

THE O.P. GUPTA

ADVANCED MATH CLASSES

Class XII - Mathematics (041)

Topics - Continuity & Differentiability

Alpha Test Series-4

(For Academic session 2025-26)

Max. Marks - 30

Time - 60 Minutes

For Video Solutions
CLICK HERE

Followings are of 2 Marks each (Q01-05).

Q01. For what value of λ , $f(x) = \begin{cases} \frac{\log(1+5x) - \log(1-7x)}{x}, & \text{if } x \neq 0 \\ 4\lambda, & \text{if } x = 0 \end{cases}$ is continuous at $x = 0$?

Q02. Discuss the continuity of $f(x) = [x]$ at $x = c$, where $c \in \mathbb{Z}$.

Q03. Find right hand limit at $x = 0$ for the function $f(x) = \begin{cases} \frac{e^{1/x} - 1}{e^{1/x} + 1}, & \text{if } x \neq 0 \\ -1, & \text{if } x = 0 \end{cases}$.

Hence, write whether the function $f(x)$ is continuous at $x = 0$ or not?

Q04. Check the differentiability of $f(x) = [x]$ at $x = -3$, where $[.]$ denotes greatest integer function.

Q05. Find the derivative of $f(\log_e x)$, if $f(x) = \log_e x$? [2×5 = 10]

Followings are of 3 Marks each (Q06-07).

Q06. Differentiate $\tan^{-1}\left(\frac{2x}{1-x^2}\right)$, where $x \in (-\infty, -1)$ with respect to x .

Q07. If $(\cos x)^y = (\cos y)^x$, then find $\frac{dy}{dx}$.

OR

If $(\tan^{-1} x)^y + y^{\cot x} = 1$, then find $\frac{dy}{dx}$. [3×2 = 6]

Following is of 4 Marks (Q08).

Q08. **PASSAGE BASED QUESTION :** Let $f(x)$ be a real valued function. Then the function $f(x)$ is said to be continuous at a point $x = m$, if $\lim_{x \rightarrow m^-} f(x) = \lim_{x \rightarrow m^+} f(x) = f(m)$, where $\lim_{x \rightarrow m^-} f(x)$ is Left Hand Limit of $f(x)$ at $x = m$ and $\lim_{x \rightarrow m^+} f(x)$ is Right Hand Limit of $f(x)$ at $x = m$.

Also for the function $f(x)$, we have

- Left Hand Derivative (L.H.D.) : $Lf'(m) = \lim_{h \rightarrow 0} \frac{f(m-h) - f(m)}{-h}$
- Right Hand Derivative (R.H.D.) : $Rf'(m) = \lim_{h \rightarrow 0} \frac{f(m+h) - f(m)}{h}$

The function $f(x)$ is said to be differentiable at $x = m$ if its L.H.D. and R.H.D. at $x = m$ exist and both are equal.

For the function $f(x) = \begin{cases} \frac{x-2}{|x-2|} + a, & \text{if } x < 2 \\ a + b, & \text{if } x = 2 \\ \frac{x-2}{|x-2|} + b, & \text{if } x > 2 \end{cases}$, answer the following questions :

(i) Find the value of a , if $f(x)$ is continuous at $x = 2$.

(ii) Find the value of b , if $f(x)$ is continuous at $x = 2$.

(iii) What is L.H.D. of $f(x)$ at $x = 2$?

(iv) Check if the function $f(x)$ is differentiable at $x = 2$.

[1 × 4 = 4]

Followings are of 5 Marks each (Q09-10).

Q09. If $x = \cos t + \log \tan\left(\frac{t}{2}\right)$, $y = \sin t$, then find the value of $\frac{d^2y}{dt^2}$ and $\frac{d^2y}{dx^2}$ both, at $t = \frac{\pi}{4}$.

OR

If $x \cos(p+y) + \cos p \sin(p+y) = 0$, prove that $\cos p \left(\frac{dy}{dx}\right) = -\cos^2(p+y)$, where 'p' is a constant.

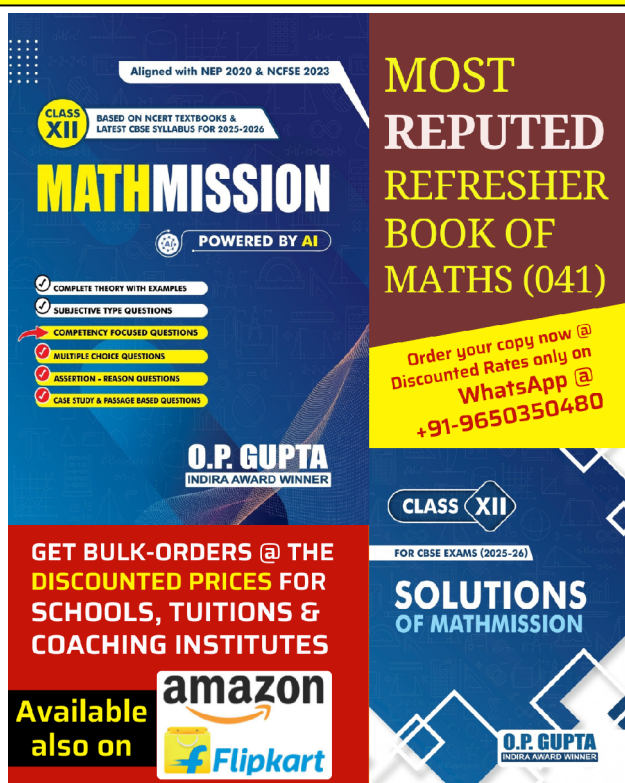
Q10. If $y = x^x$, then prove that $\frac{d^2y}{dx^2} - \frac{1}{y} \left(\frac{dy}{dx}\right)^2 - \frac{y}{x} = 0$.

[5 × 2 = 10]

① SHARE THIS FILE with all other math scholars.

① You may Add our mobile no. +919650350480 to your WhatsApp Groups for regular updates.

① MS Word files of MCQ Tests / Subjective Tests / Case-Study Questions are available for SALE.



We have released Set of 2 Books for CBSE XII Maths (041) useful for session 2025-26.

1. MATHMISSION FOR XII

- ☑ COMPLETE THEORY & EXAMPLES
- ☑ SUBJECTIVE TYPE QUESTIONS
- ☑ COMPETENCY FOCUSED QUESTIONS
 - ⊛ Multiple Choice Questions
 - ⊛ Assertion-Reason Questions
 - ⊛ Case-Study / Passage Based Questions
- ☑ H.O.T.S. Questions from recent exams.
- ☑ Answers of all the Questions of Exercises

2. SOLUTIONS OF MATHMISSION

- ☑ Step-by-step Detailed Solutions (For all the Exercises of MATHMISSION)

Grab the best Seller book for X, XI & XII Maths (041) CBSE Exams.

☑ **MATHMISSION FOR XII, XI & X**
(Refresher Guide with Competency Focused Questions)

⊛ The books are developed as per CBSE Curriculum for 2025-26.

☑ **CBSE 39 SAMPLE PAPERS For Class XII**

☑ **CBSE YODDHA SAMPLE PAPERS For Class XI**

☑ **CBSE UMANG SAMPLE PAPERS For Class X**

(Order now at Discounted rate on WhatsApp - 9650350480)



Scan QR-Code to
Visit Amazon Store

MATHEMATICIA BY O.P. GUPTA

...a name you can bank upon!



Feel Safe to **Share this Document** with other math scholars

CLICK NOW

TO

Download



or, just type -
theopgupta.com

**FREE PDF TESTS AND
ASSIGNMENTS OF THE
CLASSES XII, XI & X**



To get **FREE PDF Materials**, join
WhatsApp Teachers Group
by Clicking on the Logo

Click on the
Book cover
to buy!



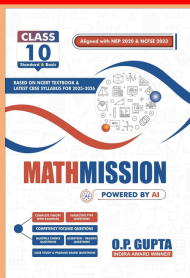
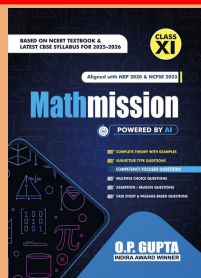
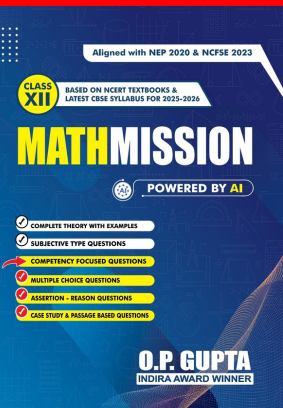
If you are a **Student**, then you may
join our **Students Group**

CLICK HERE FOR
**CLASSES
IX & X**

CLICK HERE FOR
**CLASSES
XI & XII**

You can add our WhatsApp no. **+919650350480** to your Groups also

Many **Direct Questions** from our Books have been asked in the recent CBSE Exams



**MATHMISSION
FOR XII, XI & X**
2025-26 Edition

Buy our
books on
amazon
Flipkart

/theopgupta /theopgupta /theopgupta /@theopgupta

For Bulk Orders of our Books at Discounted Price, contact on +91-9650350480

**CLASS
12**



**PLEASURE
TEST SERIES**



POWERED BY AI

39 CBSE SAMPLE PAPERS

**MATHEMATICS (041)
SESSION 2025-26**



**FULLY SOLVED OFFICIAL
CBSE SAMPLE PAPER**
issued on 30 July, 2025



**15 FULLY SOLVED SAMPLE PAPERS
BASED ON LATEST PATTERN**



**10 UNSOLVED SAMPLE PAPERS
WITH VIDEO / PDF SOLUTIONS**



**13 PDF SOLVED SAMPLE PAPERS
AVAILABLE THROUGH QR CODE**



**FREE PDF ACCESS TO LAST 15 YEARS
CBSE SOLVED PAPERS ON theopgupta.com**

O.P. GUPTA

INDIRA AWARD WINNER