

PARUL UNIVERSITY
MATHEMATICS I
IMPORTANT QUESTION BANK

LOGARITHM

Evaluate:

- 1) $\log_3 243$ 2) $\log_{5\sqrt{2}} 2500$ 3) $1024^{(\log_2 m)}$ 4) $729^{(\log_3 m)}$
5) $\log_\alpha \left(\frac{1}{\alpha}\right)$ 6) $\log 81 \div \log 27$

Prove That

- 1) $\log\left(\frac{9}{14}\right) - \log\left(\frac{15}{16}\right) + \log\left(\frac{35}{24}\right) = 0$
2) $\frac{1}{\log_{24} 12} + \frac{1}{\log_8 12} + \frac{1}{\log_9 12} = 3$
3) $\frac{1}{\log_2 64} + \frac{1}{\log_{\sqrt{2}} 64} + \frac{1}{\log_{2\sqrt{2}} 64} = \frac{1}{2}$
4) $\log\left(\sqrt{x^2 + 1} + x\right) + \log\left(\sqrt{x^2 + 1} - x\right) = 0$
5) $\log\left(\frac{32}{25}\right) + \log\left(\frac{64}{225}\right) + \log\left(\frac{25}{128}\right) + \log\left(\frac{450}{32}\right) = 0$

Solve following:

- 1) $\log_x 243 = 5$ 2) $\log_{32} x = \frac{2}{5}$
3) $\frac{\log x \times \log 16}{\log 32} = \log 256$ 4) $\log_x 4 + \log_x 8 + \log_x 16 = 9$
5) $\log_2(\log_3(2x + 1)) = 1$ 6) $\frac{1}{\log_8 x} + \frac{1}{\log_9 x} + \frac{1}{\log_{16} x} = 3$

PARTIAL FRACTION

Express Following as Sum of Partial Fraction:

$$1) \frac{7x - 25}{(x-3)(x-4)}$$

$$2) \frac{3x + 1}{(x+1)(x+2)}$$

$$3) \frac{x}{(x+2)(x-1)}$$

$$4) \frac{(x+4)}{(x-2)^2(x+1)}$$

$$5) \frac{x^2 - 3x + 1}{(x-1)^2(x-2)}$$

$$6) \frac{x}{(x-1)^2(x+1)}$$

COMPLEX NUMBER

- 1) If $z_1 = 3 - 2i$ and $z_2 = 2 + 5i$ then find the value of $|z_1 + z_2|$.
- 2) If $z_1 = -3 + 5i$ and $z_2 = 5 - i$ then find the value of $|z_1 - z_2|$.
- 3) If $z = 4 - 3i$ is given then find out $z + \bar{z}$, $z - \bar{z}$ and $z \cdot \bar{z}$.
- 4) If $z_1 = 5 - 2i$ and $z_2 = 2 + i$ then find the value of $|z_1 \cdot z_2|$
- 5) Find modulus of $\frac{5+12i}{4+3i}$
- 6) Find the value of $i^{19}, i^{108}, i^{97}, i^{76}$.
- 7) If $z = \frac{3}{5} - \frac{4}{5}i$ then find $Re(z)$ and $Im(z)$.
- 8) Solve: $\frac{\cos 2\theta + i \sin 2\theta}{\cos \theta - i \sin \theta}$.
- 9) Find the conjugate of $\frac{2+3i}{3+2i}$.
- 10) Find the inverse of $z = 2 + 3i$.
- 11) Solve: $z = \frac{1}{4+i}$

TRIGNOMETRY

1) Convert the given degree to radian

1) 540° 2) 120° 3) 135° 4) 630°

2) Convert the given radian to degree

1) $\frac{5\pi}{2}$ 2) $\frac{3\pi}{2}$ 3) $\frac{11\pi}{3}$ 4) $\frac{13\pi}{2}$

3) Solve: 1) $\sin\left(\frac{\pi}{2} + \theta\right)$ 2) $\cos(2\pi + \theta)$ 3) $\tan\left(\frac{3\pi}{2} + \theta\right)$

4) If $\sin \theta = \frac{1}{2}$ then find all other T-Ratios.

5) Find the value of: 1) $\sin(120^\circ)$ 2) $\sin(180^\circ)$ 3) $2 \sin 15^\circ \cos 15^\circ$

6) Prove that $\tan 57^\circ = \frac{\cos 12^\circ - \sin 12^\circ}{\cos 12^\circ + \sin 12^\circ}$

7) Simplify: $\frac{\sin(B - C)}{\sin B \cdot \sin C} + \frac{\sin(C - A)}{\sin C \cdot \sin A} + \frac{\sin(A - B)}{\sin A \cdot \sin B}$

8) Evaluate: $\frac{\sin(\pi - \theta)}{\sin(2\pi - \theta)} + \frac{\tan\left(\frac{\pi}{2} - \theta\right)}{\cos(\pi - \theta)} + \frac{\cos(2\pi - \theta)}{\sin\left(\frac{\pi}{2} - \theta\right)}$

9) Draw Graph

1) $y = \sin x$ $-\pi \leq \theta \leq \pi$ 1) $y = \sin x$ $0 \leq \theta \leq 2\pi$

3) $y = \cos x$ $-\pi \leq \theta \leq \pi$ 4) $y = \cos x$ $0 \leq \theta \leq 2\pi$

CALCULUS

1) If $f(x) = \frac{1-x}{1+x}$ then prove that

i) $f(x) - f\left(\frac{1}{x}\right) = 2f(x)$ ii) $f(x) + f\left(\frac{1}{x}\right) = 0$ iii) $f(x) \times f(-x) = 1$

2) If $f(x) = \log\left(\frac{x-1}{x}\right)$ then prove that $f(x) + f(-x) = f(x^2)$

3) If $f(x) = \log x$ then prove that

(i) $f(xy) = f(x) + f(y)$ (ii) $f\left(\frac{x}{y}\right) = f(x) - f(y)$

4) If $f(x) = a^x$ then prove that

(i) $f(x+y) = f(x).f(y)$ (ii) $f(x-y) = \frac{f(x)}{f(y)}$

If $f(x) = \tan x$ then prove that $f(x+y) = \frac{f(x)+f(y)}{1-f(x)f(y)}$.

5) If $f(x) = 3^x$ and $g(x) = \log_3 x$ then find (i) $f(g(3))$ (ii) $g(f(3))$

6) Evaluate:

1) $\lim_{x \rightarrow 1} \frac{x^2 - 8x + 7}{7x^2 - 6x - 1}$ 2) $\lim_{x \rightarrow -3} \frac{x^3 + 27}{x^2 + 5x + 6}$ 3) $\lim_{\theta \rightarrow 0} \frac{\sin(m\theta)}{\tan(n\theta)}$

4) $\lim_{x \rightarrow 0} \frac{e^x - 1}{x}$ 5) $\lim_{x \rightarrow 0} \frac{a^x - b^x}{x}$ 6) $\lim_{x \rightarrow 0} \frac{10^x - 5^x - 2^x - 1}{x^2}$

Find $\frac{dy}{dx}$ for given y

1) $y = 3x^2 + 2x + 5$ 2) $y = \sin^2 x + \cos^2 x$

3) $y = x^a + a^x + a^a$ 4) $y = x \cdot \sin x$

5) $y = x^2 \cdot \tan x$ 6) $y = x^2 \cdot e^x$

7) $y = \sin(x^2)$ 8) $y = \sin(\log x)$

9) $y = \log(\log x)$