



**ZEAL EDUCATION SOCIETY'S
ZEAL COLLEGE OF ENGINEERING AND
RESEARCH
NARHE | PUNE -41 | INDIA**



Record No.: ZCOER-ACAD/R/16M

Revision: 00

Date: 01/04/2021

Question Bank

Department: Common for all Semester: I

Academic Year: 2022- 2025

Class: F.Y.B.Tech.

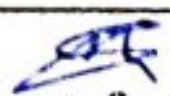
Div: All

Date:

Course: Engineering Mathematics –I & Linear Algebra and Differential Calculus

Unit III –Differential Calculus

Q. No.	Question	Marks	CO	Blooms Level
Q.1	For $0 < a < b$, show that $\left(\frac{b-a}{b}\right) < \log\left(\frac{b}{a}\right) < \left(\frac{b-a}{a}\right)$. Hence show that $\frac{1}{4} < \log\left(\frac{4}{3}\right) < \frac{1}{3}$	5	CO3	3
Q.2	By using Taylor's theorem, expand $f(x) = e^x$ in powers of $(x-2)$.	5	CO3	2
Q.3	Expand $7+(x+1)+3(x+1)^3+(x+1)^4$ in ascending powers of x by using Taylor's theorem.	5	CO3	2
Q.4	Prove that $\log(1 + \tan x) = x - \frac{x^2}{2} + \frac{2}{3}x^3 \dots$	5	CO3	2
Q.5	Evaluate $\lim_{x \rightarrow 0} \left(\frac{a^x + b^x}{2}\right)^{\frac{1}{x}}$	5	CO3	2
Q.6	Find a and b if $\lim_{x \rightarrow 0} \left[\frac{a \cos x - a + bx^2}{x^4}\right] = \frac{1}{2}$	5	CO3	2
Q.7	If $f(x) = \sin^{-1}x$ then show that $\frac{b-a}{\sqrt{1-a^2}} < \sin^{-1}b - \sin^{-1}a < \frac{b-a}{\sqrt{1-b^2}}$	5	CO3	2
Q.8	Using Taylor's theorem, expand $1 + 2x + 3x^2 + 4x^3$ in powers of $(x+1)$.	5	CO3	2
Q.9	Evaluate $\lim_{x \rightarrow \frac{\pi}{2}} (\cos x)^{\cos x}$	5	CO3	2
Q.10	Find the values of a and b if $\lim_{x \rightarrow 0} \frac{\sin x + ax + bx^3}{x^3} = 0$	5	CO3	2
Q.11	For function $f(x) = \sqrt{x}$ and $g(x) = \frac{1}{\sqrt{x}}$, prove that 'C' of Cauchy's mean value theorem is the geometric mean between a and b where $a, b > 0$.	5	CO3	2
Q.12	Find the values of a and b such that $\lim_{x \rightarrow 0} \frac{a \sin 2x - b \tan x}{x^3} = 1$.	5	CO3	2
Q.13	Prove that $e^x \cos x = 1 + x - \frac{x^3}{3} + \dots$	5	CO3	2
Q.14	Prove that $\frac{b-a}{1+b^2} < \tan^{-1}b - \tan^{-1}a < \frac{b-a}{1+a^2}$ where $0 < a < b$. Hence show that $\frac{\pi}{4} + \frac{3}{25} < \tan^{-1}\frac{4}{3} < \frac{\pi}{4} + \frac{1}{6}$	5	CO3	3


Course faculty