

**Uka Tarsadia University (Diwaliba Polytechnic)**

**Diploma in Chemical Engineering**

**Assignment (Mathematics - II)**

**Section -1**

<b>Unit 1- Functions and Limits</b>	
<b>1 marks questions</b>	
<b>1</b>	(1) If a function $f$ is defined as $f: Z \rightarrow Z, f(x) = x^2 - 3$ , then find the range of the function. (2) If a function $f$ is defined as $f: Z \rightarrow Z, f(x) = x^2 + 3$ then find the range of the function. (3) If a function $f$ is defined as $f: Z \rightarrow Z, f(x) = 2x^2$ , then find the range of the function. (4) If a function $f$ is defined as $f: Z \rightarrow Z, f(x) = 2x^2 + 1$ then Find the range of the function. (5) If a function $f$ is defined as $f: Z \rightarrow Z, f(x) = 3x^2 - 5$ then find the range of the function. (6) If a function $f$ is defined as $f: Z \rightarrow Z, f(x) = x^2 + 4$ , then find the range of the function (7) If a function $f$ is defined as $f: Z \rightarrow Z, f(x) = x^2 - 2$ , then find the range of the function. (8) If a function $f$ is defined as $f: Z \rightarrow Z, f(x) = x^2 + 2$ , then find the range of the function. (9) If a function $f$ is defined as $f: Z \rightarrow Z, f(x) = 3x^2$ , then find the range of the function. (10) If a function $f$ is defined as $f: Z \rightarrow Z, f(x) = 2x^2 - 1$ , then find the range of the function. (11) If a function $f$ is defined as $f: R \rightarrow R, f(x) = 2x + 6$ , then find the range of the function. (12) If a function $f$ is defined as $f: Z \rightarrow Z, f(x) = 3x^2 + 5$ , then find the range of the function.
<b>2</b>	Evaluate: (1) $\lim_{x \rightarrow 1} \frac{x^2+x-2}{x-1}$ (2) $\lim_{x \rightarrow 1} \frac{2x^2+2x-4}{x-1}$ (3) $\lim_{x \rightarrow 1} \frac{x^2-4x+3}{x^2+2x-3}$ (4) $\lim_{x \rightarrow 1} \frac{3x^2-12x+9}{x^2+2x-3}$ (5) $\lim_{x \rightarrow 1} \frac{x^2-6x+5}{2x^2-5x+3}$ (6) $\lim_{x \rightarrow 1} \frac{5x^2-30x+25}{2x^2-5x+3}$ (7) $\lim_{x \rightarrow 2} \frac{x^3-8}{x-2}$ (8) $\lim_{x \rightarrow -3} \frac{x^3+27}{x^2+5x+6}$ (9) $\lim_{x \rightarrow -3} \frac{4x^3+108}{x^2+5x+6}$ (10) $\lim_{x \rightarrow 2} \frac{x^3-x^2-5x+6}{x^2+5x+6}$ (11) $\lim_{x \rightarrow 1} \frac{x^2+x+2}{x+1}$ (12) $\lim_{x \rightarrow 1} \frac{2x^2+2x+4}{x+1}$ (13) $\lim_{x \rightarrow 1} \frac{(x-1)(x+2)}{x-1}$ (14) $\lim_{x \rightarrow 1} \frac{x^2-4x+3}{x^2+2x-3}$
<b>3</b>	(i) If a function $f$ is defined by $f: R \rightarrow R, f(x) = 3x + 6$ , find $f^{-1}$ . (ii) If a function $f$ is defined by $f: R \rightarrow R, f(x) = 2x + 10$ , find $f^{-1}$ . (iii) If a function $f$ is defined as $f: Z \rightarrow Z, f(x) = 4x^4 + 8$ , find the range of the function. find $f^{-1}$ . (iv) If a function $f$ is defined by $f: R \rightarrow R, f(x) = 4x + 2$ , find $f^{-1}$ .
<b>4</b>	(i) If $f(x) = 2x - 3$ and $g(x) = x^2 - x + 7$ , then find the values of $f \circ g$ (1). (ii) If $f(x) = 2x + 1$ and $g(x) = x^2 - 2$ , then find the values of $f \circ g$ and $g \circ f$ .
<b>5</b>	If $f(x) = 2x$ and $g(x) = x^2 - 3x + 1$ , then find the values of $f \circ g$ (4).
<b>4 marks questions</b>	
<b>6</b>	(i) If $f(x) = e^x$ , prove that $f(x) = e^x$ (i) $f(x + y) = f(x) \cdot f(y)$ (ii) $f(x - y) = \frac{f(x)}{f(y)}$ . (ii) If $f(x) = \log x$ , prove that (a) $f(x) + f(y) = f(xy)$ (b) $f(x) - f(y) = f\left(\frac{x}{y}\right)$ (iii) If $f(x) = e^{2x}$ , prove that $f(x) = e^x$ (i) $f(x + y) = f(x) \cdot f(y)$ (ii) $f(x - y) =$

	$\frac{f(x)}{f(y)}$ .
7	<p>Evaluate: (i) <math>\lim_{n \rightarrow \infty} [\sqrt{n^2 + n + 1} - n]</math>      (ii) <math>\lim_{n \rightarrow \infty} [\sqrt{n^2 + n + 1} - \sqrt{n^2 + 1}]</math></p> <p>(iii) <math>\lim_{x \rightarrow \infty} \sqrt{x} [\sqrt{x+p} - \sqrt{x}]</math>.      (iv) <math>\lim_{x \rightarrow 2} \frac{x^3 - 6x^2 + 11x - 6}{x^3 - 8}</math>.</p> <p>(v) <math>\lim_{x \rightarrow -2} \frac{x^3 + 6x^2 + 11x + 6}{5x^2 + 10x}</math>.      (vi) <math>\lim_{x \rightarrow \infty} [\sqrt{x^2 + 2x} - \sqrt{x^2 - 3}]</math></p> <p>(vii) <math>\lim_{x \rightarrow -2} \frac{2x^3 + 12x^2 + 22x + 12}{15x^2 + 30x}</math>.      (viii) <math>\lim_{x \rightarrow 2} \frac{x^4 - 8x^2 + 16}{x^3 - 3x^2 + 4}</math>.</p> <p>(ix) <math>\lim_{x \rightarrow 2} \frac{3x^4 - 24x^2 + 48}{x^3 - 3x^2 + 4}</math>.      (x) <math>\lim_{x \rightarrow 1} \frac{2x^2 - 16x + 14}{7x^2 - 6x - 1}</math>.</p>
8	If $f(x) = \frac{b+ax}{bx+a}$ , then prove that $f(x) \cdot f\left(\frac{1}{x}\right) = 1$
9	<p>(A) If <math>f(x) = \frac{1-x}{1+x}</math>, prove that (i) <math>f(x) + f\left(\frac{1}{x}\right) = 0</math>. (ii) <math>f(x) - f\left(\frac{1}{x}\right) = 2f(x)</math>. (iii) <math>f(x) \cdot f(-x) = 1</math>.</p> <p>(B) If <math>f(y) = \frac{1+y}{1-y}</math>, prove that (i) <math>f(y) - f\left(\frac{1}{y}\right) = 2f(y)</math>. (ii) <math>f(y) \cdot f(-y) = 1</math>.</p>
<b>Unit 2 Differentiation</b>	
<b>1 marks questions</b>	
1	<p>Differentiate the following with respect to 'x':</p> <p>(I) <math>y = e^x</math>    (II) <math>y = x^2 + e^x</math>    (III) <math>y = \sin x + \cos x</math>    (IV) <math>y = (\log x) - 3</math></p> <p>(V) <math>y = \cos x - 6</math>    (VI) <math>y = \log x</math></p> <p>(VII) <math>y = x^3 - 1</math>    VIII <math>(y = x^2</math></p> <p>(IX) <math>(y = x^3</math>    (X) <math>y = 2x^4</math></p>
2	<p>Find <math>\frac{dy}{dx}</math></p> <p>(i) <math>y = 2 \log x</math></p> <p>(ii) <math>y = \log x</math></p> <p>(iii) <math>y = x - 4</math></p> <p>(iv) <math>y = \tan x</math></p> <p>(v) <math>y = e^x</math></p> <p>(vi) <math>y = x^2 - 3</math></p> <p>(vii) <math>y = x^4 + 1</math></p> <p>(viii) <math>y = \sin x</math>    (ix) <math>y = \cos x</math></p> <p>(x) <math>y = e^x \sin x</math>    (xi) <math>y = e^x \cos x</math>    (xii) <math>\frac{\ln x}{x}</math>    (xiii) <math>\frac{\ln x}{\cos x}</math></p>

3	(i) Find $\frac{d^2y}{dx^2}$ if $y = x^3$ (ii) If $y = x + 1$ then find $\frac{d^2y}{dx^2}$ (iii) Find $\frac{d^2y}{dx^2}$ if $y = x^2$
<b>5 marks questions</b>	
4	Find $\frac{dy}{dx}$ if $x = at^2$ and $y = 2at$
5	If $y = 2e^{3x} + 3e^{-2x}$ , then prove that $\frac{d^2y}{dx^2} - \frac{dy}{dx} - 6y = 0$ .
6	Using the definition of derivation find the derivative of (i) $x^3$ (ii) $x^2$
7	(i) If $y = \log \sin x^2$ then obtain $\frac{dy}{dx}$ . (ii) Find $\frac{dy}{dx}$ where $y = \log \sin x + \log \cos x$ . (iii) If $y = \log \cos x - \log \sin x + 1$ then find $\frac{dy}{dx}$ . (iv) Obtain $\frac{dy}{dx}$ for $y = x^3 \sin(\log x)$ .
8	Differentiate the given terms with respect to x: (i) $y = e^x \cdot 3^x \cdot x^3$ (ii) $\frac{5}{x^3-3}$ (iii) $y = \log(\log x)$ (iv) $y = \left(x + \frac{2}{x+3}\right) \left(\frac{2x-1}{x^2+3x+2}\right)$ (v) $y = \cos(\sin x)$ (vi) $y = \sin x - \cos x - \log x$ (vii) $y = (3x - 4)^5$ (viii) $y = \left(1 + \frac{1}{x}\right) \left(\frac{3x^2}{x^2+6x+5}\right)$
9	(i) If the equation of motion of a particle is $s = t^3 - 6t^2 + 9t + 6$ , find its velocity (ii) If the equation of motion of a particle is $s = 2t^3 + 6t^2 - 4t + 10$ , find its velocity (iii) If the equation of motion of a particle is $s = t^3 + 2t^2 - 3t - 2$ , find its velocity (iv) If the equation of motion of a particle is $s = 2t^3 + 4t^2 - 8t - 3$ , find its velocity
10	The equation of motion of a particle is $s = t^3 - 5t^2 + 3t + 1$ , Find the time when the particle change its direction.
<b>Unit 3 Integration</b>	
<b>1 marks questions</b>	
1	Find) (1) $\int x^2 dx$ (2) $\int 3x^3 dx$ (3) $\int 2x^2 dx$ (4) $\int (x^3 dx)$ (4) $\int x^2 dx$ (5) $\int (1 + 2x) dx$
2	(1) $\int 1 dx = ?$ (2) $\int e^x dx = ?$ (3) $\int (1 - 2x) dx = ?$ (4) $\int \frac{1}{x} dx = ?$ (5) $\int (\sin x - 1) dx = ?$ (6) $\int (e^x + 1) dx = ?$ (7) $\int \cos x dx = ?$ (8) $\int \sin x dx = ?$ (9) $\int x^4 dx$ (10) $\int x^3 dx$

	(11) $\int x dx$ (12) $\int 2 dx = ?$ (13) $\int 3e^x dx = ?$ (14) $\int \frac{2}{x} dx = ?$ (15) $\int \sin x dx = ?$
3	Integrate the given function with respect to x, (1) $(\sin x + \cos x)$ (2) $3x^2 + 4x$ (3) $(\sin x - \cos x)$ (4) $(\cos x - 1)$ (5) $\int (e^x + 2) dx$ (6) $\int (x^2 + 2x) dx$
4	Evaluate) 1) $(\int_2^5 (x^3) dx$ (2) $:\int_1^3 (x^2) dx$ (3) $\int_2^3 (2x^4) dx$ (4) $\int_2^5 (x^2) dx$ (5) $\int_2^5 (x^4) dx$
	<b>5 marks questions</b>
5	Find the value of (1) $\int xe^x dx$ (2) $\int 3xe^x dx$ (3) $(\int_0^1 (4x^3 + 3x^2 + 2x + 1) dx$ (4) $\int (4x^3 - \frac{1}{x} + \sin x - e^x) dx$ (5) $\int (5x^2 - \frac{1}{x} + \sin x + 2e^x) dx$ (6) $\int_0^1 (4x^3 + 3x^2 + 2x + 1) dx$ (7) $\int (\frac{2+3 \sin x}{\cos^2 x}) dx$ (8) $\int_0^2 (3x^2 + 2x - 1) dx$ (9) $\int_0^1 (x^3 + x^2 + x + 1) dx$ (10) $\int (x^3 - \frac{1}{x} + \cos x - e^x) dx$ (11) $\int (3x^2 - \frac{1}{x} + 2\sin x + e^x) dx$ (12) $\int (5x^3 + 4x^2 + 3x + 1) dx$ (13) $\int x \cos x dx$ (14) $\int (3x^2 + \frac{1}{x} - \sin x - e^x) dx$ (15) $\int (\frac{4+6 \sin x}{\cos^2 x}) dx$
6	Integrate the following with respect to x: (1) $3x^2 + 5x - 7$ (2) $3x^2 + 5x - 7$ (3) $(\sqrt{x} + \frac{1}{\sqrt{x}})^2$ (4) $\frac{x^2+5x+6}{x^2+2x}$ (5) $(\sqrt{x} - \frac{1}{\sqrt{x}})^2$ (6) $\frac{x^2+4x+4}{x^2+2x}$ (6) $\frac{x^2+7x+6}{x^2+x}$ (7) $(2\sqrt{x} + \frac{1}{2\sqrt{x}})^2$ (8) $\frac{x^2+8x+7}{x^2+7x}$
7	Evaluate 1) $\int (\sqrt{x} + \frac{1}{\sqrt{x}})^2 dx$ (2) $\int \sqrt{1 + \sin 2x} dx$ (3) $\int (x - 3)^2 dx$ (4) $\int \sqrt{1 - \sin 2x} dx$ (5) $\int (2x - 3)^2 dx$
8	Evaluate (1) $\int (3x - 7)^9 dx$ (2) $\int (2x - 7)^9 dx$ (3) $\int (\frac{1-\cos 2x}{1+\cos 2x}) dx$ (4) $\int (\frac{1+\cos 2x}{1-\cos 2x}) dx$
9	Evaluate (i) $\int (\sqrt{x} + \frac{1}{\sqrt{x}})^2 dx$ (ii) $\int \cos(5x + 4) dx$
10	Evaluate (i) $\int \frac{1}{1+\sin x} dx$ (ii) $\int \sqrt{1 - \sin 2x} dx$

**Section -2**

**Unit-4 Differential Equations(First Order First Degree)**

Question	Do as directed.
1	Find order and degree of the differential equation

	<p>i) <math>\left(\frac{d^2y}{dx^2}\right)^3 + 3\left(\frac{dy}{dx}\right)^2 - 5y = 0</math></p> <p>ii) Solve: <math>\frac{dy}{dx} = x</math></p> <p>iii) solve <math>y\frac{dy}{dx} = x^2</math></p> <p>iv) Find Integrating Factor of <math>\frac{dy}{dx} + 5y = x^3</math></p> <p>v) <math>y^2\frac{dy}{dx} = x^2</math></p> <p>vi) <math>\frac{dy}{dx} = y</math></p> <p>vii) <math>\frac{dy}{dx} + \sin y = 0</math></p> <p>viii) <math>x^5\left(\frac{d^2y}{dx^2}\right)^4 + \left(\frac{dy}{dx}\right)^2 + \frac{x}{y}\left(\frac{dy}{dx}\right)^3 = 0</math></p> <p>ix) <math>\left(\frac{dy}{dx}\right)^2 + \frac{x}{y}\left(\frac{dy}{dx}\right) = 0</math></p> <p>x) <math>\left(\frac{d^2y}{dx^2}\right)^3 + \sin\left(\frac{dy}{dx}\right)^2 = 0</math></p> <p>xi) <math>\left(\frac{d^3y}{dx^3}\right)^3 + \sin\left(\frac{dy}{dx}\right) + 3y = 0</math></p>
2	<p>i) Define the form of 1<sup>st</sup> order linear differential equation</p> <p>ii) Define General solution of the differential equation.</p> <p>iii) Define order of the differential equation.</p>
3	<p>The degree of the homogenous differential equation is</p> <p>i) <math>\frac{dy}{dx} = \frac{x^3+y^3}{x+y}</math></p> <p>ii) <math>\frac{dy}{dx} = \frac{x^4+y^4}{x+y}</math></p>
4	<p>Solve the differential equation</p> <p>1) <math>\frac{dy}{dx} + \frac{y}{x} = x^2</math>.</p> <p>2) <math>x\left(\frac{dy}{dx}\right) = x + y</math>.</p> <p>3) <math>\frac{dy}{dx} = x^2 + 2x + 3</math></p> <p>4) <math>y\frac{dy}{dx} = x^3 - 3x^2 + 7</math></p> <p>5) Solve the differential equation(ડીફરન્શીયલ ઇક્વેશન ઉકેલો): <math>\frac{dy}{dx} + 3y = e^{2x}</math></p> <p>6) <math>x(1 + y^2)dx - y(1 + x^2)dy = 0</math></p> <p>7) <math>\frac{dy}{dx} + x^2e^{-y} = 0</math>.</p> <p>8) Solve the differential equation : <math>\frac{dy}{y} = (\tan x)dx</math></p>
5	<p>(1) Verify that <math>y = cx + \frac{1}{c}</math> is a solution of the differential equation <math>y\left(\frac{dy}{dx}\right) = x\left(\frac{dy}{dx}\right)^2 + 1</math>. Where C is arbitrary constant.</p> <p>(2) Verify that <math>y = e^x \sin x</math> is the solution of differential equation <math>\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = 0</math>.</p> <p>(3) Verify that <math>y = e^{ax} \sin bx</math> is a solution of differential equations</p>

	$\frac{d^2y}{dx^2} - 2a \frac{dy}{dx} + (a^2 + b^2)y = 0$ <p>(4) Verify that <math>y = e^{2x} \sin x</math> is a solution of differential equations <math>\frac{d^2y}{dx^2} - 4 \frac{dy}{dx} + 5y = 0</math>.</p>
6	<p>Derive a differential equation for the family of line <math>y = mx + c</math> (Where m and c are constant).</p> <p>Find the order and degree of the differential equation:  <math>\left(\frac{d^2y}{dx^2}\right)^2 + \left(\frac{dy}{dx}\right)^3 + \sin y = 0</math>, Also Find Integrating Factor of  <math>\frac{dy}{dx} - 2xy = \frac{1}{x}</math></p> <p>Derive a differential equation for the family of line <math>y = 2x + 3</math></p>

### Unit- 5 Complex number

Question	Do as directed .
1	<p>Find the principle argument of :</p> <ul style="list-style-type: none"> <li>i) <math>1 + i</math>.</li> <li>ii) <math>1 + \sqrt{3}i</math>.</li> <li>iii) <math>2 + 2i</math></li> <li>iv) <math>2 + 2\sqrt{3}i</math>.</li> <li>v) <math>3 + 3i</math>.</li> <li>vi) <math>3 + 3\sqrt{3}i</math>.</li> <li>vii) <math>\sqrt{3} + i</math> .</li> <li>viii) <math>2\sqrt{3} + 2i</math></li> <li>ix) <math>3\sqrt{3} + 3i</math></li> <li>x) <math>4\sqrt{3} + 4i</math></li> <li>xi) <math>5 + 5i</math></li> <li>xii) <math>1 - \sqrt{3}i</math>.</li> <li>xiii) <math>3 + 3i</math></li> <li>xiv) <math>11 + 11i</math></li> <li>xv) <math>2\sqrt{3} + 2i</math>.</li> </ul>
2	<p>Find the modulus of the complex number.</p> <ul style="list-style-type: none"> <li>i) <math>-3\sqrt{2} + 3\sqrt{2}i</math></li> <li>ii) <math>\sqrt{2} + \sqrt{7}i</math> .</li> <li>iii) <math>\sqrt{3} - \sqrt{6}i</math> .</li> <li>iv) <math>1 + 2\sqrt{6}i</math></li> <li>v) <math>\sqrt{6} + \sqrt{2}i</math> .</li> <li>vi) <math>\sqrt{5} - 3\sqrt{2}i</math></li> <li>vii) <math>\sqrt{2} + \sqrt{6}i</math> .</li> <li>viii) <math>2\sqrt{6} - 3\sqrt{2}i</math></li> <li>ix) <math>\sqrt{6} - \sqrt{2}i</math> .</li> </ul>

	<p>x) <math>-4\sqrt{2} + 3\sqrt{2}i</math>  xi) <math>\sqrt{5} - \sqrt{6}i</math>  xii) <math>\sqrt{6} + \sqrt{7}i</math>  xiii) <math>5 + 2\sqrt{6}i</math>  xiv) <math>\sqrt{7} + \sqrt{8}i</math>  xv) <math>\sqrt{5} + 4\sqrt{2}i</math></p>
3	<p>Express the following complex number in polar form:</p> <p>i) <math>1 + i</math>  ii) <math>1 - i</math>  iii) <math>1 + \sqrt{3}i</math>  iv) <math>3 + 3\sqrt{3}i</math>  v) <math>2 + 2\sqrt{3}i</math>  vi) <math>2 + 2\sqrt{3}i</math>  vii) <math>2 - 2i</math>  viii) <math>7 + 7\sqrt{3}i</math>  ix) <math>\sqrt{3} - i</math></p>
4	<p>Find the inverse complex number of complex number</p> <p>i) <math>\frac{2+3i}{4-3i}</math>  ii) <math>3 - 4i</math>  iii) <math>3 + 4i</math>  iv) <math>1 + 3i</math>  v) <math>5 + 3i</math>  vi) <math>2 + 7i</math>  vii) <math>3 + 2i</math>  viii) <math>5 + 2i</math>  ix) <math>5 - 4i</math>  x) <math>\frac{1-3i}{4-3i}</math>  xi) <math>3 - 5i</math>  xii) <math>8 + 3i</math>  xiii) <math>2 - 7i</math></p>
5	<p>Simplify</p> <p>(1) <math>\frac{(\cos 3\theta + i \sin 3\theta)^{-3} (\cos 12\theta + i \sin 12\theta)^4}{(\cos 3\theta + i \sin 3\theta)^{16} (\cos \theta - i \sin \theta)^9}</math>      (5) <math>\frac{(\cos 5\theta + i \sin 5\theta)^{-4} (\cos 3\theta + i \sin 3\theta)^4}{(\cos 4\theta + i \sin 4\theta)^3 (\cos 4\theta - i \sin 4\theta)^5}</math></p> <p>(2) <math>\frac{(\cos 3\theta + i \sin 3\theta)^{-12} (\cos 12\theta + i \sin 12\theta)^4}{(\cos 3\theta + i \sin 3\theta)^{16} (\cos 6\theta - i \sin 6\theta)^6}</math>      (6) <math>\frac{(\cos 2\theta + i \sin 2\theta)^3 (\cos 2\theta - i \sin 2\theta)^4}{(\cos 3\theta + i \sin 3\theta)^2 (\cos 4\theta + i \sin 4\theta)^{-2}}</math></p> <p>(3) <math>\frac{(\cos 3\theta + i \sin 3\theta)^{-3} (\cos 12\theta + i \sin 12\theta)^4}{(\cos 3\theta + i \sin 3\theta)^{16} (\cos \theta - i \sin \theta)^9}</math>      (7) <math>\frac{(\cos 3\theta + i \sin 3\theta)^4 (\cos 4\theta - i \sin 4\theta)^5}{(\cos 4\theta + i \sin 4\theta)^3 (\cos 5\theta + i \sin 5\theta)^{-4}}</math></p> <p>(4) <math>\frac{(\cos 3\theta + i \sin 3\theta)^{-3} (\cos 3\theta + i \sin 3\theta)^4}{(\cos 4\theta + i \sin 4\theta)^3 (\cos \theta - i \sin \theta)^9}</math>      (8) <math>\frac{(\cos 3\theta + i \sin 3\theta)^{-3} (\cos 11\theta + i \sin 11\theta)^4}{(\cos 4\theta + i \sin 4\theta)^{11} (\cos \theta - i \sin \theta)^9}</math></p>

	$(9) \frac{(\cos 3\theta + i \sin 3\theta)^{-4} (\cos 12\theta + i \sin 12\theta)^4}{(\cos 3\theta + i \sin 3\theta)^{16} (\cos 4\theta - i \sin 4\theta)^3}$ $(10) \frac{(\cos 5\theta + i \sin 5\theta)^{-3} (\cos 12\theta + i \sin 12\theta)^4}{(\cos 3\theta + i \sin 3\theta)^{16} (\cos \theta - i \sin \theta)^{15}}$ $(11) \frac{(\cos 3\theta + i \sin 3\theta)^{-3} (\cos 7\theta + i \sin 7\theta)^4}{(\cos 4\theta + i \sin 4\theta)^7 (\cos \theta - i \sin \theta)^9}$ $(11) \frac{(\cos 5\theta + i \sin 5\theta)^{-4} (\cos 2\theta + i \sin 2\theta)^4}{(\cos 4\theta + i \sin 4\theta)^2 (\cos 4\theta - i \sin 4\theta)^5}$ $(12) \frac{(\cos 5\theta + i \sin 5\theta)^3 (\cos 2\theta - i \sin 2\theta)^4}{(\cos 3\theta + i \sin 3\theta)^5 (\cos 4\theta + i \sin 4\theta)^{-2}}$
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6	<p>Find the conjugate complex number and moduli of the complex number <math>\frac{1+i}{1-4i}</math>.</p> <p>Find the conjugate complex number and moduli of the complex number : <math>\frac{4+i}{2-3i}</math>.</p> <p>Find the conjugate complex number and moduli of the complex number <math>\frac{4-i}{2+3i}</math>.</p> <p>Find the conjugate complex number and moduli of the complex number <math>\frac{5+i}{2+3i}</math>.</p> <p>Find the conjugate complex number and moduli of the complex number <math>\frac{2-i}{1+3i}</math>.</p> <p>Find the conjugate complex number and moduli of the complex number <math>\frac{2+i}{3+4i}</math>.</p> <p>Find the conjugate complex number and moduli of the complex number <math>\frac{1-i}{1-4i}</math>.</p> <p>Find the conjugate complex number and moduli of the complex number <math>\frac{2-8i}{1+i}</math>.</p>
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### Unit-6 STATISTICS

Question	Do as directed.
1	<p>Find the median for the observation</p> <p>i) 3,5,2,6,5</p> <p>ii) 4,1,-2,0,1,2</p> <p>iii) -3,7,9,5,7,8,2</p> <p>iv) 18,12,27,35,26,21,16,24</p> <p>v) 8,3,5,12,9,14,17,1,7</p>
2	<p>(I) Find the mode for the observation 3,2,6,5,7,3,8,10,3,14</p> <p>(I) Find the mode for the observation 3,5,2,6,5</p> <p>(I) Find the mode for the observation 4,1,-2,0,1,2</p>
3	<p>(I) What is mean of the first five even natural number?</p> <p>(II) What is mean of the first five odd natural number?</p> <p>(III) What is mean of the first five prime number?</p> <p>(IV) What is mean of the first six multiple of five?</p> <p>(I) What is mean of the first 6 prime number?</p> <p>(II) What is mean of the first four prime number?</p> <p>(I) What is mean of the first seven even natural number?</p>
4	<p>Find the mean for the observation</p> <p>(I) 4,1,-2,0,1,2</p> <p>(II) -2,-1,-1,1,2,4</p> <p>(III) 3,5,2,6,5</p>

(IV) -3,7,9,5,7,8,2

5 The dividends declared by 60 different companies in the year 2011–2012 are shown in the following table. Find the mean of the data.

Dividend (in %)	10	12	15	18	20	22	25
No. of companies	7	10	12	6	12	8	5

6 Find the median of the following data

X	2	5	6	8	10	12
F	2	8	10	7	8	3

7 The following table shows the number of children per family. Using the data, find the mean.

Number of children	0	1	2	3	4	5
Number of families	6	40	30	16	6	2

8 Find the median of the frequency distribution given in the following table.

Marks	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Number of students	3	7	12	15	8	3	2

9 Find the median of the following frequency distribution.

$x_j$	0	1	2	3	4
$f_j$	4	1	6	11	3

10 The following table shows the marks (out of 50) obtained by 100 students in an aptitude test. Calculate the mean of the given frequency distribution.

Marks	21-25	26-30	31-35	36-40	41-45	46-50
Number of students	8	10	24	30	12	16

11 The following table shows the number of children per family. Using the data, find the mean.

Number of children	0	1	2	3	4	5
Number	3	20	15	8	3	1

	of families							
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