

1. Examine whether the following functions are even or odd or none.

(i)  $f(x) = \log(x + \sqrt{1+x^2})$

(ii)  $f(x) = \frac{x(a^x+1)}{a^x-1}$

(iii)  $f(x) = \frac{x}{e^x-1} + \frac{x}{2} + 1$

(iv)  $f(x) = \frac{(1+2^x)^7}{2^x}$

(v)  $f(x) = \frac{\sec x + x^2 - 9}{x \sin x}$

(vi)  $f(x) = \sqrt{1+x+x^2} - \sqrt{1-x+x^2}$

(vii)  $f(x) = \begin{cases} x|x| & , \quad x \leq -1 \\ [1+x] - [x-1] & , \quad -1 < x < 1 \\ -x|x| & , \quad x \geq 1 \end{cases}$

(viii)  $f(x) = \frac{2x(\sin x + \tan x)}{2\left[\frac{x+2\pi}{\pi}\right]-3}$

where  $[*]$  denotes greatest integer function.

2. Make the graph of the following functions

(i)  $f(x) = ||x| - 3|$

(ii)  $f(x) = |\ln |x||$

(iii)  $f(x) = [|x|]$

(iv)  $f(x) = |\{x\}|$

(v)  $f(x) = 3\sin\left(x - \frac{\pi}{3}\right)$

(vi)  $f(x) = \frac{x^8}{x}$

(vii)  $f(x) = x + \sin x$

(viii)  $f(x) = (\sin x)^0$

(ix)  $f(x) = 3e^{x+5} - 7$

(x)  $f(x) = |\sin x| + |\cos x|$

3. If  $f(x) = \frac{4^x}{4^x+2}$ , then show that  $f(x) + f(1-x) = 1$

4. Find the period of the following functions (where  $[*]$  denotes greatest integer function)

(i)  $f(x) = 2 + 3\cos(x-2)$

(ii)  $f(x) = \sin 3x + \cos^2 x + |\tan x|$

(iii)  $f(x) = \sin \frac{\pi x}{4} + \sin \frac{\pi x}{3}$

(iv)  $f(x) = \cos \frac{3}{5}x - \sin \frac{2}{7}x$

(v)  $f(x) = [\sin 3x] + |\cos 6x|$

(vi)  $f(x) = \frac{1}{1-\cos x}$

(vii)  $f(x) = \frac{\sin 12x}{1+\cos^2 6x}$

(viii)  $f(x) = \sec^2 x + \operatorname{cosec}^3 x$

5. Find the period of the following functions.

(i)  $f(x) = 1 - \frac{\sin^2 x}{1+\cot x} - \frac{\cos^2 x}{1+\tan x}$

(ii)  $f(x) = \log(2 + \cos 3x)$

(iii)  $f(x) = \tan \frac{\pi}{2}[x]$ ,

where  $[*]$  denotes greatest integer function

(iv)  $f(x) = e^{\ln \sin x} + \tan^3 x - \operatorname{cosec}(3x-5)$

(v)  $f(x) = \frac{1}{2} \left( \frac{|\sin x|}{\cos x} + \frac{\sin x}{|\cos x|} \right)$

Answer Key

- |    |                                    |                            |                            |   |
|----|------------------------------------|----------------------------|----------------------------|---|
| 1. | (i) odd<br>(v) even                | (ii) even<br>(vi) odd      | (iii) even<br>(vii) even   | (iv) neither even nor odd<br>(viii) odd |
| 4. | (i) $2\pi$<br>(v) $\frac{2\pi}{3}$ | (ii) $2\pi$<br>(vi) $2\pi$ | (iii) 24<br>(vii) $\pi/12$ | (iv) $70\pi$<br>(viii) $2\pi$           |
| 5. | (i) $\pi$<br>(v) $2\pi$            | (ii) $\frac{2\pi}{3}$      | (iii) 2                    | (iv) $2\pi$                             |

