Chapter-11 Section-A

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1) Evaluate $\lim_{x\to a} \frac{\sqrt{a+2x}-\sqrt{3x}}{\sqrt{3a+x}-2\sqrt{x}}$, $(a \neq 0)$ (1978)

2) $f(x)$ is the integral of $\frac{2\sin x \sin 2x}{x^3}$, $x \neq 0$,find $\lim_{x\to 0} f'(x)$ (1979)

3) Evaluate: $\lim_{h\to 0} \frac{(a+h)^2 \sin(a+h) - a^2 \sin a}{h}$ (1980)

4) Let $f(x+y) = f(x) + f(y)$ for all x and y. If the function $f(x)$is continuous at $x = 0$,then show that $f(x)$ is continuous at all x. (1981 - 2Marks)

5) Use the formula $\lim_{x\to 0} \frac{a^x-1}{x} = lna$ to find $\lim_{x\to 0} \frac{2^x-1}{(1+x)^{\frac{1}{2}}-1}$ (1982 - 2 Marks)

6) Let $f(x) = \begin{cases} 1+x & 0 \le x \le 2 \\ 3-x & 2 \le x \le 3 \end{cases}$ Determine the form of $g(x) = f(x)$ and hence find the points of discontinuity of g, if any (1983 - 2 Marks)

7) Let $f(x) = \begin{cases} \frac{x^2}{2} & , 0 \le x \le 1 \\ 2x^2 - 3x + \frac{3}{2} & , 1 \le x \le 2 \end{cases}$ Discuss the continuity of f, f' and f'' on $[0, 2]$. (1983 - 2 Marks)

8) Let $f(x) = x^3 - x^2 + x + 1$ and $g(x) \begin{matrix} = max f(t); 0 \le t \le 1 \\ = 3 - x \quad 0 \le t \le 2 \end{matrix}$ Discuss the continuity and differentiability of the function $g(x)$ in the interval $(0, 2)$ (1985 - 5 Marks)

9) Let $f(x)$ be defined in the interval [-2,2]such that f(x)= $\begin{cases} -1 & , -2 \le x \le 0 \\ x-1 & , 0 < x \le 2 \end{cases}$ and $g(x) = f(|x|) + |f(x)|$ Test the differentiability of $g(x)$ in $(-2, 2)$. (1986 - 5 Marks)

10) Let $f(x)$ be a continuous and $g(x)$ be a discontinuous function.Prove that $f(x) + g(x)$ is a discontinuous function. (1987 -2Marks)