CONTINUITY

SYNOPSIS

1. A function f is defined on deleted neighbourhood of a and also

   (i) $\underset{x\to a^-}{Lt}$ f(x) = f(a) then f(x) is left continuous at x = a.

   (ii) $\underset{x\to a^+}{Lt}$ f(a) then f(x) is right continuous at x = a.

   (iii) $\underset{x\to a^-}{Lt}$ f(x) = $\underset{x\to a^+}{Lt}$ f(x) $\Rightarrow$ $\underset{x\to a}{Lt}$ f(x) = f(a) then f(x) is continuous at x = a.

2. If f is not continuous at x = a then f(x) is called discontinuous at x = a.

3. The function f(x) is discontinuous at x = a if a is not in the domain of the function.

4. If f(x) is discontinuous at x = a if $\underset{x\to a^-}{Lt}$ f(x) ≠ f(a) (or) $\underset{x\to a^+}{Lt}$ f(x) ≠ f(a) (or) $\underset{x\to a^-}{Lt}$ f(x) ≠ $\underset{x\to a^+}{Lt}$ f(x).

5. If f is continuous at every point in a set A then f is called continuous on A.

6. The function f is continuous on (a, b) if f is continuous at every point in (a, b).

7. The function f is said to be continuous on [a, b] if

   (i) f is continuous at each point of (a, b)

   (ii) f is right continuous at x = a

   (iii) f is left continuous at x = b.

8. $\underset{x\to a}{Lt}$ f(x) exists and is not equal to f(a), then the discontinuity is called the removable discontinuity at a.

9. $\underset{x\to a}{Lt}$ f(x) does not exists then f has irremovable discontinuity at a.

10. f and g are continuous at a then f + g, f – g, fg f/g are also continuous at a.

11. If ‘f’ is continuous at x = a and g is continuous at x = f(a) then g of is continuous at x = a.

12. Every polynomial function is continuous on R.

13. Every identify function is continuous on R.

14. log x is continuous on R^+. Constant function is continuous on R sin x, cos x, e^x, |x| are continuous on R.

15. log |x| is continuous on R – {0} tan x, sec x are continuous on R – $\left\{(2n+1)\frac{\pi}{2}; n \in z\right\}$.

16. cot x, cosec x are continuous on R – {nπ; n $\in$ z}

17. [x], x – [x] are continuous on R – Z.

18. f(x) is continuous at x = a then |f(x)| is also continuous at x = a the converse is not true.

19. Every differentiable function f(x) at x = a is continuous at x = a converse need not be true.