$ is

(A) one-one (B) onto (C) odd (D) into

15. If α,β,γ are roots of equation $\tan^{-1}(|x^2+2x|+|x+3|-||x^2+2x|-|x+3||)+\cot^{-1}\left(-\frac{1}{2}\right)=\pi$ in ascending order $(\alpha<\beta<\gamma)$ then
(A) $\sin^{-1}\gamma$ is defined (B) $\sec^{-1}\alpha$ is defined
(C) $\gamma-\beta=\sqrt{2}$ (D) $|\beta|>|\gamma|$

16. If f(x) and g(x) are two polynomials such that the polynomial $h(x)=xf(x^3)+x^2g(x^6)$ is divisible by x^2+x+1, then
(A) f(1) = g(1) (B) f(1) = –g(1) (C) h(1) = 0 (D) all of these

17. $1+[\sin^{-1}x]>[\cos^{-1}x]$ where [.] denotes GIF, if $x\in$
(A) (cos1, sin1) (B) [sin1, 1] (C) (cos1, 1] (D) [cos1, 1]

18. If the solution of equation $\sin(\tan^{-1}x)=\sqrt{4-\left[\sin\left(\cos^{-1}x\right)+\cos\left(\sin^{-1}x\right)\right]^2}$ is a, then

(A) $\sin^{-1}a+\cos^{-1}a=\frac{\pi}{2}$ (B) $2\sin^{-1}a+\cos^{-1}a=\frac{\pi}{2}$ (C) $\sin^{-1}a+3\cos^{-1}a=\frac{3\pi}{2}$ (D) $\tan^{-1}a+\cos^{-1}a=\frac{\pi}{2}$

19. If $f(x)=\frac{2^{\{x\}}-1}{2^{\{x\}}+1}$ then (where {x} represent fractional part of x)

(A) $D_f\in R$ (B) $R_f\in[0,\frac{1}{3})$ (C) period of f(x) is 1 (D) f(x) is even function

20. Which of the following is true for $f(x)=(\cos x)^{\cos x}$, $x\in\left[-\cos^{-1}\frac{1}{e},\cos^{-1}\frac{1}{e}\right]$

(A) $R_f\in\left[\left(\frac{1}{e}\right)^{1/e},1\right]$ (B) f(x) is increasing (C) f(x) is many-one (D) f(x) is maximum at x = 0

21. If $f(x)=\tan^{-1}\left(\frac{2x}{1-x^2}\right)$ is a bijective function from set A to set B then which of the following may be true

(A) $A=(-\infty,-1),B=\left(0,\frac{\pi}{2}\right)$ (B) $A=(-1,1),B=\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$

(C) $A=[1,\infty),B=\left(-\frac{\pi}{2},0\right]$ (D) All of these