DURATION:-2.30hrs   MARKS:-75

Q.1.Solve any four   [20]

1) $f:[0.1] \to R$ defined by: $f(x)=\frac{\sin x}{x}$ when $x \neq 0$ and $f(x)=1$ when $x=0$

2) For what values of b function f is continuous: $f(x) =2x$ at $x<2$ and $f(x) = bx^2$ at $x \geq -2$

3) Discuss the continuity of the function in the domain $[0,1]$: $f(x) = \frac{x^2-9}{x-3}3$

4) Using $\epsilon - \delta$ definition of limit evaluate the limit of following: $f(x) = 3x +5$ at $x=2$

5) Discuss the continuity of the function in the domain $[0,3]$: $f(x) = \frac{x^2-4}{x-2}$

6) Show that following function is bijective: $f(x) = 9x -5$

7) Evaluate the limit of following function: $f(x)=\frac{7x+2}{x^2-4x+6}$, at $x=1$

8) Using $\epsilon - \delta$ definition of limit evaluate the limit of following: $f(x) = 9x +15$ at $x=4$

Q.2 Solve any four   [20]

1) Check the differentiability : $f(x) = 4$ when $x<0$ and $f(x) = 4x+1$ when $x \geq 0$ at $x=0$

2) Check the differentiability : $f(x) = 5$ when $x<0$ and $f(x) = 5x-3$ when $x \geq 0$ at $x=0$

3) If $y=e^{m\cos-1x}$,then prove that $(1-x^2)y_2- xy_1 =m^2 y$

4) If $y=\frac{x^{25}+4x^{24}+9}{x+5}$ then find y_{25}

5) If $y=\sin(m\sin^{-1}x)$,then prove that $(1-x^2)y_2- xy_1 +m^2 y=0$

6) Check whether funct if ion is differentiable : $f(x) = \frac{2}{x^3}$ when $x \neq 0$ and $f(x) = 1$ when $x= 0$ at $x=0$

7) Find the nth order derivative of following: $f(x)=(4x+ 5)^8$

8) Discuss the differentiability of : $f(x) = x^2 \sin \left(\frac{1}{x}\right)$ at $x \neq 0$ and $f(x) = 0$ at $x=0$

Q.3 Solve any two   [20]

1) Find the point of maxima and minima of : ii) $f(x)= x^3-10x+1$ i) $f(x)=x^4-8x^3+x^2-24x+1$

2) Verify LMVT for $f(x)= \log x$ in $[1,e]$

3) Find the point of maxima and minima of i) $f(x)=x^2(2-x)^2$ ii) $f(x)=x(1-x)^2$

4) Verify roll's theorem for $f(x)= (3-x).\log x$ in $[1,4]$

Q.4 Solve any three   [15]

1) Find the point of extrema of i) $f(x)=x(4-x)^2$

2) Verify roll's theorem for $f(x)= x^2$ in $[-1,1]$

3) If $y=(\sin^{-1}x)^2$ then prove that $(1-x^2)y_2- xy_1 =2$

4) Find the nth order derivative of following: $f(x)=(10 + 2x)^7$

5) Verify LMVT for $f(x)= x(2-x)$ in $[0,1]$

6) Show that following function is bijective: $f(x) = 5x -8$

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