DAE / IA - 2018

MATH - 233 APPLIED MATHEMATICS - II

PAPER 'A' PART - A (OBJECTIVE)

Time: 30 Minutes Marks: 15

Q.1: *Encircle the correct answer.*

1. Given $f(x)=\frac{1}{x}-1$ then $f(2)=?$

[a] 1 [b] 2 [c] $-\frac{1}{2}$ [d] 3

2. ~~$\lim_{x\to 0}(1+x)^{1/x}=?$~~

[a] 0 [b] 1

[c] e [d] e^2

3. ~~$\lim_{x\to \frac{\pi}{2}}\frac{1}{\cos\theta}=?$~~

[a] 0 [b] 1

[c] $\frac{2}{\pi}$ [d] ∞

4. Second derivative of x^2 is:

[a] 2 [b] $2x$

[c] zero [d] $2x^2$

5. If $u=t^2-3$ then $\frac{du}{dt}=?$

[a] $2t$ [b] $2t-3$

[c] t^{-2} [d] $2t^{-2}$

6. If $y=\frac{x+1}{x^2}$, then $\frac{dy}{dx}=$

[a] $\frac{x+1}{x^2}$ [b] $\frac{2}{x^2}$

[c] $-\frac{1}{x^2}$ [d] $\frac{x^2-1}{x^2}$

7. $\frac{d}{dx}(2\cos 3x)=?$

[a] $6\sin 3x$ [b] $-6\sin 3x$

[c] $-6\cos 3x$ [d] $6\cos 3x$

8. ~~$\frac{d}{dx}\left(\sin^{-1}\frac{1}{x}\right)=?$~~

[a] $\frac{1}{\sqrt{1-x^2}}$ [b] $\frac{-1}{x\sqrt{x^2-1}}$

[c] $\frac{1}{x\sqrt{x^2-1}}$ [d] $\frac{-1}{\sqrt{x^2-1}}$

9. $\frac{d}{dx}(\ell n \sin x)=$

[a] $\cot x$ [b] $\frac{1}{\sin x}\ell n \sin x$

[c] $\ell n \cos x$ [d] $\tan x$

10. For a decreasing function $\frac{dy}{dx}$ is:

[a] $+ve$ [b] $-ve$

[c] zero [d] None of these

11. The function $f(x)=x^2$ between $-5\le x\le -4$ is:

[a] Decreasing [b] Increasing

[c] Maximum [d] Minimum

12. ~~$\frac{d}{dx}(a^x)=?$~~

[a] $a^x \ell n a$ [b] xa^{x-1}

[c] a^{x-1} [d] a^x

13. When n is odd the $\left(\frac{n+1}{2}\right)^{th}$ value is called:

[a] Mean [b] Mode

[c] Median [d] Harmonic Mean

14. Arithmetic mean of the values 4.5, 7.5, 4.5, 2.4, 4.5 is:

[a] 4.5 [b] 4.7 [c] 7.5 [d] 4.6

15. The mode of 2, 3, 3, 4, 4, 4, 8, 9, 10 is:

[a] 3 [b] 8 [c] 9 [d] 4

Answer Key

1	d	2	d	3	d	4	c	5	c
6	c	7	b	8	a	9	a	10	a
11	a	12	b	13	c	14	d	15	d

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DAE / IA - 2018

MATH - 233 APPLIED MATHEMATICS - II

PAPER 'B' PART - B (SUBJECTIVE)

Time : 2 : 30Hrs   Marks : 60

Section - I

Q.1. Write short answers to any Eighteen (18) questions.

1. Is the following function even, odd or neither: $f(x) = 4x^3 - 2x + 6$

Sol. As, $f(x) = 4x^3 - 2x + 6$

Replace x by $-x$, we have:

$$f(-x) = 4(-x)^3 - 2(-x) + 6$$
$$f(-x) = -4x^3 + 2x + 6$$
$$f(-x) = -(4x^3 - 2x - 6)$$
$$f(-x) \neq -f(x)$$

Hence $f(x)$ is $\boxed{\text{neither}}$ even nor odd function.

2. Evaluate: $\lim\limits_{x \to a} \frac{\sqrt{x} - \sqrt{a}}{x - a}$

Sol. $\lim\limits_{x \to a} \frac{\sqrt{x} - \sqrt{a}}{x - a} \quad \left(\frac{0}{0}\right)$ form

$$= \lim_{x \to a} \frac{\sqrt{x} - \sqrt{a}}{x - a} \times \frac{\sqrt{x} + \sqrt{a}}{\sqrt{x} + \sqrt{a}}$$
$$= \lim_{x \to a} \frac{(\sqrt{x})^2 - (\sqrt{a})^2}{(x - a)(\sqrt{x} + \sqrt{a})}$$
$$= \lim_{x \to a} \frac{\cancel{(x - a)}}{\cancel{(x - a)}(\sqrt{x} + \sqrt{a})}$$
$$= \lim_{x \to a} \frac{1}{\sqrt{x} + \sqrt{a}} = \frac{1}{\sqrt{a} + \sqrt{a}} = \boxed{\frac{1}{2\sqrt{a}}}$$

4. Evaluate: $\lim\limits_{x \to 0} \frac{\tan x}{x}$

Sol. $\lim\limits_{x \to 0} \frac{\tan x}{x} \quad \left(\frac{0}{0}\right)$ form

$$= \lim_{x \to 0} \frac{\sin x}{x . \cos x}$$
$$= \lim_{x \to 0} \frac{\sin x}{x} . \lim_{x \to 0} \frac{1}{\cos x}$$
$$= (1) . \frac{1}{\cos 0} = \frac{1}{1} = \boxed{1}$$

4. ~~**Find** $\lim\limits_{x \to 0} \left(1 + \frac{x}{3}\right)^{1/x}$~~.

Sol. $\lim\limits_{x \to 0} \left(1 + \frac{x}{3}\right)^{1/x}$

$$= \lim_{x \to 0} \left(1 + \frac{x}{3}\right)^{\frac{3}{x} \times \frac{1}{3}}$$
$$= \left[\lim_{x \to 0} \left(1 + \frac{x}{3}\right)^{3/x}\right]^{1/3} = \boxed{e^{1/3}}$$

5. Differentiate x^3 w.r.t. x by ab-initio.

Sol. Let, $y = x^3 \rightarrow (i)$

Step-I: then $y + \delta y = (x + \delta x)^3 \rightarrow (ii)$

Step-II: Subtracting eq. (i) from eq. (ii), we have:

$$y + \delta y - y = (x + \delta x)^3 - x^3$$
$$\delta y = x^3 + 3x^2\delta x + 3x\delta x^2 + \delta x^3 - x^3$$
$$\delta y = 3x^2\delta x + 3x\delta x^2 + \delta x^3$$
$$\delta y = \delta x(3x^2 + 3x\delta x + \delta x^2)$$

Step-III: Dividing both sides by 'δx':

$$\frac{\delta y}{\delta x} = 3x^2 + 3x\delta x + \delta x^2$$

Step-IV: Taking limit $\delta x \to 0$ on both sides:

$$\lim_{\delta x \to 0} \frac{\delta y}{\delta x} = \lim_{\delta x \to 0} (3x^2 + 3x\delta x + \delta x^2)$$
$$\frac{dy}{dx} = 3x^2 + 3x(0) + (0)^2$$
$$\frac{dy}{dx} = 3x^2 + 0 + 0 = \boxed{3x^2}$$

6. **Find the derivative of** $\left(3-x^2\right)\left(x^3-x+1\right)$ **w.r.t. 'x'.**

Sol. $\frac{d}{dx}\left[\left(3-x^2\right)\left(x^3-x+1\right)\right]$

{using Product Rule}

$$=\left(\frac{d}{dx}\left(3-x^2\right)\right)\left(x^3-x+1\right)+\left(3-x^2\right)\left(\frac{d}{dx}\left(x^3-x+1\right)\right)$$

$$=(0-2x)\left(x^3-x+1\right)+\left(3-x^2\right)\left(3x^2-1+0\right)$$

$$=(-2x)\left(x^3-x+1\right)+\left(3-x^2\right)\left(3x^2-1\right)$$

$$=-2x^4+2x^2-2x+9x^2-3-3x^4+x^2$$

$$=\boxed{-5x^4+12x^2-2x-3}$$

7. **Find** $\frac{dy}{dx}$ **if** $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

Sol. Differentiate both sides w.r.t. 'x':

$$\frac{d}{dx}\left(\frac{x^2}{a^2}+\frac{y^2}{b^2}\right)=\frac{d}{dx}(1)$$

$$\frac{2x}{a^2}+\frac{2y}{b^2}\frac{dy}{dx}=0$$

$$\frac{2y}{b^2}\frac{dy}{dx}=-\frac{2x}{a^2}$$

$$\frac{dy}{dx}=-\frac{2x}{a^2}.\frac{b^2}{2y}\Rightarrow\boxed{\frac{dy}{dx}=-\frac{b^2x}{a^2y}}$$

8. **If** $y=5x^3-7x^2+9-\frac{8}{x}+\frac{7}{x^4}$, **find** $\frac{dy}{dx}$

Sol. $y=5x^3-7x^2+9-\frac{8}{x}+\frac{7}{x^4}$

Differentiate both sides w.r.t. 'x':

$$\frac{d}{dx}(y)=\frac{d}{dx}\left(5x^3-7x^2+9-\frac{8}{x}+\frac{7}{x^4}\right)$$

$$\frac{dy}{dx}=\frac{d}{dx}\left(5x^3-7x^2+9-8x^{-1}+7x^{-4}\right)$$

$$\frac{dy}{dx}=5\left(3x^2\right)-7(2x)+0-8(-1)x^{-2}+7(-4)x^{-5}$$

$$\boxed{\frac{dy}{dx}=15x^2-14x+\frac{8}{x^2}-\frac{28}{x^5}}$$

9. **If** $y=\frac{x^2+1}{x-1}$, **find** $\frac{dy}{dx}$ **at** $x=2$.

Sol. $y=\frac{x^2+1}{x-1}$

Differentiate both sides w.r.t. 'x':

$$\frac{d}{dx}(y)=\frac{d}{dx}\left(\frac{x^2+1}{x-1}\right)\left\{\begin{matrix}\text{using by}\\ \text{Quotient Rule}\end{matrix}\right\}$$

$$\frac{dy}{dx}=\frac{(x-1)\left(\frac{d}{dx}\left(x^2+1\right)\right)-\left(x^2+1\right)\left(\frac{d}{dx}(x-1)\right)}{(x-1)^2}$$

$$\frac{dy}{dx}=\frac{(x-1)(2x+0)-\left(x^2+1\right)(1-0)}{(x-1)^2}$$

$$\frac{dy}{dx}=\frac{2x^2-2x-x^2-1}{(x-1)^2}$$

$$\frac{dy}{dx}=\frac{x^2-2x-1}{(x-1)^2}$$

At x = 2

$$\frac{dy}{dx}=\frac{(2)^2-2(2)-1}{(2-1)^2}=\frac{4-4-1}{(1)^2}=\boxed{-1}$$

10. **Differentiate** $\sin(\tan x)$ **w.r.t. 'x'.**

Sol. $\frac{d}{dx}\left[\sin(\tan x)\right]$

$$=\cos(\tan x).\left(\frac{d}{dx}(\tan x)\right)$$

$$=\boxed{\cos(\tan x)\sec^2 x}$$

11. ~~**Find the derivative of** $\sin^{-1}\left(\frac{x}{a}\right)$~~

Sol. $\frac{d}{dx}\left(\sin^{-1}\left(\frac{x}{a}\right)\right)$

$$=\frac{1}{\sqrt{1-\left(\frac{x}{a}\right)^2}}.\frac{d}{dx}\left(\frac{x}{a}\right)$$

$$= \frac{1}{\sqrt{1-\frac{x^2}{a^2}}} \times \left(\frac{1}{a}\right) = \frac{1}{\sqrt{\frac{a^2-x^2}{a^2}}} \cdot \frac{1}{a}$$

$$= \frac{1}{\frac{\sqrt{a^2-x^2}}{a}} \cdot \frac{1}{a} = \boxed{\frac{1}{\sqrt{a^2-x^2}}}$$

12. ~~Find the value of $\frac{d}{dx}(x^x)$~~

Sol. Let $y = x^x$

Taking 'ℓn' on both sides:

$$\ell n(y) = \ell n(x^x)$$

$$\ell n(y) = x(\ell n x) \left\{\begin{matrix}\text{using logrithm law} \\ \ell n(m^n) = n\ \ell n(m)\end{matrix}\right\}$$

$$\frac{d}{dx}(\ell n y) = \frac{d}{dx}(x(\ell n x)) \left\{\begin{matrix}\text{using by} \\ \text{Product Rule}\end{matrix}\right\}$$

$$\frac{1}{y}\frac{dy}{dx} = \left(\frac{d}{dx}(x)\right)\ell n x + x\left(\frac{d}{dx}(\ell n x)\right)$$

$$\frac{dy}{dx} = y\left[(1)\ell n x + x\left(\frac{1}{x}\right)\right]$$

$$\frac{dy}{dx} = x^x[\ell n x + 1] \Rightarrow \frac{dy}{dx} = \boxed{x^x[1 + \ell n x]}$$

13. **Differentiate $\frac{x}{\ell n x}$ w.r.t. 'x'.**

Sol. $\frac{d}{dx}\left(\frac{x}{\ell n x}\right)$ {using Quotient Rule}

$$= \frac{\ell n x.\left(\frac{d}{dx}(x)\right) - x\left(\frac{d}{dx}(\ell n x)\right)}{(\ln x)^2}$$

$$= \frac{\ell n x.(1) - x\left(\frac{1}{x}\right)}{(\ell n x)^2} = \boxed{\frac{\ell n x - 1}{(\ell n x)^2}}$$

14. ~~Find $\frac{dy}{dx}$ for $e^{\sqrt{x+1}}$~~

Sol. Let $y = e^{\sqrt{x+1}}$

Differentiate both sides w.r.t. 'x':

$$\frac{d}{dx}(y) = \frac{d}{dx}\left(e^{\sqrt{x+1}}\right)$$

$$\frac{dy}{dx} = e^{\sqrt{x+1}} \cdot \left(\frac{d}{dx}\left(\sqrt{x+1}\right)\right)$$

$$\frac{dy}{dx} = e^{\sqrt{x+1}} \cdot \frac{1}{2}(x+1)^{-1/2}\left(\frac{d}{dx}(x+1)\right)$$

$$\frac{dy}{dx} = e^{\sqrt{x+1}} \cdot \frac{1}{2\sqrt{x+1}}(1+0)$$

$$\boxed{\frac{dy}{dx} = \frac{e^{\sqrt{x+1}}}{2\sqrt{x+1}}}$$

15. ~~Differentiate~~ **$\sin^{-1} x$ w.r.t. $\cos^{-1} x$.**

Sol. Let, $y = \sin^{-1} x$ and $t = \cos^{-1} x$

$$\frac{d}{dx}(y) = \frac{d}{dx}(\sin^{-1} x)$$

$$\frac{dy}{dx} = \frac{1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx}(t) = \frac{d}{dx}(\cos^{-1} x)$$

$$\frac{dt}{dx} = \frac{-1}{\sqrt{1-x^2}}$$

$$\frac{dx}{dt} = -\sqrt{1-x^2}$$

By using Chain's Rule: $\frac{dy}{dt} = \frac{dy}{dx} \times \frac{dx}{dt}$

$$\frac{dy}{dt} = \frac{1}{\sqrt{1-x^2}} \cdot \left(-\sqrt{1-x^2}\right) = \boxed{-1}$$

16. ~~Find $\frac{dy}{dx}$ if $x = a\theta^3$, $y = b\left(\theta - \frac{1}{\theta}\right)$~~

Sol. Differentiate both sides w.r.t. 'θ':

$$\frac{d}{d\theta}(x) = \frac{d}{d\theta}(a\theta^3)$$

$$\frac{dx}{d\theta} = a(3\theta^2)$$

$$\frac{dx}{d\theta} = 3a\theta^2$$

$$\frac{d\theta}{dx} = \frac{1}{3a\theta^2}$$

$$\frac{d}{d\theta}(y) = \frac{d}{d\theta}\left(b\left(\theta - \frac{1}{\theta}\right)\right)$$

$$\frac{dy}{d\theta} = b\left(1 - (-1)\theta^{-2}\right)$$

$$\frac{dy}{d\theta} = b\left(1 + \frac{1}{\theta^2}\right)$$

$$\frac{dy}{d\theta} = b\left(\frac{\theta^2 + 1}{\theta^2}\right)$$

using chain rule: $\frac{dy}{dx}=\frac{dy}{d\theta}\times\frac{d\theta}{dx}$

$$\frac{dy}{dx}=b\left(\frac{\theta^2+1}{\theta^2}\right)\left(\frac{1}{3a\theta^2}\right)\Rightarrow \boxed{\frac{dy}{dx}=\frac{b}{3a}\left(\frac{\theta^2+1}{\theta^4}\right)}$$

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17. Find the derivative w.r.t. 'x' of $x\sqrt{x+1}$

Sol. $\frac{d}{dx}\left(x\sqrt{x+1}\right)$ {using Product Rule}

$$=\left(\frac{d}{dx}(x)\right)\sqrt{x+1}+x\left(\frac{d}{dx}\left(\sqrt{x+1}\right)\right)$$

$$=1.\sqrt{x+1}+x.\frac{1}{2}(x+1)^{-1/2}\left(\frac{d}{dx}(x+1)\right)$$

$$=\sqrt{x+1}+\frac{x}{2\sqrt{x+1}}(1+0)$$

$$=\sqrt{x+1}+\frac{x}{2\sqrt{x+1}}$$

$$=\frac{2\left(\sqrt{x+1}\right)^2+x}{2\sqrt{x+1}}$$

$$=\frac{2(x+1)+x}{2\sqrt{x+1}}$$

$$=\frac{2x+2+x}{2\sqrt{x+1}}=\boxed{\frac{3x+2}{2\sqrt{x+1}}}$$

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18. ~~**Calculate the limit** $\lim_{x\to\infty}\frac{x^2+1}{2x^3-x}$~~

Sol. $\lim_{x\to\infty}\frac{x^2+1}{2x^3-x}\left(\frac{\infty}{\infty}\right)$ form

Dividing numerator & Denominator by x^3

$$=\lim_{x\to\infty}\frac{\frac{x^2}{x^3}+\frac{1}{x^3}}{2\frac{x^3}{x^3}-\frac{x}{x^3}}=\lim_{x\to\infty}\frac{\frac{1}{x}+\frac{1}{x^3}}{2-\frac{1}{x^2}}$$

$$=\frac{\frac{1}{\infty}+\frac{1}{\infty^3}}{2-\frac{1}{\infty^2}}=\frac{0+0}{2-0}=\frac{0}{2}=\boxed{0}$$

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19. Find the slope of the tangent to the curve $y=\sin 2x$ at $x=\frac{\pi}{6}$

Sol. $y=\sin 2x$

$$\frac{d}{dx}(y)=\frac{d}{dx}(\sin 2x)$$

$$\frac{dy}{dx}=\cos 2x(2)$$

$$\frac{dy}{dx}=2\cos 2x$$

At $x=\pi/6$

$$\frac{dy}{dx}=2\cos 2\left(\pi/6\right)$$

$$\frac{dy}{dx}=2\cos\left(\pi/3\right)$$

$$\frac{dy}{dx}=2\left(\frac{1}{2}\right)$$

$$\frac{dy}{dx}=\boxed{1}$$

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20. Find the turning points of the curve $y=2x^3-15x^2+36x+10$

Sol. $y=2x^3-15x^2+36x+10$

Differentiate both sides w.r.t. 'x':

$$\frac{d}{dx}(y)=\frac{d}{dx}\left(2x^3-15x^2+36x+10\right)$$

$$\frac{dy}{dx}=2\left(3x^2\right)-15(2x)+36(1)+0$$

$$\frac{dy}{dx}=6x^2-30x+36$$

For turning point, put $\frac{dy}{dx}=0$

$$6x^2-30x+36=0$$

Dividing each term on '6'

$$x^2-5x+6=0$$

$$x^2-3x-2x+6=0$$

$$x(x-3)-2(x-3)=0$$

$$(x-3)(x-2)=0$$

Either **OR**

$x-3=0$	$x-2=0$
$\boxed{x=3}$	$\boxed{x=2}$

21. **If $s = \log t$, find the velocity and acceleration at $t = 3\,\text{sec}$.**

Sol. $s = \log t$

Differentiate both sides w.r.t. 't':

$$\frac{d}{dt}(s) = \frac{d}{dt}(\log t)$$

$$v = \frac{1}{t} \rightarrow (i)$$

Differentiate both sides w.r.t. 't':

$$\frac{d}{dt}(v) = dt\left(\frac{1}{t}\right)$$

$$a = -\frac{1}{t^2} \rightarrow (ii)$$

Put $t = 3$ in eq.(i) & eq(ii)

$$\boxed{v = \frac{1}{3}\ m/s}$$

&

$$a = -\frac{1}{(3)^2}$$

$$a = \boxed{\frac{-1}{9}\ m/sec^2}$$

22. **If mode = 15, Median = 12 find mean.**

Sol. As, Mode = 15

$$3\text{Median} - 2\text{Mean} = 15$$

$$3(12) - 2\text{Mean} = 15$$

$$-2\text{Mean} = 15 - 36$$

$$-2\text{Mean} = -21$$

$$\text{Mean} = \frac{-21}{-2}$$

$$\text{Mean} = \boxed{10.5}$$

23. ~~**Find standard deviation of the values:**~~ **2, 4, 6, 8, 10.**

Sol.

x	x^2
2	4
4	16
6	36
8	64
10	100
$\sum x = 30$	$\sum x^2 = 220$

$$\text{S.D.} = \sqrt{\frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2}$$

$$\sigma = \sqrt{\left(\frac{220}{5}\right) - \left(\frac{30}{5}\right)^2}$$

$$\sigma = \sqrt{44 - 36}$$

$$\sigma = \sqrt{8} = \boxed{2.83}$$

24. **Write formula to find the mode of a grouped frequency distribution.**

Sol. $$\text{Mode} = \ell + \frac{(f_m - f)_1}{(f_m - f_1) + (f_m - f_2)} \times h$$

25. **A fair coin is tossed twice what is the probability that we get at least on head.**

Sol. $S = \{HH,\ HT,\ TH,\ TT\}$, $n(S) = 4$

Let A be event that at least one head appears.

$$A = \{HH,\ HT,\ TH\} \Rightarrow n(A) = 4$$

$$\therefore P(A) = \frac{n(A)}{n(S)} = \boxed{\frac{3}{4}}$$

26. **If a die is rolled once, what is the probability of getting a 4?**

Sol. $S = \{1, 2, 3, 4, 5, 6\}$, $n(S) = 6$

Let A be event that getting number is 4. $A = \{4\}$

$$n(A) = 1 \therefore P(A) = \frac{n(A)}{n(S)} = \boxed{\frac{1}{6}}$$

27. **Write down the formula to find the probability of two not mutually exclusive events.**

Sol. $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

Section - II

Note : Attemp any three (3) questions $3 \times 8 = 24$

Q.2.(a) Prove that: $f[f(x)] = x$, for the function $f(x) = \frac{x+1}{x-1}$

Sol. See Q.10 of Ex# 1.1 (Page # 9)

(b) ~~Evaluate $\lim_{x \to 0} \frac{\operatorname{cosec} x - \cot x}{x}$~~

Sol. See Q.1(xii) of Ex# 1.3 (Page # 28)

Q.3.(a) Differentiate

$$\frac{x}{(a^2 + x^2)^{3/2}} \text{ w.r.t. 'x'.}$$

Sol. See Q.4(xiii) of Ex# 2.2 (Page # 60)

(b) ~~Find $\frac{dy}{dx}$ if $x = \frac{1-t^2}{1+t^2}, y = \frac{2t}{1+t^2}$~~

Sol. See Q.3(vii) of Ex# 2.3 (Page # 78)

Q.4.(a) Find the derivative w.r.t x

$$\sqrt{\frac{1-\cos x}{1+\cos x}}$$

Sol. See Q.3(viii) of Ex# 3.1 (Page # 117)

(b) ~~Differentiate $\tan^{-1}\left(\frac{x-1}{x+1}\right)$~~

~~w.r.t.~~ 'x'.

Sol. See Q.2(ii) of Ex# 3.2 (Page # 129)

Q.5.(a) If $y = \cos x + \ln \tan \frac{x}{2}$, Find $\frac{dy}{dx}$

Sol. See Q.1(xi) of Ex# 3.3 (Page # 143)

(b) Discuss for the relative maxima and minima $y = x + \frac{1}{x}$

Sol. See Q.3(iv) of Ex# 4.2 (Page # 202)

Q.6.(a) ~~Calculate the standard deviation from the following data:~~

Size Item	Frequency
2	9
3	6
4	2
5	2
6	2
7	4
8	3
9	3
10	2
11	3

Sol. See Q.6 of Ex# 5.2 (Page # 243)

(b) Two fair dice are rolled. Find the probability that the sum is 6 or 8.

Sol. See Q.1 of Ex# 6.2 (Page # 265)

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